37VMH-1P
Sizes 36K-60K
Full DC Inverter for Variable Refrigerant Flow (VRF)

Installation and Operations Manual

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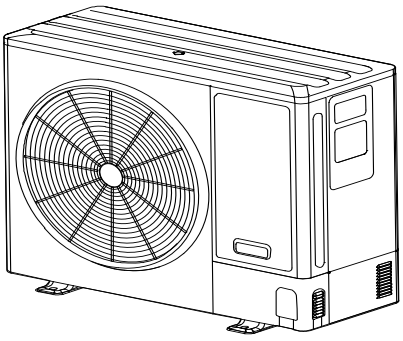


Fig. 1 —Unit Image (3.0 Ton)

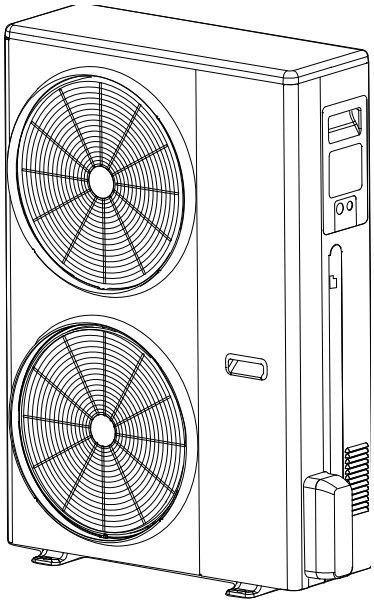


Fig. 2 —Unit Image (4.0-5.0 Ton)

NOTE: The figures in this manual are for explanation purposes only. They may be slightly different from the air conditioner you purchased (depending on the model). The actual shape shall prevail.

ABOUT THIS DOCUMENT

NOTE: Make sure that the user has the printed documentation and ask him/her to keep it for future reference.

Target audience

Authorized installers + end users

NOTE: This appliance is intended to be used by expert or trained users in shops, in light industry, and on farms, or for commercial and household use by lay persons.

⚠ WARNING

Please thoroughly read and ensure that you fully understand the safety precautions

(including the signs and symbols) in this manual, and follow relevant instructions during use to prevent damage to health or property.

Documentation set

This document is part of a documentation set. The complete set consists of:

- **General safety precautions:**
  - **Safety instructions that you must read before installing**
- **Indoor unit installation and operation manual:**
  - **Installation and operation instructions**
- **Repeater installation and operation manual:**
  - Installation and operation instructions

Technical engineering data

Latest revisions of the supplied documentation may be available via your dealer.

The original documentation is written in English. All other languages are translations.

SAFETY SIGNS

Explanation of Safety Signs

The precautions and things to note in this document involve very important information. Please read them carefully.

⚠ WARNING

indicates a hazardous situation which, if not avoided, could result in death or serious injury

⚠ CAUTION

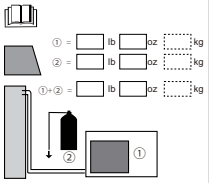
Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury

NOTE: Used to address practices not related to physical injury.

⚠ SAFETY INSTRUCTIONS

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury

Table 1 — Explanation of Symbols Displayed on Unit

	DANGER This symbol shows that this appliance used a mild flammable refrigerant. If the refrigerant is leaked and exposed to an external ignition source, there is a risk of fire.
	WARNING This symbol shows that appliance shall be installed, operated and stored in a room with a floor area not less than the minimum room area.
	CAUTION This symbol indicates that the operation manual should be read carefully.
	CAUTION This symbol indicates that service personnel should be handling this equipment while referencing the installation manual.
	CAUTION This symbol indicates that additional information is available in documents such as the operating manual or installation manual.
	CAUTION This symbol shows that when addition of charge is required by the manufacturer installation instructions for completing the refrigerating system .Recorded the resulting total refrigerant charge for each refrigerating system.

IMPORTANT INFORMATION FOR THE DEALER AND SERVICE PERSONNEL

⚠ WARNING

- Risk of Fire. Flammable Refrigerant Used.
- Installation, repair, maintenance, decommission and disposal Should Be Performed Only By Trained and Certified Service Personnel.
- Information of procedures additional to usual information for refrigerating appliance installation, repair, maintenance and decommission procedures is required when an appliance with FLAMMABLE REFRIGERANTS is affected.
- The training of these procedures is carried out by national training organizations or manufacturers that are accredited to teach the relevant national competency standards that may be set in legislation.
- The achieved competence should be documented by a certificate.

⚠ WARNING

The unit employs FLAMMABLE REFRIGERANT R454B.

- General
- The following information is provided for units that employ FLAMMABLE REFRIGERANTS.
- . Transport
- Attention is drawn to the fact that additional transportation regulations may exist with respect to equipment containing flammable gas. The maximum number of pieces of equipment or the configuration of the equipment permitted to be transported together will be determined by the applicable transport regulations.
- Marking of equipment using signs
- Signs for similar appliances used in a work area are generally addressed by local regulations and give the minimum requirements for the provision of safety and/or health signs for a work location.
- All required signs are to be maintained and employers should ensure that employees receive suitable and sufficient instruction and training on the meaning of appropriate safety signs and the actions that need to be taken in connection with these signs.
- The effectiveness of signs should not be diminished by too many signs being placed together.
- Any pictograms used should be as simple as possible and contain only essential details.
- Disposal of equipment using flammable refrigerants
- See national regulations.
- Storage of equipment
- The storage of the equipment should be in accordance with the applicable regulations or instructions, whichever is more stringent.

⚠ WARNING

- Storage of packed (unsold) equipment Storage package protection should be constructed in such a way that mechanical damage to the equipment inside the package will not cause a leak of the REFRIGERANT CHARGE.
- The maximum number of pieces of equipment permitted to be stored together will be determined by local regulations.
- Every working procedure that affects safety means shall only be carried out by competent personnel.
- Examples for such working procedures are:
  - breaking into the refrigerating circuit;
  - opening of sealed components;
  - opening of ventilated enclosures.
- Pipe-work shall be in compliance with national and local codes and standards.
- The pipe-work including piping material, pipe routing, and installation shall include protection from physical damage in operation and service, and be in compliance with national and local codes and standards, such as ASHRAE 15, ASHRAE 15.2, IAPMO Uniform Mechanical Code, ICC International Mechanical Code, or CSA B52. All field joints shall be accessible for inspection prior to being covered or enclosed;
- 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, according to the following requirements;
- The minimum test pressure for the low side of the system shall be the low side design pressure and the minimum test pressure for the high side of the system shall be the high side design pressure, unless the high side of the system, cannot be isolated from the low side of the system in which case the entire system shall be pressure tested to the low side design pressure.
  - field-made refrigerant joints indoors shall be tightness tested. The test method shall have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0,25 times the maximum allowable pressure. No leak shall be detected;
  - taking into consideration the length and diameter of the connecting refrigerant piping, add refrigerant to complete the installation according to the information provided on the label for determining the required additional refrigerant charge, as well as the instructions in this manual on how to complete the refrigerant charge.
- The minimum INSTALLED HEIGHT shall comply with the corresponding requirements in this manual.
- Protection devices, piping and fittings shall be protected as far as possible against adverse environmental effects, for example the danger of water collecting and freezing in relief pipes or the accumulation of dirt and debris;

⚠ WARNING

- Provision shall be made for expansion and contraction of long runs of piping;
- For add on heat pumps with flammable refrigerants;
  - the critical-to-safety wiring connection of the leak detection sensor or leak detection system to the furnace assembly. The wiring shall be not less than 18 AWG with a minimum insulation thickness of 1.58 mm or protected from damage. Critical-to-safety wiring is any field installed wiring necessary to fulfill the requirements in the event of detection of a leak;
  - shall not be installed on furnaces with an inductive electrical greater than Le as calculated; and
  - detection of a leak shall turn on the indoor fan at the highest available speed or turn it on to not less than Qmin as determined in applicable standard. Consult furnace manufacturer.
  - shall not be installed on furnaces if the temperature is great than declared maximum operating temperature marked on the unit.
- This appliance contains FLAMMABLE REFRIGERANTS, the minimum floor area of the room shall comply with the requirements in the " Required Minimum Room Area" table within this manual;
- A REFRIGERANT DETECTION SYSTEMS is installed. The unit must be powered except for service.
- REFRIGERANT SENSORS for REFRIGERANT DETECTION SYSTEMS Shall Only be replaced with sensors specified by the appliance manufacture.
- The detailed information on the following topics is included in the manual:
  - function, operation and required servicing measures;
  - specified end-of-life and replacement instructions;
  - other information about REFRIGERANT DETECTION SYSTEMS.
- Room shall be without continuously operating open flames (for example an operating gas appliance) or other POTENTIAL IGNITION SOURCES (for example an operating electric heater, hot surfaces).
- Auxiliary devices which may be a POTENTIAL IGNITION SOURCE shall not be installed in the duct work.
- The appliance contains more than m1 for any refrigerating circuit, an unventilated area where the appliance using FLAMMABLE REFRIGERANTS is installed shall be so constructed that should any refrigerant leak, it will not stagnate so as to create a fire or explosion hazard.

⚠ WARNING

- The appliance connected via an air duct system to one or more rooms are installed in a room with an area less than Amin, or installed in a room with an EFFECTIVE DISPERSAL VOLUME VED less than the minimum, that room shall be without continuously operating open flames (for example an operating gas appliance) or other POTENTIAL IGNITION SOURCES (for example an operating electric heater, hot surfaces). A flame-producing device may be installed in the same space if the device is provided with an effective flame arrestor.
- Only auxiliary devices approved by the appliance manufacturer or declared suitable with the refrigerant shall be installed in connecting ductwork.
  - f or appliances connected via an air duct system to one or more rooms, the auxiliary devices which can be a potential ignition source shall not be installed in the ductwork;
  - for appliances connected via an air duct system to one or more rooms, only auxiliary devices approved by the appliance manufacturer or declared suitable with the refrigerant shall be installed in connecting ductwork.

⚠ SAFETY INSTRUCTIONS

False ceilings or drop ceilings may be used as a return air plenum if a REFRIGERANT DETECTION SYSTEM is provided in the appliance and any external connections are also provided with a sensor immediately below the return air plenum duct joint.

⚠ CAUTION

- Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimized. For repair to the refrigerating system, the following shall be completed prior to conducting work on the system:
  - Work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapour being present while the work is being performed.
  - 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.
  - The area around the workspace shall be sectioned off. Ensure that the conditions within the area have been made safe by control of flammable material.

⚠ CAUTION

– 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.

– 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 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 can 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.

- 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.
- 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 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 can 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.

⚠ CAUTION

- 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.

⚠ WARNING

- Sealed electrical components shall be replaced.
- Intrinsically safe components must be replaced.
- 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.
- 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 can be inadequate, or can 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.

⚠ WARNING

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

NOTE: Examples of leak detection methods are:

– bubble method,
– fluorescent agent method.

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

⚠ CAUTION

- 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 the following.
- Oxygen free nitrogen (OFN) shall then be purged through the system both before and during the brazing process.
- 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 with inert gas when using flame to open circuit;
  - 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.

⚠ CAUTION

- The outlet for the vacuum pump shall not be close to any potential ignition sources, and ventilation shall be available.
- An inert gas, specifically, is dry oxygen free nitrogen(OFN).
- The system shall be “flushed” with OFN to render the unit safe. This process may need to be repeated several times.
- This operation is absolutely vital if brazing operations on the pipework are to take place.
- 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 minimize 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 labeled).
  - 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.
- 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.

1.Become familiar with the equipment and its operation.
2. Isolate system electrically.
3. 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.
4. Pump down refrigerant system, if possible.
5. If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
6. Make sure that the cylinder is situated on the scales before recovery takes place.

⚠ CAUTION

7. Start the recovery machine and operate in accordance with instructions.
8. Do not overfill cylinders (no more than 80 %volume liquid charge).
9. Do not exceed the maximum working pressure of the cylinder, even temporarily.
10. 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.
11. Recovered refrigerant shall not be charged into another refrigerating system unless it has been cleaned and checked.

- Equipment shall be labeled 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.
- When removing refrigerant from a system, either for servicing or decommissioning, it is required to follow good practice so 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 labeled 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.

⚠ CAUTION

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.

IMPORTANT INFORMATION FOR THE USER

⚠ WARNING

ELECTRICAL HAZARD 380 VOLTS DC

- Failure to follow this warning could result in property damage, severe personal injury, or death.
- WAIT FIVE (5) MINUTES after disconnecting power prior to touching electrical components as they may hold a dangerous charge of 380 VDC, then verify DC Voltage is less than 42 VDC at inverter TEST POINTS P-N.

NOTES:

- **This document is customer property and is to remain with this unit. Please return to service information pack upon completion of work.**
- **These instructions do not cover all variations in systems or provide for every possible contingency to be met in connection with the installation.**
- **Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to your installing dealer or local distributor.**
- **The manufacturer recommends installing only approved matched indoor and outdoor 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.**
- **This document contains a wiring diagram.**
- **This is customer property and is to remain with this unit.**

⚠ WARNING

This information is intended for use by individuals possessing adequate backgrounds of electrical and mechanical experience. Any attempt to repair air conditioning product may result in personal injury and/or property damage.

⚠ WARNING

HOT SURFACE

- May cause minor to severe burning. Failure to follow this Caution could result in property damage or personal injury.
- Do not touch the high-temperature components such as compressor.

⚠ WARNING

HAZARDOUS VOLTAGE

- Failure to follow this warning could result in property damage, severe personal injury, or death.
- Disconnect all electric power, Including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized.

⚠ WARNING

REFRIGERANT OIL

These units use R454B refrigerant. Use only R454B approved service equipment. These units use a POE oil that readily absorbs moisture from the atmosphere. To limit this 'hygroscopic' action, the system should remain sealed whenever possible. If a system has been open to the atmosphere for more than 4 hours, the compressor oil must be replaced. Never break a vacuum with air and when opening the system for component always change the driers when opening the system for component replacement.

⚠ CAUTION

CONTAINS REFRIGERANT

Failure to follow proper procedures can result in personal illness or injury or severe equipment damage. System contains oil and refrigerant under high pressure. Recover refrigerant to relieve pressure before opening system.

Flammable refrigerant used.

⚠ WARNING

This product can expose you to chemicals including Lead and Lead components, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www. P65 Warnings.ca.gov.

⚠ CAUTION

GROUNDIND REQUIRED

Failure to inspect or use proper service tools may result in equipment damage or personal injury. All parts of this product that are capable of conducting electrical current are grounded. If grounding wires, screws, straps, clips, nuts, or washers used to complete a path to earth are removed for service, they must be returned to their original position and properly fastened.

⚠ WARNING

SERVICE VALVES

Failure to follow this warning will result in abrupt release of system charge and may result in personal injury and/or property damage. Extreme caution should be exercised when opening the Liquid Line Service valve. Turn valve stem counterclockwise only until the stem contacts the rolled edge.

⚠ WARNING

BRAZING REQUIRED

- Failure to inspect lines or use proper service tools may result in equipment damage or personal injury. If using existing refrigerant lines make certain that all joints are brazed, not soldered.
- If refrigerant gas leaks during installation, ventilate the area immediately.
- Comply with national gas regulations.

⚠ WARNING

HIGH CURRENT LEAKAGE

Grounding is required before connecting electrical supply.

Failure to follow this warning could result in property damage, severe personal injury, or death.

⚠ WARNING

RISK OF FIRE

Mild flammable refrigerant used. Follow handling instructions carefully in compliance with national regulations.

⚠ WARNING

FIRE, EXPLOSION

Store in a well ventilated room without continuously operating flames or other potential ignition.

⚠ WARNING

- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or persons who lack experience and knowledge, unless they are supervised or have been given instructions concerning the use of the appliance by a person responsible for their safety.
- Children should be supervised to ensure that they do not play with the appliance.
- Any person who is involved with working on or opening a refrigerant circuit should hold a current valid certificate from an industry-accredited assessment authority, which authorizes their competence to handle refrigerants safely in accordance with an industry recognized assessment credential.
- Servicing shall only be performed as recommended by the equipment manufacturer.
- Maintenance and repair requiring the assistance of other skilled personnel shall be carried out under the supervision of a person competent in the use of flammable refrigerants.
- Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to minimize the risk of ignition.
- Risk of electric shock. Can cause injury or death. Disconnect all remote electric power supplies before servicing.
- Risk of fire mild. Flammable refrigerant used. To be repaired only by trained service personnel. Do not puncture refrigerant tubing.
- Risk of fire. Dispose of properly in accordance with federal or local regulations.
- Risk of fire. Consult repair manual/owner's guide before attempting to service this product. All safety precautions must be followed.
- Risk of fire – auxiliary devices which may be ignition sources shall not be installed in the ductwork, other than auxiliary devices listed for use with the specific appliance. See instructions.

ABOUT THE REFRIGERANT

⚠ WARNING

The appliance uses R454B refrigerant.

⚠ WARNING

These instructions are exclusively intended for qualified contractors and authorized installers.

- Work on the refrigerant circuit with mild flammable refrigerant in safety group A2L may only be carried out by authorized heating contractors.These heating contractors must be trained in accordance with UL 60335-2-40, Section HH. The certificate of competence from an industry accredited body is required.
- Work on electrical equipment may only be carried out by a qualified electrician.
- Before initial commissioning, all safety - related points must be checked by the particular certified heating contractors. The system must be commissioned by the system installer or a qualified person authorized by the installer.

⚠ WARNING

- Appliance shall be installed, operated and stored in a room that meets special requirements and has an area limit as shown in sections 2.6.2.
- Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
- The appliance shall be stored in a room that does not have continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).
- Do not pierce or burn the unit.
- Be aware that refrigerants may be odorless.
- Appliance shall be installed and operated in a room with an EFFECTIVE DISPERSAL VOLUME larger than 'A' m^3 ('B' ft^3).
- When stored in an unpowered state, the appliance must be stored in a room with a floor area larger than 'X'm^2 ('y' ft^2).

ROOM AREA LIMITATIONS

In UL/CSA 60335-2-40, R454B refrigerant is classified as class A2L,which is mildly flammable.Therefore, R454B refrigerant is suitable for systems needing additional refrigerant charge and which will limit the area of the rooms being served by the system.

Similarly, the total amount of refrigerant in the system shall be less than or equal to the allowable maximum refrigerant charge. The allowable maximum refrigerant charge depends on the area of the rooms being served by the system.

⚠ WARNING

The space considered shall be any space which contains refrigerant-containing parts or into which refrigerant could be released.

The room area (A) of the smallest, enclosed, occupied space shall be used in the determination of the refrigerant quantity limits.

⚠ CAUTION

- For more detailed instructions on the installation height of the indoor unit, please refer to the corresponding INSTALLATION AND OPERATION MANUAL.
- If the installation height of the VRF indoor unit is less than 1.8 m, please contact your installer or dealer to receive more information and professional advice.

The room area calculation requirements

- For determination of room area (A) when used to calculate the refrigerant charge limit, the following shall apply.
- The room area (A) shall be defined as the room area enclosed by the projection to the base of the walls, partitions and doors of the space in which the appliance is installed.
- Spaces connected by only drop ceilings, ductwork, or similar connections shall not be considered a single space.
- Units mounted higher than 70-55/64 inches and spaces divided by partition walls that are no higher than 62-63/64 inches shall be considered a single space. Rooms on the same floor and connected by an open passageway between the spaces can be considered a single room when determining compliance to Amin, if the passageway complies with all of the following.

1. It is a permanent opening.
2. It extends to the floor.
3. It is intended for people to walk through.

- The area of the connected rooms, on the same floor connected by permanent opening in the walls and/or doors between occupied spaces, including gaps between the wall and the floor, can be considered a single room when determining compliance to Amin provided all of the following conditions are met as Figure 3.

1. Low level opening
   a. The opening shall not be less than Anvmin in Tables 2 - 5.
   b. The area of any openings above 11-13/16 inches from the floor shall not be considered in determining compliance with Anvmin.
   c. At least 50 % of the opening area of Anvmin shall be below 7-7/8 inches from the floor.
   d. The bottom of the opening is not more than 3-15/16 inches from the floor.
   e. The opening is a permanent opening that cannot be closed.
   f. For openings extending to the floor the height shall not be less than 25/32 inches above the surface of the floor covering.
2. High level opening
   a. The opening shall not be less than 50 % of Anvmin in Tables 2 - 5.
   b. The opening is a permanent opening that cannot be closed.
   c. The opening shall be at least 59 inches above the floor.
   d. The height of the opening is not less than 25/32 inches.
3. Room size requirement
   a. The room into which refrigerant can leak, plus the connected adjacent room(s) shall have a total area not less than Amin. Amin is shown in Tables 2 - 5.
   b. The room area in which the unit is installed shall be not less than 20 % Amin. Amin is shown in Tables 2 - 5.

NOTE: The requirement for the second opening can be met by drop ceilings, ventilation ducts, or similar arrangements that provide an airflow path between the connected rooms.

The minimum opening for natural ventilation (Anvmin) in connected rooms is related to the room area (A), the actual refrigerant charge of refrigerant in the system (mc), and the allowable MAXIMUM REFRIGERANT CHARGE in the system (mmax), Anvmin can be determined.

CONNECTED ROOMS

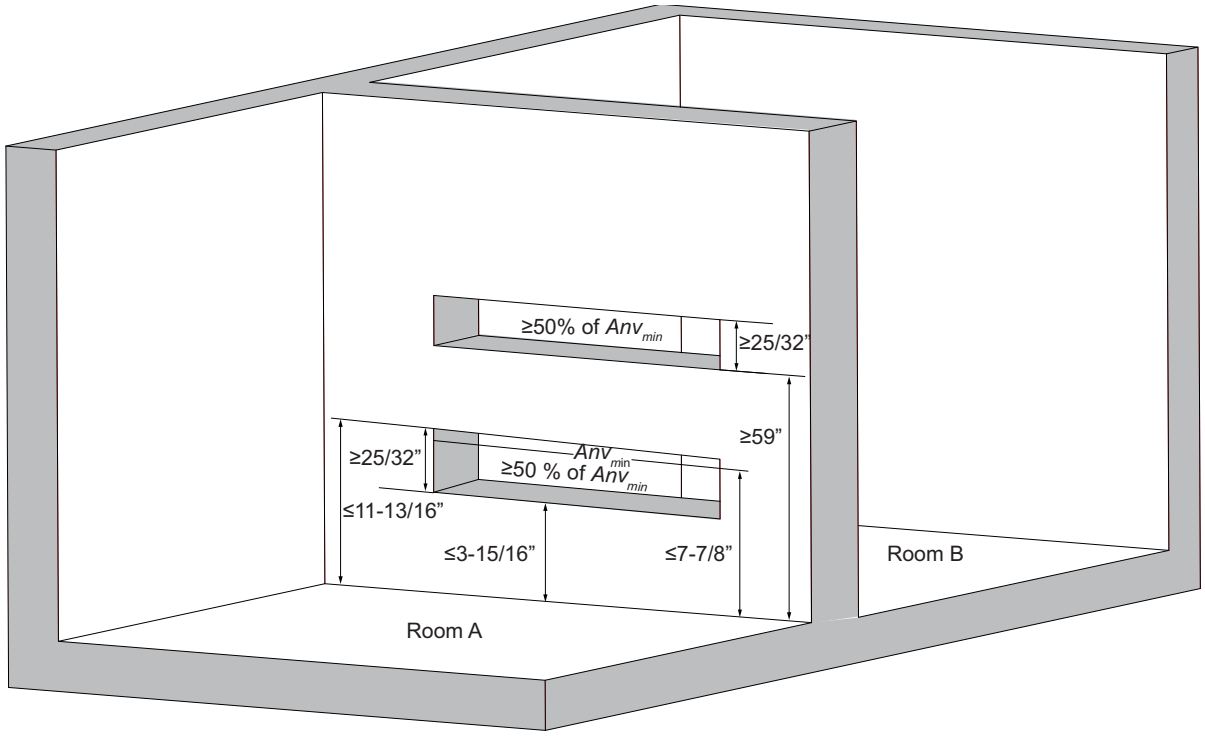


Fig. 3 —Opening Conditions for Connected Rooms

Table 2 — Minimum Opening Area for Connected Rooms

A(ft²)	Anv_{min}(ft²)-(a)/(b)/(c)/(d)/(e)/(f)/(g)/(h)/(i)
10	1.5/1.6/3.0/3.0/3.3/5.9/3.6/4.0/7.1
20	1.4/1.6/2.9/2.9/3.3/5.8/3.5/3.9/7.0
30	1.3/1.5/2.9/2.8/3.2/5.8/3.4/3.9/7.0
40	1.2/1.4/2.8/2.7/3.1/5.8/3.4/3.8/6.9
50	1.1/1.4/2.8/2.7/3.0/5.7/3.3/3.7/6.9
60	1.1/1.3/2.8/2.6/3.0/5.7/3.2/3.6/6.8
70	1.0/1.2/2.7/2.5/2.9/5.6/3.1/3.6/6.8
80	0.9/1.1/2.7/2.4/2.8/5.6/3.0/3.5/6.8
90	0.8/1.1/2.6/2.3/2.7/5.5/3.0/3.4/6.7
100	0.7/1.0/2.6/2.3/2.7/5.5/2.9/3.3/6.7
110	0.7/0.9/2.5/2.2/2.6/5.5/2.8/3.3/6.6
120	0.6/0.8/2.5/2.1/2.5/5.4/2.7/3.2/6.6
130	0.5/0.8/2.5/2.0/2.4/5.4/2.6/3.1/6.5
140	0.4/0.7/2.4/1.9/2.4/5.3/2.6/3.1/6.5
150	0.3/0.6/2.4/1.9/2.3/5.3/2.5/3.0/6.5
160	0.3/0.6/2.3/1.8/2.2/5.2/2.4/2.9/6.4
170	0.2/0.5/2.3/1.7/2.2/5.2/2.3/2.8/6.4
180	0.1/0.4/2.3/1.6/2.1/5.2/2.2/2.8/6.3
190	0.0/0.3/2.2/1.5/2.0/5.1/2.1/2.7/6.3
200	0.0/0.3/2.2/1.5/1.9/5.1/2.1/2.6/6.3
210	0.0/0.2/2.1/1.4/1.9/5.0/2.0/2.5/6.2
220	0.0/0.1/2.1/1.3/1.8/5.0/1.9/2.5/6.2
230	0.0/0.0/2.0/1.2/1.7/5.0/1.8/2.4/6.1
240	0.0/0.0/2.0/1.1/1.6/4.9/1.7/2.3/6.1
250	0.0/0.0/2.0/1.1/1.6/4.9/1.7/2.3/6.0
260	0.0/0.0/1.9/1.0/1.5/4.8/1.6/2.2/6.0
270	0.0/0.0/1.9/0.9/1.4/4.8/1.5/2.1/6.0
280	0.0/0.0/1.8/0.8/1.4/4.7/1.4/2.0/5.9
290	0.0/0.0/1.8/0.7/1.3/4.7/1.3/2.0/5.9

Table 3 — Minimum Opening Area for Connected Rooms (Cont.)

A(ft²)	Anv_{min}(ft²)-(a)/(b)/(c)/(d)/(e)/(f)/(g)/(h)/(i)
300	0.0/0.0/1.7/0.6/1.2/4.7/1.3/1.9/5.8
310	0.0/0.0/1.7/0.6/1.1/4.6/1.2/1.8/5.8
320	0.0/0.0/1.7/0.5/1.1/4.6/1.1/1.7/5.7
330	0.0/0.0/1.6/0.4/1.0/4.5/1.0/1.7/5.7
340	0.0/0.0/1.6/0.3/0.9/4.5/0.9/1.6/5.7
350	0.0/0.0/1.5/0.2/0.8/4.4/0.9/1.5/5.6
360	0.0/0.0/1.5/0.2/0.8/4.4/0.8/1.4/5.6
370	0.0/0.0/1.5/0.1/0.7/4.4/0.7/1.4/5.5
380	0.0/0.0/1.4/0.0/0.6/4.3/0.6/1.3/5.5
390	0.0/0.0/1.4/0.0/0.6/4.3/0.5/1.2/5.5
400	0.0/0.0/1.3/0.0/0.5/4.2/0.5/1.2/5.4
410	0.0/0.0/1.3/0.0/0.4/4.2/0.4/1.1/5.4
420	0.0/0.0/1.2/0.0/0.3/4.2/0.3/1.0/5.3
430	0.0/0.0/1.2/0.0/0.3/4.1/0.2/0.9/5.3
440	0.0/0.0/1.2/0.0/0.2/4.1/0.1/0.9/5.2
450	0.0/0.0/1.1/0.0/0.1/4.0/0.1/0.8/5.2
460	0.0/0.0/1.1/0.0/0.0/4.0/0.0/0.7/5.2
470	0.0/0.0/1.0/0.0/0.0/3.9/0.0/0.6/5.1
480	0.0/0.0/1.0/0.0/0.0/3.9/0.0/0.6/5.1
490	0.0/0.0/0.9/0.0/0.0/3.9/0.0/0.5/5.0
500	0.0/0.0/0.9/0.0/0.0/3.8/0.0/0.4/5.0
510	0.0/0.0/0.9/0.0/0.0/3.8/0.0/0.4/4.9
520	0.0/0.0/0.8/0.0/0.0/3.7/0.0/0.3/4.9
530	0.0/0.0/0.8/0.0/0.0/3.7/0.0/0.2/4.9
540	0.0/0.0/0.7/0.0/0.0/3.6/0.0/0.1/4.8
550	0.0/0.0/0.7/0.0/0.0/3.6/0.0/0.1/4.8
560	0.0/0.0/0.7/0.0/0.0/3.6/0.0/0.0/4.7
570	0.0/0.0/0.6/0.0/0.0/3.5/0.0/0.0/4.7
580	0.0/0.0/0.6/0.0/0.0/3.5/0.0/0.0/4.7

Table 4 — Minimum Opening Area for Connected Rooms (Cont.)

