

37VMA***HDS*H1

High Heat Heat Pump Unit for R-454B Series Variable Refrigerant Flow (VRF)

Installation and Operations Manual

NOTE: Please read this manual carefully and keep it for future reference.

NOTE: All the pictures in this manual are for illustration purpose only.

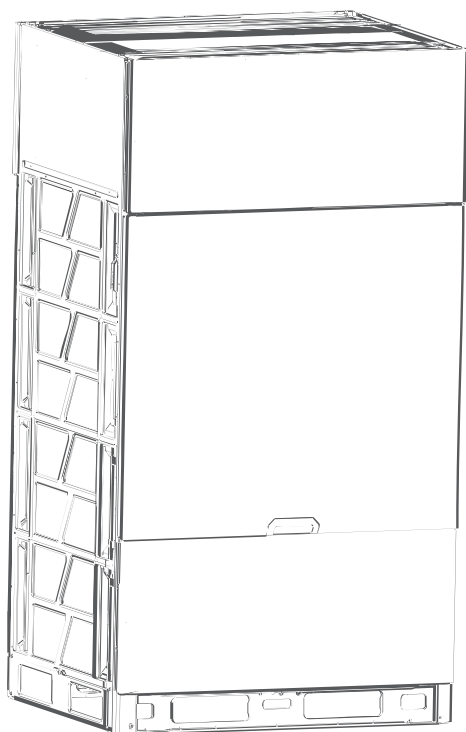


Fig. 1 – High Heat Heat Pump

A260218

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ABOUT THIS DOCUMENT

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

Target audience: Authorized installers and 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.

CAUTION

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

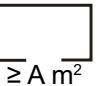
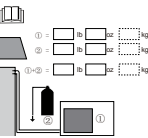
! WARNING

Indicates a hazardous situation which, if not avoided, could result in personal injury or death.

! NOTICE

Used to address practices not related to physical injury.

Explanation of Symbols Displayed on the Unit

 A260212	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.
 A260213	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.
 A260214	CAUTION	This symbol shows that the operation manual should be read carefully.
 A260215	CAUTION	This symbol shows that only a competent service personnel should be handling this equipment while referencing the installation manual.
 A260216	CAUTION	This symbol shows that additional information is available such as the operating manual or installation manual.
 A260217	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 R-454B**.

1. General

The following information is provided for units that employ FLAMMABLE REFRIGERANTS.

2. 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.

3. 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.

4. Disposal of equipment using flammable refrigerants

See national regulations.

5. Storage of equipment

The storage of the equipment should be in accordance with the applicable regulations or instructions, whichever is more stringent.

6. 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.

! WARNING

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;

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 L_e 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 Q_{min} 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.

! WARNING

This appliance contains FLAMMABLE REFRIGERANTS, the minimum floor area of the room shall comply with the requirements in the “Required Minimum Room Area”

Table 2 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.

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 ml 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.

The appliance connected via an air duct system to one or more rooms are installed in a room with an area less than A_{min} , 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.

- for 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.

! WARNING

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 vapor 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.
 - 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.

! CAUTION

- 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.
- 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 grounding.

! 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.
- 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 - general 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.
 - 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 grounded 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.

CAUTION

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

a) Become familiar with the equipment and its operation.

b) Isolate system electrically.

c) Before attempting the procedure, ensure that:

-mechanical handling equipment is available, if required, for handling refrigerant cylinders;

-all personal protective equipment is available and being used correctly;

-the recovery process is supervised at all times by a competent person;

-recovery equipment and cylinders conform to the appropriate standards.

d) Pump down refrigerant system, if possible.

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

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

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

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

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

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

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

- 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.

CAUTION

- The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of the flammable refrigerant. If in doubt, the manufacturer should be consulted. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition.
- The recovered refrigerant shall be processed according to local legislation in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.
- If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely.

Important Information for 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.

NOTICE

- 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/tag-out procedures to ensure the power cannot be inadvertently energized.

 WARNING**Refrigerant Oil**

These units use R-454B refrigerant. Use only R-454B 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.P65Warnings.ca.gov.

 CAUTION**GROUNDING 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 ground 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**Risk of Fire or 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

This appliance uses R-454B refrigerant.



A260212

! 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 [Room Area Limitations](#).
- 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'm³('B' ft³).
- When stored in an unpowered state, the appliance must be stored in a room with a floor area larger than 'X'm²('y' ft²).

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 detailed demands on the room area calculation requirements and the allowed maximum refrigerant charge and required minimum room area, please refer to the corresponding INSTALLATION AND OPERATION MANUAL of outdoor unit.
- If the installation height of the VRF indoor unit is less than 5.9 ft (1.8 m), please contact your installer or dealer to receive more information and professional advice.

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 the following tables.

! CAUTION

- The allowable maximum refrigerant charge of [Table 1](#) or the required minimum room area of [Table 2](#) 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 3](#), which is related to the actual refrigerant charge of the system (m_c).

! NOTICE

- 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.
- R-454B 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 [Table 1](#) or [Table 2](#).
- 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 1](#), [Table 2](#), [Table 3](#).

The allowed maximum refrigerant charge: Determine the maximum refrigerant limit for the system based on the area and height of the room where the indoor unit is installed. First, determine the area A and effective height Hr of each room where the indoor unit is installed, then refer to [Table 2](#) to find the maximum allowable system refrigerant amount for each room.

The maximum refrigerant limit for the system is the smallest value among the maximum allowable system refrigerant amounts for each room (for split systems, refer to [Table 3](#) based on room area). For example, a system with one outdoor unit and three VRF indoor units: Indoor unit A is installed in a room with an area of 150 ft² (13.9 m²) and a height of 9.2 ft (2.8 m), indoor unit B is installed in a room with an area of 115 ft² (10.7 m²) and a height of 7.2 ft (2.2 m), and indoor unit C is installed in a room with an area of 100 ft² (9.3 m²) and a height of 7.2 ft (2.2 m). Referring to [Table 2](#), the maximum allowable refrigerant amount for the room with indoor unit A is 11.36 lb (5.14 kg), for the room with indoor unit B is 7.33 lb (3.32 kg), and for the room with indoor unit C is 6.66 lb (3.02 kg). Therefore, the maximum allowable refrigerant amount for the system is 6.66 lb (3.02 kg). [$m_{\max} = \min(m_A, m_B, m_C)$]

Table 1 – Allowable Maximum Refrigerant Charge

A/TA		$m_{\max}$											
		$H_r=a$		$H_r=b$		$H_r=c$		$H_r=d$		$H_r=e$		$H_r=f$	
ft ²	m ²	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
10	0.9	1.21	0.53	0.9	0.39	0.75	0.33	0.66	0.29	0.6	0.26	0.54	0.23
20	1.9	2.42	1.12	1.81	0.84	1.51	0.7	1.33	0.61	1.21	0.56	1.09	0.5
30	2.8	3.63	1.65	2.72	1.24	2.27	1.03	2	0.91	1.81	0.82	1.63	0.74
40	3.7	4.85	2.19	3.63	1.64	3.03	1.36	2.66	1.2	2.42	1.09	2.18	0.98
50	4.6	6.06	2.72	4.54	2.04	3.78	1.7	3.33	1.49	3.03	1.36	2.72	1.22
60	5.6	7.27	3.31	5.45	2.48	4.54	2.07	4	1.82	3.63	1.65	3.27	1.49
70	6.5	8.48	3.84	6.36	2.88	5.3	2.4	4.66	2.11	4.24	1.92	3.81	1.73
80	7.4	9.7	4.38	7.27	3.28	6.06	2.73	5.33	2.4	4.85	2.19	4.36	1.97
90	8.4	10.91	4.97	8.18	3.72	6.82	3.1	6	2.73	5.45	2.48	4.91	2.23
100	9.3	12.12	5.5	9.09	4.12	7.57	3.44	6.66	3.02	6.06	2.75	5.45	2.47
110	10.2	13.33	6.03	10	4.52	8.33	3.77	7.33	3.32	6.66	3.01	6	2.71
120	11.1	14.55	6.57	10.91	4.92	9.09	4.1	8	3.61	7.27	3.28	6.54	2.95
130	12.1	15.76	7.16	11.82	5.37	9.85	4.47	8.66	3.93	7.88	3.58	7.09	3.22
140	13.0	16.97	7.69	12.73	5.77	10.6	4.81	9.33	4.23	8.48	3.84	7.63	3.46
150	13.9	18.18	8.22	13.64	6.17	11.36	5.14	10	4.52	9.09	4.11	8.18	3.7
160	14.9	19.4	8.82	14.55	6.61	12.12	5.51	10.67	4.85	9.7	4.41	8.73	3.96
170	15.8	20.61	9.35	15.45	7.01	12.88	5.84	11.33	5.14	10.3	4.67	9.27	4.2
180	16.7	21.82	9.88	16.36	7.41	13.64	6.17	12	5.43	10.91	4.94	9.82	4.44
190	17.7	23.03	10.47	17.27	7.85	14.39	6.54	12.67	5.76	11.51	5.23	10.36	4.71
200	18.6	24.25	11.01	18.18	8.25	15.15	6.88	13.33	6.05	12.12	5.5	10.91	4.95
210	19.5	25.46	11.54	19.09	8.65	15.91	7.21	14	6.34	12.73	5.77	11.45	5.19
220	20.4	26.67	12.07	20	9.05	16.67	7.54	14.67	6.64	13.33	6.03	12	5.43
230	21.4	27.88	12.66	20.91	9.5	17.42	7.91	15.33	6.96	13.94	6.33	12.54	5.7
240	22.3	29.1	13.2	21.82	9.9	18.18	8.25	16	7.26	14.55	6.6	13.09	5.94
250	23.2	30.31	13.73	22.73	10.3	18.94	8.58	16.67	7.55	15.15	6.86	13.64	6.18
260	24.2	31.52	14.32	23.64	10.74	19.7	8.95	17.33	7.87	15.76	7.16	14.18	6.44
270	25.1	32.73	14.85	24.55	11.14	20.46	9.28	18	8.17	16.36	7.42	14.73	6.68
280	26.0	33.95	15.39	25.46	11.54	21.21	9.62	18.67	8.46	16.97	7.69	15.27	6.92
290	26.9	35.16	15.92	26.37	11.94	21.97	9.95	19.33	8.75	17.58	7.96	15.82	7.16
300	27.9	36.37	16.51	27.28	12.38	22.73	10.32	20	9.08	18.18	8.25	16.36	7.43

Table 1 – Allowable Maximum Refrigerant Charge

A/TA		m _{max}											
		H ₁ =a		H ₁ =b		H ₁ =c		H ₁ =d		H ₁ =e		H ₁ =f	
ft ²	m ²	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
310	28.8	37.58	17.04	28.19	12.78	23.49	10.65	20.67	9.37	18.79	8.52	16.91	7.67
320	29.7	38.8	17.58	29.1	13.18	24.25	10.98	21.34	9.67	19.4	8.79	17.46	7.91
330	30.7	40.01	18.17	30	13.63	25	11.35	22	9.99	20	9.08	18	8.17
340	31.6	41.22	18.7	30.91	14.03	25.76	11.69	22.67	10.28	20.61	9.35	18.55	8.41
350	32.5	42.43	19.24	31.82	14.43	26.52	12.02	23.34	10.58	21.21	9.62	19.09	8.65
360	33.4	43.65	19.77	32.73	14.82	27.28	12.35	24	10.87	21.82	9.88	19.64	8.89
370	34.4	44.86	20.36	33.64	15.27	28.03	12.72	24.67	11.2	22.43	10.18	20.18	9.16
380	35.3	46.07	20.89	34.55	15.67	28.79	13.06	25.34	11.49	23.03	10.44	20.73	9.4
390	36.2	47.28	21.43	35.46	16.07	29.55	13.39	26	11.78	23.64	10.71	21.27	9.64
400	37.2	48.5	22.02	36.37	16.51	30.31	13.76	26.67	12.11	24.25	11.01	21.82	9.91
410	38.1	49.71	22.55	37.28	16.91	31.07	14.09	27.34	12.4	24.85	11.27	22.37	10.14
420	39.0	50.92	23.08	38.19	17.31	31.82	14.43	28	12.69	25.46	11.54	22.91	10.38
430	39.9	52.13	23.62	39.1	17.71	32.58	14.76	28.67	12.99	26.06	11.81	23.46	10.62
440	40.9	53.35	24.21	40.01	18.15	33.34	15.13	29.34	13.31	26.67	12.1	24	10.89
450	41.8	54.56	24.74	40.92	18.55	34.1	15.46	30	13.61	27.28	12.37	24.55	11.13
460	42.7	55.77	25.27	41.83	18.95	34.85	15.79	30.67	13.9	27.88	12.63	25.09	11.37
470	43.7	56.98	25.87	42.74	19.4	35.61	16.16	31.34	14.22	28.49	12.93	25.64	11.64
480	44.6	58.2	26.4	43.65	19.8	36.37	16.5	32.01	14.52	29.1	13.2	26.19	11.88
490	45.5	59.41	26.93	44.55	20.2	37.13	16.83	32.67	14.81	29.7	13.46	26.73	12.12
500	46.5	60.62	27.52	45.46	20.64	37.89	17.2	33.34	15.14	30.31	13.76	27.28	12.38
510	47.4	61.83	28.06	46.37	21.04	38.64	17.53	34.01	15.43	30.91	14.03	27.82	12.62
520	48.3	63.05	28.59	47.28	21.44	39.4	17.87	34.67	15.72	31.52	14.29	28.37	12.86
530	49.2	64.26	29.12	48.19	21.84	40.16	18.2	35.34	16.01	32.13	14.56	28.91	13.1
540	50.2	65.47	29.71	49.1	22.28	40.92	18.57	36.01	16.34	32.73	14.85	29.46	13.37
550	51.1	66.68	30.25	50.01	22.68	41.68	18.9	36.67	16.63	33.34	15.12	30	13.61
560	52.0	67.9	30.78	50.92	23.08	42.43	19.24	37.34	16.93	33.95	15.39	30.55	13.85
570	53.0	69.11	31.37	51.83	23.53	43.19	19.61	38.01	17.25	34.55	15.68	31.1	14.11
580	53.9	70.32	31.89	52.74	23.92	43.95	19.93	38.67	17.54	35.16	15.94	31.64	14.35
590	54.8	71.53	32.44	53.65	24.33	44.71	20.28	39.34	17.84	35.76	16.22	32.19	14.6
600	55.7	72.75	32.99	54.56	24.74	45.46	20.62	40.01	18.14	36.37	16.49	32.73	14.84
610	56.7	73.96	33.54	55.47	25.16	46.22	20.96	40.67	18.45	36.98	16.77	33.28	15.09
620	57.6	75.17	34.09	56.38	25.57	46.98	21.31	41.34	18.75	37.58	17.04	33.82	15.34
630	58.5	76.38	34.64	57.29	25.98	47.74	21.65	42.01	19.05	38.19	17.32	34.37	15.59
640	59.5	77.6	35.19	58.2	26.39	48.5	21.99	42.68	19.35	38.8	17.59	34.92	15.83
650	60.4	78.81	35.74	59.11	26.81	49.25	22.34	43.34	19.66	39.4	17.87	35.46	16.08
660	61.3	80.02	36.29	60.01	27.22	50.01	22.68	44.01	19.96	40.01	18.14	36.01	16.33
670	62.2	81.23	36.84	60.92	27.63	50.77	23.03	44.68	20.26	40.61	18.42	36.55	16.58
680	63.2	82.45	37.39	61.83	28.04	51.53	23.37	45.34	20.56	41.22	18.69	37.1	16.82
690	64.1	83.66	37.94	62.74	28.46	52.28	23.71	46.01	20.87	41.83	18.97	37.64	17.07
700	65.0	84.87	38.49	63.65	28.87	53.04	24.06	46.68	21.17	42.43	19.24	38.19	17.32
710	66.0	86.08	39.04	64.56	29.28	53.8	24.4	47.34	21.47	43.04	19.52	38.73	17.57
720	66.9	87.3	39.59	65.47	29.69	54.56	24.74	48.01	21.77	43.65	19.79	39.28	17.81
730	67.8	88.51	40.14	66.38	30.11	55.32	25.09	48.68	22.08	44.25	20.07	39.83	18.06
740	68.7	89.72	40.69	67.29	30.52	56.07	25.43	49.34	22.38	44.86	20.34	40.37	18.31
750	69.7	90.93	41.24	68.2	30.93	56.83	25.78	50.01	22.68	45.46	20.62	40.92	18.56
760	70.6	92.15	41.79	69.11	31.34	57.59	26.12	50.68	22.98	46.07	20.89	41.46	18.8
770	71.5	93.36	42.34	70.02	31.76	58.35	26.46	51.34	23.29	46.68	21.17	42.01	19.05
780	72.5	94.57	42.89	70.93	32.17	59.11	26.81	52.01	23.59	47.28	21.44	42.55	19.3
790	73.4	95.78	43.44	71.84	32.58	59.86	27.15	52.68	23.89	47.89	21.72	43.1	19.55
800	74.3	97	43.99	72.75	32.99	60.62	27.49	53.35	24.19	48.5	21.99	43.65	19.79
810	75.3	98.21	44.54	73.66	33.41	61.38	27.84	54.01	24.5	49.1	22.27	44.19	20.04
820	76.2	99.42	45.09	74.56	33.82	62.14	28.18	54.68	24.8	49.71	22.54	44.74	20.29
830	77.1	100.63	45.64	75.47	34.23	62.89	28.53	55.35	25.1	50.31	22.82	45.28	20.54
840	78.0	101.85	46.19	76.38	34.64	63.65	28.87	56.01	25.4	50.92	23.09	45.83	20.78
850	79.0	103.06	46.74	77.29	35.06	64.41	29.21	56.68	25.71	51.53	23.37	46.37	21.03
860	79.9	104.27	47.29	78.2	35.47	65.17	29.56	57.35	26.01	52.13	23.64	46.92	21.28
870	80.8	105.48	47.84	79.11	35.88	65.93	29.9	58.01	26.31	52.74	23.92	47.46	21.53
880	81.8	106.7	48.39	80.02	36.29	66.68	30.24	58.68	26.61	53.35	24.19	48.01	21.77
890	82.7	107.91	48.94	80.93	36.71	67.44	30.59	59.35	26.92	53.95	24.47	48.56	22.02
900	83.6	109.12	49.49	81.84	37.12	68.2	30.93	60.01	27.22	54.56	24.74	49.1	22.27
910	84.5	110.33	50.04	82.75	37.53	68.96	31.28	60.68	27.52	55.16	25.02	49.65	22.52
920	85.5	111.55	50.59	83.66	37.94	69.71	31.62	61.35	27.82	55.77	25.29	50.19	22.76
930	86.4	112.76	51.14	84.57	38.36	70.47	31.96	62.02	28.13	56.38	25.57	50.74	23.01
940	87.3	113.97	51.69	85.48	38.77	71.23	32.31	62.68	28.43	56.98	25.84	51.28	23.26
950	88.3	115.18	52.24	86.39	39.18	71.99	32.65	63.35	28.73	57.59	26.12	51.83	23.51
960	89.2	116.4	52.79	87.3	39.59	72.75	32.99	64.02	29.03	58.2	26.39	52.38	23.75
970	90.1	117.61	53.34	88.21	40.01	73.5	33.34	64.68	29.34	58.8	26.67	52.92	24
980	91.0	118.82	53.89	89.11	40.42	74.26	33.68	65.35	29.64	59.41	26.94	53.47	24.25
990	92.0	120.03	54.44	90.02	40.83	75.02	34.03	66.02	29.94	60.01	27.22	54.01	24.5
1000	92.9	121.25	54.99	90.93	41.24	75.78	34.37	66.68	30.24	60.62	27.49	54.56	24.74
1010	93.8	122.46	55.54	91.84	41.66	76.53	34.71	67.35	30.55	61.23	27.77	55.1	24.99
1020	94.8	123.67	56.09	92.75	42.07	77.29	35.06	68.02	30.85	61.83	28.04	55.65	25.24
1030	95.7	124.88	56.64	93.66	42.48	78.05	35.4	68.68	31.15	62.44	28.32	56.2	25.49
1040	96.6	126.1	57.19	94.57	42.89	78.81	35.74	69.35	31.45	63.05	28.59	56.74	25.73
1050	97.5	127.31	57.74	95.48	43.31	79.57	36.09	70.02	31.76	63.65	28.87	57.29	25.98
1060	98.5	128.52	58.29	96.39	43.72	80.32	36.43	70.68	32.06	64.26	29.14	57.83	26.23
1070	99.4	129.73	58.84	97.3	44.13	81.08	36.78	71.35	32.36	64.86	29.42	58.38	26.48

Manufacturer reserves the right to change, at any time, specifications and designs without notice and without obligations.

