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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 (or equivalent) or service agency.

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

### VRB Heat Recovery

VRF SYSTEMS  
OUTDOOR UNITS  
507885-04  
11/2019

#### ⚠ WARNING

Do not change the settings of any protection devices installed in the outdoor unit. If the pressure switch, thermal switch, or other protection device is shorted or forcibly operated, fire or explosion may occur.

Do not use parts other than those specified by Lennox or fire and/or explosion may occur.

#### ⚠ 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.

These units must be installed as part of a matched system as specified in the Product Specifications (EHB) bulletin.

#### General

The VRB heat recovery outdoor units are matched with up to 64 indoor units per system to create a VRF (variable refrigerant flow) system that uses HFC-410A refrigerant.

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

#### 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 VRB heat recovery outdoor unit
- 1 - Outdoor unit installation instruction
- 1 - Piping accessory package

## Safety Requirements

### ⚠ WARNING

#### ELECTRICAL SHOCK, FIRE, OR EXPLOSION HAZARD.

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

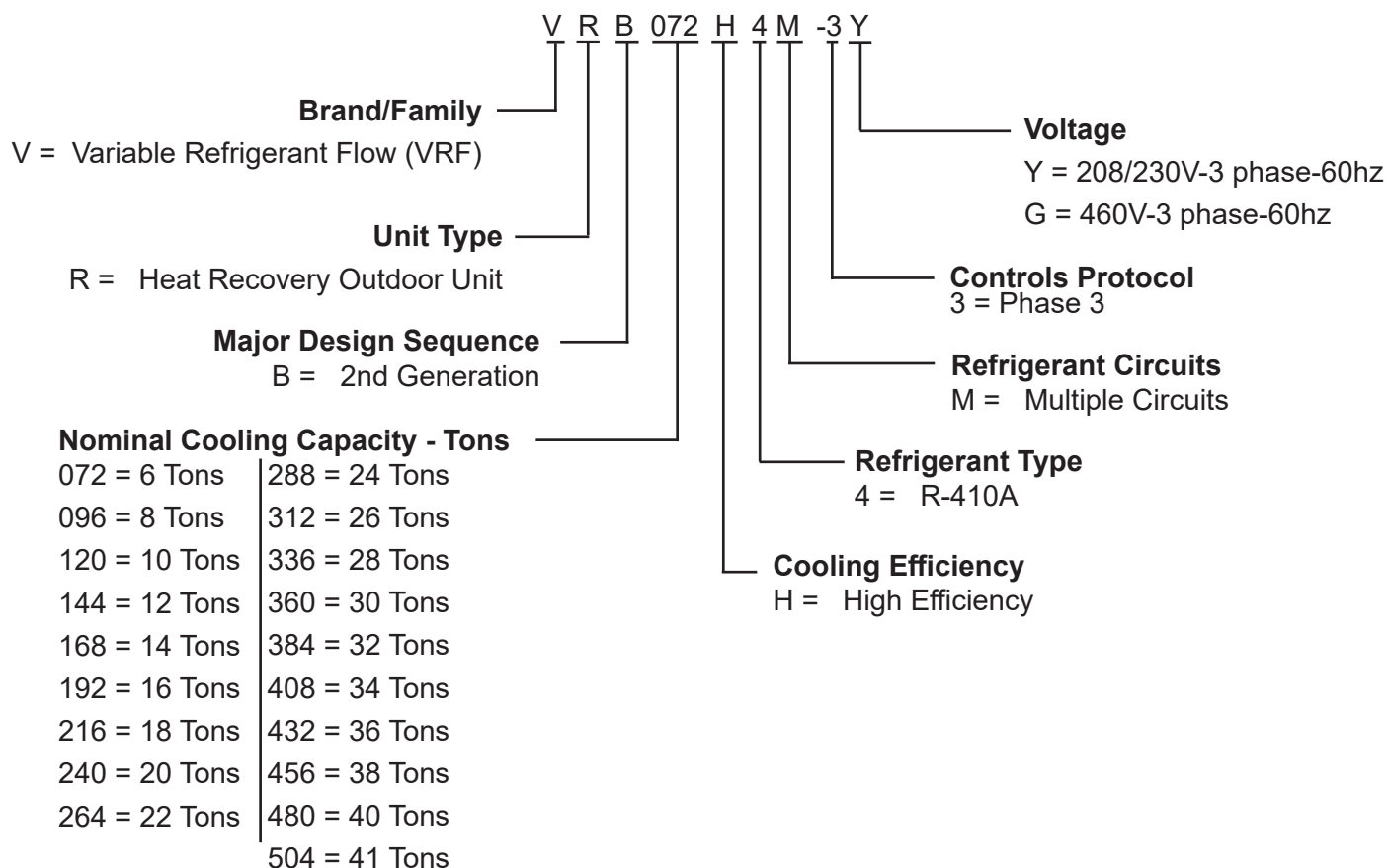
Do not operate appliances with an open flame near the unit.

Do not replace a fuse with a fuse of a different rating. Do not attempt to bypass 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.

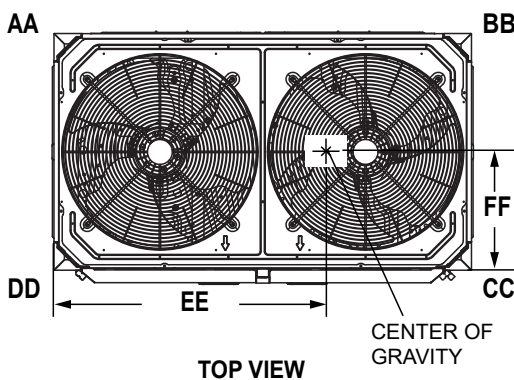
When the indicated lengths change from the figures stated within the report, it is imperative that prior to the commencement of the refrigerant pipe work installation, Lennox VRF applications department are informed of these proposed changes.

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.

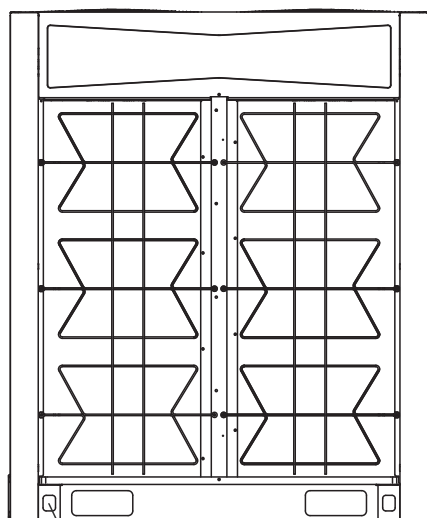
Failure to provide this information regarding changes to the original design may lead to insufficient capacity, equipment failure, warranty being made void and the refusal to commission the system.

## Unit 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
072, 096, 120	121	55	203	92	211	96	251	114	27-3/4	705	12-1/4	311

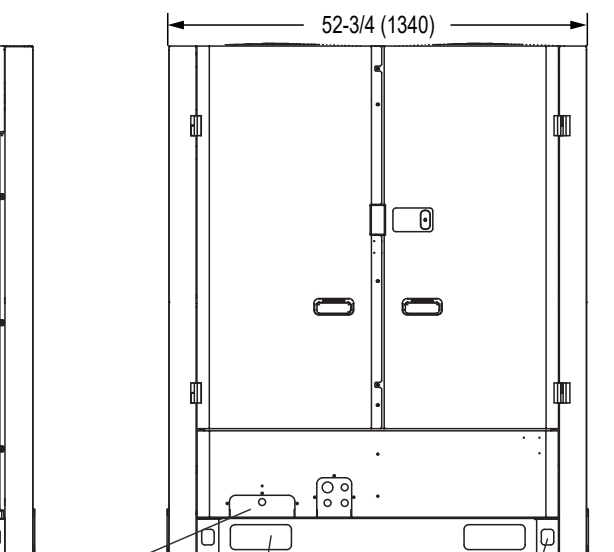


TOP VIEW



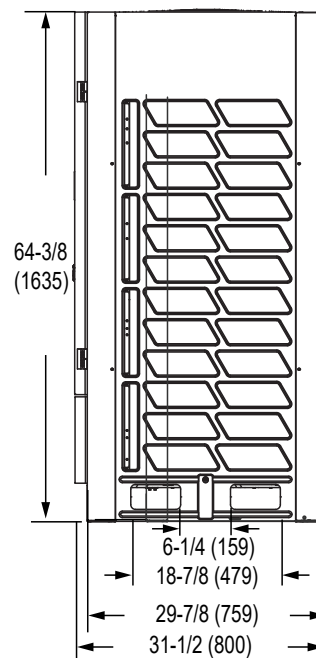
BACK VIEW

LAG BOLT DESIGNATION  
(BOTH SIDES)  
(TO ACCESS LAG BOLT)

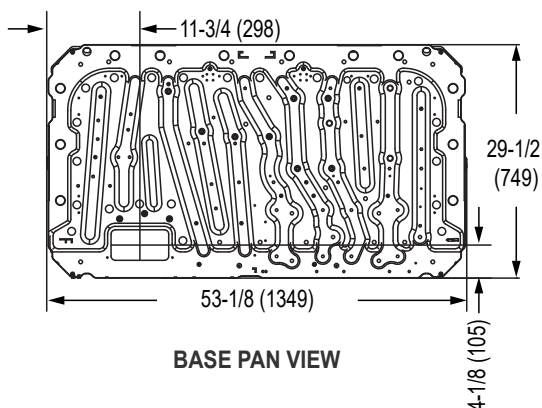


FRONT VIEW

REFRIGERANT LINE PATH



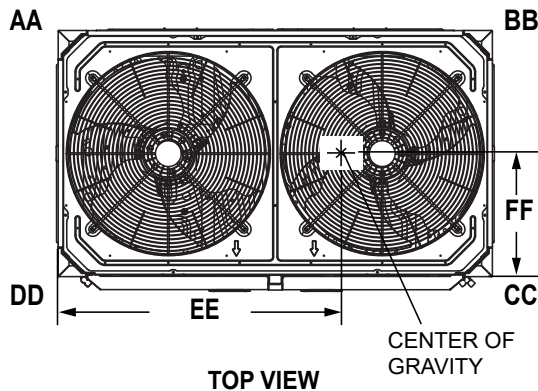
SIDE VIEW



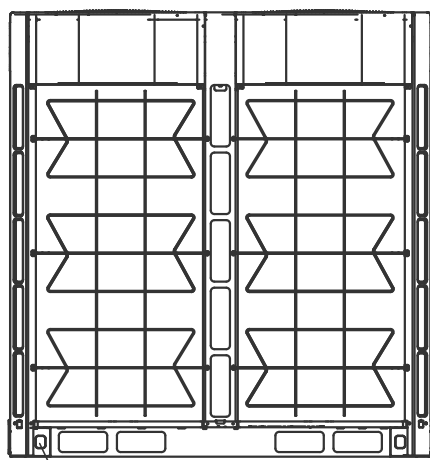
BASE PAN VIEW

## Unit 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
144, 168, 192	172	78	264	120	330	150	321	146	37-3/4	953	12	305

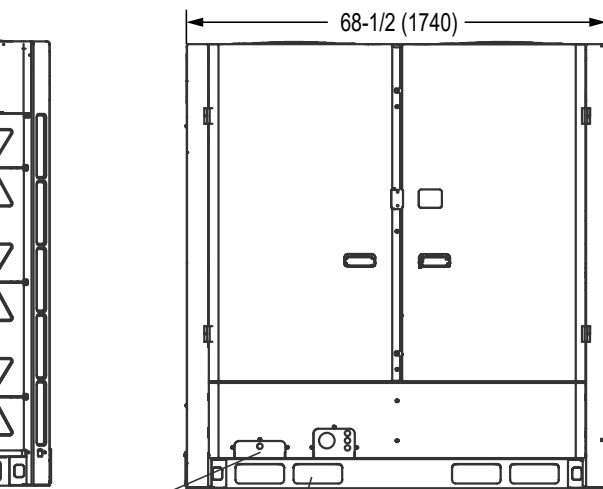


TOP VIEW



BACK VIEW

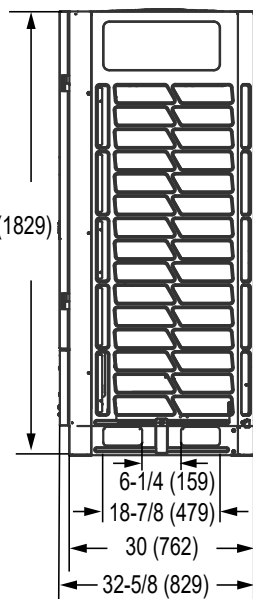
LAG BOLT DESIGNATION  
(BOTH SIDES)  
(TO ACCESS LAG BOLT)



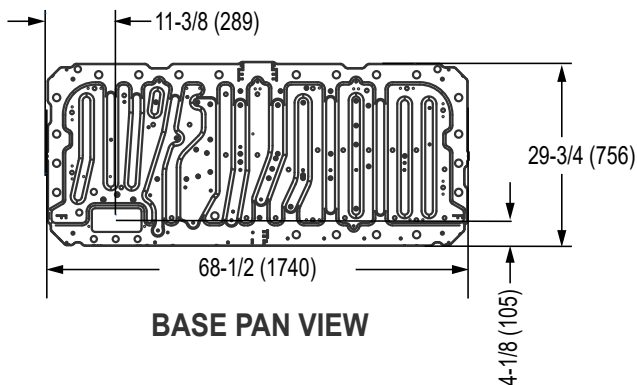
FRONT VIEW

PARALLEL MODULE  
PIPING KNOCKOUT

FORKLIFT SLOT  
(BOTH SIDES)  
REFRIGERANT LINE PATH



SIDE VIEW



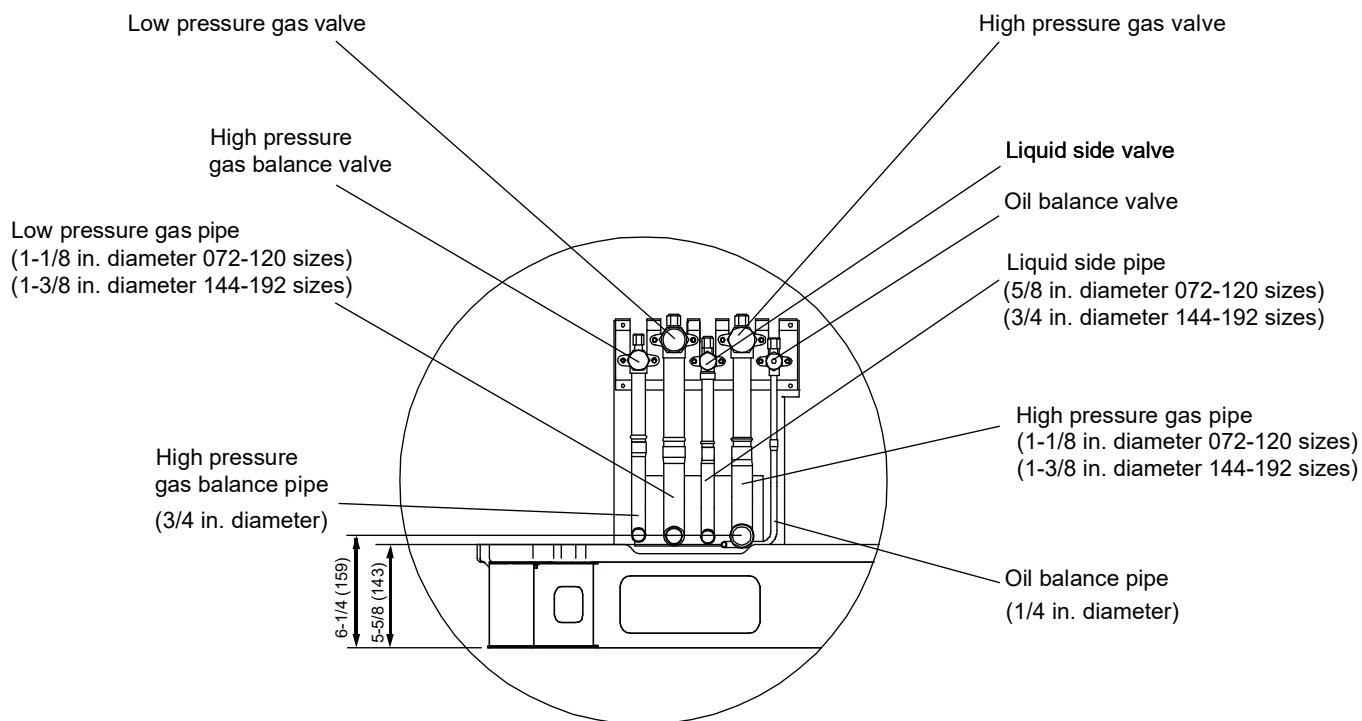
BASE PAN VIEW



## Dimensions - Piping Details - inches (mm)

Internal valve layouts are the same in both heat recovery and heat pump units, it is their function that is different. Pay close attention when making final piping connections.

Heat Recovery internal valve layouts are described below. See the Heat Pump installation manual for heat pump internal valve information.



## Outdoor Unit Placement Considerations

### **⚠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.

### **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.

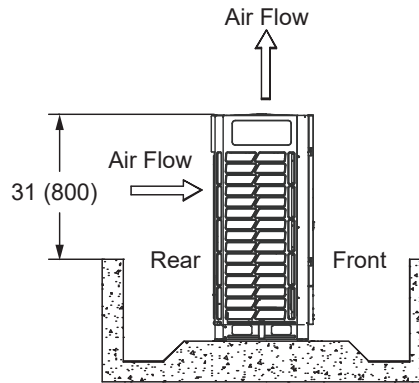
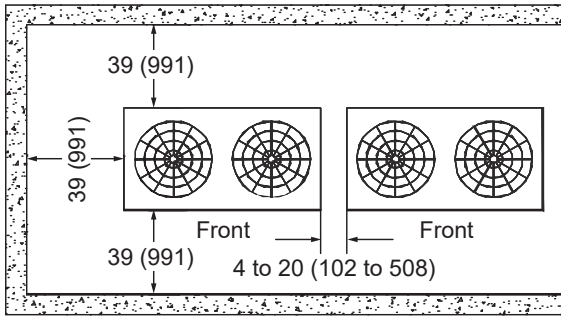
In addition to clearances, the following items should be considered when setting the outdoor unit:

- 2007 EPA Noise Policy. Observe local code adoptions/enforcement as consideration should be used when selecting an outdoor unit's permanent placement. Sound data for each unit can be found in the Product Specifications Document.
- 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.
- Allow sufficient space around unit for proper operation and maintenance.
- Install the outdoor 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.
- Outdoor unit shall maintain a minimum distance of 10 ft. (3 m) from dryer exhaust vents.
- Outdoor unit shall maintain a minimum distance of 10 ft. (3 m) from Type 1 kitchen exhaust outlets.
- Coating outdoor coils is recommended in applications installed in coastal regions less than 30 miles (48 kilometers) inland.

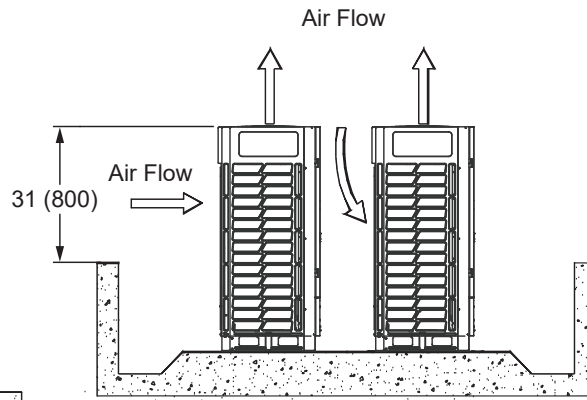
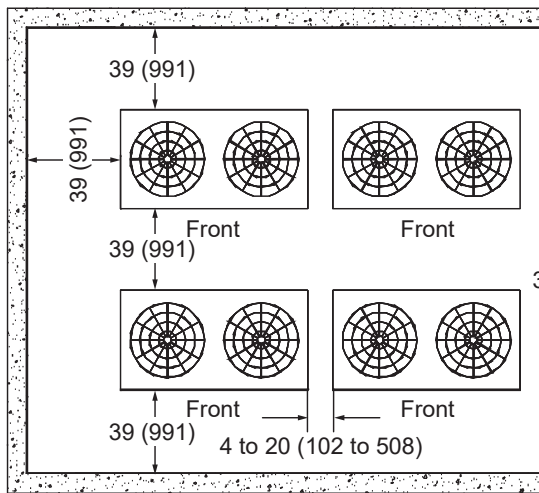
## Lifting the Unit

- 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.