A(ft²)	Anv_{min}(ft²)-(a)/(b)/(c)/(d)/(e)/(f)/(g)/(h)/(i)
590	0.0/0.0/0.5/0.0/0.0/3.4/0.0/0.0/4.6
600	0.0/0.0/0.5/0.0/0.0/3.4/0.0/0.0/4.6
610	0.0/0.0/0.4/0.0/0.0/3.4/0.0/0.0/4.5
620	0.0/0.0/0.4/0.0/0.0/3.3/0.0/0.0/4.5
630	0.0/0.0/0.4/0.0/0.0/3.3/0.0/0.0/4.4
640	0.0/0.0/0.3/0.0/0.0/3.2/0.0/0.0/4.4
650	0.0/0.0/0.3/0.0/0.0/3.2/0.0/0.0/4.4
660	0.0/0.0/0.2/0.0/0.0/3.1/0.0/0.0/4.3
670	0.0/0.0/0.2/0.0/0.0/3.1/0.0/0.0/4.3
680	0.0/0.0/0.1/0.0/0.0/3.1/0.0/0.0/4.2
690	0.0/0.0/0.1/0.0/0.0/3.0/0.0/0.0/4.2
700	0.0/0.0/0.1/0.0/0.0/3.0/0.0/0.0/4.1
710	0.0/0.0/0.0/0.0/0.0/2.9/0.0/0.0/4.1
720	0.0/0.0/0.0/0.0/0.0/2.9/0.0/0.0/4.1
730	0.0/0.0/0.0/0.0/0.0/2.8/0.0/0.0/4.0
740	0.0/0.0/0.0/0.0/0.0/2.8/0.0/0.0/4.0
750	0.0/0.0/0.0/0.0/0.0/2.8/0.0/0.0/3.9
760	0.0/0.0/0.0/0.0/0.0/2.7/0.0/0.0/3.9
770	0.0/0.0/0.0/0.0/0.0/2.7/0.0/0.0/3.9
780	0.0/0.0/0.0/0.0/0.0/2.6/0.0/0.0/3.8
790	0.0/0.0/0.0/0.0/0.0/2.6/0.0/0.0/3.8
800	0.0/0.0/0.0/0.0/0.0/2.6/0.0/0.0/3.7
810	0.0/0.0/0.0/0.0/0.0/2.5/0.0/0.0/3.7
820	0.0/0.0/0.0/0.0/0.0/2.5/0.0/0.0/3.6
830	0.0/0.0/0.0/0.0/0.0/2.4/0.0/0.0/3.6
840	0.0/0.0/0.0/0.0/0.0/2.4/0.0/0.0/3.6
850	0.0/0.0/0.0/0.0/0.0/2.3/0.0/0.0/3.5
860	0.0/0.0/0.0/0.0/0.0/2.3/0.0/0.0/3.5
870	0.0/0.0/0.0/0.0/0.0/2.3/0.0/0.0/3.4
880	0.0/0.0/0.0/0.0/0.0/2.2/0.0/0.0/3.4
890	0.0/0.0/0.0/0.0/0.0/2.2/0.0/0.0/3.3
900	0.0/0.0/0.0/0.0/0.0/2.1/0.0/0.0/3.3
910	0.0/0.0/0.0/0.0/0.0/2.1/0.0/0.0/3.3
920	0.0/0.0/0.0/0.0/0.0/2.0/0.0/0.0/3.2
930	0.0/0.0/0.0/0.0/0.0/2.0/0.0/0.0/3.2
940	0.0/0.0/0.0/0.0/0.0/2.0/0.0/0.0/3.1
950	0.0/0.0/0.0/0.0/0.0/1.9/0.0/0.0/3.1
960	0.0/0.0/0.0/0.0/0.0/1.9/0.0/0.0/3.1
970	0.0/0.0/0.0/0.0/0.0/1.8/0.0/0.0/3.0
980	0.0/0.0/0.0/0.0/0.0/1.8/0.0/0.0/3.0
990	0.0/0.0/0.0/0.0/0.0/1.8/0.0/0.0/2.9
1 000	0.0/0.0/0.0/0.0/0.0/1.7/0.0/0.0/2.9
1 010	0.0/0.0/0.0/0.0/0.0/1.7/0.0/0.0/2.8
1 020	0.0/0.0/0.0/0.0/0.0/1.6/0.0/0.0/2.8
1 030	0.0/0.0/0.0/0.0/0.0/1.6/0.0/0.0/2.8
1 040	0.0/0.0/0.0/0.0/0.0/1.5/0.0/0.0/2.7
1 050	0.0/0.0/0.0/0.0/0.0/1.5/0.0/0.0/2.7
1 060	0.0/0.0/0.0/0.0/0.0/1.5/0.0/0.0/2.6
1 070	0.0/0.0/0.0/0.0/0.0/1.4/0.0/0.0/2.6
1 080	0.0/0.0/0.0/0.0/0.0/1.4/0.0/0.0/2.5
1 090	0.0/0.0/0.0/0.0/0.0/1.3/0.0/0.0/2.5
1 100	0.0/0.0/0.0/0.0/0.0/1.3/0.0/0.0/2.5
1 110	0.0/0.0/0.0/0.0/0.0/1.2/0.0/0.0/2.4
1 120	0.0/0.0/0.0/0.0/0.0/1.2/0.0/0.0/2.4
1 130	0.0/0.0/0.0/0.0/0.0/1.2/0.0/0.0/2.3
1 140	0.0/0.0/0.0/0.0/0.0/1.1/0.0/0.0/2.3
1 150	0.0/0.0/0.0/0.0/0.0/1.1/0.0/0.0/2.3
1 160	0.0/0.0/0.0/0.0/0.0/1.0/0.0/0.0/2.2
1 170	0.0/0.0/0.0/0.0/0.0/1.0/0.0/0.0/2.2
1 180	0.0/0.0/0.0/0.0/0.0/1.0/0.0/0.0/2.1
1 190	0.0/0.0/0.0/0.0/0.0/0.9/0.0/0.0/2.1

Table 5 — Minimum Opening Area for Connected Rooms (Cont.)

A(ft²)	Anv_{min}(ft²)-(a)/(b)/(c)/(d)/(e)/(f)/(g)/(h)/(i)
1 200	0.0/0.0/0.0/0.0/0.0/0.9/0.0/0.0/2.0
1 210	0.0/0.0/0.0/0.0/0.0/0.8/0.0/0.0/2.0
1 220	0.0/0.0/0.0/0.0/0.0/0.8/0.0/0.0/2.0
1 230	0.0/0.0/0.0/0.0/0.0/0.7/0.0/0.0/1.9
1 240	0.0/0.0/0.0/0.0/0.0/0.7/0.0/0.0/1.9
1 250	0.0/0.0/0.0/0.0/0.0/0.7/0.0/0.0/1.8
1 260	0.0/0.0/0.0/0.0/0.0/0.6/0.0/0.0/1.8
1 270	0.0/0.0/0.0/0.0/0.0/0.6/0.0/0.0/1.7
1 280	0.0/0.0/0.0/0.0/0.0/0.5/0.0/0.0/1.7
1 290	0.0/0.0/0.0/0.0/0.0/0.5/0.0/0.0/1.7
1 300	0.0/0.0/0.0/0.0/0.0/0.4/0.0/0.0/1.6
1 310	0.0/0.0/0.0/0.0/0.0/0.4/0.0/0.0/1.6
1 320	0.0/0.0/0.0/0.0/0.0/0.4/0.0/0.0/1.5
1 330	0.0/0.0/0.0/0.0/0.0/0.3/0.0/0.0/1.5
1 340	0.0/0.0/0.0/0.0/0.0/0.3/0.0/0.0/1.5
1 350	0.0/0.0/0.0/0.0/0.0/0.2/0.0/0.0/1.4
1 360	0.0/0.0/0.0/0.0/0.0/0.2/0.0/0.0/1.4
1 370	0.0/0.0/0.0/0.0/0.0/0.2/0.0/0.0/1.3
1 380	0.0/0.0/0.0/0.0/0.0/0.1/0.0/0.0/1.3
1 390	0.0/0.0/0.0/0.0/0.0/0.1/0.0/0.0/1.2
1 400	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/1.2
1 410	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/1.2
1 420	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/1.1
1 430	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/1.1
1 440	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/1.0
1 450	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/1.0
1 460	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.9
1 470	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.9
1 480	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.9
1 490	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.8
1 500	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.8
1 510	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.7
1 520	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.7
1 530	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.7
1 540	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.6
1 550	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.6
1 560	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.5
1 570	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.5
1 580	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.4
1 590	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.4
1 600	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.4
1 610	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.3
1 620	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.3
1 630	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.2
1 640	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.2
1 650	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.1
1 660	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.1
1 670	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.1
1 680	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0
1 690	0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0/0.0

a. The indoor unit installation height not less than 7.2 ft (2.2 m) and mc=13.2 lb (6.0 kg).
b. The indoor unit installation height between 5.9 ft (1.8 m) and 7.2 ft (2.2 m) and mc=13.2 lb (6.0 kg).
c. The indoor unit installation height between 2.0 ft (0.6 m) and 5.9 ft (1.8 m) and mc=13.2 lb (6.0 kg)
d. The indoor unit installation height not less than 7.2 ft (2.2 m) and mc=25.8 lb (11.7 kg).
e. The indoor unit installation height between 5.9 ft (1.8 m) and 7.2 ft (2.2m) and mc=25.8 lb (11.7 kg).
f. The indoor unit installation height between 2.0 ft (0.6 m) and 5.9 ft (1.8 m) and mc=25.8 lb (11.7 kg).
g. The indoor unit installation height not less than 7.2 ft (2.2 m) and mc=30.8 lb (14.0 kg).
h. The indoor unit installation height between 5.9 ft (1.8 m) and 7.2 ft (2.2 m) and mc=30.8 lb (14.0 kg).
i. The indoor unit installation height between 2.0 ft (0.6 m) and 5.9 ft (1.8 m) and mc=30.8 lb (14.0 kg).

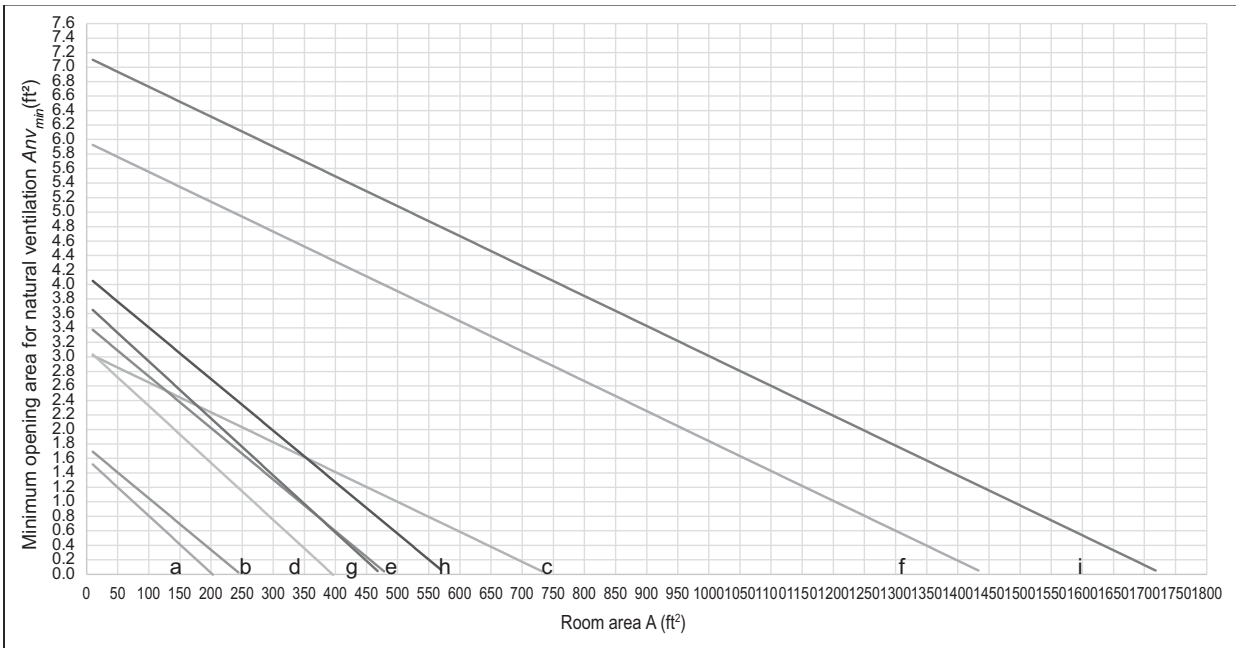


Fig. 4 —Minimum Opening Area for Connected Rooms

Curve (a) is the Anvmin limit for the indoor unit installation height h0 ≥ 7.2 ft (2.2 m) and mc = 13.2 lb (6.0 kg).
Curve (b) is the Anvmin limit for the indoor unit installation height 5.9 ft (1.8 m) ≤ h0 ? 7.2 ft (2.2 m) and mc = 13.2 lb (6.0 kg).
Curve (c) is the Anvmin limit for the indoor unit installation height 2.0 ft (0.6 m) ≤ h0 ? 5.9 ft (1.8 m) and mc = 13.2 lb (6.0 kg).
Curve (d) is the Anvmin limit for the indoor unit installation height h0 ≥ 7.2 ft (2.2 m) and mc = 25.8 lb (11.7 kg).
Curve (e) is the Anvmin limit for the indoor unit installation height 5.9 ft (1.8 m) ≤ h0 ? 7.2 ft (2.2 m) and mc = 25.8 lb (11.7 kg).
Curve (f) is the Anvmin limit for the indoor unit installation height 2.0 ft (0.6 m) ≤ h0 ? 5.9 ft (1.8 m) and mc = 25.8 lb (11.7 kg).
Curve (g) is the Anvminn limit for the indoor unit installation height h0 ≥ 7.2 ft (2.2m) and mc = 30.8 lb (14.0 kg).
Curve (h) is the Anvmin limit for the indoor unit installation height 5.9 ft (1.8 m) ≤ h0 ? 7.2 ft (2.2 m) and mc = 30.8 lb (14.0 kg).
Curve (i) is the Anvmin limit for the indoor unit installation height 2.0 ft (0.6 m) ≤ h0 ? 5.9 ft (1.8 m) and mc = 30.8 lb (14.0 kg).

For appliances serving two or more rooms with an air duct system, The room area calculation shall be determined based on the total area of the conditioned space (TA) connected by ducts taking into consideration that the circulating airflow distributed to all the rooms by the appliance integral indoor fan will mix and dilute the leaking refrigerant before entering any room.

The allowed maximum refrigerant charge and required minimum room area

If the fan incorporated to an appliance is continuously operated or operation is initiated by a REFRIGERANT DETECTION SYSTEM with a sufficient CIRCULATION AIRFLOW rate, the allowable maximum refrigerant charge (m_{max}) and the required minimum room area (A_{min}/TA_{min}) is shown in Table 6 and Table 7.

⚠ CAUTION

The allowable maximum refrigerant charge of the Table 6 or the required minimum room area of the Table 7 is available only if the following conditions are met:

- Minimum velocity of 3.28 ft/s, which is calculated as the indoor unit airflow divided by the nominal face area of the outlet. And the grill area shall not be deducted.
- Minimum airflow rate must meet the corresponding values in Table , which is related to the actual refrigerant charge of the system (mc).

NOTES:

- **The maximum refrigerant limit described above applies to unventilated areas. If adding additional measures, such as areas with mechanical ventilation or natural ventilation or Refrigerant shut-off Device, The maximum refrigerant charge can be increased or the minimum room area can be reduced.**
- **R454B refrigerant leakage sensor is configured for the indoor unit, meets the incorporated circulation airflow requirements, the maximum refrigerant charge or minimum room area can be determined according to Tables 6, 7, 8.**
- **If the actual room area, air outlet height, and refrigerant charge amount are not reflected in the above table, more severe cases need to be considered according to the data in the Table 6, 7, 8.**

Table 6 — Allowable Maximum Refrigerant Charge

A/TA(ft²)	m_{max}(lb)-a/b/c	A/TA(ft²)	m_{max}(lb)-a/b/c
10	0.6/0.5/0.1	570	30.8/30.8/10.3
20	1.3/1.0/0.3	580	30.8/30.8/10.5
30	2.0/1.6/0.5	590	30.8/30.8/10.7
40	2.6/2.1/0.7	600	30.8/30.8/10.9
50	3.3/2.7/0.9	610	30.8/30.8/11.0
60	4.0/3.2/1.0	620	30.8/30.8/11.2
70	4.6/3.8/1.2	630	30.8/30.8/11.4
80	5.3/4.3/1.4	640	30.8/30.8/11.6
90	6.0/4.9/1.6	650	30.8/30.8/11.8
100	6.6/5.4/1.8	660	30.8/30.8/12.0
110	7.3/6.0/2.0	670	30.8/30.8/12.1
120	8.0/6.5/2.1	680	30.8/30.8/12.3
130	8.6/7.0/2.3	690	30.8/30.8/12.5
140	9.3/7.6/2.5	700	30.8/30.8/12.7
150	10.0/8.1/2.7	710	30.8/30.8/12.9
160	10.6/8.7/2.9	720	30.8/30.8/13.0
170	11.3/9.2/3.0	730	30.8/30.8/13.2
180	12.0/9.8/3.2	740	30.8/30.8/13.4
190	12.6/10.3/3.4	750	30.8/30.8/13.6
200	13.3/10.9/3.6	760	30.8/30.8/13.8
210	14.0/11.4/3.8	770	30.8/30.8/14.0
220	14.6/12.0/4.0	780	30.8/30.8/14.1
230	15.3/12.5/4.1	790	30.8/30.8/14.3
240	16.0/13.0/4.3	800	30.8/30.8/14.5
250	16.6/13.6/4.5	810	30.8/30.8/14.7
260	17.3/14.1/4.7	820	30.8/30.8/14.9
270	18.0/14.7/4.9	830	30.8/30.8/15.0
280	18.6/15.2/5.0	840	30.8/30.8/15.2
290	19.3/15.8/5.2	850	30.8/30.8/15.4
300	20.0/16.3/5.4	860	30.8/30.8/15.6
310	20.6/16.9/5.6	870	30.8/30.8/15.8
320	21.3/17.4/5.8	880	30.8/30.8/16.0
330	22.0/18.0/6.0	890	30.8/30.8/16.1
340	22.6/18.5/6.1	900	30.8/30.8/16.3
350	23.3/19.0/6.3	910	30.8/30.8/16.5
360	24.0/19.6/6.5	920	30.8/30.8/16.7
370	24.6/20.1/6.7	930	30.8/30.8/16.9
380	25.3/20.7/6.9	940	30.8/30.8/17.0
390	26.0/21.2/7.0	950	30.8/30.8/17.2
400	26.6/21.8/7.2	960	30.8/30.8/17.4
410	27.3/22.3/7.4	970	30.8/30.8/17.6
420	28.0/22.9/7.6	980	30.8/30.8/17.8
430	28.6/23.4/7.8	990	30.8/30.8/18.0
440	29.3/24.0/8.0	1 000	30.8/30.8/18.1
450	30.0/24.5/8.1	1 010	30.8/30.8/18.3
460	30.6/25.0/8.3	1 020	30.8/30.8/18.5
470	30.8/25.6/8.5	1 030	30.8/30.8/18.7
480	30.8/26.1/8.7	1 040	30.8/30.8/18.9
490	30.8/26.7/8.9	1 050	30.8/30.8/19.0
500	30.8/27.2/9.0	1 060	30.8/30.8/19.2
510	30.8/27.8/9.2	1 070	30.8/30.8/19.4
520	30.8/28.3/9.4	1 080	30.8/30.8/19.6
530	30.8/28.9/9.6	1 090	30.8/30.8/19.8
540	30.8/29.4/9.8	1 100	30.8/30.8/20.0
550	30.8/30.0/10.0	1 110	30.8/30.8/20.1
560	30.8/30.5/10.1	1 120	30.8/30.8/20.3

Table 7 — Allowable Maximum Refrigerant Charge (Cont)

A/TA(ft²)	m_{max}(lb)-a/b/c	A/TA(ft²)	m_{max}(lb)-a/b/c
1 130	30.8/30.8/20.5	1 280	30.8/30.8/23.2
1 140	30.8/30.8/20.7	1 290	30.8/30.8/23.4
1 150	30.8/30.8/20.9	1 300	30.8/30.8/23.6
1 160	30.8/30.8/21.0	1 310	30.8/30.8/23.8
1 170	30.8/30.8/21.2	1 320	30.8/30.8/24.0
1 180	30.8/30.8/21.4	1 330	30.8/30.8/24.1
1 190	30.8/30.8/21.6	1 340	30.8/30.8/24.3
1 200	30.8/30.8/21.8	1 350	30.8/30.8/24.5
1 210	30.8/30.8/22.0	1 360	30.8/30.8/24.7
1 220	30.8/30.8/22.1	1 370	30.8/30.8/24.9
1 230	30.8/30.8/22.3	1 380	30.8/30.8/25.0
1 240	30.8/30.8/22.5	1 390	30.8/30.8/25.2
1 250	30.8/30.8/22.7	1 400	30.8/30.8/25.4
1 260	30.8/30.8/22.9	1 410	30.8/30.8/25.6
1 270	30.8/30.8/23.0	1 420	30.8/30.8/25.8

Table 8 — Allowable Maximum Refrigerant Charge (Cont)

A/TA(ft²)	m_{max}(lb)-a/b/c	A/TA(ft²)	m_{max}(lb)-a/b/c
1 430	30.8/30.8/26.0	1 570	30.8/30.8/28.5
1 440	30.8/30.8/26.1	1 580	30.8/30.8/28.7
1 450	30.8/30.8/26.3	1 590	30.8/30.8/28.9
1 460	30.8/30.8/26.5	1 600	30.8/30.8/29.1
1 470	30.8/30.8/26.7	1 610	30.8/30.8/29.2
1 480	30.8/30.8/26.9	1 620	30.8/30.8/29.4
1 490	30.8/30.8/27.0	1 630	30.8/30.8/29.6
1 500	30.8/30.8/27.2	1 640	30.8/30.8/29.8
1 510	30.8/30.8/27.4	1 650	30.8/30.8/30.0
1 520	30.8/30.8/27.6	1 660	30.8/30.8/30.1
1 530	30.8/30.8/27.8	1 670	30.8/30.8/30.3
1 540	30.8/30.8/28.0	1 680	30.8/30.8/30.5
1 550	30.8/30.8/28.1	1 690	30.8/30.8/30.7
1 560	30.8/30.8/28.3	1 700	30.8/30.8/30.8

a. The indoor unit installation height not less than 7.2 ft (2.2 m).
b. The indoor unit installation height between 5.9 ft (1.8 m) and 7.2 ft (2.2 m).
c. The indoor unit installation height between 2.0 ft (0.6 m) and 5.9 ft (1.8 m).

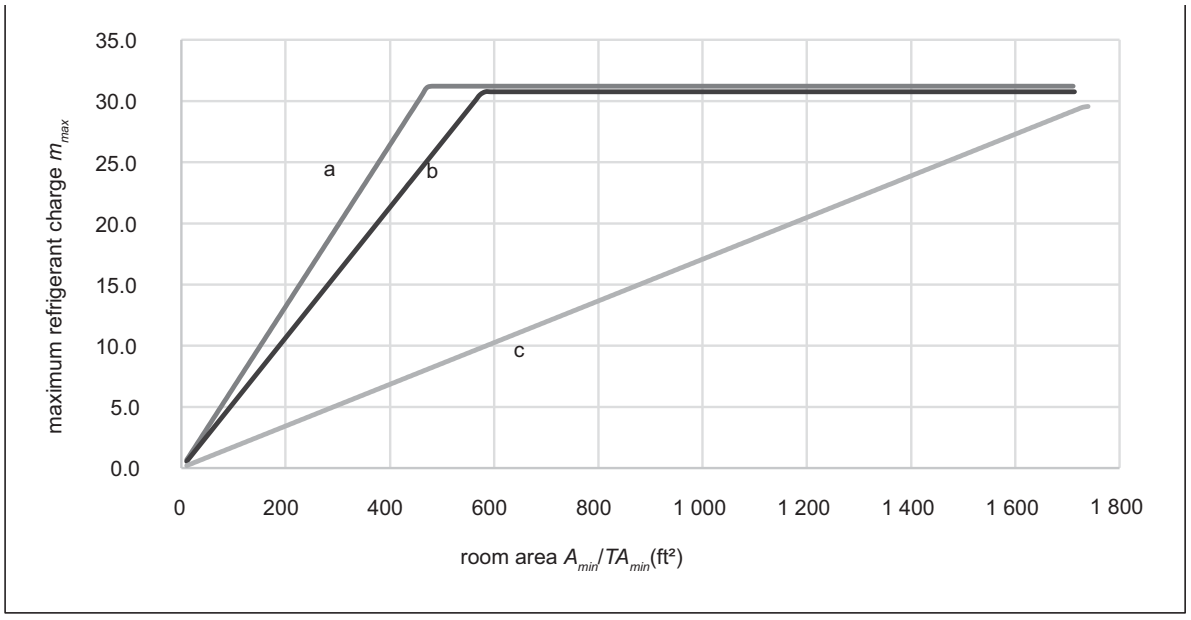


Fig. 5 —Indoor Unit Installation Height

Curve (a) is the mmax limit for the indoor unit installation height h0 ≥ 7.2 ft (2.2 m).
Curve (b) is the mmax limit for the indoor unit installation height 5.9 ft (1.8 m) ≤ h0 < 7.2 ft (2. 2m).
Curve (c) is the mmax limit for the indoor unit installation height 2.0 ft (0.6 m) ≤ h0 < 5.9 ft (1.8 m).

Table 9 — Required Minimum Room Area

m_c(lb)	A_{min}/TA_{min}(ft²)-a/b/c
1	14.9/18.3/54.9
2	29.9/36.6/109.9
3	44.9/54.9/164.9
4	59.9/73.3/219.9
5	74.9/91.6/274.9
6	89.9/109.9/329.8
7	104.9/128.2/384.8
8	119.9/146.6/439.8
9	134.9/164.9/494.8
10	149.9/183.2/549.8
11	164.9/201.6/604.8
12	179.9/219.9/659.7
13	194.9/238.2/714.7
14	209.9/256.5/769.7
15	224.9/274.9/824.7
16	239.9/293.2/879.7
17	254.9/311.5/934.6
18	269.9/329.8/989.6

Table 10 — Required Minimum Room Area (Cont)

m_c(lb)	A_{min}/TA_{min}(ft²)-a/b/c
19	284.9/348.2/1044.6
20	299.9/366.5/1099.6
21	314.8/384.8/1154.6
22	329.8/403.2/1209.6
23	344.8/421.5/1264.5
24	359.8/439.8/1319.5
25	374.8/458.1/1374.5
26	389.8/476.5/1429.5
27	404.8/494.8/1484.5
28	419.8/513.1/1539.5
29	434.8/531.4/1594.4
30	449.8/549.8/1649.4
31	464.8/568.1/1704.4

a. The indoor unit installation height not less than 7.2 ft (2.2 m).
b. The indoor unit installation height between 5.9 ft (1.8 m) and 7.2 ft (2.2 m).
c. The indoor unit installation height between 2.0 ft (0.6 m) and 5.9 ft (1.8 m).

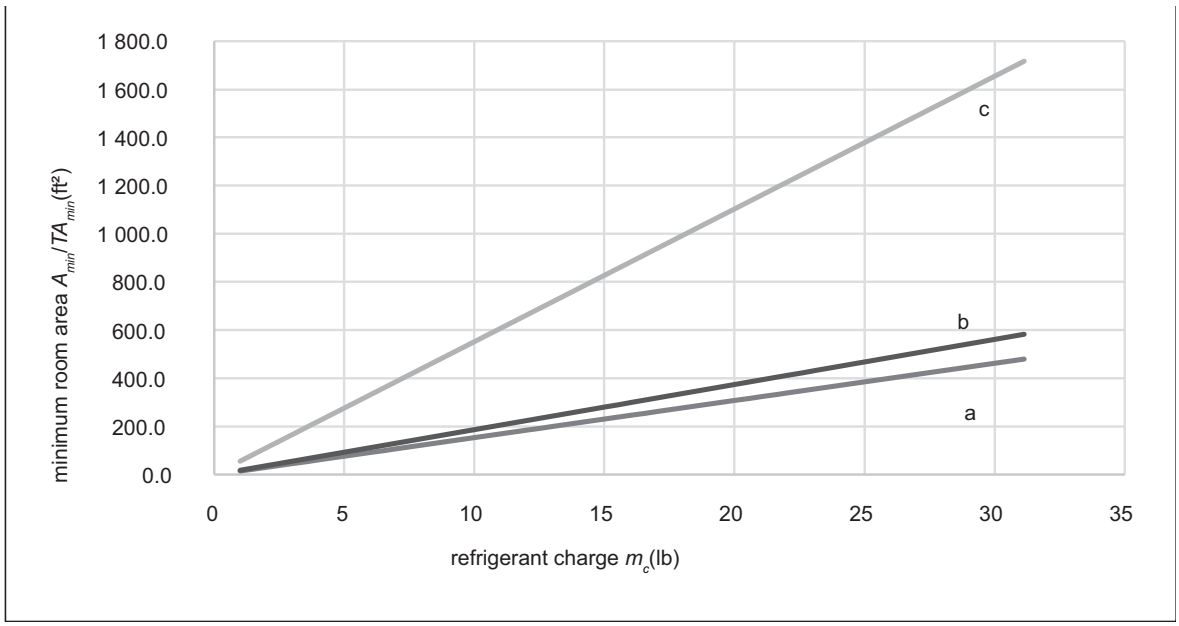


Fig. 6 —Required Minimum Room Area

Curve (a) is the Amin/TAmin limit for the indoor unit installation height h0 ≥ 7.2 ft (2.2 m).
Curve (b) is the Amin/TAmin limit for the indoor unit installation height 5.9 ft (1.8 m) ≤ h0 ? 7.2 ft (2.2 m).
Curve (c) is the Amin/TAmin limit for the indoor unit installation height 2.0 ft (0.6 m) ≤ h0 ? 5.9 ft (1.8 m).