Table 1 – Allowable Maximum Refrigerant Charge

A/TA		m _{max}											
		H ₁ =a		H ₁ =b		H ₁ =c		H ₁ =d		H ₁ =e		H ₁ =f	
ft ²	m ²	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
1080	100.3	130.95	59.39	98.21	44.54	81.84	37.12	72.02	32.66	65.47	29.69	58.92	26.72
1090	101.3	132.16	59.94	99.12	44.96	82.6	37.46	72.69	32.97	66.08	29.97	59.47	26.97
1100	102.2	133.37	60.49	100.03	45.37	83.36	37.81	73.35	33.27	66.68	30.24	60.01	27.22
1110	103.1	134.58	61.04	100.94	45.78	84.11	38.15	74.02	33.57	67.29	30.52	60.56	27.47
1120	104.1	135.8	61.59	101.85	46.19	84.87	38.49	74.69	33.87	67.9	30.79	61.11	27.71
1130	105.0	137.01	62.14	102.76	46.61	85.63	38.84	75.35	34.18	68.5	31.07	61.65	27.96
1140	105.9	138.22	62.69	103.66	47.02	86.39	39.18	76.02	34.48	69.11	31.34	62.2	28.21
1150	106.8	139.43	63.24	104.57	47.43	87.14	39.53	76.69	34.78	69.71	31.62	62.74	28.46
1160	107.8	140.65	63.79	105.48	47.84	87.9	39.87	77.35	35.08	70.32	31.89	63.29	28.7
1170	108.7	141.86	64.34	106.39	48.26	88.66	40.21	78.02	35.39	70.93	32.17	63.83	28.95
1180	109.6	143.07	64.89	107.3	48.67	89.42	40.56	78.69	35.69	71.53	32.44	64.38	29.2
1190	110.6	144.28	65.44	108.21	49.08	90.18	40.9	79.35	35.99	72.14	32.72	64.93	29.45
1200	111.5	145.5	65.99	109.12	49.49	90.93	41.24	80.02	36.29	72.75	32.99	65.47	29.69
1210	112.4	146.71	66.54	110.03	49.91	91.69	41.59	80.69	36.6	73.35	33.27	66.02	29.94
1220	113.3	147.92	67.09	110.94	50.32	92.45	41.93	81.35	36.9	73.96	33.54	66.56	30.19
1230	114.3	149.13	67.64	111.85	50.73	93.21	42.28	82.02	37.2	74.56	33.82	67.11	30.44
1240	115.2	150.35	68.19	112.76	51.14	93.96	42.62	82.69	37.5	75.17	34.09	67.65	30.68
1250	116.1	151.56	68.74	113.67	51.56	94.72	42.96	83.36	37.81	75.78	34.37	68.2	30.93
1260	117.1	152.77	69.29	114.58	51.97	95.48	43.31	84.02	38.11	76.38	34.64	68.74	31.18
1270	118.0	153.98	69.84	115.49	52.38	96.24	43.65	84.69	38.41	76.99	34.92	69.29	31.43
1280	118.9	155.2	70.39	116.4	52.79	97	43.99	85.36	38.71	77.6	35.19	69.84	31.67
1290	119.8	156.41	70.94	117.31	53.21	97.75	44.34	86.02	39.02	78.2	35.47	70.38	31.92
1300	120.8	157.62	71.49	118.22	53.62	98.51	44.68	86.69	39.32	78.81	35.74	70.93	32.17
1310	121.7	158.83	72.04	119.12	54.03	99.27	45.03	87.36	39.62	79.41	36.02	71.47	32.42
1320	122.6	160.05	72.59	120.03	54.44	100.03	45.37	88.02	39.92	80.02	36.29	72.02	32.66
1330	123.6	161.26	73.14	120.94	54.86	100.79	45.71	88.69	40.23	80.63	36.57	72.56	32.91
1340	124.5	162.47	73.69	121.85	55.27	101.54	46.06	89.36	40.53	81.23	36.84	73.11	33.16
1350	125.4	163.68	74.24	122.76	55.68	102.3	46.4	90.02	40.83	81.84	37.12	73.66	33.41
1360	126.3	164.9	74.79	123.67	56.09	103.06	46.74	90.69	41.13	82.45	37.39	74.2	33.65
1370	127.3	166.11	75.34	124.58	56.51	103.82	47.09	91.36	41.44	83.05	37.67	74.75	33.9
1380	128.2	167.32	75.89	125.49	56.92	104.57	47.43	92.02	41.74	83.66	37.94	75.29	34.15
1390	129.1	168.53	76.44	126.4	57.33	105.33	47.78	92.69	42.04	84.26	38.22	75.84	34.4
1400	130.1	168.68	76.51	127.31	57.74	106.09	48.12	93.36	42.34	84.87	38.49	76.38	34.64
1410	131.0	168.68	76.51	128.22	58.16	106.85	48.46	94.03	42.65	85.48	38.77	76.93	34.89
1420	131.9	168.68	76.51	129.13	58.57	107.61	48.81	94.69	42.95	86.08	39.04	77.47	35.14
1430	132.9	168.68	76.51	130.04	58.98	108.36	49.15	95.36	43.25	86.69	39.32	78.02	35.39
1440	133.8	168.68	76.51	130.95	59.39	109.12	49.49	96.03	43.55	87.3	39.59	78.57	35.63
1450	134.7	168.68	76.51	131.86	59.81	109.88	49.84	96.69	43.86	87.9	39.87	79.11	35.88
1460	135.6	168.68	76.51	132.77	60.22	110.64	50.18	97.36	44.16	88.51	40.14	79.66	36.13
1470	136.6	168.68	76.51	133.67	60.63	111.39	50.53	98.03	44.46	89.11	40.42	80.2	36.38
1480	137.5	168.68	76.51	134.58	61.04	112.15	50.87	98.69	44.76	89.72	40.69	80.75	36.62
1490	138.4	168.68	76.51	135.49	61.46	112.91	51.21	99.36	45.07	90.33	40.97	81.29	36.87
1500	139.4	168.68	76.51	136.4	61.87	113.67	51.56	100.03	45.37	90.93	41.24	81.84	37.12
1510	140.3	168.68	76.51	137.31	62.28	114.43	51.9	100.69	45.67	91.54	41.52	82.39	37.37
1520	141.2	168.68	76.51	138.22	62.69	115.18	52.24	101.36	45.97	92.15	41.79	82.93	37.61
1530	142.1	168.68	76.51	139.13	63.11	115.94	52.59	102.03	46.28	92.75	42.07	83.48	37.86
1540	143.1	168.68	76.51	140.04	63.52	116.7	52.93	102.69	46.58	93.36	42.34	84.02	38.11
1550	144.0	168.68	76.51	140.95	63.93	117.46	53.27	103.36	46.88	93.96	42.62	84.57	38.36
1560	144.9	168.68	76.51	141.86	64.34	118.22	53.62	104.03	47.18	94.57	42.89	85.11	38.6
1570	145.9	168.68	76.51	142.77	64.76	118.97	53.96	104.7	47.49	95.18	43.17	85.66	38.85
1580	146.8	168.68	76.51	143.68	65.17	119.73	54.31	105.36	47.79	95.78	43.44	86.2	39.1
1590	147.7	168.68	76.51	144.59	65.58	120.49	54.65	106.03	48.09	96.39	43.72	86.75	39.35
1600	148.6	168.68	76.51	145.5	65.99	121.25	54.99	106.7	48.39	97	43.99	87.3	39.59
1610	149.6	168.68	76.51	146.41	66.41	122	55.34	107.36	48.7	97.6	44.27	87.84	39.84
1620	150.5	168.68	76.51	147.32	66.82	122.76	55.68	108.03	49	98.21	44.54	88.39	40.09
1630	151.4	168.68	76.51	148.22	67.23	123.52	56.02	108.7	49.3	98.81	44.82	88.93	40.34
1640	152.4	168.68	76.51	149.13	67.64	124.28	56.37	109.36	49.6	99.42	45.09	89.48	40.58
1650	153.3	168.68	76.51	150.04	68.06	125.04	56.71	110.03	49.91	100.03	45.37	90.02	40.83
1660	154.2	168.68	76.51	150.95	68.47	125.79	57.06	110.7	50.21	100.63	45.64	90.57	41.08
1670	155.1	168.68	76.51	151.86	68.88	126.55	57.4	111.36	50.51	101.24	45.92	91.12	41.33
1680	156.1	168.68	76.51	152.77	69.29	127.31	57.74	112.03	50.81	101.85	46.19	91.66	41.57
1690	157.0	168.68	76.51	153.68	69.71	128.07	58.09	112.7	51.12	102.45	46.47	92.21	41.82
1700	157.9	168.68	76.51	154.59	70.12	128.82	58.43	113.37	51.42	103.06	46.74	92.75	42.07
1710	158.9	168.68	76.51	155.5	70.53	129.58	58.77	114.03	51.72	103.66	47.02	93.3	42.32
1720	159.8	168.68	76.51	156.41	70.94	130.34	59.12	114.7	52.02	104.27	47.29	93.84	42.56
1730	160.7	168.68	76.51	157.32	71.36	131.1	59.46	115.37	52.33	104.88	47.57	94.39	42.81
1740	161.7	168.68	76.51	158.23	71.77	131.86	59.81	116.03	52.63	105.48	47.84	94.93	43.06
1750	162.6	168.68	76.51	159.14	72.18	132.61	60.15	116.7	52.93	106.09	48.12	95.48	43.31
1760	163.5	168.68	76.51	160.05	72.59	133.37	60.49	117.37	53.23	106.7	48.39	96.03	43.55
1770	164.4	168.68	76.51	160.96	73.01	134.13	60.84	118.03	53.54	107.3	48.67	96.57	43.8
1780	165.4	168.68	76.51	161.87	73.42	134.89	61.18	118.7	53.84	107.91	48.94	97.12	44.05
1790	166.3	168.68	76.51	162.77	73.83	135.64	61.52	119.37	54.14	108.51	49.22	97.66	44.3
1800	167.2	168.68	76.51	163.68	74.24	136.4	61.87	120.03	54.44	109.12	49.49	98.21	44.54
1810	168.2	168.68	76.51	164.59	74.66	137.16	62.21	120.7	54.75	109.73	49.77	98.75	44.79
1820	169.1	168.68	76.51	165.5	75.07	137.92	62.56	121.37	55.05	110.33	50.04	99.3	45.04
1830	170.0	168.68	76.51	166.41	75.48	138.68	62.9	122.03	55.35	110.94	50.32	99.85	45.29
1840	170.9	168.68	76.51	167.32	75.89	139.43	63.24	122.7	55.65	111.55	50.59	100.39	45.53

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Table 1 – Allowable Maximum Refrigerant Charge

A/TA		m _{max}											
		H ₁ =a		H ₁ =b		H ₁ =c		H ₁ =d		H ₁ =e		H ₁ =f	
ft ²	m ²	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
1850	171.9	168.68	76.51	168.23	76.31	140.19	63.59	123.37	55.96	112.15	50.87	100.94	45.78
1860	172.8	168.68	76.51	168.68	76.51	140.95	63.93	124.04	56.26	112.76	51.14	101.48	46.03
1870	173.7	168.68	76.51	168.68	76.51	141.71	64.27	124.7	56.56	113.37	51.42	102.03	46.28
1880	174.7	168.68	76.51	168.68	76.51	142.47	64.62	125.37	56.86	113.97	51.69	102.57	46.52
1890	175.6	168.68	76.51	168.68	76.51	143.22	64.96	126.04	57.17	114.58	51.97	103.12	46.77
1900	176.5	168.68	76.51	168.68	76.51	143.98	65.31	126.7	57.47	115.18	52.24	103.66	47.02
1910	177.4	168.68	76.51	168.68	76.51	144.74	65.65	127.37	57.77	115.79	52.52	104.21	47.27
1920	178.4	168.68	76.51	168.68	76.51	145.5	65.99	128.04	58.07	116.4	52.79	104.76	47.51
1930	179.3	168.68	76.51	168.68	76.51	146.25	66.34	128.7	58.38	117	53.07	105.3	47.76
1940	180.2	168.68	76.51	168.68	76.51	147.01	66.68	129.37	58.68	117.61	53.34	105.85	48.01
1950	181.2	168.68	76.51	168.68	76.51	147.77	67.02	130.04	58.98	118.22	53.62	106.39	48.26
1960	182.1	168.68	76.51	168.68	76.51	148.53	67.37	130.7	59.28	118.82	53.89	106.94	48.5
1970	183.0	168.68	76.51	168.68	76.51	149.29	67.71	131.37	59.59	119.43	54.17	107.48	48.75
1980	183.9	168.68	76.51	168.68	76.51	150.04	68.06	132.04	59.89	120.03	54.44	108.03	49
1990	184.9	168.68	76.51	168.68	76.51	150.8	68.4	132.7	60.19	120.64	54.72	108.58	49.25
2000	185.8	168.68	76.51	168.68	76.51	151.56	68.74	133.37	60.49	121.25	54.99	109.12	49.49
2010	186.7	168.68	76.51	168.68	76.51	152.32	69.09	134.04	60.8	121.85	55.27	109.67	49.74
2020	187.7	168.68	76.51	168.68	76.51	153.07	69.43	134.71	61.1	122.46	55.54	110.21	49.99
2030	188.6	168.68	76.51	168.68	76.51	153.83	69.77	135.37	61.4	123.07	55.82	110.76	50.24
2040	189.5	168.68	76.51	168.68	76.51	154.59	70.12	136.04	61.7	123.67	56.09	111.3	50.48
2050	190.5	168.68	76.51	168.68	76.51	155.35	70.46	136.71	62.01	124.28	56.37	111.85	50.73
2060	191.4	168.68	76.51	168.68	76.51	156.11	70.81	137.37	62.31	124.88	56.64	112.4	50.98
2070	192.3	168.68	76.51	168.68	76.51	156.86	71.15	138.04	62.61	125.49	56.92	112.94	51.23
2080	193.2	168.68	76.51	168.68	76.51	157.62	71.49	138.71	62.91	126.1	57.19	113.49	51.47
2090	194.2	168.68	76.51	168.68	76.51	158.38	71.84	139.37	63.22	126.7	57.47	114.03	51.72
2100	195.1	168.68	76.51	168.68	76.51	159.14	72.18	140.04	63.52	127.31	57.74	114.58	51.97
2110	196.0	168.68	76.51	168.68	76.51	159.9	72.52	140.71	63.82	127.92	58.02	115.12	52.22
2120	197.0	168.68	76.51	168.68	76.51	160.65	72.87	141.37	64.12	128.52	58.29	115.67	52.46
2130	197.9	168.68	76.51	168.68	76.51	161.41	73.21	142.04	64.43	129.13	58.57	116.21	52.71
2140	198.8	168.68	76.51	168.68	76.51	162.17	73.56	142.71	64.73	129.73	58.84	116.76	52.96
2150	199.7	168.68	76.51	168.68	76.51	162.93	73.9	143.37	65.03	130.34	59.12	117.31	53.21
2160	200.7	168.68	76.51	168.68	76.51	163.68	74.24	144.04	65.33	130.95	59.39	117.85	53.45
2170	201.6	168.68	76.51	168.68	76.51	164.44	74.59	144.71	65.64	131.55	59.67	118.4	53.7
2180	202.5	168.68	76.51	168.68	76.51	165.2	74.93	145.38	65.94	132.16	59.94	118.94	53.95
2190	203.5	168.68	76.51	168.68	76.51	165.96	75.27	146.04	66.24	132.77	60.22	119.49	54.2
2200	204.4	168.68	76.51	168.68	76.51	166.72	75.62	146.71	66.54	133.37	60.49	120.03	54.44
2210	205.3	168.68	76.51	168.68	76.51	167.47	75.96	147.38	66.85	133.98	60.77	120.58	54.69
2220	206.2	168.68	76.51	168.68	76.51	168.23	76.31	148.04	67.15	134.58	61.04	121.13	54.94
2230	207.2	168.68	76.51	168.68	76.51	168.68	76.51	148.71	67.45	135.19	61.32	121.67	55.19
2240	208.1	168.68	76.51	168.68	76.51	168.68	76.51	149.38	67.75	135.8	61.59	122.22	55.43
2250	209.0	168.68	76.51	168.68	76.51	168.68	76.51	150.04	68.06	136.4	61.87	122.76	55.68
2260	210.0	168.68	76.51	168.68	76.51	168.68	76.51	150.71	68.36	137.01	62.14	123.31	55.93
2270	210.9	168.68	76.51	168.68	76.51	168.68	76.51	151.38	68.66	137.62	62.42	123.85	56.18
2280	211.8	168.68	76.51	168.68	76.51	168.68	76.51	152.04	68.96	138.22	62.69	124.4	56.42
2290	212.7	168.68	76.51	168.68	76.51	168.68	76.51	152.71	69.27	138.83	62.97	124.94	56.67
2300	213.7	168.68	76.51	168.68	76.51	168.68	76.51	153.38	69.57	139.43	63.24	125.49	56.92
2310	214.6	168.68	76.51	168.68	76.51	168.68	76.51	154.04	69.87	140.04	63.52	126.04	57.17
2320	215.5	168.68	76.51	168.68	76.51	168.68	76.51	154.71	70.17	140.65	63.79	126.58	57.41
2330	216.5	168.68	76.51	168.68	76.51	168.68	76.51	155.38	70.48	141.25	64.07	127.13	57.66
2340	217.4	168.68	76.51	168.68	76.51	168.68	76.51	156.05	70.78	141.86	64.34	127.67	57.91
2350	218.3	168.68	76.51	168.68	76.51	168.68	76.51	156.71	71.08	142.47	64.62	128.22	58.16
2360	219.3	168.68	76.51	168.68	76.51	168.68	76.51	157.38	71.38	143.07	64.89	128.76	58.4
2370	220.2	168.68	76.51	168.68	76.51	168.68	76.51	158.05	71.69	143.68	65.17	129.31	58.65
2380	221.1	168.68	76.51	168.68	76.51	168.68	76.51	158.71	71.99	144.28	65.44	129.86	58.9
2390	222.0	168.68	76.51	168.68	76.51	168.68	76.51	159.38	72.29	144.89	65.72	130.4	59.15
2400	223.0	168.68	76.51	168.68	76.51	168.68	76.51	160.05	72.59	145.5	65.99	130.95	59.39
2410	223.9	168.68	76.51	168.68	76.51	168.68	76.51	160.71	72.9	146.1	66.27	131.49	59.64
2420	224.8	168.68	76.51	168.68	76.51	168.68	76.51	161.38	73.2	146.71	66.54	132.04	59.89
2430	225.8	168.68	76.51	168.68	76.51	168.68	76.51	162.05	73.5	147.32	66.82	132.58	60.14
2440	226.7	168.68	76.51	168.68	76.51	168.68	76.51	162.71	73.8	147.92	67.09	133.13	60.38
2450	227.6	168.68	76.51	168.68	76.51	168.68	76.51	163.38	74.11	148.53	67.37	133.67	60.63
2460	228.5	168.68	76.51	168.68	76.51	168.68	76.51	164.05	74.41	149.13	67.64	134.22	60.88
2470	229.5	168.68	76.51	168.68	76.51	168.68	76.51	164.71	74.71	149.74	67.92	134.77	61.13
2480	230.4	168.68	76.51	168.68	76.51	168.68	76.51	165.38	75.01	150.35	68.19	135.31	61.37
2490	231.3	168.68	76.51	168.68	76.51	168.68	76.51	166.05	75.32	150.95	68.47	135.86	61.62
2500	232.3	168.68	76.51	168.68	76.51	168.68	76.51	166.72	75.62	151.56	68.74	136.4	61.87
2510	233.2	168.68	76.51	168.68	76.51	168.68	76.51	167.38	75.92	152.17	69.02	136.95	62.12
2520	234.1	168.68	76.51	168.68	76.51	168.68	76.51	168.05	76.22	152.77	69.29	137.49	62.36
2530	235.0	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	153.38	69.57	138.04	62.61
2540	236.0	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	153.98	69.84	138.59	62.86
2550	236.9	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	154.59	70.12	139.13	63.11
2560	237.8	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	155.2	70.39	139.68	63.35
2570	238.8	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	155.8	70.67	140.22	63.6
2580	239.7	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	156.41	70.94	140.77	63.85
2590	240.6	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	157.02	71.22	141.31	64.1
2600	241.5	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	157.62	71.49	141.86	64.34
2610	242.5	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	158.23	71.77	142.4	64.59

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Table 1 – Allowable Maximum Refrigerant Charge

A/TA		m _{max}											
		H _r =a		H _r =b		H _r =c		H _r =d		H _r =e		H _r =f	
ft ²	m ²	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
2620	243.4	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	158.83	72.04	142.95	64.84
2630	244.3	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	159.44	72.32	143.5	65.09
2640	245.3	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	160.05	72.59	144.04	65.33
2650	246.2	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	160.65	72.87	144.59	65.58
2660	247.1	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	161.26	73.14	145.13	65.83
2670	248.1	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	161.87	73.42	145.68	66.08
2680	249.0	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	162.47	73.69	146.22	66.32
2690	249.9	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	163.08	73.97	146.77	66.57
2700	250.8	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	163.68	74.24	147.32	66.82
2710	251.8	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	164.29	74.52	147.86	67.07
2720	252.7	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	164.9	74.79	148.41	67.31
2730	253.6	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	165.5	75.07	148.95	67.56
2740	254.6	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	166.11	75.34	149.5	67.81
2750	255.5	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	166.72	75.62	150.04	68.06
2760	256.4	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	167.32	75.89	150.59	68.3
2770	257.3	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	167.93	76.17	151.13	68.55
2780	258.3	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.53	76.44	151.68	68.8
2790	259.2	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	152.23	69.05
2800	260.1	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	152.77	69.29
2810	261.1	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	153.32	69.54
2820	262.0	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	153.86	69.79
2830	262.9	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	154.41	70.04
2840	263.8	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	154.95	70.28
2850	264.8	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	155.5	70.53
2860	265.7	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	156.05	70.78
2870	266.6	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	156.59	71.03
2880	267.6	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	157.14	71.27
2890	268.5	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	157.68	71.52
2900	269.4	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	158.23	71.77
2910	270.3	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	158.77	72.02
2920	271.3	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	159.32	72.26
2930	272.2	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	159.86	72.51
2940	273.1	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	160.41	72.76
2950	274.1	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	160.96	73.01
2960	275.0	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	161.5	73.25
2970	275.9	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	162.05	73.5
2980	276.9	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	162.59	73.75
2990	277.8	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	163.14	74
3000	278.7	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	163.68	74.24
3010	279.6	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	164.23	74.49
3020	280.6	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	164.78	74.74
3030	281.5	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	165.32	74.99
3040	282.4	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	165.87	75.23
3050	283.4	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	166.41	75.48
3060	284.3	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	166.96	75.73
3070	285.2	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	167.5	75.98
3080	286.1	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.05	76.22
3090	287.1	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.6	76.47
3100	288.0	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51	168.68	76.51

- The effective room height not less than 13.2 ft (4.0 m).
- The effective room height between 9.9 ft (3.0 m) and 13.2 ft (4.0 m).
- The effective room height between 8.2 ft (2.5 m) and 9.9 ft (3.0 m).
- The effective room height between 7.2 ft (2.2 m) and 8.2 ft (2.5 m).
- The effective room height between 6.6 ft (2.0 m) and 7.2 ft (2.2 m).
- The effective room height between 5.9 ft (1.8 m) and 6.6 ft (2.0 m).

