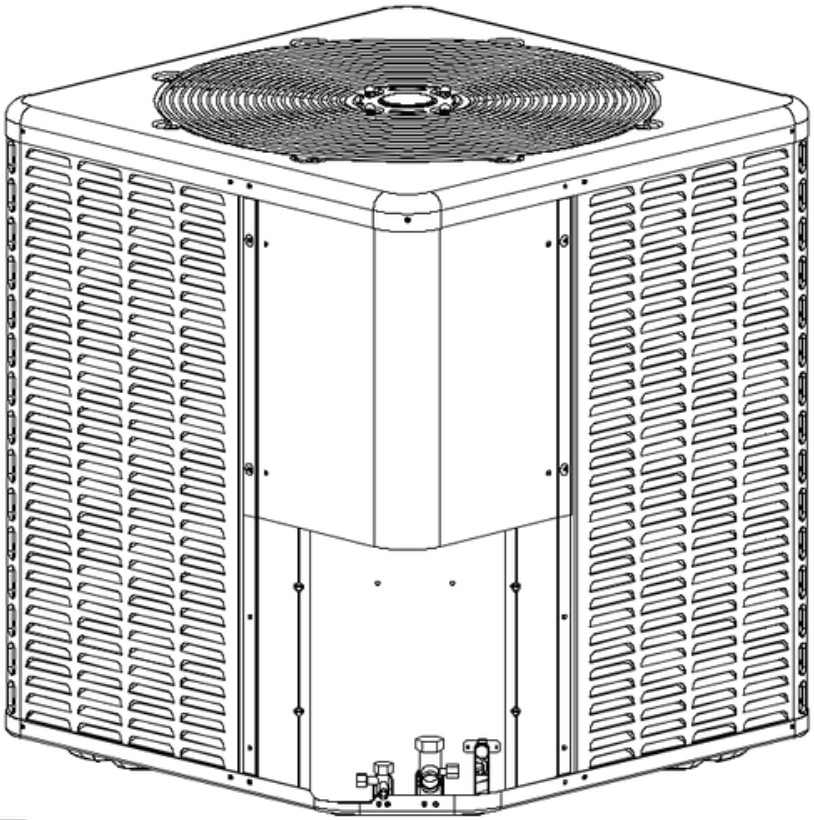
INSTALLATION INSTRUCTIONS

Split System Heat Pump

Model Size:
2&3&4&5 Tons
24&36&48&60K Btu/h
R32



AHRI CERTIFIED®
www.ahridirectory.org
Unitary Small AC
AHRI Standard 210/240
Certification applies only when the complete system is listed with AHRI.

AHRI CERTIFIED®
www.ahridirectory.org
Unitary Small HP
AHRI Standard 210/240
Certification applies only when the complete system is listed with AHRI.

C ETL US
Intertek

TGM
AIR CONDITIONERS

■■■■■■■

1. Symbol and Key to Safety Instructions

1.1 Symbol Keywords

⚠	WARNING	The warnings in this document are identified by warning triangles printed on a black background. The key words at the beginning of the warning indicate the type and severity of the next risk if no measures are taken to prevent it.

The following keywords are defined and used in this document:

▶	Danger	Indicates a hazardous situation, which, if not avoided, will lead to death or serious injury.
▶	[illegible]	Indicates a hazardous situation, which, if not avoided, may lead to death or serious injury.
▶	[illegible]	Indicates a hazardous situation, which, if not avoided, may cause mild to moderate injury.
▶	[illegible]	Used to deal with behaviors unrelated to personal injury.

Important information

ⓘ	This symbol represents important information that is not dangerous to people or property.

1.2 Safety

Please Read Before Continuing.

⚠	WARNING	▶ Failure to observe this warning may result in property damage, serious personal injury or death.
		▶ Before touching the electrical components, wait for 3 minutes after disconnecting the power supply.

⚠	NOTICE	▶ This document is the property of the customer and is kept by this unit. When you are finished, please return to the service information package.
		▶ These instructions do not cover all changes in the system, nor do they provide all unexpected situations that may be encountered during installation.
		▶ If you need more information, or there are special problems that are not sufficient for the buyer, you should consult your installation dealer or local dealer.

Some benefits of installing an approved indoor and outdoor split system are maximum efficiency, best performance and best overall system reliability.

This document contains wiring diagram and maintenance information. This is the customer's property and belongs to this unit. When you are finished, please return to the service information package.

Warning:

- The unit must be installed by qualified personnel with a capability certificated for handling refrigerant fluids. Refer to regulation and laws in use on installation location.
- Installation, service, maintenance and repair of this unit must be performed by a certified technician.
- Servicing shall be performed only as recommended by the manufacturer.
- Product uninstallation and recycling must be performed by a certified technician.
- The appliances is designed to be operated in outdoor area. If have to be installed indoor, the appliance shall be stored in a room without continuously operating open flames (for example an operating gas appliance) and ignition sources (for example an operating electric heater).
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- The appliance shall be installed in accordance with national wiring regulations.
- Children should be supervised to ensure that they do not play with the appliance.
- Before accessing the connection terminals, all power circuits must be disconnected.
- This information is intended for use by individuals with sufficient electrical and mechanical experience background. Attempting to repair central air conditioning products may result in personal injury and/or property damage.

Warning: Dangerous voltage

- Failure to observe this warning may result in property damage, serious personal injury or death.
- Can cause injury or death. disconnect all remote electric power supplies before servicing. Follow proper locking/tagging procedures to ensure that the power supply will not be energized accidentally.

Warning: Refrigerant oil

- Attempting to repair central air-conditioning products may result in property damage, serious personal injury or death. These units use R32 refrigerant, and its working pressure is 50-70% higher than R-22. Use only the service equipment approved by R32 . The refrigerant cylinder may contain a "dip" tube to allow liquid refrigerant to be filled into the system. This systems use POE oil (VG75、VG75R or equivalent), which can easily absorb moisture from the atmosphere. In order to limit this "moisture absorption" effect, the system should be sealed as much as possible. If the system is exposed to the atmosphere for more than 4 hours, the compressor oil must be changed.
  Do not destroy the vacuum with air, and always replace the filter dryer when you open the system for component replacement.

Warning: Hot surface

- May cause mild to severe burns. Failure to observe this caution may result in property damage or personal injury. Do not touch the top of the compressor.

Caution: Contains refrigerant

- Failure to follow the correct procedures will lead to personal illness or injury or serious equipment damage. The system contains high-pressure oil and refrigerant. Before opening the system, recover the refrigerant to release the pressure.

Note: Indoor unit required

- The indoor unit must be matched with the expansion valve.

Note:

- The manufacturer recommends installing only approved matched indoor and outdoor systems. All of the manufacturer's split systems are AHRI rated with expansion valve indoor systems. Some of the benefits of installing approved matched indoor and outdoor split systems are maximum efficiency, optimum performance and the best overall system reliability.

Note: Grounding required

- Failure to check or use the correct maintenance tools may result in equipment damage or personal injury. Reconnect all grounding devices. All parts of this product that can conduct current are grounded. If the grounding wire, screw, strap, clip, nut or washer used to complete the grounding path is removed during maintenance, it must be put back in place and properly fixed.

Warning: service valve

- Failure to observe this warning will result in release of system pressure, which may result in personal injury and/or property damage. When opening the liquid pipeline service valve, be extra careful. Turn the valve stem counterclockwise until the valve stem touches the bead.

Warning: Brazing required

- Failure to check the wiring or use the correct maintenance tools may result in equipment damage or personal injury. If using existing refrigerant lines, make sure that all joints are brazed, not soldered.

Warning: High current leakage

- Failure to observe this warning may result in property damage, serious personal injury or death. Before connecting the power supply, grounding is essential.

Warning:

- This product may expose you to chemicals including lead and lead components, which are known to cause cancer, birth defects or other reproductive harm in California. For more information, please visit www.P65Warnings.ca.gov.

Warning:

- Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
- The appliances is designed to be operated in outdoor area. If have to be installed indoor, the appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater.)
- Do not pierce or burn.
- Be aware that refrigerants may not contain an odour.

A2L	**WARNING**	This symbol that this appliance used a flammable refrigerant . If the refrigerant is leaked and exposed to an external ignition source, there is a risk of fire.
	CAUTION	This symbol that the operation manual should be read carefully.
	CAUTION	This symbol that a service personnel should be handling this equipment with reference to the installation manual.
	CAUTION	This symbol that information is available such as the operating manual or installation manual.

1.3 Instructions for repairing appliances containing R32

Checks to the area

Prior to beginning work on systems containing FLAMMABLE REFRIGERANTS, safety checks are necessary to ensure that the risk of ignition is minimised.

Work procedure

Work shall be undertaken under a controlled procedure so as to minimise the risk of a flammable gas or vapor being present while the work is being performed.

General work area

All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided.

Checking for presence of refrigerant

The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i. e. non-sparking, adequately sealed or intrinsically safe.

Presence of fire extinguisher

If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO2 fire extinguisher adjacent to the charging area.

No ignition sources

No person carrying out work in relation to a REFRIGERATING SYSTEM which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.

Ventilated area

Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

Checks to the refrigerating equipment

Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer’s maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer’s technical department for assistance.

The following checks shall be applied to installations using FLAMMABLE REFRIGERANTS:

– *the actual REFRIGERANT CHARGE is in accordance with the room size within which the refrigerant containing parts are installed;*

– *the ventilation machinery and outlets are operating adequately and are not obstructed;*

– *if an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant*

– *marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected;*

– *refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.*

Checks to electrical devices

Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised. Initial safety checks shall include:

• that capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;

• that no live electrical components and wiring are exposed while charging, recovering or purging the system;

• that there is continuity of earth bonding.

Repairs to sealed components

Sealed electrical components shall be replaced.

Repair to intrinsically safe components

Intrinsically safe components must be replaced.

Cabling

Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

Detection of flammable refrigerants

Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.

The following leak detection methods are deemed acceptable for all refrigerant systems.

Electronic leak detectors may be used to detect refrigerant leaks but, in the case of FLAMMABLE REFRIGERANTS, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed.

Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

If a leak is suspected, all naked flames shall be removed/extinguished.

If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Removal of refrigerant shall be according to **Removal and evacuation.**

Removal and evacuation

When breaking into the refrigerant circuit to make repairs – or for any other purpose –conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration. The following procedure shall be adhered to:
– safely remove refrigerant following local and national regulations;
– evacuate;
– purge the circuit with inert gas (optional for A2L);
– evacuate (optional for A2L);
– continuously flush or purge with inert gas when using flame to open circuit;
and
– open the circuit.

The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems.

For appliances containing flammable refrigerants, refrigerants purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum (optional for A2L). This process shall be repeated until no refrigerant is within the system (optional for A2L). When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.

The outlet for the vacuum pump shall not be close to any potential ignition sources, and ventilation shall be available.

Charging procedures

In addition to conventional charging procedures, the following requirements shall be followed.

- Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimise the amount of refrigerant contained in them.
- Cylinders shall be kept in an appropriate position according to the instructions.
- Ensure that the REFRIGERATING SYSTEM is earthed prior to charging the system with refrigerant
- Label the system when charging is complete (if not already).
- Extreme care shall be taken not to overfill the REFRIGERATING SYSTEM.

Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

Decommissioning

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant. It is essential that electrical power is available before the task is commenced.

a) Become familiar with the equipment and its operation.

b) Isolate system electrically.

c) Before attempting the procedure, ensure that:

- mechanical handling equipment is available, if required, for handling refrigerant cylinders;
- all personal protective equipment is available and being used correctly;
- the recovery process is supervised at all times by a competent person;
- recovery equipment and cylinders conform to the appropriate standards.

d) Pump down refrigerant system, if possible.

e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.

f) Make sure that cylinder is situated on the scales before recovery takes place.

g) Start the recovery machine and operate in accordance with instructions.

h) Do not overfill cylinders (no more than 80 % volume liquid charge).

i) Do not exceed the maximum working pressure of the cylinder, even temporarily.

j) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.

k) Recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked.

Labelling

Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. For appliances containing FLAMMABLE REFRIGERANTS, ensure that there are labels on the equipment stating the equipment contains FLAMMABLE REFRIGERANT.

Recovery

When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i. e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of the flammable refrigerant. If in doubt, the manufacturer should be consulted. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition.

The recovered refrigerant shall be processed according to local legislation in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely.

2. Considerations of Unit Location

2.1 Unit Size

Table 2.1 Outdoor Operating Temperature

Model	Temperature
Cooling mode	5-125°F
Heating	-13-86°F

Table 2.2

Unit size	
Model	H x W x L (inches)
24/36K	25 x 29-1/7 x 29-1/7
48/60K	32-7/8 x 29-1/7 x 29-1/7

The weight of the unit is labeled on the carton.

When installing the outdoor unit on the roof, make sure that the roof can support the weight of the outdoor unit. It is recommended to choose appropriate isolation to prevent sound or vibration from being transmitted to the building structure.