Minimum Circulation Airflow

Table 11 — Minimum Circulation Airflow

m_c(lb)	Q_{min}(CFM)
1	27.1
2	54.1
3	81.2
4	108.2
5	135.3
6	162.3
7	189.4
8	216.5
9	243.5
10	270.6
11	297.6
12	324.7
13	351.8
14	378.8

Table 12 — Minimum Circulation Airflow (Cont.)

m_c(lb)	Q_{min}(CFM)
15	405.9
16	432.9
17	460.0
18	487.0
19	514.1
20	541.2
21	568.2
22	595.3
23	622.3
24	649.4
25	676.5
26	703.5
27	730.6
28	757.6
29	784.7
30	811.7
31	838.8

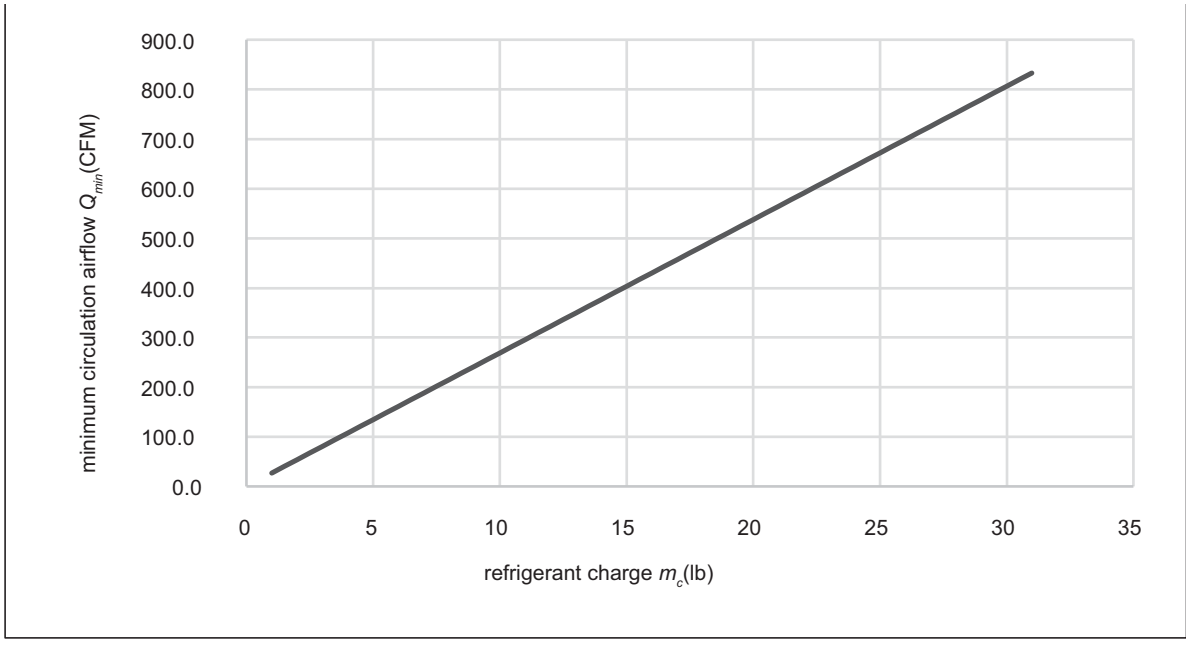


Fig. 7 —Minimum Circulation Airflow

Installation Scheme Flow Chart

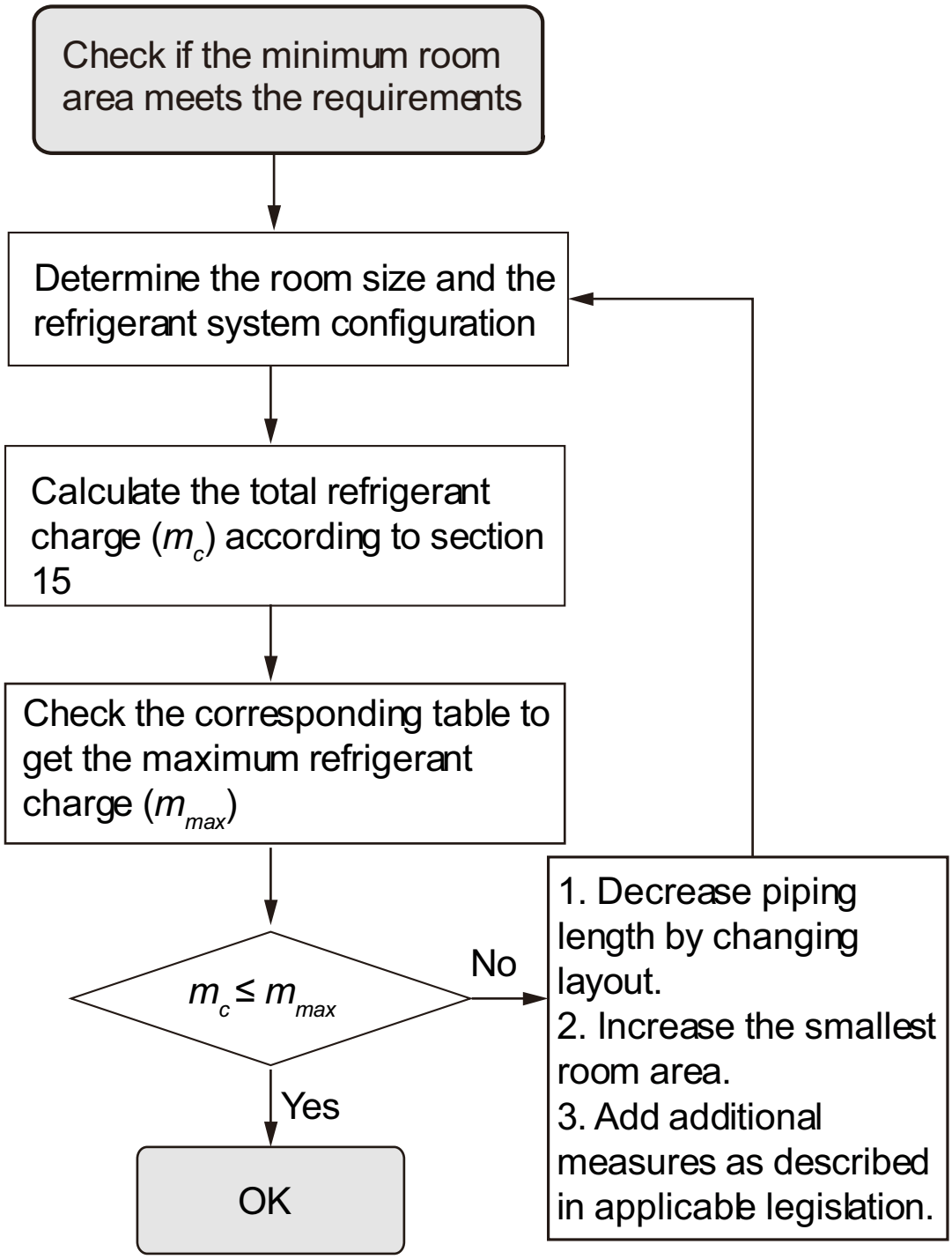


Fig. 8 —Installation Scheme Flow Chart

OPERATIONS MANUAL

⚠ WARNING

- This appliance can be used by children ages 8 and above and persons with reduced physical, sensory or mental capabilities or who lack experience and knowledge only if they are supervised or have been given instruction concerning the use of the appliance in a safe way and understand the hazards involved.Children shall not play with the appliance. Children shall not clean or maintain the appliance without supervision.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or persons who lack experience and knowledge, unless they are supervised or have been given instructions concerning the use of the appliance by a person responsible for their safety.
  - – Children should be supervised to ensure that they do not play with the appliance.
  - – The split units shall only be connected to an appliance compatible with the same refrigerant.
  - – The units 3.0-5.0 ton are split unit air conditioners, complying with split unit requirements of this International standard, and must only be connected to the units that have been confirmed as complying with the corresponding split unit requirements of this International standard.

⚠ WARNING

- Ask your dealer to assist in the installation of the air conditioner.
- Incomplete installation performed by yourself may result in a water leakage, electric shock, and fire.
- Ask your dealer to assist in the installation of the air conditioner.
- Incomplete installation performed by yourself may result in a water leakage, electric shock, and fire.
- Ask your dealer for assistance with improvement, repair, and maintenance. Incomplete improvement, repair, and maintenance may result in a water leakage, electric shock, and fire.
- To avoid electric shock, fire or injury, please turn off the power supply and call your dealer for instructions if you detect any abnormalities such as a burning smell
- Never let the indoor unit or the remote controller get wet.
- This could lead to electric shock or fire.
- Never press the button of the remote controller with a hard, pointed object.
- The remote controller may be damaged.
- Never replace a fuse with a fuse that has an incompatible rated current or other wires when a fuse blows out.
- The use of wire or copper wire may cause the unit to break down or cause a fire.
- Exposing your body to the air flow of the air conditioner for long periods of time may be harmful to your health
- Do not insert fingers, rods or other objects into the air inlet or outlet.
- When the fan is in operation, it will cause injury.

SYSTEM LAYOUT REQUIREMENTS

Unit Installation Requirements

The outdoor unit shall be located in a well-ventilated location other than the occupied space, such as in the open air.

For installation of the indoor unit, refer to the corresponding installation and operation manual.

If an indoor unit is installed in an unventilated area, the area shall be so constructed that should any refrigerant leak, it will not stagnate so as to create a fire or explosion hazard.

PIPING INSTALLATION REQUIREMENTS

Low temperature solder alloys, such as lead/tin alloys, are not acceptable for pipe connections.

Mechanical connectors used indoors shall comply with ISO 14903. When mechanical connectors are reused indoors, sealing parts shall be renewed. When flared joints are reused indoors, the flaring part shall be

re-fabricated.

Equipment pipes in the occupied space in question must be installed in such a way that it is protected against accidental damage.

NOTE:

- **Installation of pipe-work shall be kept to a minimum.**
- **Pipework shall be protected from physical damage and shall not be installed in an unventilated space, if that space is smaller than Amin in Table 2.**
- **Compliance with national gas regulations shall be observed;**
- **Mechanical connections made shall be accessible for maintenance purposes.**

SYSTEM INFORMATION

System Layout

Case 1: Outdoor unit is connected with VRF indoor unit

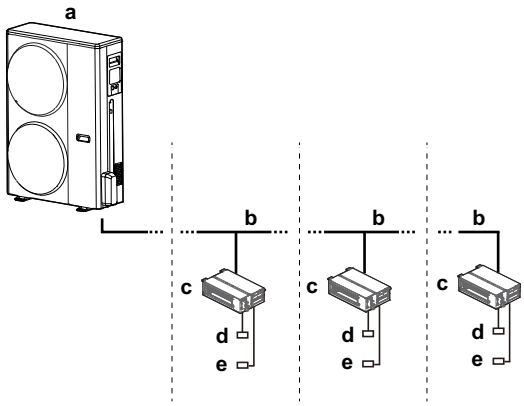


Fig. 9 —System Layout - Case 1

a. Heat pump outdoor unit
b. Refrigerant piping
c. VRF indoor unit
d. Wired controller (optional)
e. Display box (optional)

OPERATING INSTRUCTIONS

Operating Range

Use the system at the following temperatures to ensure safe and effective operation. The operating range for the unit is shown in Table 13.

Table 13 — Operating Range

MODEL	3.0/4.0/5.0 ton	
Cooling	Indoor temperature dry bulb	62.6 ºF to 89.6 ºF (17 ºC to 32 ºC)
	Indoor temperature wet bulb	55.4 ºF to 73.4 ºF (13 ºC to 23 ºC)
	Outdoor temperature/dry bulb	5 ºF to 125 ºF (-15 ºC to 52 ºC)
Heating	Indoor temperature dry bulb	62.6 ºF to 86 ºF (17 ºC to 30 ºC)
	Outdoor temperature dry bulb	-22 ºF to 86 ºF (-30 ºC to 30 ºC)
	Outdoor temperature/wet bulb	122 ºF to 61.7 ºF (-30 ºC to 16.5 ºC)
Dry	Indoor temperature dry bulb	53.6 ºF to 89.6 ºF (12 ºC to 32 ºC)
	Indoor temperature wet bulb	48.2 ºF to 73.4 ºF (9 ºC to 23 ºC)
	Outdoor temperature/dry bulb	5 ºF to 125 ºF (-15 ºC to 52 ºC)

NOTE:

- If the above operating conditions cannot be met, the safety protection function may be triggered and the air conditioner may malfunction.
- When the unit operates in "Cool" mode in a relatively humid environment (relative humidity higher than 80%), condensation may occur on the surface of the indoor unit, causing water to drip. In this case, turn the air baffle to the maximum air outlet position and set the fan speed to "High".
- Outdoor operating temperature under 23ºF (-5ºC) in "Cool" mode, the startup capacity of indoor units must meet at least 50 % of outdoor unit capacity.

OPERATING SYSTEM

System operation

The operating program varies with different combina- tions of outdoor unit and controller.

To protect this unit, turn on the main power supply 12 hours before operation.

If there is a power outage while the unit is running, the unit will automatically restart its operation when the power supply resumes.

Cooling, Heating, Fan Only and Auto

The indoor unit of the air conditioning system can be controlled separately, but the outdoor unit cannot operate in both heating and cooling modes.

When the cooling mode conflicts with the heating mode, the operating mode of the system is determined by the outdoor unit menu Settings.

Table 14 — Outdoor Unit Menu Settings

SETTING	DESCRIPTION
First enabled priority (default)	The operating mode of the indoor unit that is first activated determines the system operating mode.
Cooling mode priority	When the cooling mode priority is selected, the heating mode of the indoor unit stops running, and the cooling and fan only modes operate normally.
Auto mode priority	The indoor units automatically select cooling or heating priority based on ambient temperature
In response to cooling mode only	The indoor units in cooling and fan only modes operate normally, while the indoor units in heating modes stop operating.
In response to heating mode only	The indoor units in heating mode operate normally, while the indoor units in cooling and fan only modes stop operating.
VIP mode only	If the VIP indoor unit has been set and turned on, the operating mode of the VIP indoor unit is the priority mode of the system.
Heating mode priority	When heating mode priority is selected, the cooling and fan only modes of the indoor unit stop running, while heating modes operate normally.

Heating Operation

It may take longer to reach the set temperature for general heating operation than for cooling operation.

The following operation is performed in order to prevent the heating capacity from dropping or cold air from blowing

Defrost Operation

In the heating operation, as the outdoor temperature decreases, frost may be formed on the heat exchanger in the outdoor unit, making it more difficult for the heat exchanger to heat up the air. The heating capacity decreases, and a defrosting operation needs to be performed on the system in order for the system to provide sufficient heat to the indoor unit. At this point, the indoor unit will show “dF” on the display screen.

The indoor fan motor will automatically stop running so as to prevent cold air from coming out of the indoor unit when the heating operation starts. This process will take some time. This is not a malfunction.

Safety Instructions

- In heating mode, the system absorbs heat from the outdoor air and releases heat to the indoor side. When the outdoor temperature is low, less heat is released. This is the principle of heat pump.
- When the outdoor temperature is extremely low, the heating capacity of the unit decreases, and other heating equipment may need to be added
- The motor in the indoor unit will continue running for about 40 seconds to remove residual heat when the indoor unit receives a shutdown command while heating.

To operate the system

Press the operation mode selector button on the user interface and select the operation mode.

Auto mode Fan mode
Cooling mode Heating mode
Dry mode

Operation

Press the ON/OFF button on the user interface.

Result: The running light turns on and the system starts to run.

Stop

Press the ON/OFF button on the user interface. Result: The running light is off, and the system stops running.

NOTE: Once the unit has stopped running, do not disconnect the power immediately. Wait for at least 10 minutes.

Adjust

Refer to the user manual for the controller on how to set the required temperature, fan speed and air flow direction.

DRY PROGRAM

System operations

The function in this program uses the minimum temperature drop (minimum indoor cooling) to bring about a drop in humidity in the room.

The temperature and fan speed cannot be set.

CUTTING OFF POWER SUPPLY

If there is a power outage while the unit is running, the unit will automatically restart when the power supply resumes.

Misoperation

If misoperation happens, please disconnect the power from the system and then reconnect it after a few minutes.

PROTECTION PROCEDURE

Protection Functions

A protection feature prevents the air conditioner from being activated within 4 minutes when it restarts immediately after operation.

Protective Equipment

This protective equipment will enable the air conditioner to stop when the air conditioner is forced to run.

The protective equipment may be activated in the following circumstances:

Cooling

- The air inlet or air outlet of the outdoor unit is blocked.
- Strong wind is continuously blowing into the air outlet of the outdoor unit.

Heating

- Too much dust and rubbish are stuck to the dust filter of the indoor unit.
- The air outlet of indoor unit is blocked.

⚠ CAUTION

When the protective equipment activates, please turn off the power, and restart operations after the problem is solved.

MAINTENANCE AND REPAIR

ABOUT REFRIGERANT

This product contains fluorinated greenhouse gases as stipulated in the Kyoto Protocol. Do not discharge the gas into the atmosphere.

Refrigerant Type: R454B GWP: 466

Law requires that refrigerant must be checked regularly for leakages. Please contact the installation personnel for more information.

⚠ WARNING

- **The refrigerant in the air conditioner is safe, and usually does not leak.**
- **Do not use the air conditioner again until the maintenance personnel has confirmed that the refrigerant leakage has been sufficiently resolved.**

AFTER-SALES SERVICE AND WARRANTY

Warranty Period

This product comes with a warranty card that was completed by the dealer during installation. The customer must check the completed warranty card and keep it properly.

If you need to repair the air conditioner during the warranty period, please contact the dealer and provide the warranty card.

When you request assistance from the dealer, please remember to state:

- Complete model name of the air conditioner
- Date of installation
- Details on the fault symptoms or errors.

⚠ WARNING

- Do not attempt to modify, dismantle, remove, reinstall or repair this unit, as the improper dismantling or installation may result in electric shock or fire. Please contact the agent.
- If the refrigerant accidentally leaks, make sure that there are no open flames around the unit. Refrigerant itself is completely safe, non-toxic and non-flammable, but it will produce toxic gases when it accidentally leaks and comes in contact with flammable substances generated by heaters and burning devices in the room. Qualified maintenance personnel must verify that the point of leakage has been repaired or rectified before you resume operations of the unit.

Shorter Maintenance and Replacement Cycle

In the following situations, the "maintenance cycle" and "replacement cycle" may be shortened.

The unit is used in the following situations:

- Temperature and humidity fluctuations are outside the normal range.
- Large power fluctuations (voltage, frequency, waveform distortion etc.) (must not use the unit if the power fluctuations exceed the allowed range).
- Frequent collisions and vibrations.
- The air may contain dust, salt, harmful gases or oils such as sulphite and hydrogen sulphide.
- Frequently turning the unit on and off or operating the unit for too long (in places where the air conditioning is on for 24 hours a day).

Maintenance and Repair

Each refrigerating system shall be subjected to preventative maintenance in accordance with legal requirements. The frequency of maintenance depends on the type, size, age, use, etc. of the system. In many cases, more than one maintenance service is required per year.

The operator of the refrigerating system shall ensure that the system is inspected, regularly supervised and maintained.

Systems shall be inspected for tightness by a qualified person. If, during the inspection, a leak is suspected, e.g., through refrigerant temperature checks or capacity reduction, then the location of the leak shall be identified with suitable detection equipment and shall be repaired and checked again after the repair in accordance with national regulations. The results of the inspection and measures taken afterwards shall be included in the logbook.

Regular leak tests and inspections shall be carried out, including tests and inspections of the safety equipment.

⚠ WARNING

- When the breaker was broken ?do not use any unspecified breaker or other wire to replace the original breaker. The use of electrical wires or copper wires may cause the unit to malfunction or cause a fire.
- Do not insert your fingers, sticks, or other items into the air inlet or outlet. Do not remove the fan mesh cover. When the fan rotates at a high speed, it could cause bodily injury.
- It is very dangerous to check the unit when the fan is rotating.
- Make sure you turn off the main breaker before any maintenance work begins.
- Check the supporting and base structure of the unit for any damages after a long period of use. The unit could fall and cause personal injury if there is any damage.
- Do not check or repair the unit on your own. Please get qualified professionals to conduct any checks or repairs.

NOTES:

Do not use substances like gasoline, diluent, or chemical dust cloths to wipe the operations panel of the controller. Doing so could remove the surface layer of the controller. If the unit is dirty, immerse a cloth in diluted and neutral detergent, wring it out, and then use it to clean the panel. Lastly, wipe it with a dry cloth.

Ensure that the area is in the open or that it is adequately ventilated before opening 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 surroundings.

Maintenance Before Long Shutdown

For example, at the end of winter and summer.

Run the indoor unit in the fan mode for about half a day to dry the internal parts of the unit.

Turn off the power supply.

Clean the air filter and external shell of the unit. Please contact the installation or maintenance personnel to clean the air filter and external shell of the indoor unit. The installation/operation manual of the specialized indoor unit includes maintenance tips and cleaning procedures. Make sure that the clean air filter is installed in its original position.

Maintenance After Long Shutdown

For example, in early summer or winter.

- Check and remove all objects that may clog the air inlets and outlets of the indoor and outdoor units.
- Clean the air filter and external shell of the unit. Please contact the installation or maintenance personnel. The installation/operation manual of the indoor unit includes maintenance tips and cleaning procedures. Make sure that the clean air filter is installed in its original position.
- Turn on the main power supply 12 hours before this unit is operated in order to ensure that the unit runs smoothly. The user interface is displayed once the power is turned on.

TROUBLESHOOTING

UNIT PROBLEMS AND CAUSES

If one of the following malfunctions occurs, stop the air conditioner from operating, shut off the power, and contact your dealer.

- The remote controller malfunctions or the buttons do not work well.
- A safety device such as a leakage breaker or a circuit breaker is frequently tripped.
- Dust, moisture and other particles have entered the unit.
- Water leaks from the indoor unit.
- Other malfunctions.
- The operation lamp flashes rapidly (twice every second).
- This lamp is still flashing rapidly after the power is restarted.

If the system does not properly operate other than the above mentioned cases or if the above mentioned malfunctions are evident, use the following procedures to check the system. (See Table 15).

REMOTE CONTROLLER PROBLEMS AND CAUSES

Before requesting service or repair, check the following points. (See Table 16),

Table 15 — Unit Troubleshooting

SYMPTOM	POSSIBLE CAUSES	SOLUTION
The unit does not start.	• Power failure. • Power breaker is off. • Batteries of the remote controller are depleted or there is another problem with the controller.	• Wait for the power supply to be restored. Turn on the power. • Replace the batteries or check the controller.
Air is flowing normally but offers zero cooling effect.	• Temperature is not set correctly. The unit's compressor is in the 3-7 minutes protection period.	• Set the temperature properly. Wait.
Units start or stop frequently.	• Refrigerant is too little or too much. There is air or no condensing gas in the refrigerating circuit. • The compressor is malfunctioning. Voltage is too high or too low. • The system circuit is blocked.	• Check for leakage and correctly recharge refrigerant. • Vacuum and recharge refrigerant. Maintain or change compressor. Install a manostat. • Find reasons and solutions.
Poor cooling effect.	• The heat exchangers of the outdoor unit and indoor unit are dirty. • The air filter is dirty. • Inlet/outlet of indoor/outdoor unit is blocked. • Doors and windows are open. • The unit is directly exposed to sunlight. There are too many heat sources. Outdoor temp. is too high. • Leakage of refrigerant or lack of refrigerant.	• Clean the heat exchanger. Clean the air filter. • Eliminate all dirt and allow air to flow smoothly. • Close doors and windows. Install or close curtains in order to shade the unit from sunshine. Reduce heat source. • Unit cooling capacity is reduced (normal) • Check for leakage and correctly recharge refrigerant.
Poor heating effect.	• Outdoor temperature is lower than 47ºF (8.3ºC). Doors and windows are not completely closed. Leakage of refrigerant or lack of refrigerant.	• Use heating devices. • Close doors and windows. Check for leakage and correctly recharge refrigerant.

Table 16 — Remote Controller Troubleshooting

SYMPTOM	TROUBLESHOOTING	SOLUTION
The fan speed cannot be changed.	Check whether the MODE indicated on the display is "AUTO".	When the automatic mode is selected, the air conditioner will automatically change its fan speed.
	Check whether the MODE indicated on the display is "DRY".	When Dry mode is selected, the air conditioner will automatically change its fan speed. When dry operation is selected, the air conditioner automatically changes the fan speed. Fan speed can be selected in "COOL", “FAN ONLY”, and “HEAT” modes
The remote controller signal is not transmitted even when the ON/OFF button is pushed.	Check whether the batteries in the remote controller are exhausted.	The power supply is off.
The TEMP. indicator does not come on.	Check whether the MODE indicated on the display is FAN ONLY.	The temperature cannot be set when the unit is working in FAN mode.
The indication on the display disappears after a lapse of time.	Check whether the timer has ended when TIMER OFF is indicated on the display.	Air conditioner operation will stop when the set time is reached.
The TIMER ON indicator goes off after a lapse of time.	Check whether the timer starts when TIMER ON is indicated on the display	When the set time is reached, the air conditioner will automatically start and the corresponding indicator will turn off.
The indoor unit does not produce a sound when the ON/OFF button is pressed.	Check whether the signal transmitter of the remote controller is properly pointing towards the infrared signal receiver of the indoor unit when the ON/OFF button is pressed.	Air conditioner operation will stop when the set time is reached.

FAULT SYMPTOM: NON UNIT ISSUES

Symptom 1: The system does not operate

- The air conditioner does not start immediately after the ON/OFF button on the remote controller is pressed. If the operating indicator lights up, the system is working normally. To prevent overloading of the compressor motor, the air conditioner starts 3 minutes after it is turned on.
- If the operation lamp and the "PRE-DEF indicator (cooling and heating type) or fan only indicator (cooling only type)" light up, it means you must choose heating mode. When the unit has just started up, if the compressor has not started, the indoor unit displays "anti cold wind" protection because the air outlet temperature is too low.

Symptom 2: The system switches into the fan mode during cooling

- In order to prevent the indoor evaporator from frosting, the system will switch into fan mode automatically, and promptly return to cooling mode.
- When the room temperature drops to the set temperature, the compressor goes off and the indoor unit switches to fan mode; when the temperature increases, the compressor starts again. It is same in heating mode.

Symptom 3: White mist comes out of unit

Symptom 3.1: Indoor unit

When humidity is high during cooling operation, if the interior of the indoor unit is dirty, the indoor temperature distribution will be uneven. The interior of the indoor unit needs to be cleaned. Ask the dealer for detailed information on how to clean the unit. This operation requires a qualified service person.

Symptom 3.2: Indoor unit, Outdoor unit

When the system switches over to heating operation after defrost operation, moisture generated by defrosting becomes steam and is discharged.

Symptom 4: Air conditioner generates noise during cooling

Symptom 4.1: Indoor unit

A "zeen" sound is heard immediately after the power supply is turned on. The electronic expansion valve inside an indoor unit starts working and makes the noise. it will reduce in about one minute.

A continuous low "shah" sound is heard when the system is in COOL mode or stops. This noise can be heard when the drainage pump is running (optional accessory).

A "pishi-pishi" squeaking sound is heard when the system stops after heating operation. Expansion and contraction of plastic parts caused by temperature changes can make this noise.

Symptom 4.2: Indoor unit, Outdoor unit

A continuous low hissing sound is heard when the system is in operation. This is the sound of refrigerant gas flowing through both the indoor unit and outdoor unit.

A hissing sound is heard when the system starts or stops operation or after the defrosting operation has been completed. This is the noise of refrigerant that occurs when it stops flowing or its flow changes.

Symptom 4.3: Outdoor unit

When the tone of operating noise changes, the noise is caused by the change of frequency.

Symptom 5: Dust comes out of the unit

When the unit is being used for the first time after a long period of disuse, dust has got into the unit, which leads to this symptom.

Symptom 6: The units give off odors

This unit will absorb the odors of rooms, furniture, cigarettes and others, and then disperse the odors again.

During operation, the speed of the fan is controlled to optimize product performance.

Symptom 7: The outdoor unit fan does not spin

RELOCATION

Contact the dealer to dismantle and reinstall all the units. You need specialized skills and technology to move the units.

DISPOSAL

This unit uses hydrogen fluorocarbons. Please contact the dealer when you want to dispose of this unit. Law requires that the collection, transportation and disposal of refrigerants must conform with the regulations governing the collection and destruction of hydrofluorocarbons.

INSTALLATION MANUAL

PRECAUTIONS

- Before installing the unit, ensure that all Local, National and International regulations are satisfied, and read these "PRECAUTIONS" carefully.
- The precautions described below include important items regarding safety. They must be strictly observed.
- After the installation work, perform a test run to check for any problems.
- Explain how to use and maintain the unit to the customer following the INSTALLATION AND OPERATION MANUAL.
- Turn off the main power supply breaker before maintaining the unit.
- Retain the INSTALLATION AND OPERATION MANUAL.

⚠ CAUTION

Specialized tools are required for the installation of air conditioner with new refrigerant (R454B).

THIS AIR CONDITIONER ADOPTS THE NEW HFC REFRIGERANT(R454B) WHICH DOES NOT DESTROY THE OZONE LAYER.

The characteristics of R454B refrigerant are: it is a hydrophilic, oxidizing membrane or oil, and its pressure is approx 1.5 times higher than that of refrigerant R22. Accompanied with the new refrigerant, refrigerating oil has also been changed. Therefore, during installation work, be sure that water, dust, former refrigerant, or refrigerating oil does not enter the refrigerating cycle.

To prevent charging an incorrect refrigerant and refrigerating oil, the sizes of connecting sections of charging port of the main unit and installation tools are different from those for the conventional refrigerant.

This means that exclusive tools are required for the new refrigerant (R454B):

For connecting pipes, use new and clean piping designed for R454B, and please take care so that water or dust does not enter.

In addition, do not use the existing piping because there are problems with pressure-resistance force and impurities in it.

⚠ WARNING

- Do not directly connect the appliance to the main power supply. Install the main power supply breaker.
- If the supply cord is damaged, it must be replaced by the manufacturer or its service agent or a similarly qualified person in order to avoid creating a hazard.
- An all-pole disconnection switch which has a contact separation of at least 3 mm in all poles shall be connected using fixed wiring.
- The appliance shall be installed in accordance with national wiring regulations.
- The temperature of the refrigerant circuit will be high. Please keep the interconnection cable away from the copper tube.
- An all-pole disconnection device which has at least 3 mm of separation distance in all poles and a residual current device (RCD) with a rating of above 10 mA shall be incorporated in the fixed wiring in accordance with national requirements.
- Ask an authorized dealer or qualified installation professional to install or maintain the air conditioner.
- Incorrect installation may result in water leakage, electric shock or fire.
- Turn off the main power supply breaker before attempting any electrical work.
- Make sure all power breakers are off. Failure to do so may cause electric shock.
- Connect the connecting cable correctly.
- If the connecting cable is connected incorrectly, electric parts may become damaged.
- When relocating the air conditioner that is to be installed, be very careful to prevent the entry of any gaseous matter other than the specified refrigerant into the refrigeration cycle.
- If air or any other gas is mixed into the refrigerant, the gas pressure in the refrigeration cycle can become abnormally high and it may cause pipes to burst, leading to injury.
- Do not modify this unit by removing any of the safety guards or by by-passing any of the safety interlock switches.

⚠ WARNING

- Exposure of the unit to water or other moisture before installation may cause a short-circuiting of electrical parts.
- Do not store the unit in a wet basement or expose it to rain or water.
- After unpacking the unit, examine it carefully to see if there is possible damage.
- Do not install the unit in a place that might increase the vibration of the unit.
- To avoid personal injury (with sharp edges), be careful when handling parts.
- Perform installation work properly according to the Installation Manual.
- Incorrect installation may result in water leakage, electric shock or fire.
- When the air conditioner is installed in a small room, take appropriate measures to ensure that the concentration of refrigerant leakage occurring in the room does not exceed the critical level.
- Install the air conditioner securely in a location where the base can adequately sustain the weight.
- Perform the specified installation work to guard against earthquakes.
- If the air conditioner is not installed properly, the unit could fall and cause an accident.
- If refrigerant gas has leaked during installation, ventilate the room immediately.
- If the leaked refrigerant gas comes into contact with fire, noxious gas may be generated.
- After the installation, confirm that refrigerant gas does not leak.
- If refrigerant gas leaks into the room and flows near a source of flame, such as a cooking range, noxious gas might be generated.
- Electrical work must be performed by a qualified electrician in accordance with the Installation Manual. Make sure the air conditioner uses a dedicated power supply.
- An insufficient power supply capacity or inappropriate installation may cause fire.
- Use the specified cables for wiring to connect the terminals securely, and to prevent external forces applied to the terminals from affecting the terminals.
- Be sure to provide grounding.
- Do not connect ground wires to gas pipes, water pipes, lightning rods or ground wires for telephone cables.
- Conform to the regulations of the local electric company when wiring the power supply.
- Improper grounding may cause electric shock.
- Do not install the air conditioner in a location subject to a risk of exposure to combustible gas.
- If combustible gas leaks and stays around the unit, a fire may occur

Required tools for installation work

1. Phillips screw driver
2. Hole core drill [2.56 in (65 mm)]
3. Spanner
4. Pipe cutter
5. Knife
6. Reamer
7. Gas leak detector
8. Tape measure
9. Thermometer
10. Mega-tester
11. Electro circuit tester
12. Hexagonal wrench
13. Flaring tool
14. Pipe bender
15. Level vial
16. Metal saw
17. Gauge manifold (Charge hose: R454B special requirement)
18. Vacuum pump (Charge hose: R454B special requirement)
19. Torque wrench

Table 17 — Torque Wrench

OUTER DIAMETER	TORQUE WRENCH [ft-lbs (N·m)]
1/4 in (6.35 mm)	10.5 ~ 12-3/4 (14.2 ~ 17.2)
3/8 in (9.52 mm)	24-1/8 ~ 29-3/8 (32.7 ~ 39.9)
1/2 in (12.70 mm)	36.5 ~ 44.5 (49.5 ~ 60.3)
5/8 in (15.88 mm))	45-5/8 ~ 55-5/8 (61.8 ~ 75.4)
3/4 in (19.05 mm)	71-5/8 ~ 87.5 (97.2 ~ 118.6)

20. Copper pipe gauge adjusting projection margin
21. Vacuum pump adapter

PACKING BOX

Overview

This chapter mainly introduces the subsequent operations after the outdoor unit has been delivered to site and unpacked.