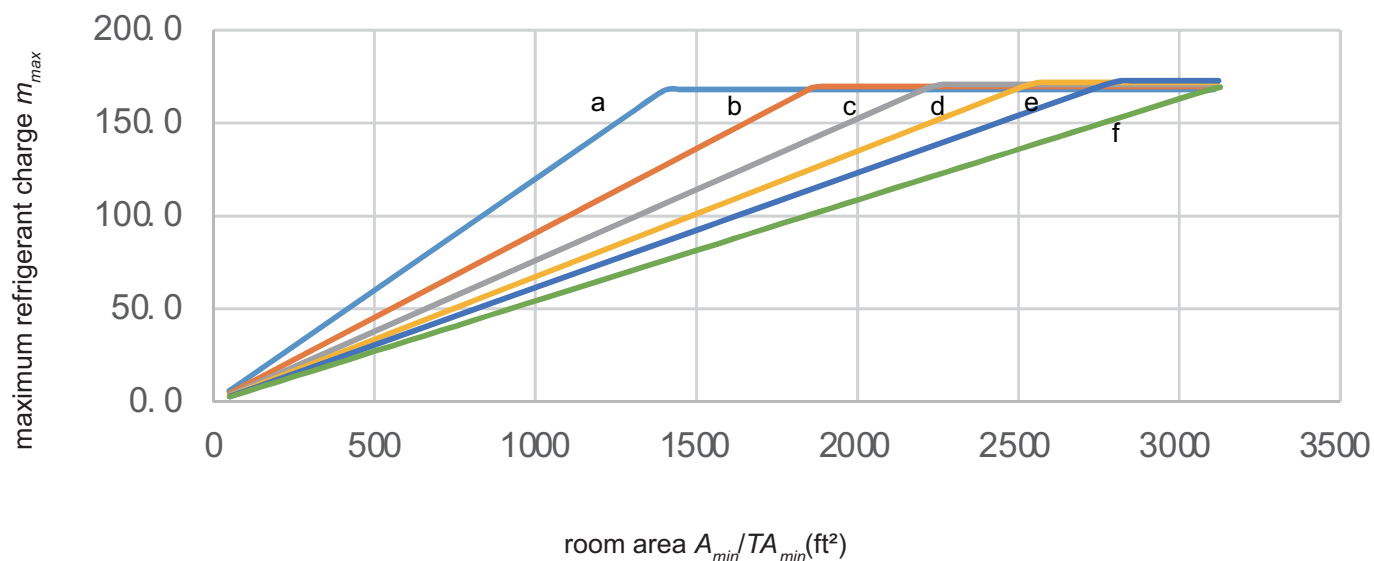


Fig. 2 – Required Minimum Room Area

A260224

Curve (a) is the $m_{\max}$ limit for the effective room height $H_r \geq 13.2$ ft (4.0 m).

Curve (b) is the $m_{\max}$ limit for the effective room height 9.9 ft (3.0 m) $\leq H_r < 13.2$ ft (4.0 m).

Curve (c) is the $m_{\max}$ limit for the effective room height 8.2 ft (2.5 m) $\leq H_r < 9.9$ ft (3.0 m).

Curve (d) is the $m_{\max}$ limit for the effective room height 7.2 ft (2.2 m) $\leq H_r < 8.2$ ft (2.5 m).

Curve (e) is the $m_{\max}$ limit for the effective room height 6.6 ft (2.0 m) $\leq H_r < 7.2$ ft (2.2 m).

Curve (f) is the $m_{\max}$ limit for the effective room height 5.9 ft (1.8 m) $\leq H_r < 6.6$ ft (2.0 m).

Table 2 – Required Minimum Room Area

m_c		$A_{\min}/TA_{\min}$											
		$H_r=a$		$H_r=b$		$H_r=c$		$H_r=d$		$H_r=e$		$H_r=f$	
lb	kg	ft ²	m ²	ft ²	m ²	ft ²	m ²	ft ²	m ²	ft ²	m ²	ft ²	m ²
1.0	0.5	8.2	0.8	11.0	1.1	13.2	1.4	15.0	1.5	16.5	1.7	18.3	1.9
2.0	0.9	16.5	1.5	22.0	2.0	26.4	2.4	30.0	2.8	33.0	3.0	36.7	3.4
3.0	1.4	24.7	2.4	33.0	3.2	39.6	3.8	45.0	4.3	49.5	4.7	55.0	5.3
4.0	1.8	33.0	3.0	44.0	4.1	52.8	4.9	60.0	5.5	66.0	6.1	73.3	6.8
5.0	2.3	41.2	3.9	55.0	5.2	66.0	6.2	75.0	7.1	82.5	7.8	91.6	8.6
6.0	2.7	49.5	4.6	66.0	6.1	79.2	7.3	90.0	8.3	99.0	9.1	110.0	10.1
7.0	3.2	57.7	5.4	77.0	7.2	92.4	8.6	105.0	9.8	115.5	10.8	128.3	12.0
8.0	3.6	66.0	6.1	88.0	8.1	105.6	9.7	120.0	11.1	132.0	12.2	146.6	13.5
9.0	4.1	74.2	6.9	99.0	9.2	118.8	11.1	135.0	12.6	148.5	13.9	164.9	15.4
10.0	4.5	82.5	7.6	110.0	10.1	132.0	12.2	150.0	13.8	164.9	15.2	183.3	16.9
11.0	5.0	90.7	8.4	121.0	11.3	145.2	13.5	164.9	15.4	181.4	16.9	201.6	18.8
12.0	5.4	99.0	9.1	132.0	12.2	158.3	14.6	179.9	16.6	197.9	18.2	219.9	20.3
13.0	5.9	107.2	10.0	143.0	13.3	171.5	15.9	194.9	18.1	214.4	19.9	238.3	22.1
14.0	6.4	115.5	10.8	154.0	14.4	184.7	17.3	209.9	19.7	230.9	21.6	256.6	24.0
15.0	6.8	123.7	11.5	164.9	15.3	197.9	18.4	224.9	20.9	247.4	23.0	274.9	25.5
16.0	7.3	132.0	12.3	175.9	16.4	211.1	19.7	239.9	22.4	263.9	24.7	293.2	27.4
17.0	7.7	140.2	13.0	186.9	17.3	224.3	20.8	254.9	23.6	280.4	26.0	311.6	28.9

Table 2 – Required Minimum Room Area

m_c		A_{min}/TA_{min}											
		$H_r=a$		$H_r=b$		$H_r=c$		$H_r=d$		$H_r=e$		$H_r=f$	
lb	kg	ft ²	m ²	ft ²	m ²	ft ²	m ²	ft ²	m ²	ft ²	m ²	ft ²	m ²
18.0	8.2	148.5	13.9	197.9	18.5	237.5	22.2	269.9	25.2	296.9	27.7	329.9	30.8
19.0	8.6	156.7	14.5	208.9	19.4	250.7	23.2	284.9	26.4	313.4	29.1	348.2	32.3
20.0	9.1	164.9	15.4	219.9	20.5	263.9	24.6	299.9	27.9	329.9	30.7	366.5	34.2
21.0	9.5	173.2	16.0	230.9	21.4	277.1	25.7	314.9	29.2	346.4	32.1	384.9	35.7
22.0	10.0	181.4	16.9	241.9	22.5	290.3	27.0	329.9	30.7	362.9	33.8	403.2	37.5
23.0	10.4	189.7	17.6	252.9	23.4	303.5	28.1	344.9	31.9	379.4	35.1	421.5	39.0
24.0	10.9	197.9	18.4	263.9	24.5	316.7	29.5	359.9	33.5	395.9	36.8	439.9	40.9
25.0	11.3	206.2	19.1	274.9	25.5	329.9	30.5	374.9	34.7	412.4	38.2	458.2	42.4
26.0	11.8	214.4	19.9	285.9	26.6	343.1	31.9	389.9	36.2	428.9	39.9	476.5	44.3
27.0	12.2	222.7	20.6	296.9	27.5	356.3	33.0	404.9	37.5	445.4	41.2	494.8	45.8
28.0	12.7	230.9	21.5	307.9	28.6	369.5	34.3	419.9	39.0	461.9	42.9	513.2	47.7
29.0	13.2	239.2	22.3	318.9	29.7	382.7	35.7	434.9	40.5	478.3	44.6	531.5	49.5
30.0	13.6	247.4	23.0	329.9	30.6	395.9	36.8	449.9	41.8	494.8	45.9	549.8	51.1
31.0	14.0	255.7	23.6	340.9	31.5	409.1	37.8	464.8	43.0	511.3	47.3	568.1	52.6
32.0	14.5	263.9	24.5	351.9	32.7	422.3	39.2	479.8	44.6	527.8	49.0	586.5	54.5
33.0	15.0	272.2	25.3	362.9	33.7	435.5	40.5	494.8	46.0	544.3	50.6	604.8	56.2
34.0	15.4	280.4	26.1	373.9	34.7	448.7	41.7	509.8	47.4	560.8	52.1	623.1	57.9
35.0	15.9	288.7	26.8	384.9	35.8	461.9	42.9	524.8	48.8	577.3	53.6	641.5	59.6
36.0	16.3	296.9	27.6	395.9	36.8	475.0	44.1	539.8	50.2	593.8	55.2	659.8	61.3
37.0	16.8	305.2	28.3	406.9	37.8	488.2	45.4	554.8	51.5	610.3	56.7	678.1	63.0
38.0	17.2	313.4	29.1	417.9	38.8	501.4	46.6	569.8	52.9	626.8	58.2	696.4	64.7
39.0	17.7	321.6	29.9	428.9	39.8	514.6	47.8	584.8	54.3	643.3	59.8	714.8	66.4
40.0	18.1	329.9	30.6	439.9	40.9	527.8	49.0	599.8	55.7	659.8	61.3	733.1	68.1
41.0	18.6	338.1	31.4	450.9	41.9	541.0	50.3	614.8	57.1	676.3	62.8	751.4	69.8
42.0	19.1	346.4	32.2	461.9	42.9	554.2	51.5	629.8	58.5	692.8	64.4	769.8	71.5
43.0	19.5	354.6	32.9	472.8	43.9	567.4	52.7	644.8	59.9	709.3	65.9	788.1	73.2
44.0	20.0	362.9	33.7	483.8	45.0	580.6	53.9	659.8	61.3	725.8	67.4	806.4	74.9
45.0	20.4	371.1	34.5	494.8	46.0	593.8	55.2	674.8	62.7	742.3	69.0	824.7	76.6
46.0	20.9	379.4	35.2	505.8	47.0	607.0	56.4	689.8	64.1	758.8	70.5	843.1	78.3
47.0	21.3	387.6	36.0	516.8	48.0	620.2	57.6	704.8	65.5	775.2	72.0	861.4	80.0
48.0	21.8	395.9	36.8	527.8	49.0	633.4	58.8	719.8	66.9	791.7	73.6	879.7	81.7
49.0	22.2	404.1	37.5	538.8	50.1	646.6	60.1	734.8	68.3	808.2	75.1	898.0	83.4
50.0	22.7	412.4	38.3	549.8	51.1	659.8	61.3	749.8	69.7	824.7	76.6	916.4	85.1
51.0	23.1	420.6	39.1	560.8	52.1	673.0	62.5	764.8	71.0	841.2	78.2	934.7	86.8
52.0	23.6	428.9	39.8	571.8	53.1	686.2	63.7	779.7	72.4	857.7	79.7	953.0	88.5
53.0	24.0	437.1	40.6	582.8	54.1	699.4	65.0	794.7	73.8	874.2	81.2	971.4	90.2
54.0	24.5	445.4	41.4	593.8	55.2	712.6	66.2	809.7	75.2	890.7	82.7	989.7	91.9
55.0	24.9	453.6	42.1	604.8	56.2	725.8	67.4	824.7	76.6	907.2	84.3	1008.0	93.6
56.0	25.4	461.9	42.9	615.8	57.2	739.0	68.7	839.7	78.0	923.7	85.8	1026.3	95.3
57.0	25.9	470.1	43.7	626.8	58.2	752.2	69.9	854.7	79.4	940.2	87.3	1044.7	97.1
58.0	26.3	478.3	44.4	637.8	59.3	765.4	71.1	869.7	80.8	956.7	88.9	1063.0	98.8
59.0	26.8	486.6	45.2	648.8	60.3	778.5	72.3	884.7	82.2	973.2	90.4	1081.3	100.5
60.0	27.2	494.8	46.0	659.8	61.3	791.7	73.6	899.7	83.6	989.7	91.9	1099.6	102.2
61.0	27.7	503.1	46.7	670.8	62.3	804.9	74.8	914.7	85.0	1006.2	93.5	1118.0	103.9

Manufacturer reserves the right to change, at any time, specifications and designs without notice and without obligations.

Table 2 – Required Minimum Room Area

m _c		A _{min} /TA _{min}											
		H _r =a		H _r =b		H _r =c		H _r =d		H _r =e		H _r =f	
lb	kg	ft ²	m ²	ft ²	m ²	ft ²	m ²	ft ²	m ²	ft ²	m ²	ft ²	m ²
62.0	28.1	511.3	47.5	681.8	63.3	818.1	76.0	929.7	86.4	1022.7	95.0	1136.3	105.6
63.0	28.6	519.6	48.3	692.8	64.4	831.3	77.2	944.7	87.8	1039.2	96.5	1154.6	107.3
64.0	29.0	527.8	49.0	703.8	65.4	844.5	78.5	959.7	89.2	1055.7	98.1	1173.0	109.0
65.0	29.5	536.1	49.8	714.8	66.4	857.7	79.7	974.7	90.6	1072.2	99.6	1191.3	110.7
66.0	29.9	544.3	50.6	725.8	67.4	870.9	80.9	989.7	91.9	1088.6	101.1	1209.6	112.4
67.0	30.4	552.6	51.3	736.8	68.4	884.1	82.1	1004.7	93.3	1105.1	102.7	1227.9	114.1
68.0	30.8	560.8	52.1	747.8	69.5	897.3	83.4	1019.7	94.7	1121.6	104.2	1246.3	115.8
69.0	31.3	569.1	52.9	758.8	70.5	910.5	84.6	1034.7	96.1	1138.1	105.7	1264.6	117.5
70.0	31.8	577.3	53.6	769.8	71.5	923.7	85.8	1049.7	97.5	1154.6	107.3	1282.9	119.2
71.0	32.2	585.6	54.4	780.7	72.5	936.9	87.0	1064.7	98.9	1171.1	108.8	1301.2	120.9
72.0	32.7	593.8	55.2	791.7	73.6	950.1	88.3	1079.7	100.3	1187.6	110.3	1319.6	122.6
73.0	33.1	602.1	55.9	802.7	74.6	963.3	89.5	1094.6	101.7	1204.1	111.9	1337.9	124.3
74.0	33.6	610.3	56.7	813.7	75.6	976.5	90.7	1109.6	103.1	1220.6	113.4	1356.2	126.0
75.0	34.0	618.6	57.5	824.7	76.6	989.7	91.9	1124.6	104.5	1237.1	114.9	1374.6	127.7
76.0	34.5	626.8	58.2	835.7	77.6	1002.9	93.2	1139.6	105.9	1253.6	116.5	1392.9	129.4
77.0	34.9	635.0	59.0	846.7	78.7	1016.1	94.4	1154.6	107.3	1270.1	118.0	1411.2	131.1
78.0	35.4	643.3	59.8	857.7	79.7	1029.3	95.6	1169.6	108.7	1286.6	119.5	1429.5	132.8
79.0	35.8	651.5	60.5	868.7	80.7	1042.5	96.8	1184.6	110.1	1303.1	121.1	1447.9	134.5
80.0	36.3	659.8	61.3	879.7	81.7	1055.7	98.1	1199.6	111.4	1319.6	122.6	1466.2	136.2
81.0	36.7	668.0	62.1	890.7	82.7	1068.9	99.3	1214.6	112.8	1336.1	124.1	1484.5	137.9
82.0	37.2	676.3	62.8	901.7	83.8	1082.1	100.5	1229.6	114.2	1352.6	125.7	1502.8	139.6
83.0	37.6	684.5	63.6	912.7	84.8	1095.2	101.8	1244.6	115.6	1369.1	127.2	1521.2	141.3
84.0	38.1	692.8	64.4	923.7	85.8	1108.4	103.0	1259.6	117.0	1385.6	128.7	1539.5	143.0
85.0	38.6	701.0	65.1	934.7	86.8	1121.6	104.2	1274.6	118.4	1402.0	130.3	1557.8	144.7
86.0	39.0	709.3	65.9	945.7	87.9	1134.8	105.4	1289.6	119.8	1418.5	131.8	1576.2	146.4
87.0	39.5	717.5	66.7	956.7	88.9	1148.0	106.7	1304.6	121.2	1435.0	133.3	1594.5	148.1
88.0	39.9	725.8	67.4	967.7	89.9	1161.2	107.9	1319.6	122.6	1451.5	134.9	1612.8	149.8
89.0	40.4	734.0	68.2	978.7	90.9	1174.4	109.1	1334.6	124.0	1468.0	136.4	1631.1	151.5
90.0	40.8	742.3	69.0	989.7	91.9	1187.6	110.3	1349.6	125.4	1484.5	137.9	1649.5	153.2
91.0	41.3	750.5	69.7	1000.7	93.0	1200.8	111.6	1364.6	126.8	1501.0	139.4	1667.8	154.9
92.0	41.7	758.8	70.5	1011.7	94.0	1214.0	112.8	1379.6	128.2	1517.5	141.0	1686.1	156.6
93.0	42.2	767.0	71.3	1022.7	95.0	1227.2	114.0	1394.5	129.6	1534.0	142.5	1704.4	158.3
94.0	42.6	775.2	72.0	1033.7	96.0	1240.4	115.2	1409.5	131.0	1550.5	144.0	1722.8	160.1
95.0	43.1	783.5	72.8	1044.7	97.1	1253.6	116.5	1424.5	132.3	1567.0	145.6	1741.1	161.8
96.0	43.5	791.7	73.6	1055.7	98.1	1266.8	117.7	1439.5	133.7	1583.5	147.1	1759.4	163.5
97.0	44.0	800.0	74.3	1066.7	99.1	1280.0	118.9	1454.5	135.1	1600.0	148.6	1777.8	165.2
98.0	44.5	808.2	75.1	1077.7	100.1	1293.2	120.1	1469.5	136.5	1616.5	150.2	1796.1	166.9
99.0	44.9	816.5	75.9	1088.6	101.1	1306.4	121.4	1484.5	137.9	1633.0	151.7	1814.4	168.6
100.0	45.4	824.7	76.6	1099.6	102.2	1319.6	122.6	1499.5	139.3	1649.5	153.2	1832.7	170.3
101.0	45.8	833.0	77.4	1110.6	103.2	1332.8	123.8	1514.5	140.7	1666.0	154.8	1851.1	172.0
102.0	46.3	841.2	78.2	1121.6	104.2	1346.0	125.0	1529.5	142.1	1682.5	156.3	1869.4	173.7
103.0	46.7	849.5	78.9	1132.6	105.2	1359.2	126.3	1544.5	143.5	1699.0	157.8	1887.7	175.4
104.0	47.2	857.7	79.7	1143.6	106.2	1372.4	127.5	1559.5	144.9	1715.4	159.4	1906.1	177.1
105.0	47.6	866.0	80.5	1154.6	107.3	1385.6	128.7	1574.5	146.3	1731.9	160.9	1924.4	178.8

Manufacturer reserves the right to change, at any time, specifications and designs without notice and without obligations.