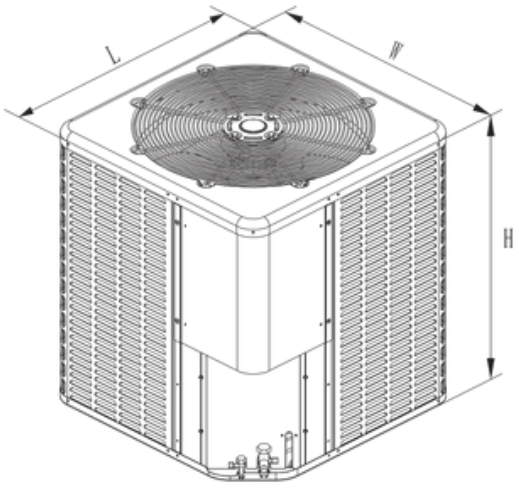


Figure 2.1

2.2 Refrigerant Pipeline Restriction

Table 2.3

System Capacity Model	Liquid Line	Suction Line	Total Equivalent Length - Feet					
			25	50	75	100	125	150
	Inch O.D		Maximum Vertical Separation -Feet					
24K	3/8	3/4 Std.	25	50	45	40	30	25
36K	3/8	3/4 Std.	25	50	50	50	35	25
48K	3/8	7/8 Std.	25	50	50	40	30	25
60K	3/8	7/8 Std.	25	50	50	40	30	25

* It is recommended to adopt standard pipeline size; Refrigerant charge: see Section 14.

- Maximum equivalent length of pipeline = 1■0 feet.
- Maximum vertical equivalent length = 50 feet.
- Use only the pipe diameters shown in Table 2.3.
- If the suction line exceeds 65 feet, do not use a larger suction line than recommended.

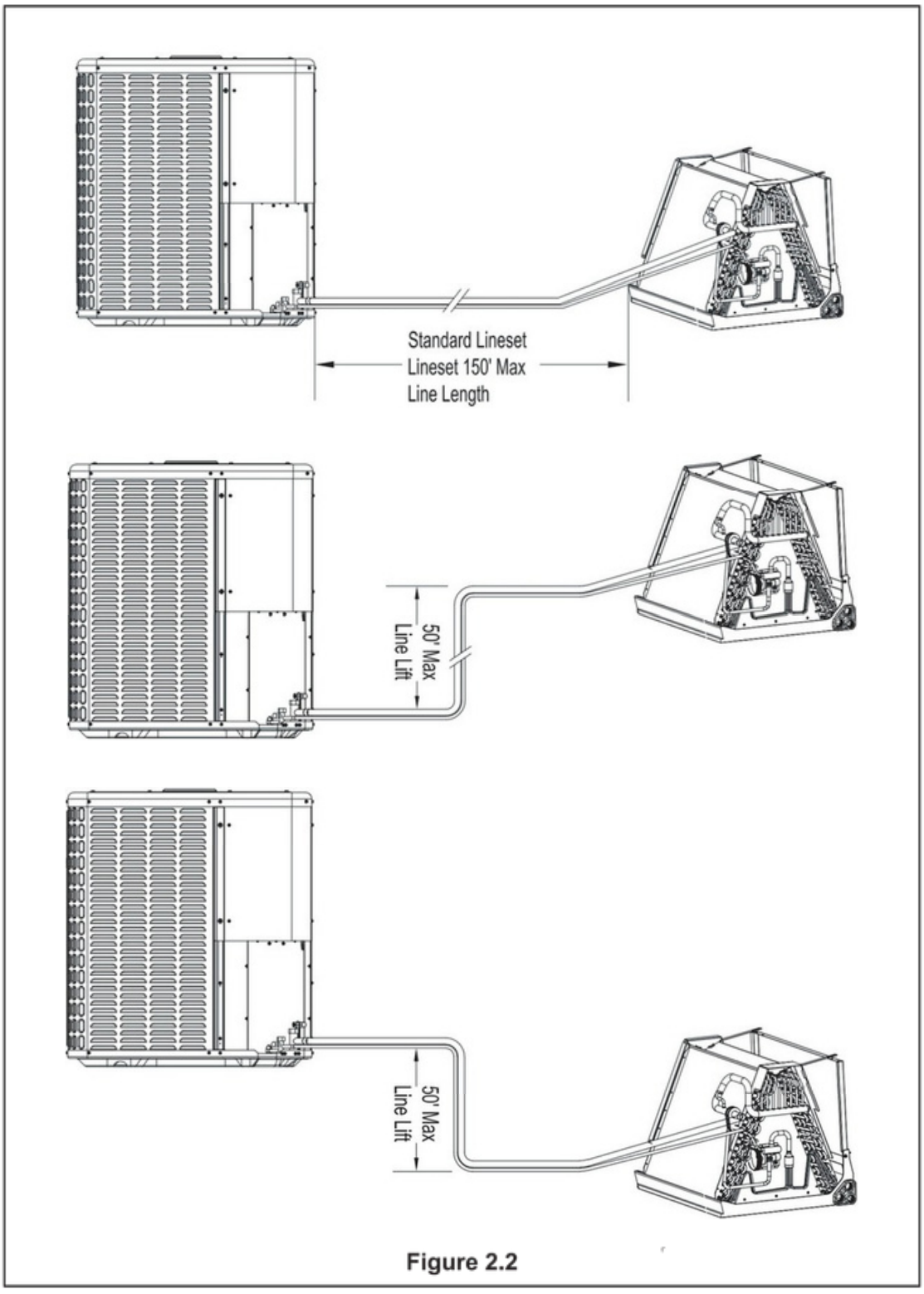


Figure 2.2

2.3 Long Line Installation Precautions

- Note that the length of the connecting line from the outdoor unit to the indoor unit cannot exceed 150 feet.
- If all long lines are in a horizontal state, no additional measures are required;
- If there is a vertical height difference in the long line, it needs to be installed according to the following requirements:
- When the vertical height difference is 0＜h≤16.5feet, no additional measures are required;
- When the vertical height difference is 16.5feet＜h≤33feet, an oil return bend needs to be added in the middle of the height difference.
- When the vertical height difference is 33feet＜h≤50feet, two oil return bends need to be added at an equal distance in the height difference.

NOTE: The vertical height difference between the outdoor unit and the indoor unit cannot exceed 50 feet.

The following is the connection method of the oil return bend

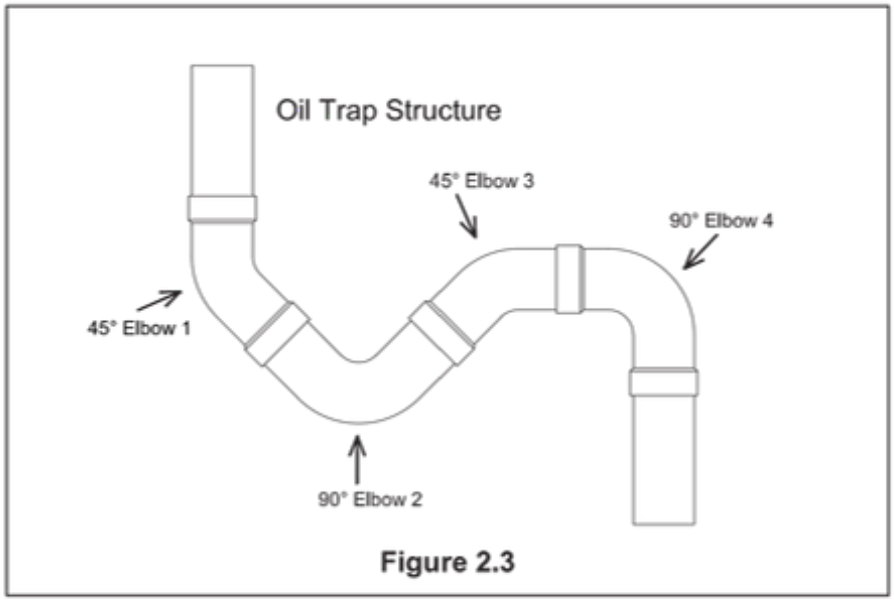


Figure 2.3

2.4 Position Restriction

- Make sure that the discharge area at least 60 inches above the top of the unit is unrestricted.
- Don't put the outdoor unit near the bedroom, because the normal operating sound may be offensive.
- Position the equipment, leaving enough space for smooth airflow, wiring, refrigerant lines and maintainability.
- Ensure a minimum of 12 in. clearance on the adjacent side without any obstructions, and a minimum of 24 in. clearance on one side of control board access panel to a wall.
- Keep a distance of 24 inches between adjacent units.
- Place the unit in a place where water, snow or ice cannot fall directly on the device from the roof or overhangs.
- See figures 2.4 and 2.5

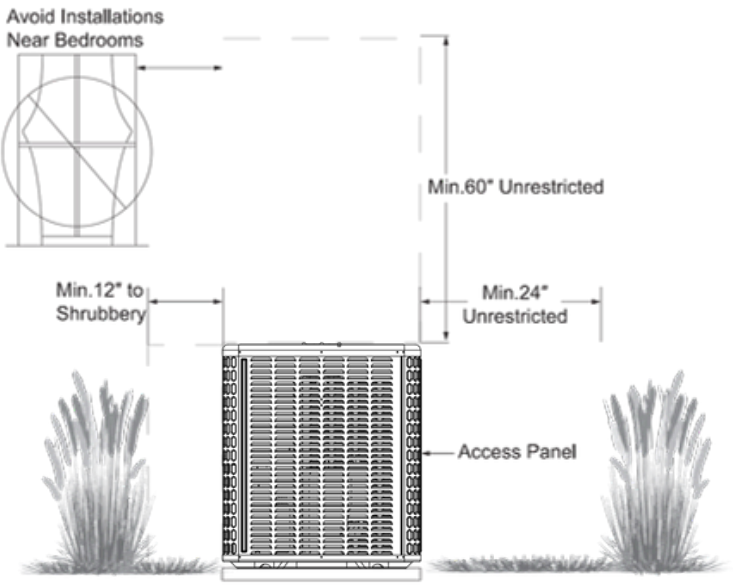


Figure 2.4

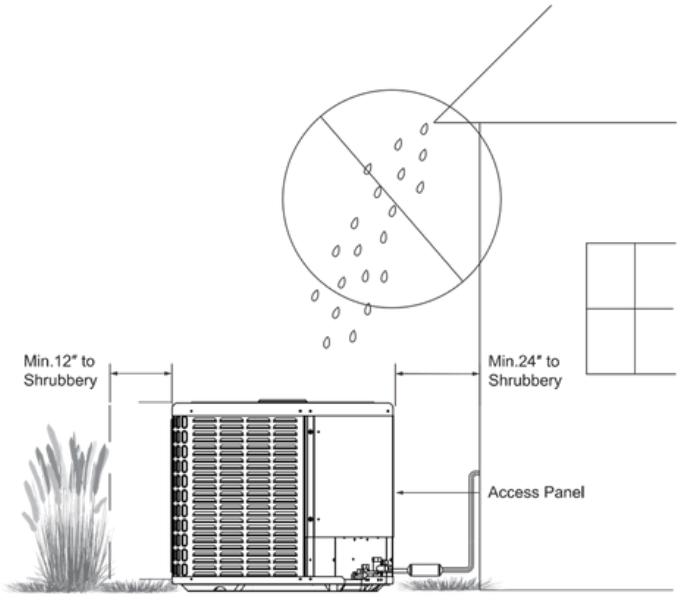


Figure 2.5

Precautions in cold climate (heat pump only)

Precautions must be taken for units installed in areas with snow and long-term temperatures below freezing point.

- Depending on the local weather conditions, the unit should be raised by 3-12 inches. This extra height will allow the snow and ice melted during the defrosting cycle to be discharged before re-freezing. Make sure that the drain hole on the unit chassis is not blocked, otherwise it will hinder the defrosting water discharge (Figure 2.6).
- If possible, avoid places that are prone to snow. If this is not feasible, a snow barrier should be installed around the unit to prevent snow accumulation on the side of the unit.

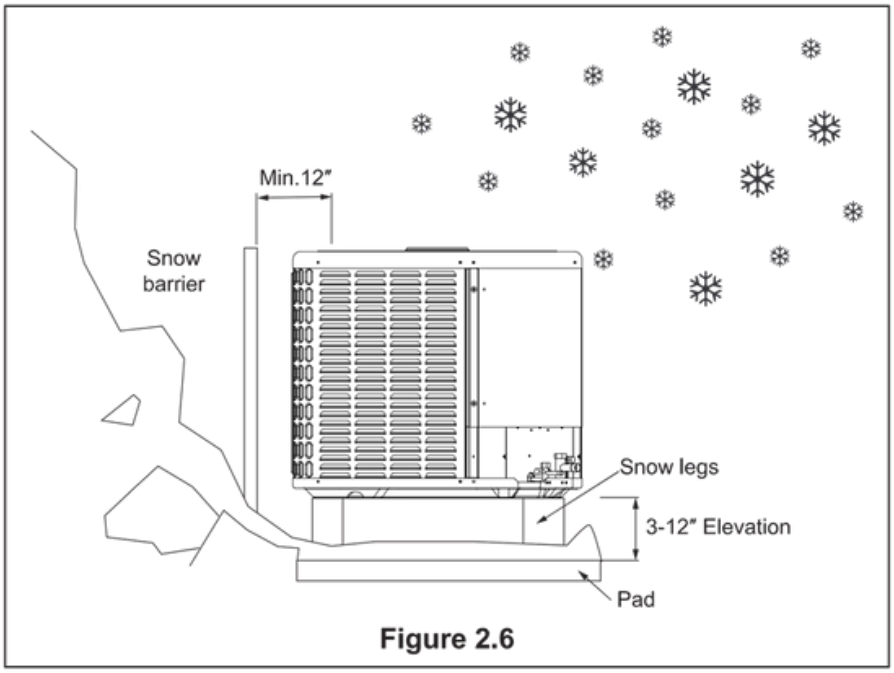


Figure 2.6

Corrosive Environment

Exposure to corrosive environment may shorten the service life of unit, corrode metal parts and/or negatively affect the performance of unit. Corrosive elements include but are not limited to: sodium chloride, sodium hydroxide, sodium sulfate and other compounds commonly found in seawater, sulfur, chlorine, fluorine, fertilizers and various chemical pollutants from industrial/manufacturing plants. If it is installed in an area that may be exposed to corrosive environment, special attention should be paid to the placement and maintenance of the unit.