This specifically including the following information:

Remember the following:

- Dismantle and dispose of the outdoor unit.
- Remove the accessories of the outdoor unit.
- Dismantle the transport rack.
- At the time of delivery, check the unit for any damage. Report any damage immediately to the carrier's claim agent.
- As much as possible, transport the packaged unit to its final installation site to prevent damage during the handling process.
- Take note of the following items when transporting the unit:

Fragile. Handle with care.

Keep the front of the unit facing upwards so as not to damage the compressor.

- Select the unit transportation path in advance.

TRANSPORTATION

Lifting method

NOTES:

- **Do not remove any packaging during lifting. If the unit is not packaged or the packaging is damaged, please use gaskets or packaging materials to protect the unit.**
- **Use a belt that is sufficient to support the weight of the unit, and with a width of at least 0.79 in (20 mm).**
- **Images are for reference purpose only. Please refer to the actual product.**
- **The belt must have enough strength to bear the weight of the unit; Maintain balance of the unit and ensure safe and stable lifting of the unit.**

Well-packaged

Lift the unit while it is still packaged or protected and do not remove any packaging before lifting.

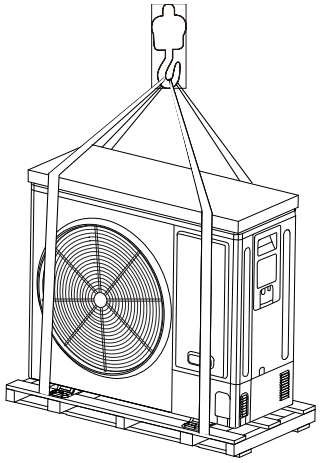


Fig. 10 —Packaged Lifting Method

Unpackaged

If the packaging is damaged, the under plate shown in the following figure shall be used for protection.

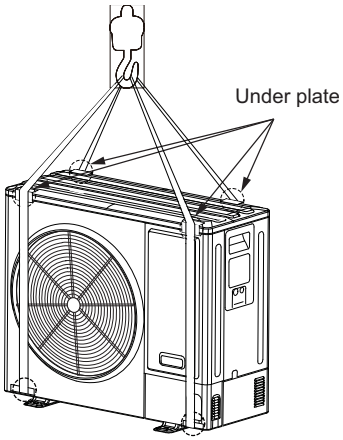


Fig. 11 —Unpackaged Lifting Method

The center of gravity is shown in the Figs 12 and 13:

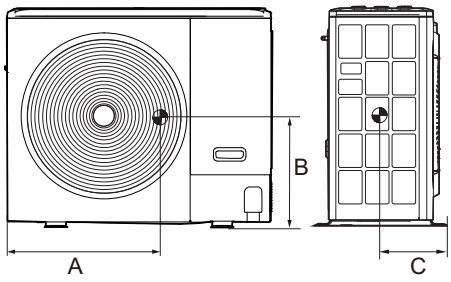


Fig. 12 —Center of Gravity - 3.0Tons

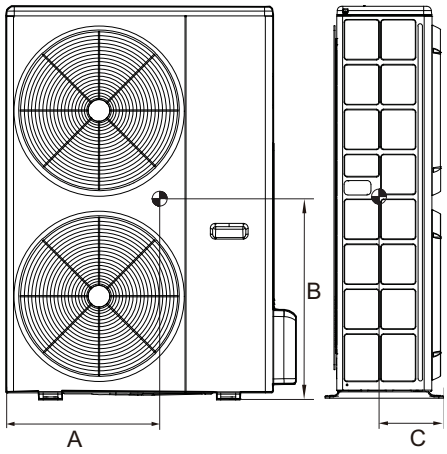


Fig. 13 —Center of Gravity - 4.0/5.0

Table 18 — Center of Gravity - 4.0 to 5.0 Tons

OUTDOOR UNIT MODEL (TON)	A (in (mm))	B (in (mm))	C (in (mm))
3.0	28.3 (720)	16.3 (413)	8.1 (207)
4.0-5.0	24.5 (623)	21.9 (557)	6.6 (168)

Forklift lifting method

When using a forklift to move the unit, insert the fork into the opening at the bottom of the unit, as shown in Fig 14.

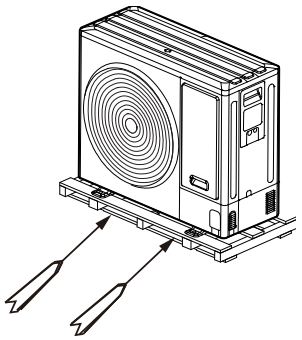


Fig. 14 —Forklift Method

UNPACKING THE OUTDOOR UNIT

Remove the unit from the packing materials:

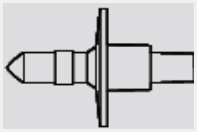
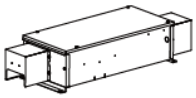
- Be careful not to damage the unit when you use a cutting tool to cut the packaging film.
- Remove the four nuts on the back of the wooden bracket.

⚠ CAUTION

- Handle plastic film correctly. Keep away from children.
- Potential risk: Asphyxia.

ATTACHED FITTINGS

Table 19 — Installation Fittings

NAME	IMAGE	QUANTITY
Installation and operation manual		1
T10 sensor (optional)		1
Refrigerant shut-off device (optional)		1

NOTE:

- **Check if any accessory in the above figure is missing. All the accessories must be properly maintained.**
- **All the fittings shall be factory fittings.**
- **Wired/Remote controller - purchase separately.**
- **Outlet sealant - purchase separately.**

Table 20 — Outdoor Unit Combination

OUTDOOR UNIT MODEL	CAPACITY OF OUTDOOR UNIT (TON)	NUMBER OF VRF INDOOR UNITS
37VMB036HDS3-1	3.0	1 ~ 5
37VMB048HDS3-1	4.0	1 ~ 7
37VMB060HDS3-1	5.0	1 ~ 9

NOTE:

- **When the combination ratio of multiple indoor units exceeds 100 %, the air outlet effect of the indoor unit may deteriorate;**
- **In areas where the designed temperature of the air conditioner is ≤ 32ºF (0ºC) in winter and the unit needs to be fully switched on, the combination ratio of indoor units is recommended to not exceed 100%.**
- **The heating capacity of the system decreases as the ambient outdoor temperature decreases.**

UNIT INSTALLATION

Choosing and Preparing the Installation Site

Unit Dimensions

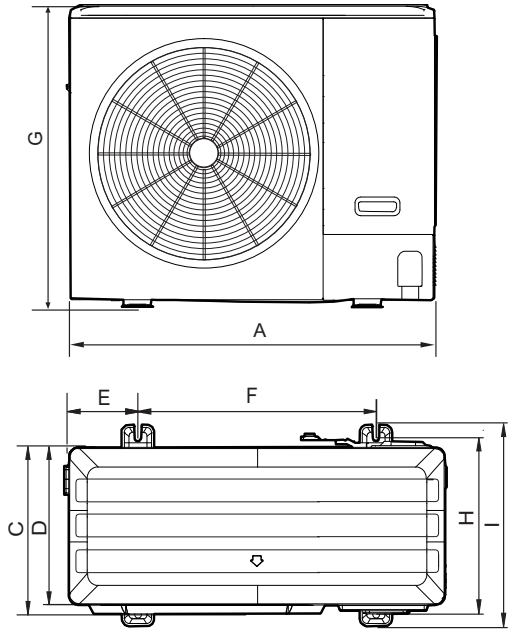


Fig. 15 —3.0 Ton

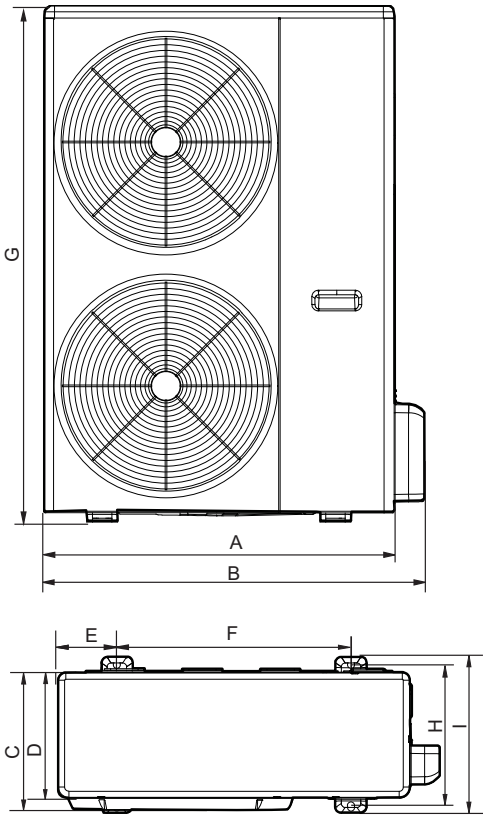


Fig. 16 —4.0/5.0 Ton

Table 21 — Dimensions

MODEL (TON)	3.0	4.0/5.0
A	40.7 (1033)	35.6 (905)
B	/	38.5 (978)
C	17.0 (433)	13.9 (352)
D	16.1 (410)	12.7 (322)
E	7.5 (191)	5.9 (151)
F	25.8 (656)	23.6 (600)
G	34.0 (864)	52.2 (1327)
H	18.0 (458)	14.2 (360)
I	20.6 (523)	15.7 (400)

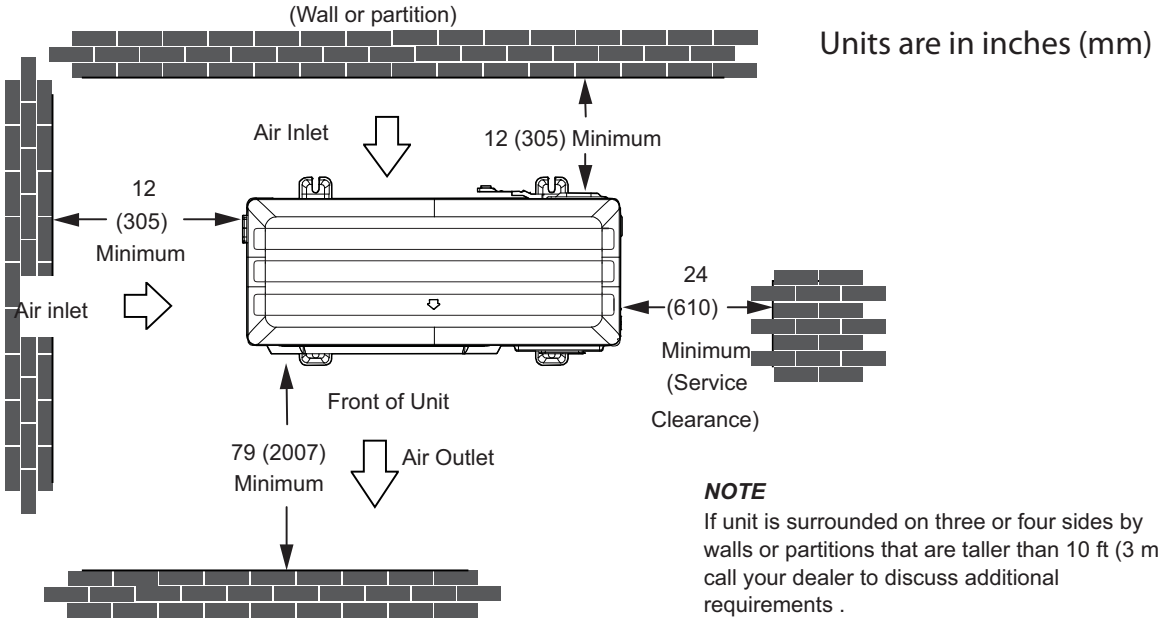
Placement Consideration

⚠ 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.
- •The outdoor unit shall be located in a
- •well-ventilated location other than the occupied space, such as in the open air.
- •For installation of the indoor unit, refer to the corresponding installation and operation manual. If an indoor unit is installed in an unventilated area, the area shall be so constructed that should any refrigerant leak, it will not stagnate so as to create a fire or explosion hazard.

NOTE:

- **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.**
- **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.**



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

NOTE
If unit is surrounded on three or four sides by walls or partitions that are taller than 10 ft (3 m), call your dealer to discuss additional requirements .

Fig. 17 —Installation of Single Outdoor Unit

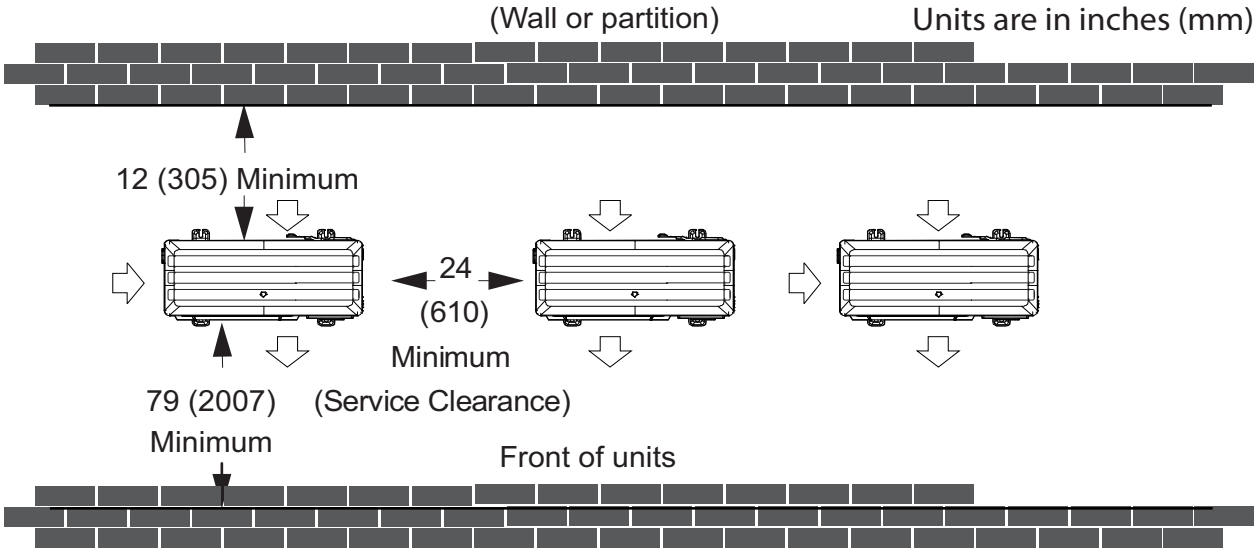


Fig. 18 —Installation of Two or More Outdoor Units Side-by-Side

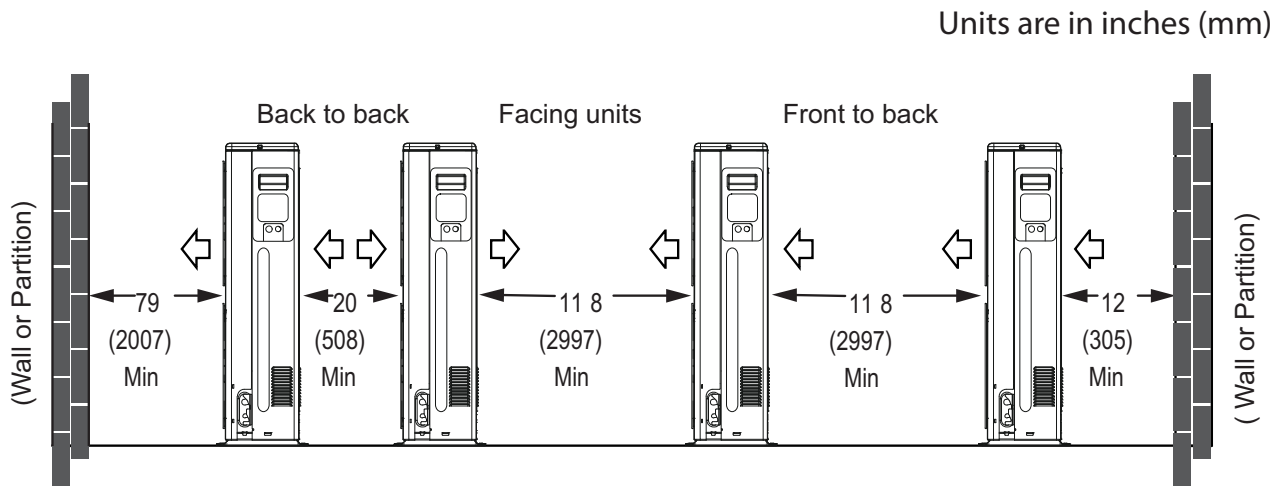


Fig. 19 —Installation of Two or More Outdoor Units in a Front-to-Back Configuration

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

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

Keep away from the following places, otherwise unit malfunctions may occur:

- A place with combustible gas leakage.
- A place with lots of oil (including engine oil) compounds.
- A place with salty air (near the coast)
- A place with caustic gas (sulfide, for example) existing in the air (near a hot spring).
- A place where the hot air expelled from the outdoor unit can reach your neighbor's window.
- A place where the noise interferes your neighbor's everyday life.
- A place that is too weak to bear the weight of the unit.
- An uneven place.
- Insufficient ventilation place.
- A place near a private power station or high frequency equipment.
- A place where indoor unit, outdoor unit, power cable and connecting wire are installed at least 3.28 ft (1 m) away from TV set or radio.
- A place that has strict noise requirements.

Prevailing Winds Protection

NOTE: When outdoor units are installed in coastal areas or high floors of buildings where they are frequently exposed to strong winds, fans should be ensured to operate properly.

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

Construct a wind barrier. Size barrier at least the same height and width as outdoor unit. Install a barrier 12 inches (305 mm) minimum from the sides of the unit in the direction of prevailing winds.

Install outdoor unit in non-confined space.

Install outdoor unit in alcove or under roof overhang but not under or directly near a storm gutter.

NOTE: When the outdoor unit is installed in a place such as the roof of a building that is often exposed to strong winds and does not have any shelter facilities, it is recommended to set the outlet fan direction at a right Angle to the wind direction.

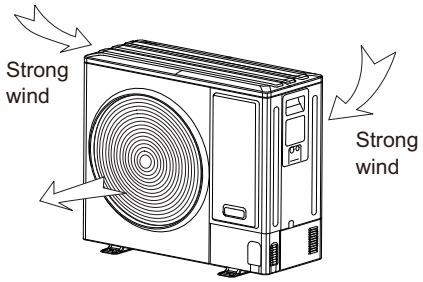


Fig. 20 —Prevailing Winds Protection

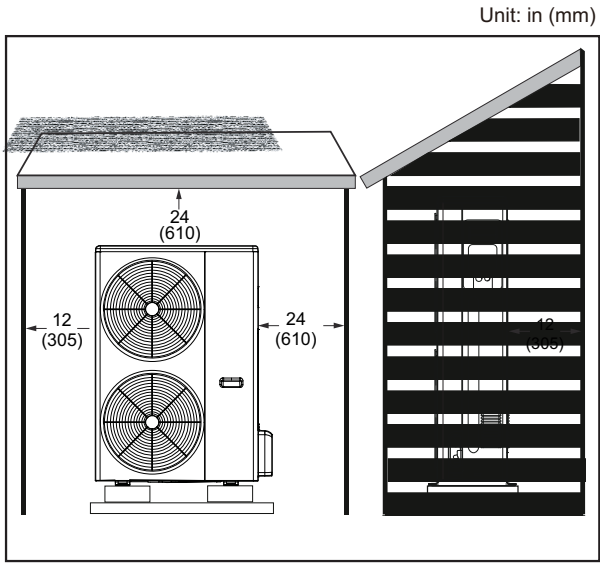


Fig. 21 —Prevailing Winds Protection

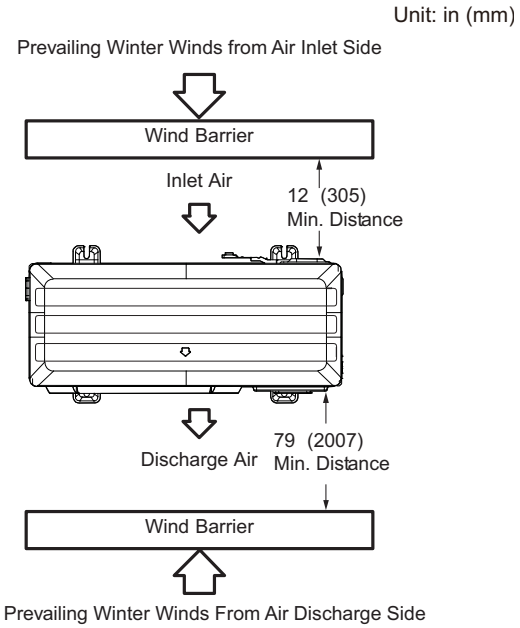


Fig. 22 —Prevailing Winds Protection

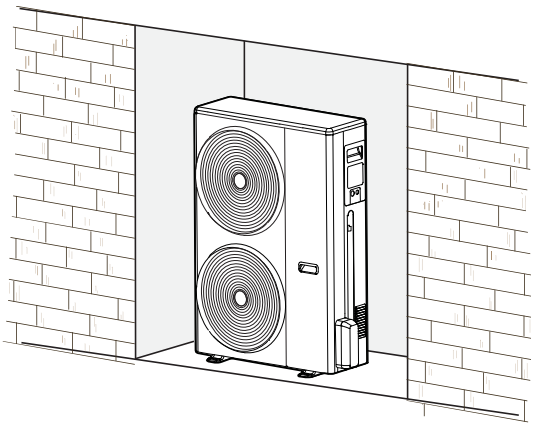


Fig. 23 —Prevailing Winds Protection

Snow and Ice Protection

Install the unit high enough above the ground or roof to allow adequate drainage of defrost water and prevent ice or snow build-up.

Carefully consider how to manage defrost water disposal to prevent ice from blocking walkways or creating a safety hazard near the outdoor unit.

In heavy snow areas, do not locate the unit where drifting will occur. The unit base should be elevated above the depth of average snows. Locate unit away from overhanging roof lines which would allow water or ice to drop on, or in front of, coil or into unit.

There must be unobstructed air flow around the air inlet and the air outlet.

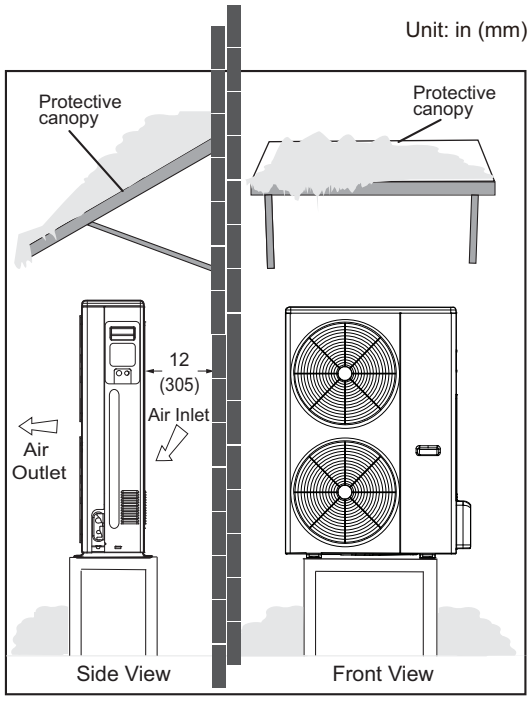


Fig. 24 —On Unit Pedestal (Stand) Above Snow Line

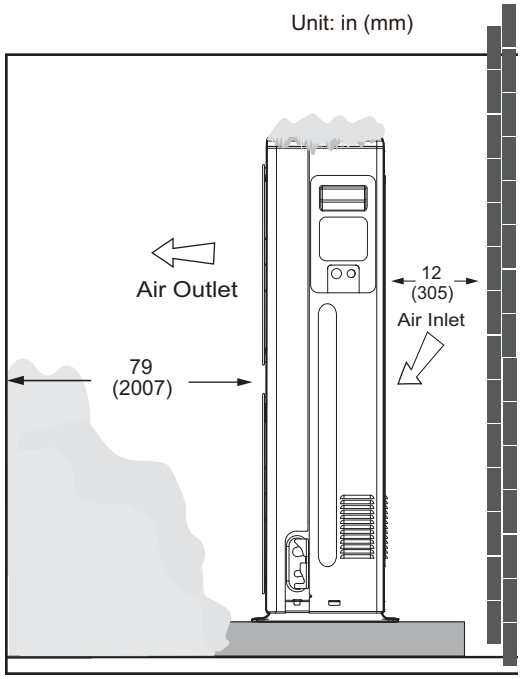


Fig. 25 —Airflow Obstructed by Snow

Unit: in (mm)

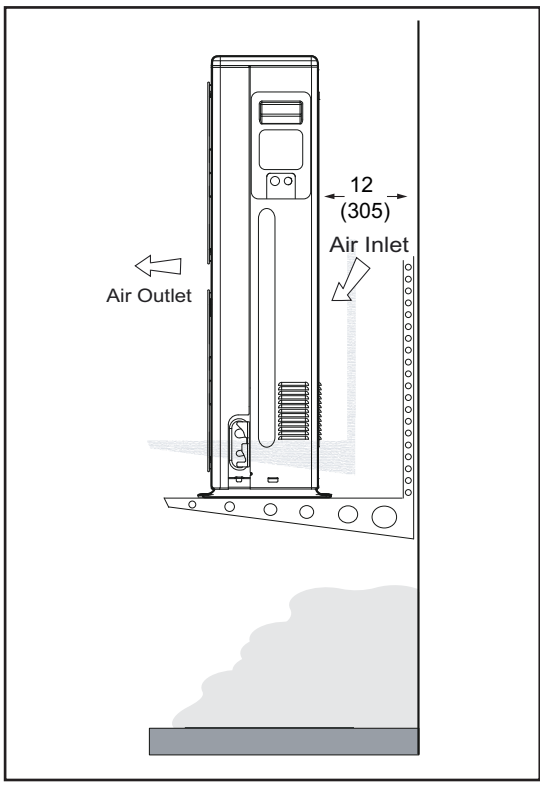


Fig. 26 —Unit on Brackets above Snow Line

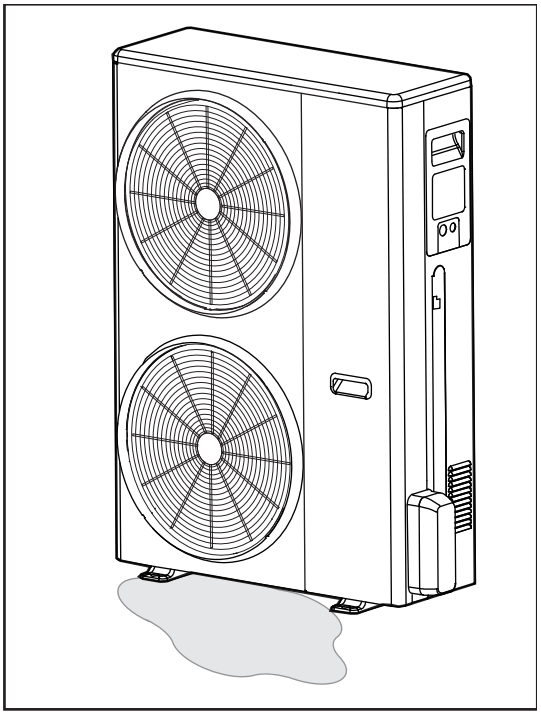


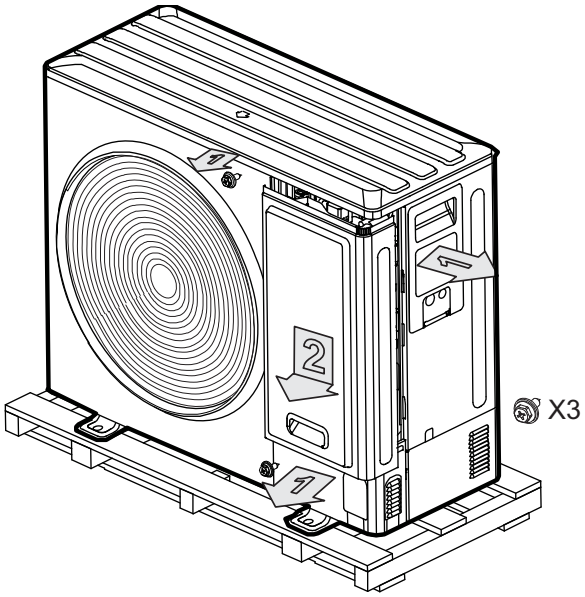
Fig. 27 —Avoid Defrost Water Ice Hazard

OPENING AND CLOSING THE UNIT

Opening the Outdoor Unit

⚠ CAUTION

- Risk of electric shock.
- Risk of burns.



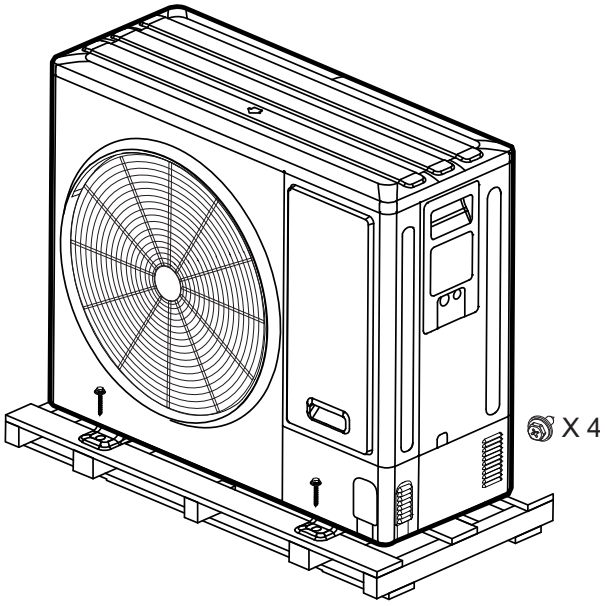
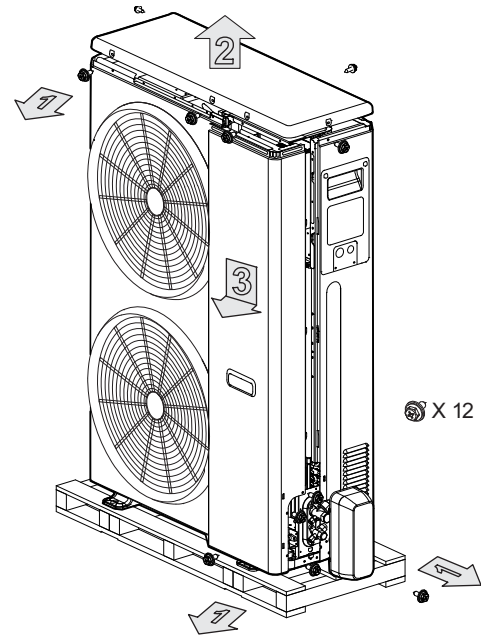


Fig. 28 —3.0



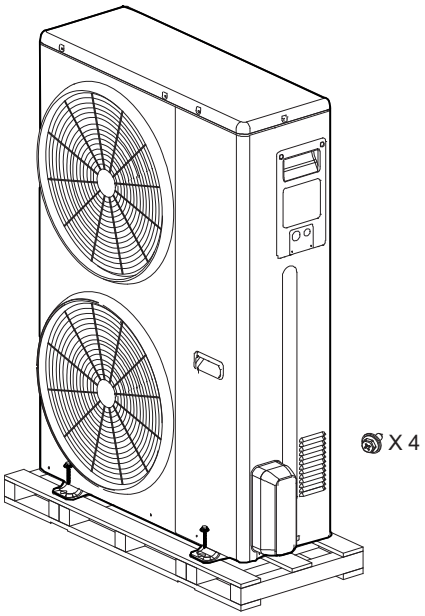


Fig. 29 —4.0/5.0 Ton

Closing the Outdoor Unit

NOTE: Ensure that the tightening torque does not exceed 4.1 N·m when closing the outdoor unit cover.