Table 2 – Required Minimum Room Area

m _c		A _{min} /TA _{min}											
		H _r =a		H _r =b		H _r =c		H _r =d		H _r =e		H _r =f	
lb	kg	ft ²	m ²	ft ²	m ²	ft ²	m ²	ft ²	m ²	ft ²	m ²	ft ²	m ²
106.0	48.1	874.2	81.2	1165.6	108.3	1398.7	129.9	1589.5	147.7	1748.4	162.4	1942.7	180.5
107.0	48.5	882.5	82.0	1176.6	109.3	1411.9	131.2	1604.5	149.1	1764.9	164.0	1961.0	182.2
108.0	49.0	890.7	82.7	1187.6	110.3	1425.1	132.4	1619.5	150.5	1781.4	165.5	1979.4	183.9
109.0	49.4	899.0	83.5	1198.6	111.4	1438.3	133.6	1634.5	151.8	1797.9	167.0	1997.7	185.6
110.0	49.9	907.2	84.3	1209.6	112.4	1451.5	134.9	1649.5	153.2	1814.4	168.6	2016.0	187.3
111.0	50.3	915.5	85.0	1220.6	113.4	1464.7	136.1	1664.5	154.6	1830.9	170.1	2034.3	189.0
112.0	50.8	923.7	85.8	1231.6	114.4	1477.9	137.3	1679.5	156.0	1847.4	171.6	2052.7	190.7
113.0	51.3	931.9	86.6	1242.6	115.4	1491.1	138.5	1694.5	157.4	1863.9	173.2	2071.0	192.4
114.0	51.7	940.2	87.3	1253.6	116.5	1504.3	139.8	1709.4	158.8	1880.4	174.7	2089.3	194.1
115.0	52.2	948.4	88.1	1264.6	117.5	1517.5	141.0	1724.4	160.2	1896.9	176.2	2107.7	195.8
116.0	52.6	956.7	88.9	1275.6	118.5	1530.7	142.2	1739.4	161.6	1913.4	177.8	2126.0	197.5
117.0	53.1	964.9	89.6	1286.6	119.5	1543.9	143.4	1754.4	163.0	1929.9	179.3	2144.3	199.2
118.0	53.5	973.2	90.4	1297.6	120.5	1557.1	144.7	1769.4	164.4	1946.4	180.8	2162.6	200.9
119.0	54.0	981.4	91.2	1308.6	121.6	1570.3	145.9	1784.4	165.8	1962.9	182.4	2181.0	202.6
120.0	54.4	989.7	91.9	1319.6	122.6	1583.5	147.1	1799.4	167.2	1979.4	183.9	2199.3	204.3
121.0	54.9	997.9	92.7	1330.6	123.6	1596.7	148.3	1814.4	168.6	1995.9	185.4	2217.6	206.0
122.0	55.3	1006.2	93.5	1341.6	124.6	1609.9	149.6	1829.4	170.0	2012.4	187.0	2235.9	207.7
123.0	55.8	1014.4	94.2	1352.6	125.7	1623.1	150.8	1844.4	171.4	2028.8	188.5	2254.3	209.4
124.0	56.2	1022.7	95.0	1363.6	126.7	1636.3	152.0	1859.4	172.7	2045.3	190.0	2272.6	211.1
125.0	56.7	1030.9	95.8	1374.6	127.7	1649.5	153.2	1874.4	174.1	2061.8	191.6	2290.9	212.8
126.0	57.2	1039.2	96.5	1385.6	128.7	1662.7	154.5	1889.4	175.5	2078.3	193.1	2309.3	214.5
127.0	57.6	1047.4	97.3	1396.5	129.7	1675.9	155.7	1904.4	176.9	2094.8	194.6	2327.6	216.2
128.0	58.1	1055.7	98.1	1407.5	130.8	1689.1	156.9	1919.4	178.3	2111.3	196.1	2345.9	217.9
129.0	58.5	1063.9	98.8	1418.5	131.8	1702.3	158.1	1934.4	179.7	2127.8	197.7	2364.2	219.6
130.0	59.0	1072.2	99.6	1429.5	132.8	1715.4	159.4	1949.4	181.1	2144.3	199.2	2382.6	221.3
131.0	59.4	1080.4	100.4	1440.5	133.8	1728.6	160.6	1964.4	182.5	2160.8	200.7	2400.9	223.1
132.0	59.9	1088.6	101.1	1451.5	134.9	1741.8	161.8	1979.4	183.9	2177.3	202.3	2419.2	224.8
133.0	60.3	1096.9	101.9	1462.5	135.9	1755.0	163.0	1994.4	185.3	2193.8	203.8	2437.5	226.5
134.0	60.8	1105.1	102.7	1473.5	136.9	1768.2	164.3	2009.4	186.7	2210.3	205.3	2455.9	228.2
135.0	61.2	1113.4	103.4	1484.5	137.9	1781.4	165.5	2024.3	188.1	2226.8	206.9	2474.2	229.9
136.0	61.7	1121.6	104.2	1495.5	138.9	1794.6	166.7	2039.3	189.5	2243.3	208.4	2492.5	231.6
137.0	62.1	1129.9	105.0	1506.5	140.0	1807.8	168.0	2054.3	190.9	2259.8	209.9	2510.9	233.3
138.0	62.6	1138.1	105.7	1517.5	141.0	1821.0	169.2	2069.3	192.2	2276.3	211.5	2529.2	235.0
139.0	63.0	1146.4	106.5	1528.5	142.0	1834.2	170.4	2084.3	193.6	2292.8	213.0	2547.5	236.7
140.0	63.5	1154.6	107.3	1539.5	143.0	1847.4	171.6	2099.3	195.0	2309.3	214.5	2565.8	238.4
141.0	64.0	1162.9	108.0	1550.5	144.0	1860.6	172.9	2114.3	196.4	2325.7	216.1	2584.2	240.1
142.0	64.4	1171.1	108.8	1561.5	145.1	1873.8	174.1	2129.3	197.8	2342.2	217.6	2602.5	241.8
143.0	64.9	1179.4	109.6	1572.5	146.1	1887.0	175.3	2144.3	199.2	2358.7	219.1	2620.8	243.5
144.0	65.3	1187.6	110.3	1583.5	147.1	1900.2	176.5	2159.3	200.6	2375.2	220.7	2639.1	245.2
145.0	65.8	1195.9	111.1	1594.5	148.1	1913.4	177.8	2174.3	202.0	2391.7	222.2	2657.5	246.9
146.0	66.2	1204.1	111.9	1605.5	149.2	1926.6	179.0	2189.3	203.4	2408.2	223.7	2675.8	248.6
147.0	66.7	1212.4	112.6	1616.5	150.2	1939.8	180.2	2204.3	204.8	2424.7	225.3	2694.1	250.3
148.0	67.1	1220.6	113.4	1627.5	151.2	1953.0	181.4	2219.3	206.2	2441.2	226.8	2712.5	252.0
149.0	67.6	1228.9	114.2	1638.5	152.2	1966.2	182.7	2234.3	207.6	2457.7	228.3	2730.8	253.7

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Table 2 – Required Minimum Room Area

m_c		A_{min}/TA_{min}											
		$H_r=a$		$H_r=b$		$H_r=c$		$H_r=d$		$H_r=e$		$H_r=f$	
lb	kg	ft ²	m ²	ft ²	m ²	ft ²	m ²	ft ²	m ²	ft ²	m ²	ft ²	m ²
150.0	68.0	1237.1	114.9	1649.5	153.2	1979.4	183.9	2249.3	209.0	2474.2	229.9	2749.1	255.4
151.0	68.5	1245.3	115.7	1660.5	154.3	1992.6	185.1	2264.3	210.4	2490.7	231.4	2767.4	257.1
152.0	68.9	1253.6	116.5	1671.5	155.3	2005.8	186.3	2279.3	211.8	2507.2	232.9	2785.8	258.8
153.0	69.4	1261.8	117.2	1682.5	156.3	2018.9	187.6	2294.3	213.1	2523.7	234.5	2804.1	260.5
154.0	69.9	1270.1	118.0	1693.5	157.3	2032.1	188.8	2309.3	214.5	2540.2	236.0	2822.4	262.2
155.0	70.3	1278.3	118.8	1704.4	158.3	2045.3	190.0	2324.2	215.9	2556.7	237.5	2840.7	263.9
156.0	70.8	1286.6	119.5	1715.4	159.4	2058.5	191.2	2339.2	217.3	2573.2	239.1	2859.1	265.6
157.0	71.2	1294.8	120.3	1726.4	160.4	2071.7	192.5	2354.2	218.7	2589.7	240.6	2877.4	267.3
158.0	71.7	1303.1	121.1	1737.4	161.4	2084.9	193.7	2369.2	220.1	2606.2	242.1	2895.7	269.0
159.0	72.1	1311.3	121.8	1748.4	162.4	2098.1	194.9	2384.2	221.5	2622.7	243.7	2914.1	270.7
160.0	72.6	1319.6	122.6	1759.4	163.5	2111.3	196.1	2399.2	222.9	2639.1	245.2	2932.4	272.4
161.0	73.0	1327.8	123.4	1770.4	164.5	2124.5	197.4	2414.2	224.3	2655.6	246.7	2950.7	274.1
162.0	73.5	1336.1	124.1	1781.4	165.5	2137.7	198.6	2429.2	225.7	2672.1	248.2	2969.0	275.8
163.0	73.9	1344.3	124.9	1792.4	166.5	2150.9	199.8	2444.2	227.1	2688.6	249.8	2987.4	277.5
164.0	74.4	1352.6	125.7	1803.4	167.5	2164.1	201.1	2459.2	228.5	2705.1	251.3	3005.7	279.2
165.0	74.8	1360.8	126.4	1814.4	168.6	2177.3	202.3	2474.2	229.9	2721.6	252.8	3024.0	280.9
166.0	75.3	1369.1	127.2	1825.4	169.6	2190.5	203.5	2489.2	231.3	2738.1	254.4	3042.4	282.6
167.0	75.7	1377.3	128.0	1836.4	170.6	2203.7	204.7	2504.2	232.6	2754.6	255.9	3060.7	284.3
168.0	76.2	1385.6	128.7	1847.4	171.6	2216.9	206.0	2519.2	234.0	2771.1	257.4	3079.0	286.0
169.0	76.7	1393.8	129.5	1858.4	172.7	2230.1	207.2	2534.2	235.4	2787.6	259.0	3097.3	287.8

- The effective room height not less than 13.2 ft (4.0 m).
- The effective room height between 9.9 ft (3.0 m) and 13.2 ft (4.0 m).
- The effective room height between 8.2 ft (2.5 m) and 9.9 ft (3.0 m).
- The effective room height between 7.2 ft (2.2 m) and 8.2 ft (2.5 m).
- The effective room height between 6.6 ft (2.0 m) and 7.2 ft (2.2 m).
- The effective room height between 5.9 ft (1.8 m) and 6.6 ft (2.0 m).

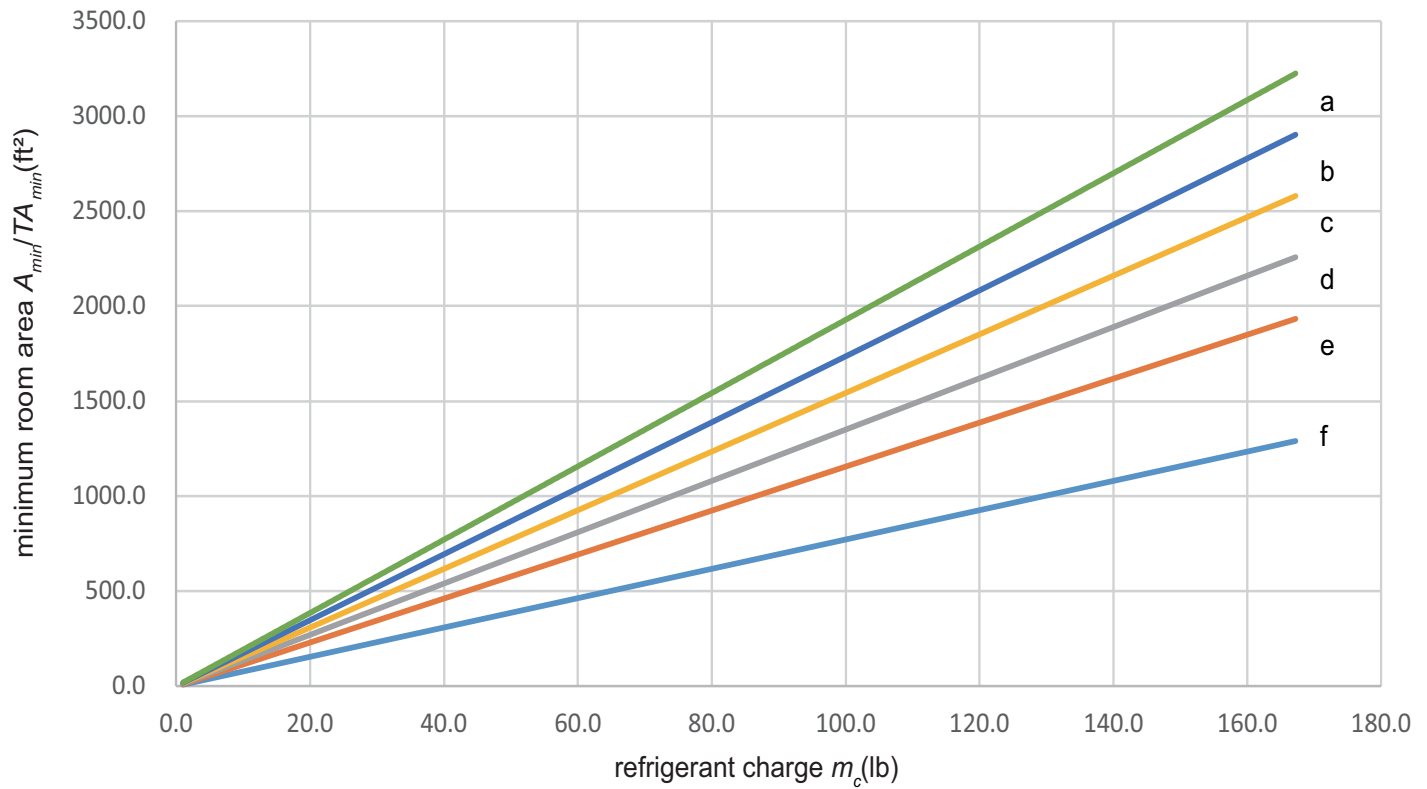


Fig. 3 – Required Refrigerant Charge Per Room Area

A260225

Curve (a) is the A_{min}/TA_{min} limit for the effective room height $H_r \geq 13.2$ ft (4.0 m).

Curve (b) is the A_{min}/TA_{min} limit for the effective room height 9.9 ft (3.0 m) $\leq H_r < 13.2$ ft (4.0 m).

Curve (c) is the A_{min}/TA_{min} limit for the effective room height 8.2 ft (2.5 m) $\leq H_r < 9.9$ ft (3.0 m).

Curve (d) is the A_{min}/TA_{min} limit for the effective room height 7.2 ft (2.2 m) $\leq H_r < 8.2$ ft (2.5 m).

Curve (e) is the A_{min}/TA_{min} limit for the effective room height 6.6 ft (2.0 m) $\leq H_r < 7.2$ ft (2.2 m).

Curve (f) is the A_{min}/TA_{min} limit for the effective room height 5.9 ft (1.8 m) $\leq H_r < 6.6$ ft (2.0 m).

Table 3 – Minimum Airflow for R-454B VRF Indoor Unit

Q_{min}	
CFM	cu yd/h (m³/h)
141.3	313.9 (240)

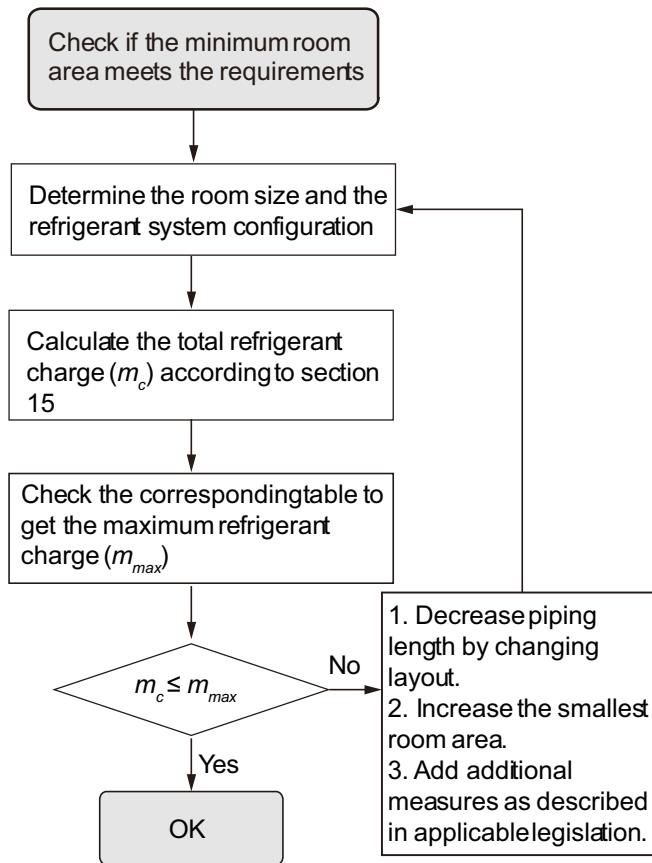


Fig. 4 – Installation Scheme Flow Chart

A260226

OPERATION MANUAL

Important Information

! WARNING

- This appliance can be used by children ages 12 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 2.5-5.0 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.

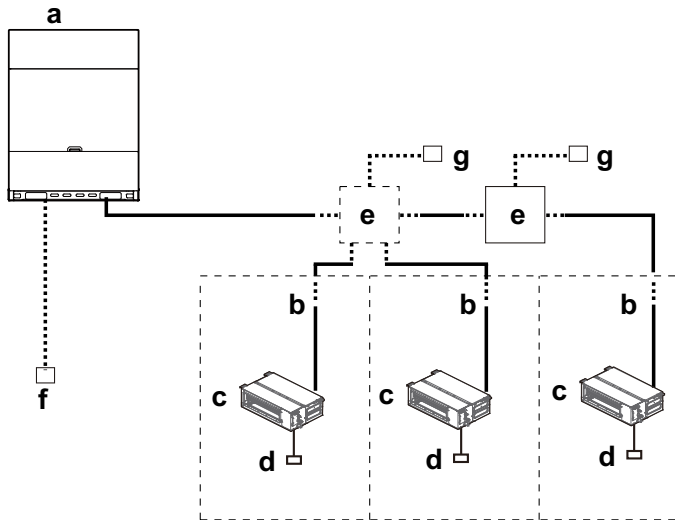
Equipment pipes in the occupied space in question must be installed in such a way that it is protected against accidental damage.

! NOTICE

- 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 A_{min} in Table 3.
- Compliance with national gas regulations shall be observed;
- Mechanical connections made shall be accessible for maintenance purposes.

System Information

System Layout



- a Heat pump outdoor unit
 b Refrigerant piping
 c VRF indoor unit
 d Wired controller (optional)
 e SV box
 f Centralized control (optional)
 g Alarm (Customer self-provision)

Fig. 5 – Case 1: Outdoor Unit is Connected with VRF Indoor Unit ^{A260227}

Operating Instructions

Operating Range

Table 4 – Operating Range

IDU Type	Common Indoor Unit	
Mode	Cooling Mode	Heating Mode
Outdoor Temperature	5 to 126°F (-12 to 52°C)	-22 to 86°F (-30 to 30°C)
Indoor Temperature	61 to 90°F (16 to 32°C)	59 to 86°F (15 to 30°C)
Indoor Humidity	≤80%*	

*. Condensate might form on the unit's surface if the humidity is above 80%.

! NOTICE

The safety device will be triggered if the temperature or humidity exceeds these conditions, and the air conditioner may not run.

Operating System

System Operations

The operating program varies with different combinations of outdoor unit and controller.

To protect this unit, please turn on the main power supply 12 hours before you start to operate this unit.

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 Operations

The indoor units in the air conditioner can be controlled separately, but the indoor units in the same system cannot operate in the heating and cooling modes at the same time.

When the cooling and heating modes conflict, the mode is determined based on the setting of the "Menu mode" of the outdoor unit.

Table 5 – Outdoor Unit Menu Modes

Automatic priority mode	Automatic selection of heating or cooling priority based on the ambient temperature.
Cooling priority mode	When you select the cooling mode as the priority mode, the heating operations of the indoor unit stop running, while the cooling mode will operate as usual;
No.63 (VIP indoor unit) + voting priority mode	If the indoor unit assigned to address number 63 is operating in cooling or heating mode, the mode of the system will be the same as the mode of the indoor unit assigned to address number 63. If the indoor unit assigned to address number 63 is in thermo off mode, the model of the system will reflect the mode of the majority of the other addressed indoor units.
In response to heating only mode	Indoor units which are set to heating mode will operate normally, while indoor units in the cooling or fan mode will display the "E0 mode conflict error".
In response to cooling only mode	Indoor units which are set to cooling and fan modes will operate normally, while indoor units in the heating mode will display the "E0 mode conflict error".
Heating priority mode	Indoor units which are set to cooling or fan mode will stop running, while indoor units in the heating mode will run as usual.
Change over	Only applicable to R454b series indoor unit, must set the No.63 (VIP indoor unit). The operation mode of non-VIP indoor units cannot be selected by the wired controller even if the outdoor unit is not running.
Voting priority mode	The mode that the majority of indoor units are currently using will be the priority operating mode of the system.
First on priority mode	The operating mode of the first running Indoor unit will be regarded as the priority operating mode of the system.
Capability requirements priority mode	The mode of the indoor unit that is running to meet the most demands at a point in time is adopted as a priority mode of the system.

Heating Operations

Heating usually takes longer than cooling.

Perform the following operations to prevent the heating capacity from dropping or to prevent the system from outputting cold air.

Defrost Operation

While heating is in use, as the outdoor temperature decreases, frost may form on the heat exchanger in the outdoor unit, making it more difficult for the heat exchanger to heat the air. This decreases the heating capacity, and the system will need to be defrosted to provide sufficient heat to the indoor unit. At this point, the indoor unit's display screen will show the defrost operation.

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

! NOTICE

- When there is a drop in the external temperature, the heating capacity decreases. If this happens, please use another heating device and the unit at the same time. (Make sure the room is well ventilated if you are using equipment that produces fire.) Do not place any equipment that may produce a flame where the air outlets of the unit are or below the unit itself.
- Once the unit starts, it takes some time for the room temperature to rise, as the unit uses a hot air circulation system to heat the room.
- If the hot air rises to the ceiling, causing the ground area to become cold, it is recommended that you use a circulating device (to circulate the indoor air). Please contact the agent for details.

Operating System

- Press the "switch" button on the controller. Result: The running light turns on and the system starts to operate.
- Repeatedly press the mode selector on the controller to select the required operation mode.

Stop

Press the "switch" button on the controller again.