- Lawn sprinklers/hoses/waste water should not be sprayed directly on the outer panel of the unit for a long time.
- In coastal areas: install the unit on the side away from the waterfront.
- Fences or shrubs can provide some shielding protection for the unit, but the minimum device clearance must still be kept.
- Clean the outdoor coil and any exposed external surfaces about every three months.

3. Unit Installation Preparation

3.1 Prepare the Unit for Installation

- Check whether there is any damage and report any damage to the unit to the carrier in time (Figure 3.1).
- The charge port can be used to ensure that the refrigerant charge is maintained during shipment.

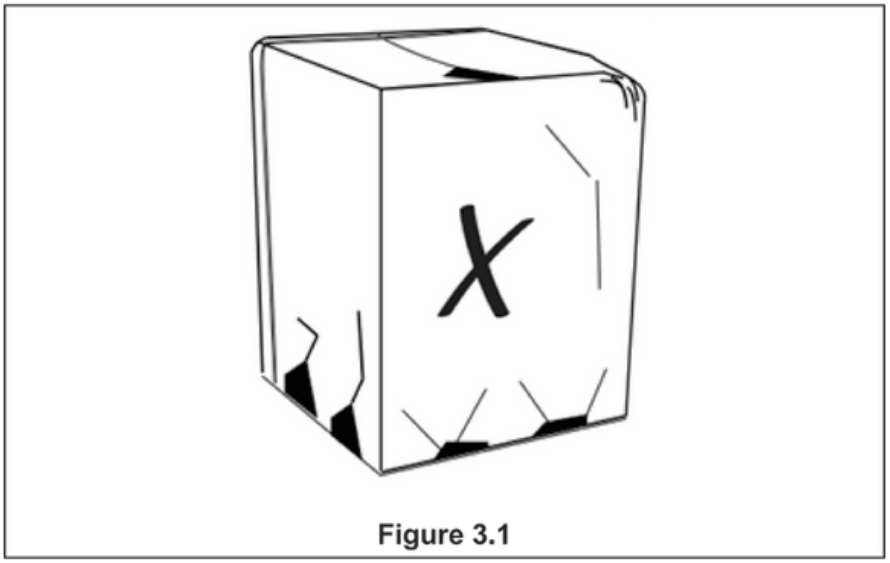


Figure 3.1

4. Unit Settings

4.1 Pad Installation

When installing the unit on a support pad (such as a concrete slab), please consider the following:

- All sides of the pad must be at least 1-2 inches larger than the unit.
- The pad must be separated from any structure.
- The pad must be level.
- The pad must be high enough above the ground for drainage.
- The location of the pad must comply with national, state and local regulations.

These instructions are intended to provide a method of fixing the system to the cement slab as a fixing procedure in windy areas. Check the local regulations of tie-down methods and protocols.

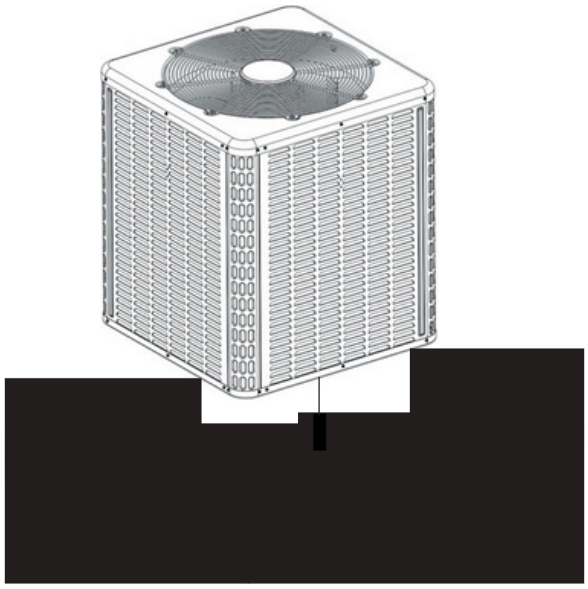


Figure 4.1

5. Precautions for Refrigerant Pipeline

5.1 Connecting Dimensions of Refrigerant Lines and Service Valves

Table 5.1

Model	Suction line	Liquid line	Suction line connection	Liquid line connection
	The dimensions are in inches.			
24K/36K	3/4	3/8	3/4	3/8
48K/60K	7/8	3/8	7/8	3/8

5.2 Required Refrigerant Line Length

Determine the required pipeline length (Figure 5.1). Please refer to Section 2.2.

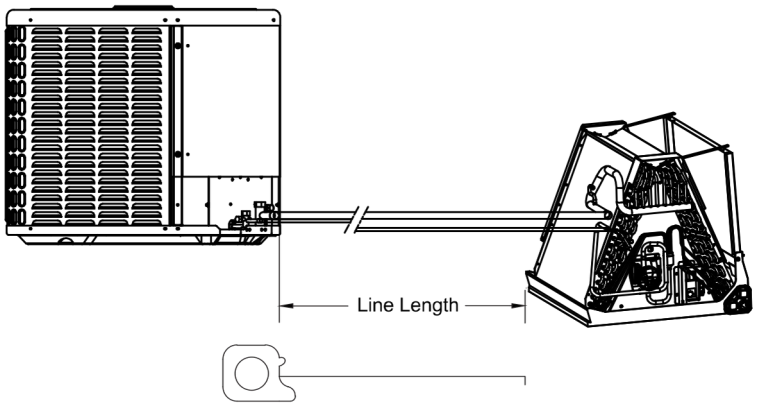


Figure 5.1

5.3 Refrigerant Pipe Insulation

The refrigerant pipe must always be insulated. Do not let the liquid line and suction line come into direct contact (metal to metal).

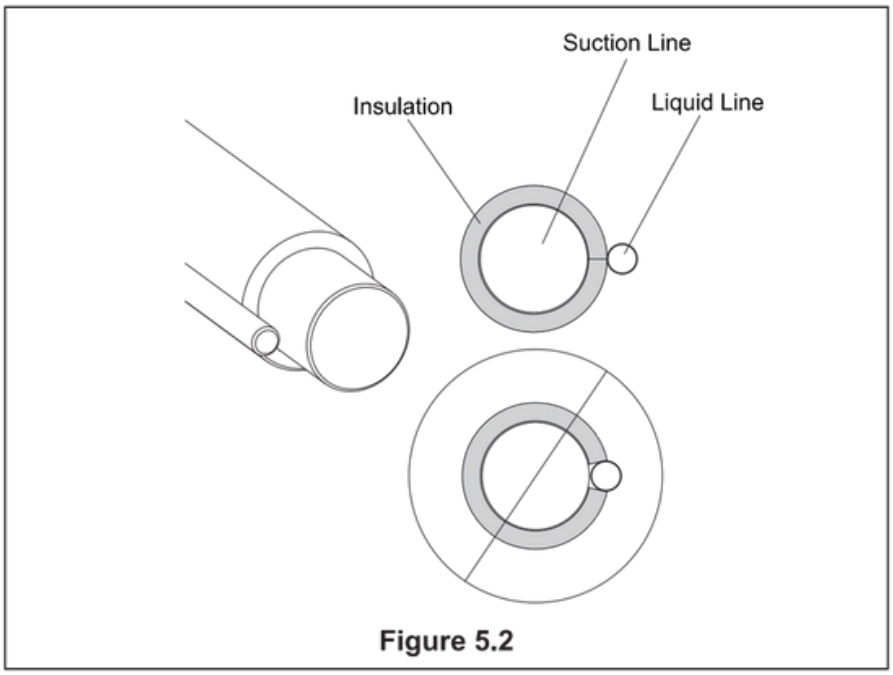


Figure 5.2

5.4 Reuse the Existing Refrigerant Lines

Note: Mild to moderate burns

- If using existing refrigerant lines, make sure that all joints are brazed, not soldered.

The following precautions should be taken for the retrofit application that will use the existing refrigerant pipeline:

- Make sure the refrigerant line size is correct. Refer to Section 2.2 and Table 2.3.
- Make sure the refrigerant line is free of leakage, acid and oil.

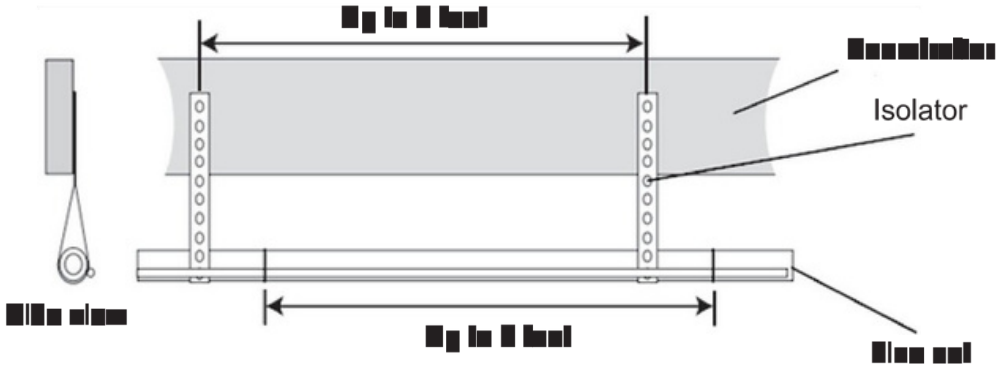
The manufacturer recommends that only approved matching indoor and outdoor systems be installed. All split systems of the manufacturer are AHRI-rated, only applicable to indoor units with expansion valve. The benefits of installing an approved indoor and outdoor split system are maximum efficiency, best performance and best overall system reliability.

6. Refrigerant Pipeline Routing

6.1 Preventive Measure

Take preventive measures to prevent noise generated by vibration transmission of refrigerant line in building structure. For example:
- When the refrigerant line must be fixed on floor joists or other frames in the structure, use isolated hangers.
- When the refrigerant line runs in the column space or closed ceiling, the isolation hanger should also be used.
- When refrigerant lines pass through walls or windowsills, they should be insulated and isolated.
- Isolate the line from all ductwork systems.
- Try to reduce the number of 90º turn.

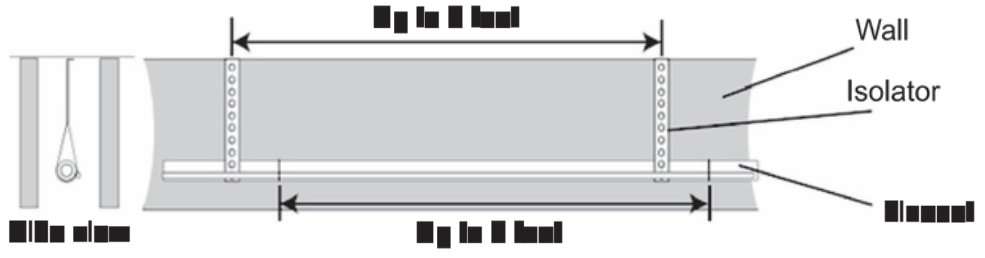
Comply with national, state and local regulations when isolating the wire group from joists, rafters, walls or other structural elements.



Secure Suction Line from joists using isolators every 8 ft. Secure Liquid Line directly to Suction Line using tape, wire, or other appropriate method every 8 ft.

Isolated from beam/rafter

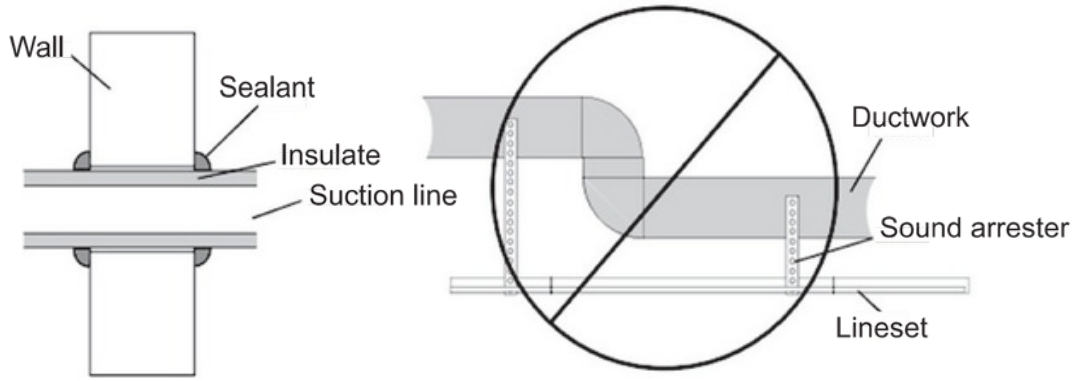
Figure 6.1



Secure Suction Line from joists using isolators every 8 ft. Secure Liquid Line directly to Suction Line using tape, wire, or other appropriate method every 8 ft.

Isolation on the wall

Figure 6.2



Wall isolation

Do not hang the lineset on the duct work.