### SINGLE ROW



### TWO ROWS



### THREE OR MORE ROWS

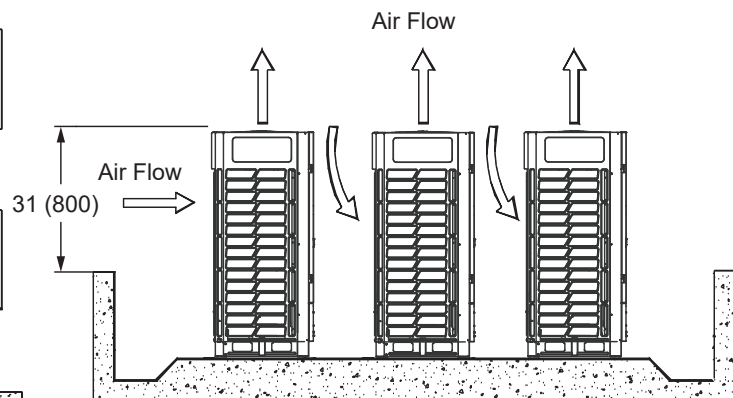
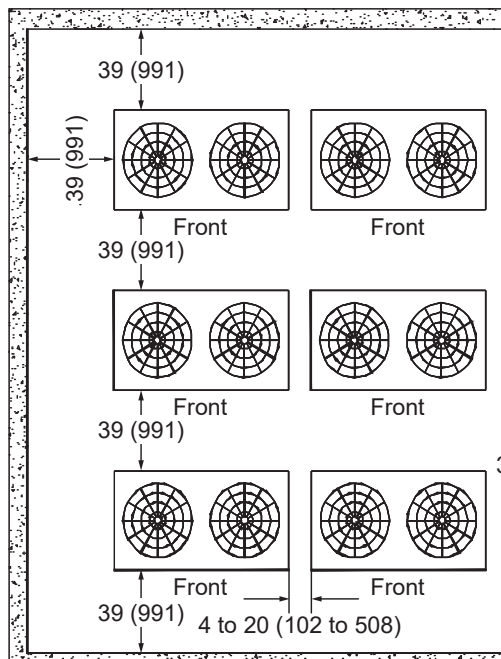


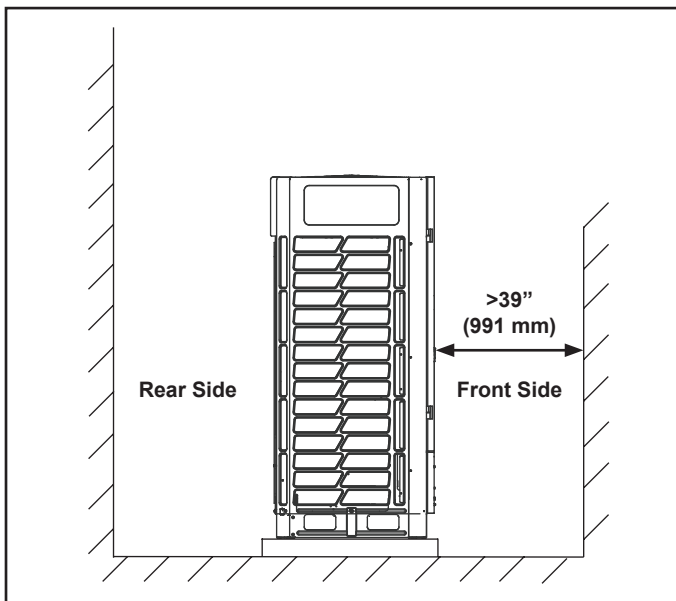
Figure 1. Installation Clearances - inches (mm)

## **! NOTICE**

Drawings in this manual are for illustrative purposes and should not be used as a template for fabricating field-supplied accessories or apparatuses. Consider the environment in which this unit is being installed and make necessary adjustments to ensure safe operation. Local codes prevail.

### **Clearances from Obstructions**

- Allow adequate air flow clearance on all sides of the unit. See Figure 1 and this section.
- Allow at least 39 in. (991 mm) clearance in front of the unit for maintenance and service access. The outdoor unit service access is via hinged service doors that swing open in front of the unit. Figure 2.

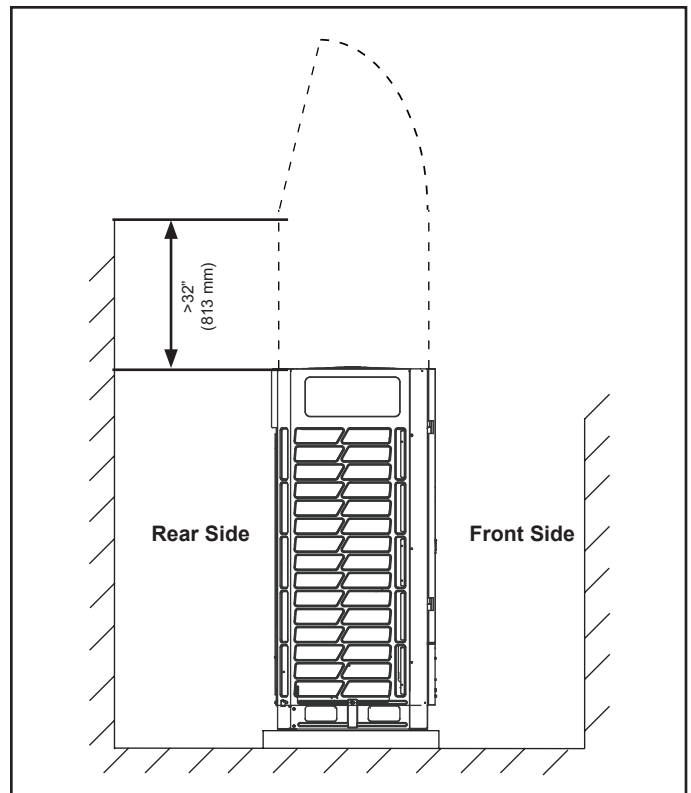


**Figure 2. Maintenance & Service Clearance**

- Perimeter obstructions that are 32 in. (813 mm) taller than the top of the outdoor unit require a field supplied air discharge duct to avoid recirculation of discharge air. The discharge duct should be installed to at least the height of the surrounding obstructions (for ex. walls) to ensure that discharge air goes over the height of the obstruction. Ensure that the static capabilities of the outdoor unit are not exceeded. Figure 3.

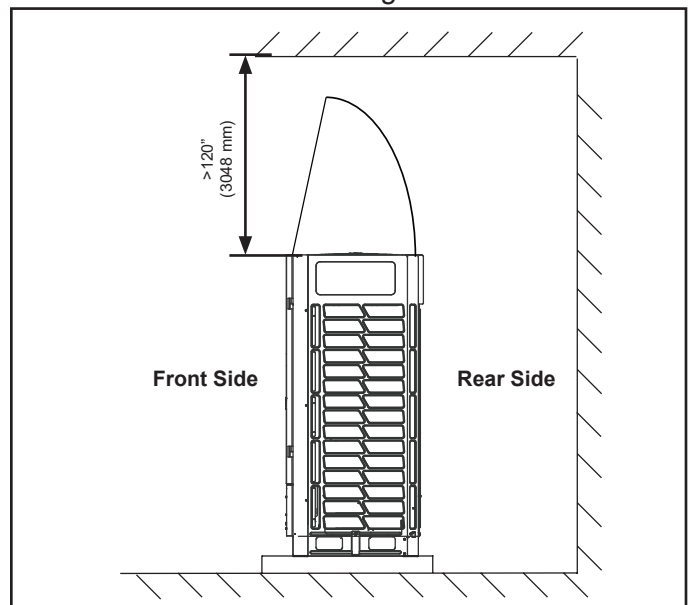
## **! CAUTION**

In order to avoid injury, take proper precaution when lifting heavy objects. Take care when using a sling to lift the unit for installation. The unit center of gravity is not at its physical center.



**Figure 3. Perimeter Obstructions**

- Allow at least 120 in. (3048 mm) clearance above the unit. If an obstruction above the unit does not allow for adequate clearance, a field-supplied discharge duct is required. The discharge duct should be installed in such a way as to ensure that discharge air goes beyond the obstruction and does not cause recirculation of discharge air. Ensure that the static capabilities of the outdoor unit are not exceeded. Figure 4.

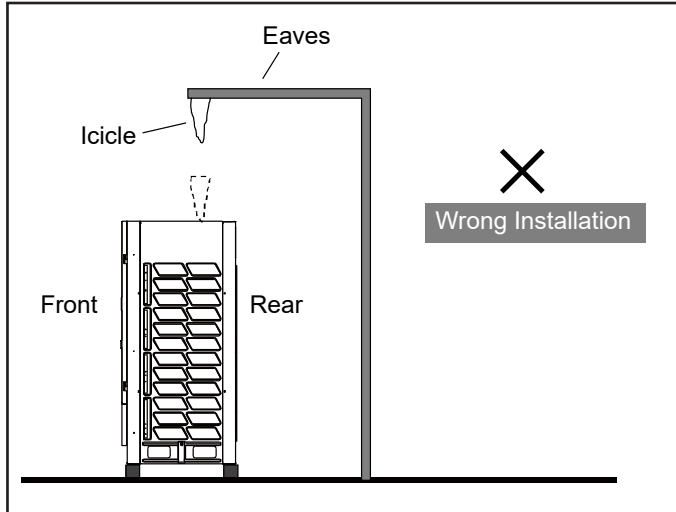


**Figure 4. Obstructions Above the Unit**

## Cold Climate Considerations

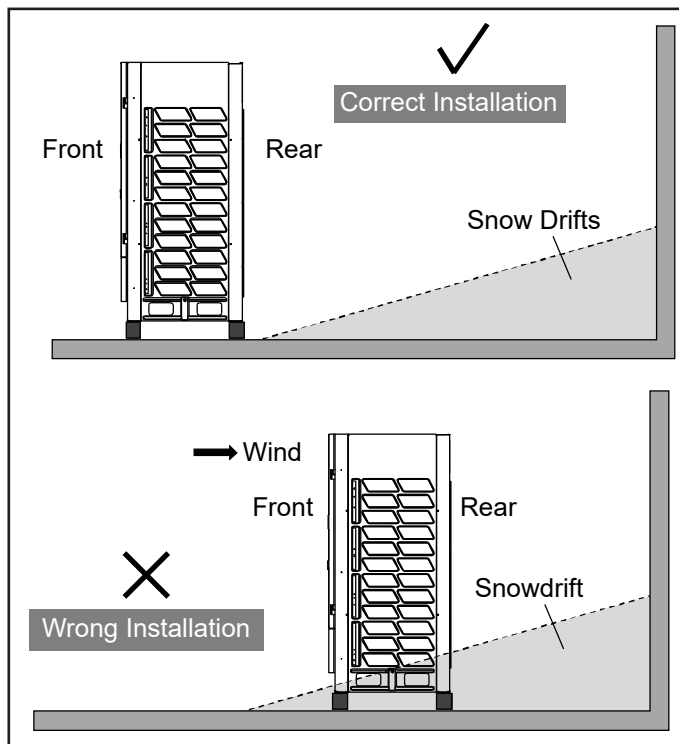
Select a location where high winds and snow will not affect the unit. In areas where typical ambient temperatures are below 50°F (10°C), the following precautions should be observed.

- Locate unit away from overhanging roof lines which would allow water or ice to drop on, or in front of, coil or into unit.



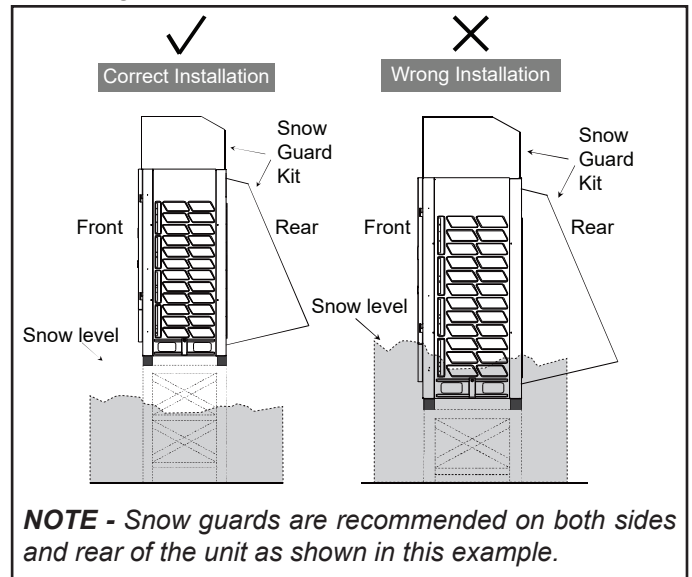
**Figure 5. Do Not Locate Under Roof Overhang**

- The unit base should be elevated above the depth of average snows plus 12 in. (305 mm). In heavy snow areas, do not locate the unit where drifting will occur.



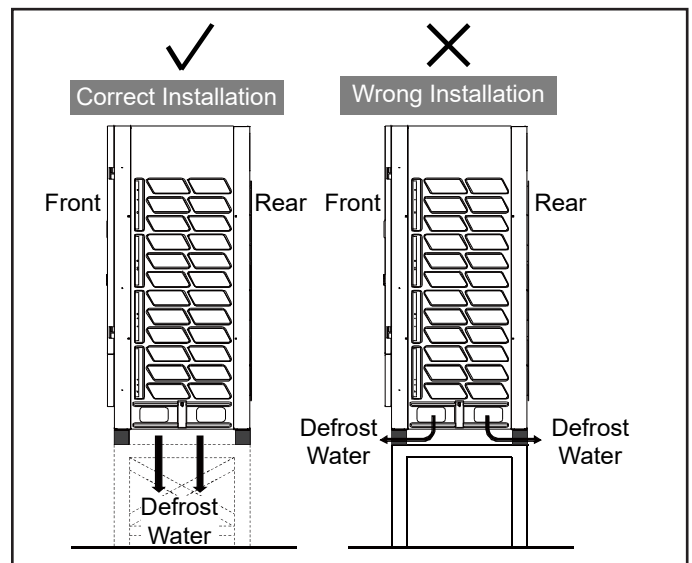
**Figure 6. Do Not Locate Where Drifting Will Occur**

- Install snow guards to prevent snow fall from entering air inlet and outlet.



**Figure 7. Elevate Above Average Snow Level & Protect Coil**

- If necessary, install the unit on a raised base made of angle iron and that allows snow and wind to pass through

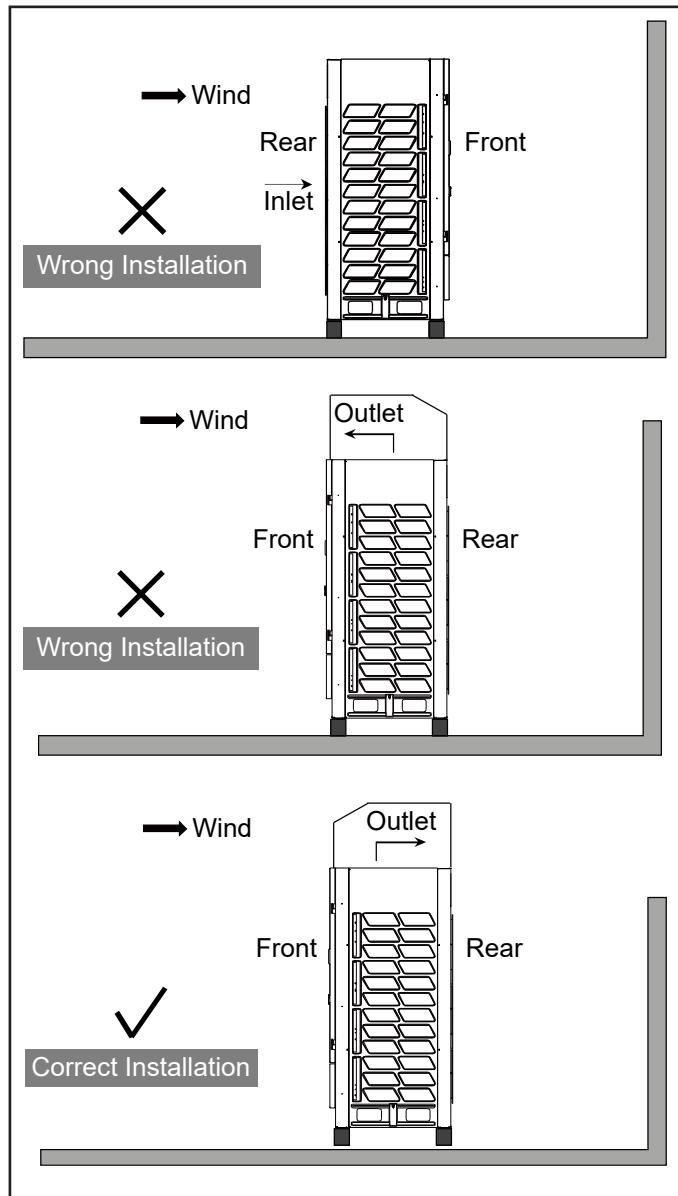


**Figure 8. Secure Unit to Weather Resistant Support**

## ! IMPORTANT

These illustrations are examples of possible snow protection options. They should not be used as a template for fabricating the snow protection apparatuses. Consider the environment in which this unit is being installed and make necessary adjustments to ensure safe operation.

- When installed in areas where low ambient temperatures exist, locate unit so winter prevailing winds do not blow directly on to the outdoor unit.



**Figure 9. Protect Unit from Prevailing Winds**

### Air Discharge Duct

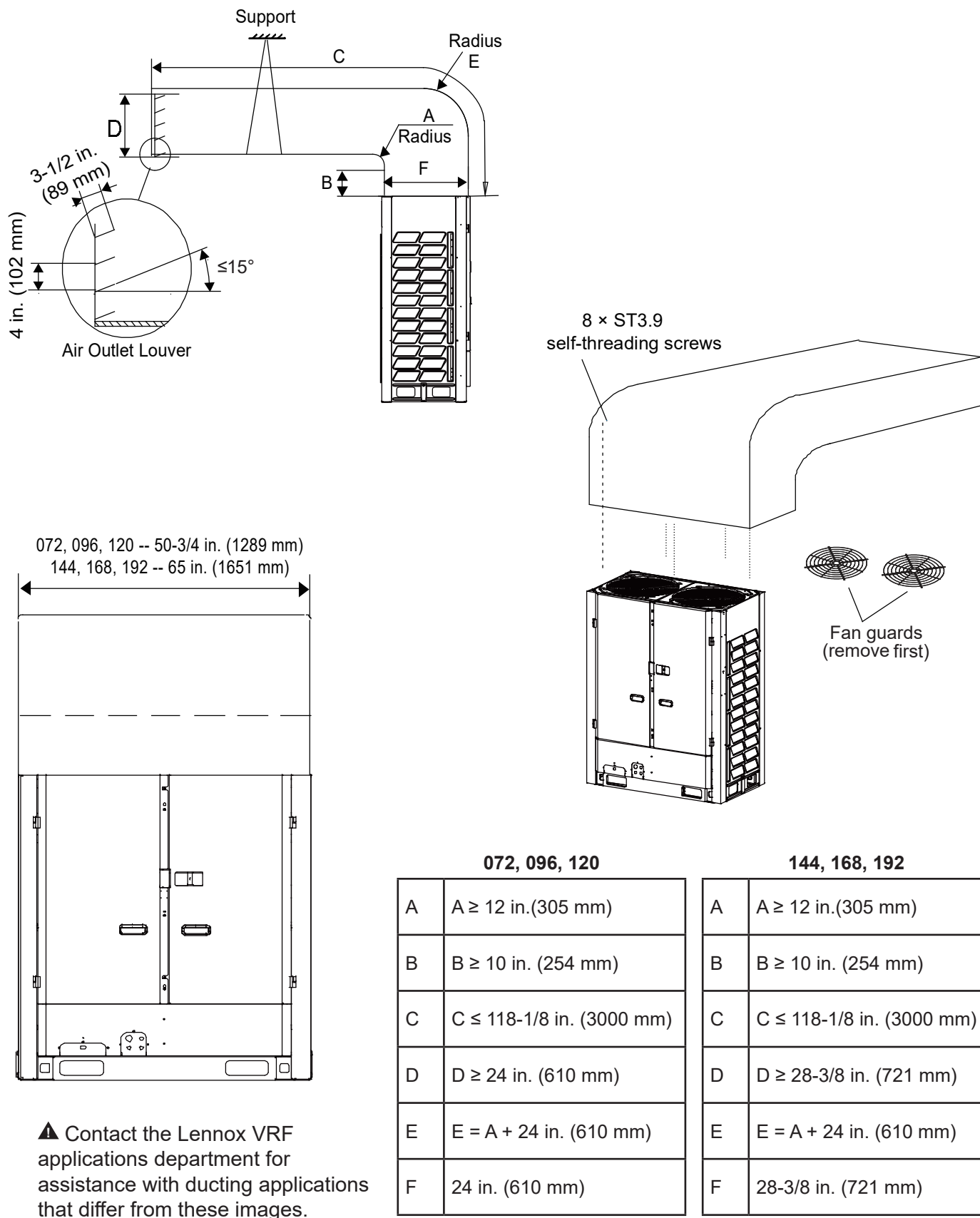
- Before installing the air duct, remove the two fan guards from the top of the unit.
- Duct each outdoor unit separately. Do not use a combined plenum as this may result in air not being discharged directly to the outside.
- Discharge air duct shall be constructed of steel and installed in a manner which prevents sagging and or collapsing.
- Only one bend is allowed in the air duct.
- Duct louvers will reduce air volume, cooling and heating capacity and efficiency. Louvers are not recommended; if they are required by the job, the louver angle should be no larger than 15°.
- It may be necessary to install a flexible connector between the unit and the duct to reduce vibration noise.