Result: The running light is now off, and the system stops

running.

NOTICE

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

Adjust

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

Dry Program

System Operations

The function of this program uses the minimum temperature drop (minimum indoor cooling) to lower the humidity in the room.

In the drying process, the system automatically determines the temperature and fan speed (the settings cannot be implemented through the user interface).

Dry Operations

Start

1. Press the switch button on the controller. Result: The running light turns on and the system starts operating.
2. Repeatedly press the mode selector on the controller.
3. Press the button to adjust the air flow direction (this function is not available for all indoor units).

Stop

4. Press the switch button on the user interface again.
Result: The running light is now off, and the system has stopped running.

WARNING

Do not touch the air outlet or the horizontal blade when the fan is operating in swing mode. Your fingers could become caught in the unit or the unit could be damaged.

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: R-454B

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.

NOTICE

Do not check or repair the unit on your own.

Please get qualified professionals to conduct any checks or repairs.

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.

WARNING

- When the fuse melts, do not use any unspecified fuses or other wires to replace the original fuse. 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 switch 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.

Maintenance After the Unit has Been Shut Down for a Long Period

For example, in early summer or winter.

- Check for and remove all objects that could 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 operating this unit to ensure that the unit runs smoothly. The user interface is displayed once the power is turned on.

Maintenance Before the Unit is Shut Down for a Long Period

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. 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.

About the Refrigerant

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

Refrigerant Type: R-454B

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 contains the warranty card that was completed by the agent during installation. The customer must check the completed warranty card and retain it properly.

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

Recommended Maintenance and Inspection

Using the unit for many years will eventually cause a dust layer to develop, which will cause the performance of the unit to degenerate to a certain extent.

As professional skills are needed to dismantle and clean the unit, and to ensure optimal maintenance of this unit, please contact your agent for more details.

When you request the agent for assistance, please remember to state:

- The complete model name of the air conditioner.
- Date of installation.
- Details of the fault symptoms or errors, and any defects.

! 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 an agent.
- If the refrigerant accidentally leaks, make sure that there is no open flame around the unit. The 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 flames generated by existing heaters, and burning devices in the room. Request the assistance of qualified maintenance personnel to verify that the point of leakage has been repaired or rectified before you restore the operations of the unit.

Shorter Maintenance and Replacement Cycle

The “maintenance cycle” and “replacement cycle” may be shortened if the unit is used in the following situations:

- Temperature and humidity fluctuations are outside the normal ranges.
- 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 gas, or oil such as sulfite and hydrogen sulphide.
- The unit is frequently turned on and off of unit or the operating time is too long (in places where the air conditioning is on for 24 hours a day).

Troubleshooting

The warranty does not cover the damage caused by dismantling or cleaning of the internal components by unauthorized agents.

! WARNING

- When any unusual situations arise (burning smell, etc.), stop the unit immediately and turn off the power.
- As a result of a certain situation, the unit has caused damage, an electric shock, or a fire. Please contact the agent.

The system maintenance must be carried out by qualified maintenance personnel:

Table 6 – System Maintenance

Symptom	Measures
The safety device, such as a fuse, circuit breaker or a leakage circuit breaker is triggered frequently or the ON/OFF switch is not working properly.	Turn off the main power switch.
The operating switch is not functioning normally.	Turn off the power supply.
The unit number is displayed on the user interface, and the operating indicator is flickering, and an error code is shown on the screen as well.	Notify the installation personnel and report the error code.

Other than the above-mentioned situations, and where the fault is not obvious, if the system continues to malfunction, carry out the following steps to investigate.

Table 7 – System Maintenance Continued

Symptom	Measures
The system does not run at all.	Check if there is a power failure. Wait for the power supply to be restored. If a power failure occurs when the unit is still running, the system will restart automatically once the power is restored. Check if the fuse is broken or if the circuit breaker is working. If necessary, replace the fuse or reset the circuit breaker.
The system works fine in the fan-only operating mode but stops running once it enters the heating or cooling mode.	Check if the air inlets or outlets of the outdoor or indoor units are blocked by any obstacles. Remove the obstacles, and maintain good ventilation in the room.
The system is running but there is poor cooling or heating effect.	- Check if the air inlets or outlets of the outdoor or indoor units are blocked by any obstacles. - Remove the obstacles, and maintain good ventilation in the room. - Check if the filter is blocked (please refer to the "Maintenance" section in the manual of the indoor unit). - Check the temperature settings. - Check the fan speed settings on the user interface. - Check if the doors and windows are open. Close the doors and windows to shut out the wind from the external environment. - Check if there are too many people in the room when the cooling mode is in operation. Check if the heat source of the room is too high. - Check if there is direct sunlight shining into the room. Use curtains or blinds. - Check that the angle of air flow is appropriate.

Error Code: Overview

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

Table 8 – Outdoor Unit Error Code

Error Code	Error Description	Manual Restart Required
A01	Emergency stop	NO
xA61	Address (x) of the slave unit error	NO
AAx	No.x driver mismatch,	NO
xb53	No.(x) Heat dissipation fan error	YES
C13	Outdoor unit address is repeated	NO
C21	Communication error between indoor and master unit	NO
C26	Number of indoor units detected by master unit has decreased or less than the setting amount	NO
C28	Number of indoor units detected by master unit has increased or more than the setting amount	NO
xC31	Communication error of address X slave outdoor unit	NO
C32	Number of slave units detected by master unit has decreased	NO
C33	Number of slave units detected by master unit has increased	NO
xC41	Communication error between main control chip and No.(x) inverter driver chip	NO
E41	Outdoor ambient temperature sensor (T4) error (open/short)	NO
F31	Microchannel heat exchanger outlet temperature sensor(T6B) error (open/short)	NO
F41	Main heat exchanger pipe temperature sensor (T3) error (open/short)	NO
F51	Microchannel heat exchanger inlet temperature sensor(T6A) error (open/short)	NO
F62	Inverter module temperature (NTC) protection	NO
F63	Non-inductance Resistor temperature (Tr) protection	NO
F6A	F62 protection occurs 3 times in 100 minutes	YES
xF71	No.(x) compressor discharge temperature sensor (T7C) error (open/short)	YES
xF72	No.(x) compressor discharge temperature (T7C) protection	NO
F75	Compressor discharge insufficient superheat protection	NO
F7A	F72 protection occurs 3 times in 100 minutes	YES
F81	Gas stop-valve temperature sensor (Tg) error (open/short)	NO
F91	Liquid pipe temperature sensor (T5) error (open/short)	NO
FA1	Outdoor heat exchanger inlet temperature sensor (T8) error (open/short)	NO
FC1	Outdoor heat exchanger outlet temperature sensor (TL) error (open/short)	NO
xFd1	No.(x) Compressor suction temperature sensor (T7) error (open/short)	NO
FL1	T10 outdoor ambient temperature sensor fault (open circuit/short circuit)	NO
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
P24	Suction pipe low pressure abnormal rise	NO
P25	P22 protection occurs 3 times in 60 minutes	YES
xP32	No. (x) compressor high DC bus current protection	NO
xP33	xP32 protection occurs 3 times in 100 minutes	YES
P51	High AC voltage protection	NO
P52	Low AC voltage protection	NO
P53	Phase B and N of the power cable are connected to the opposite protection	NO
P54	DC bus low voltage protection	NO
P55	DC bus ripple over protection	NO
xP56	No. (x) Inverter module DC bus low voltage error	NO
xP57	No. (x) Inverter module DC bus high voltage error	NO
xP58	No. (x) Inverter module DC bus excessively high voltage error	NO
xP59	No. x inverter module bus voltage drop fault	NO
P71	EEPROM error	YES
Pb1	HyperLink overcurrent error	NO
Pd1	Anti-condensation protection	NO
Pd2	Pd1 protection occurs 2 times in 60 minutes	YES
1b01	Electronic expansion valve (EEVA) error	YES
2b01	Electronic expansion valve (EEVB) error	YES
3b01	Electronic expansion valve (EEVC) error	YES
4b01	Electronic expansion valve (EEVE) error	YES
bA1	HyperLink cannot control indoor unit's electronic expansion valve	NO

NOTE: 'x' is a placeholder for the fan or compressor address, with 1 representing fan A or compressor A and 2 representing fan B or compressor B.

Table 9 – Installation and Debugging Error Code

Error Code	Error Description	Manual Restart Required
U11	Outdoor unit type setting error	YES
U12	Capacity setting error	YES
U21	The system contains the 1st generation indoor unit or the indoor units address are repeated	YES
U22	Only hydraulic module available for system IDUs	YES
U23	Common IDU and constant temperature and humidity modular AHU in the system	YES
U24	Common IDU and reheat type fresh air modular AHU in the system	YES
U25	Non-common IDU in the system	YES
U26	IDU and ODU mismatch	YES
U31	No test run or unsuccessful test run, please re-enter the test run	YES
U32	Outdoor temperature out of operating range	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	YES
U3b	The installation environment is abnormal	YES
U3C	Auto mode error	NO
U41	Common indoor unit exceeds the allowable connection range	YES
U42	Fresh Air Processing indoor unit exceeds the allowable connection range	YES
U43	AHU kit (discharge air temperature control) is out of the allowable connection range	YES
U44	AHU kit (return air temperature control) is out of the allowable connection range	YES
U45	Constant temperature and humidity modular AHU (with outlet air temperature control) combination ratio out of range	YES
U46	Reheat type fresh air modular AHU (with outlet air temperature control) combination ratio out of range	YES
U48	The total capacity of the indoor unit is out of the allowable connection range	YES
U51	Detected more than one outdoor unit in the individual VRF system	YES
U53	Detected different series outdoor units in the same VRF system	YES
U54	Number of SV on heat pump ODU ≥ 1	YES

Table 10 – Compressor Driver Error Code

Error Code	Error Description	Manual Restart Required
xL01	xL1* or xL2* error occurs 3 times in 60 minutes	YES
xL11	Software overcurrent	NO
xL12	Software overcurrent protection lasting 30s	NO
xL1E	Hardware overcurrent	NO
xL2E	Module over-temperature protection	NO
xL33	Bus voltage drop fault	NO
xL43	The current sampling bias is abnormal	NO
xL45	Motor code mismatch	NO
xL46	IPM protection (FO)	NO
xL47	Module type mismatch	NO
xL4E	EEPROM error	NO
xL51	Out-of-step error	NO
xL52	Locked-rotor protection	NO
xL5E	Startup failed	NO
xL65	IPM short circuit	NO
xL66	FCT test fault	NO
xL6E	Motor phase loss protection	NO
xL71	U-phase upper driver open circuit	NO
xL76	W-phase lower driver open circuit	NO
xLB7	Other check exceptions	NO
xLBE	High voltage switch operation	NO
xLBF	Software certification module failure	NO

NOTE: 'x' is a placeholder for the compressor address, with 1 representing compressor A and 2 representing compressor B.

Table 11 – Fan Motor Error Code

Error Code	Error Description	Manual Restart Required
xJ01	xJ1* or xJ2* error occurs 10 times in 60 minutes	YES
xJ11	Software overcurrent	NO
xJ12	Software overcurrent protection lasting 30s	NO
xJ1E	Hardware overcurrent	NO
xJ2E	Inverter module high temperature protection	NO
xJ33	Bus voltage drop fault	NO
xJ43	The current sampling bias is abnormal	NO
xJ4E	EEPROM error	NO
xJ51	Out-of-step error	NO
xJ52	Locked-rotor protection	NO
xJ5E	Startup failed	NO
xJ6E	Motor phase loss protection	NO
xJBJ	Software certification module failure	NO

NOTE: 'x' is a placeholder for the fan address, with 1 representing fan A and 2 representing fan B.

Table 12 – Status Code

Status Code	Code Description	Manual Restart Required
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
d37	IDU connected to system is not common	NO
d38	Too low proportion of running IDUs	NO
d39	Failed to detect refrigerant amount during backup	NO
d41	System exist no power indoor unit, HyperLink is controlling this indoor unit's valve	NO
d42	Communication error between the outdoor unit and the optional board	NO

Fault Symptom: Non-Air-Conditioning Issues

The following fault symptoms are not caused by the air conditioning:

Fault Symptom: System Cannot Run

The air conditioner does not start immediately after pressing the switch button on the controller. If the operating indicator lights up, the system is working normally. To prevent overloading of the compressor motor, restart the air conditioner 12 minutes after the switch button is pressed to prevent it from shutting down immediately after it turns on. The same start-up delay occurs after the mode selector is pressed.

Fault symptom: Fan Speed is Not Consistent With The Setting

Even if the fan speed regulation button is pressed, the fan speed does not change. During heating, when the indoor temperature reaches the set temperature, the outdoor unit will shut down, and the indoor unit switches to the quiet fan speed mode. This is to prevent cold air from blowing directly at the room user. The fan speed will not change even when another indoor unit is heating, if the button is pressed.

Fault Symptom: Fan direction is Not Consistent With the Settings

The air direction is not consistent with the user interface display. The air direction does not swing. This is because the unit is controlled by the centralized controller.

Fault Symptom: A Unit is Emitting White Smoke (Indoor Unit)

When cooling during high humidity, if the interior pollution of the indoor unit is severe, the indoor temperature distribution will be uneven. The interior of the indoor unit should be cleaned. Ask the agent for detailed information on how to clean the unit. This operation must be carried out by qualified maintenance personnel.

Surface immediately after cooling has stopped and when the indoor humidity is relatively low. This is due to the steam produced by the warm refrigerant gas on its return path to the indoor unit.

Fault Symptom: A Unit is Emitting White Smoke (Indoor Unit, Outdoor Unit)

After defrosting, switch the system to the heating mode. The moisture produced by the defrosting operation will become steam which is discharged out of the system.

Fault Symptom: The Air Conditioner is Producing Noise (Indoor Unit)

A sound is heard the moment the system is powered on. This noise is produced by the electronic expansion valves inside the indoor unit as they begin to work. The sound volume will be reduced in about 1 minute.

A soft and continuous sound can be heard when the system is in cooling mode or has stopped running. This noise can be heard when the drainage pump is running (optional accessory).

A loud creaking sound can be heard once the system stops after it has heated up the room. The expansion and contraction of plastic parts caused by temperature changes will also make this noise.

Once the indoor unit stops, a soft sound can be heard. This noise can be heard when another indoor unit is still running. A small amount of refrigerant flow must be maintained to prevent oil and refrigerant residues in the system.

Fault Symptom: Noise From Air Conditioner (Indoor Unit, Outdoor Unit)

A soft, continuous hissing sound can be heard when the system is in cooling or defrosting operation. This is the sound of the refrigerant gas flowing in the indoor and outdoor units.

A hissing sound is heard the moment the system starts or stops operation or after the defrosting operation has been completed. This is the noise produced when the refrigerant flow is stopped or changed.

Fault Symptom: Noise From Air Conditioner (Outdoor Unit)

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

Fault Symptom: Dust and Dirt in the Unit

When using the unit for the first time, this is because there is dust inside the unit.

Fault Symptom: The Unit is Emitting a Strange Odor

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

Sometimes small animals stray into the unit, which can also cause odors.

Fault Symptom: ODU Fan Does Not Run

In the course of operation. Control the speed of the fan motor to optimize the product operations.

Fault Symptom: Hot Air is Felt When the Indoor Unit Stops

Different types of indoor units are operating in the same system. When another unit is running, part of the refrigerant will still flow through this unit.

Changing Installation Site

Please contact the agent to dismantle and reinstall the units. You need specialized skills and technology to move the units.

Disposal

The unit uses hydrogen fluorocarbons. Please contact the agent when you want to dispose the unit. Based on the requirements of the law, the collection, transportation and disposal of refrigerants must be in accordance with the regulations governing the collection and destruction of hydrofluorocarbons.

INSTALLATION MANUAL

Overview

Notice to Installation Personnel

Overview

If you are uncertain about how to install or run the unit, please contact the agent.

WARNING

- Make sure the installation, testing and materials used comply with applicable laws.
- Plastic bags should be disposed of properly. Keep away from children. Potential risk: Asphyxia.
- Do not touch the refrigerant piping, water piping or internal parts while the unit is operating or immediately after it has finished operating. The unit could be very hot or cold. Let it return to a normal temperature first. If you need to touch the unit, wear protective gloves.
- Do not touch leaked refrigerant.

CAUTION

- Please wear the appropriate personal protective tools during installation, maintenance or repair of the system (protective gloves, safety glasses, etc.).
- Do not touch the air inlet or aluminum fin of the unit.

NOTICE

- The figure shown in this manual is for reference only and may be slightly different from the actual product.
- Improper installation or connection of equipment and accessories may cause electrical shock, short circuits, leaks, fires, or other damage to the equipment. Use only accessories, equipment and spare parts made or approved by the manufacturer.
- Take appropriate measures to prevent small animals from entering the unit. Contact between small animals and electrical components may cause the system to malfunction, leading to smoke or fire.
- Do not place any object or equipment on top of the unit.
- Do not sit, climb, or stand on the unit.
- The operation of this equipment in a residential environment could cause radio interference.

Installation Site

- Provide sufficient space around the unit for maintenance and air circulation.
- Make sure the installation site can bear the weight and vibrations of the unit.
- Make sure the area is well ventilated.
- Make sure the unit is stable and level.

Do not install the unit in the following locations:

- An environment in which there is a potential risk of explosions.
- Where there is equipment emitting electromagnetic waves. Electromagnetic waves may disrupt the control system, and cause the unit to malfunction.
- Where there are existing fire hazards such as leakage of flammable gases, carbon fibers, and combustible dust (such as diluents or gasoline).

- Where corrosive gases (such as sulfurous gases) are produced. Corrosion of copper pipes or welded parts may lead to refrigerant leakage.

Refrigerant

WARNING

During the test, do not exert a force greater than the maximum allowed pressure on the product (as shown on the nameplate).

CAUTION

Specialized tools are required for the installation of air conditioner with new refrigerant (R-454B).

THIS AIR CONDITIONER ADOPTS THE NEW HFC REFRIGERANT(R-454B) WHICH DOES NOT DESTROY THE OZONE LAYER.

The characteristics of R-454B 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 (R-454B): For connecting pipes, use new and clean piping designed for R-454B, 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

- Take appropriate precautions to prevent refrigerant leakage. If the refrigerant gas leaks, ventilate the area immediately. Possible risks: An excessively high concentration of refrigerant in an enclosed area can lead to anoxia (oxygen deficiency). The refrigerant gas may produce a toxic gas if it comes in contact with fire.
- Refrigerant must be recovered. Do not release it into the environment. Use the vacuum pump to draw the refrigerant out from the unit.

NOTICE

- Make sure the refrigerant piping is installed in accordance with the applicable law.
- Make sure the piping and connections are not placed under pressure.
- After all the piping has been connected, check to make sure there are no gas leaks. Use nitrogen to conduct the leak check for gas.
- Do not charge refrigerant before the wiring layout is completed.
- Only charge the refrigerant after the leak tests and vacuum drying have been completed.
- When charging the system with refrigerant, do not exceed the allowable charge to prevent liquid slugging.

- Do not charge more than the specified amount of refrigerant. This is to prevent the compressor from malfunctioning.
- The refrigerant type is clearly marked on the nameplate.

- The unit is charged with refrigerant when it is shipped from the factory. But depending on the piping dimensions and length, the system may require additional refrigerant.
- Only use tools specific to the type of system refrigerant to make sure the system can withstand the pressure, and prevent foreign objects from entering the system.
- Follow the steps below to charge the liquid refrigerant:
Open the refrigerating cylinder slowly.
Charge the liquid refrigerant. Charging with gas refrigerant may hamper normal operations.

CAUTION

Once refrigerant charging is completed or suspended, close the refrigerant tank valve immediately. The refrigerant may volatilize if the refrigerant tank valve is not closed in time.

Electricity

 WARNING

- Make sure you switch off the power of the unit before you open the electric control box, and access any circuit wiring or components inside. At the same time, this prevents the unit from being accidentally powered up during installation or maintenance work.
- Once you open the cover of the electric control box, do not let any liquid spill into the box, and do not touch the components in the box with wet hands.
- Cut off the power supply more than 10 minutes prior to access the electrical parts. Measure the voltage of the main circuit capacitor or electrical component terminals to make sure the voltage is less than 36 V before you touch any circuit components. Refer to the connections and wiring on the nameplate for the master circuit terminals and connections.
- The installation must be completed by professionals, and must comply with local laws and regulations.
- Make sure the unit is properly grounded, in compliance with local laws.
- Use only copper core wires for installation.
- Wiring must be carried out in accordance with what is stated on the nameplate.
- The unit does not include a safety switch device. Make sure a safety switch device that can completely disconnect all polarities is included in the installation, and that the safety device can be completely disconnected when there is excessive voltage (such as during a lightning strike).
- Make sure the wiring ends are not subjected to any external force. Do not pull or squeeze the cables and wires. At the same time, make sure the wiring ends are not in contact with the piping or sharp edges of the sheet metal.
- Do not connect the grounding wire to public pipes, telephone ground wires, surge absorbers and other places that are not designed for grounding. Improper grounding could lead to electrical shock.
- Use a dedicated power supply cord for the unit. Do not share the same power source with other equipment.
- A fuse or circuit breaker must be installed, and these must conform to local laws.
- Make sure an electric leakage protection device is installed to prevent electrical shock or fire. The model specifications and characteristics (anti high-frequency noise characteristics) of the electric leakage protection device are compatible with the unit to prevent frequent tripping.
- Make sure a lightning rod is installed if the unit is placed on the roof or other places that can be easily struck by lightning.