Figure 6.3

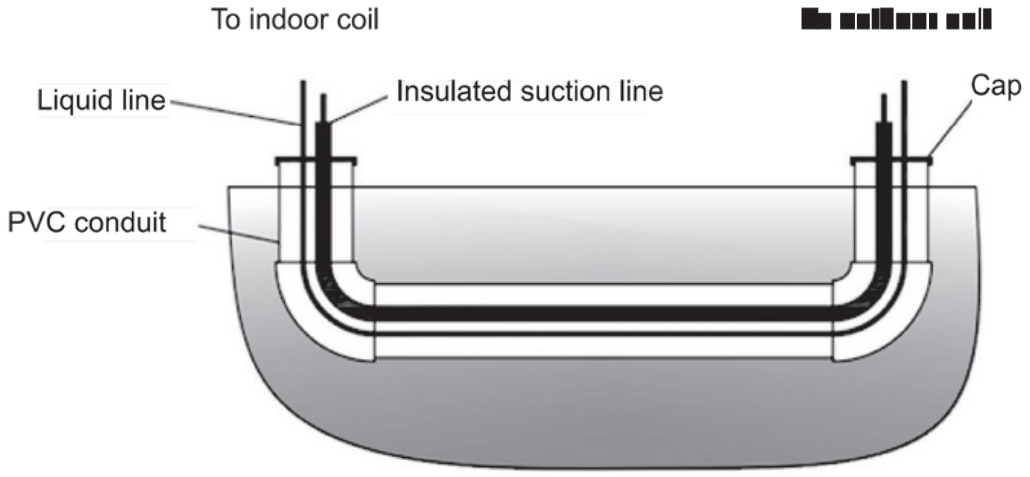


Figure 6.4

7. Refrigerant Line Brazing

7.1 Brazed Refrigerant Pipeline

1. Remove the cover or plug. Use the deburring tool to deburr the line end. Clean the inner and outer surfaces of the pipeline with emery cloth.

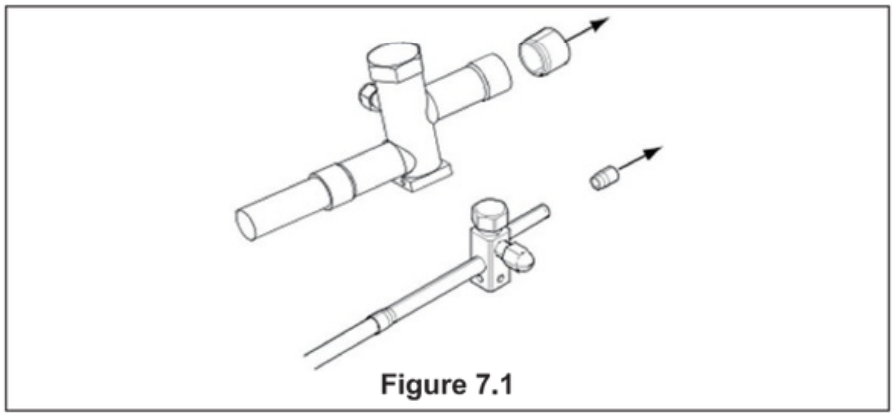


Figure 7.1

2. Remove the pressure taps from the two service valves.

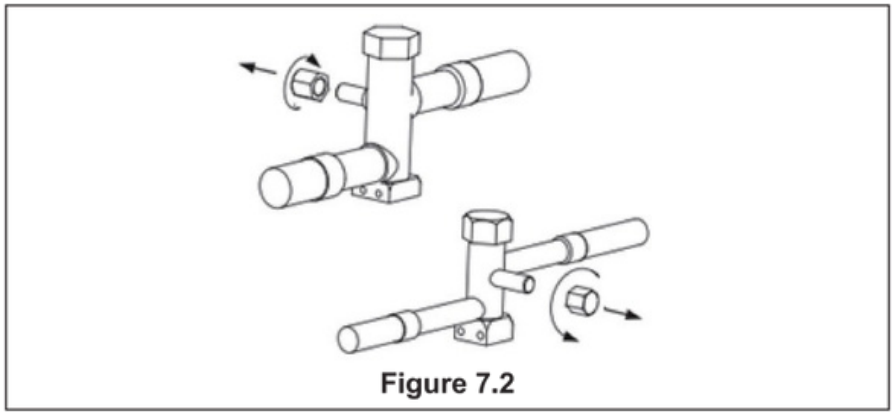


Figure 7.2

3. Purge refrigerant lines and indoor coils with dry nitrogen.

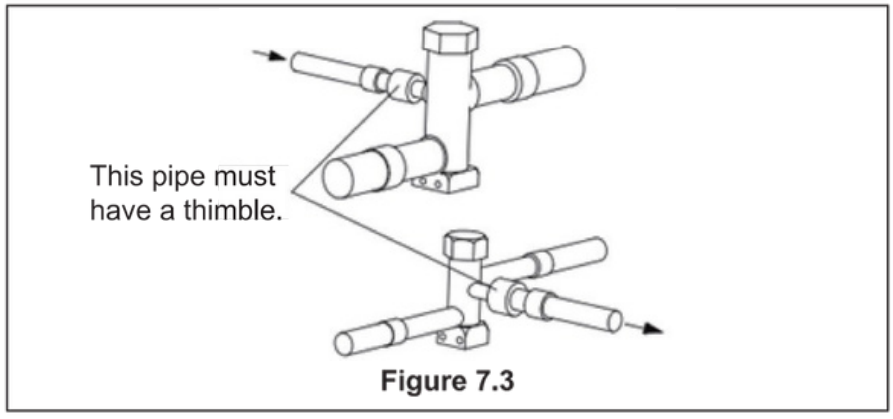


Figure 7.3

4. Wrap the valve body with a wet rag to avoid thermal damage, and continue the dry nitrogen purging (Figure 7.4).
   Braze the refrigerant line to the service valve.
   Braze the filter drier to the liquid line.

All units are recommended to install bidirectional filter drier. Braze the filter drier to the liquid line, taking care not to push the refrigerant line too hard through the stopper in the filter drier (this may damage the filter).

Continue the dry nitrogen purge. Don't take off the wet rag before all brazing is completed.

Before stopping the dry nitrogen purge, please remove the wet rag.

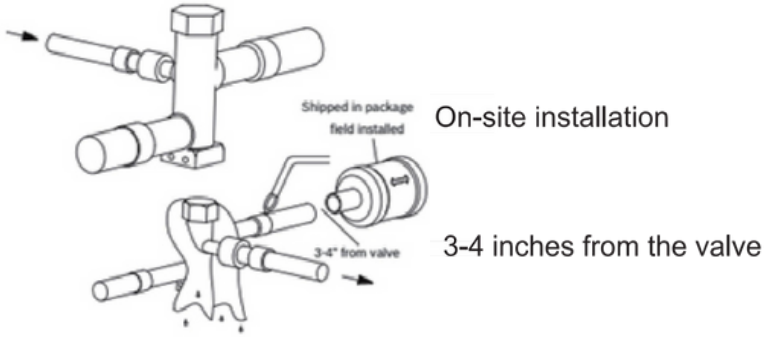


Figure 7.4

5. After the service valve cools down, put back the pressure tap.

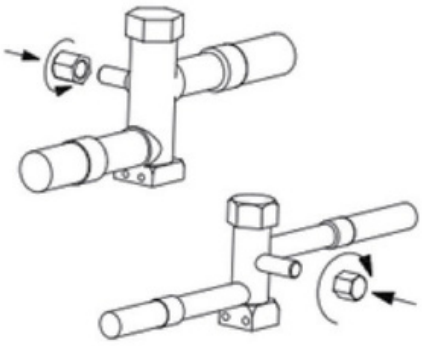


Figure 7.5

8. Refrigerant Line Leakage Inspection

8.1 Check for Leaks

1. Use dry nitrogen to pressurize the refrigerant line and evaporator coil to 150 PSIG.

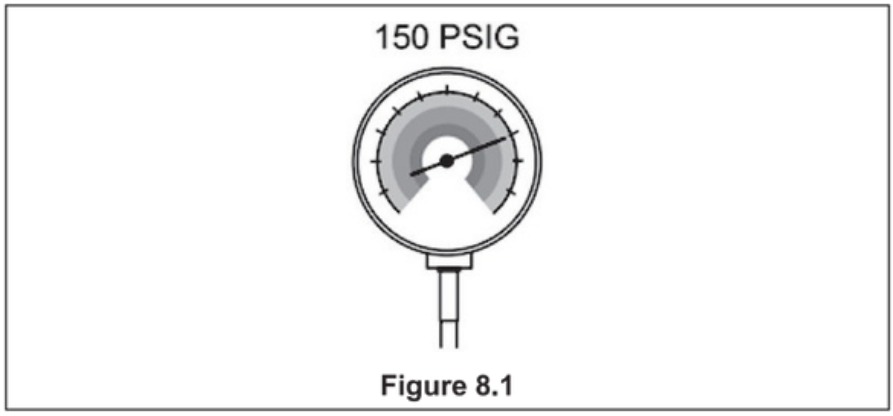


Figure 8.1

2. Use soapy water or bubbles at each brazing position to check for leaks.

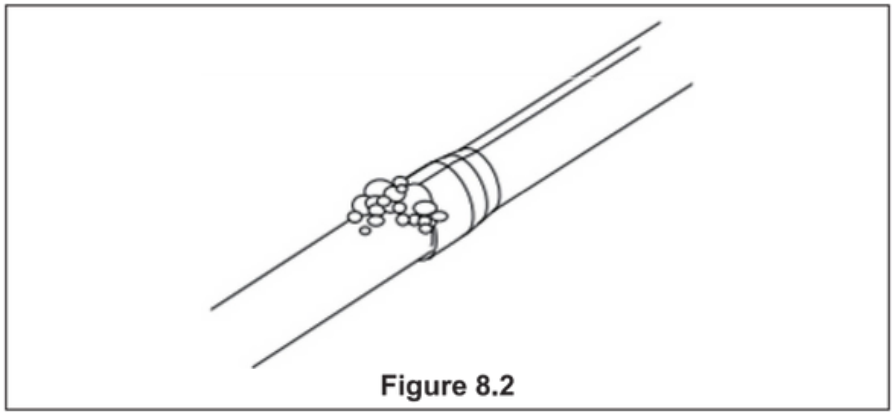


Figure 8.2

9. Evacuate the system

9.1 Evacuate Refrigerant Lines and Indoor Coils

After completion of field piping for split systems, the field pipework shall be pressure tested with an inert gas and then vacuum tested prior to refrigerant charging. The minimum test pressure for the system shall be the low side design pressure (See nameplate for detail).

Do not open the service valve until the leakage inspection and evacuation of the refrigerant lines and indoor coils are completed.

1. Evacuate the syste, until the micron gauge reads no higher than 350 microns, then close the valve to the vacuum pump.

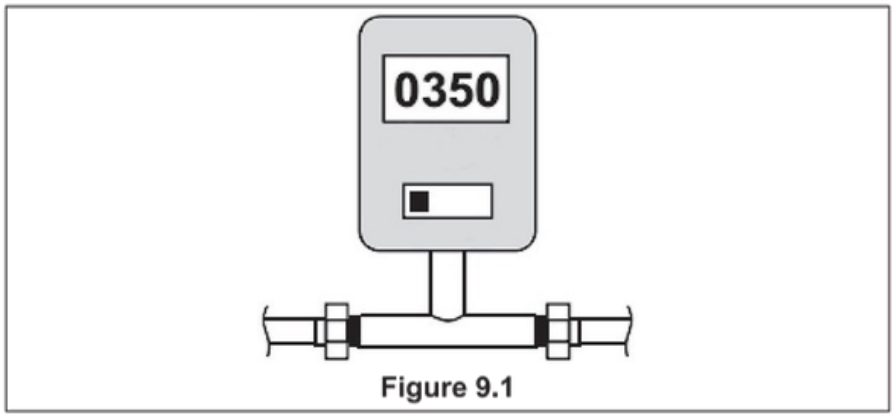


Figure 9.1

2. Observe micron gauge. If the micrometer meter does not rise above 500 microns within one (1) minute, the evacuation is completed.

After the evacuation, turn off the vacuum pump and micron gauge, and close the valve on the manifold instrument cluster.

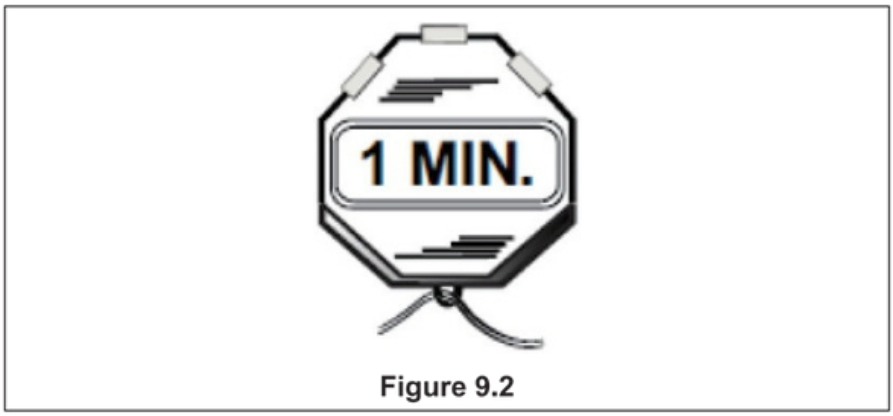


Figure 9.2

10. Service Valve

10.1 Open the Service Valve

Warning: Moderate to severe burns

- When opening the liquid line service valve, be extra careful. Turn counterclockwise until the valve stem just touches the hem. No torque is required. Failure to observe this warning will result in sudden release of system pressure, and may result in personal injury and/or property damage.

Before opening the service valve, the leakage inspection and evacuation must be completed. The valve of copper welded pipe installation should be used for leakage inspection and vacuum pumping. The use of a separate suction port in this process will lead to refrigerant loss.

1. Remove the valve cover (Figure 10.1).
2. Insert the hex wrench into the valve stem completely and back out counterclockwise until the valve stem just touches the bead.
3. Replace the valve stem cap to prevent leakage. Tighten it with your fingers and turn it for another 1/6 turn.
4. Repeat steps 1-3 for the liquid service valve.