**Table 1. Static Pressure Settings**

Static Pressure	Description
0 WG (0 Pa)	Default
0-0.08 WG (0-20 Pa)	Remove fan guard, < 10 ft. (3 m) duct length
Above 0.08 WG (20 Pa)	Contact Lennox VRF Applications Support

**NOTE** - Use dip switch S4 to change outdoor unit static pressure settings.

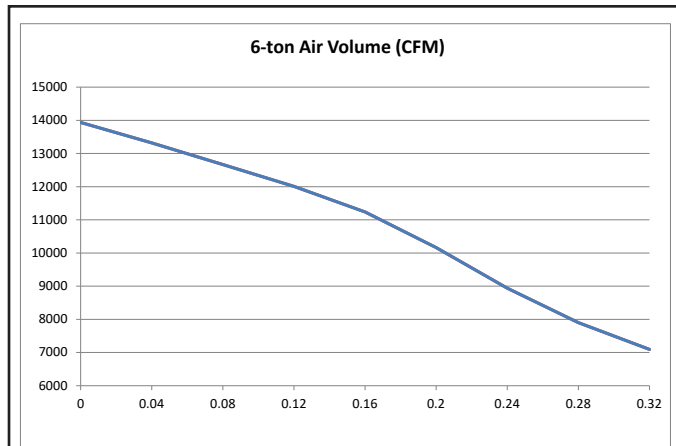




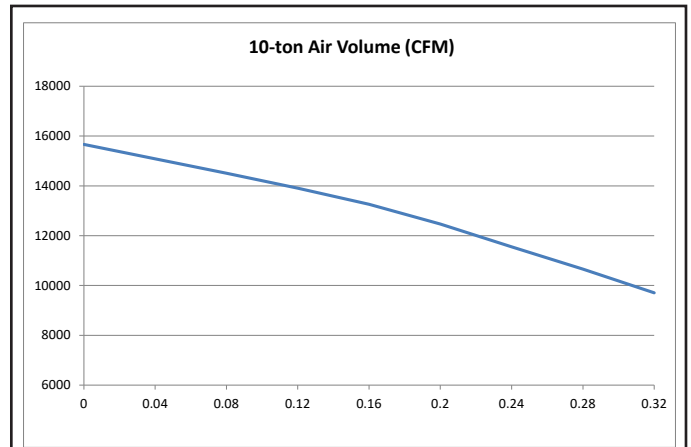
**Figure 10. Air Discharge Duct  
(Front or Rear Connection)**

## Discharge Duct Pressure Curves

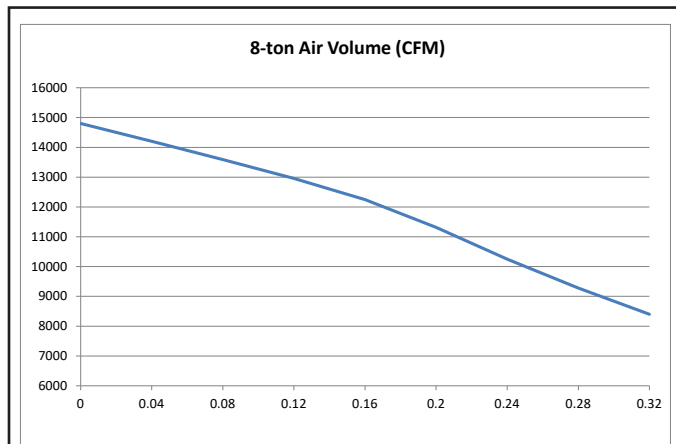
**VRB072**



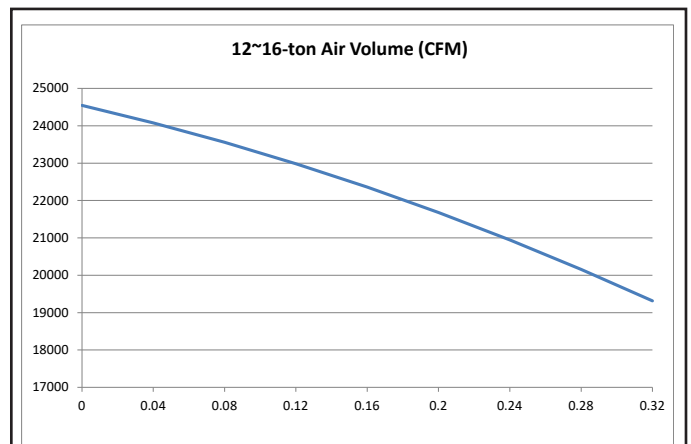
**VRB120**



**VRB096**

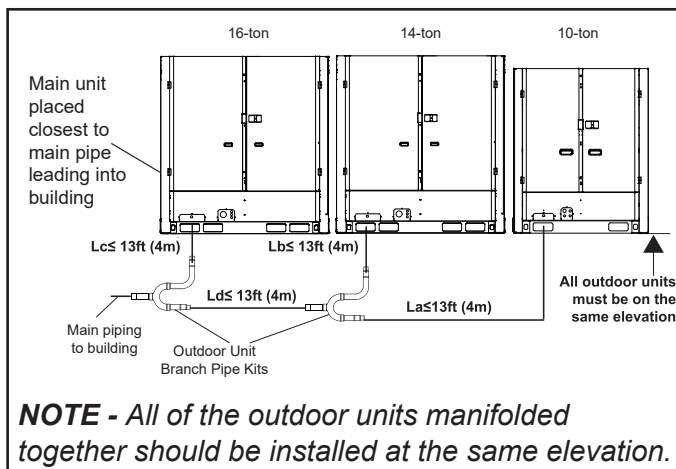


**VRB144, 168, & 192**



## Main/Sub Outdoor Unit Placement

- A VRF system consisting of more than two outdoor units must be placed in order from the largest to the smallest capacity. See figure 8.
- The largest capacity outdoor unit must be installed closest to the main pipe leading into the building. See Figure 11.
- The largest capacity outdoor unit address is the main unit, while the others are the sub units. See Figure 11.
- All of the outdoor units manifolded together should be installed at the same elevation.



**Figure 11. Main/Sub Unit Placement  
(40-Ton System Example)**

## Installation

### Slab or Roof Mounting

Install the unit a minimum of 8 inches (203 mm) above the roof or ground surface to avoid ice build-up around the unit. Locate the unit above a load-bearing area of the roof that can adequately support the unit. Consult local codes for rooftop applications.

- Use a field supplied slab or suitably sized steelwork to construct a base for locating the condensing unit. All supporting work should be verified by a qualified engineer.  
**NOTE - Prefabricated light duty equipment pads are NOT suitable for use.**
- Support the unit across the front and back of the unit.

- 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.

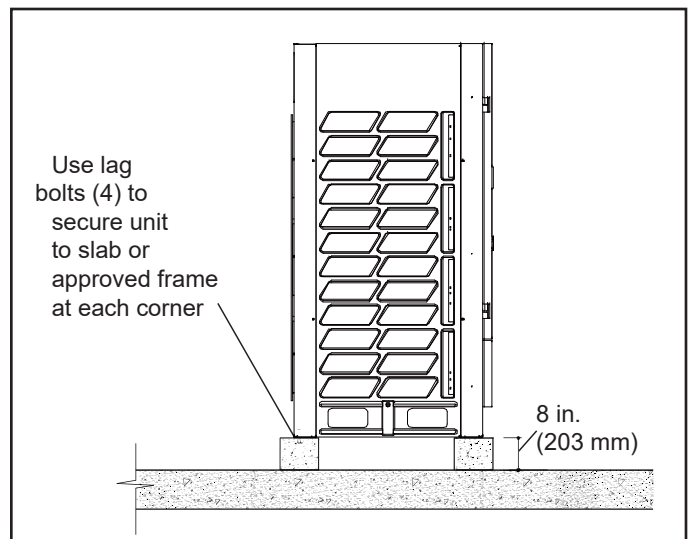
## IMPORTANT!

### 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.**

### Securing Outdoor Unit to Slab or Frame

- Use lag bolts (min. 3/8 in.) at all four corners to secure the unit to the field-provided slab or frame.
- Lag bolts must extend through material to the slab or frame.
- Isolation material can be used to control vibration or sound transmission.
- Where required Use/loop steal hurricane strapping that is secured to the structure.
- Do not use galvanized strap over the top and screwed to support.
- Prefabricated light duty equipment pads are not acceptable for use.



**Figure 12. Secure Outdoor Unit  
to Approved Structure**

## 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 R-410A 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.

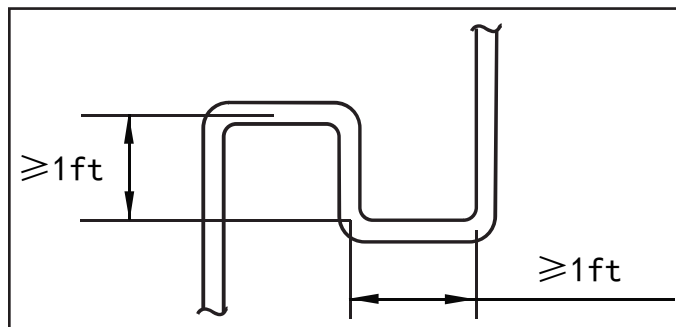
Insulate all refrigerant piping.

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.

- Both liquid and gas (vapor) lines must be individually insulated.
  - Field piping consists of three HVAC/R field-provided copper refrigerant lines connected to the outdoor unit. These lines carry the liquid and vapor refrigerant to and from the mode selection box(es).
  - Refrigerant piping and wiring connections can be brought into the outdoor unit through openings provided in the front, side(s), or underside (recommended) of the unit.
  - Refrigerant piping must be connected using mode selection boxes and individual branch pipe kits. Six mode selection boxes are available in varying sizes to accommodate connection of one to 41 indoor units.
  - The following restrictions apply to each VRB system:
    - Total refrigerant pipe length 3280 ft. (1000 m)
    - Longest pipe length (actual) 574 ft. (175 m)
    - Level difference between indoor units 98 ft. (30 m)
    - Piping length from the first branch pipe to the farthest indoor unit 132/295 ft. (40/90 m)
  - For each branch pipe, allow 20" (508 mm) of equivalent length.
- ⚠️ Contact the Lennox VRF applications department for assistance.

- When the outdoor unit is installed 164 feet (50 m) or more above the indoor units, install an oil return trap every 33 feet (10 m) in the main low pressure gas pipe. See Figure 13 for trap specifications.



**Figure 13. Oil Return Trap**

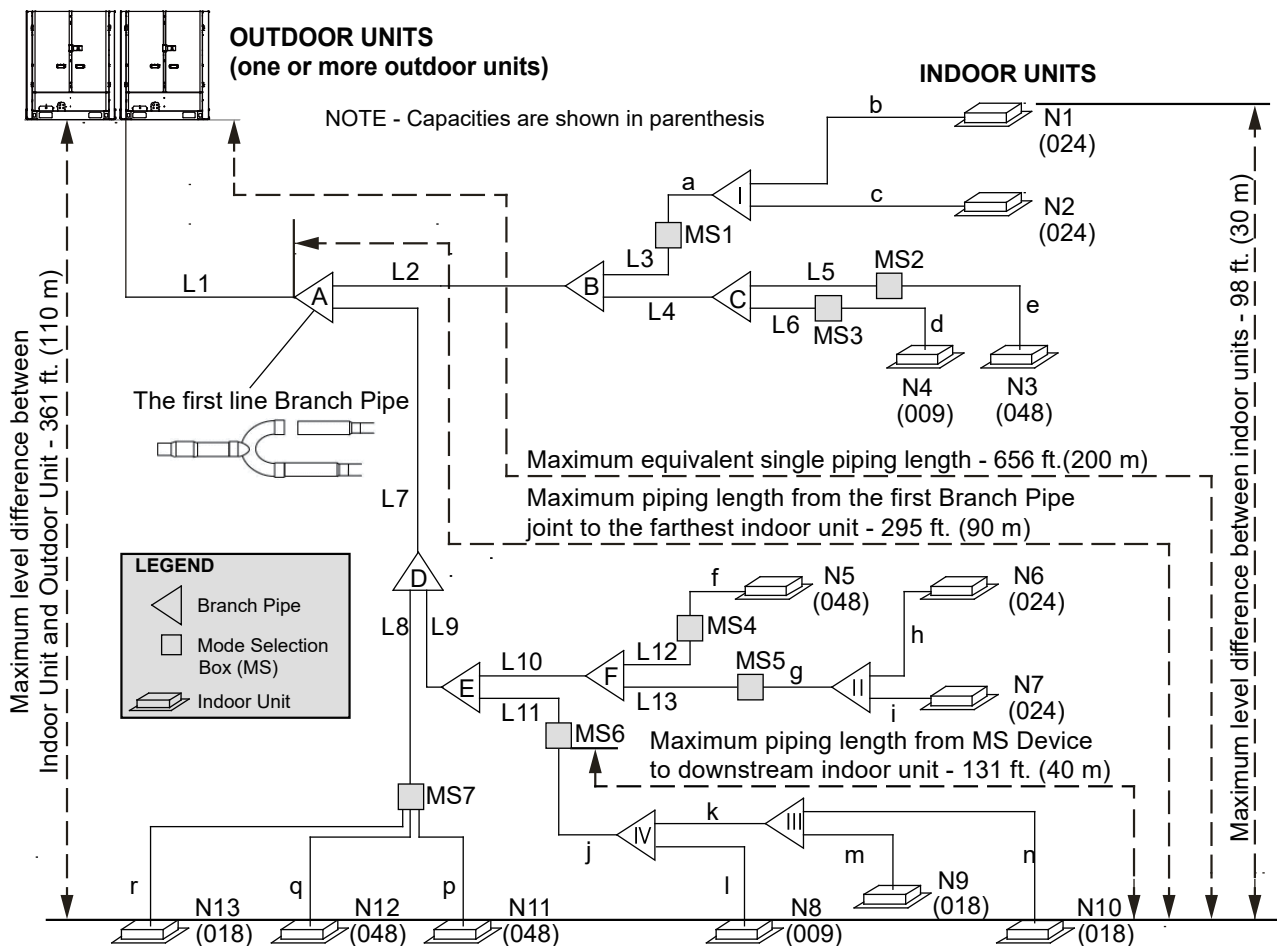
- When the outdoor unit is 132 feet (40 m) or more below the indoor units, increase the diameter of the liquid line pipe from the outdoor unit to the first branch pipe by one size. ⚠️ Contact the Lennox VRF applications department for assistance.
- To extend the length from the first branch pipe to the farthest indoor unit beyond 132 ft. (40 m) and up to 295 ft. (90 m), the following three conditions must be met.
  1. Increase diameter of the main pipe between the first and the last branch pipes. If the diameter of the pipe is the same as the main outdoor pipe, then it does not need to be increased.  
Ex: If  $132 \text{ ft.} < L1 + L7 + L9 + L10 \leq 295 \text{ ft.}$ , increase the diameter of all the pipes by one size.
  2. The length from the indoor unit to the nearest branch pipe must be 132 ft. (40 m) or less.  
Ex:  $a, b, c, d, e, f, g, h, i, j, k, l, m \leq 132 \text{ ft.}$
  3. The difference between [the distance from the outdoor unit to the farthest indoor unit] and [the distance from the outdoor unit to the nearest indoor unit] is  $\leq 132 \text{ ft.}$   
Ex:  $(L1 + L7 + L9 + L11 + 11 + j + k + n) - (L1 + L7 + L8 + p) \leq 132 \text{ ft.}$

⚠️ Contact the Lennox VRF applications department for assistance.

### 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), you should not mix PVE oil with any other type of refrigerant oil.

## Maximum Permitted Refrigerant Pipe Length and Maximum Height Difference



Piping Length		Permitted value	Piping
Piping Length	Total piping length	<sup>1</sup> 3280 ft. (1000 m)	$L1 + (L2 + L3 + L4 + L5 + L6 + L7 + L8 + L9 + L10 + L11 + L12 + L13) \times 2 + a + b + c + d + e + f + g + h + i + j + k + l + m + n + p + q + r$
	Single piping length	Actual length	574 ft. (175 m)
		Equivalent length	<sup>2</sup> 656 ft. (200 m)
	Piping length from the first branch joint to the farthest indoor unit	<sup>3</sup> 132/295 ft. (40/90 m)	$L7 + L9 + L11 + j + k + n$
Level Difference	Level difference between indoor unit and outdoor unit	Outdoor unit up	<sup>4</sup> 360 ft. (110 m)
		Outdoor unit down	<sup>5</sup> 230 ft. (70 m)
	Level difference between indoor units	98 ft. (30 m)	---

### NOTES:

The first branch in all systems must be centrally located between all Mode Selection (MS) Boxes.

<sup>1</sup> When counting the total piping length, double the actual length of the distribution pipes between first Branch Pipe joint and Mode Selection Box (MS): Installation.  
Total piping length =  $L1 + (L2 + L3 + L4 + L5 + L6 + L7 + L8 + L9 + L10 + L11 + L12 + L13) \times 2 + a + b + c + d + e + f + g + h + i + j + k + l + m + n + p + q + r \leq 3280 \text{ ft. (1000 m)}$ .

<sup>2</sup> Each Branch Pipe or bend is equivalent to 20 in. (508 mm).

<sup>3</sup> The maximum allowable piping length from the first Branch Pipe joint to the farthest indoor unit must be  $\leq 132 \text{ ft. (40 m)}$ , but if the following conditions are met, the maximum allowable length can be extended to 295 ft. (90 m):

- The piping length from each indoor unit to the nearest Branch Pipe joint or direct connected Mode Selection Box (MS) must be less than 132 ft. (40m) (b to r).

- The difference in length between the outdoor unit to the farthest indoor unit, and the outdoor unit to the nearest indoor unit is  $\leq 132 \text{ ft. (40 m)}$ .

Example: The farthest indoor unit is N10, The nearest indoor unit is N11 ( $L1 + L7 + L9 + L11 + j + k + n$ ) minus ( $L1 + L7 + L8 + p$ )  $\leq 132 \text{ ft. (40 m)}$ .

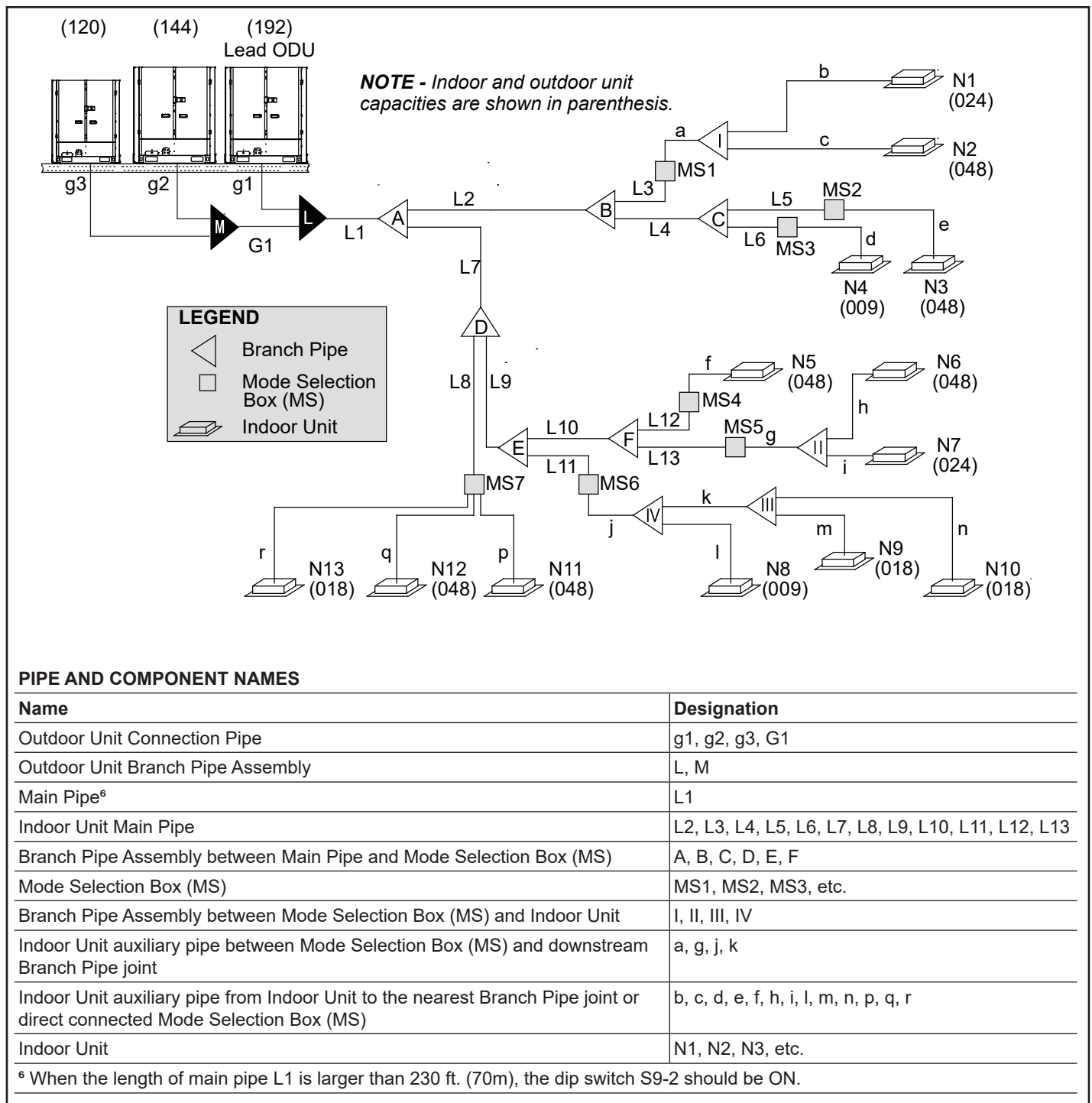
- Increase the distribution pipe diameter between the first Branch Pipe and Mode Selection Box (MS) L2-L13. If the pipe diameter is the same as the main outdoor pipe, it does not need to be increased.