 WARNING

- Make sure all terminals of the components are firmly connected before you close the cover of the electric control box. Before you power on and start the unit, check that the cover of the electric control box is tight and secured properly with screws. Do not let any liquid spill into the electric control box, and do not touch the components in the box with wet hands.
- The appliance shall be installed in accordance with national wiring regulations.
- 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 hazards.
- An all-pole disconnection switch with a contact separation of at least 3mm in all poles should be connected in fixed wiring.
- The dimensions of the space necessary for correct installation of the appliance including the minimum permissible distances to adjacent structures.
- The temperature of the refrigerant circuit will be high. Please keep the interconnection cable away from the copper tube.

 NOTICE

- Do not install the power cord near equipment that is susceptible to electromagnetic interference, such as TV, and radios to prevent interference.
- Use a dedicated power supply cord for the unit. Do not share the same power source with other equipment. A fuse or circuit breaker must be installed, and these must conform to local laws.

 NOTICE

The installation manual is only a general guide on the wiring and connections, and is not specifically designed to contain all information regarding this unit.

Notice to Users

- If you are unsure how to run the unit, please contact the installation personnel.
- This unit should not be operated by people who lack sufficient physical strength, cognitive sense or mental ability, or who lack experience and knowledge (including children). For their own safety, they should not use this unit unless they are supervised or guided by someone who is in charge of their safety. Children must be monitored to ensure that they do not play with this product.

 WARNING**To prevent electrical shock or fire:**

- Do not wash the electric box of the unit.
- Do not operate the unit with wet hands.
- Do not place any items that contain water on the unit.

 NOTICE

- Do not place any object or equipment on top of the unit.
- Do not sit, climb, or stand on the unit.

Packing Box

Overview

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

This specifically includes the following information:

- Unboxing and handling the outdoor unit.
- Taking out the accessories of the outdoor unit.
- Dismantling the transport rack.

Remember the following:

- Report any damage immediately to the carrier's claim agent.
- Transport the packaged unit as close as possible to its final installation site to prevent damage during the handling process.
- Take note of the following items when transporting the unit:



A260228 Fragile. Handle with care.



A260229 Keep the unit with its front facing upwards so as not to damage the compressor.

- Select the unit transportation path in advance.
- As shown in the following figure, it is better to use a crane and two long belts to lift the unit. Handle the unit carefully to protect it, and note the position of the center of gravity of the unit.

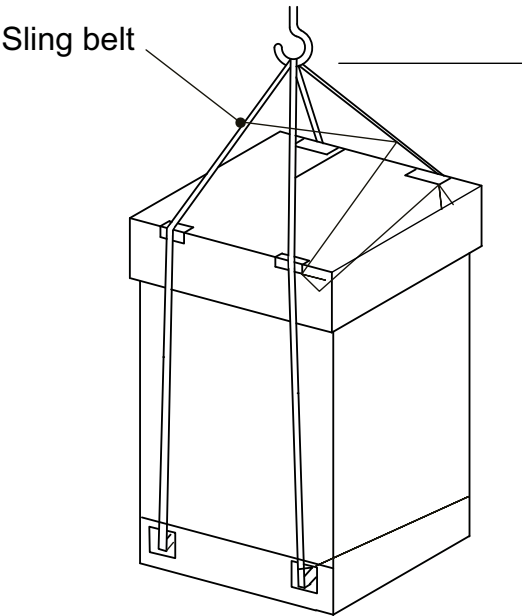


Fig. 6 – Lifting the Unit

A260230

Table 13 – Center of Gravity Figure Dimensions

Model	A	B	C	D
6-10 Ton	52-3/4 (1340)	32-2/4 (825)	24 (609)	16-3/4 (424)

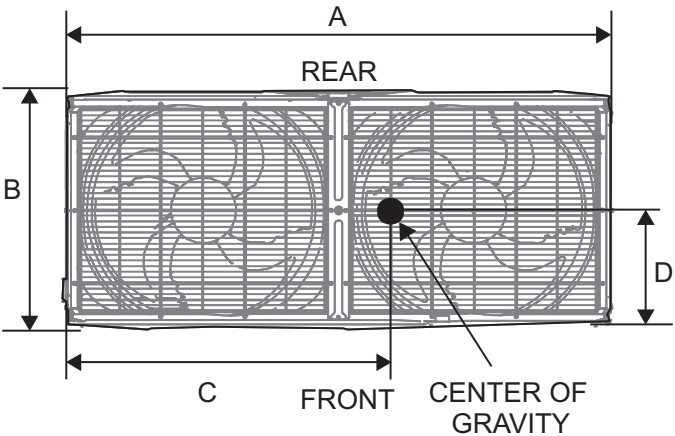


Fig. 7 – Center of Gravity

A260231

! NOTICE

- Use a leather belt that can adequately support the weight of the unit, and has a width $\leq 3/4$ in (20 mm).
- Images are for reference only. Please refer to the actual product.
- Do not remove any packaging while hoisting the unit. Where the unit is not packed or the package is damaged, use a gasket or package to protect the unit.
- The belt must have enough strength to bear the weight of the unit; keep the machine balanced and ensure the unit is lifted safely and stably.

Forklift Method

- To move the unit with a forklift, insert the forks into the opening at the bottom of the unit, as shown in Fig. 8.
- For anti-corrosion models, put a pad on the forks to prevent damage to the bottom frame paint of the unit.

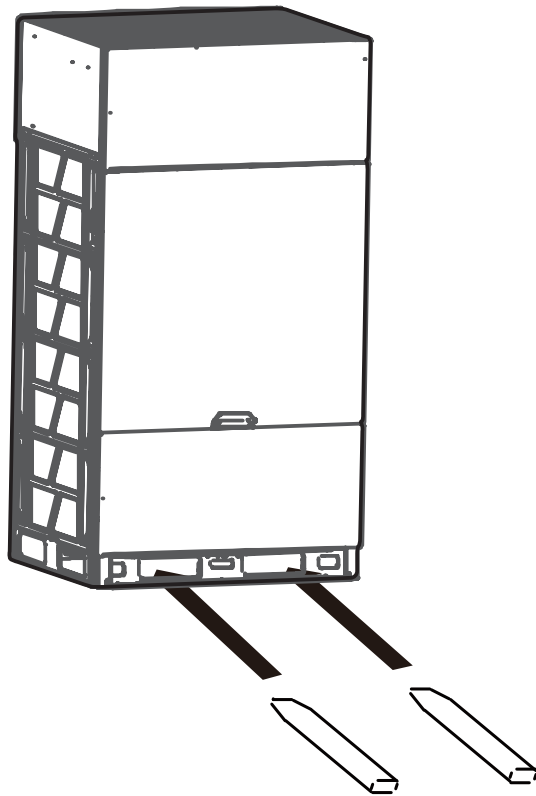


Fig. 8 – Forklift Method

A260232

Unboxing the Outdoor Unit

Take the unit out of the packing materials:

- Be careful not to damage the unit when you use a cutting tool to remove the wrapping film.
- Remove the four nuts on the wooden back stand.



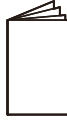
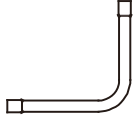
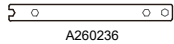
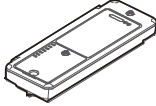
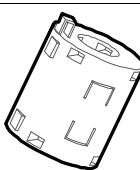
WARNING

Plastic film should be disposed of properly. Keep away from children. Potential risk: Asphyxia.

Taking Out Accessories of Outdoor Unit

The accessories for the unit are stored in two parts. Documents like the manual are located at the top of the unit. Accessories like the pipes are located inside the unit. The unit contains the following accessories:

Table 14 –

Name	Quantity	Appearance	Function
Installation and operation manual	1	 A260233	To explain the processes of installing and operating the unit
L-shaped pipe connection	2	 A260234	To connect gas and liquid pipes
Build-out resistor	1	 A260235	To improve communication stability
Wrench	1	 A260236	To remove the side plate screws
Bluetooth Module	1	 A260237	Refer to attached manual
Magnetic ring	1	 A260238	Improve the EMI effect of communication

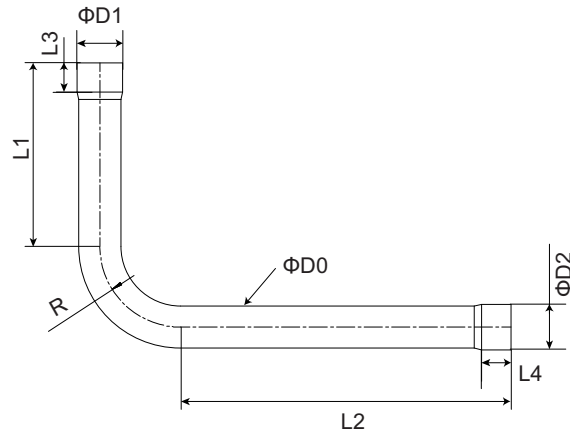


Fig. 9 – L-shaped Pipe Size

A260239

Table 15 – L-shaped Pipe Size (in. (mm))

Ton	Pipe	ΦD0(OD)	L1	L2	L3	L4	ΦD1(ID)	ΦD2(ID)	R
6 Ton	Gas Pipe	1-1/8(28.6)	5(125)	8-7/8(225)	1/2(15)	1/2(15)	1-1/8(28.6)	7/8(22)	2-3/16(55)
	Liquid Pipe	1/2(12.7)	6-1/4(160)	10-7/16(265)	9/16(15)	9/16(15)	1/2(12.7)	1/2(12.7)	1(25)
8-10 Ton	Gas Pipe	1-1/8(28.6)	5(125)	8-7/8(225)	3/4(20)	3/4(20)	1-1/8(28.6)	1-1/8(28.6)	2-3/16(55)
	Liquid Pipe	5/8(15.9)	6-1/8(155)	10-1/16(255)	9/16(15)	9/16(15)	5/8(15.9)	5/8(15.9)	1-3/16(30)

Pipe Fittings

The schematic after the L-shaped pipe (from accessories) is properly connected to the unit is shown below:

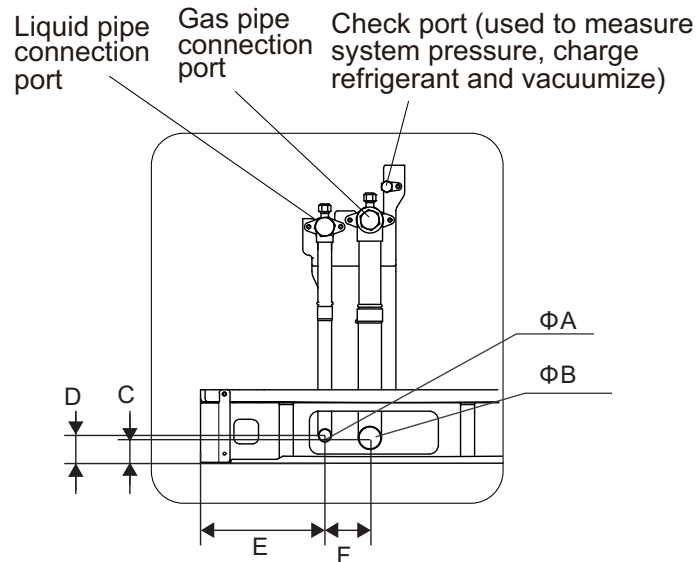


Fig. 10 – L-shaped Pipe Connected to Unit

A260240

Table 16 – L-shaped Pipe Connected to Unit Dimensions

Size	ΦA(ID)	ΦB(ID)	C	D	E	F
6 Ton	1/2 (12.7)	1-1/8 (28.6)	1-5/8 (41)	2-1/2 (65)	8-1/8 (207)	2-7/8 (73)
8-10 Ton	5/8 (15.9)	1-1/8 (28.6)	1-5/8 (41)	2-1/2 (65)	8-1/8 (207)	2-7/8 (73)

Outdoor Unit Combination

Overview

This chapter contains the following information:

- List of branch joint fittings.
- Recommended combination for outdoor units.

Branch Joints

Table 17 – For Combinable Series

Description	Model
Outdoor Unit Branch Joint Assembly	45VM900021
Indoor Unit Branch Joint Assembly	45VM900031
	45VM900032
	45VM900033
	45VM900034
	45VM900035

On the choice of branch joints, refer to section [Selecting and Preparing the Refrigerant Piping on p34](#).

Recommended Outdoor Unit Combination

CAUTION

- The total capacity of the IDU shall be between 50%–150% of the combined capacity of the ODU.
- In the system where all indoor units are running at the same time, the total capacity of the indoor units should be less than or equal to the combined capacity of the outdoor unit to prevent overloading in poor operating conditions or narrow operating space.
- The total capacity of the indoor units can be up to a maximum of 130% of the combined capacity of the outdoor unit for a system where not all the indoor units are operating at the same time.
- If the system is being used in a cold region (ambient temperature is 14°F(-10°C) or below) or a very hot, heavy-load environment, the total capacity of the indoor units should be less than the combined capacity of the outdoor unit.
- The heating capacity of the heat pump will reduce when the outdoor ambient temperature is lowered. Therefore, when installing a heat pump in an area with low temperatures, it is recommended to use the IDU with an auxiliary heater.

Table 18 – Recommended Outdoor Unit Combination

Ton	6	8	10	Max Quantity of Indoor Units
6	X			13
8		X		16
10			X	19
12	XX			23
16		XX		29
20			XX	36

Preparations Before Installation

Overview

This chapter mainly describes the precautions and things to note before the unit is installed at the site.

This mainly includes the following information:

- Choosing and Preparing the Installation Site.
- Selecting and Preparing the Refrigerant Piping.
- Selecting and Preparing the Electrical Wiring.

Choosing and Preparing the Installation Site

Site Requirements for Installation of the Outdoor Unit

- Provide sufficient space around the unit for maintenance and air circulation.
- Make sure the installation site can bear the weight and vibrations of the unit.
- Make sure the area is well ventilated. Make sure the unit is stable and level.
- Choose a place where the rain can be avoided as much as possible.
- The unit should be installed in a location where the noise generated by the unit will not create an inconvenience to people.
- Choose a site that will comply with the applicable laws.

Do not install the unit in the following locations:

- An environment where there is a potential risk of explosions.
- Where there is equipment emitting electromagnetic waves. Electromagnetic waves may disrupt the control system, and cause the unit to malfunction.
- Where there are existing fire hazards like leakage of flammable gases, carbon fibers, and combustible dust (such as diluents or gasoline).
- Where corrosive gases (such as sulphurous gases) are produced. Corrosion of copper pipes or welded parts may lead to refrigerant leakage.
- Where mineral oil mist, spray, or steam may exist in the atmosphere. Plastic parts may age, fall off or cause water leakage.

- Where there is a high salt content in the air such as places near the sea.

! CAUTION

- Electric appliances that should not be used by the general public must be installed in a safe location to prevent others from getting close to these electric appliances.
- Both indoor and outdoor units are suitable for the installation of commercial and light industrial environment.
- An excessively high concentration of refrigerant in an enclosed area can lead to anoxia (oxygen deficiency).

! NOTICE

- This is a class A product. This product may cause radio interference in the home environment. The user may need to take the necessary measures if such a situation does arise.
- The unit described in this manual may cause electronic noise generated by radio frequency energy. The unit conforms to the design specifications and provides reasonable protection to prevent such interference. However, there is no guarantee that there will be no interference during a specific installation process.
- Therefore, it is suggested that you install the units and wires at an appropriate distance from devices like sound equipment and personal computers.

- Do take into considerations adverse environmental conditions such as strong winds, typhoons or earthquakes as improper installation may cause the unit to overturn.
- Take precautions to make sure water will not damage the installation space and environment in the event of a water leakage.
- If the unit is installed in a small room, refer to section “[Safety Measures to Prevent Refrigerant Leaks on p33](#)” to make sure the refrigerant concentration does not exceed the permissible safety limit when there is a refrigerant leak.
- Make sure the air inlet of the unit is not facing the predominant wind direction. Incoming wind will disrupt the operations of the unit. If necessary, use a deflector as an air baffle.
- Add water discharge piping on the base so that the condensed water will not damage the unit, and prevent the pooling of water when work is in progress.

Site Requirements for Installation of Outdoor Unit in Cold Regions

! NOTICE

- Snow protection equipment must be installed in areas with snowfall. Refer to the following figure, (malfunctions are more common when there are insufficient snow protection facilities). In order to protect the unit from accumulated snow, increase the height of the rack, and install a snow shield at the air inlets and outlets.
- Do not obstruct the air flow of the unit when you install the snow shield.

Make note of the following when installing the unit in areas affected by cold weather or snow:

- Avoid directly exposing the air outlet or air inlet to the wind.
- The local maximum snowfall should be taken into consideration when deciding the foundation height of ODU.
- The foundation or base height of the ODU is required to be the expected maximum snowfall thickness $h_0 + 11\frac{3}{4}$ in (300mm), preventing the snow from contacting the bottom of the unit.

Unit: in.mm

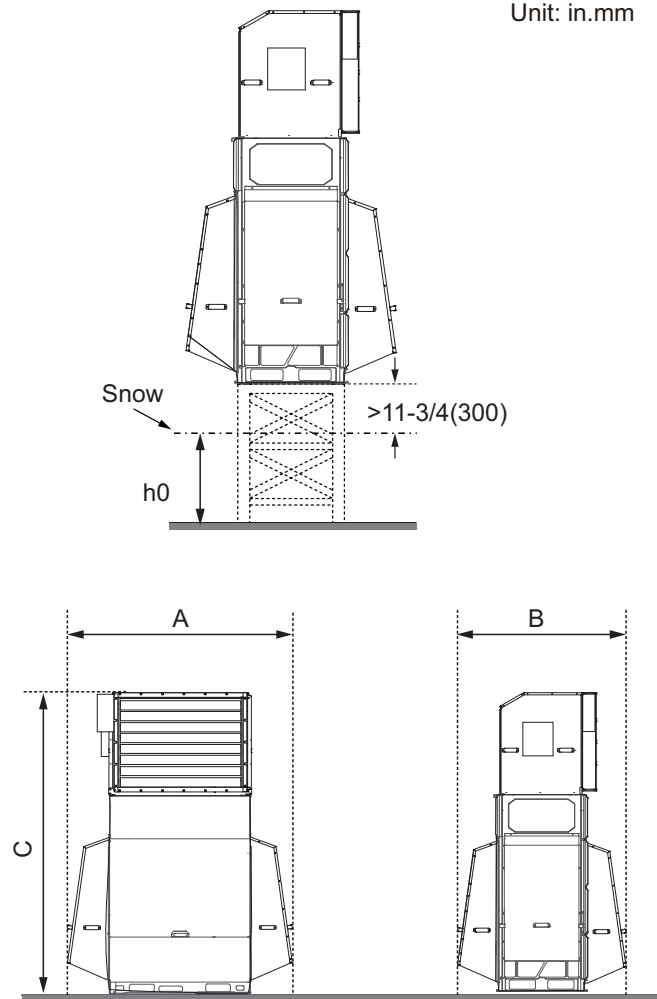


Fig. 11 – Foundation Base Height

A260241

Table 19 – Foundation Base Height Dimensions

Ton Size	A	B	C
6-10	82-1/4 (2090)	47-1/4 (1200)	105-11/16 (2685)

When a snow shield needs to be installed, to ensure smooth air intake and supply of the ODU, conduct site planning and construction as follows:

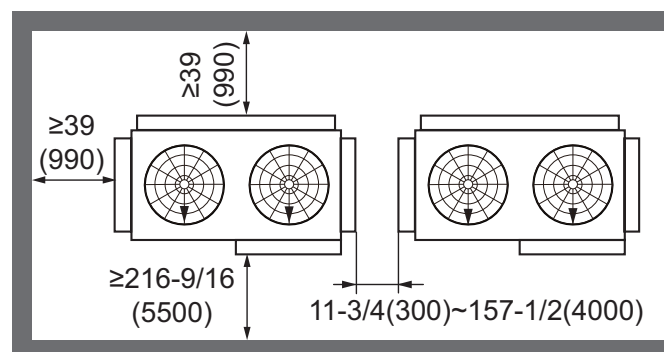


Fig. 12 – Installation of ODUs in a Row

A260242

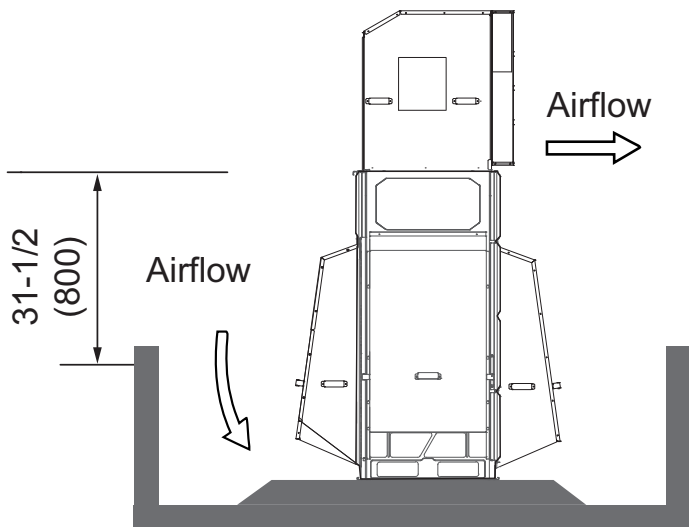


Fig. 13 – Installation of ODUs in a Row (Cont.)