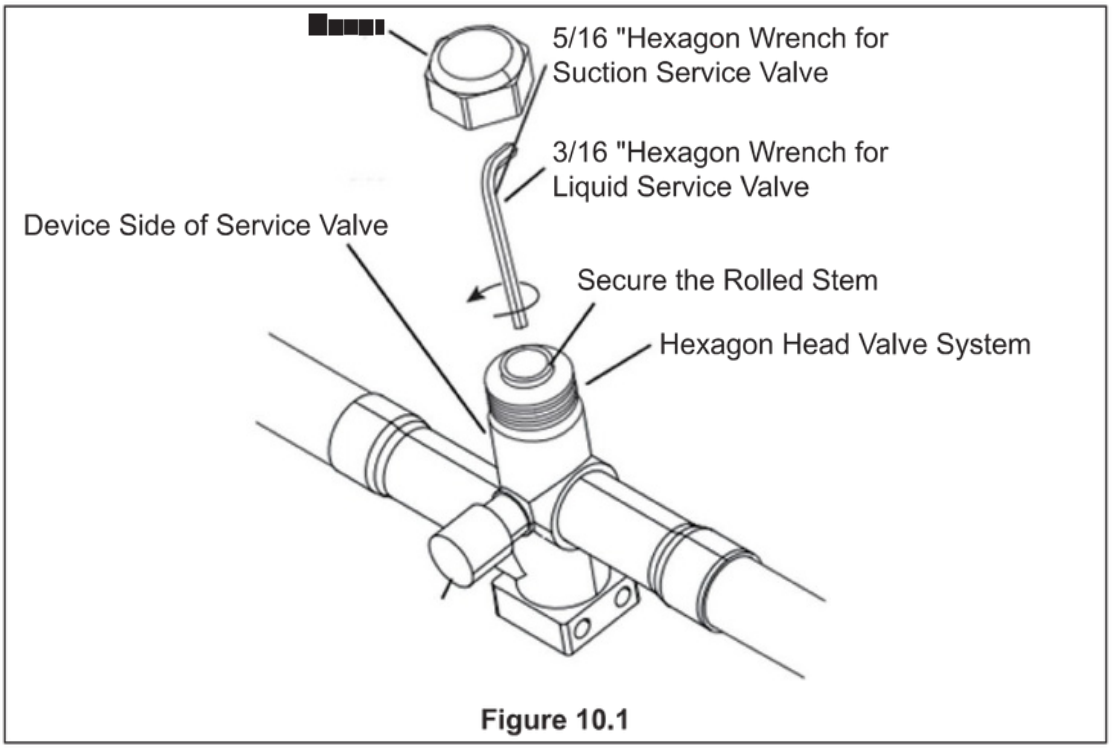


Figure 10.1

11. Electrical-Low Voltage

11.1 Low Voltage Connection Diagram

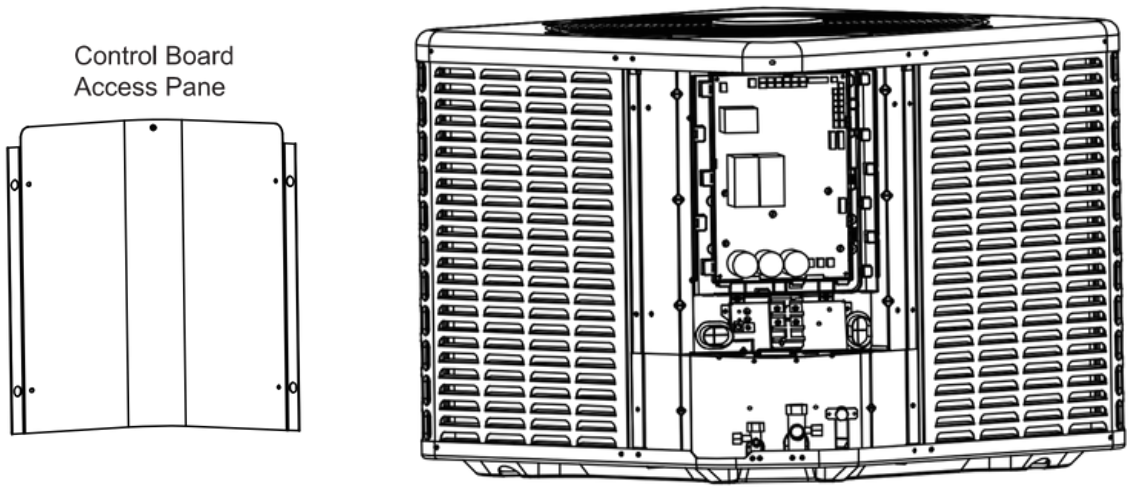


Figure 11.1 Connection of Low Voltage Device

11.2 Wiring Diagram of Thermostat

- Ensure that the power supply is consistent with the nameplate of the unit.
- The power connection and grounding of the unit must comply with local regulations.
- Scenes less than 100 feet in length should use 18 AWG colored low-voltage wires. 16 AWG wire should be used for scenes with a length of more than 100 feet.
- "-----"On-site installation of electrical auxiliary heat connection
- W1: The first stage of motor heating installed in the indoor unit.
- W2: The second stage of electric heating or electric auxiliary heating installed in the indoor unit.
- The W signal of the outdoor unit is connected to the electric auxiliary heating.

i	The dotted line in the following thermostat wiring diagram indicates optional wiring (wiring for passive dehumidification and/or electric heating). For the wiring of the thermostat, please refer to the user manual of the thermostat.
i	The reversing valve is energized in heating mode and de-energized in cooling mode.

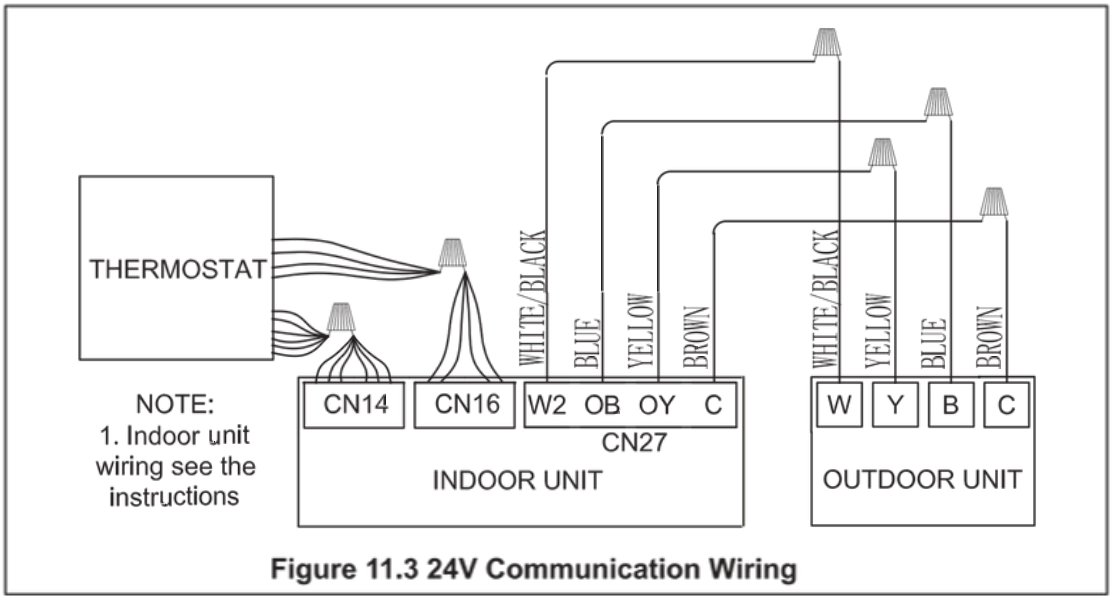


Figure 11.3 24V Communication Wiring

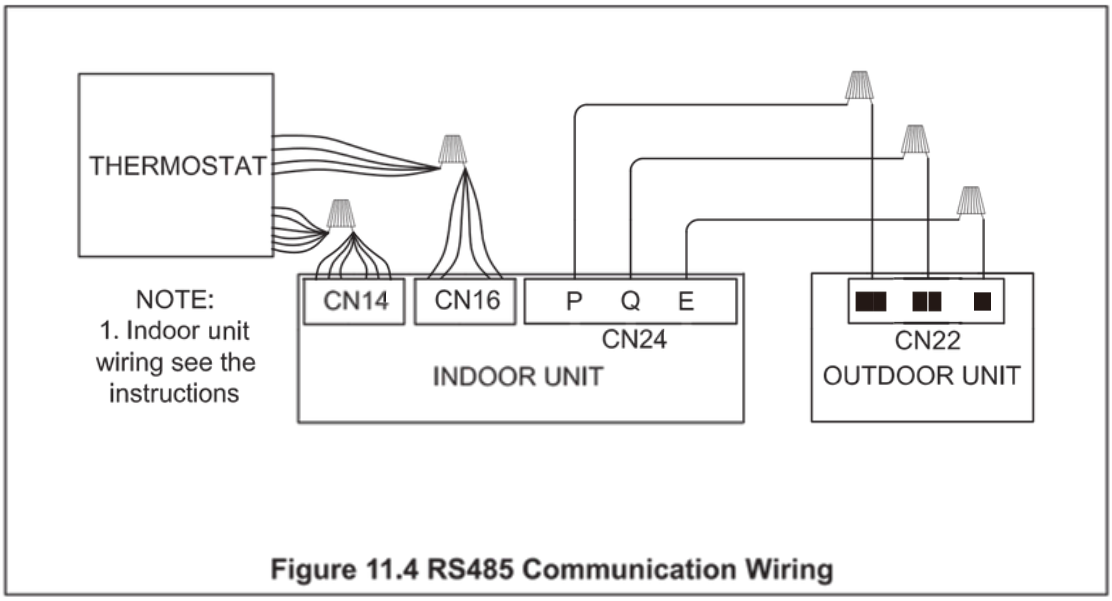


Figure 11.4 RS485 Communication Wiring

12. Electrical-High Voltage

12.1 High Voltage Power Supply

Warning: Live electrical parts!

- During the installation, testing, maintenance and troubleshooting of this product, it may be necessary to use live electrical parts. Failure to observe all electrical safety precautions when exposed to live electrical parts may result in death or serious injury.

The high-voltage power supply must match the nameplate of the unit (208/230V, 1ph, 60Hz).

Power supply wiring must comply with national, state and local regulations.

Follow the instructions of the unit wiring diagram located at the back side of control box access panel, and refer to the wiring diagram in this installation manual.

12.2 High Voltage Disconnect Switch

Install a separate disconnect switch on the outdoor unit.
High-voltage wiring must use flexible electrical conduit supplied on site.

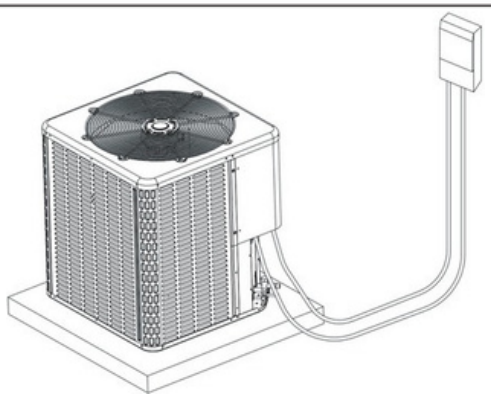


Figure 12.1

12.3 High Voltage Grounding

Ground the outdoor unit according to the requirements of national, state and local regulations.

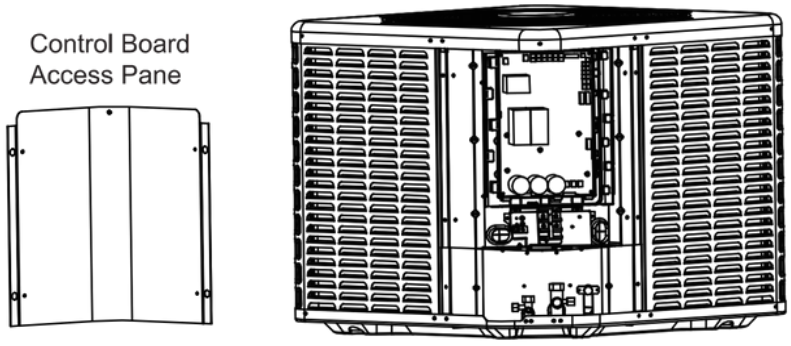


Figure 12.2

Table 12.1 Electric wiring gauge

Model			24K	36K	48K	60K
Line Gauge	Indoor Unit Power Line	Line Quantity	3	3	3	3
		Line Diameter(AWG)	16	16	16	16
	Outdoor Unit Power Line	Line Quantity	3	3	3	3
		Line Diameter(AWG)	14	14	10	10

13. Start

13.1 System Startup

1. Make sure that Step 7, 8, 9, 10, 11 and 12 have been completed.
2. Set the system thermostat to off.

Figure 13.1

3. Turn on the disconnect switch and apply power to indoor unit and outdoor unit.

Figure 13.2

4. When starting the unit for the first time and the outdoor temperature is below 70°F, it is recommended to power on and let the crankshaft heater preheat for 1 hour before turning on the unit .

Figure 13.3

5. Set the system thermostat to ON.

Figure 13.4

14. System Refrigerant Charging Method

14.1 Refrigerant Charging: Weigh-In Method

Use weigh-in method the initial installation, or anytime a system charge is being replaced. Weigh-in method can also be used when power is not available to the equipment site or operating conditions (indoor/outdoor temperatures) are not in range to verify with the subcooling charging method.