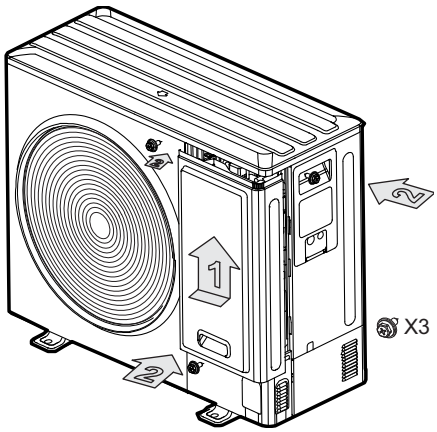


Fig. 30 —3.0 Ton

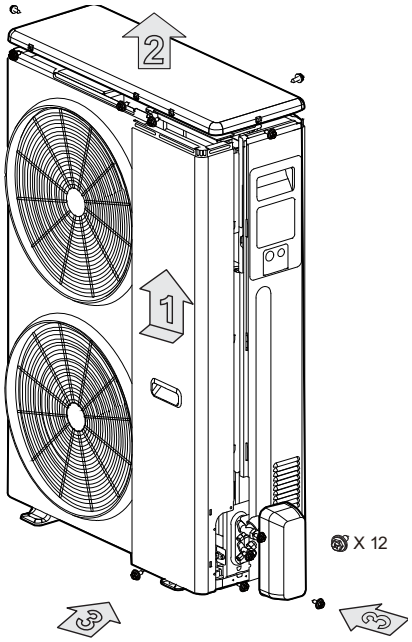


Fig. 31 —4.0/5.0 Ton

OUTDOOR UNIT INSTALLATION

Preparing the Structure for Installation

NOTES:

- **Ensure that the base does not cover the drain outlet on the unit under the plate or the snow-clearing interfaces.**
- **The recommended height for the protruding part of the upper part of the bolt is 20 mm.**

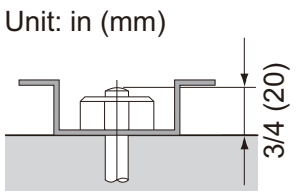


Fig. 32 —Height for Protruding Part of Bolt

- **Fasten the outdoor unit to the foundation bolts using nuts with resin washers.**
- **If the coating in the fastening area is peeled off, the metal is prone to rusting.**

Fig. 33 —Fasten Outdoor Unit to Foundation Bolts

- **Build a concrete base according to the specifications of the outdoor unit (see the Fig. 34).**
- **Prepare four sets of M12 anchor bolts, nuts, and washers (provided on site), as shown in Fig. 34.**

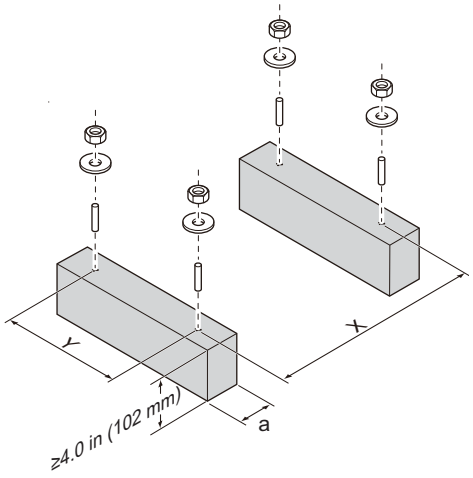


Fig. 34 —Build Concrete Base

Table 22 — Dimensions for Fig. 34

OUTDOOR UNIT MODEL (TON)	a [in (mm)]	b [in (mm)]	c [in (mm)]
3.0	≥ 4.0 (102)	23.0 (584)	15.4 (390)
4.0/5.0	≥ 4.0 (102)	23.6 (600)	14.2 (360)

Installing Outdoor Unit

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

- Use a field-provided slab or frame.
- Install the unit in an upright and level position.

Securing Outdoor Unit to Slab or Frame

- Brackets are provided at the base of the outdoor unit so that it can be secured to a field-provided slab or frame.
- Use lag bolts or equivalent to secure the outdoor unit to the slab or frame. Fig. 35.

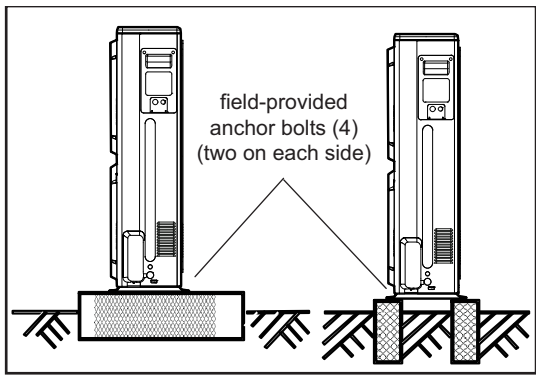


Fig. 35 —Securing Outdoor Unit to Slab or Frame

Securing Outdoor Unit to Wall-Mounted Brackets

- Units can be secured to field-provided wall-mounted brackets as long as the following conditions are met.
- Use lag bolts or equivalent to secure the outdoor unit to the wall-mounted brackets. Figure 36.
- Maintain proper air flow clearances.

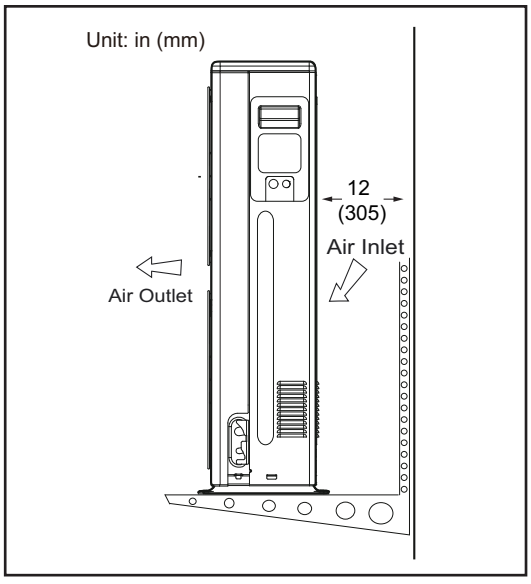


Fig. 36 —Securing Outdoor Unit to Wall-Mounted Brackets

Drainage

The bottom of the outdoor unit is equipped with multiple drain holes to route water away from the unit during a defrost cycle.

If water produced during the defrost cycle is not drained away from the unit before it re-freezes, the drain may be blocked by ice.

In snowy regions, snow may accumulate and freeze between the heat exchanger and the unit casing. This may reduce operational efficiency.

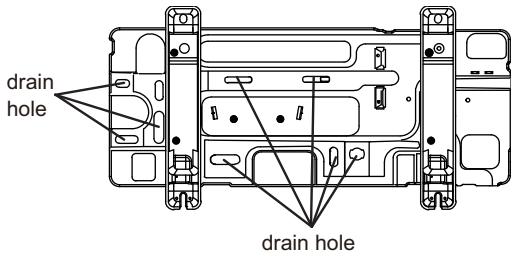


Fig. 37 —Drainage

NOTE: If it is not possible to install the unit completely horizontally, please make sure to tilt towards the back of the unit to ensure smooth drainage.

Preventing Outdoor Units from Tipping Over

If the unit is installed in a location where strong winds may tilt the unit, please take the following measures:

- Prepare two cables as shown in Fig. 38 (provided on-site).
- Place two cables on the outdoor unit.
- Insert a rubber plate between the cables and the outdoor unit to prevent the cables from scratching the paint (provided on-site).
- Connect both ends of cables.
- Tighten the cables.

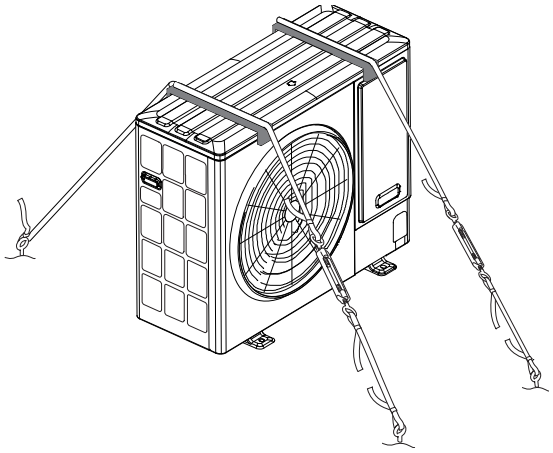


Fig. 38 —Preventing Units from Tipping Over

INSTALLATION OF REFRIGERANT PIPING

Selecting and Preparing the Refrigerant Piping

Refrigerant Piping Requirements

NOTE: The R454B refrigerant pipeline system must be kept strictly clean, dry and sealed.

- **Cleaning and drying: prevent foreign objects (including mineral oil or water) from mixing into the system.**
- **Seal: R454B does not contain fluorine, does not destroy the ozone layer, and does not deplete the ozone layer that protects the earth from harmful ultraviolet radiation. However, if it is released, R454B can also cause a slight greenhouse effect. Therefore, you must pay special attention when you check the quality of the installation seal.**
- **The piping and other pressure vessels must comply with the applicable laws and be suitable for use with the refrigerant. Use only phosphoric acid deoxidized seamless copper for the refrigerant piping.**
- **Foreign objects in the pipes (including lubricant used during pipe bending) must be ≤ 30 mg/10 m.**
- **Calculate all piping lengths and distances.**

⚠ WARNING

The pipe-work including piping material, pipe routing, and installation shall include protection from physical damage in operation and service, and be in compliance with national and local codes and standards, such as ASHRAE 15, ASHRAE 15.2, IAPMO Uniform Mechanical Code, ICC International Mechanical Code. Inspection prior to being covered or enclosed, or CSA B52. All field joints shall be accessible for inspection prior to being covered or enclosed.

Design Considerations

NOTE:

- **The amount of brazing required shall be kept to a minimum.**
- **As bends cause pressure loss when transporting refrigerant, the fewer bends in the system, the better it is. Piping length needs to take the equivalent length of bends into account (the equivalent length of each branch joint is 1.64 ft (0.5 m)).**
- **On the two insides of the first branch joint, the system shall, as much as possible, be equal in terms of the number of units, total capacities and total piping lengths.**

Table 23 — Pipe Connection Position

DESCRIPTION	PIPE CONNECTION POSITION	CODE
Main pipe	Pipe between the outdoor unit and the first branch joint.	L1
Primary piping of Indoor unit	Pipe between the branch joints.	L3~L8
Indoor unit auxiliary pipe	Pipe between the indoor unit and the nearest branch joint.	a ~ 1
Indoor unit	VRF indoor unit	N1 - N12

Length and Height Difference for Refrigerant Piping

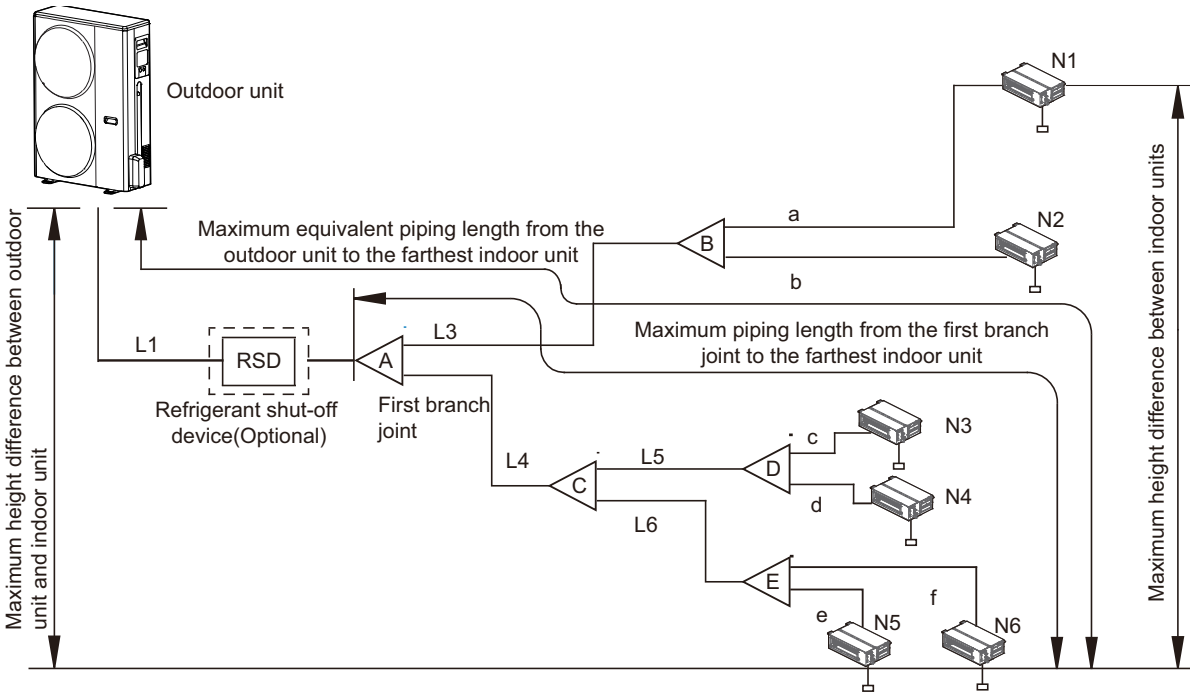


Fig. 39 —Allowable Length and Height Difference for Refrigerant Piping

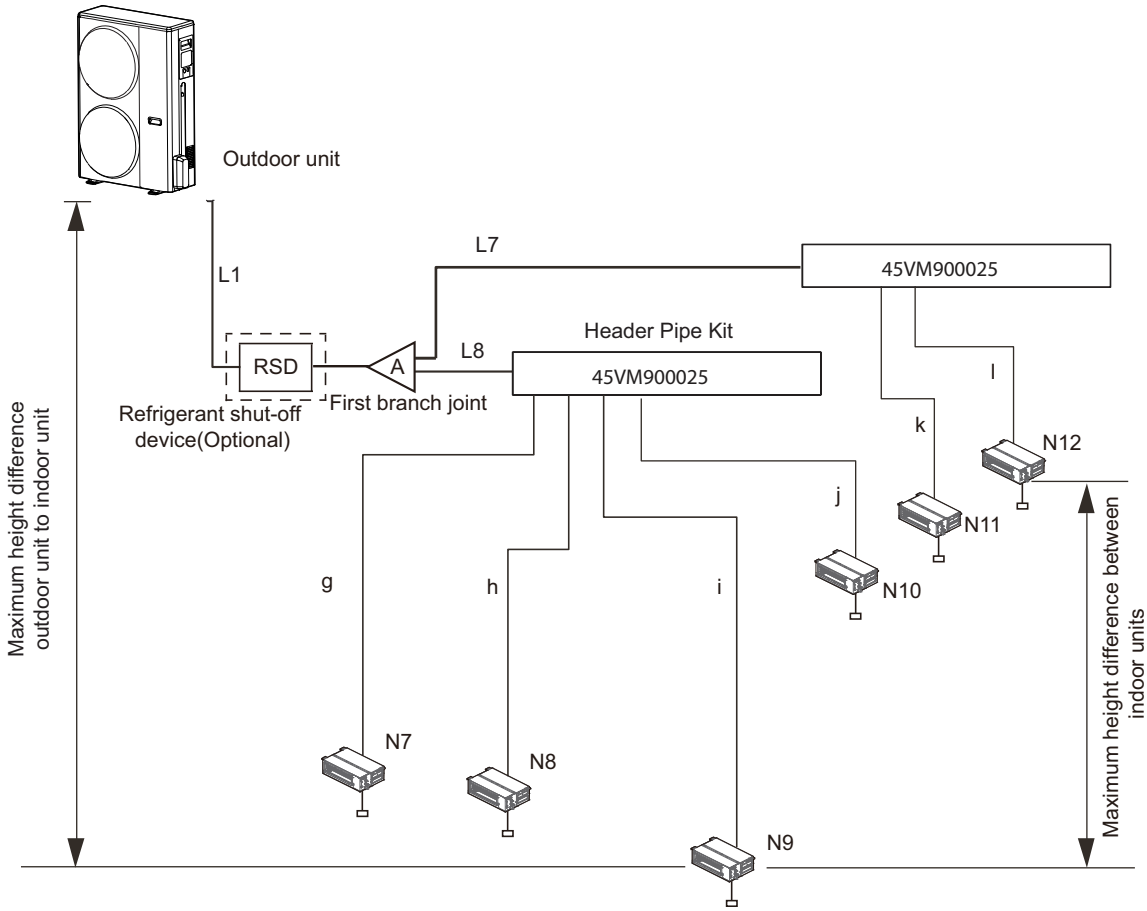


Fig. 40 —Allowable Length and Height Difference for Refrigerant Piping

Table 24 — Allowable Length and Height Difference for Refrigerant Piping

		PERMITTED VALUE	PIPING
Length of refrigerant pipe (actual)	3.0/4.0/5.0 ton	≤ 984 ft (300 m)	L1 + L3 + L4 + L5 + L6 + a + b + c + d + e + f or L1 + L7 + L8 + g + h + j + k + l
Piping length between the outdoor unit and the farthest indoor unit	Actual length	≤ 296 ft (90 m)	L1 + L3 + max (a, b) or L1 + L4 + L5 + max (c, d) or L1 + L4 + L6 + max (e, f) or L1 + L7 + max (k, l) or L1 + L8 + max (g, h, i, j)
	Equivalent length	≤ 328 ft (100 m)	
Piping length between the first branch and the furthest indoor unit		≤ 131 ft (40 m)	L3 + max (a, b) or L4 + L5 + Max(c, d) or L4+L6 + Max(e, f) or L7 + max (k, i) or L8 +max (g, h, i, j)
Outdoor unit to indoor unit	Outdoor unit is above	≤ 164 ft (50 m)	-
	Outdoor unit is below	≤ 131 ft (40 m)	-
Indoor unit to indoor unit		≤ 49 ft (15 m)	

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

Table 25 — Indoor Unit Combination Ratio and Piping Length

INDOOR UNIT	COMBINATION RATIO	TOTAL PIPING LENGTH
Standard indoor units (Except VRF Air Handler)	≤ 130 %	< 984 ft (300 m)
Standard indoor units (Includes VRF Air Handler)	≤ 100 %	< 984 ft (300 m)
	100 % - 130 %	< 492 ft (150 m)
Contains Air Handler Control Kit	≤ 100 %	< 984 ft (300 m)
Non-VRF Air Handler	≤ 100 %	< 164 ft (50 m)

Refrigerant Pipe Selection

Select refrigerant pipe and branch joint according to Table 26, 27, 28, and 29.

NOTE:

- **Branch header can also be selected to connect pipes and indoor units. Meanwhile, the relevant requirements in the Installation Manual must be followed.**
- **The selection of branch header depends on the quantity of branches it connects to.**
- **Branches and other branch heads cannot be installed downstream of the initial head branch.**

Table 26 — Main Pipes (L1) and First Branch Joint (A) According to Outdoor Unit

OUTDOOR UNIT MODEL (TON)	LIQUID PIPE LENGTH	MAIN GAS (VAPOR) PIPE DIAMETER REQUIRED	MAIN LIQUID PIPE DIAMETER REQUIRED	MAXIMUM NUMBER OF INDOOR UNITS	INDOOR UNIT BRANCH PIPE
3.0	Less than 148 ft (45 m)	5/8 in (15.88 mm)	3/8 in (9.52 mm)	5	40VM900031
	More than 148 ft (45 m)	[1]3/4 in (19.05 mm)	3/8 in (9.52 mm)		
4.0	Less than 148 ft (45 m)	[1]5/8 in (15.88 mm)	3/8 in (9.52 mm)	7	
	More than 148 ft (45 m)	3/4 in (19.05 mm)	3/8 in (9.52 mm)		
5.0	Less than 148 ft (45 m)	3/4 in (19.05 mm)	3/8 in (9.52 mm)	9	40VM900031
	More than 148 ft (45 m)	[2]7/8 in (22.23 mm)	3/8 in (9.52 mm)		40VM900032

1 Field provided 5/8 x 3/4 in. adapter required for gas pipe connection.
2 Field provided 3/4 x 7/8 in. adapter required for gas pipe connection.

Main indoor piping sizes for connection to VRF indoor units and AHU control kits

Table 27 — Indoor Main Pipe Selection (L3, L4, L5, L6, L7, and L8)

DOWNSTREAM INDOOR UNIT CAPACITY (BTUH)	GAS (VAPOR) PIPE DIAMETER	LIQUID PIPE DIAMETER	INDOOR UNIT BRANCH PIPE
A < 56 700	5/8 in (15.88 mm)	3/8 in (9.52 mm)	40VM900031
56 700 ≤ A < 78 500	3/4 in (19.05 mm)	3/8 in (9.52 mm)	40VM900031

NOTE:

- **The corresponding maximum values listed in Table 26 and Table 29 shall be used as the main pipe (L1) size, the first ranch joint (A) size and the main pipes (L3-L8) of indoor unit.**
- **Choose indoor unit main pipes and branch joints between the first branch joint and indoor units from the above table in accordance with the total capacity of all the indoor units connected downstream.**

Table 28 — Indoor Unit Auxiliary Pipe (a to l)

INDOOR UNIT TYPE	INDOOR UNIT SIZE	GAS (VAPOR) PIPE DIAMETER	LIQUID PIPE DIAMETER
VRF indoor unit	005, 007, 009, 012, 015, 018	1/2 in (12.70 mm)	1/4 in (6.35 mm)
	024, 030, 036, 048, 054	5/8 in (15.88 mm)	3/8 in (9.52 mm)
VRF air handler only	012, 018, 024, 030, 036	3/4 in (19.05 mm)	3/8 in (9.52 mm)
	048, 054	7/8 in (22.23 mm)	3/8 in (9.52 mm)

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

Table 29 — Size of Outdoor Unit Stop Valve

OUTDOOR UNIT MODEL (TON)	SIZE OF OUTDOOR UNIT STOP VALVE	
	GAS SIDE	LIQUID SIDE
3.0	5/8 in (15.88 mm)	3/8 in (9.52 mm)
4.0	3/4 in (19.05 mm)	3/8 in (9.52 mm)
5.0	3/4 in (19.05 mm)	3/8 in (9.52 mm)

The wall thickness of the refrigerant piping conforms to applicable laws and specifications.

The minimum wall thickness of the R454B piping must be consistent with Table 30.

Table 30 — Minimum Thickness of R454B Piping

PIPING OUTER DIAMETER	MINIMUM THICKNESS	TEMPER GRADE
1/4 in (6.35 mm)	0.0315 in (0.80 mm)	M-type
3/8 in (9.52 mm)	0.0315 in (0.80 mm)	M-type
1/2 in (12.70 mm)	0.0394 in (1.00 mm)	M-type
5/8 in (15.88 mm)	0.0394 in (1.00 mm)	M-type
3/4 in (1905 mm)	0.0394 in (1.00 mm)	M-type
7/8 in (22.23 mm)	0.0394 in (1.00 mm)	Y2-type

NOTE:

- **Material: Only seamless phosphorus-deoxidized copper piping that complies with all applicable legislation shall be used.**
- **Thicknesses: Temper grades and minimum thicknesses for different diameters of piping shall comply with local regulations.**
- **Design pressure of R454B refrigerant is 609 psig (42 bar).**

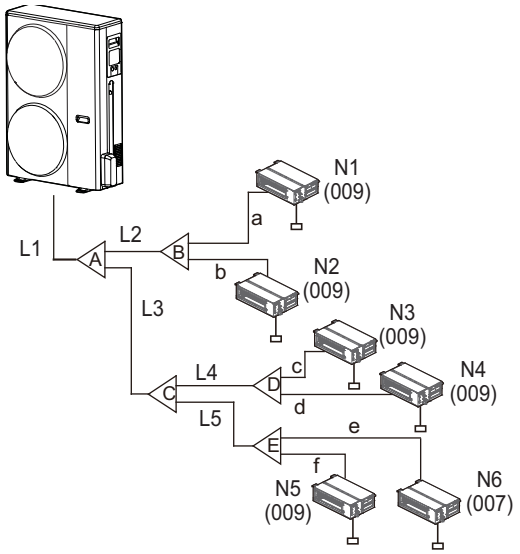


Fig. 41 —Example of Refrigerant Piping Selection

The example below illustrates the piping selection procedure for a system consisting of 1 outdoor unit (5.0 ton) and 6 low static pressure indoor units (007 kBtu × 1 + 009 kBtu × 5), as shown in Figure 23.

The system's total equivalent piping length for all liquid pipes is more than 148 ft. (45 m).

Select the main pipe (L1) and first branch joint (A)

The outdoor unit capacity is 5.0 ton, and the equivalent piping length of all liquid and gas pipes is greater than 148 ft. (45 m). According to Table 24, the gas and liquid pipe sizes are 7/8 in (22.2 mm) and 3/8 (9.5 mm) in respectively. The capacity of the downstream indoor units is 52 kBtu. Then refer to Table 25; the main gas and liquid pipe size are 5/8 in/3/8 in. Referring to the max value principle, the gas and liquid pipe sizes are 7/8 (22.2 mm) in and 3/8 (9.5 mm) in and the first branch joint A is 40VM900032.

Select indoor main pipe (L2 to L5) and branch joint (B to E)

The downstream indoor units of L2 are N1 to N2, with the capacity of 18 kBtu.

Referring to Table 27, the gas and liquid pipe sizes of L2 are 5/8 in (15.8 mm) and 3/8 (9.5 mm) in respectively, and the branch joint B is 40VM900031.

Similarly, the gas and liquid pipe sizes of L3 are 5/8 in (15.8 mm) and 3/8 (9.5 mm) in respectively, the gas and liquid pipe sizes of L4 and L5 are 5/8 in (15.8 mm) and 3/8 (9.5 mm) in respectively. The branch joints B to E are all 40VM900031.

Select the indoor unit auxiliary pipe (a to f)

According to Table 28, the gas and liquid pipe size of a to f are 1/2 (12.7 mm) in and 1/4 (6.4 mm) in respectively.

CONNECTING REFRIGERANT PIPING

Things to Note When Connecting the Refrigerant Piping

⚠ CAUTION

- Take appropriate precautions to prevent refrigerant leakage and ventilate the area immediately if the refrigerant leaks, as high concentration of R454B refrigerant in an enclosed area can cause poisoning or fire.
- Refrigerant must be recovered. Do not release it into the environment. Use professional fluorine extraction equipment to extract the refrigerant from the unit.

NOTE:

- **Make sure the refrigerant piping is installed in accordance with applicable laws.**
- **Make sure the piping and connections are not placed under pressure.**
- **Before brazing, the refrigerant piping shall be flushed with oxygen free nitrogen (OFN) to remove dust, moisture and other particles. Never use outdoor unit refrigerant.**
- **Do not open the stop valves until confirming that all the piping connections have been completed and there are no gas leaks in the system.**

Refrigerant Piping Connection

NOTE:

- **Be careful to avoid the components while connecting to the connecting pipes.**
- **Low temperature solder alloys, such as lead/tin alloys, are not acceptable for pipe connections or any other refrigerant pressure containing purposes.**
- **Vacuum before welding, if necessary, to ensure that there is no R454B residue in the piping.**
- **Oxygen free nitrogen (OFN) shall be purged through the system both before and during the brazing process.**

Outdoor Refrigerant Piping Position

Various piping and wiring patterns can be selected, such as exiting from the front, the back, the side, and bottom, etc.

(The following displays the locations of several piping and wiring knock-out holes)

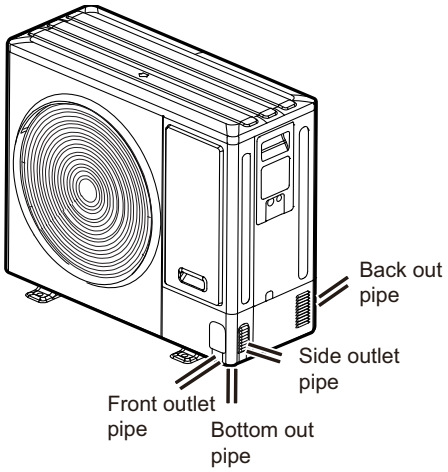


Fig. 42 —Connection of Flaring (3.0 Ton)

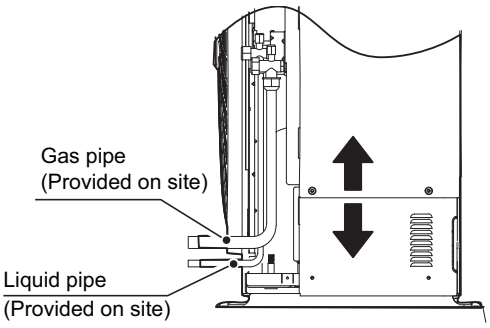


Fig. 43 —Front Out Pipe Connection Mode

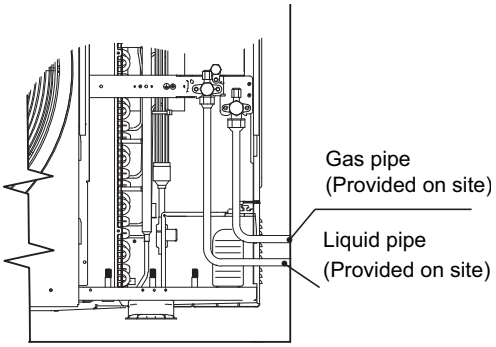


Fig. 44 —Side Out Pipe Connection Mode

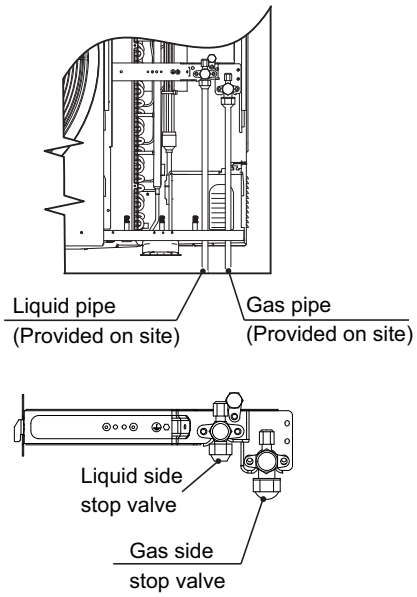


Fig. 45 —Bottom Out Pipe Connection Mode

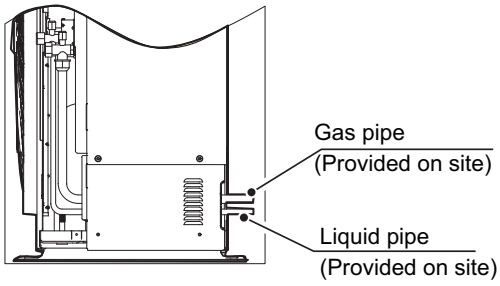


Fig. 46 —Back Out Pipe Connection Mode

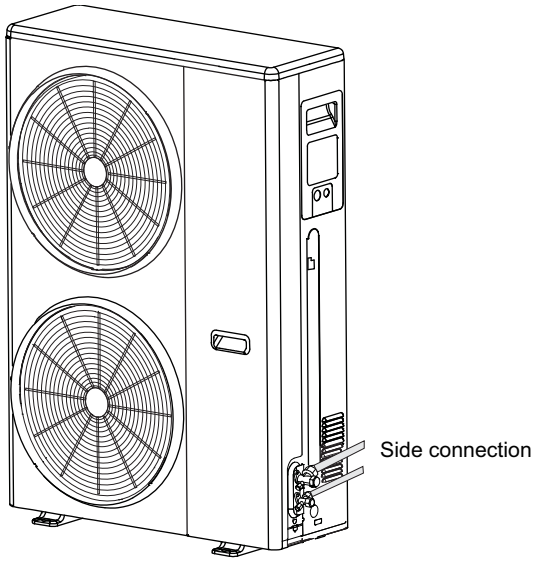


Fig. 47 —Connection of Flaring (4.0/5.0 ton) - Front View

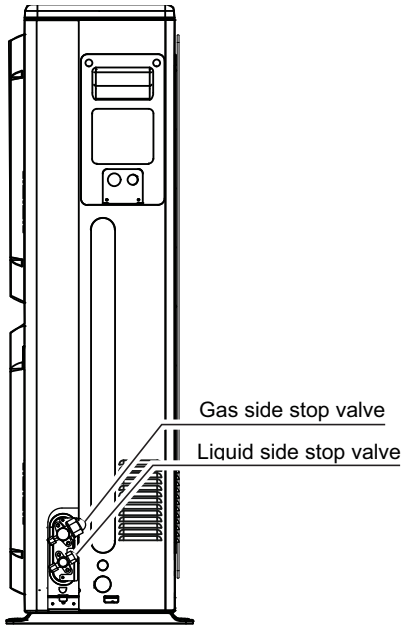


Fig. 48 —Connection of Flaring (4.0/5.0 ton) - Side View

NOTE:

- **Side out pipe: please remove the L shaped metal plate; otherwise, wiring cannot be completed.**
- **Back out pipe: please wipe off the bracket rubber beside the inner outlet pipe cover of the machine while the pipe exits from the back.**
- **Front out pipe: cut the frontal hole of the pipe-outlet plate. The method for the out pipe is the same as the back out pipe.**

⚠ CAUTION

Bottom out pipe: The knock out shall be from inside to outside, and then piping and wiring shall be fed through this. Make sure that the fat connecting pipe exits through the largest hole, otherwise the pipes will rub together. Please complete moth-proofing for the created hole, to prevent pests from entering the unit and destroying the components.