A260243

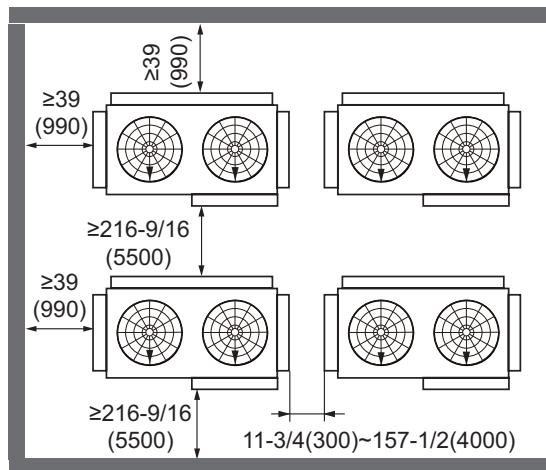


Fig. 14 – Installation of ODUs in Two Rows

A260244

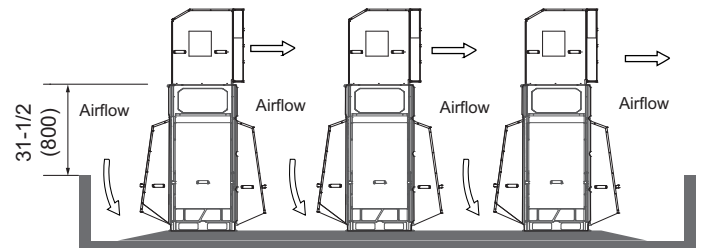
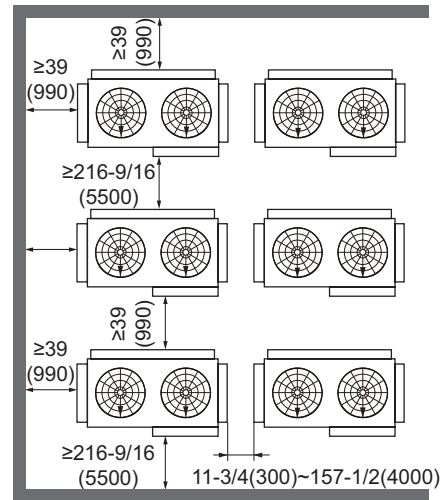


Fig. 15 – Installation of ODUs in Three Rows

A260245

Safety Measures to Prevent Refrigerant Leaks

Safety Measures to Prevent Refrigerant Leaks

The installation personnel must make sure the safety measures to prevent leaks comply with local regulations or standards. If the local regulations do not apply, the following criteria can be applied.

The system uses R-454B as the refrigerant. R-454B itself is a completely non-toxic, and non-combustible refrigerant. However, do ensure that the air conditioning unit is installed in a room with sufficient space. This is so that when there is a serious leak in the system, the maximum concentration of the refrigerant gas in the room will not exceed the stipulated concentration, and is consistent with the relevant local regulations and standards.

About the Maximum Concentration Level

The calculation for the maximum concentration of the refrigerant is directly related to the occupied space that the refrigerant may leak to and the refrigerant's level of charge.

The measurement unit for concentration is kg/m^3 (weight of gaseous refrigerant that has a volume of 1 m^3 in the occupied space).

The highest permissible concentration must comply with the relevant local regulations and standards.

Based on the applicable European standards, the maximum permissible concentration level of R-454B in the space occupied by humans is limited to 0.44 kg/m^3 . If this limit is exceeded, necessary measures shall be taken. Please confirm as follows:

- Calculate the total refrigerant charging amount.
Total refrigerant charging amount = refrigerant charging amount of the unit itself + charging amount calculated according to the pipe length.
- Calculate the indoor volume (based on the minimum volume).
- Calculated refrigerant concentration = (total charging amount / indoor volume).

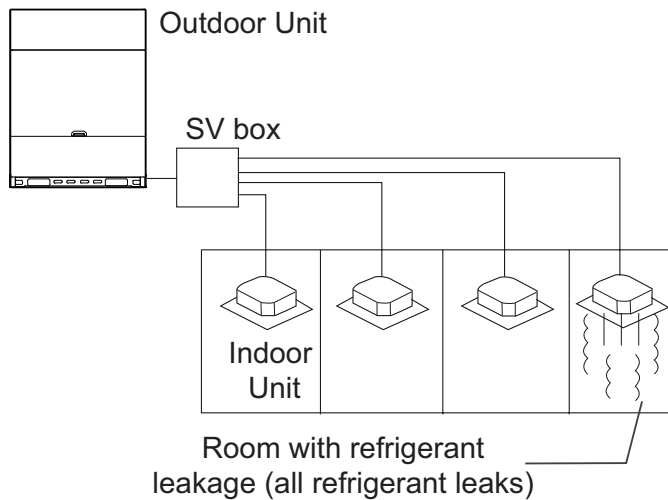


Fig. 16 – Room with Refrigerant Leakage

A260246

Countermeasures When Exceeding the Max Concentration

- Please install a mechanical ventilation device.
- If it is impossible to change air frequently, please install a leak detection alarm device connected with the mechanical ventilation device.

Selecting and Preparing the Refrigerant Piping

Refrigerant Piping Requirements

! NOTICE

- Seal: R-454B 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, R-454b 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/3.28 ft (10 m).
- Calculate all piping lengths and distances.

! NOTICE

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.

! 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.

Allowable Length and Height Difference for Refrigerant Piping

Refer to the following table and figure (for reference only) to determine the appropriate size.

! NOTICE

- The equivalent length of each elbow and U-shape branch joint is 1.64 ft (0.5 m), and the equivalent length of each branch header is 3.28 ft (1 m).
- Install the indoor units such that they are as equidistant as possible on both sides of the U-shape branch joint.
- When the outdoor unit is above the indoor unit, and the level difference exceeds 65.6 ft (20 m), it is recommended that an oil return bend be set up at every 32.8 ft (10 m) interval on the gas pipe of the main piping. The recommended specifications of the oil return bend are shown in Fig. 19.
- The allowable length of the farthest indoor unit to the first branch joint in the system should be equal to or less than 131.2 ft (40 m) unless specified conditions are met, in which case the permitted length is up to 393.7 ft (120 m). Please refer to requirement 2.
- Special-purpose branch joints from the manufacturer should be used for all branch joints. Failing to do so may lead to severe system malfunction.

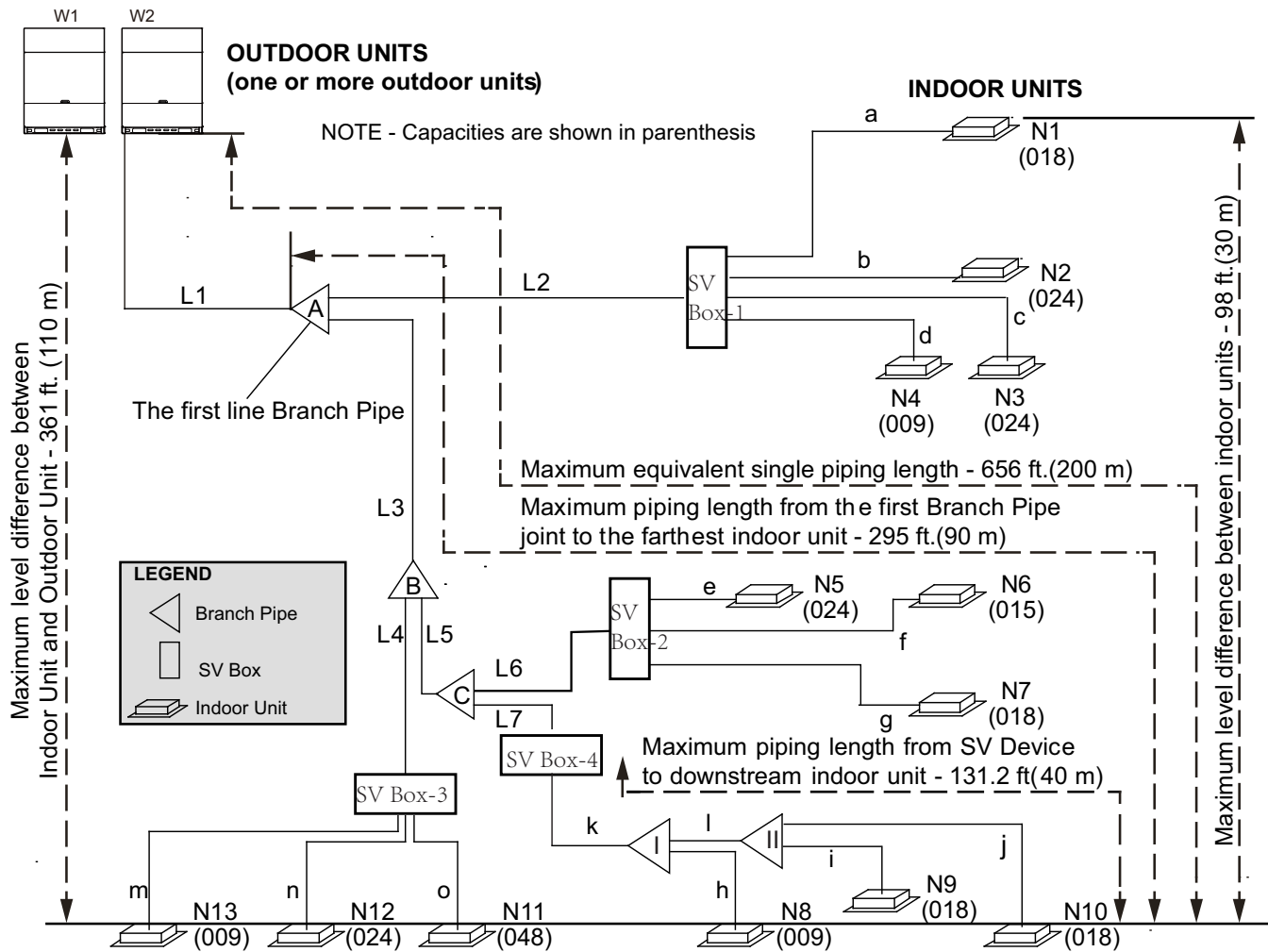


Fig. 17 – Piping Diagram

A260247

Table 20 – Pipe and Component Names and Designations

Pipe and Component Names	Designation
Outdoor Unit Connection Pipe	g1, g2, g3, G1
Outdoor Unit Branch Pipe Assembly	L, M
Main Pipe	*L1
Indoor Unit Main Pipe	L2, L3, L4, L5, L6, L7
Branch Pipe Assembly between Main Pipe and SV Box	A, B, C
Mode Selection SV Box	Box-1, Box-2, Box-3, Box-4
Branch Pipe Assembly between SV Box and Indoor Unit	I, II
Indoor Unit Auxiliary Pipe Between SV Box and Downstream Branch Pipe joint	j
Indoor Unit Auxiliary Pipe from Indoor Unit to the Nearest Branch Pipe Joint or Direct Connected SV Box	a, b, c, d, e, f, h, i, l, m, n
Indoor Unit	N1, N2, N3, etc.

*. When counting the total piping length, double the actual length of the distribution pipes between first branch pipe joint and SV Box: Installation.

Total Piping Length = $L1 + (L2 + L3 + L4 + L5 + L6 + L7) \times 2 + a + b + c + d + e + f + g + h + i + j + k + l + m + n + o \leq 3280 \text{ ft. (1000 m.)}$

NOTE: The first branch in all systems must be centrally located between all SV Boxes.

Table 21 – Summary of Permitted Refrigerant Piping Lengths and Level Differences

Piping Length	Piping Length		Permitted Value	Piping
	Total Piping Length		*3280 ft. (1000 m.)	$L1+(L2+L3+L4+L5+L6+L7) \times 2 + a+b+c+d+e+f+g+h+i+j+k+l+m+n+o$
	Single Piping Length	Actual Length	574 ft (175 m.)	$L1+L3+L5+L7+k+l+j$
		Equivalent Length	†656 ft. (200 m.)	
	Piping Length from the First Branch Joint to the Farthest Indoor Unit		‡132/295 ft. (40/90 m.)	$L3+L5+L7+k+l+j$
Level Difference	Piping Length from SV Box to the Downstream Indoor Unit of Itself		132 ft. (40 m.)	$k+l+j$
	Level Difference Between Indoor Unit and Outdoor Unit	Outdoor Unit Up	**360 ft. (110 m.)	---
		Outdoor Unit Down	††230 ft. (70 m.)	---
	Level Difference Between Indoor Units		98 ft. (30 m.)	---

*. When counting the total piping length, double the actual length of the distribution pipes between first branch pipe joint and SV Box: Installation.

Total Piping Length = $L1+(L2+L3+L4+L5+L6+L7) \times 2 + a+b+c+d+e+f+g+h+i+j+k+l+m+n+o \leq 3280$ ft. (1000 m.)

†. Each Branch Pipe is equivalent to 20 in. (508 mm.).

‡. The maximum allowable piping length from the first Branch Pipe joint to the farthest indoor unit must be ≤ 132 ft. (40 m.), but if the following conditions are met, the maximum allowable length can be extended to 295.2 ft. (90 m.).

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

• The difference in length between the outdoor unit to the farthest indoor unit, and the outdoor unit to the nearest indoor unit is ≤ 132 ft. (40 m.). Example: The farthest indoor unit is N10, the nearest indoor unit is N11 ($L1+L3+L5+L9+k+l+j$) minus $L1+L3+L4+0 \leq 132$ ft. (40 m.)

• Increase the distribution pipe diameter between the first Branch Pipe and SV Box L2-L7. If the pipe diameter is the same as the main outdoor pipe, it does not need to be increased.

• See **Table 22 “Pipe Size Allowable Increase Diameters”** below.

**. When the outdoor unit is higher than the indoor units and the level difference is over 164 ft. (50 m.), it is recommended to set an oil return bend every 32.8 ft. (10 m.) in the gas pipe of the main pipe. Refer to installation instructions for additional details.

††. When the outdoor unit is lower than indoor units and the level difference is more than 132 ft. (40 m.), the main liquid pipe needs to increase by one size.

NOTE: The first branch in all systems must be centrally located between all SV Boxes.

Table 22 – Pipe Size Allowable Increase Diameters

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

- Select the diameter of the main piping.
 - The main pipe (L1) and first indoor branch joint (A) should be sized according to **Table 23** and **Table 24**.

Table 23 – Main Pipe and First Indoor Branch Joint Sizing (Total Liquid Piping Length < 98.4 yd.)

Ton of ODU	Equivalent Length of all Liquid Piping < 98.4 yd.		
	Gas Side in. [mm.]	Liquid Side in. [mm.]	First Indoor Branch Joint
6	Φ3/4[19.05]	Φ3/8[9.52]	45VM900032
8	Φ7/8[22.2]	Φ3/8[9.52]	45VM900032
10	Φ1-1/8[28.58]	Φ1/2[12.7]	45VM900033
12	Φ1-1/8[28.58]	Φ1/2[12.7]	45VM900033
16	Φ1-1/8[28.58]	Φ5/8[15.88]	45VM900033
20	Φ1-3/8[34.93]	Φ5/8[15.88]	45VM900033

Table 24 – Main Pipe and First Indoor Branch Joint Sizing (Total Liquid Piping Length ≥ 98.4 yd.)

Ton of ODU	Equivalent Length of all Liquid Piping ≥ 98.4 yd.		
	Gas Side in. [mm.]	Liquid Side in. [mm.]	First Indoor Branch Joint
6	Φ7/8[22.2]	Φ1/2[12.7]	45VM900032
8	Φ1-1/8[28.58]	Φ1/2[12.7]	45VM900033
10	Φ1-1/8[28.58]	Φ5/8[15.88]	45VM900033
12	Φ1-1/8[28.58]	Φ5/8[15.88]	45VM900033
16	Φ1-3/8[34.93]	Φ3/4[19.05]	45VM900034
20	Φ1-3/8[34.93]	Φ3/4[19.05]	45VM900034

- Select the branch joint diameters for the indoor unit.
Based on the total capacity of the indoor unit, select the branch joint for the indoor unit from the following table.

Table 25 – Branch Joint Diameters

Total Capacity of Indoor Units A (kbtu/h)	Gas Side in. [mm.]	Liquid Side in. [mm.]	Branch Joint
A<18	Φ1/2[12.7]	Φ1/4[6.35]	45VM900031
18≤A<54	Φ5/8[15.9]	Φ3/8[9.52]	45VM900031
54≤A<72	Φ3/4[19.05]	Φ3/8[9.52]	45VM900031
72≤A<111	Φ7/8[22.2]	Φ3/8[9.52]	45VM900032
111≤A<162	Φ1-1/8[28.58]	Φ1/2[12.7]	45VM900033
162≤A<230	Φ1-1/8[28.58]	Φ5/8[15.88]	45VM900033
230≤A<300	Φ1-3/8[34.9]	Φ3/4[19.05]	45VM900034
300≤A<460	Φ1-5/8[41.3]	Φ3/4[19.05]	45VM900035
460≤A	Φ1-5/8[41.3]	Φ7/8[22.2]	45VM900035

If the size of the branch joint pipe selected according to the above table is larger than that of the main pipe according to **Table 23** or **Table 24**, the

size of the branch joint pipe should be reduced to make it the same as the main pipe.

The pipe thickness of the refrigerant piping shall comply with the applicable legislation. The minimal pipe thickness for R-454B piping must be in accordance with the table below.

Table 26 – Minimal Pipe Thickness for R-454B Piping

Piping Outer Diameter (in./mm)	Minimum Thickness in. (mm)	Temper Grade
Φ1/4[6.35]	0.0315 (0.80)	M-type
Φ3/8[9.52]	0.0315 (0.80)	
Φ1/2[12.7]	0.0394 (1.00)	
Φ5/8[15.9]	0.0394 (1.00)	
Φ3/4[19.05]	0.0394 (1.00)	
Φ7/8[22.2]	0.0394 (1.00)	Y2-type
Φ1-1/8[28.58]	0.0394 (1.00)	
Φ1-3/8[34.9]	0.0492 (1.25)	
Φ1-5/8[41.3]	0.0591 (1.50)	

Material: Only seamless phosphorus-deoxidized copper piping that complies with all applicable legislation should be used.

Thicknesses: Temper grades and minimum thicknesses for different diameters of piping should comply with local regulations.

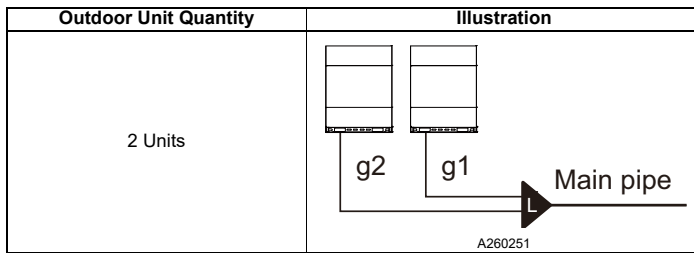
Design pressure of R-454B refrigerant is 4.2MPa (42bar).

If the required pipe size is not available, you can use other diameters by considering the following factors:

- If the standard size is not available in local market, a pipe that is one size larger should be used.
- In some circumstances, the pipe size needs to be one size larger than the standard size; this is the “Size up Size” (for example: when the equivalent length of all the liquid piping is larger than 3-1/2 in., the pipe size needs to be one size up; when the piping length from the farthest indoor unit to the first indoor unit is more than 1-1/2 in., the indoor main pipe size needs to be one size up to allow a piping length of up to 4-3/4 in.). If the “Size up Size” is not available in the local market, the standard size pipe must be used.
- Pipe sizes bigger than the corresponding “Size up Size” cannot be used under any circumstances.
- Calculation for the additional refrigerant must be adjusted according to **Refrigerant Charging on p50** on the determination of the additional refrigerant volume.

- Select the branch joint diameters for the outdoor unit.
Select the branch joint of the outdoor unit from the table below.

Table 27 – For Combinable Series



! NOTICE

For systems with multiple units, the branch joints of the outdoor unit are sold separately.

Table 28 – For Combinable Series

Outdoor Unit Quantity	Total Parallel Capacity of Outdoor Units	Outdoor Connection Pipes Diameter	Branch Joint Kit
2 Units	<20 Ton	6/8 Ton: Φ1-1/8[28.6]/Φ5/8[15.88] 10 Ton: Φ1-1/4[31.8]/Φ3/4[19.05]	45VM900021

4. Indoor unit auxiliary connection pipe.

Table 29 – Indoor Unit Auxiliary Connection Pipe

Indoor Unit Capacity A (kBtu/h)	Gas Side (in. [mm.])	Liquid Side (in. [mm.])
A<24	Φ1/2[12.7]	Φ1/4[6.35]
24≤A<72	Φ5/8[15.9]	Φ3/8[9.52]
72≤A<96	Φ3/4[19.05]	Φ3/8[9.52]
96≤A	Φ7/8[22.2]	Φ1/2[12.7]

! CAUTION

- If the indoor unit capacity exceeds the range in the table above, select the pipe diameter according to the manual of the indoor unit.
- The size of the indoor branch pipe shall not be larger than that of the main pipe. If the size of the main pipe selected according to the above table is larger than that of the main pipe, the size of the branch pipe shall be reduced to make it the same as that of the main pipe.

5. An example of refrigerant piping selection.

The example below illustrates the piping selection procedure for a system consisting of two outdoor units (10Ton+10Ton) and 11 indoor units. The system's equivalent length of all liquid pipes is less than 3-1/2 in.; the piping between the farthest indoor unit and the first indoor branch joint is less than 1-1/2 in. in length, and each indoor auxiliary pipe (from each indoor unit to its nearest branch joint) is less than 32.8 ft. (10 m.) in length.