The factory charge in the outdoor unit is sufficient for 25 feet of standard size interconnecting liquid line. Additional 0.32 oz/ft refrigerant is needed when length of lineset is more than 25 feet.

After completion of field piping for split systems, the field pipework shall be pressure tested with an inert gas and then vacuum tested prior to refrigerant charging. The minimum test pressure for the system shall be the low side design pressure (See nameplate for detail).

New Installations — Calculating additional charge for lineset greater than 25 ft.

1. Total length of line (ft) = _____(a)
2. Standard line setup (ft) =25 (b)
3. (a) minus (b) = _____ (c)
4. Refrigerant multiplier = 0.32 oz/ft (d)
5. Additional refrigerant quantity (c*d) = _____(e)*

* If the line set is less than 25 feet, e=0

Sealed-System Repairs — Calculating total system charge.

1. Total length of line (ft) = _____(a)
2. Standard line setup (ft) =25 (b)
3. (a) minus (b) = _____ (c)
4. Refrigerant multiplier = 0.32 oz/ft (d)
5. Additional refrigerant quantity (c*d)= _____(e) *
6. Factory filling quantity (nameplate)= _____(f)
7. Total system charge (e +f) = _____

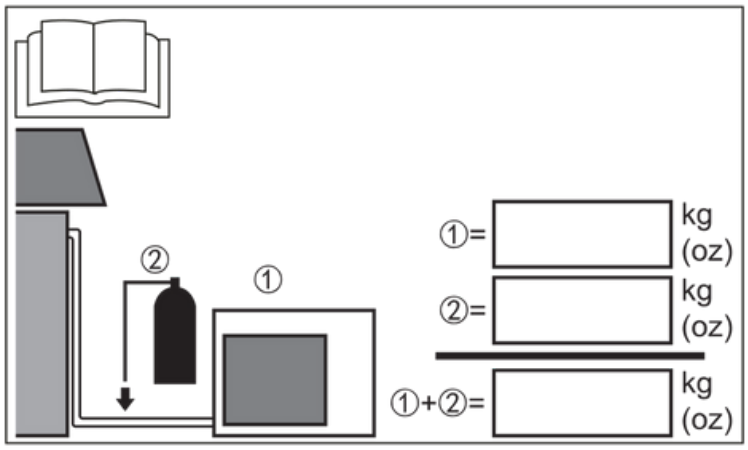
* If the line set is less than 25 feet, e =0

The only mode approved for verifying system charging is in "forced cooling mode". The outdoor temperature must be between 68°F and 113°F, and the indoor temperature should be between 68°F and 89°F.

You can refer to the above formula for calculation, or you can choose the appropriate refrigerant addition according to the piping length.

Table 14.1 Additional Refrigerant Guidelines

Piping length (ft)	Additional charge (oz)
25.0	0.00
50.0	8.00
75.0	16.00
100.0	24.00
125.0	32.00
150.0	40.00



Example 1 REFRIGERANT CHARGE of the precharged part of the appliance
Example 2 REFRIGERANT CHARGE added during installation

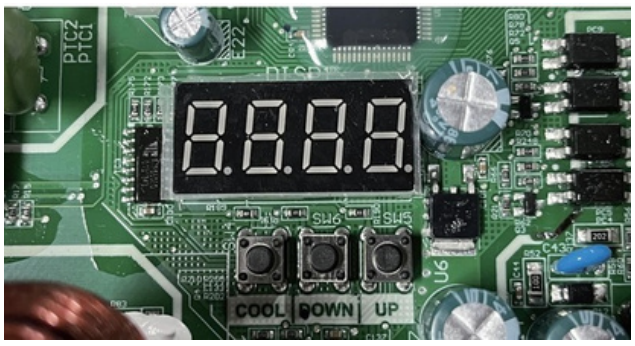
14.2 Subcooling Charging and Refrigerant Adjustment in Cooling Mode

1. Check the outdoor ambient temperature.
   Subcooling (cooling mode) is the only recommended charging method when the outdoor ambient temperature is higher than 68°F.
   For outdoor ambient temperature below 68°F, use the weigh-in charging method.

When the outdoor ambient temperature is higher than 68°F, be sure to return in spring or summer, so as to accurately charge the system in cooling mode.

Subcooling Method

1. Check the ambient temperature. Subcooling method (cooling mode) is only for outdoor temperature between 68°F and 113°F, and indoor temperature between 68°F and 89°F. For temperature out of the range, use the weigh-in method mentioned above.
2. Start "forced cooling" mode. Start the system in cooling mode, briefly press "COOL" button until the symbol “dC” displayed. Once enter “forced cooling mode”, symbol “dC” and the current frequency will be displayed in digital display. "Forced cooling" mode will automatically exit after 60 minutes or briefly press the “COOL” quit “forced cooling” mode manually.



briefly press “COOL” till “dC” displayed to start/quit “forced cooling” mode

Figure 14.1

3. Wait until the system is stable. Wait for twenty (20) minutes after "forced cooling" mode started. Compressor will maintain a specific frequency in "forced cooling" mode.

4. Calculate subcooling value. Calculate subcooling value with measured liquid line temperature and pressure according to Table 14.2. If calculated subcooling value is lower than the design subcooling value of Table 14.3, refrigerant should be added. If calculated subcooling value is higher than the value of Table 14.3, refrigerant should be recovered.

5. Adjust refrigerant. Connect service tools to unit and adjust refrigerant according to analysis in step 4.

6. Wait for stabilization of system. Wait for 5 minutes and repeat steps 4 through 5 until the subcooling value matches the design subcooling value mentioned in Table 14.3.

7. Recover normal state. Remove service tools, briefly press “COOL” button to quit “forced cooling” mode. Symbol “dC” should disappear when “forced cooling”mode quitted.

Table 14.2

Liquid Line Temp (°F)	Subcooling Value(°F)								
	0	1	2	3	4	5	6	7	8
	Liquid Gauge Pressure (PSI)								
55	174	177	180	183	186	189	192	195	198
60	189	192	195	198	201	204	207	211	214
65	204	207	211	214	217	221	224	227	231
70	221	224	227	231	234	238	241	245	249
75	238	241	245	249	252	256	260	264	268
80	256	260	264	268	272	276	280	284	288
85	276	280	284	288	292	296	300	305	309
90	296	300	305	309	313	318	322	327	331
95	318	322	327	331	336	340	345	350	355
100	340	345	350	355	359	364	369	374	379
105	364	369	374	379	384	390	395	400	405
110	390	395	400	405	411	416	422	427	433
115	416	422	427	433	438	444	450	456	461
120	444	450	456	461	467	473	479	486	492
125	473	479	486	492	498	504	511	517	523

Table 14.3

Subcooling (°F)		Ambient Remperature(°F)			
		68~77	77~86	86~95	＞95
Model	24K	4±2	4±2	3±2	2±2
	36K	4±2	4±2	3±2	2±2
	48K	4±2	3±2	3±2	2±2
	60K	4±2	3±2	3±2	2±2

15. System Operation and Troubleshooting

15.1 Control Logic Description

- The Inverter system adopts the same 24VAC control as any conventional heat pump.
- The compressor's speed is controlled based on coil pressures monitored by the unit's pressure transducer. To ensure stable and adequate capacity, the compressor speed will modulate relative to evaporator pressure during cooling operation and relative to condensing pressure during heating operation.

15.2 Sensors and valves

T3: Outdoor Coil Temperature

— High temperature protection

— Outdoor fan control (Cooling mode)

— Defrost control (Heating mode)

T4: ODU Ambient Temperature

— Maximum current limitation

— Defrosting condition (Heating mode)

— Outdoor fan control (Heating mode)

T5: Compressor Discharge Temperature

— High discharge temperature / Low superheat protection

— Electronic Expansion Valve (EEV) control

Tfin: IPM Radiator Temperature

— High IPM temperature protection

PS2: Pressure Transducer

— Detect evaporating pressure in cooling mode and condensing pressure in heating mode.

— Compressor frequency control

— Electronic Expansion Valve (EEV) control

— High pressure protection (heating mode)

— Low pressure protection (cooling mode)

Reversing valve

— Used to switch the refrigerant flow direction between cooling and heating mode

15.3 Defensive Function

- Temperature protection of outdoor coil in cooling mode (T3)

  1. If T3 > Maximum set temperature, the system stops for protection.
  2. If T3 < the set recovery temperature value, the system restarts.

Note: Please consult the supplier for maximum temperature and recovery temperature.

- Exhaust temperature protection (T5)

  1. In cooling or heating mode, if the temperature is higher than the set maximum value, the system will stop for protection.
  2. In cooling or heating mode, if the temperature is lower than the set recovery temperature, the system will restart.

Note: Please consult the supplier for maximum temperature and recovery temperature.

- IPM module (inverter) protection (TF)

  1. TF ≥ the highest judgment value C. If the outdoor fan does not reach the highest level at this time, the fan speed will be increased one by one. At this time, the compressor frequency is not limited. If the outdoor fan is the highest fan speed, the current frequency is the highest allowable operating frequency.
  2. TF ≥ the highest judgment value B, the compressor reduces the frequency successively.
  3. TF ≥ the highest judgment value A, the compressor stands by abnormally.
  4. TF ≤ the highest judgment value D, the system restarts.

Note: The highest judgment value A/B/C/D are all parameters set in the program. Please consult the supplier for specific values.

Table 15.1

Code	Fault or Protection Definition	Notes
C1	Outdoor air temperature sensor failure	
C2	Condensate temperature sensor failure / T3 sensor not securely connected	Lock protection if T3 sensor is loose 20 times in 120 minutes; cannot recover until re-energized.
C3	Exhaust temperature sensor failure / T5 sensor not securely connected	Lock protection if T5 sensor is loose 20 times in 180 minutes; cannot recover until re-energized.
E8	Condensate high temperature protection	Lock protection if triggered 20 times in 180 minutes; cannot recover until re-energized.
E3	Exhaust high temperature protection	Lock protection if triggered 20 times in 100 minutes; cannot recover until re-energized.
F1	High pressure sensor failure	
F3	Overpressure protection	Lock protection if triggered 20 times in 180 minutes; cannot recover until re-energized.
F4	Low pressure sensor failure	
F6	Low pressure too low	Lock protection if triggered 10 times in 100 minutes; cannot recover until re-energized.
F8	High compression ratio protection	
F9	Low compression ratio protection	
H2	High pressure switch failure	Lock protection if triggered 20 times in 150 minutes; cannot recover until re-energized.
H5	Low pressure switch failure	Lock protection if triggered 10 times in 60 minutes; cannot recover until re-energized.
HE	AC voltage protection	
LF	Primary side overcurrent protection	Lock protection if triggered 3 times in 60 minutes; cannot recover until re-energized.

L0	IPM A protection	
PE	Fan A protection	
P9	Fan B protection	
L9	IPM module high temperature protection	Lock protection if triggered 20 times in 120 minutes; cannot recover until re-energized.
E0	Fluorine deficiency protection	Lock protection if triggered 5 times in 100 minutes; cannot recover until re-energized.
H0	Wet operation protection	Lock protection if triggered 20 times in 200 minutes; cannot recover until re-energized.
J2	485 Communication failure	
d0	Oil return	
dF	Defrost	
dH	Forced cooling	

15.4 Capacity model selection

■ **Communication Mode Selection**

1. Set the DIP switch SW3-3 to “OFF” for control by a 24V thermostat.
2. Set the DIP switch SW3-3 to “ON” for control by RS485 communication, .

The RS485 communication mode is only applicable to indoor units and outdoor units produced by the manufacturer.

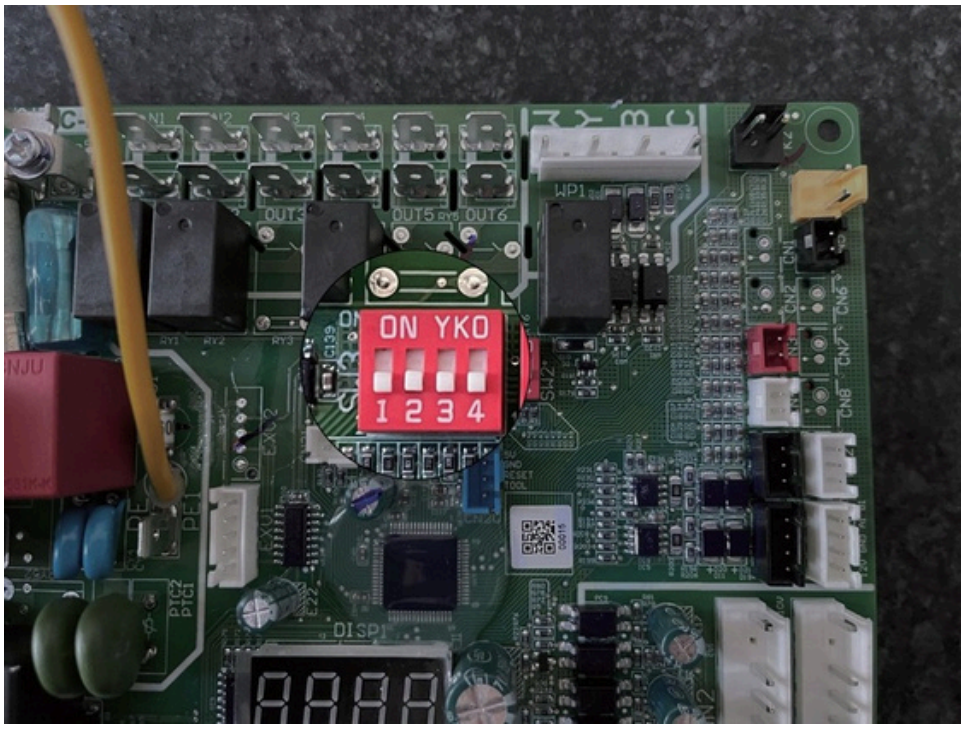


Figure 15.1

- **Capacity model selection**

System software will recall performance setting parameters according to the DIP switch selection. The DIP should be set according to the matched IDU.