### Pipe Size Allowable Increase Diameters (in.):

3/8 to 1/2	1/2 to 5/8	5/8 to 3/4	3/4 to 7/8	7/8 to 1-1/8	1-1/8 to 1-3/8	1-3/8 to 1-5/8	1-5/8 to 2-1/8
------------	------------	------------	------------	--------------	----------------	----------------	----------------

<sup>4</sup> When the outdoor unit is higher than indoor units and the level difference is over 164 ft. (50 m), it is required to set an oil return bend every 33 ft. (10 m) in the gas pipe of the main pipe. Refer to Installation Instructions for additional details.

<sup>5</sup> When the outdoor unit is lower than indoor units and the level difference is more than 132 ft. (40 m), the main liquid pipe pipe need to increase by one size.



**Figure 14. Typical Refrigerant Piping Diagram**

#### INDOOR UNIT AUXILIARY PIPE SELECTION

(From Indoor Unit To The Nearest Branch Joint (a, b, c, d, e, f, g, h, i, j, k, l, m))

Indoor Unit Capacity (kBtuh)	Pipe Diameter (in.)			
	Pipe length from indoor unit to nearest branch joint			
	Pipe length <u>less</u> than 100 ft (30 m)		Pipe length <u>more</u> than 100 ft (30 m)	
	Gas Pipe	Liquid Pipe	Gas Pipe	Liquid Pipe
A<18	1/2	1/4	5/8	1/4
18≤A≤54	5/8	3/8	3/4	3/8
54<A≤96	7/8	3/8	1-1/8	3/8



### OUTDOOR UNIT MAIN PIPE SELECTION (L1)

Outdoor Unit Size	Main Pipe Diameter (in.)							
	Equivalent length of all liquid pipes is <u>less</u> than 295 ft. (90 m)			First Branch Pipe Assembly	Equivalent length of all liquid pipes is <u>more</u> than 295 ft. (90 m)			First Branch Pipe Assembly
	Low Pressure Gas Pipe	High Pressure Gas Pipe	Liquid Pipe		Low Pressure Gas Pipe	High Pressure Gas Pipe	Liquid Pipe	
072	7/8	3/4	3/8	V8MSBP02	7/8	3/4	1/2	V8MSBP02
096	7/8	3/4	3/8	V8MSBP02	7/8	3/4	1/2	V8MSBP02
120	1-1/8	3/4	1/2	V8MSBP03	1-1/8	3/4	5/8	V8MSBP03
144	1-1/8	7/8	1/2	V8MSBP03	1-1/8	7/8	5/8	V8MSBP03
168-216	1-3/8	1-1/8	5/8	V8MSBP04	1-3/8	1-1/8	3/4	V8MSBP04
240	1-3/8	1-1/8	5/8	V8MSBP04	1-3/8	1-1/8	3/4	V8MSBP04
264-312	1-3/8	1-1/8	3/4	V8MSBP04	1-3/8	1-1/8	7/8	V8MSBP04
336-432	1-5/8	1-3/8	3/4	V8MSBP05	1-5/8	1-3/8	7/8	V8MSBP05
432~	1-5/8	1-3/8	3/4	V8MSBP05	1-5/8	1-3/8	7/8	V8MSBP05

Note - The Main Pipe (L1) can be selected from the Outdoor Unit Main Pipe Selection table or the Indoor Unit Main Pipe Selection table, the larger size must be used.

### INDOOR UNIT MAIN PIPE SELECTION (L1 to L13)

Indoor Unit Total Capacity (kBtuh)	Indoor Unit Main Pipe Diameter (in.)			Branch Pipe Assembly
	Low Pressure Gas Pipe	High Pressure Gas Pipe	Liquid Pipe	
A < 018	1/2	3/8	1/4	V8MSBP01
018 ≤ A < 056	3/4	5/8	3/8	V8MSBP01
056 ≤ A < 078	7/8	3/4	3/8	V8MSBP02
078 ≤ A < 112	7/8	3/4	1/2	V8MSBP02
112 ≤ A < 156	1-1/8	7/8	1/2	V8MSBP03
156 ≤ A < 224	1-1/8	7/8	5/8	V8MSBP03
224 ≤ A < 314	1-3/8	1-1/8	3/4	V8MSBP04
314 ≤ A < 460	1-5/8	1-3/8	3/4	V8MSBP05
460 ≤ A	1-5/8	1-3/8	7/8	V8MSBP05

### OUTDOOR UNIT PIPE SELECTION (g1, g2, g3, G1)

Pipe	Outdoor Unit Size	Pipe Diameter (in.)		
		Low Pressure Gas Pipe	High Pressure Gas Pipe	Liquid Pipe
G1	408, 432, 456, 480, 504	1-5/8	1-3/8	7/8
g1, g2, g3	6 or 8-ton	7/8	3/4	1/2
	10 or 12-ton	1-1/8	7/8	5/8
	14 or 16-ton	1-3/8	1-1/8	3/4

### OUTDOOR UNIT BRANCH PIPE ASSEMBLY SELECTION (L, M)

Outdoor Unit Quantity	Parallel Connection with Branch Pipes
2 units	L use V8ODBP02HR-3
3 units	L + M use V8ODBP03HR-3

### INDOOR UNIT AUXILIARY PIPE SELECTION (Between Branch Box (MS) And Downstream Branch Joint) (a, g, j, k)

Indoor Unit Capacity (kBtuh)	Pipe Diameter (in.)		Available Branch Pipe
	Gas Pipe	Liquid Pipe	
A<56	5/8	3/8	V8IDBP01

Name	Gas Side Joints (inch)	Liquid Side Joints (inch)	Insulation Material (furnished)
V8IDBP01			 (2 sets)
V8IDBP02			 (2 sets)
V8IDBP03			 (2 sets)
V8IDBP04			 (2 sets)
V8IDBP05			 (2 sets)

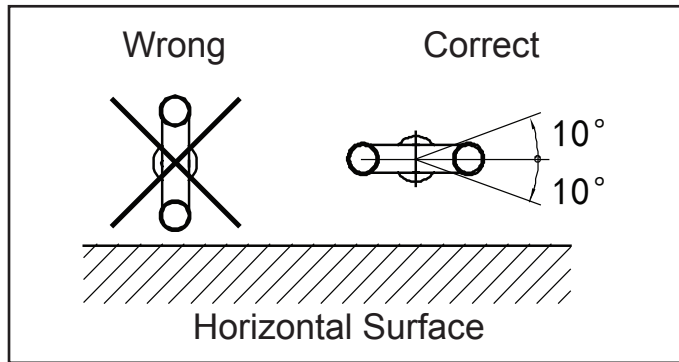
**Figure 15. Indoor Unit Branch Pipe Kits**

	Low-Pressure Gas Side Joints - Inch	High-Pressure Gas Side Joints - Inch	Liquid Side Joints - Inch	Adapter Pipe - Inch	Insulation Material (furnished)
<b>V8MSBP01</b>				 (Low-pressure) side used / (High-pressure) side used / (Liquid) side used	 (3 sets)
<b>V8MSBP02</b>				 (Low-pressure) side used / (High-pressure) side used / (Liquid) side used	 (3 sets)
<b>V8MSBP03</b>				 (Low-pressure) side used / (High-pressure) side used / (Liquid) side used	 (3 sets)
<b>V8MSBP04</b>				 (Low-pressure) side used / (High-pressure) side used / (Liquid) side used	 (3 sets)
<b>V8MSBP05</b>				 (Low-pressure) side used / (High-pressure) side used / (Liquid) side used	 (3 sets)

Figure 16. Mode Selection Box Branch Pipe Kits

## Horizontal Runs

When installed horizontally, these branch pipe kits **MUST** be installed level  $\pm 10^\circ$ .



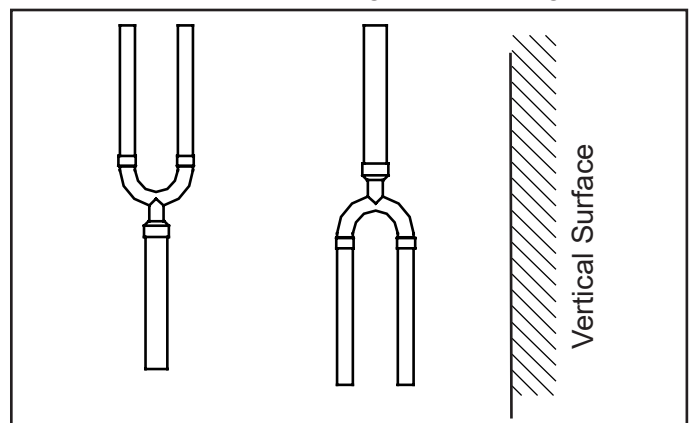
**Figure 17. Horizontal Installation**

Indoor unit branch kits have graduated piping diameters.

- The piping can be cut to suit the installation needs. See figure 19.
- Use a pipe cutter designed for refrigeration tubing to cut pipe.
- Discard unused pipe.

## Vertical Runs

When installed vertically, mode selection branch kits **MUST** be installed straight up or straight down.



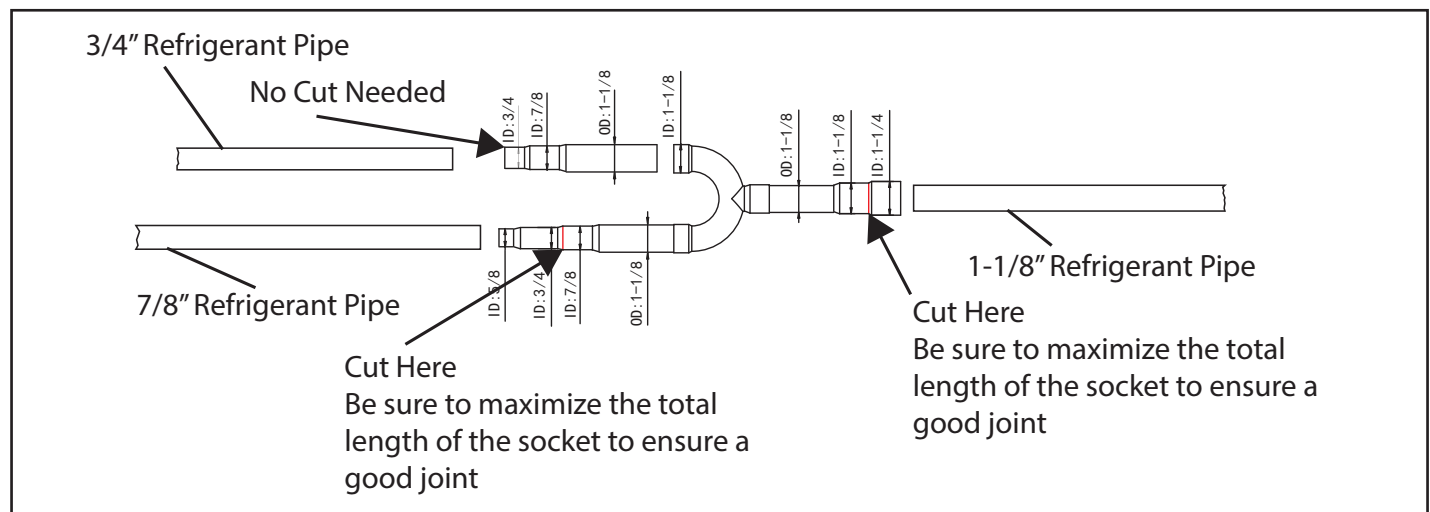
**Figure 19. Vertical Installation**



## IMPORTANT

**Locate first branch pipe kit of the system centrally to ensure correct distribution of refrigerant.**

- Refer to the Lennox VRF Selection Software (LVSS) pipe sizing diagram to obtain the correct inlet and outlet sizes for the installation.
- Keep all components sealed until brazing.



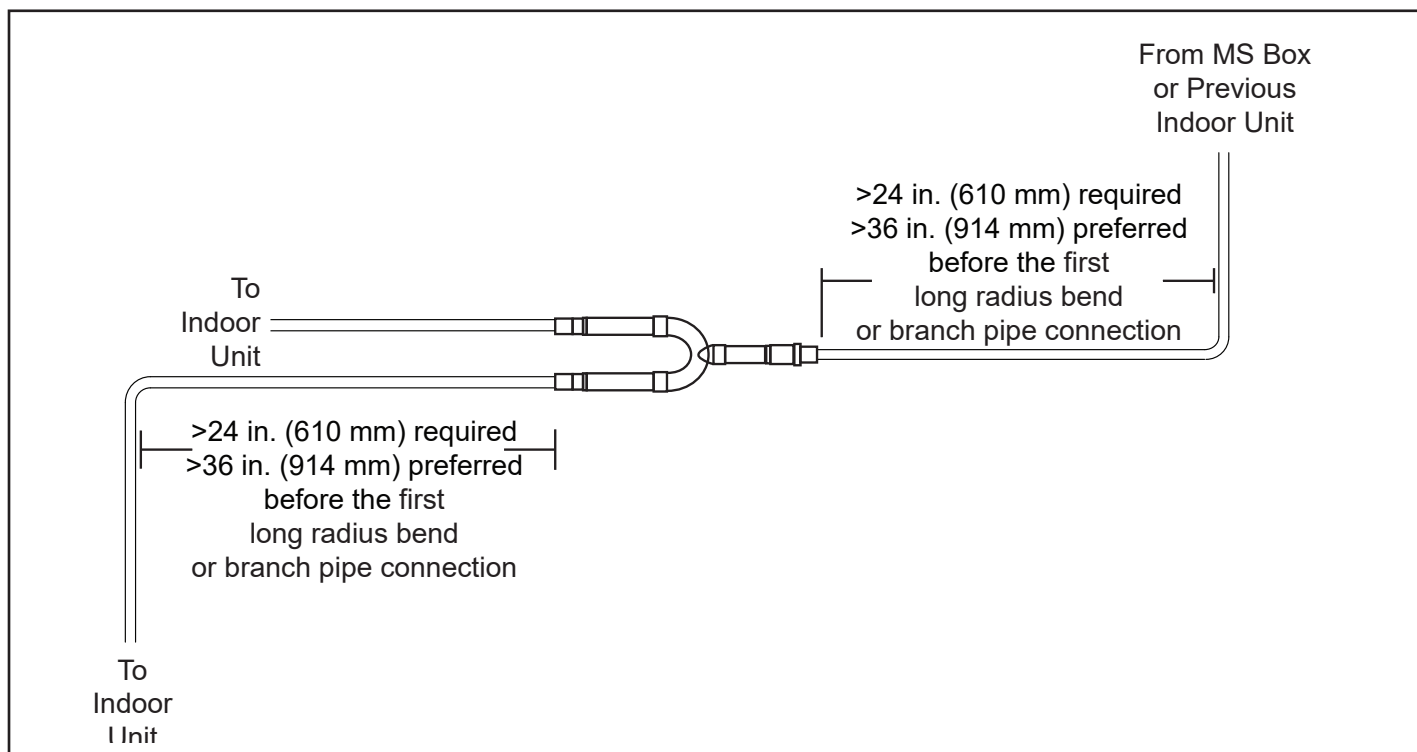
**Figure 18. Cutting Branch Pipe Kits to Size Example**

## Branch Pipe Kit Placement

Provide 24 to 36 inches of straight pipe before and after each branch 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.

## CAUTION

24 inches (588 mm) minimum straight pipe required before and after branch pipe kit to prevent capacity loss, refrigerant hammering and equipment damage.



**Figure 20. 24 to 36" of Straight Pipe Before and After Branch Pipe Kit**

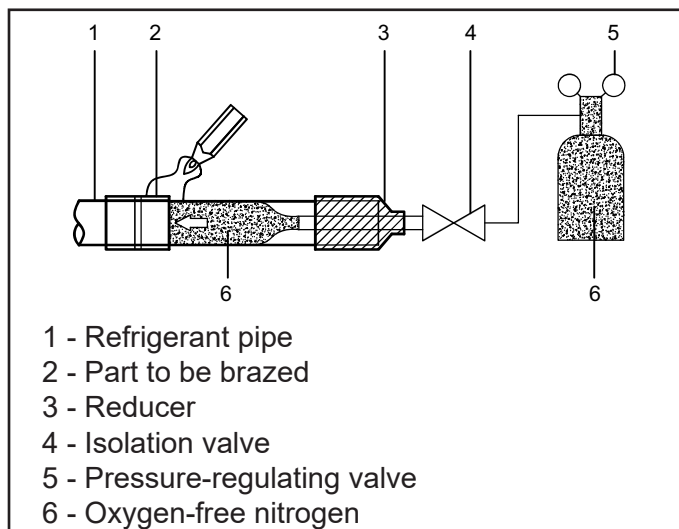
- The seal on the unit refrigerant piping connections should remain in place until the last possible moment. This will prevent dust or water from getting into the refrigerant piping before it is connected.
- Flow the pipework with dry (oxygen-free) nitrogen (2.9 psig or 3 CFH) during brazing to avoid oxidation which may block the refrigerant piping.
- Do not use 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 2 for proper pressure testing procedures.
- Ensure the unit service valves are fully closed and haven't become loose during transportation.
- Use oxygen-free nitrogen to pressure test to 650 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 21. Brazing Best Practices**

## IMPORTANT!

**Use only oxygen-free nitrogen (OFN).**

**Table 2. 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	45 bar	500 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

1. Refer to the LVSS Calculation and Selection report for proper system additional refrigerant charge amount.
2. For manual calculations, calculate the additional refrigerant charge using the diameter and length of the liquid pipe (only) using Table 3.
3. Calculate the additional refrigerant charge per outdoor unit using Table 4.
4. Calculate the additional refrigerant charge for each liquid line branch pipe kit.
5. Calculate the additional refrigerant charge for each Mode Selection Box using Table 5.
6. If the ratio of VMDB or V33B Indoor unit capacity exceeds 80% of all indoor units, use Table 6 to determine the additional refrigerant charge to add.
7. Total all calculations.
8. Do not exceed the maximum allowed additional refrigerant charge amount for the system. Table 7.
9. 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 3. Liquid Line Calculation**

$$\text{Liquid Line Additional Refrigerant (lbs.)} = \left( \begin{aligned} &\left( \text{Total length (ft) of liquid piping size at } \Phi 7/8 \right) \times 0.255 + \left( \text{Total length (ft) of liquid piping size at } \Phi 3/4 \right) \times 0.181 \\ &+ \left( \text{Total length (ft) of liquid piping size at } \Phi 5/8 \right) \times 0.120 + \left( \text{Total length (ft) of liquid piping size at } \Phi 1/2 \right) \times 0.080 \\ &+ \left( \text{Total length (ft) of liquid piping size at } \Phi 3/8 \right) \times 0.040 + \left( \text{Total length (ft) of liquid piping size at } \Phi 1/4 \right) \times 0.015 \end{aligned} \right)$$

## Outdoor Unit Calculation

Calculate additional refrigerant charge per outdoor unit.

**Table 4. Outdoor Unit Additional Charge**

Model	lb	kg
6-10 Ton	6.39	2.9
12-16 Ton	15.87	7.2

## Mode Selection Box Calculation

Use Table 4 to determine the amount of additional refrigerant for EACH mode selection box.