Method of piping flaring connection

To cut the piping with a pipe cutter, rotate the pipe cutter repeatedly.

Put the pipe into the connecting nut flaring, and both the gas pipe and liquid pipe of the indoor unit are connected by flaring.

Align the connecting piping, firstly tighten most of the thread of the connecting nut by hand, and then use a wrench to tighten the last 1-2 turns of the thread as shown in Fig 49.

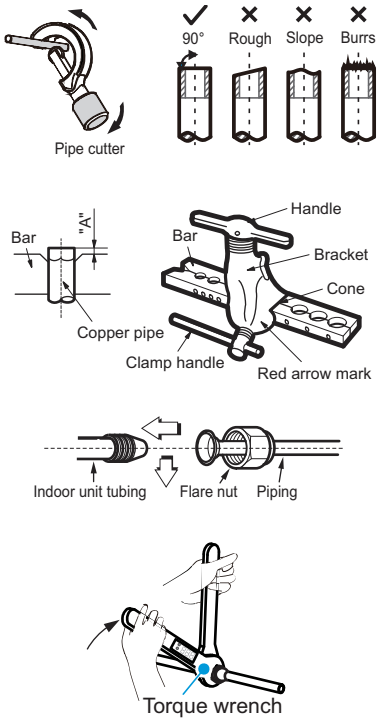


Fig. 49 —Method of Piping Flaring Connection

⚠ CAUTION

- Excessive torque can break the nut during installation.
- When flared joints are reused indoors, the flaring part shall be re-fabricated.

Method of Piping Brazing Connection

Flow the pipework with dry (oxygen-free) nitrogen (2.9 psig (20 kPa) or 3 CFH (85 LPH) during brazing to avoid oxidation which may block the refrigerant piping.

Do not use anti-oxidants when brazing.

Do not use flux when brazing copper-to-copper piping. Use phosphor copper brazing filler alloy (BCuP) which does not require flux. Flux has a harmful effect on refrigerant pipe.

Use a wet cloth to insulate the shut-off valve during brazing.

Use dedicated gauges and hoses with R454B equipment.

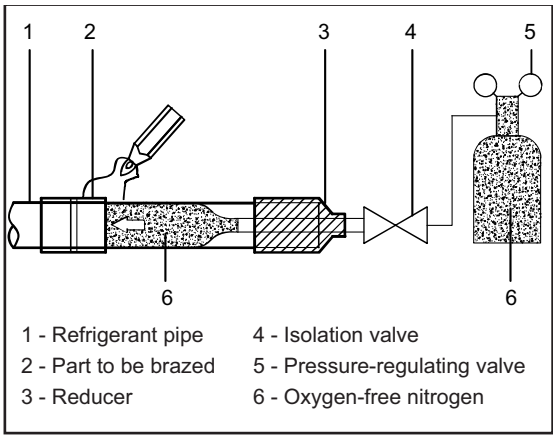


Fig. 50 —Method of Piping Brazing Connection

CHECKING REFRIGERANT PIPING

Refrigerant Piping Settings

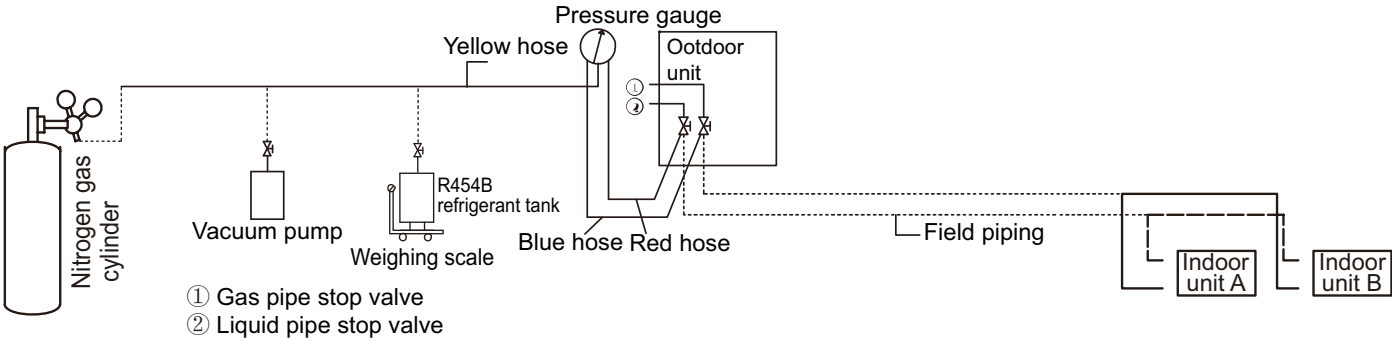


Fig. 51 —Refrigerant Piping Settings

Flushing Pipes

To remove dust, other particles and moisture, which could cause compressor malfunction if not flushed out before the system is run, the refrigerant piping should be flushed using nitrogen. Pipe flushing should be performed once the piping connections have been completed with the exception of the final connections to the indoor units. That is, flushing should be performed once the outdoor units have been connected but before the indoor units are connected.

The liquid and gas sides must be flushed simultaneously.

The flushing procedure is as follows:

1. Cover the inlets and outlets of the indoor units to prevent dirt getting blown in during pipe flushing. (Pipe flushing should be carried out before connecting the indoor units to the piping system.)
2. Attach a pressure reducing valve to a nitrogen cylinder.
3. Connect the pressure reducing valve outlet to the inlet on the liquid (or gas) side of the outdoor unit.
4. Use blind plugs to block all liquid (gas) side openings, except for the opening at the indoor unit which is furthest from the outdoor units ("Indoor unit A" in Fig.52).

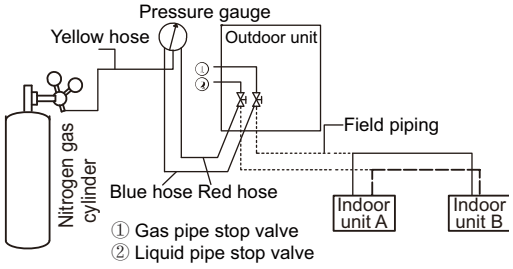


Fig. 52 —Blind Plugs to Block all Liquid (Gas) Side Openings

5. Start to open the nitrogen cylinder valve and gradually increase the pressure to 73 psig (0.5 MPa).
6. Allow time for nitrogen to flow as far as opening at indoor unit A.
7. Flush the first opening:
   a. Using suitable material, such as a bag or cloth, press firmly against the opening at indoor unit A.
   b. When the pressure becomes too high to block with your hand, suddenly remove your hand allowing gas to rush out.
   c. Repeatedly flush in this manner until no further dirt or moisture is emitted from the piping. Use a clean cloth to check for dirt or moisture being emitted. Seal the opening once it has been flushed.
8. Flush the other openings in the same manner, working in sequence from indoor unit A towards the outdoor units. Refer to Fig.53.

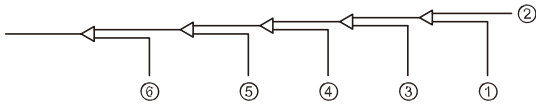


Fig. 53 —Flush Other Openings from Indoor Unit A Towards the Outdoor Units

9. Once flushing is complete, seal all openings to prevent dust and moisture from entering.

⚠ CAUTION

Only use nitrogen for flushing. Using carbon dioxide risks leaving condensation in the piping. Oxygen, air, refrigerant, flammable gases and toxic gases must not be used for flushing. Use of such gases may result in fire or explosion.

Gas Tightness Test

To prevent faults caused by refrigerant leakage, a gas tightness test should be performed before system commissioning.

⚠ CAUTION

- Only dry nitrogen should be used for gas tightness testing. Oxygen, air, flammable gases and toxic gases must not be used for gas tightness testing. Use of such gases may result in fire or explosion.
- Make sure that all the outdoor unit stop valves are firmly closed.
- Make sure all piping connections are complete before the tightness test begins.

The gas tightness test procedure is as follows:

1. Charge the indoor piping with nitrogen at 3 bar(44 psig) through the needle valves on the liquid and gas stop valves and leave for at least 10 minutes (do not open the liquid or gas stop valves). Observe the pressure gauge to check for large leakages. If there is a large leakage, the pressure gauge will drop quickly.
2. If there are no large leakages, charge the piping with nitrogen at 15 bar(220 psig) and leave for at least 10 minutes. Observe the pressure gauge to check for small leakages. If there is a small leakage, the pressure gauge will drop distinctly.
3. If there are no large leakages, charge the piping with nitrogen at 32 bar(470 psig) and leave for at least 10 minutes. Observe the pressure gauge to check for small leakages. If there is a small leakage, the pressure gauge will drop distinctly.
4. If there are no large leakages, charge the piping with nitrogen at 41 bar(600 psig) and leave for at least 1 hour. Observe the pressure gauge to check for small leakages. If there is a small leakage, the pressure gauge will drop distinctly.
5. If there are no small leakages, charge the piping with nitrogen at 32 bar(470 psig) and leave for at least 24 hours to check for micro leakages. Micro leakages are difficult to detect. To check for micro leakages, allow for any change in ambient temperature over the test period by adjusting the reference pressure by 0.1bar per 1°C of temperature difference. Adjusted reference pressure = Pressure at pressurization + (temperature at observation – temperature at pressurization) x 0.1bar. Compare the observed pressure with the adjusted reference pressure. If they are the same, the piping has passed the gas tightness test. If the observed pressure is lower than the adjusted reference pressure, the piping has a micro leakage.
6. If the leakage is detected, refer to following part “Leak detection”. Once the leak has been found and fixed, the gas tightness test should be repeated.
7. If not continuing straight to vacuum drying once the gas tightness test is complete, reduce the system pressure to 5-8bar and leave the system pressurized until ready to carry out the vacuum drying procedure.

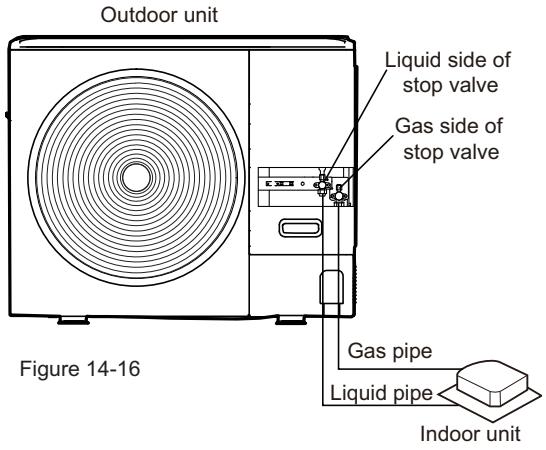


Figure 14-16

Fig. 54 —Gas Tightness Test

Leak Test

The general methods for identifying the source of a leak are as follows:

1. Audio detection: relatively large leaks are audible.
2. Touch detection: place your hand at joints to feel for escaping gas.
3. Soapy water detection: small leaks can be detected by the formation of bubbles when soapy water is applied to a joint.
4. Electronic leak detector detection: electronic leak detector shall be used to check whether air leaks at each joint.

Vacuum Drying

Vacuum drying should be performed in order to remove moisture and non-condensable gases from the system. Removing moisture prevents ice formation and oxidization of copper piping or other internal components. The presence of ice particles in the system would cause abnormal operation, whilst particles of oxidized copper can cause compressor damage. The presence of non-condensable gases in the system would lead to pressure fluctuations and poor heat exchange performance.

Vacuum drying also provides additional leak detection (in addition to the gas tightness test).

NOTE:

- **Before performing vacuum drying, make sure that all the outdoor unit stop valves are firmly closed.**
- **Once the vacuum drying is complete and the vacuum pump is stopped, the low pressure in the piping could suck vacuum pump lubricant into the air conditioning system. The same could happen if the vacuum pump stops unexpectedly during the vacuum drying procedure. Mixing of pump lubricant with compressor oil could cause compressor malfunction. Therefore, a check valve should be used to prevent vacuum pump lubricant seeping into the piping system.**
- **Vacuumize using a vacuum pump. Do not use refrigerant gas to discharge air.**
- **To prevent the entry of impurities, the R454B special tool must be used to ensure compression strength is maintained. Use a charging hose with a top rod to connect to the access hole of the stop valve or the refrigerant charging port.**

During vacuum drying, a vacuum pump is used to lower the pressure in the piping to the extent that any moisture present evaporates. At 5mm Hg (755mm Hg below typical atmospheric pressure) the boiling point of water is 32°F. Therefore, a vacuum pump capable of maintaining a pressure of -756 mm Hg or lower should be used. Using a vacuum pump with a discharge in excess of 4 L/s and a precision level of 0.02mm Hg is recommended. The vacuum drying procedure is as follows:

1. Connect the vacuum pump through a manifold with a pressure gauge to the service port of all stop valves.
2. Start the vacuum pump and then open the manifold valves to start vacuuming the system.
3. Continue vacuum drying for at least 2 hours and until a pressure difference of -1 bar or more has been achieved. Once the pressure difference of at least -1 bar has been achieved, continue vacuum drying for 2 hours. Close the manifold valves and then stop the vacuum pump. After 1 hour, check the pressure gauge. If the pressure in the piping has not increased, the procedure is finished. If the pressure has increased, repeat the steps 1 to 3 until all moisture has been remove.
4. After vacuum drying, keep the manifold connected to the master unit stop valves, in preparation for refrigerant charging.

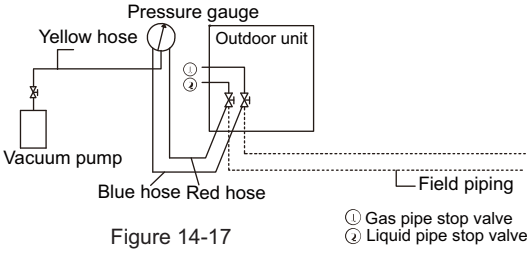


Figure 14-17

Fig. 55 —Vacuum Drying

Piping Insulation

After the leak test and the vacuum drying are completed, the pipe must be insulated.

Considerations:

- Make sure the refrigerant piping and branch joints are completely insulated.
- Make sure the liquid and gas pipes (for all units) are insulated.
- Use heat-resistant polyethylene foam for the liquid pipes (able to withstand temperature of 158°F), and polyethylene foam for the gas pipes (able to withstand temperature of 248°F).
- Reinforce the insulation layer of the refrigerant piping based on the installation environment.

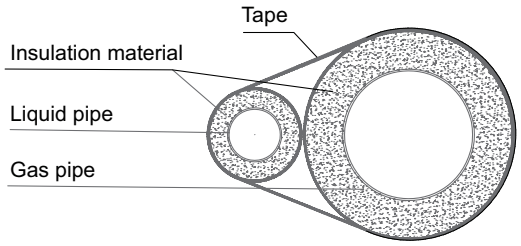
Table 31 — Selection of Insulation Material Thickness

PIPING SIZE	Humidity<80%RH Thickness	Humidity≥80%RH Thickness
1/4-1/2 in	≥ 0.59 in	≥ 0.79 in
5/8-7/8 in	≥ 0.79 in	≥ 0.99 in

NOTE: Condensed water may form on the surface of the insulation layer.

Pipe wrapping

To avoid condensation and water leakage, the connecting pipe must be wrapped with tape to ensure isolation from the air.



When wrapping insulation tape, each circle should press half of the previous circle of tape. Do not wrap the tape too tightly to avoid reducing the thermal insulation effect.

After completing the pipe insulation work, seal the holes in the wall with sealing material.

Protective Measures of the Pipeline

The refrigerant pipe will swing, expand or shrink during operations. If the pipe is not fixed, the load will be concentrated in a certain part, which may cause the deformation or rupture of the refrigerant pipe.

The suspended connecting pipes shall be well supported, and the distance between supports shall not exceed 1m.

The outdoor pipes shall be protected against accidental damage. If the length of the pipe exceeds 1m, a gusset plate must be added for protection.

REFRIGERANT CHARGING

⚠ WARNING

- Use only R454B as the refrigerant. Other substances may cause explosions and accidents.
- R454B contains fluorinated greenhouse gases. Do not discharge the gas into the surroundings.
- When charging the refrigerant, make sure you wear protective gloves and safety glasses. Be careful when you open the refrigerant piping.
- Charge the refrigerant only after the system has not failed the gas tightness tests and vacuum drying.
- Ensure that the refrigeration system is earthed prior to charging the system with refrigerant.
- Add the refrigerant amount according to the calculation results. Extreme care shall be taken not to overfill the refrigeration system.
- 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.

Calculating Additional Refrigerant Charge

The additional refrigerant charge required depends on the lengths and diameters of the outdoor and indoor liquid pipes and the capacity of the indoor unit connected. Tables 32 and 33 show the additional refrigerant charge required under different conditions. Additional refrigerant charge R1 (according to liquid pipe lengths and diameters)

Table 32 — Additional Refrigerant Charge

DIAMETER OF LIQUID PIPE	ADDITONAL REFRIGERANT CHARGE (EQUIVALENT LENGTH OF LIQUID PIPE PER FOOT)
1/4 in (6.35 mm)	0.014 lb/ft (0.020 kg/m)
3/8 in (9.52 mm)	0.036 lb/ft (0.053 kg/m)
1/2 in (12.70 mm)	0.067 lb/ft (0.100 kg/m)
5/8 in (15.88 mm)	0.108 lb/ft (0.160 kg/m)
3/4 in (19.05 mm)	0.162 lb/ft (0.240 kg/m)
7/8 in (22.23 mm)	0.222 lb/ft (0.330 kg/m)

Table 33 — Additional Refrigerant Charge

	Indoor unit is VRF unit lb (kg)			
Outdoor unit model (ton)	Air handler indoor units exceed 80 % of all indoor units and indoor unit amount ≥ 2	4 way cassette indoor units exceed 80 % of all indoor units and indoor unit amount ≥ 2	Medium static pressure duct indoor units exceed 80 % of all indoor units and indoor unit amount ≥ 2	Other
3.0	2.07 lb (0.94 kg)	1.83 lb (0.83 kg)	-	-
4.0	0.44 lb (0.20 kg)	-	-	-
5.0	0.44 lb (0.20 kg)	-	-	-

Additional refrigerant charge R2 (see Table 33)

Total additional charge (R) is equal to the sum of R1 and R2. Calculate the refrigerant charge according to the following formula:

R = R1 + R2.

Determine the total refrigerant charge of the system:

Total charge (mc) = factory charge + additional charge = R0 + R.

The factory charge (R0) can be obtained from Table 34.

Table 34 — Factory Charge

OUTDOOR UNIT MODEL (TON)	FACTORY CHARGE REFRIGERANT LB (KG)
3.0	**6.83 lb (3.10 kg)**
4.0	**9.04 lb (4.10 kg)**
5.0	**9.04 lb (4.10 kg)**

Table 35 — Maximum Refrigerant Charge

OUTDOOR UNIT MODEL (TON)	MAXIMUM REFRIGERANT CHARGE AMOUNT LB (KG)
3.0	21.5 lb (9.8 kg)
4.0	30.8 lb (14.0 kg)
5.0	30.8 lb (14.0 kg)

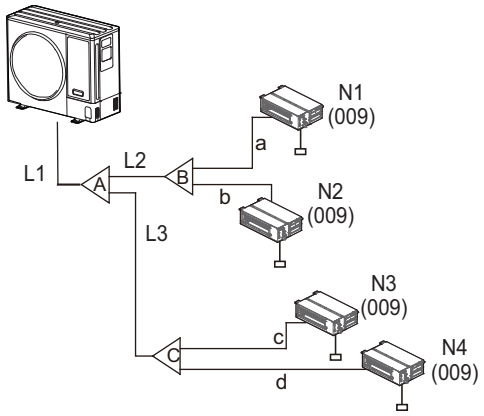


Fig. 56 —Example of Total Additional Refrigerant Charge

The example system consisting of 1 outdoor unit (3.0 ton) and 4 low static pressure indoor units (009 kBtu × 4), as shown in Figure 56.

The liquid pipe size of L1 is 3/8 in and 30 ft. The liquid pipe size of L2 is 3/8 in and 10 ft. The liquid pipe size of L3 is 3/8 in and 10 ft .The liquid pipe size of a is 1/4 in and 15 ft. The liquid pipe size of b is 1/4 in and 5 ft .The liquid pipe size of c is 1/4 in and 10 ft The liquid pipe size of d is 1/4 in and 8 ft.

Branch A and B and C are 40VM900031.

Total additional charge (R)

R (lb) = (30 + 10 + 10) × 0.036 + (15 + 5 + 10 + 8) × 0.014 = 2.332 lb

R (kg) = (9.14 + 3.05 + 3.05) x 0.053 + (4.57 + 1.52 + 3.05 + 2.44) x 0.020 = 1.039 kg

NOTES:

- **The maximum refrigerant charge is related to types of the indoor units, which have different installation heights.**
- **The actual charges shall not exceed the maximum refrigerant limits of all rooms.**
- **The maximum refrigerant limit described in Table 9 applies to unventilated areas. For adding additional measures, such as areas with mechanical ventilation, please refer to applicable legislation for the maximum refrigerant limit.**
- **Make sure all connected indoor units have been identified.**
- **Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.**
- **Label the system when charging is complete (if it is not already labeled).**
- **If the power supply of some units is off, the charging program cannot be completed normally.**
- **Make sure the power supply is turned on 12 hours before operations so that the crankcase heater is properly energized. This is also to protect the compressor.**

The procedure for adding refrigerant is as follows:

1. Calculate additional refrigerant charge R (lb).
2. Place a tank of R454B refrigerant on a weighing scale. Turn the tank upside down to ensure refrigerant is charged in a liquid state.
3. After vacuum drying, the blue and red pressure gauge hoses should still be connected to the pressure gauge and to the master unit stop valves.
4. Connect the yellow hose from the pressure gauge to the R454B refrigerant tank.
5. Open the valve where the yellow hose meets the pressure gauge, and open the refrigerant tank slightly to let the refrigerant eliminate the air. Caution: open the tank slowly to avoid freezing your hand.
6. Set the weighing scale to zero.
7. Open the three valves on the pressure gauge to begin charging refrigerant.
8. When the amount charged reaches R (lb), close the three valves. If the amount charged has not reached R (lb) but no additional refrigerant can be charged, close the three valves on the pressure gauge, run the outdoor units in cooling mode, and then open the yellow and blue valves. Continue charging until the full R (lb) of refrigerant has been charged, then close the yellow and blue valves. Note: Before running the system, be sure to complete all the pre-commissioning checks and be sure to open all stop valves as running the system with the stop valves closed would damage the compressor.

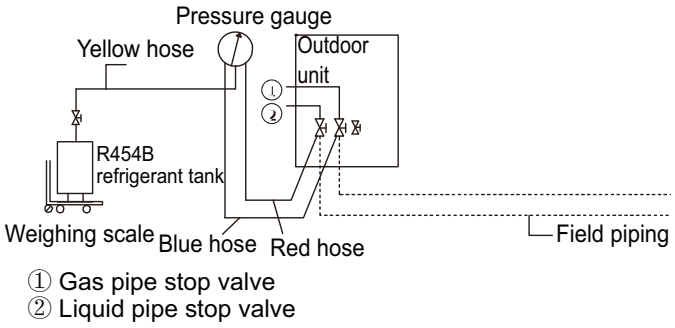


Fig. 57 —Procedure for Adding Refrigerant

ELECTRICAL WIRING

In the U.S.A., wiring must conform with current local codes and the current National Electric Code (NEC). In Canada, wiring must conform with current local codes and the current Canadian Electrical Code (CEC).

⚠ WARNING

- Installation and servicing of air conditioning equipment can be hazardous due to internal refrigerant pressure and live electrical components. Only trained and qualified service personnel should install or service this equipment. Installation and service performed by unqualified persons can result in property damage, personal injury, or death.
- Risk of electrical shock. Disconnect all remote power supplies before installing or servicing any portion of the system. Failure to disconnect power supplies can result in property damage, personal injury, or death.
- 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.
- 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 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.
- Fire Hazard. Use of aluminum wire with this product may result in a fire, causing property damage, severe injury or death. Use copper wire only with this product

⚠ CAUTION

- 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(1m) away from televisions, radios or other electronic devices in order to avoid the possibility of interference with the unit operation.
- Do not install the unit near a lighting appliance that includes a ballast. The ballast may affect remote control operation.
- Separate power wiring supplies must be provided for the outdoor unit and indoor unit(s).
- Do not cross-connect refrigerant piping or signal wires between VRF systems. Each VRF system must be piped and wired separately.
- Each indoor unit must have its own electrical disconnect.
- Do not run signal wire and power wire in the same conduit; keep distance between the two conduits per local codes.

NOTES:

- **Electrostatic discharge can affect electronic components. Take care during unit installation and service to protect the unit's electronic controls. Precautions will help to avoid control exposure to electrostatic discharge by putting the unit, the control and the technician at the same electrostatic potential. Touch hand and all tools on an unpainted unit surface before performing any service procedure to neutralize electrostatic charge.**
- **Do not connect the power cords (high voltage) to the HyperLink (M1M2) communication wires (low voltage), otherwise it will damage the control board.**
- **The HyperLink (M1M2) communication wires should be fixed well. Otherwise, the connectors may be loose or the terminal may be damaged when they are pulled.**
- **The HyperLink (M1M2) communication wires must be routed as close as possible. Otherwise, the communication may be abnormal.**
- **When there is strong electromagnetic interference in the environment, it is recommended to use shielded wires for HyperLink (M1M2) communication wires. Otherwise, the communication may be abnormal. When the shielded wires are used, the shielding layers at both ends must be connected to earth.**
- **Power cords and communication wires must be separated from each other with a distance of more than 2 inches(5cm). Otherwise, the communication may be abnormal.**
- **The HyperLink (M1M2) communication wires connectors are SELV connection points.Safety Instruction**

Safety Instructions

Refer to unit nameplate for minimum circuit ampacity and maximum over current protection size.

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

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

The modification factor of the actual carrying capacity depends on cable type and length, lead-through method, and the environment for cable laying. The user is recommended to modify the factor according to local laws and the installation conditions.