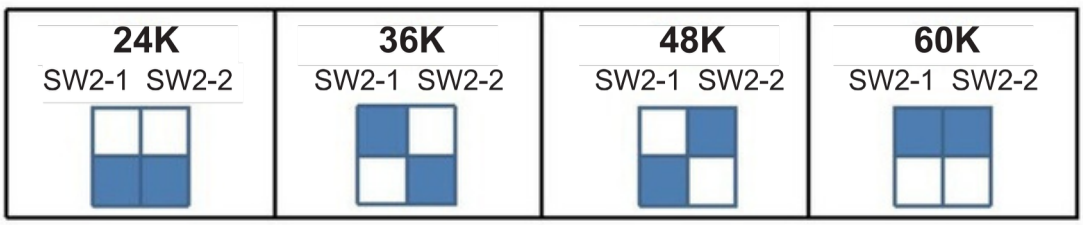


Figure 15.2

- **Defrost Mode**

Set the DIP switch SW2-4 to "OFF" for automatic defrosting.
Set the DIP switch SW2-4 to "ON" for manual defrosting.

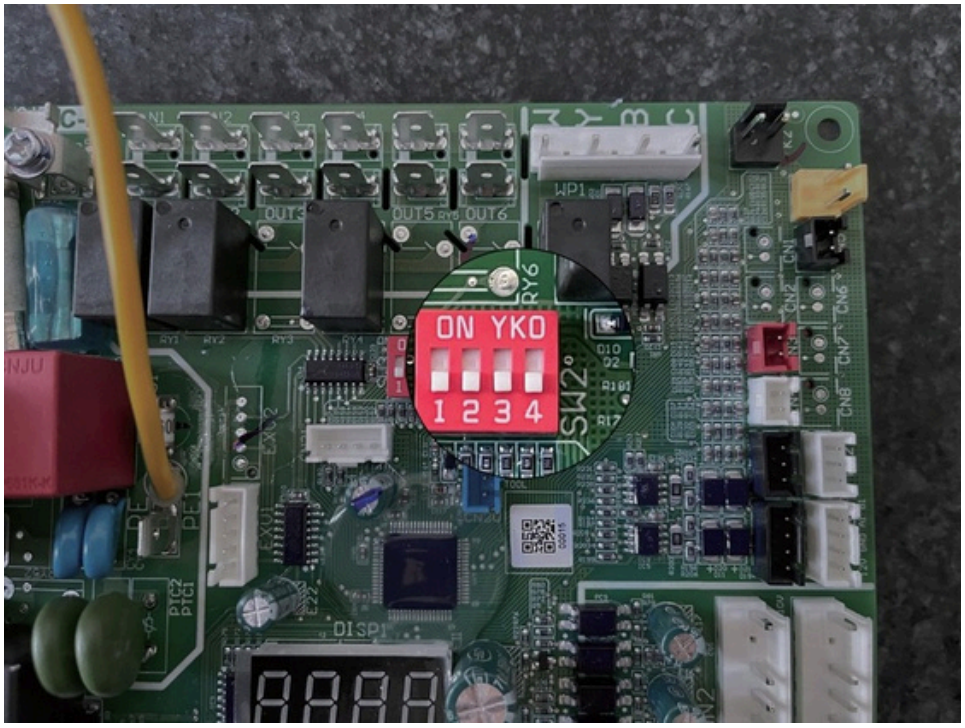


Figure 15.3

15.5 Parameter Point Check Table

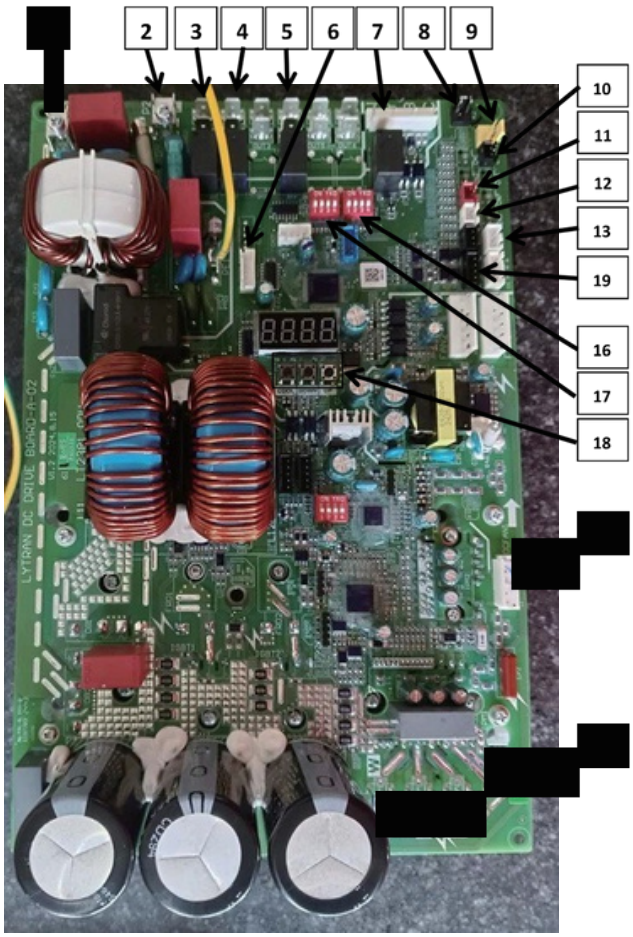
- To display system parameters, press the "DOWN" (SW6) or "UP" (SW5) button to run through the series of parameters available. The first time you press the "UP" button, it will display the NUM of the parameter, and after 1 second, it will display the value of the parameter. If you press the "UP" button again, it will go to the next NUM of the parameter; pressing the "DOWN" button will go to the previous NUM of the parameter. (Refer to Table 15.2).

Table 15.2

Check Table	
Num	Display content
01	Outdoor power(Model)
02	Run mode (1: Standby mode; 2: In cooling mode; 3: In heating mode; 4: Force cooling)
03	Internal engine start signal (0 or 1)
04	Compressor running signal (0 or 1)
05	Target frequency (Hz ; Actual value)
06	Fan speed (R/min;Actual value)
07	T3 Condenser coil temp. (℉ ; Actual value)
08	T4 outdoor ambient temp. (℉ ; Actual value)
09	T5 exhaust temp. (℉ ; Actual value)
10	Temp transform by low pressure sensor(℉ ; Actual value)
11	Low pressure value (Bar ; Actual value)
12	Temp transform by high pressure sensor (℉ ; Actual value)
13	High pressure value (Bar ; Actual value)
14	IPM modular temp. Tfin (℉ ; Actual value)
15	Target temp. Tes/Tcs (℉ ; Actual value)
16	Target superheat (℉ ; Actual value)
17	Discharge temp. superheat (℉ ; Actual value)
18	PFC temp.(℉ ; Actual value)
19	AC current (A ; Actual value)
20	Compressor current (A ; Actual value)
21	AC voltage (VAC ; Actual value)
22	DC voltage (VDC ; Actual value)
23	Enter PI contrlo sign (0 or 1)
24	Frequency increase (Actual value gear)
25	△EV(step ; Actual value)
26	EXV opening degree (step ; Actual value)
27	TOil output (CC ; Actual value)
28	Ability test mode (1-40 ; Mode gear)
29	Software version number
30	Frequency limit item
31	Last failure or protection code

15.6 Overview of Main Control Board

Outdoor Main Control Board



No. Functional description

1、Power supply input L2(AC-N)
2、Power supply input L1(AC-L)
3、Crankshaft heating port(N1-OUT1)
4、Solenoid Valve port(N2-OUT2)
5、4-Valve port(N4-OUT4)
6、Electronic expansion valve port(EXV1)
7、24V communication port(WP1)
8、low pressure protection switch port(K2)
9、High pressure protection switch port(K3)
10、Inv Exhaust Temp.senor port(CN5)
11、Condenser Coil Temp.senor port(CN3)
12、Outdoor Ambient Temp.senor port(CN4)
13、Pressure Temp . Sensor port(PS2)
14、DC motor port(DC FAN1)
15、Compressor port W U V
16、Dip switch SW2
17、Dip switch SW3
18、Switch (SW4、SW6、SW5)
19、RS485 communication port

Figure 15.4 Outdoor Main Control Board

15.7 Troubleshooting of Fault Codes

Warning: Dangerous voltage

- When measuring the resistance, make sure that the power of the unit is turned off and wait for 3 minutes before measuring.
- When there is refrigerant leakage error, the outdoor fan and compressor will be turned off.