**Table 5. Mode Selection Box Additional Charge**

Mode Selection Box Model	Amount of refrigerant (lb/per)	Amount of refrigerant (kg/per)
V8MSBB02-3P	2.20	1
V8MSBB04-3P	2.20	1
V8MSBB06-3P	2.20	1
V8MSBB08-3P	4.41	2
V8MSBB10-3P	4.41	2
V8MSBB12-3P	4.41	2

**Table 6. VMDB or V33B Indoor Unit Capacity Ratio over 80% of All Indoor Units  
Additional Charge Amount**

<b>Outdoor Unit</b>	<b>Pounds of additional refrigerant if ratio of VMDB Indoor units exceeds 80% of all indoor units.</b>	<b>Pounds of additional refrigerant if ratio of V33B indoor units exceeds 80% of all indoor units.</b>
VRB072H4M	3.31	3.53
VRB096H4M	4.19	4.85
VRB120H4M	5.29	6.61
VRB144H4M	6.39	7.72
VRB168H4M	7.39	13.23
VRB192H4M	8.38	15.87
VRB216H4M	9.26	15.87
VRB240H4M	10.93	15.87
VRB264H4M	12.08	15.87
VRB288H4M	13.76	15.87
VRB312H4M	15.12	16.18
VRB336H4M	16.20	16.49
VRB360H4M	17.73	16.80
VRB384H4M	17.73	17.11
VRB408H4M	17.73	17.42
VRB432H4M	17.73	17.73
VRB456H4M	17.73	17.73
VRB480H4M & VRB504H4M	17.73	17.73

**Table 7. Maximum Additional Refrigerant Charge Amount**

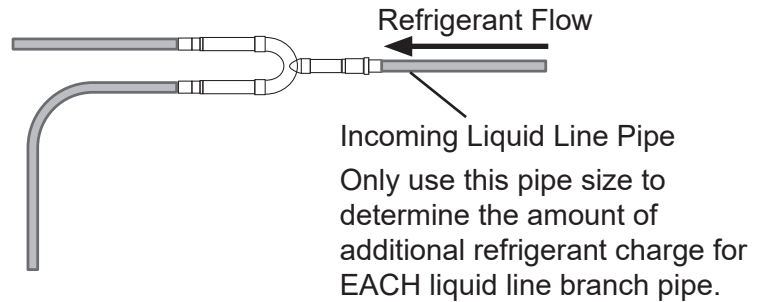
<b>Outdoor Unit</b>	<b>Maximum Additional Refrigerant Charge</b>	
	<b>lbs</b>	<b>kg</b>
VRB072H4M	53.07	24.07
VRB096H4M	63.58	28.84
VRB120H4M	66.01	29.94
VRB144H4M	82.03	37.21
VRB168H4M	86.99	39.46
VRB192H4M	98.83	44.83
VRB216H4M	116.25	52.73
VRB240H4M	121.06	54.91
VRB264H4M	148.17	67.21
VRB288H4M	150.18	68.12
VRB312H4M	150.18	68.12
VRB336H4M	166.21	75.39
VRB360H4M	168.23	76.31
VRB384H4M	170.26	77.23
VRB408H4M	189.71	86.05
VRB432H4M	189.71	86.05
VRB456H4M	215.15	97.60
VRB480H4M & VRB504H4M	226.19	102.60

▲ Contact the Lennox VRF applications department for assistance If the additional charge for the system exceeds the amount listed in this table or for other assistance with calculating additional refrigerant charge.

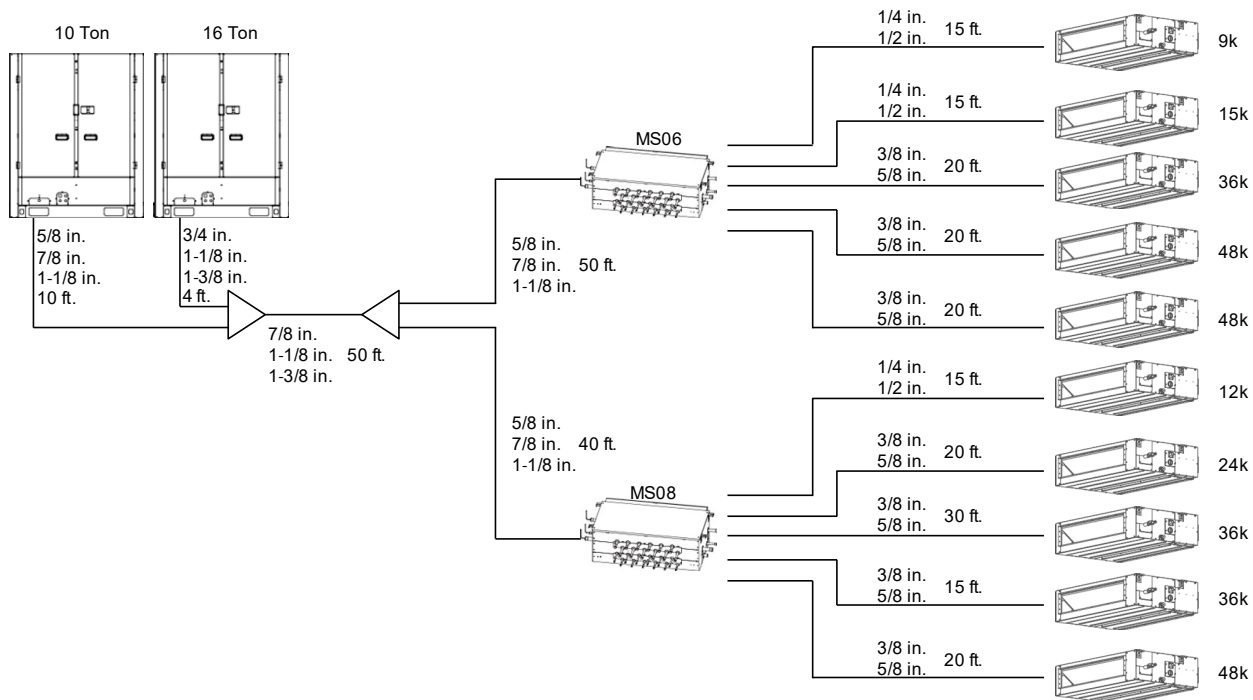
## Branch Pipe Kit Calculation

Add 1.60 ft. (488 mm) per EACH liquid line branch pipe (incoming pipe size only) for additional charge calculation.

Example: The branch pipe kit has an incoming pipe size of 7/8" and outgoing pipe sizes of 3/8" and 5/8". Use only the incoming pipe size of 7/8" to calculate the additional refrigerant charge for this branch pipe kit.



## Refrigerant Charge Calculation Example



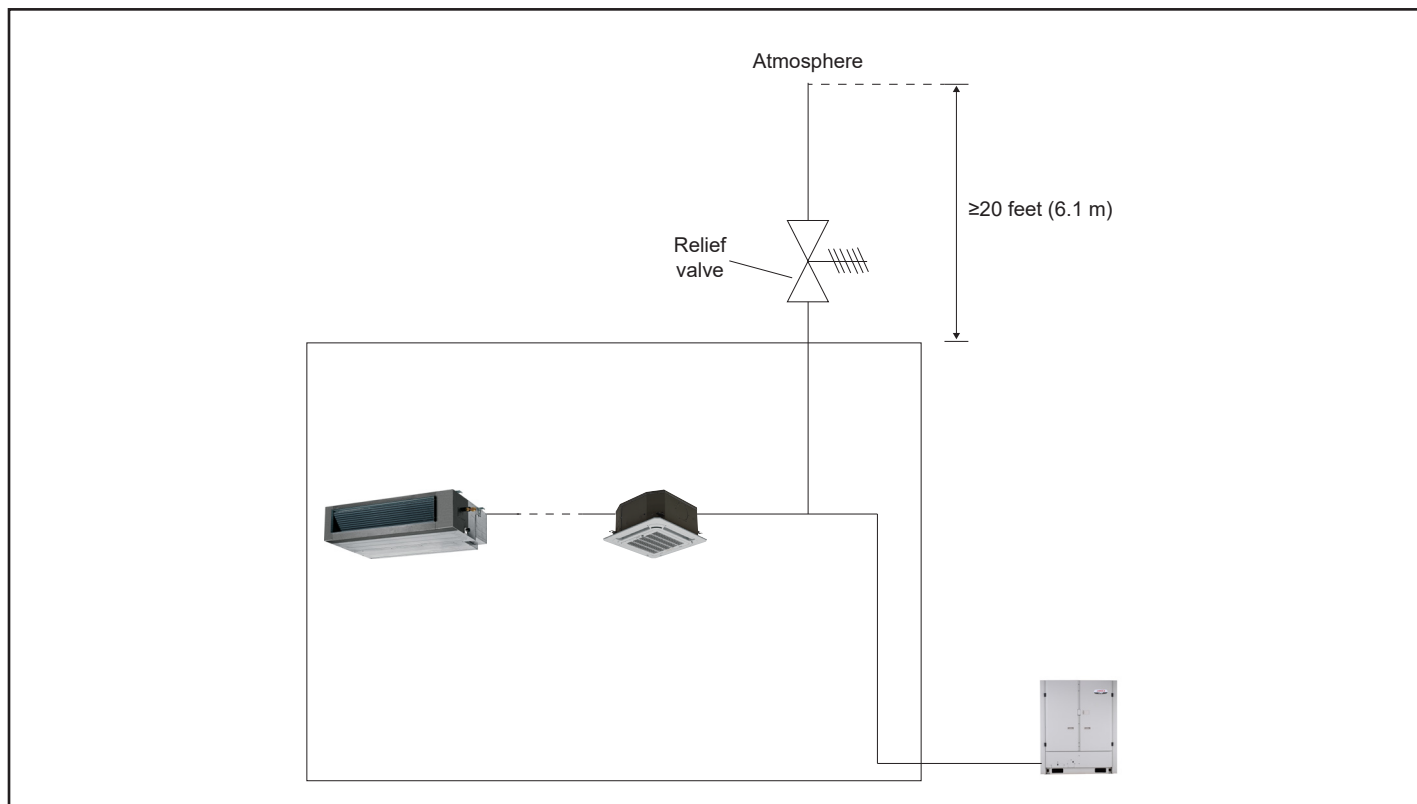
## Refrigerant Charge Amount Calculation

1. Additional refrigerant charge amount of outdoor units = 6.39+15.87 = 22.26 lbs.
  2. Additional refrigerant charge amount of MS boxes = 2.2+4.41 = 6.61 lbs.
  3. Additional refrigerant charge amount of pipes =  $(0.12 \times 10 + 0.181 \times 4) + (0.255 \times (50 + 1.6 \times 2) + 0.12 \times 50 + 0.12 \times 40) + [0.015 \times (15 + 15 + 15) + 0.04 \times (20 + 20 + 20 + 20 + 30 + 15 + 20)] = 32.79$  lbs.
  4. Additional refrigerant charge amount of indoor units = 15.12 lbs.
- The total additional refrigerant charge amount = 22.26+6.61+31.95+15.12 = 76.78 lbs.

## Refrigerant Discharge

For systems containing more than 110 lb (50 kg) of R-410A refrigerant, pressure-relief devices and fusible plugs shall discharge to the atmosphere at a location not less than 15 ft (4.57 m) above the adjoining ground level and not less than 20 ft

(6.1 m) from any window, ventilation opening, or exit in any building. Local codes may lower this charge limit and shall be investigated by the design engineer.



**Figure 22. Refrigerant Discharge**

## Connecting Manifolded Units

- See the instruction manual included with the branch pipe kit for detailed connection information.
- Connect the branch pipes between outdoor units so that they are horizontal level  $\pm 10^\circ$ .
- Do not install outdoor unit branch pipes vertically.
- Do not allow pipe to block outdoor unit access panels.
- Install a reverse trap if needed.
- Branch kits include pipes with graduated diameters. The piping can be cut to suit the installation needs.
- Use a pipe cutter designed for refrigeration tubing.
- Discard unused pipe.
- Refer to the Lennox VRF Selection Software (LVSS) pipe sizing diagram to obtain the correct inlet and outlet sizes for the installation.
- Keep all components sealed until brazing.

**NOTE** - Outdoor unit is shipped for bottom pipe entry. For front pipe entry installation, use parts in accessory bag.

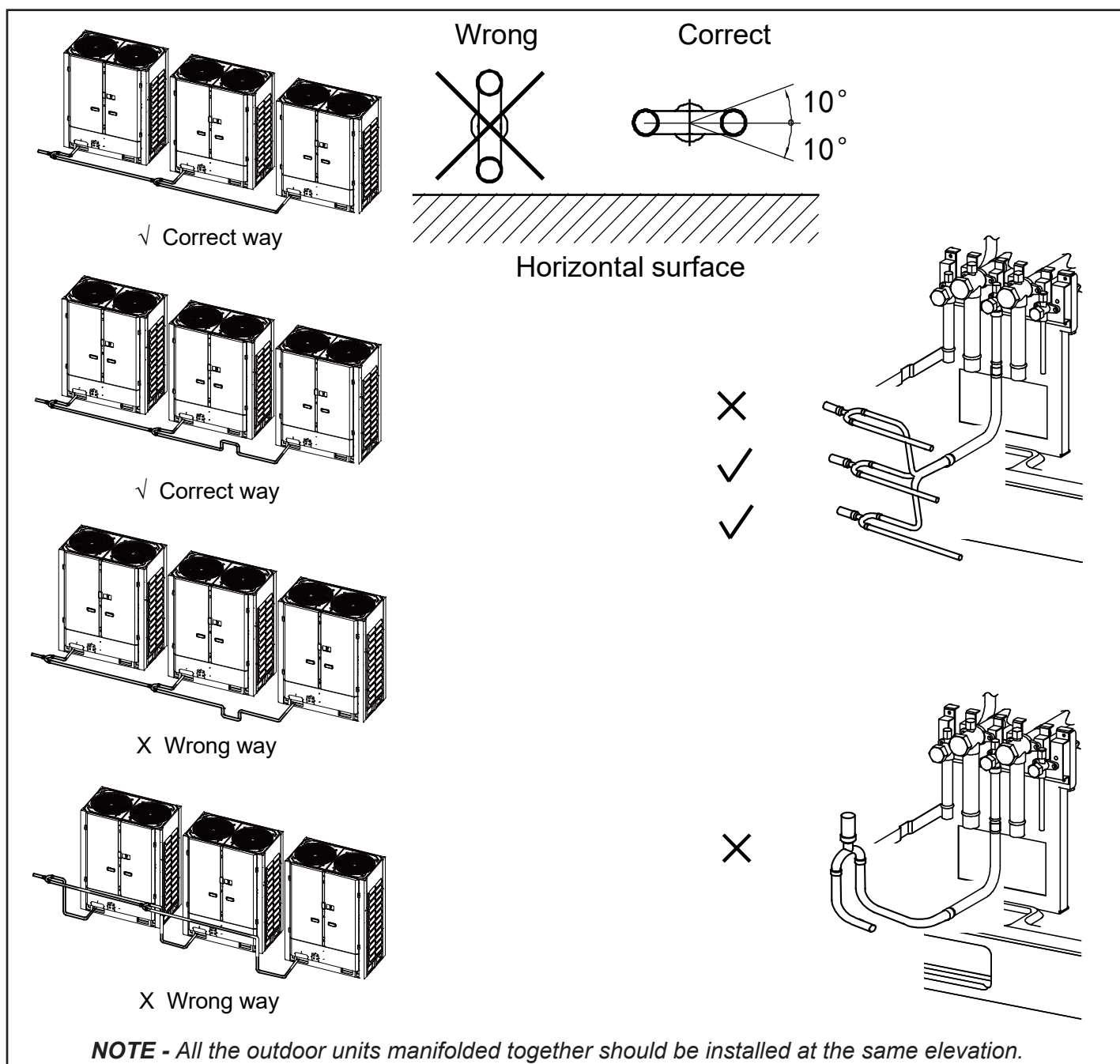
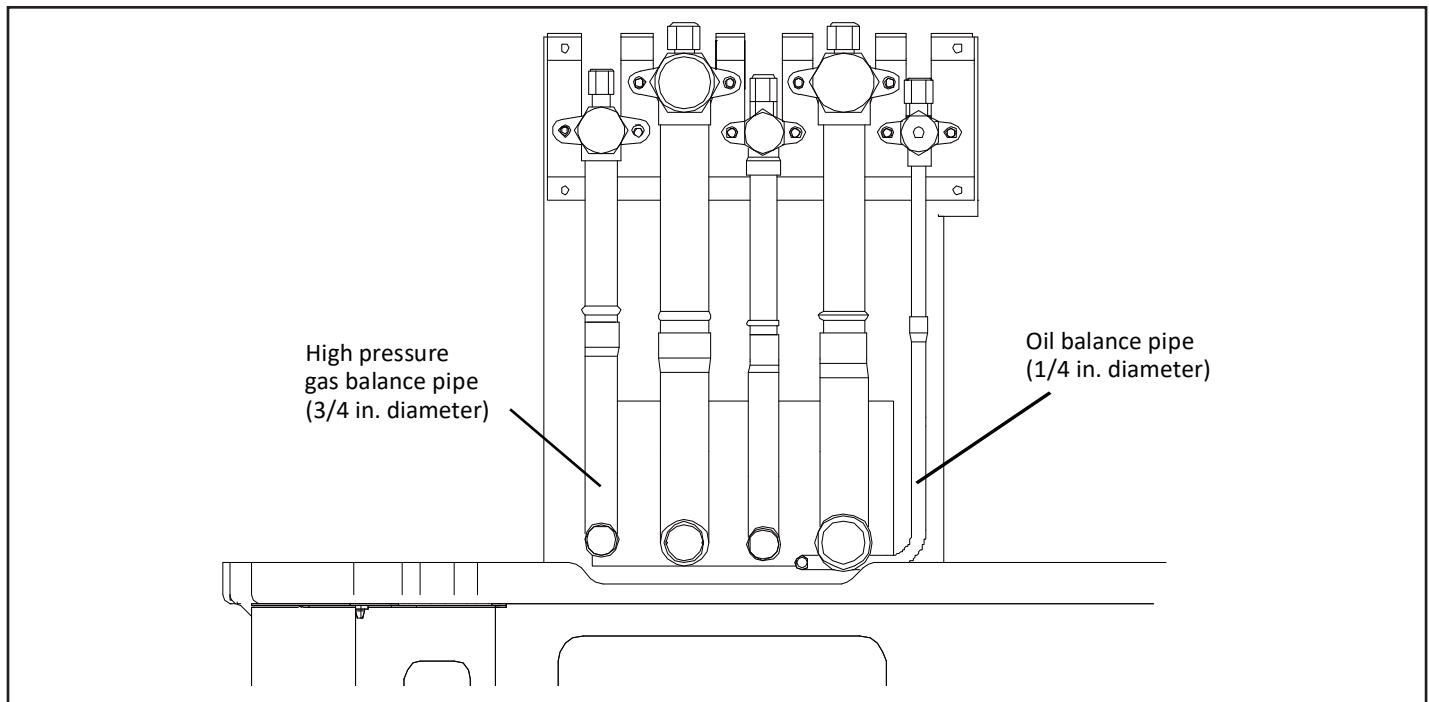
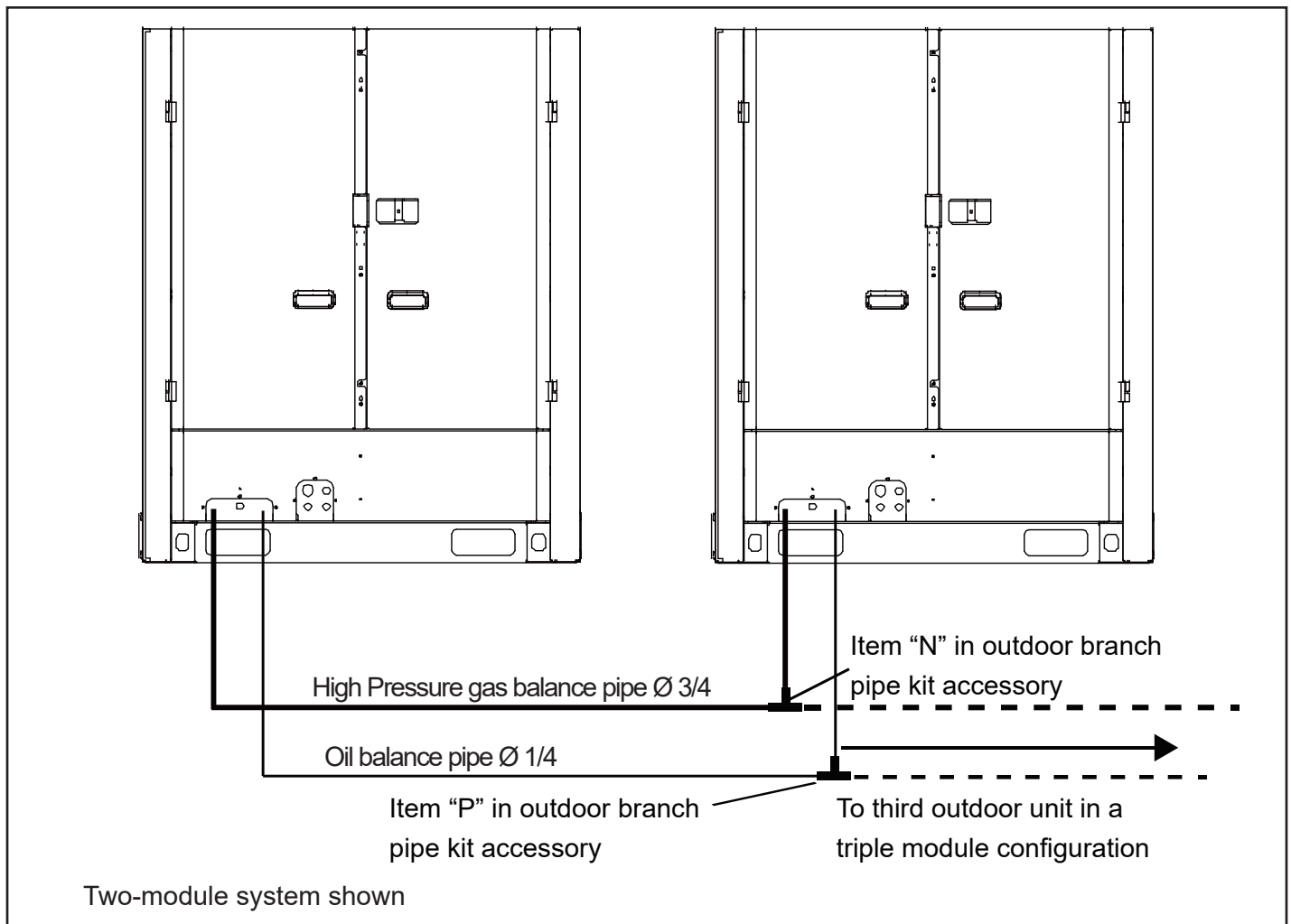


Figure 23. Connecting Manifolded Units



**Figure 24. Heat Recovery Parallel Piping Connections**



**Figure 25. Connective Piping Sizes for Manifolded Outdoor Units**



Triple-Module Balancing Pipes Only							
Name	Low-Pressure Gas Side Joints (inch)	Liquid Side Joints (inch)	Low-Pressure Gas Balance Joint (inch)	High-Pressure Gas Balance Joint (inch)	Oil Balance Joint (inch)	Insulation Material (furnished)	
V80DBP02HP-3						 (2 sets)	
V80DBP03HP-3				 ID: 7/8	 ID: 3/4	 ID: 1/4 P	 (4 sets)

Refer to the pipe sizing diagram in the LVSS Calculation and Selection report to determine pipe sizes.