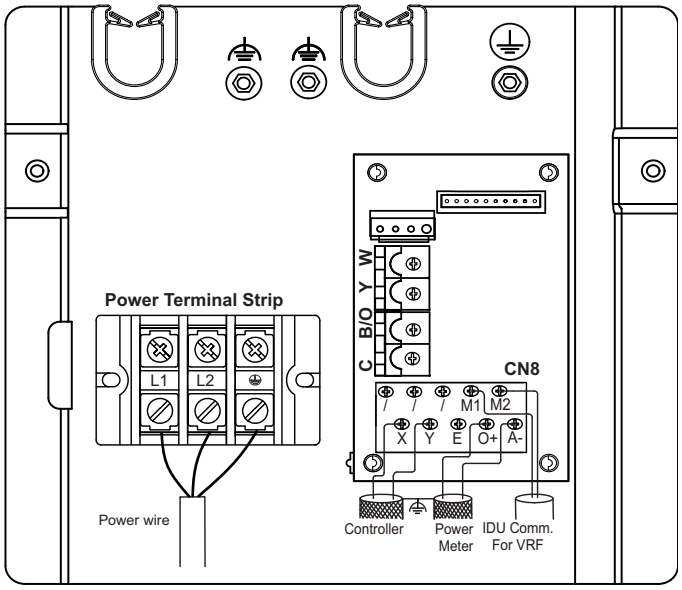


Fig. 58 —Connect Power Wiring

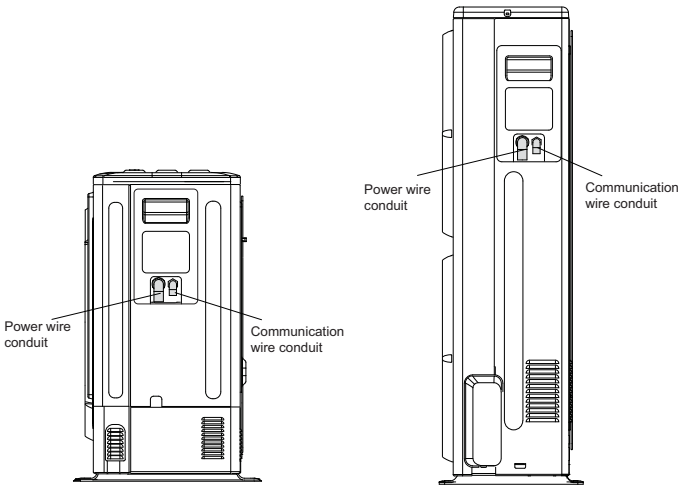
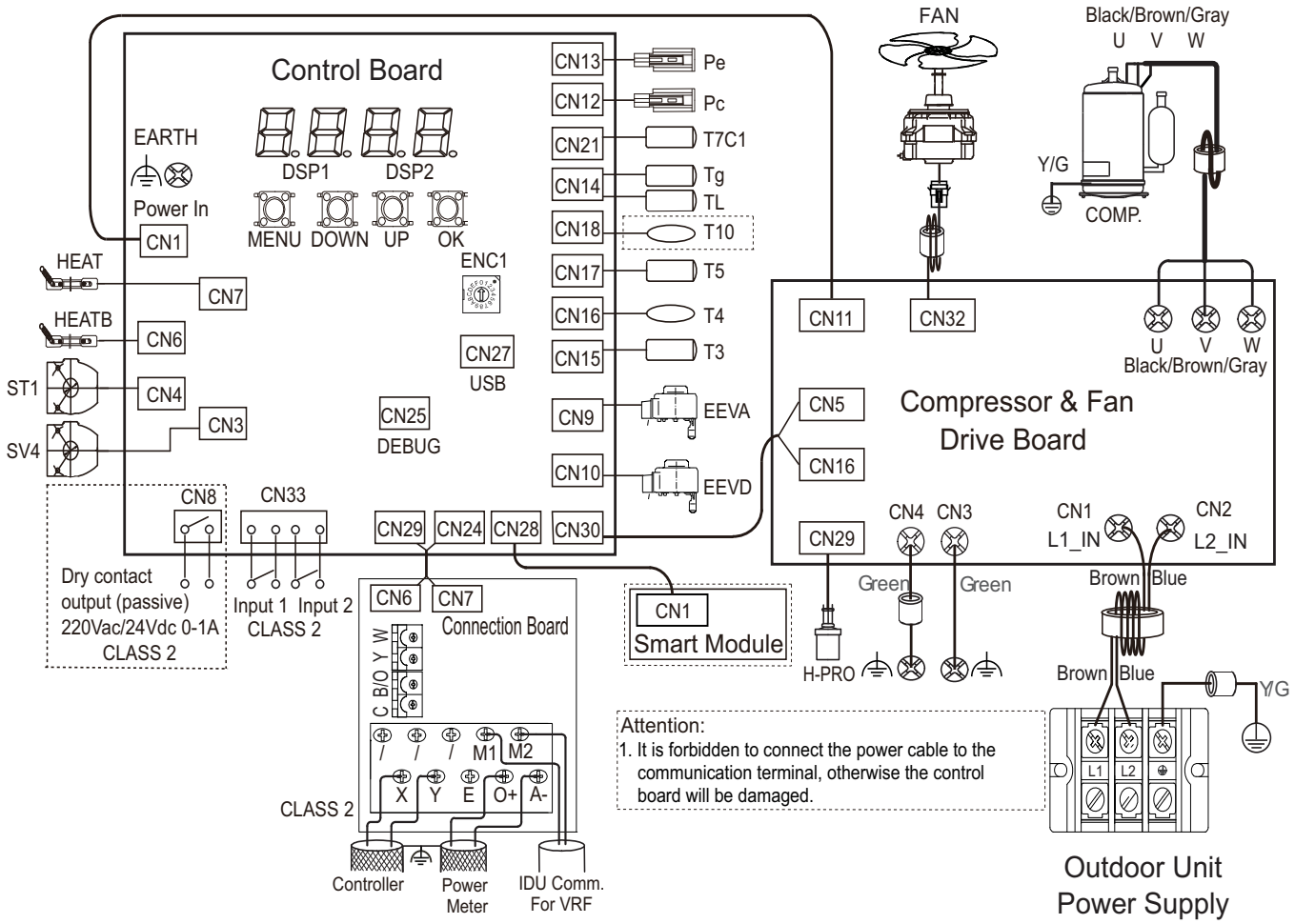


Fig. 59 —Connect Power Wiring

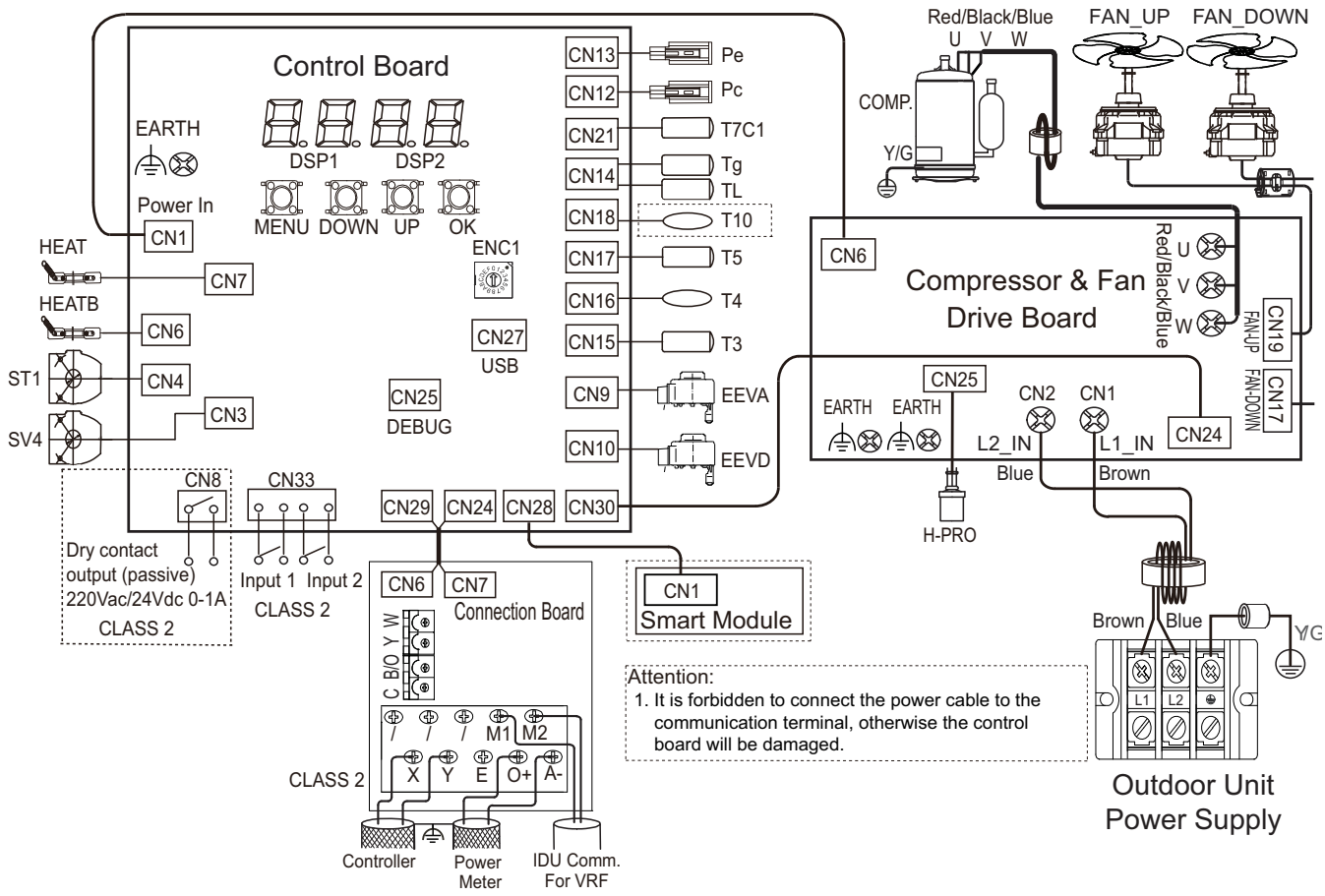
NOTES:

1. It is forbidden to connect the power cable to the communication terminal. Otherwise, the control board will be damaged. See Figure 58.
2. Power wire and communication wires are separated by individual conduits. See Figure 59.



Component Code	Description	Component Code	Description
COMP.	Compressor	T3	Heat exchanger temperature sensor
FAN	DC fan	T4	Outdoor ambient temperature sensor
EEVA	Electronic expansion valve	T5	Liquid pipe temperature sensor
EEVD	Electronic expansion valve	T7C1	Discharge temperature sensor
HEAT	Compressor crankcase heater	Tg	Suction temperature sensor
HEATB	Chassis electric heating belt	TL	Heat exchanger liquid temperature sensor
ST1	Four-way valve	T10	Additional ambient temperature sensor (optional)
SV4	Solenoid valve	H-PRO	High pressure switch
Pc	High pressure sensor	Pe	Low pressure sensor

Fig. 60 —3.0 Ton Typical Unit Wiring Diagram



Component Code	Description	Component Code	Description
COMP.	Compressor	T3	Heat exchanger temperature sensor
FAN_UP/FAN_DOWN	DC fan	T4	Outdoor ambient temperature sensor
EEVA	Electronic expansion valve	T5	Liquid pipe temperature sensor
EEVD	Electronic expansion valve	T7C1	Discharge temperature sensor
HEAT	Compressor crankcase heater	Tg	Suction temperature sensor
HEATB	Chassis electric heating belt	TL	Heat exchanger liquid temperature sensor
ST1	Four-way valve	T10	Additional ambient temperature sensor (optional)
SV4	Solenoid valve	H-PRO	High pressure switch
Pe	Low pressure sensor	Pc	High pressure sensor

Fig. 61 —4.0 Ton Typical Unit Wiring Diagram

Communication Wires Connections

Table 36 defines the maximum total length of low voltage wires from the outdoor unit to the indoor unit.

Table 36 — Hyper-Link (M1M2) Communication Wires

WIRE SIZE	MAXIMUM LENGTH
16/18 AWG	300 ft

NOTES:

- **Hyper-Link(M1M2) communication mode and conventional 24VAC non-communicating control mode can not be used at the same time.**
- **The combined indoor unit must have a R454B refrigerant sensor.**
- **The above pictures are for indication, the actual object may be different.**

NOTES:

- **Hyper-Link(M1M2) communication supports non-polar communication.**
- **If there are 2 or more systems (communication) in the same area, make sure the low voltage wires are connected to the right unit that are connected to the same refrigerant line.**
- **The Figures above for indication. The actual object may be different.**

POWER WIRING

In the U.S.A., wiring must conform with current local codes and the current National Electric Code (NEC). In Canada, wiring must conform with current local codes and the current Canadian Electrical Code (CEC).

⚠ WARNING

- Installation and servicing of air conditioning equipment can be hazardous due to internal refrigerant pressure and live electrical components. Only trained and qualified service personnel should install or service this equipment. Installation and service performed by unqualified persons can result in property damage, personal injury, or death.
- Risk of electrical shock. Disconnect all remote power supplies before installing or servicing any portion of the system. Failure to disconnect power supplies can result in property damage, personal injury, or death.
- Fire Hazard. Use of aluminum wire with this product may result in a fire, causing property damage, severe injury or death. Use copper wire only with this product.
- Can cause injury or death. Unit must be properly earthed in accordance with national and local codes.
- Natural earthing poles embedded in the earth can be used, but do not connect the earth wire to the following locations:
  a. Pipes of flammable or explosive gases, which may lead to an explosion or fire.
  b. Insulated plastic pipes, otherwise there is no earthing effect.
  c. Telephone line or lightning rod, otherwise it will be dangerous for increasing the earth potential during lightning strikes.
- During installation, testing, servicing, and troubleshooting of this product, it may be necessary to work with live electrical components. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

⚠ CAUTION

- Sharp metal edges can cause injury. When installing the unit, use care to avoid sharp edges.
- Avoid sharp metal edges for wires to prevent wear, or it may lead to short circuit or electric leakage and cause danger.
- Wires should be fixed well. Otherwise, the connectors may be loose or the terminal may be damaged when they are pulled.

NOTE:

- **Electrostatic discharge can affect electronic components. Take care during unit installation and service to protect the unit's electronic controls. Precautions will help to avoid control exposure to electrostatic discharge by putting the unit, the control and the technician at the same electrostatic potential. Touch hand and all tools on an unpainted unit surface before performing any service procedure to neutralize electrostatic charge.**
- **Do not add phase junction capacitors, otherwise it may cause serious damage to the product.**
- **Do not start the unit before installing pipes. Otherwise, the compressor will be damaged.**

1. Select the minimum diameter for each unit based on the rated current, as shown in Table 37 and Table 38.
2. Use a circuit breaker with a spacing between polar contacts of at least 3 mm to ensure full disconnection. MFA is used to select the current circuit breaker and the residual current action circuit breaker.
3. The wire carrying capacity is for reference purposes only. The modification factor of the actual carrying capacity depends on cable type and length, lead-through method, and the environment for cable laying. The user is recommended to modify the factor according to local laws and the installation conditions.

Table 37 — Rated Current

RATED CURRENT OF DEVICE (A)	NOMINAL CROSS-SECTIONAL AREA (MM^2)	
	SOFT WIRE	CABLE FOR FIXED WIRING
≤ 3	0.5 and 0.75	1 ~ 2.5
>3 and ≤ 6	0.75 and 1	1 ~ 2.5
>6 and ≤ 10	1 and 1.5	1 ~ 2.5
>10 and ≤ 16	1.5 and 2.5	1.5 ~ 4
>16 and ≤ 25	2.5 and 4	2.5 ~ 6
>25 and ≤ 32	4 and 6	4 ~ 10
>32 and ≤ 50	6 and 10	6 ~ 16
> 50 and ≤ 63	10 and 16	10 ~ 25

Table 38 — Electrical Characteristics

POWER SUPPLY	MODEL	OUTDOOR UNIT		POWER SUPPLY CURRENT		COMPRESSOR		FAN MOTOR	
	Capacity of Outdoor Unit (Ton)	Minimum (V)	Maximum (V)	Minimum current (rated current) (A)	MOP (A)	MSC (A)	RLA (A)	Power Output (kW)	FLA (A)
208/230V ~ 60 Hz	3.0	198	264	25	30	-	16.5	0.215	1.7
	4.0	198	264	28	40	-	19.0	0.123*2	1.1*2
	5.0	198	264	35	40	-	24.0	0.123*2	1.1*2

Legend:

MCA: minimum current ampacity (A)

MOP: Maximum overcurrent protection amps (A)

MSC: maximum starting current (A)

RLA: rated load amps (A)

FLA: full load amps.

- The unit is compatible with electrical systems that satisfy the following condition: The voltage supplied to the unit terminal is not lower than or greater than the listed value.
- Select cable specifications according to the MCA value (the rated current in Table 38).
- MOP is maximum overcurrent protection amps and used to select the overcurrent circuit breaker and residual current circuit breaker.
- MSC indicates the maximum current upon compressor starting.
- RLA is based on the following conditions: indoor temperature: 81°F (27°C) DB, 66°F (19°C) WB; outdoor temperature: 95°F (35°C) DB.

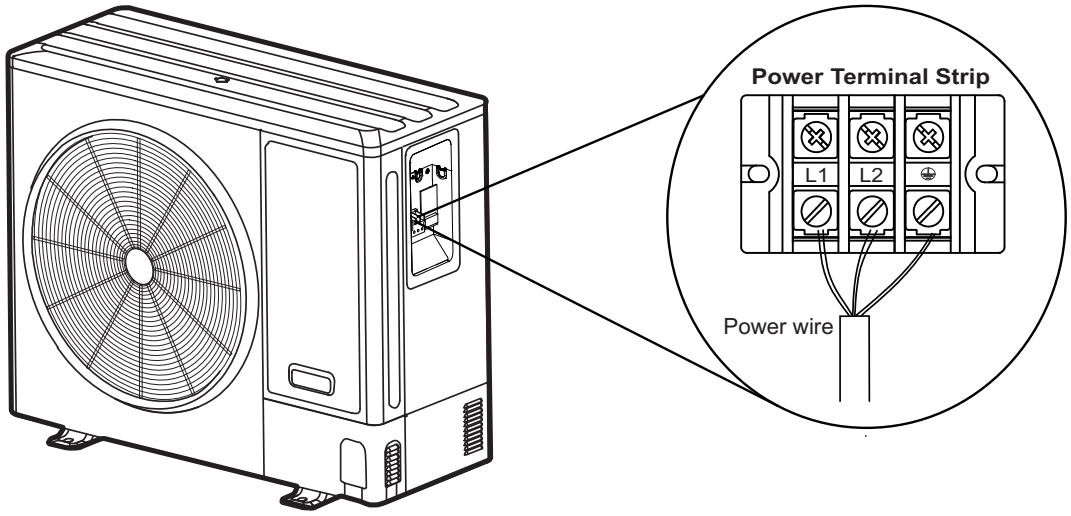


Fig. 62 —Power Connection

⚠ WARNING

- Fire hazard.
- Do not connect aluminum wire between disconnect switch and unit.

NOTES:

- **Do not share the same power supply line with other devices.**
- **Refer to the unit wiring diagram located on the inside of the electrical control box panel.**
- **During installation, the earth wire should be longer than the power cords to ensure that the earth wire can be earthed reliably when the fixed device is loose.**
- **The above pictures are for indication, the actual object may be different.**

CONFIGURATION

Overview

This chapter describes how the system configuration can be implemented once the installation is complete, and other relevant information.

It contains the following information:

- Implement field settings
- Energy-saving and optimized operation
- Using the Leak Check function

Digital Display and Button Settings

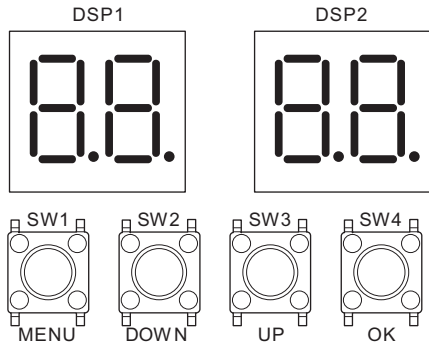


Fig. 63 —Digital Display and Buttons

Table 39 — Digital Display Output

OUTPUT UNIT STATE	PARAMETERS DISPLAYED ON DSP1	PARAMETERS DISPLAYED ON DSP2
Standby	Unit's Address	The number of indoor units in communication with the outdoor unit
Normal Operation	--	Running speed of the compressor in rotations per second
Error or Protection	Placeholder and error or protection code	
In Menu Mode	Display menu mode code	
System Check	Display system check code	

Table 40 — Function of Buttons SW1 to SW4

BUTTON	FUNCTION
SW3 (UP)	In menu mode: previous and next buttons for menu modes. Not in menu mode: previous and next buttons for system check information.
SW2 (DOWN)	
SW1 (MENU)	Enter / exit menu mode.
SW4 (OK	Confirm to enter specified menu mode.

Menu Mode

1. Press and hold SW1 "MENU" button for 5 seconds to enter menu mode, and the digital display will display "n1".
2. Press SW3 / SW2 "UP / DOWN" button to select the first-level menu "n1", "n2", "n3", "n4" or "nb".
3. Press SW4 "OK" button to enter the specified first-level menu, for example, enter "n4" mode.
4. Press SW3 / SW2 "UP / DOWN" button to select the second-level menu from "n41" to "n47".
5. Press SW4 "OK" button to enter the specified second-level menu, for example, enter "n43" mode.
6. Press SW3 / SW2 "UP / DOWN" button to select the specified menu mode code.
7. Press SW4 "OK" button to enter specified menu mode.

CAUTION

Operate the switches and push buttons with an insulated stick (such as a closed ball-point pen) to avoid touching live parts.

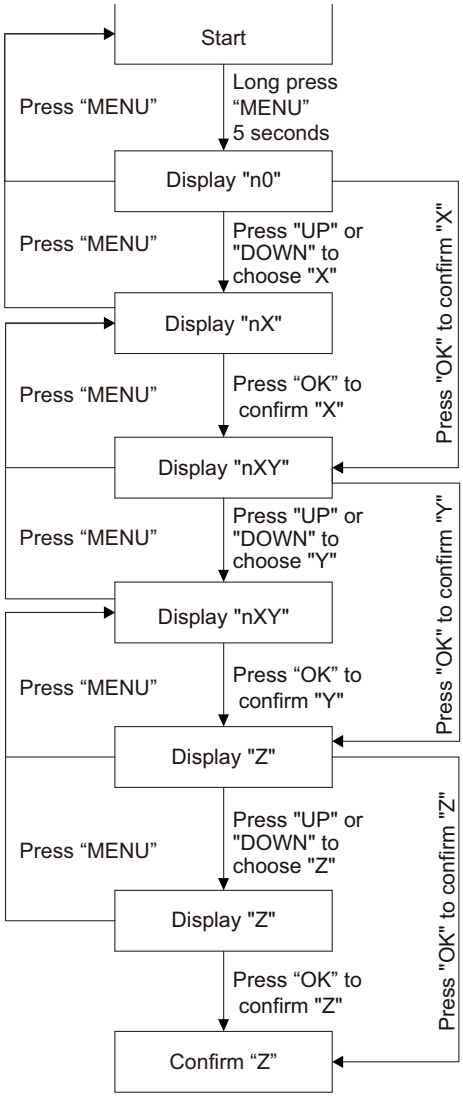


Fig. 64 —Menu Mode selection flowchart

Table 41 — Menu Modes

FIRST-LEVEL MENU	DEFAULT	SECOND-LEVEL MENU	SPECIFIED MENU MODES	DEFAULT
n0	0	0	History error	
		1	Cleaning history error	
	1	0	Query Indoor unit's address	
	2	1	Driver's version (compressor and fan displayed in turn)	
n1	1	0	Cooling Test	
		1	Heating Test	
	2	0	Refrigerant recovery to outdoor unit	
		1	Refrigerant recovery to indoor unit	
		2	Balance system refrigerant	
	3	0	Manual charge	
		1	Auto charge	
	5	0	Vacuum Mode	
	6	-	Set No.63 (VIP) indoor unit address	
n2	0	0	Automatic priority mode	
		1	Cooling priority mode	
		2	No.63 (VIP indoor unit) + voting priority mode	
		3	In response to heating mode only	
		4	In response to cooling mode only	
		5	Heating priority mode	
		6	Change over	
		7	Voting priority mode	
		8	First on priority mode	
		9	Capability requirements priority mode	X
	1	0	Non-silent mode	X
		1	Silent mode 1	
		2	Silent mode 2	
		3	Silent mode 3	
		4	Silent mode 4	
		5	Silent mode 5	
	5	0	Celsius unit (Indoor Unit Display)	
		1	Fahrenheit unit (Indoor Unit Display)	X
	9	Set target ambient temperature (T4 Setpoint) for automatic Priority Mode.		
		0	50	X
		1	60	
		2	70	
n3	2	0	0 ft (0 m) level difference between indoor unit and outdoor unit	X
		1	33 ft (10 m) level difference between indoor unit and outdoor unit	
		2	66 ft (20 m) level difference between indoor unit and outdoor unit	
		3	98 ft (30 m) level difference between indoor unit and outdoor unit	
		4	131 ft (40 m) level difference between indoor unit and outdoor unit	
		5	164 ft (50 m) level difference between indoor unit and outdoor unit	
	3	0	Display A11 after refrigerant leakage immediately	X
		4	Forced running refrigerant recovery mode 1 after refrigerant leakage, outdoor unit display A11	
	7	0	External T4 sensor(T10) unavailable	X
		1	External T4 sensor(T10) available	
n4	1	-	Network address	
	2	-	Number of indoor units	
	4	0	Auto addressing	
		1	Clear address	
	6	0	VRF Indoor Unit or AHU Control Kit	X
		1	Split Indoor Unit (CBYW (24V) Communication) 4-Way Valve Controlled by B	
		2	Split Indoor Unit (CBYW (24V) Communication) 4-Way Valve Controlled by O	

FIRST-LEVEL MENU	DEFAULT	SECOND-LEVEL MENU	SPECIFIED MENU MODES	DEFAULT
n6	0	0	Evaporation temperature setting (Ke0 = -3)	
		1	Evaporation temperature setting (Ke0 = 0)	
		2	Evaporation temperature setting (Ke0 = 2)	
		3	Evaporation temperature setting (Ke0 = 4)	X
		4	Evaporation temperature setting (Ke0 = 6)	
		5	Evaporation temperature setting (Ke0 = 8)	
		6	Evaporation temperature setting (Ke0 = 9)	
		7	Evaporation temperature setting (Ke0 = 10)	
		8	Evaporation temperature setting (Ke0 = 11)	
	2	0	Condensation temperature setting (Kc0 = 41)	
		1	Condensation temperature setting (Kc0 = 42)	
		2	Condensation temperature setting (Kc0 = 43)	
		3	Condensation temperature setting (Kc0 = 44)	
		4	Condensation temperature setting (Kc0 = 45)	
		5	Condensation temperature setting (Kc0 = 46)	X
		6	Condensation temperature setting (Kc0 = 48)	
		7	Condensation temperature setting (Kc0 = 51)	
n8	A	0	Refrigerant shut-off device unavailable	X
		1	Refrigerant shut-off device available	
	b	0	No compressor lockout temperature	X
		1	-22°F (-30°C) compressor lockout temperature	
		2	-15 °F (-26°C) compressor lockout temperature	
		3	-8°F (- 22°C) compressor lockout temperature	
		4	0°F (-18°C) compressor lockout temperature	
		5	7°F (-14°C) compressor lockout temperature	
		6	14°F (-10°C) compressor lockout temperature	
		7	21°F (-6 °C) compressor lockout temperature	
		8	28°F (-2°C) compressor lockout temperature	
		9	36°F (2°C) compressor lockout temperature	
		10	43°F (6°C) compressor lockout temperature	
		11	50°F (10°C) compressor lockout temperature	
		12	59°F (15°C) compressor lockout temperature	
		13	68°F (20°C) compressor lockout temperature	
		14	77°F (25°C) compressor lockout temperature	
		15	86°F (30°C) compressor lockout temperature	
	E	0	Without heataux	
		1	-22°F (-30°C) heataux operate temperature	
		2	-15°F (-26°C) heataux operate temperature	
		3	-8°F (-22°C) heataux operate temperature	
		4	0°F (-18°C) heataux operate temperature	
		5	7°F (-14°C) heataux operate temperature	
		6	14°F (-10°C) heataux operate temperature	X
		7	21°F (-6°C) heataux operate temperature	
		8	28°F (-2°C) heataux operate temperature	
		9	36°F (2°C) heataux operate temperature	
		10	43°F (6°C) heataux operate temperature	
		11	50°F (10°C) heataux operate temperature	
		12	59°F (15°C) heataux operate temperature	
		13	68°F (20°C) heataux operate temperature	
		14	77°F (25°C) heataux operate temperature	
		15	86°F (30°C) heataux operate temperature	
n9	0	0	Non-detection of over-connection ratio faults	
		1	When operating ratio exceeds 102%, the indoor unit air flow turns to low speed	X
	4	0	Forced Defrost	
		1	Forced Oil Return	
	5	-	Release central controller emergency stop	
	7	0	Digital electricity meter	
		1	Pulse electricity meter	X

FIRST-LEVEL MENU	DEFAULT	SECOND-LEVEL MENU	SPECIFIED MENU MODES	DEFAULT
nc	0	0	Dry contact 1 function selection (Cooling only)	
		1	Dry contact 1 function selection (Heating only)	
		2	Dry contact 1 function selection (Force incapacity requirements)	
		3	Dry contact 1 function selection (Force stop)	X
	1	0	Dry contact 2 function selection (Cooling only)	
		1	Dry contact 2 function selection (Heating only)	
		2	Dry contact 2 function selection (Force incapacity requirements)	
		3	Dry contact 2 function selection (Force stop)	X
	2	0	Dry contact 3 function selection (Operation signal)	
		1	Dry contact 3 function selection (Alarm signal)	
		2	Dry contact 3 function selection (Compressor running signal)	
		3	Dry contact 3 function selection (Defrosting signal)	
		4	Dry contact 3 function selection (Refrigerant leakage signal)	
nd	0	0	Without night silent mode	X
		1	6 hours judgement time / 10 hours operation time	
		2	6 hours judgement time / 12 hours operation time	
		3	8 hours judgement time / 10 hours operation time	
		4	8 hours judgement time / 12 hours operation time	
	2	1	Night silent mode 1	
		2	Night silent mode 2	
		3	Night silent mode 3	X
		4	Night silent mode 4	
		5	Night silent mode 5	
		6	Night silent mode 6	
		7	Night silent mode 7	
		8	Night silent mode 8	
		9	Night silent mode 9	
		10	Night silent mode 10	
		11	Night silent mode 11	
		12	Night silent mode 12	
		13	Night silent mode 13	
		14	Night silent mode 14	

DISPLAY FUNCTION

Before pressing the UP or DOWN button, allow the system to operate steadily for more than an hour. On pressing the UP or DOWN button, the parameters listed in Table 42 will be displayed in sequence.

Table 42 — Display Function

DISPLAY	CONTENT	DESCRIPTION
--	Stand by (Outdoor unit address + indoor unit quantity)/frequency/ special status	
0	Outdoor unit address	0~3,255 indicates an invalid address
1	Outdoor unit capacity	Unit: Ton
2	Quantity of outdoor unit	1~4
3	Quantity of indoor unit	1-9
4	Total capacity of indoor units system	Unit: Ton
5	Target frequency of outdoor unit	Displacement frequency (1)
6	Target frequency of outdoor unit system	Displacement frequency (1)*10
7	Actual frequency of compressor	Actual frequency
8	--	Reserved
9	Operating mode	0: OFF; 2: Cooling; 3: Heating
10	Fan 1 Speed	Unit: RPM
11	Fan 2 Speed	Unit: RPM
12	T2 average (Indoor unit coil temp sensor average)	Actual temperature = DISP. Unit: °C
13	T2B (Indoor unit coil outlet temp sensor average)	Actual temperature = DISP. Unit: °C
14	T3 (Outdoor unit coil temperature sensor)	Actual temperature = DISP. Unit: °C
15	T4 (Ambient temperature sensor)	Actual temperature = DISP. Unit: °C
16	T5 (Liquid pipe temperature sensor)	Actual temperature = DISP. Unit: °C
17	T3B/TL (Outdoor unit coil temperature sensor 2)	Actual temperature = DISP. Unit: °C
18	T10 (Ambient temperature sensor 2)	Actual temperature = DISP. Unit: °C
19	T7C1 (Discharge temperature sensor 1)	Actual temperature = DISP. Unit: °C
20	--	Reserved
21	--	Reserved
22	--	Reserved
23	--	Reserved
24	NTC_max	Actual temperature = DISP. Unit: °C
25	Tg (Suction temperature sensor)	Actual temperature = DISP. Unit: °C
26	--	Reserved
27	Discharge superheat degree	Actual temperature = DISP. Unit: °C
28	Primary current	Actual current=DISP./10 Unit: A
29	Compressor current	Actual current=DISP./10 Unit: A
30	--	Reserved
31	EEVA position	Actual Value DISP. *24
32	--	Reserved
33	--	Reserved
34	EEVD position	Actual value DISP. *4
35	High pressure of unit	Actual value DISP. *4
36	Low pressure of unit	Actual pressure DISP. /100Unit: MPa
37	Quantity of online indoor units	Actual quantity
38	Quantity of running indoor units	Actual quantity
39	Heat exchanger status	[0] OFF [1] C1: Condenser [2] D1: Reserved [3] D2: Reserved [4] E1: Evaporator [5] F1: Reserved [6] F2: Reserved
40	Special mode	[0] Not in special mode [1] Oil return [2] Defrost [3] Startup [4] Stop [5] Quick check [6] Self clean
41	Silent mode setting	0 ~ 5, 5 represents the most silent
42	--	Reserved
43	TES (Evaporating sensor temperature)	Actual temperature = DISP. Unit: °C
44	TCS (Condensing sensor temperature)	Actual temperature = DISP. Unit: °C
45	DC Voltage	Actual voltage Unit: V
46	AC Voltage	Actual voltage Unit: V
47	Quantity of indoor units in cooling mode	
48	Quantity of indoor units in heating mode	
49	Capacity of indoor units in cooling mode	
50	Capacity of indoor units in heating mode	
51	--	Reserved
52	--	Reserved

DISPLAY	CONTENT	DESCRIPTION
53	Last error code	Fan error code
54	Software version	
55	Last error code	Error code
56	System Set	[0]: VRF [1]: --
57	--	Reserved
58	--	Reserved

(1) Need to convert to current compressor output volume. For 3.0-5.0 ton: compressor output volume is 42, Target frequency = Actual frequency * 42 / 60.