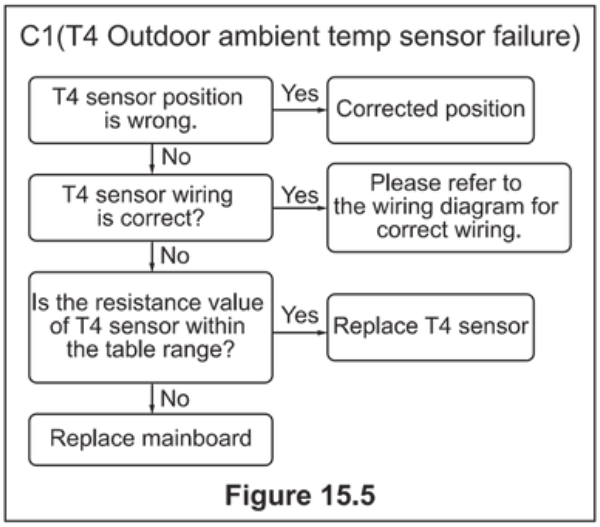


Figure 15.5

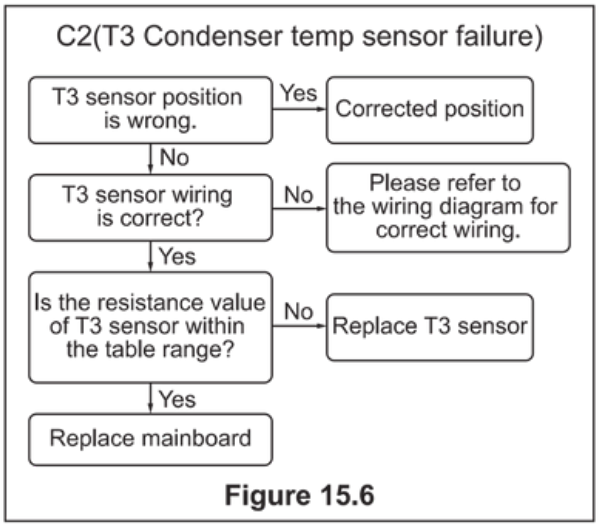


Figure 15.6

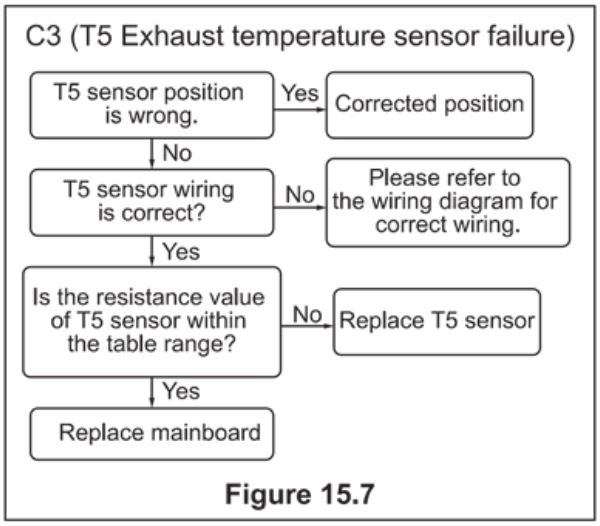


Figure 15.7

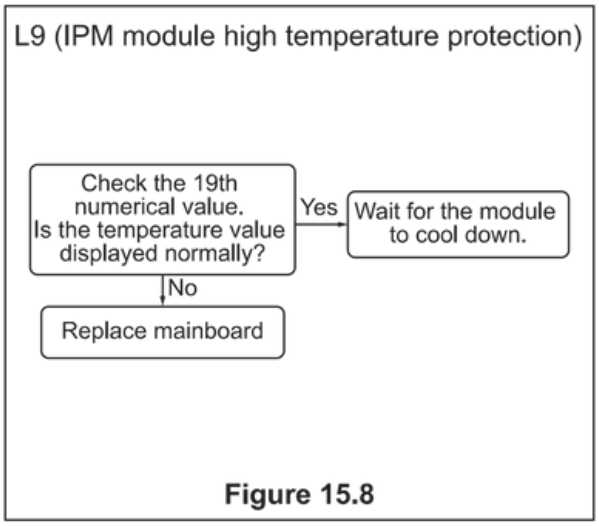


Figure 15.8

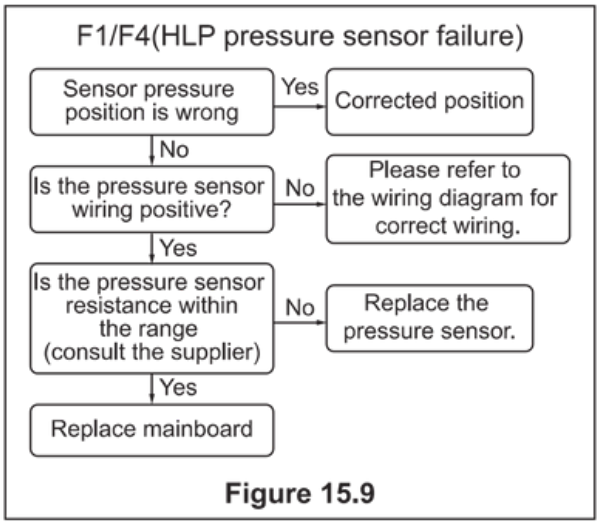


Figure 15.9

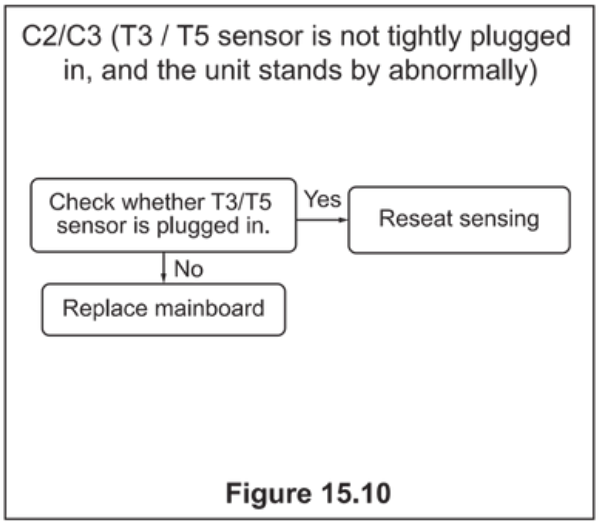


Figure 15.10

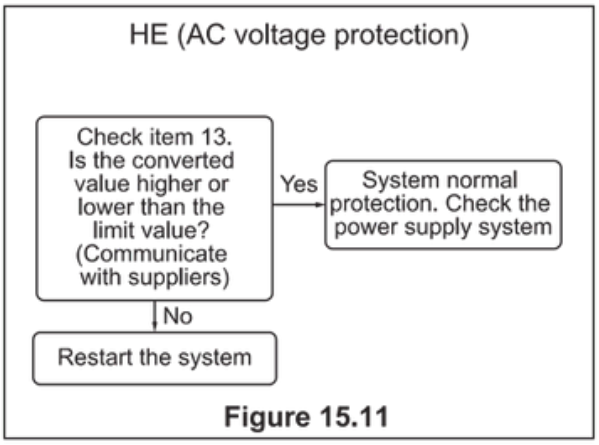


Figure 15.11

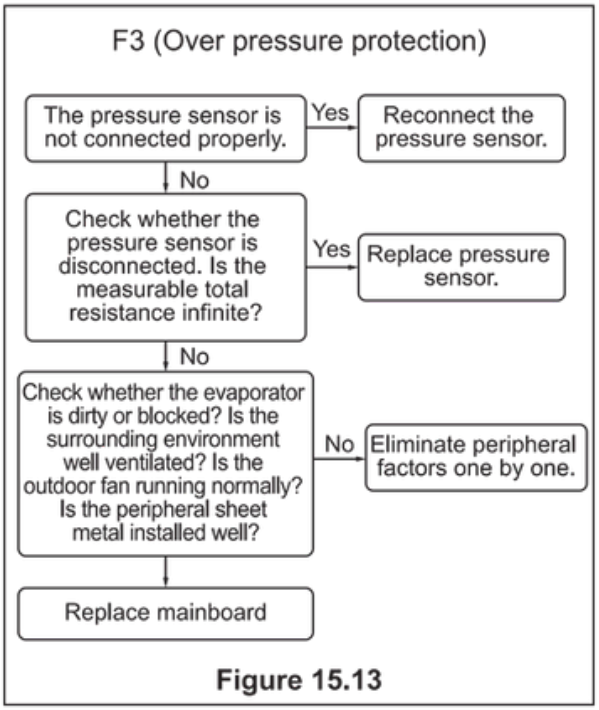


Figure 15.13

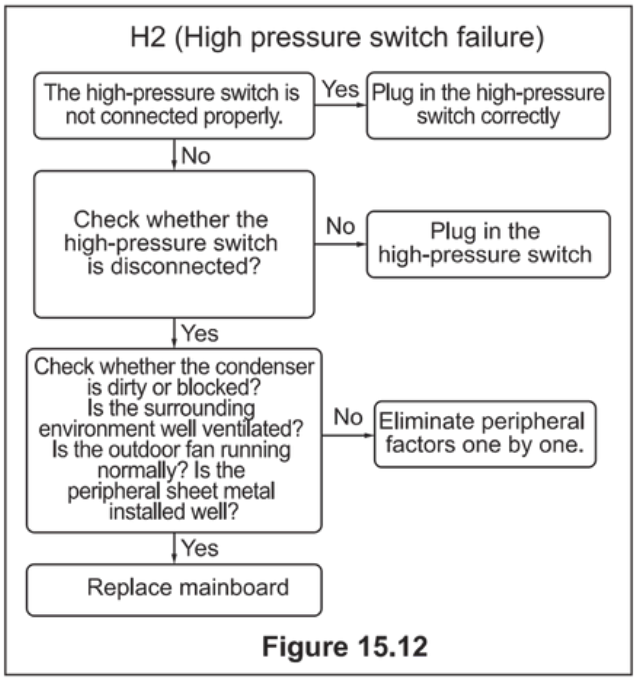


Figure 15.12

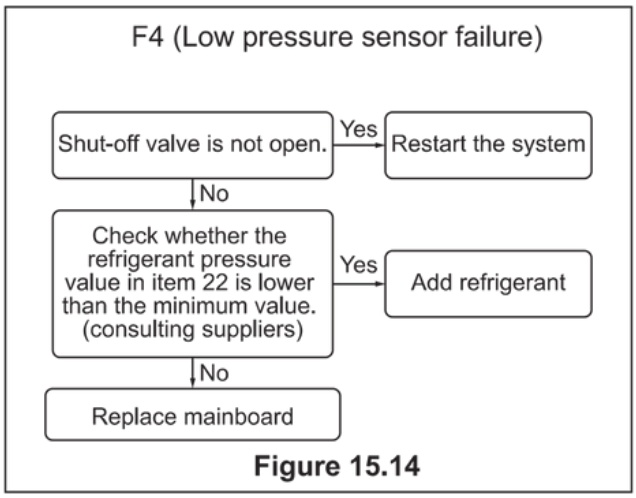


Figure 15.14

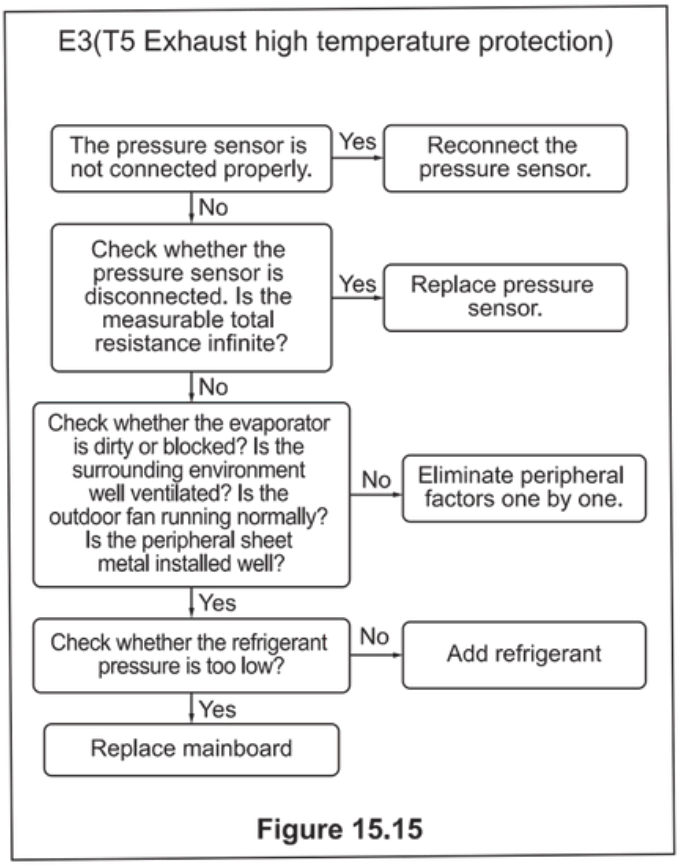


Figure 15.15

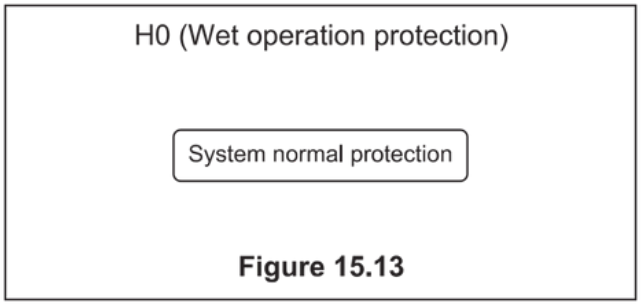


Figure 15.13

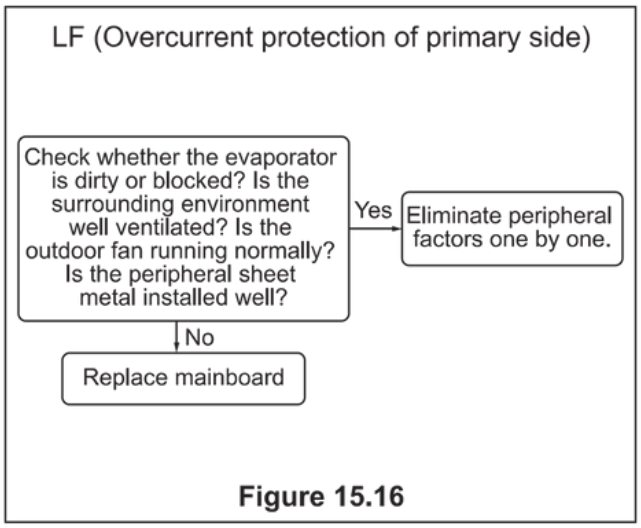


Figure 15.16

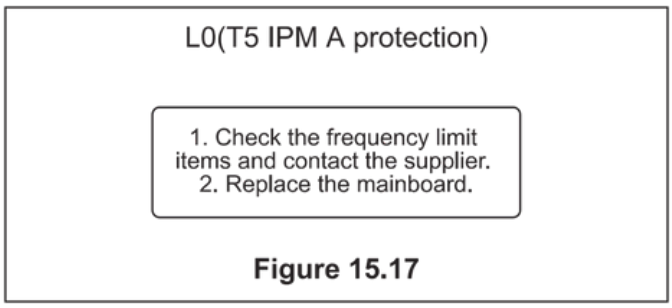


Figure 15.17

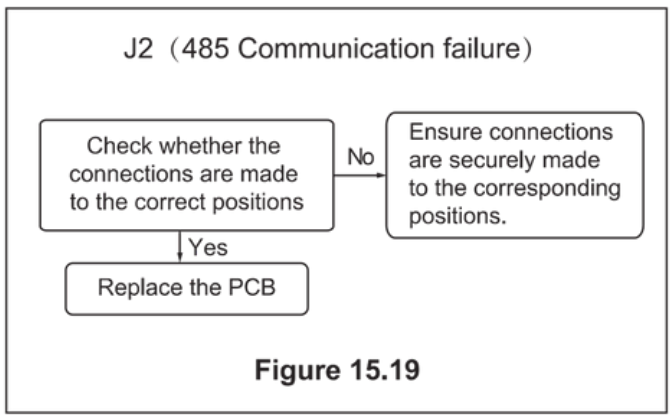


Figure 15.19

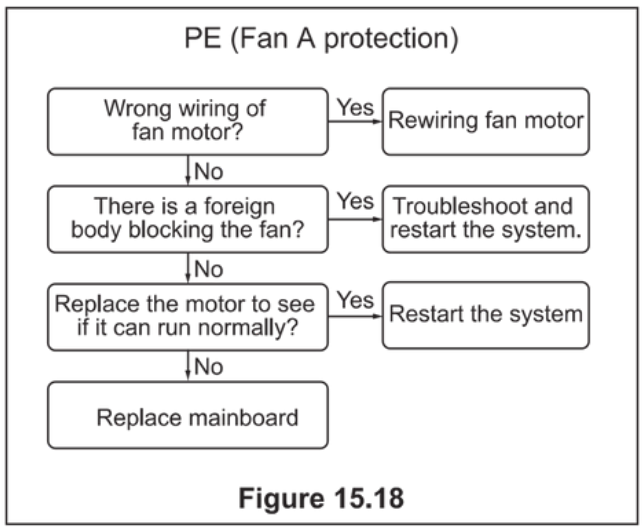


Figure 15.18

16 Cleaning and Maintenance

16.1 Cleaning Precautions

Warning:

- Any maintenance and cleaning of outdoor units can only be carried out by qualified maintenance personnel.
- Any unit maintenance can only be carried out by qualified maintenance personnel.

Caution: Electric shock

- Be sure to turn off the unit and disconnect the power supply before cleaning or maintenance.

Note:

- Do not use chemicals or chemically treated cloth to clean the unit.
- Do not use benzene, paint thinner, polishing powder or other solvents to clean this unit.

Be careful:

- When removing the filter, do not touch the metal parts in the unit. Sharp metal edges can cut you.

16.2 Pre-Season Inspection and Maintenance

At the start of each heating or cooling season, do the following:

	Turn off the unit and disconnect the power supply.
 	Check for damaged wires, check for leaks.
	Make sure that all air inlets and outlets are not blocked.

Table 16.1

Design, material, performance specifications and components subject to change without notice.