- Branch pipe kits are used to complete the piping for connecting outdoor units.
- T-shape connectors are used for balancing pipes only.
- U-shaped connectors are combined in the field to connect refrigerant piping for the structure. See Figure 26.

Figure 26. Outdoor Unit Branch Pipe Kits

## Connecting Mode Selection Boxes

- The Maximum No. of indoor units per port is 5
- For each mode selection box, dependant on mode selection box size, maximum possible number of connected indoor units is 41.
- All indoor units on the same port must operate in the same mode.
- Do not install in noise sensitive areas.
- The mode selection box must be installed level horizontal.
- Main piping may be connected to either side of the mode selection box but cannot pass through to other mode selection boxes.
- Allow at least 3 ft. (1 m) of straight pipe between the mode selection box and the branch pipes.
- There will be a 30-second auto-check function performed after the indoor and outdoor units have been started.
- Mode selection boxes require a unique address.
- See the instruction manual included with the mode selection box for detailed installation information.

**Table 8. MS Box Piping Connection Information**

		V8MSBB02	V8MSBB04	V8MSBB06	V8MSBB08	V8MSBB10	V8MSBB12
<b>Indoor Unit Pipe Connections (in)</b>	<b>Liquid</b>	1/4, 3/8	1/4, 3/8	1/4, 3/8	1/4, 3/8	1/4, 3/8	1/4, 3/8
	<b>Gas</b>	1/2, 5/8	1/2, 5/8	1/2, 5/8	1/2, 5/8	1/2, 5/8	1/2, 5/8
<b>Outdoor Unit Pipe Connections (in)</b>	<b>Liquid</b>	7/8, 3/4, 5/8	5/8, 1/2, 3/8	5/8, 1/2, 3/8	3/4, 5/8, 1/2, 3/8	3/4, 5/8, 1/2, 3/8	3/4, 5/8, 1/2, 3/8
	<b>H.P. Gas</b>	7/8, 3/4, 5/8	1-1/8, 7/8, 3/4	1-1/8, 7/8, 3/4	1-1/8, 7/8, 3/4	1-1/8, 7/8, 3/4	1-1/8, 7/8, 3/4
	<b>L.P. Gas</b>	1-1/8, 7/8, 3/4	1-3/8, 1-1/8, 7/8	1-3/8, 1-1/8, 7/8	1-3/8, 1-1/8, 7/8	1-3/8, 1-1/8, 7/8	1-3/8, 1-1/8, 7/8

**NOTE** - Field piping connections for the outdoor unit gas and liquid pipes are provided on the right and left side of the mode selection box. **Only one side can be used. Piping through the box to another mode selection box is not allowed; use the proper branch joint kit when multiple mode selection boxes are connected. Remove charging stems and braze shut should that side of the box not be used.**

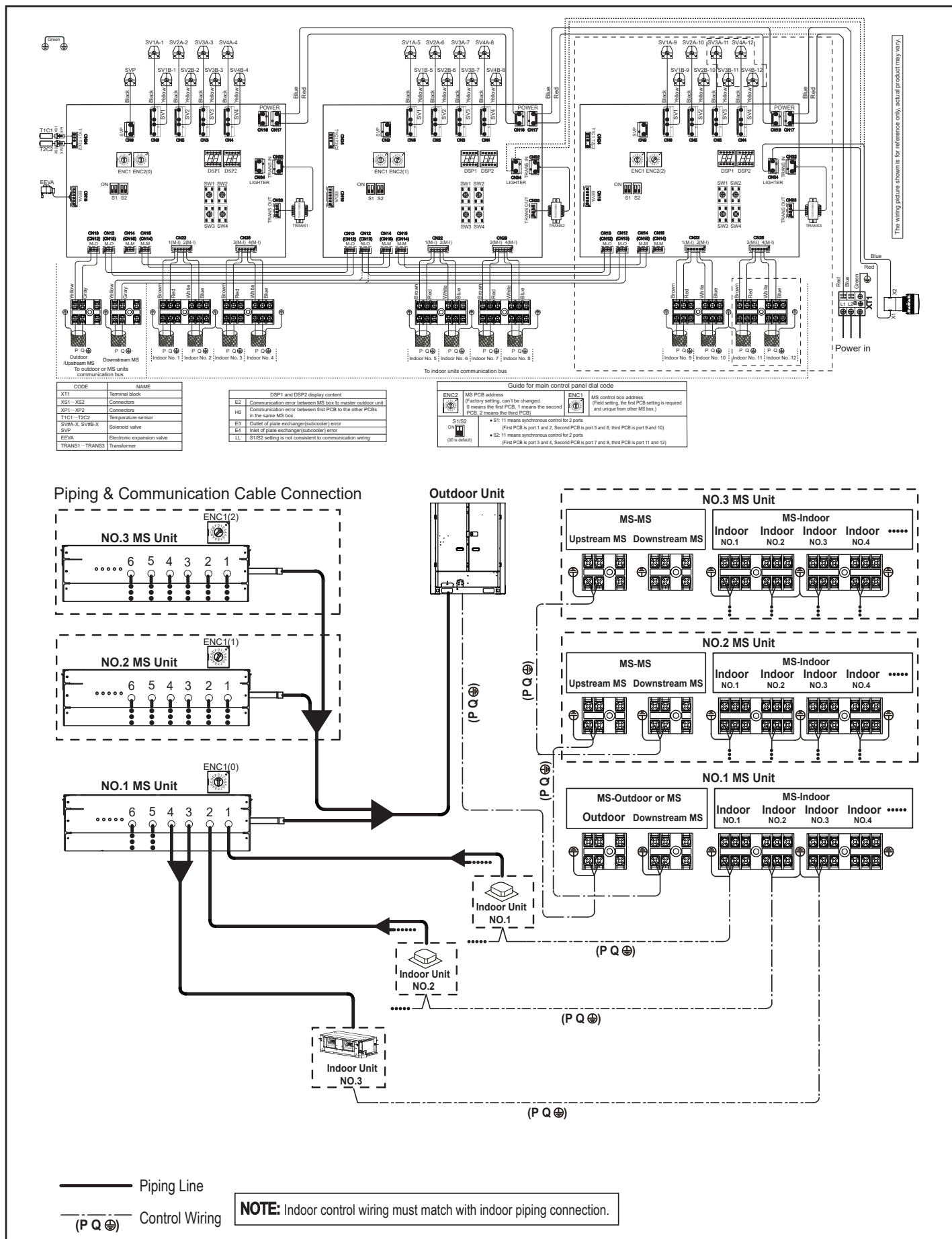


Figure 27. Mode Selection Box Wiring Diagrams

## 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.

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.

### ⚠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.

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.

Always follow NEC/CEC and Local Codes.

**NOTE** - Each outdoor unit requires a separate power supply protected by a suitably sized circuit breaker.

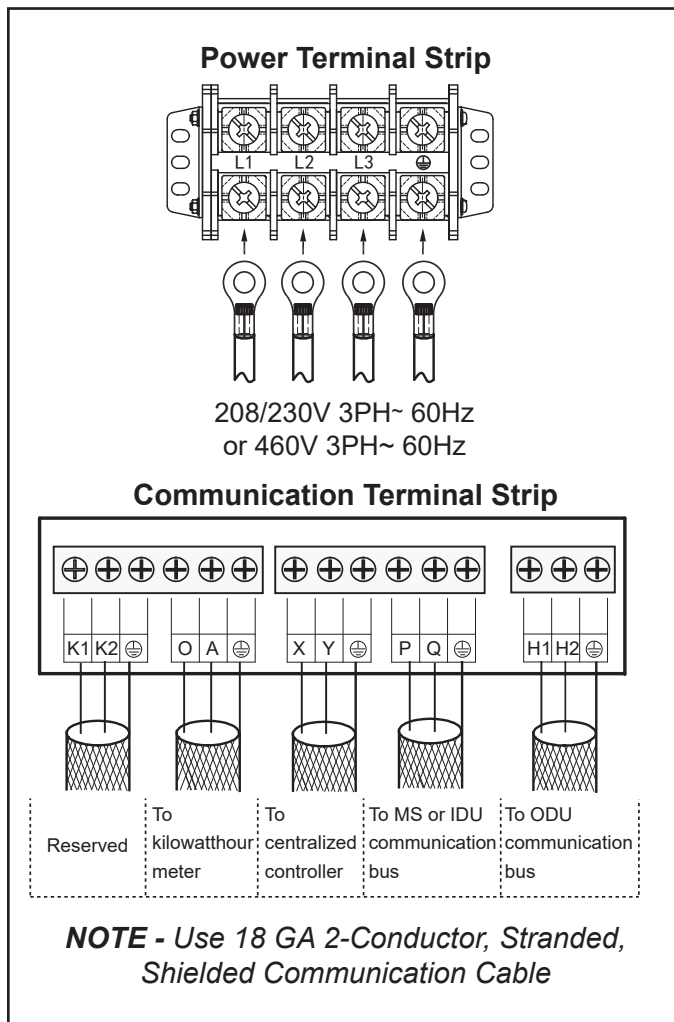
1. Select the appropriate electrical inlet into the outdoor unit. Local and national codes apply.
2. Locate the terminal strip in the outdoor unit control box. Connect the power wiring (sized per NEC/CEC and local codes) and communications cable (2-conductor, shielded cable). Refer to unit nameplate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