NOTES:

- **Heat up the unit for 12 hours after turning on the power switch. Do not turn off the power supply if the unit is designed to stop within 24 hours or less. (This is for heating up the crankshaft heating box and avoiding forced starting of the compressor.)**
- **Do not block the air inlet and outlet.**
- **Blockage may reduce the unit efficiency or activate the protector to shut down the unit.**
- **Operate the switch and button with an insulation rod (such as a ball pen with a cap) to avoid the contact with energized parts.**

COMMISIONING

OVERVIEW

After installation, and once the field settings have been defined, the installation personnel must verify the correctness of the operations. Follow the steps below to perform the commissioning.

This chapter describes how the test run can be carried out once the installation is complete, and other relevant information.

The commissioning usually includes the following stages:

1. Review the "Checklist Before Start Up."
2. Implement the commissioning.
3. Conduct troubleshooting before the commissioning is completed with faults, if necessary.
4. Run the system.

Table 43 — Check List

CHECK LIST	
☐	Read the complete installation and operation manual.
☐	Installation Check that the units are properly installed, to avoid abnormal noises and vibrations when starting up the units.
☐	Compressor and others shipping brackets removed.
☐	The piping length and additional refrigerant charge are calculated and recorded on the table of the unit.
☐	Be sure that the stop valves are open on both liquid and gas side.
☐	All Controllers installed and all control wiring is installed and properly connected at each terminal block.
☐	All drain piping is connected, including indoor units tie-in, and insulated as required.
☐	Refrigerant lines are completely insulated including flare nut connections at Indoor Units.
☐	All ductwork is connected and air filters installed.
☐	Air inlet/outlet Check that the air inlet and outlet of the unit is not obstructed by paper sheets, cardboard, or any other material.
☐	Field wiring Be sure that the field wiring has been carried out according to the instructions described in the manual and according to the applicable legislation.
☐	Field wiring Be sure that the field wiring has been carried out according to the instructions described in the manual and according to the applicable legislation.
☐	Insulation test of the main power circuit using a megatester for 500 V, check that the insulation resistance of 2 MΩ or more is attained by applying a voltage of 500 V DC between power terminals and earth. Never use the megatester for the communication wiring.
☐	Fuses, circuit breakers, or protection devices check that the fuses, circuit breakers, or the locally installed protection devices are of the specified size and type. Do not bypass a fuse and a protection device.
☐	Internal wiring Visually check the electrical component box and the inside of the unit for loose connections or damaged electrical components.
☐	Components damage Check for damaged components and extruded piping inside the unit.

CHECK LIST	
☐	Consistency check between refrigeration pipelines and communication lines check and confirm that the refrigerant piping and communication lines connected to the indoor and outdoor units are belong to the same refrigeration system.
☐	Oil leak Check if there is oil leaking from the compressor and piping. If there is an oil leak, try to repair the leak. If the repair is not successful, please call the local agent.
☐	Refrigerant leak Check for refrigerant leaks inside the unit. If there is a refrigerant leak, try to repair the leak. If the repair is not successful, please call the local agent. Do not come into contact with the refrigerant leaking from the refrigerant piping connections. It may cause frostbite.
☐	Flammable refrigerant. If there is a refrigerant leak, keep ventilation to avoid the risk of refrigerant stagnating. 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.
☐	Line voltage is checked and verified to be within specified range for all system components.
☐	Power the outdoor units 12 hours before operation in order to have power running to the crankcase heater and to protect the compressor.

COMMISSIONING

1. **Power on**
   Power on all indoor units and the outdoor unit.
2. **Enter commissioning mode**
   When the outdoor unit is first powered on, it displays “- - - -” which means the unit is not commissioned. Press and hold the Down and Up buttons simultaneously for 5 seconds to enter the commissioning mode.
3. **Set the indoor unit type (See flow chart on next page)**
   The digital display of the outdoor unit displays “01 _0”, where 4th digits flashing. The 4th digit represents the type of indoor unit. The initial value is 0 which means indoor unit type is VRF indoor unit or AHU Control Kits. Short press the Down or Up button to change the number.
   Once the number of indoor unit type has been set, short press the OK button to confirm and automatically proceed to the next step.
4. **Set the indoor unit amount**
   The digital display of the outdoor unit displays “02 __” where 3rd and 4th digits flashing. Short press the Down or Up button to change the indoor unit amount.
   Press OK to confirm. The system will set indoor unit addresses automatically. VRF Indoor Units only.

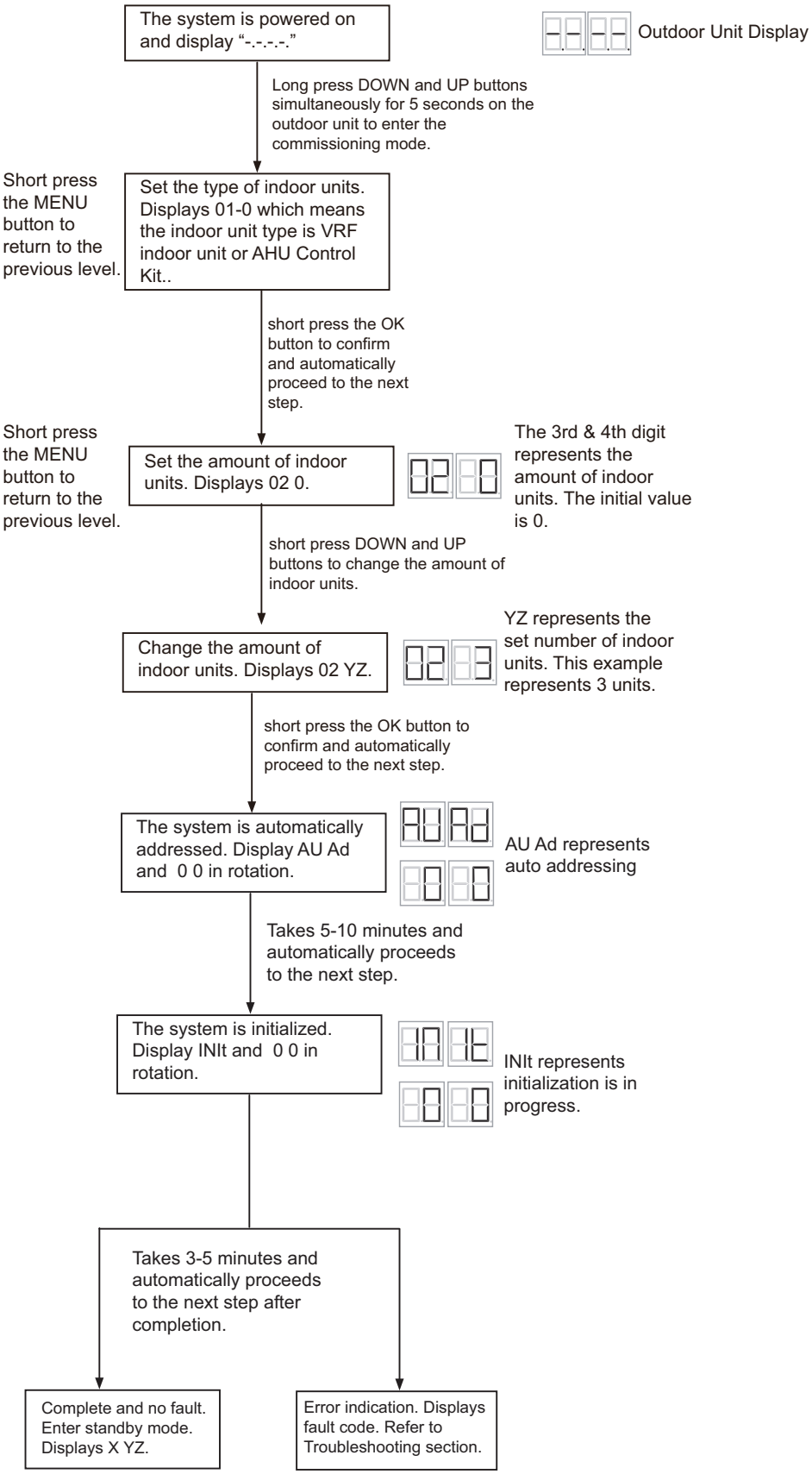


Fig. 65 —Commissioning Flow Chart

RECTIFICATIONS AFTER COMMISSIONING IS COMPLETE

The Commissioning is considered complete when there is no error code on the user interface or the outdoor unit display. When an error code is displayed, rectify the operation based on the description in the error code table.

SAFETY INSTRUCTIONS: Refer to the installation manual of the indoor unit for details on other error codes related to the indoor unit.

OPERATING THE UNIT

Once the installation of this unit is completed, and the commissioning of the outdoor and indoor units is complete, you can start to run the system.

The indoor unit user interface should be connected to facilitate the operations of the indoor unit. Please refer to the installation manual of the indoor unit for more details.

AUTO CHARGE

⚠ CAUTION

Only use auto charge if all of the following conditions are met or damage to the equipment may occur.

- Refrigerant pipe length is unknown.
- Connection ratio of outdoor to indoor unit is between 80% - 100%.
- Outdoor ambient temperature is between 41°F-109 °F (5 °C - 43 °C)
- Indoor ambient temperature is between 70°F - 90 °F (21 °C - 32 °C).

Auto Charge Instructions

1. System must be successfully commissioned prior to performing auto charge.
2. Turn off the refrigerant supply.
3. Connect the R454B refrigerant canister to the auto charging port.
4. Place the indoor unit into the Cooling mode with the fan set to High.
5. Enter auto charge mode by following the steps in this flow chart .
6. Turn on the refrigerant supply.
   The system will charge in 30 to 60 minutes.
7. When auto charge is complete, the LED will display "END“
8. Press the OK button for 5 seconds to exit auto charge mode.
9. Turn off refrigerant supply and disconnect from auto charging port.

NOTE: The indoor unit must be in cooling mode for auto charge to work. The indoor unit cannot be in heating mode or fan-only mode.

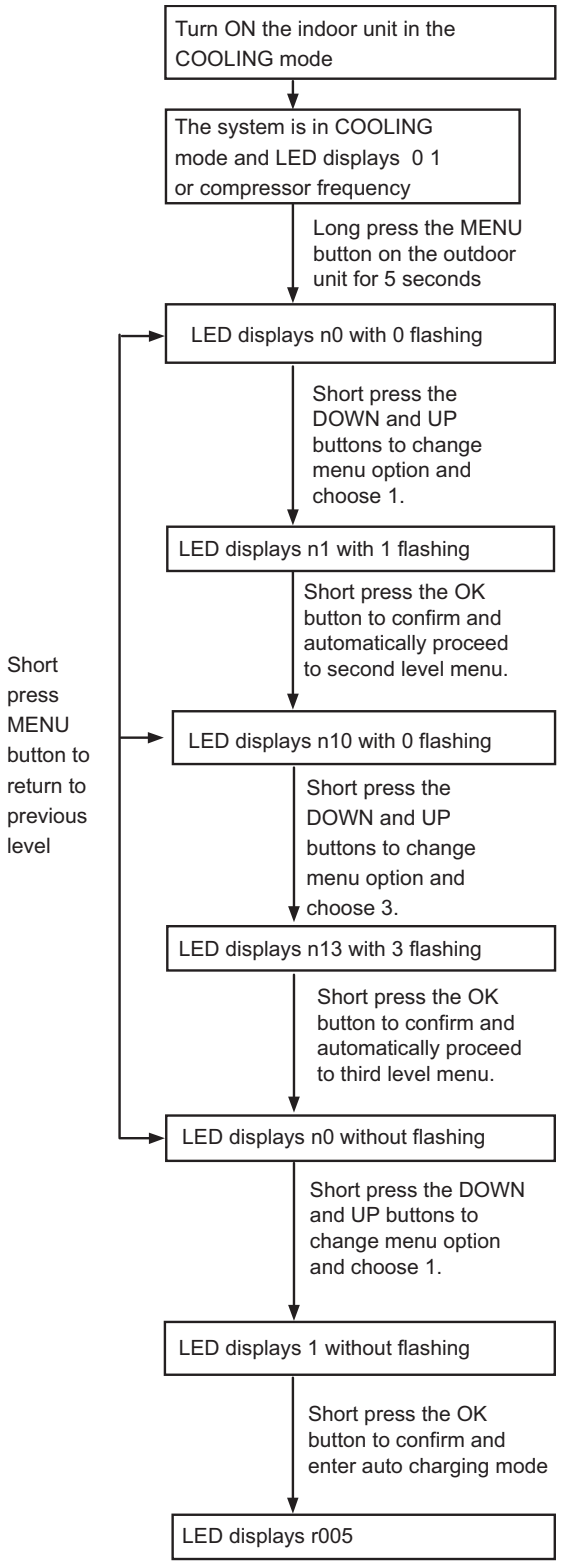


Fig. 66 —Auto Charge Flow Chart

⚠ WARNING

The installer needs to ensure that the actual charges during auto charge shall not exceed the maximum refrigerant limits of all rooms.

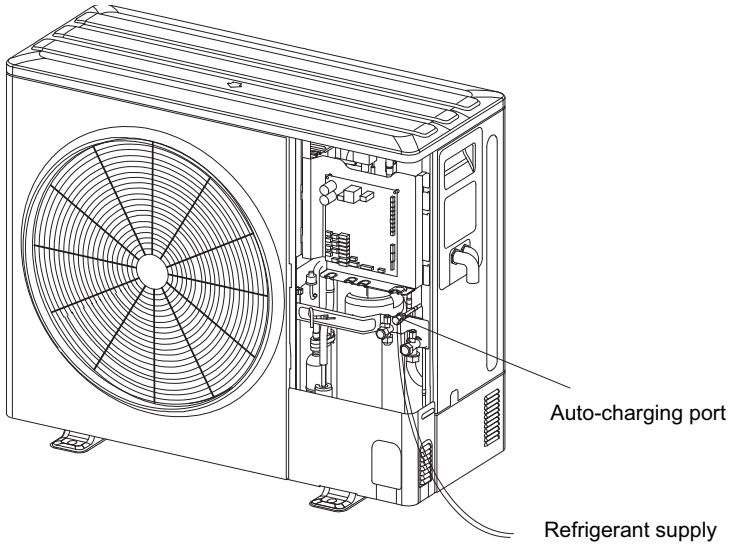


Fig. 67 —Auto Charge (3.0 Ton)

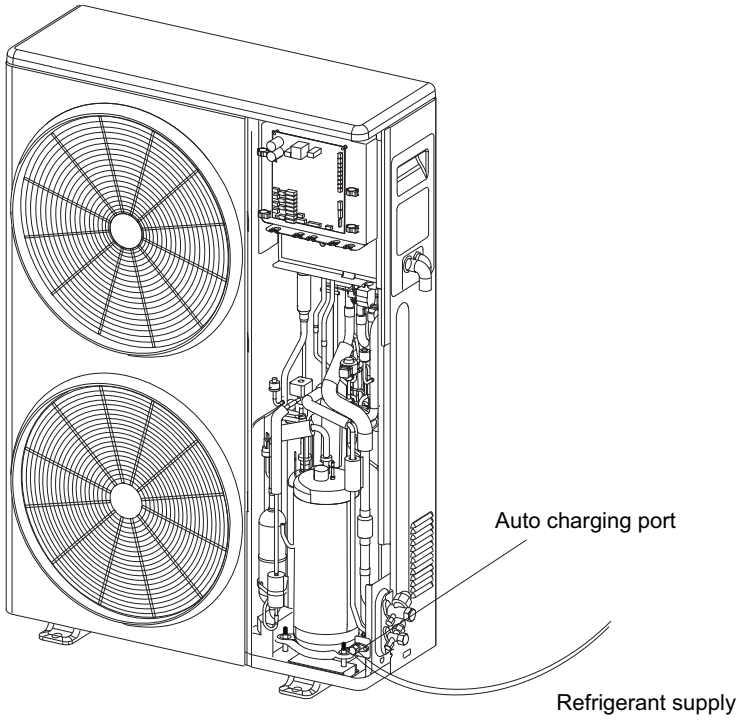


Fig. 68 —Auto Charge (4.0-5.0 Ton)

TROUBLESHOOTING

ERROR CODE: OVERVIEW

If an error code is displayed on the controller, contact the installation personnel and inform them of the error code, unit model, and serial number (you can find the information on the nameplate of Unit).

Table 44 — Outdoor Unit Error Codes

Error code	Error description	Manual re-start require
A01	Emergency stop	NO
A11	Indoor unit refrigerant leakage	YES
A15	Recover refrigerant after refrigerant leakage and shut down	NO
Ad1	Refrigerant shut-off device error	NO
C21	Communication error between indoor and outdoor unit	NO
C26	Number of indoor units detected by the outdoor unit has decreased	NO
C28	Number of indoor units detected by the outdoor unit has increased	NO
C2A	Communication error between outdoor unit and refrigerant shut-off device	NO
1C41	Communication error between main control chip and inverter driver chip	NO
E41	Outdoor ambient temperature sensor (T4) error (open/short)	NO
EC1	Refrigerant leakage sensor error	NO
F41	Outdoor heat exchanger temperature sensor (T3) error (open/short)	NO
F42	T3 temperature sensor overtemperature protection	NO
F43	T3B temperature sensor error (open/short)	NO
F62	Inverter module overtemperature (Tf) protection	NO
F6A	F62 protection occurs 3 times in 100 minutes	YES
F71	Discharge temperature sensor (T7C1) error (open/short)	YES
F72	Discharge temperature (T7C1) protection	NO
F75	Compressor discharge insufficient superheat protection	NO
F7A	F72 protection occurs 3 times in 100 minutes	YES
F81	Tg temperature sensor error (open/short)	NO
F91	Liquid pipe temperature sensor (T5) error (open/short)	NO
FC1	Outdoor heat exchanger outlet temperature sensor (TL) error (open/short)	NO
FL1	T10 temperature sensor error (open/short)	NO
1L--	Compressor error. Refer to Table 19-3 for indications of “--”	YES
1L01	1L1* error occurs 3 times in 60 minutes. Refer to Table 19-3 for indications of “*”	YES
1J--	Fan motor error. Refer to Table 19-4 for indications of “--”	YES
1J01	1J1* error occurs 10 times in 60 minutes. Refer to Table 19-4 for indications of “*”	YES
1b01	EEVA error	YES
4b01	EEVD error	YES
P11	High pressure sensor error	NO
P12	Discharge pipe high pressure protection	NO
P13	Discharge pipe high pressure switch protection	NO
P14	P12 protection occurs 3 times in 60 minutes	YES
P21	Low pressure sensor error	YES
P22	Suction pipe low pressure protection	NO
P23	Suction pipe low pressure switch protection	NO
P24	Suction pipe low pressure abnormal rise	NO
P25	P22 error occurs 3 times in 100 minutes	YES
1P32	Compressor high DC bus current protection (software protection)	NO
1P33	1P32 protection occurs 3 times in 100 minutes	YES
P51	High AC voltage protection	NO
P52	Low AC voltage protection	NO
P54	DC bus low voltage protection	NO
1P56	Inverter module DC bus low voltage error	YES
1P57	Inverter module DC bus high voltage error	YES
1P58	Inverter module DC bus seriously high voltage error	YES
1P59	Inverter module busbar voltage drop protection	YES
P71	EEPROM error	YES
P91	PFC feedback resistance failure protection	YES
Pb1	HyperLink overcurrent error	NO
pd1	Anti-condensation protection	NO
pd2	Pd1 protection occurs 2 times in 60 minutes	YES

Table 45 — Installation and Debugging Error Codes

Error code	Error description	Manual re-start require
U02	Technology barrier	NO
U11	Unit type is not set	YES
U12	Capacity setting error	YES
U13	Indoor unit type setting error	YES
U21	Indoor unit with old platform in the system	YES
U31	The test run is not performed or was not successful	YES
U32	The test run is not performed or was not successful	YES
U33	Indoor temperature out of operating range	YES
U34	Outdoor and indoor temperature out of operating range	YES
U35	Liquid side stop valve is not opened	YES
U37	Gas side stop valve is not opened	YES
U38	No address	YES
U3A	The communication cable is connected incorrectly	NO
U3b	The installation environment is abnormal	YES
U3C	Auto mode error	NO
U41	Common indoor unit exceeds the allowable connection range	YES

Table 46 — Compressor Driver Error Codes

Error code	Error description	Manual re-start require
1L1E	Hardware overcurrent	NO
1L11	Software overcurrent	NO
1L12	Software overcurrent protection last 30s	NO
1L2E	Inverter module high temperature protection	NO
1L3E	Low bus voltage error	NO
1L31	High bus voltage error	NO
1L32	Serious over voltage error of bus	NO
1L43	Abnormal current sampling	NO
1L45	Motor code mismatch	YES
1L46	IPM protection	NO
1L47	Module type mismatch	YES
1L5E	Startup failed	NO
1L51	Stall failure	NO
1L52	No load protection	NO
1L6E	Motor phase loss protection	NO
1LbE	High voltage switch action	NO
1Lb7	Other check exceptions/908 diagnosis error	NO

Table 47 — Fan Motor Error Codes

Error code	Error description	Manual re-start require
1J1E	Hardware overcurrent	NO
1J11	Software overcurrent	NO
1J12	Software overcurrent protection in last 30s	NO
1J2E	Inverter module high temperature protection	NO
1J3E	Low bus voltage error	NO
1J31	High bus voltage error	NO
1J32	Serious over voltage error of bus	NO
1J43	Abnormal current sampling	NO
1J5E	Startup failed	NO
1J51	Stall failure	NO
1J52	No load protection	NO
1J6E	Motor phase loss protection	NO

Table 48 — Status Codes

Error code	Error description	Manual re-start require
d0x	Oil return running, x represents oil return operation steps	NO
dfx	Defrost running, x represents defrosting operation steps	NO
d11	Outdoor ambient temperature exceeds the upper limit in Heating mode	NO
d12	Outdoor ambient temperature exceeds the lower limit in Heating mode	NO
d13	Outdoor ambient temperature exceeds the upper limit in Cooling mode	NO
d14	Outdoor ambient temperature exceeds the lower limit in Cooling mode	NO
d31	Refrigerant judgment, no result	NO
d32	Refrigerant quantity judgment, Significantly excessive	NO
d33	Refrigerant quantity judgment, Slightly excessive	NO
d34	Refrigerant quantity judgment, normal	NO
d35	Refrigerant quantity judgment, Slightly insufficient	NO
d36	Refrigerant quantity judgment, Significantly insufficient	NO
d41	There is a no power indoor unit in the system, HyperLink is controlling the indoor unit’s valve	NO

PRECAUTIONS FOR REFRIGERANT LEAK

Use combustible R454B refrigerant. Ensure the refrigerant is charged in a proper position to cover a large area so that its leak will never reach critical concentration.

The user/owner or their authorized representative shall check the alarm device, mechanical ventilation and refrigerant leakage sensor at least once a year to ensure they are correctly functioning.

Under no circumstances shall potential sources of ignition be used to search for or detect refrigerant leaks.

A halide torch (or any other detector using a naked flame) shall not be used.

If leak is suspected, keep the area ventilated to avoid the risk of refrigerant stagnating, and

remove/extinguish all naked flames.

When the refrigerant leakage is detected by the indoor unit, the following situations may occur:

When the system is equipped with refrigerant cut-off device, the outdoor unit enters refrigerant recovery mode. When the refrigerant recovery is completed, the outdoor unit digital tube displays "A11";

When the system is not equipped with refrigerant stage device, the outdoor unit will directly stop after receiving the refrigerant leakage signal, and the outdoor unit digital tube displays "A11.

⚠ WARNING

When the refrigerant leakage fault occurs, please contact the dealer to deal with it. It is strictly forbidden to repair by yourself.

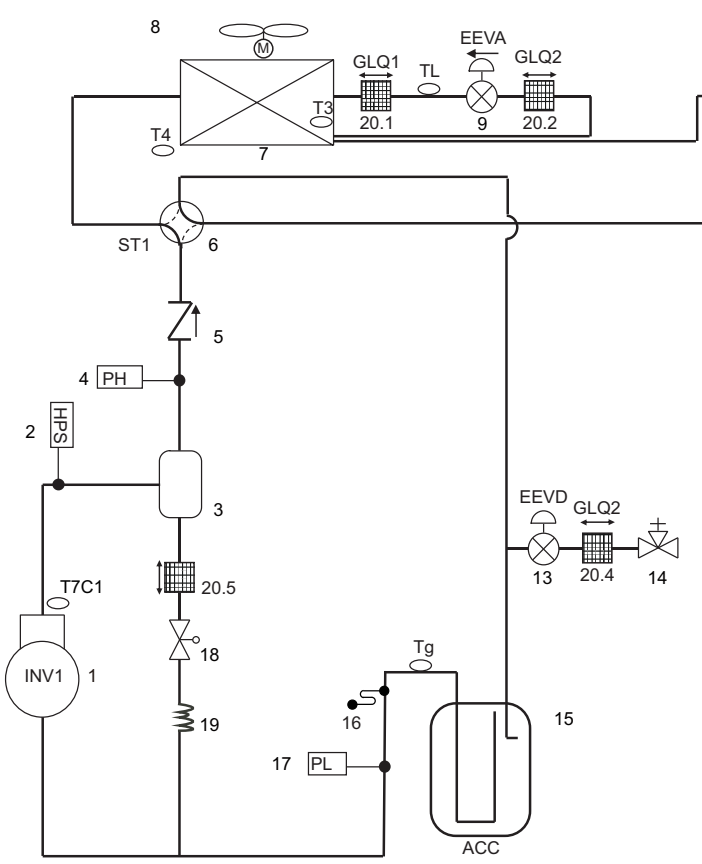
After the refrigerant leakage maintenance is completed, eliminate the refrigerant leakage error code by remote controller.

⚠ CAUTION

Only certified personnel can install, operate, and maintain the unit.

SPECIFICATIONS

PIPING DIAGRAM: OUTDOOR UNIT



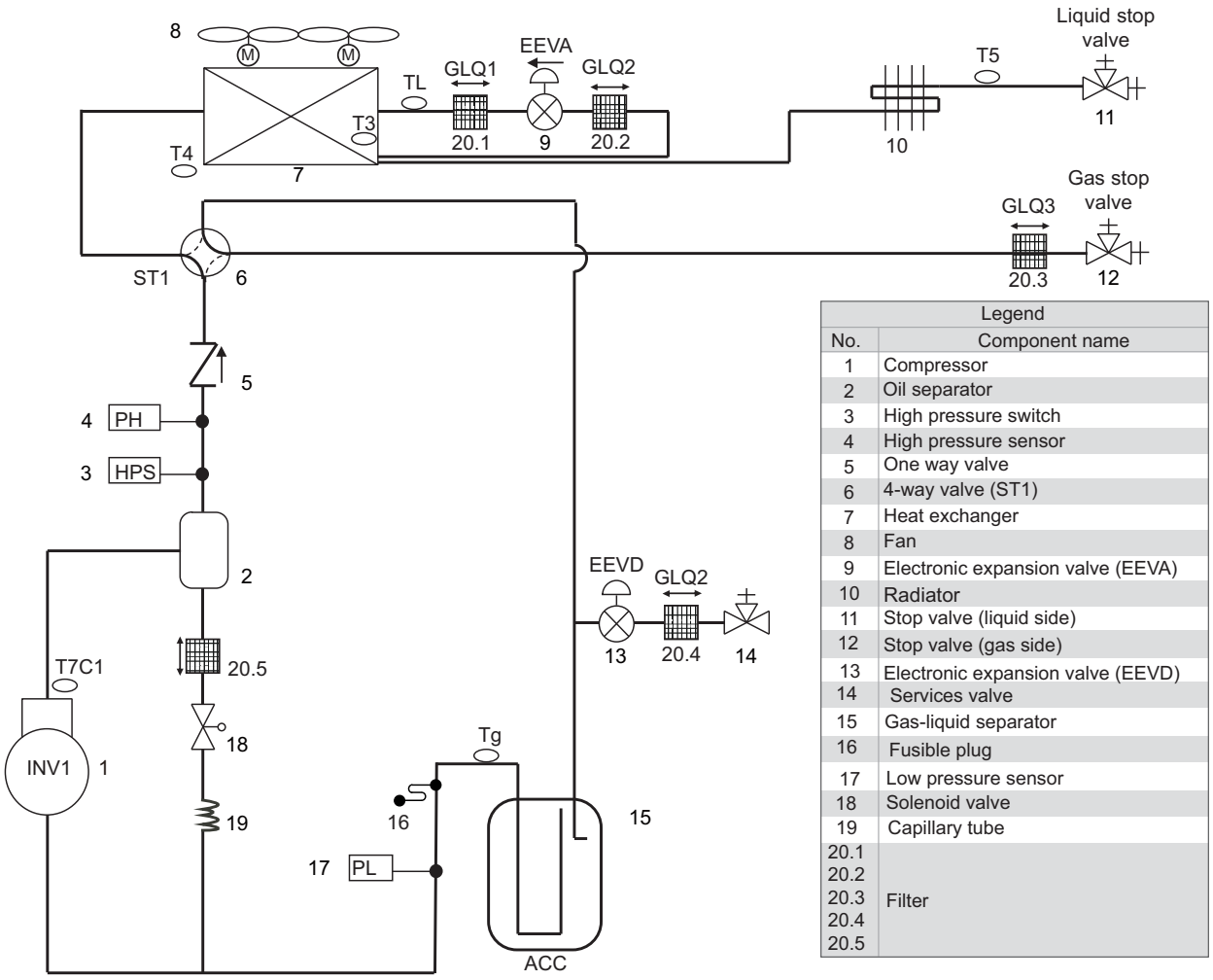
Legend	
No.	Component name
1	Compressor
2	High pressure switch
3	Oil separator
4	High pressure sensor
5	One way valve
6	4-way valve (ST1)
7	Heat exchanger
8	Fan
9	Electronic expansion valve (EEVA)
10	Radiator
11	Stop valve (liquid side)
12	Stop valve (gas side)
13	Electronic expansion valve (EEVD)
14	Services valve
15	Gas-liquid separator
16	Fusible plug
17	Low pressure sensor
18	Solenoid valve
19	Capillary tube
20.1 20.2 20.3 20.4 20.5	Filter

Figure 20-1

Legend	
T3	Heat exchanger piping temperature sensor
T4	Outdoor ambient temperature sensor
T5	Liquid pipe temperature sensor
T7C1	Discharge temperature sensor
Tg	Gas pipe temperature sensor
TL	Heat exchanger piping temperature sensor 2

Fig. 69 —Piping Diagram (3.0 Ton)

PIPING DIAGRAM: OUTDOOR UNIT (CONT.)



Legend	
No.	Component name
1	Compressor
2	Oil separator
3	High pressure switch
4	High pressure sensor
5	One way valve
6	4-way valve (ST1)
7	Heat exchanger
8	Fan
9	Electronic expansion valve (EEVA)
10	Radiator
11	Stop valve (liquid side)
12	Stop valve (gas side)
13	Electronic expansion valve (EEVD)
14	Services valve
15	Gas-liquid separator
16	Fusible plug
17	Low pressure sensor
18	Solenoid valve
19	Capillary tube
20.1 20.2 20.3 20.4 20.5	Filter

Figure 20-2

Legend	
T3	Heat exchanger piping temperature sensor
T4	Outdoor ambient temperature sensor
T5	Liquid pipe temperature sensor
T7C1	Discharge temperature sensor
Tg	Gas pipe temperature sensor
TL	Heat exchanger piping temperature sensor 2

Fig. 70 —Piping Diagram (4.0/5.0 Ton)

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