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 28. Wiring Terminals**

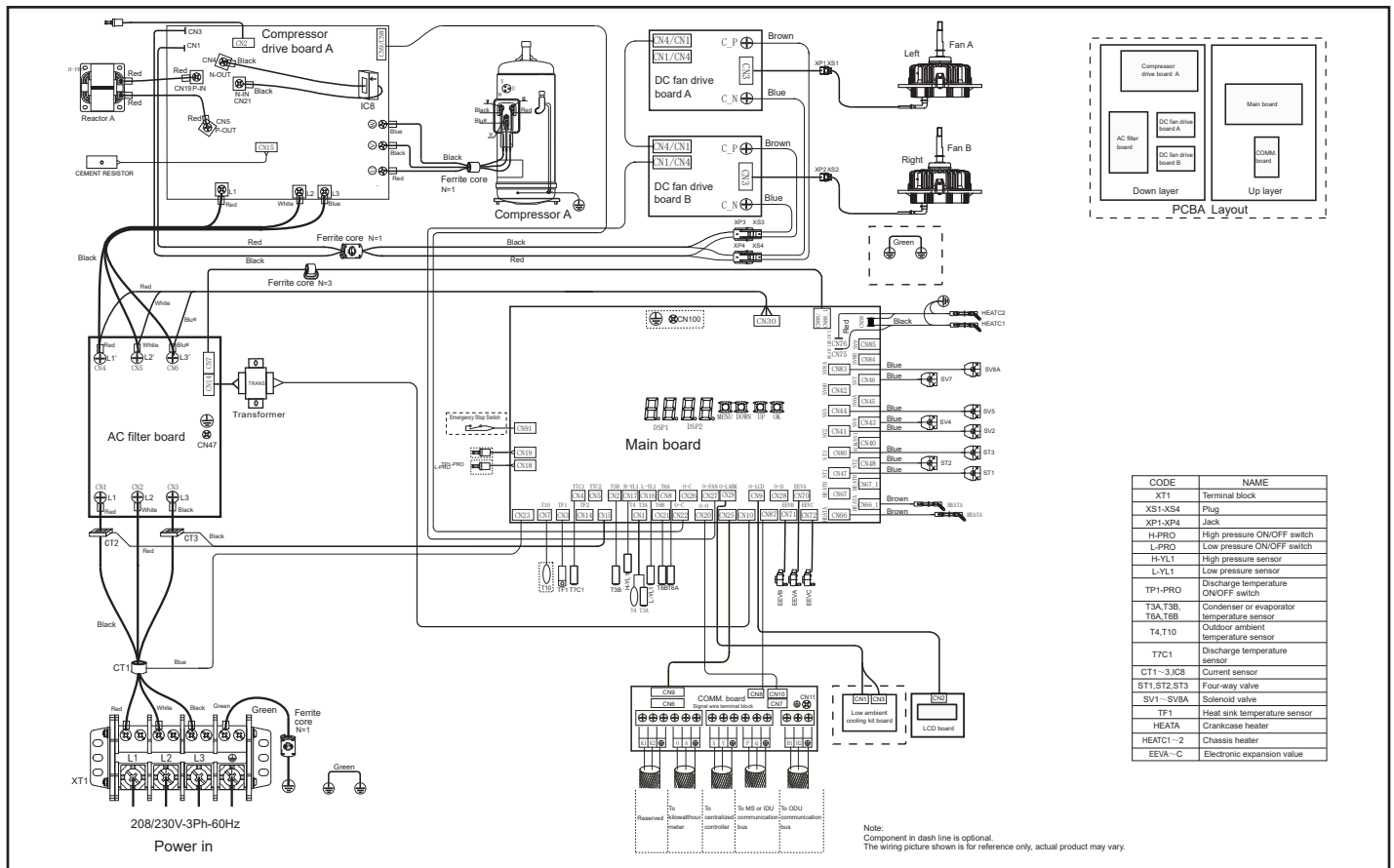


Figure 29. VRB072, 096, 120 - 230V

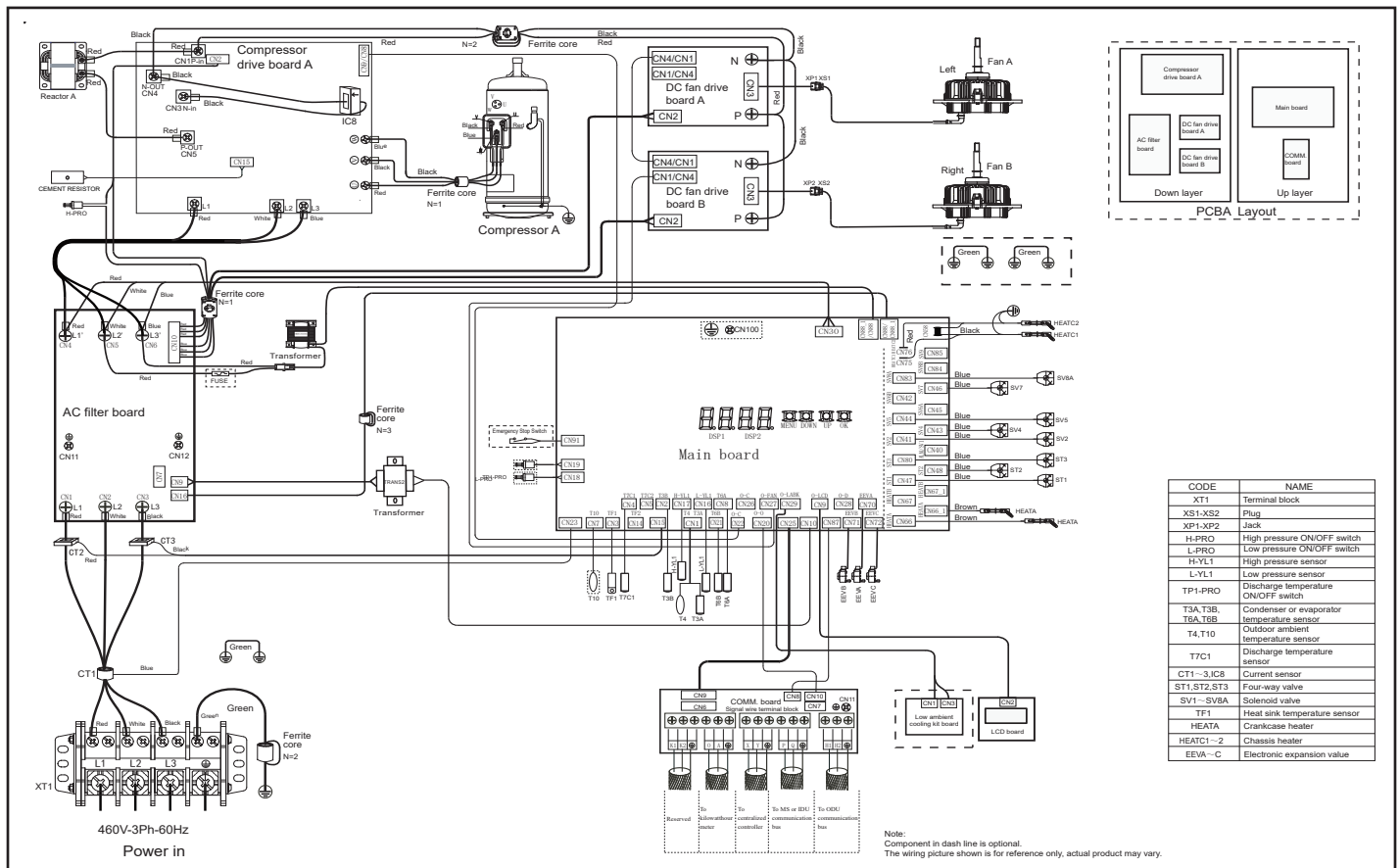


Figure 30. VRB072, 096, 120 - 460V

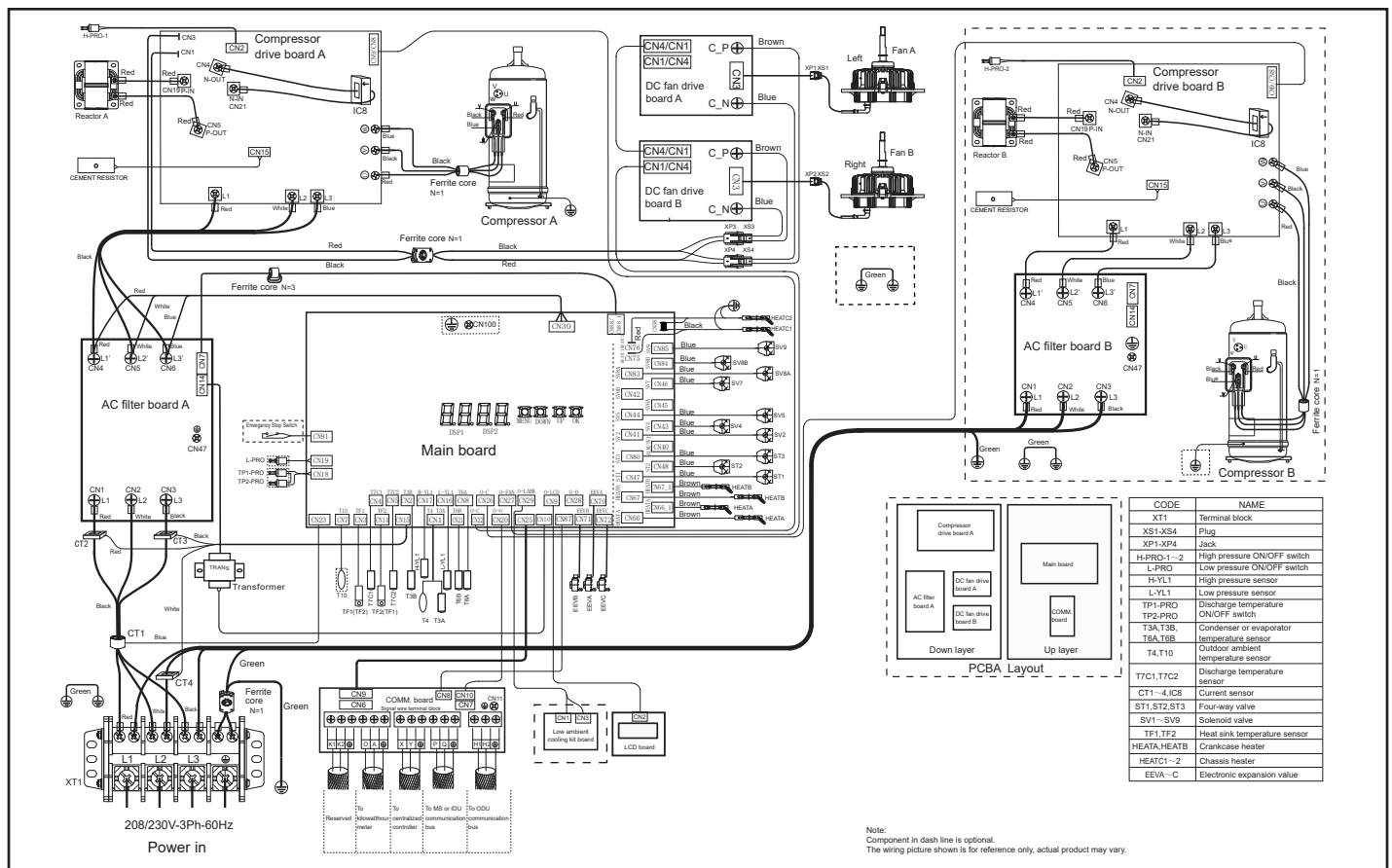


Figure 31. VRB144, 168, 192 - 230V

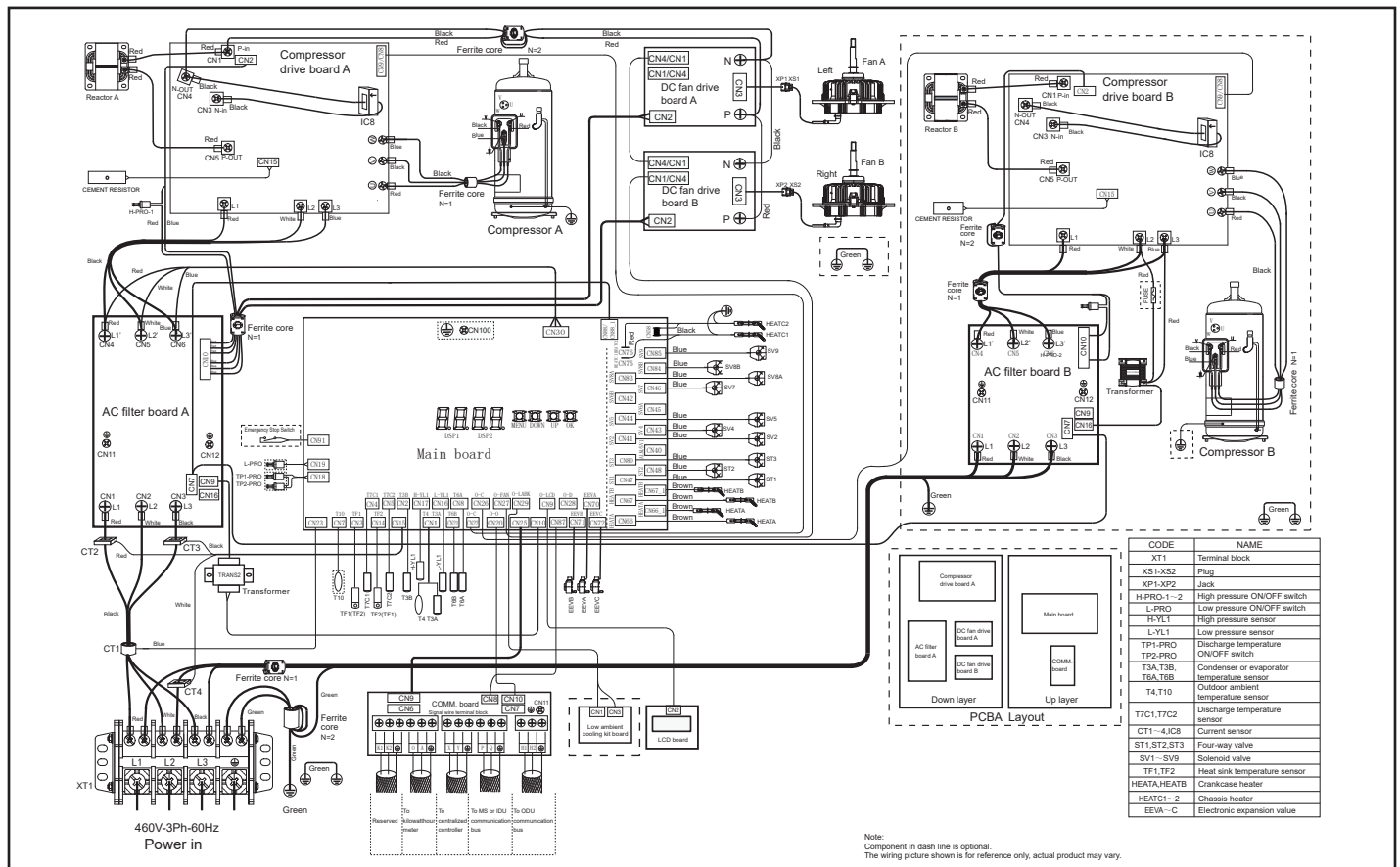


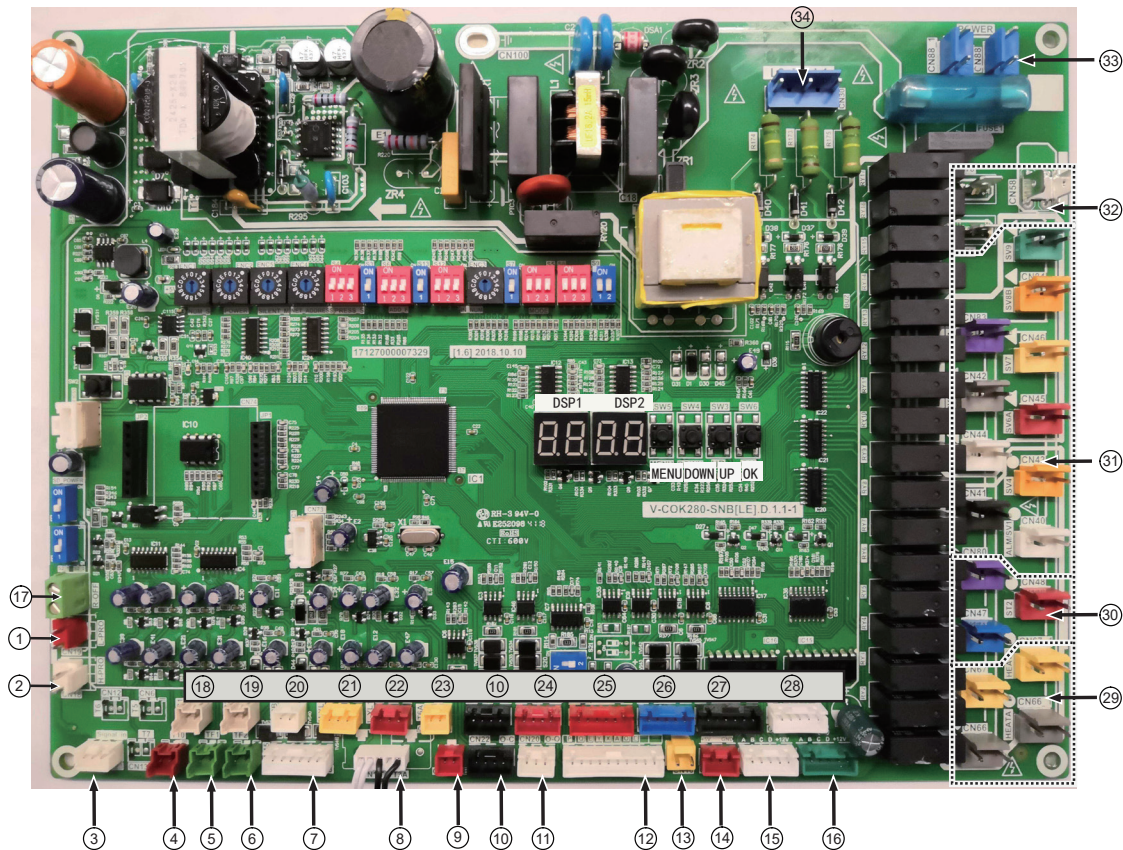
Figure 32. VRB144, 168, 192 - 460V



## Digital Display

1. Normal Display: When in standby, the digital display will provide the address of the outdoor unit and the quantity of the indoor units discovered.

2. Operating Display: When the outdoor unit is in operation, the digital display will provide the compressor(s) drive frequency.



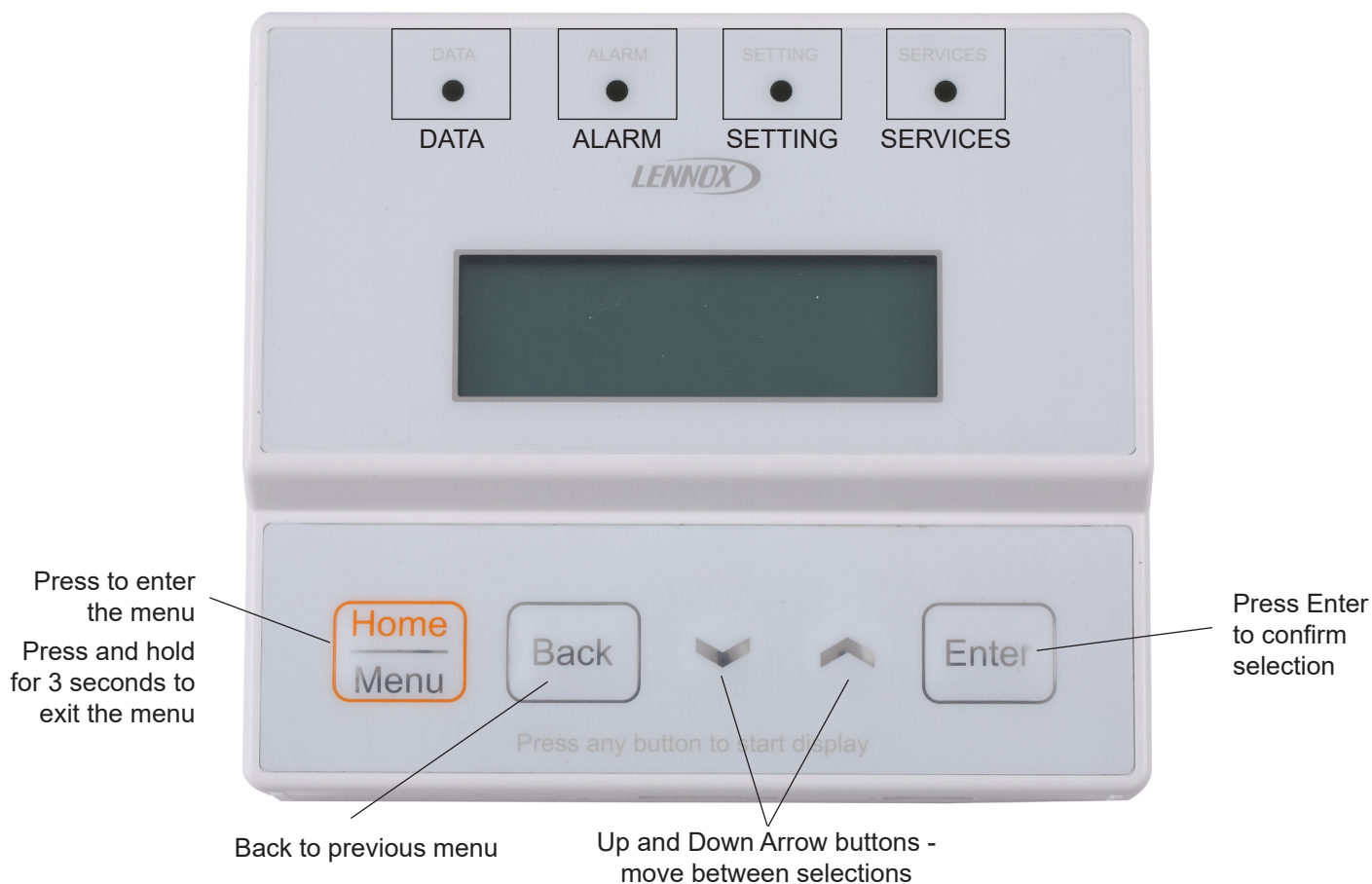
#	Description
1	ON/OFF Signal Input Port for System Low Pressure
2	ON/OFF Signal Input Port for System High Pressure
3	Input port Voltage Leakage Detection
4	Temperature Detection Port of T10
5	Heatsink Temp. Detection Port of Inverter Module A
6	Heatsink Temp. Detection Port of Inverter Module B
7	Current Inspection Port of The Inverter Compressor A & Compressor B
8	Temperature Detection Port of Outdoor Ambient & Condenser Pipe (T4/T3A)
9	Detection Port of Condenser Pipe Temp. (T6B)
10	Comm. Port between Main Board & Compressor Inverter Module
11	Comm. Port between Outdoor Units
12	Wiring Port for Communication
13	Power Input Port 24VAC
14	Power Output Port 5VDC
15	Control Port of EXV B
16	Control Port of EXV C
17	Input Port for Emergency Stop Switch

#	Description
18	Discharge Temp. Detection Port of Inv. Compressor A
19	Discharge Temp. Detection Port of Inv. Compressor B
20	Detection Port of Condenser Pipe Temp. (T3B)
21	Input Port for System High Pressure Detection
22	Input Port for System Low Pressure Detection
23	Detection Port of Condenser Pipe Temp. (T6A)
24	Communication Port between Main Board and Fan Inverter Module
25	Communication Port between Main Board and low ambient cooling kit
26	Communication Port between Main Board and LCD Module
27	Reserved
28	Control Port of EXV A
29	Output Port for Crankcase Heater Of Compressor
30	Output Port for 4-Way Valve
31	Output Port for Solenoid Valve
32	Output Port for Base Pan Heater
33	Power Input Port
34	Voltage Detection Port

**Figure 33. Outdoor Unit Main Board**



## LCD Display



- The Home screen will display incoming voltage, mode of operation, compressor(s) frequency, and operation status.
- Press the Home / Menu button to enter the service tool.
- Press the Home button to cycle through the Main Menu Selection Items (Data, Alarm, Setting, Services).
- Note that the small LEDs will illuminate as you pass through each main menu item. In this Case the DATA would be illuminated once the Menu button has been activated.
- Press the Back Button to return to the previous Main Menu item.
- Use the arrows to cycle through data and configuration options.
- Press Enter to change and or to configure selected items.
- The Service Tool will return to the Home menu after 30 seconds of inactivity or the Home Button is pressed and held for 3 seconds.

## Main Screen

Menu	Example Value	Description
MODE	MIX COOLING	System operation mode: OFF/COOLING /HEATING /MIX COOLING/MIX HEATING
COMP	100+98HZ	Main compressor speed + Sub compressor speed
VOLTAGE	208/230VAC	Input voltage
STATUS	OIL RETURN	Current status, LATEST ERROR CODE/DEFROSTING/OIL RETURN/STANDBY/RUNNING

## Menu Structure

1st Level Menu	2nd Level Menu	Display	Example Value	Description
DATA	System Data	OU ADDRESS	0	Outdoor unit address: 0/1/2
		OU CAPACITY	12 TON	Outdoor capacity/Ton
		SYS.CAPACITY	20 TON	System capacity/Ton
		OU QUANTITY	2	Outdoor unit quantity in the system
		IU QTY.	20	Indoor unit quantity in the system
		COOLING IU QTY.	10	Indoor unit quantity in cooling in the system
		HEATING IU QTY.	10	Indoor unit quantity in heating in the system
		MODE	MIX COOLING	System operation mode: OFF/COOLING /HEATING / MIX COOLING/MIX HEATING
		STATUS	RUNNING	Current status, LASTEST ERROR CODE/ DEFROSTING/OIL RETURN/STANDBY/RUNNING
	Operational Data	HIPRESSURE	650 PSIG	System high pressure
		LOPRESSURE	250 PSIG	System low pressure
		COMPRESSOR A	102 HZ	Main compressor speed
		COMPRESSOR B	100 HZ	Sub compressor speed
		FAN STEP	13+13	Outdoor left and right fan motor speed step:0~25
		EXVA	320P/480P	EXV A opening: current opening/fully opening
		EXVB	320P/480P	EXV B opening: current opening/fully opening
		EXVC	320P/480P	EXV C opening: current opening/fully opening
		EXCHANGER	COND+COND	Outdoor left and right exchanger status: COND+COND/COND+ OFF/EVAP+OFF/EVAP+EVAP/ COND + EVAP (COND-CONDENSER,EVAP-EVAPORATOR)
	Temp Sensor Data	T2 AVERAGE	100°F	Average of all indoor unit coil temperature
		T2B AVERAGE	100°F	Average of all indoor unit coil outlet temperature
		LEFTCON. T3A	100°F	Outdoor left exchanger temperature
		RIGHTCON. T3B	100°F	Outdoor right exchanger temperature
		AMBIENT T4	100°F	Outdoor ambient temperature
		T6A	100°F	Outdoor unit subcooler inlet temperature
		T6B	100°F	Outdoor unit subcooler outlet temperature
		T7C1	100°F	Main compressor discharge temperature
		T7C2	100°F	Sub compressor discharge temperature
		TC	100°F	System condensation temperature
		TE	100°F	System evaporation temperature
		TF1	100°F	Main compressor inverter module temperature
		TF2	100°F	Sub compressor inverter module temperature
		DSH	100°F	Discharge temperature superheat
		T10	100°F	External outdoor ambient sensor temperature
	Electrical Data	COMPRESSOR A	20A	Main compressor current
		COMPRESSOR B	15A	Sub compressor current
		VOLTAGE	208/230VAC	Input voltage
	Firm Ware Version	MAIN SOFTWARE	00.01	Main control PCB software version
		LCD SOFTWARE	00.01	LCD module software version
ALARM CODE	LATEST ALARM CODE	Refer to "ERROR CODE" table		
	CLEAR HISTORY			Clear all the error code record

SETTINGS	INSTALLATION INFO	TOTAL CHARGE	999 LBS	Field input
		COMMISSION	01/20/19	Field input
	DIP SWITCH READING	Refer to "DIP SWITCH READING" table		
	FUNCTION SETTINGS	INDOOR TEMP UNIT	F	Command, can change all the indoor unit temperature unit to C/F
		T4 PRIORITY	70°F	Field setting, options:50F/60F/70F
		COMP. LOCKOUT	-14°F	Ambient temperature for compressor lockout setting in heating mode.
		T2 TARGET	115°F	Field setting, options: 104/108/111/115(DEFAULT)/119/122F
		T2B TARGET	50°F	Field setting, options: 43/47/50(DEFAULT)/53/56/59F
		DEMAND CONTROL	100%	Field setting, options: 100%/90%/80%/70%/60%/50%/40%
		VIP ADDRESS	63	Field setting, options: 0~63, OXFF - no VIP indoor
		SNOW MODE	NONE	Field setting, options: NONE/HEAVY/LIGHT
	CHANGE PASSWORD			Default password is 0000
SERVICE	SERVICE MODE			Command, select "YES" to enter and "NO" to exit and press "Enter" to confirm the command.
	TEST OPERATION			Command, select "YES" to enter and "NO" to exit and press "Enter" to confirm the command.
	COOLING TEST			Command, select "YES" to enter and "NO" to exit and press "Enter" to confirm the command.
	HEATING TEST			Command, select "YES" to enter and "NO" to exit and press "Enter" to confirm the command.
	MANUAL DEFROST			Command, select "YES" to enter and "NO" to exit and press "Enter" to confirm the command.
	REFRIGERANT RECYCLE MODE	RECYCLE TO ODU		Command, select "YES" to enter and "NO" to exit and press "Enter" to confirm the command.
		RECYCLE TO IDU		Command, select "YES" to enter and "NO" to exit and press "Enter" to confirm the command.
		RECYCLE TO PIPING		Command, select "YES" to enter and "NO" to exit and press "Enter" to confirm the command.
	ASSIGN IDU ADDRESS			Command, automatically assign addresses to the indoor units in the system.
	ECO MODE			Field setting.
	CANCEL LVM E-STOP			Command, clear the emergency stop status from LVM in case LVM is broken.
	CLEAR IDU ADDRESS			Command, clear all indoor unit addresses in the system.
	FACTORY SETTINGS			Command

**Table 9. VRB Electrical Data**

Model No.		VRB072H4		VRB096H4		VRB120H4	
Line voltage data - 60 hz - 3 phase		<b>208/230V</b>	<b>460V</b>	<b>208/230V</b>	<b>460V</b>	<b>208/230V</b>	<b>460V</b>
<sup>1</sup> Maximum Overcurrent Protection (amps)		45	30	45	30	60	30
<sup>2</sup> Minimum circuit ampacity		39.0	26.8	39.0	28.2	54.0	29.5
<b>Compressor</b>	No. of compressors	1	1	1	1	1	1
	Rated load amps	26.3	19	26.3	20	38.3	21
<b>Outdoor Fan Motor</b>	Motor type	DC MOTOR	DC MOTOR	DC MOTOR	DC MOTOR	DC MOTOR	DC MOTOR
	No. of motors	2	2	2	2	2	2
	Full load amps	2.6/2.9	1.4/1.6	2.9/3.2	1.5/1.7	2.9/3.2	1.5/1.7
	Input - W	680/780	750/850	780/890	820/930	780/890	820/930
	Output - W	580/660	640/720	670/760	700/800	670/760	700/800
Model No.		VRB144H4		VRB168H4		VRB192H4	
Line voltage data - 60 hz - 3 phase		<b>208/230V</b>	<b>460V</b>	<b>208/230V</b>	<b>460V</b>	<b>208/230V</b>	<b>460V</b>
<sup>1</sup> Maximum Overcurrent Protection (amps)		80	40	80	40	80	40
<sup>2</sup> Minimum circuit ampacity		69.5	37.4	69.5	39	69.5	39.6
<b>Compressor</b>	No. of compressors	2	2	2	2	2	2
	Rated load amps	27.2/27.2	15/14	27.2/27.2	15.5/15	27.2/27.2	16/15
<b>Outdoor Fan Motor</b>	Motor type	DC MOTOR	DC MOTOR	DC MOTOR	DC MOTOR	DC MOTOR	DC MOTOR
	No. of motors	2	2	2	2	2	2
	Full load amps	4.0/4.3	2.2/2.4	4.0/4.3	2.2/2.4	4.0/4.3	2.2/2.4
	Input - W	1200/1200	1200/1200	1200/1200	1200/1200	1200/1200	1200/1200
	Output - W	900/940	900/940	900/940	900/940	900/940	900/940

**NOTES:**

In multiple module systems each outdoor unit requires a separate electrical connection.

Incoming voltage must not be above or below these voltage ranges: 208/230V - 191V minimum, 247V maximum; 460V - 423V minimum, 497V maximum. 2% Maximum line voltage tolerance between phases.

<sup>1</sup> HACR type circuit breaker or fuse.

<sup>2</sup> Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.

## Settings, Functions and Configurations

Turn power off prior to any rotary dial / dip switch configuration adjustments.

### Dip Switch Settings and Configurations

#### S2 Outdoor Unit

S2-1 ON	0 Heat recovery system
1	1 Heat pump system

#### S3 T10 Temperature Sensor

S3 ON	0 Do not use T10 temperature sensor
1	1 Use T10 temperature sensor

**NOTE** - Factory supplied T10 sensor to be used in place of T4 should ODU be placed inside an enclosure. T10 Sensor to be placed outside enclosure to configure priority operation

#### S4 Static Pressure Setting

S4 ON	Zero static pressure mode (0 WG) (Default factory setting)
S4 ON	Low static pressure mode 0.08 WG (20 Pa)
S4 ON	Medium static pressure mode 0.16 WG (40 Pa)
S4 ON	High static pressure mode 0.24 WG (60 Pa)
S4 ON	Super High static pressure mode 0.32 WG (80 Pa)
S4 ON	Reserved

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

0 = OFF (down)

1 = ON (up)

**NOTE** - Turn off power to the unit before setting the dial/dip switch. The function will be available when the unit is powered on again.

Power must be cycled for new configurations to be set.

### Dial Switch Settings and Configurations

#### ENC 1 Outdoor Unit Address Setting

ENC1	Outdoor unit address assignment (only 0-2 used)
0	Main Outdoor Unit
1	Sub 1 Outdoor Unit
2	Sub 2 Outdoor Unit

#### ENC 3 and S12 Indoor Unit Quantity Setting

ENC3 0-F	S12 ON	Number of indoor units -- 0-15
ENC3 0-F	S12 ON	Number of indoor units -- 16-31
ENC3 0-F	S12 ON	Number of indoor units -- 32-47
ENC3 0-F	S12 ON	Number of indoor units -- 48-63
ENC3 0	S12 ON	Number of indoor units -- 64

#### ENC 4 Outdoor Unit Network Address Setting

ENC4	Outdoor network address assignment -- 0-7
------	---

#### ENC 5 Silent Mode

ENC5	0 Silence mode 1
	1 Silence mode 2
	2 Silence mode 3
	3 Silence mode 4
	4 None (factory default)
	5 None
	6 None
	7 None
	8 Silent mode
	9 None
	A Super silence mode
	B None
	F Reserved

## Settings and Functions

Symbol	Function	Item	Description
n1_	Service Mode	n11	Test Operation
		n14	Cooling Test
		n15	Heating Test
		n16	Service Mode
		n17	Manual Defrost
n2_	Refrigerant recycle function	n21	Recycle to ODU
		n22	Recycle to IDU
		n23	Recycle to piping
n3_	Error and version query	n31	Last Fault Code
		n32	Clear Fault History
		n33	Fan Software Version
n4_	Demand Control Setting	n41	Demand Control Mode 1 (100%)
		n42	Demand Control Mode 2 (40%)
		n43	Demand Control Mode 3 (50%)
		n44	Demand Control Mode 4 (60%)
		n45	Demand Control Mode 5 (70%)
		n46	Demand Control Mode 6 (80%)
		n47	Demand Control Mode 7 (90%)
n5_	Snow Blowing Mode Setting	n51	Exit Snow Blowing Mode
		n52	Snow Mode 1 (High)
		n53	Snow Mode 2 (Low)
nA_	/	nA1	Compressor Lockout Temperature - Set outdoor temperature to disengage outdoor unit.
		nA2	T4 Priority - Mode Priority based on outdoor temperature.
		nA3	T2 Target - indoor unit coil temperature - heating.
		nA4	T2B Target - indoor unit coil temperature - cooling.
		nA5	VIP - Select indoor unit address that will determine mode priority.
nb_	/	nb1	Indoor Temperature Unit °C
		nb2	Indoor Temperature Unit °F
		nb3	Exit Energy Saving Mode
		nb4	Enter Energy Saving Mode
		nb5	Cancel Emergency Stop Order
		nb6	Restore Factory Setting
nC_	Address Mode Setting	nC1	Clear Indoor Unit Addresses
		nC2	Assign Indoor Unit Addresses Automatically

**SW3 / SW4 Query Instructions**

Press SW4 to move FORWARD / NEXT. Press SW3 to move BACKWARD / PREVIOUS.

#	Parameter Description	Parameter Value*	Recorded Value
0	Outdoor Unit Modular Configuration Address	Main 0 / Sub 1 / Sub 2	
1	Singular Module Capacity	Outdoor Unit Specific	
2	Outdoor Unit Module Qty.	1, 2, or 3 Outdoor Units	
3	Indoor Unit Qty. Setting	Indoor Unit Qty. Configuration	
4	System Operation Mode	0-OFF; 2-Cooling Only; 3-Heating Only; 5-Mix Cooling Mode; 6-Mix Heating Mode	
5	Total System Capacity	Main + Sub + Sub	
6	Total Heating Capacity Demand	Indoor Unit Heating Demand	
7	Total Cooling Capacity Demand	Indoor Unit Cooling Demand	
8	Corrected Heating Capacity	Revised Capacity	
9	Corrected Cooling Capacity	Revised Capacity	
10	Total Available Capacity	Total Revised Capacity	
11	Fan A Step Value		
12	Fan B Step Value		
13	Average Indoor Unit T1 Temperature	Indoor Unit R/A or Room Temp	
14	Average T2 Temperature	Indoor Unit Coil Temp. Heat Mode	
15	Average T2B Temperature	Indoor Unit Coil Temp. Cool Mode	
16	Outdoor Left Heat Exchanger Coil Temperature T3A		
17	Outdoor Right Heat Exchanger Coil Temperature T3B		
18	Outdoor Air Temperature T4		
19	Subcooler Inlet Temperature T6A		
20	Subcooler Outlet Temperature T6B		
21	Compressor A Discharge Temperature		
22	Compressor B Discharge Temperature		
23	Compressor A Inverter Module Heatsink Temperature		
24	Compressor B Inverter Module Heatsink Temperature		
25	Suction/Low Pressure Vapor Superheat Temperature	T6B -T6A	
26	Hot Gas Discharge Superheated Temperature		
27	Current Consumption Compressor A		
28	Current Consumption Compressor B		
29	EXV A Throttle Position	Actual Position Value/4	
30	EXV B Throttle Position	Actual Position Value/4	
31	EXV C Throttle Position	Actual Position Value/4	
32	High Pressure	Discharge pressure*10	
33	Low Pressure	Actual pressure*100	
34	Qty. of Indoor Units Discovered		
35	Qty. of Indoor Units in Operation		
36	Priority Mode	0-Outdoor Ambient; 1-Cooling Priority; 2-Master Indoor Unit; 3-Heating Only; 4-Cooling Only; 6-Heating Priority; 14-System Demand	
37	Silent Mode		
38	Static Pressure Mode	0-Zero Static Pressure Mode (0 W.g.); 1-Low Static Pressure Mode (0.08 W.g.); 2-Medium Static Pressure Mode (0.16 W.g.); 3-High Static Pressure Mode (0.24 W.g.); 4-Super High Static Pressure Mode (0.32 W.g.)	
39	Reserved		



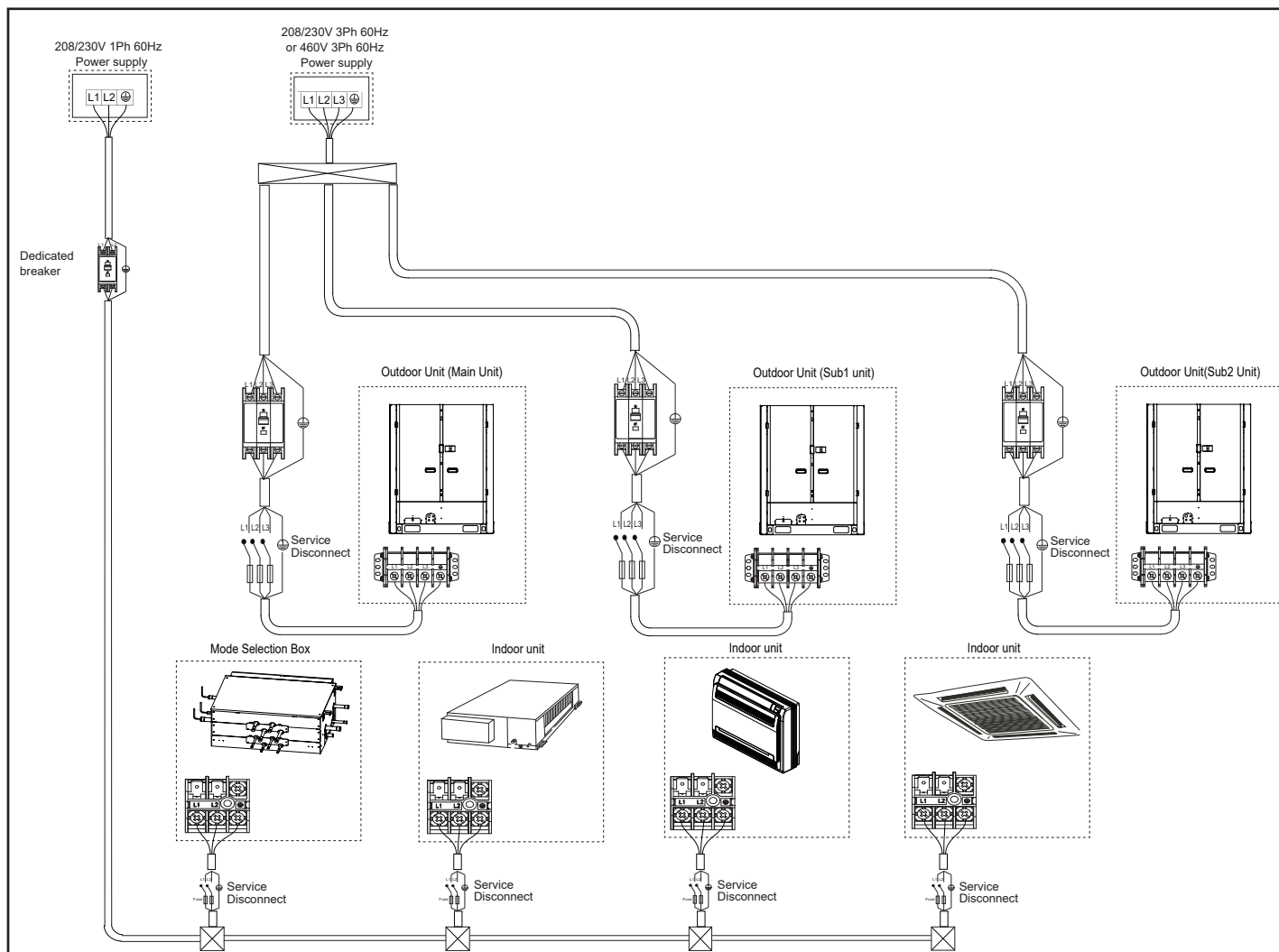
#	Parameter Description	Parameter Value*	Recorded Value
40	Reserved		
41	Reserved		
42	Reserved		
43	Reserved		
44	Indoor Unit VIP Address		
45	Reserved		
46	Reserved		
47	Reserved		
48	Software Version		
49	Reserved		
50	Last Recorded Fault Protection Code		

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

**NOTES** - Normal display: When in standby mode, the left position displays the address of the outdoor unit and the right position displays the quantity of indoor units that can communicate with the outdoor unit.

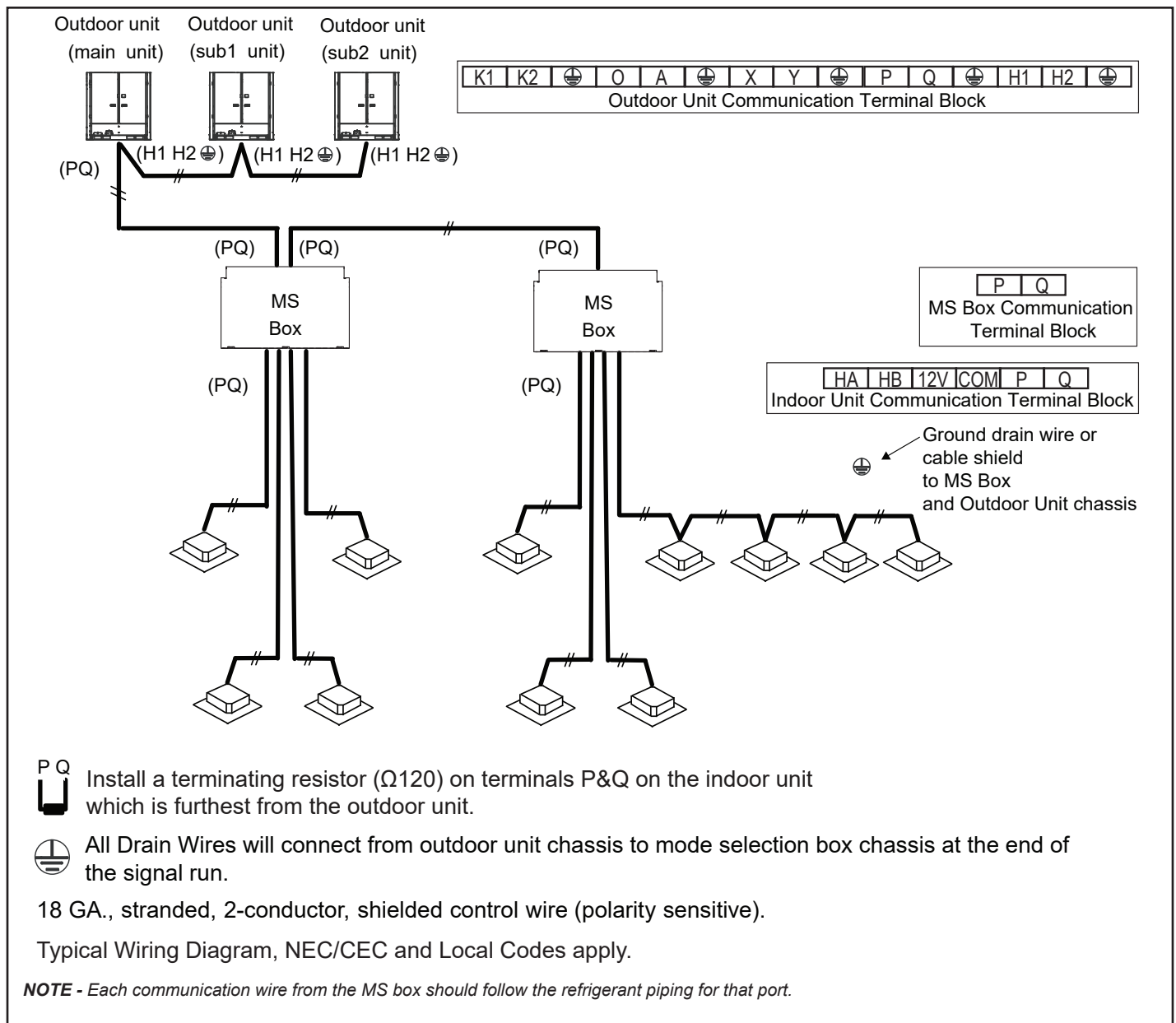
When the compressor is operating, the LED display shows the rotation frequency of the compressor.

## Electrical Installation for Indoor and Outdoor Units



Always follow NEC/CEC and Local Codes.

**Figure 34. Typical Power Wiring**



**Figure 35. VRB Heat Recovery Typical Communication Wiring**

## Troubleshooting

Digital Display	Error Code Definition
OE0	Communication error between outdoor units
OE1	Power phase loss error
OE2	Communication error between indoor and main outdoor unit
OE4	Outdoor ambient temperature sensor (T4/T10) and condenser pipe temperature sensor (T3A/T3B) error
OE5	Voltage error
OE6	Inverter module temperature sensor error
OE7	Discharge temp sensor error
OE8	Incorrect ENC 1 Main - Sub Configuration
OXE9	Compressor driver error
OXH0	Communication error between main control chip and inverter driver chip
OH2	Quantity of outdoor unit decreased
OH3	Quantity of outdoor unit increased
OXH4	Compressor inverter module protection appears three times in 60 minutes, X stands for corresponding module
OH5	Low pressure protection lock out (P2 3X in 60 minutes)
OH6	Compressor Discharge Temperature Protection ( P4 3X in 100 minutes)
OH7	Quantity of indoor unit decreased
OH8	High pressure sensor error
OH9	DC Fan Module Protection ( P9 10X in 120 minutes)
OHb	Low pressure sensor error
OYHd	Sub ODU error (Y will be 1 or 2, stands for sub 1 or sub 2 ODU)
OC7	Inverter Module Temperature Protection ( 1PL / 2PL 3X in 100 minutes)
OXF1	PTC of filter board error
OF3	Outdoor unit Subcooler Outlet Temperature sensor error
OF5	Outdoor unit Subcooler Inlet Temperature sensor error
OYF6	EEV A/B/C error (Y will be 1, 2 or 3, stands for A, B, C)
OF9	Communication error between low ambient cooling kit(LAC kit) and outdoor unit PCB
OP1	High Pressure Protection, CI/CO = 4.4/3.2 Mpa or 638/464 psig
OP2	Low Pressure Protection, CI/CO = .05/.15 Mpa or 7.25/21.8 psig
EXP3	Over current protection of inverter compressor
OP4	Compressor discharge temp protection, CI/CO = 120/90°C or 248/194°F
OP5	Condenser high temp protection, CI/CO = 65/55°C or 149/131°F
OP9	Fan module protection
OXPL	Temperature protection of inverter module, CI/CO = 80/60°C or 176/140°F
OPP	Low compressor discharge temperature protection
OXL0	Compressor inverter module error, X stands for corresponding module (Compressor inverter module protection)
OXL1	Low voltage protection of DC bus, X stands for corresponding module(Compressor inverter module protection)
OXL2	Over voltage protection of DC bus, X stands for corresponding module(Compressor inverter module protection )
OXL4	Compressor Module Protection
OXL5	Low Drive Frequency Error
OXL7	Incorrect Phase Sequence
OXL8	Frequency Differential Error
OXL9	Uniformed Frequency Error
OA0	Emergency Stop
OA2	Power leakage protection

**NOTE** - X = corresponding main compressor or sub compressor



## Technical Support

1-844-GET-VRF1

(1-844-438-8731)

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[www.LennoxVRF.com](http://www.LennoxVRF.com)

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