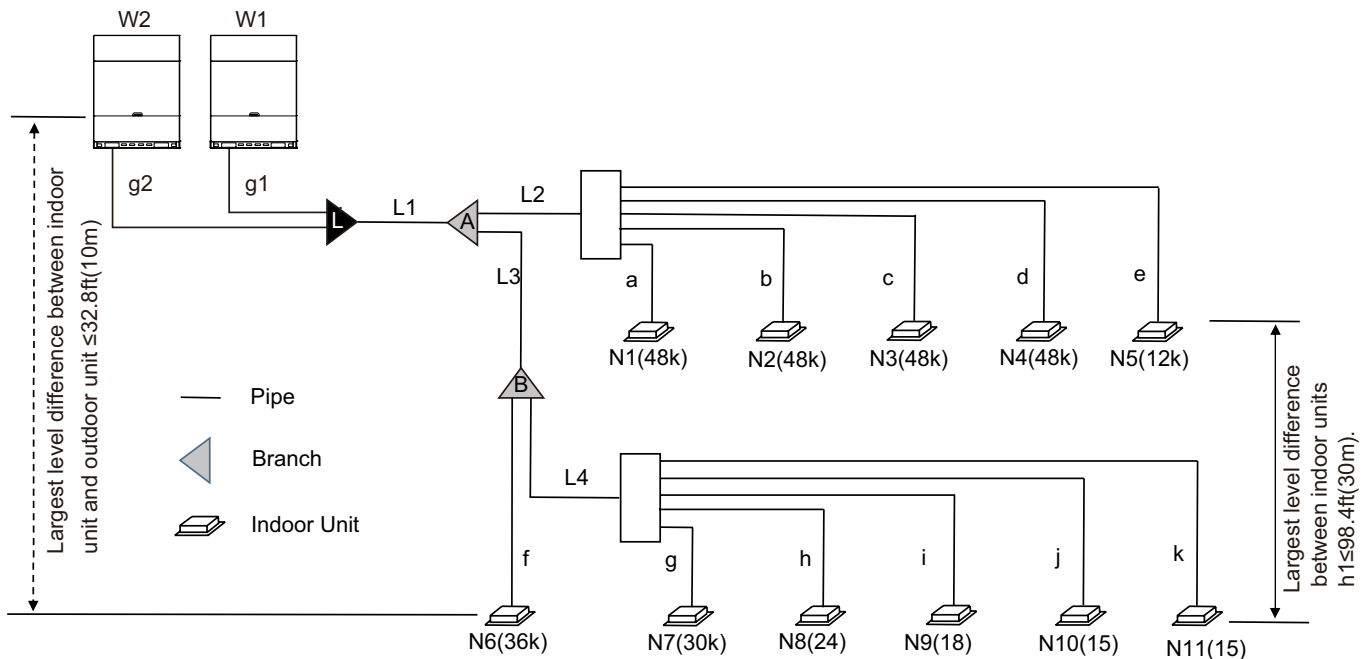


Fig. 18 – Refrigerant Piping Selection Example

Select indoor main pipes and indoor branch B:

- The indoor units (N6 to N11) downstream of indoor branch B have a total capacity of 36+30+24+18+15+15=138 k. Indoor main pipe L6 is Φ1-1/8/Φ1/2. Indoor branch joint F is 45VM900033.

Select the indoor auxiliary connection pipe a to k:

- The capacity of indoor units N1 to N4 and N6 to N8 is equal or larger than 24k, so the indoor auxiliary connection pipe a to i is Φ5/8/Φ3/8.
- The capacity of indoor units N5 and N9 to N11 is less than 24k, so the indoor auxiliary connection pipe j to k is Φ1/2/Φ1/4.

Select main pipe (L1) and first indoor branch A:

- The indoor units (N1 to N11) downstream of indoor branch joint A have a total capacity of 204+138 = 342k. The system's equivalent

length of all liquid pipes is less than 90 m. The total capacity of the outdoor units is 10 + 10= 20 Ton. Main pipe L1 is Φ 1-5/8/Φ3/4. First Indoor branch A is 45VM900034.

Select outdoor connection pipes (g1 and g2) and outdoor branch (L):

- There are two outdoor units in the system. The master unit is 10Ton, the slave unit is 10Ton. Outdoor connection pipes g1 is Φ1-1/4[31.8]/Φ 3/4[19.05], g2 is Φ1-1/4[31.8]/Φ3/4[19.05]. Outdoor branch L is 45VM900032.

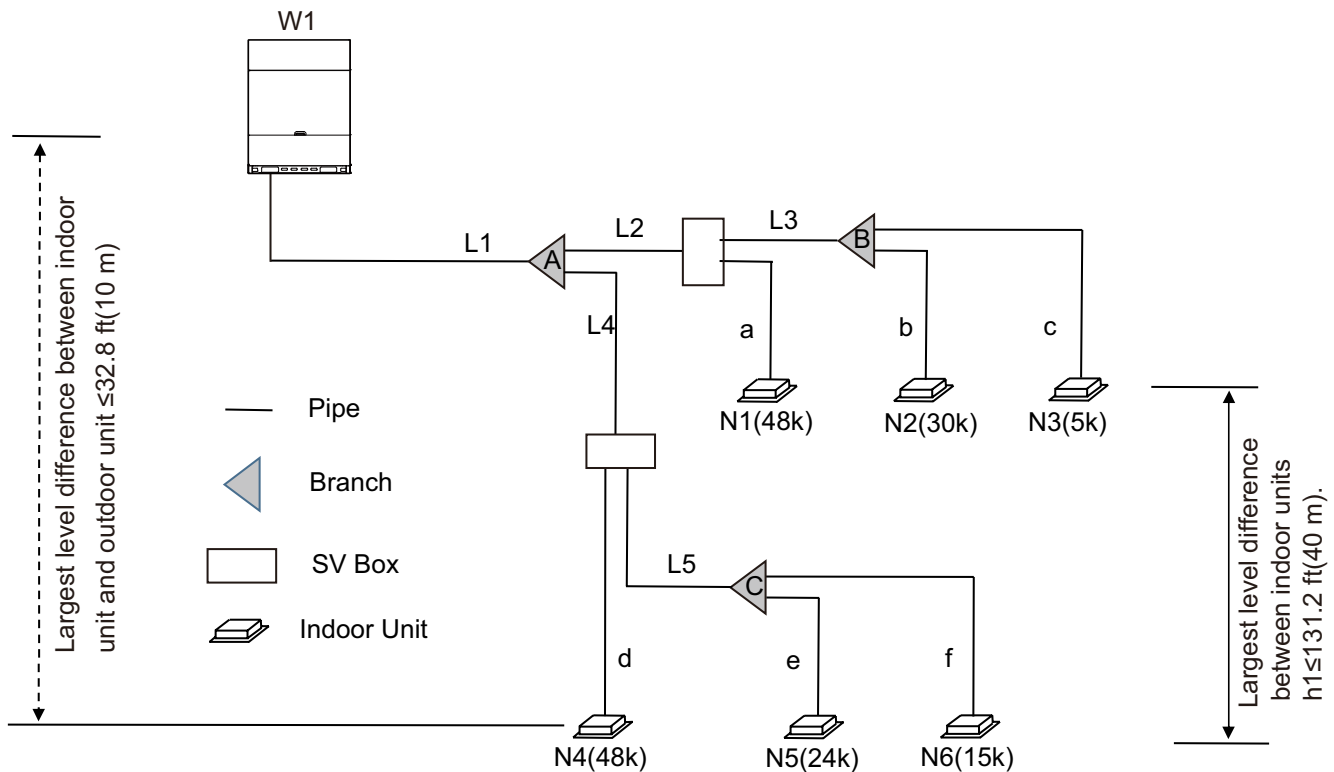


Fig. 19 – Refrigerant Piping Example — for Combinable Series

A260253

Select indoor main pipes and indoor branch B to C:

- The indoor units (N2 and N3) downstream of indoor branch B have a total capacity of $30+5=35\text{k}$. Indoor main pipe L3 is $\Phi 5/8$ / $\Phi 3/8$. Indoor branch joint B is 45VM900031.
- The indoor units (N1 to N3) downstream of indoor have a total capacity of $48+30+5=83\text{k}$. Indoor main pipe L2 is $\Phi 7/8$ / $\Phi 3/8$.
- The indoor units (N5 to N6) downstream of indoor branch C have a total capacity of $24+15=39\text{k}$. Indoor main pipe L5 is $\Phi 5/8$ / $\Phi 3/8$. Indoor branch joint C is 45VM900031.
- The indoor units (N4 to N6) downstream of indoor have a total capacity of $48+24+15=87\text{k}$. Indoor main pipe L4 is $\Phi 7/8/\Phi 3/8$.

Select the indoor auxiliary connection pipe a to k:

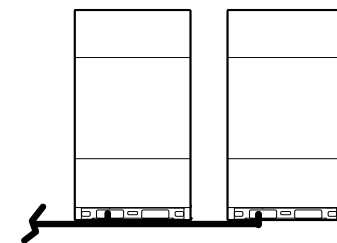
- The capacity of indoor units N1 and N2 and N4 and N5 is equal or larger than 24k, so the indoor auxiliary connection pipe (a/b/d/e) is $\Phi 5/8/\Phi 3/8$.
- The capacity of indoor units N3 and N6 is less than 24k, so the indoor auxiliary connection pipe c and f is $\Phi 1/2/\Phi 1/4$.

Select main pipe (L1) and first indoor branch A:

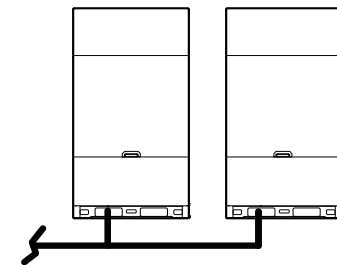
- The system's equivalent length of all liquid pipes is less than 295 ft (90 m), and the total capacity of the outdoor units is 10Ton. Main pipe L1 is $\Phi 1-1/8/\Phi 5/8$, first Indoor branch A is 45VM900033.

Arrangement and Layout of Multiple Outdoor Units

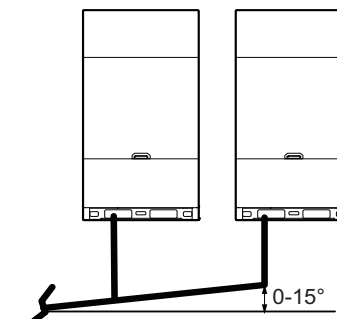
- The piping between the outdoor units must be level and lower than the outdoor unit piping connection.



✓ Correct



✓ Correct

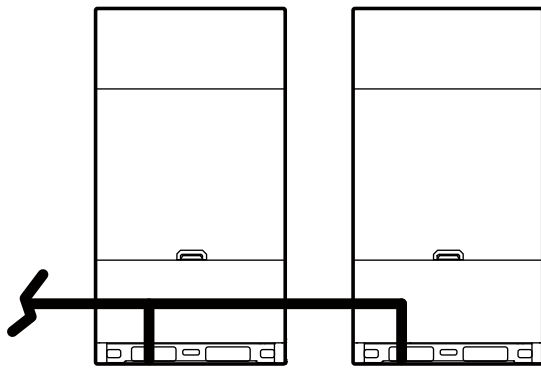


✓ Correct

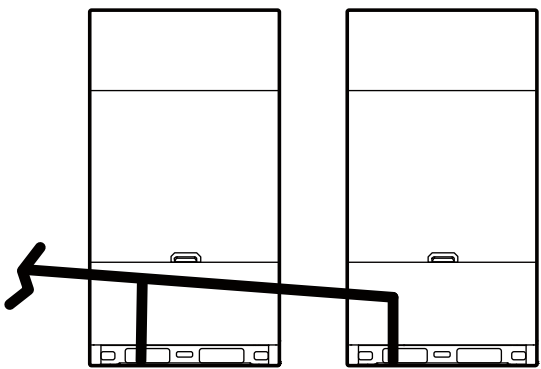
Fig. 20 – Piping Between Outdoor Units

A260254

Branch lower than the outdoor unit piping connection and the direction inclination angle is between 0-15°



× Incorrect



× Incorrect

Fig. 21 – Incorrect Piping Between Outdoor Units

A260255

If the piping length between outdoor units is 6.56 ft. (2 m.) or more, the oil trap for the gas pipe should be provided so that accumulation of refrigerant oil does not occur.

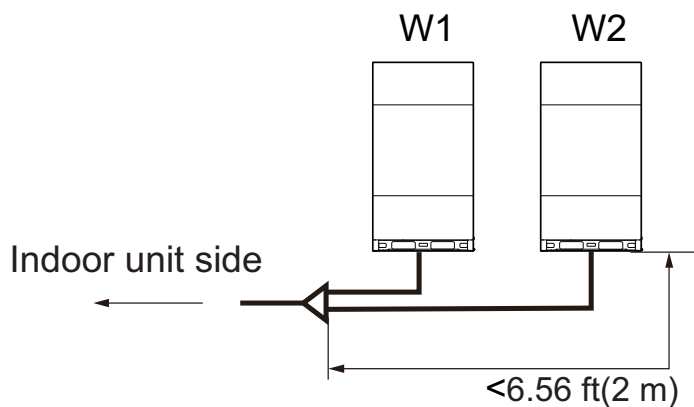


Fig. 22 – Less Than 6.56 ft. (2 m.)

A260256

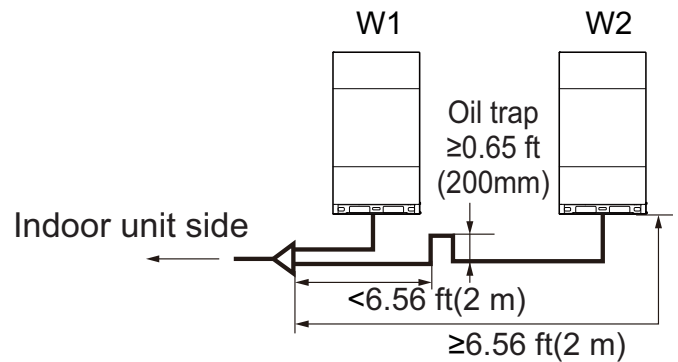
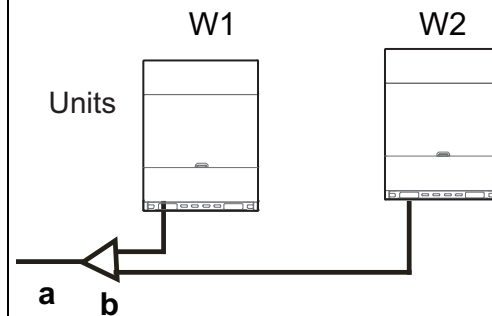


Fig. 23 – 6.56 ft. (2 m.) or More

A260257

! NOTICE

In systems with multiple outdoor units, the units should be placed in order from the largest capacity unit to the smallest capacity unit. The largest capacity unit must be placed on the first branch, and be set as the master unit, while the others should be set as slave units. The capacity of outdoor units W1, W2 must meet the following conditions: $W1 \geq W2$.



A260258

a. To indoor unit

b. Outdoor branch joint assembly (first branch joint)

Selecting and Preparing the Electrical Wiring

Safety Device Requirements

1. Select the wire diameters (minimum value) individually for each unit based on [Table 30](#) and [Table 31](#), where the rated current in [Table 30](#) refers to MCA in [Table 31](#). If the MCA exceeds 63A, the wire diameters should be selected according to the national wiring regulation.
2. The maximum allowable voltage range variation between phases is 2%.
3. Select circuit breakers that have a contact separation in all poles not less than 1/8 in (3 mm) providing full disconnection, where MFA is used to select the current circuit breakers and residual current operation breakers:

Table 30 – Wire Diameter Selection

Rated Current of Appliance (A)	Nominal Cross-sectional Area (mm ²)	
	Flexible Cords	Cable for Fixed Wiring
≤ 3	0.5 and 0.75	1 to 2.5
> 3 and ≤ 6	0.75 and 1	1 to 2.5
> 6 and ≤ 10	1 and 1.5	1 to 2.5
> 10 and ≤ 16	1.5 and 2.5	1.5 to 4
> 16 and ≤ 25	2.5 and 4	2.5 to 6
> 25 and ≤ 32	4 and 6	4 to 10
> 32 and ≤ 50	6 and 10	6 to 16
> 50 and ≤ 63	10 and 16	10 to 25

Table 31 – System Electrical Information

System	Outdoor Unit				Power Current			Compressor		Fan Motor	
	Voltage (V)	Frequency (Hz)	Min. (V)	Max. (V)	MCA (A)	TOCA (A)	MFA (A)	MSC (A)	RLA (A)	Power (kW)	FLA (A)
6 Ton	208/230	60	187	264	40	-	-	-	37.5	0.773	4.6
8 Ton	208/230	60	187	264	66	-	-	-	62.5	0.876	6.3
10 Ton	208/230	60	187	264	69	-	-	-	65.5	1.055	6.3
6 Ton	460	60	414	530	27	-	-	-	25.7	0.724	2.4
8 Ton	460	60	414	530	35	-	-	-	36	0.823	3.3
10 Ton	460	60	414	530	38	-	-	-	36	0.994	3.3

! NOTICE

**Phase and frequency of power supply system: 3N-60Hz,
Voltage: 460V or 208/230V**

Abbreviations:

MCA: Minimum Circuit Amps; TOCA: Total Over-current Amps; MFA: Maximum Fuse Amps; MSC: Maximum Starting Current (A); RLA: Rated Load Amps; FLA: Fan Load Amps.

- Units are suitable for use in electrical systems where voltage supplied to unit terminals is not below or above listed range limits. The maximum allowable voltage variation between phases is 2%.
- Select wire size based on the value of MCA.
- TOCA indicates the total overcurrent amps value of each OC set.
- MFA is used to select overcurrent circuit breakers and residual-current circuit breakers.
- MSC indicates the maximum current on compressor start-up in amps.
- RLA is based on the following conditions: indoor temperature 80.6°F (27°C) DB, 66.2°F (19°C) WB; outdoor temperature 95°F (35°C) DB.

Outdoor Unit Installation

Overview

This chapter includes the following information:

- Open the unit
- Outdoor unit installation
- Welding refrigerant piping
- Refrigerant piping check
- Refrigerant charging
- Electrical Wiring

Opening the Unit

Opening the Outdoor Unit

Remove four mounting screws A on the middle panel;

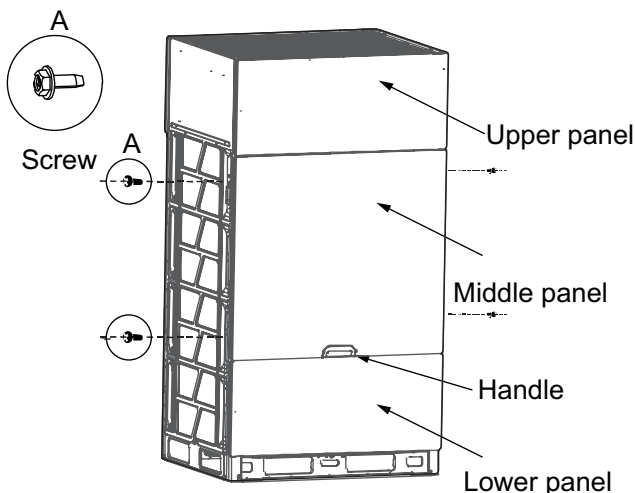


Fig. 24 – Remove Four Mounting Screws

A260259

Hold the parts indicated as B in the figure on the middle panel and gently pull the panel outward. The hooks on the panel are hung on the holes of the side plate.

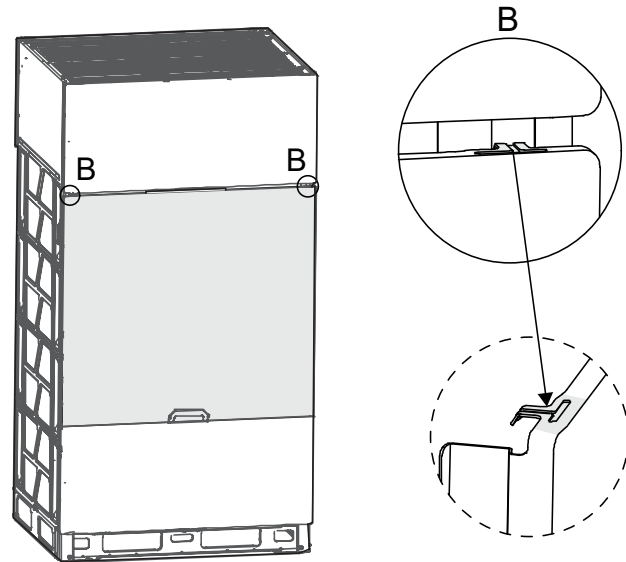


Fig. 25 – Remove Front Panel Step One

A260260

Hold the panel with one hand and lift the handle with the other hand to disengage the left and right hooks from the holes of the side plate in turn.

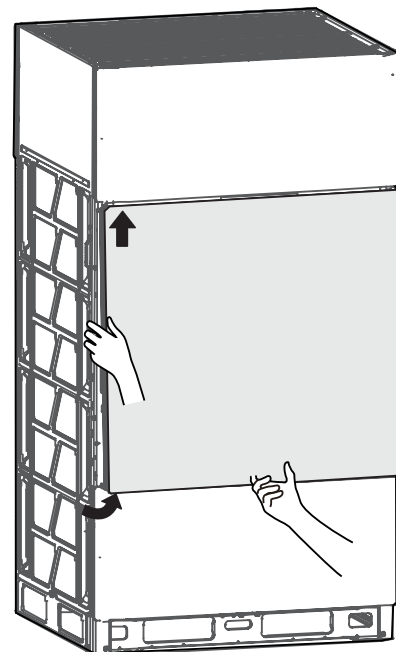


Fig. 26 – Remove Front Panel Step Two

A260261

! NOTICE

When removing the panels, remove the middle panel first, and then the other panels. Similarly, when installing the panels, install other panels first, and then the middle panel.

Opening the Electric Control Box

- Loosen the two screws (by turning them 1 to 3 turns counter-clockwise) from the cover of the electric control box.
- Lift the cover upwards for 1/4 in (7 mm) to 5/16 in (8 mm), and then turn it outwards for 3/8 in (10 mm) to 3/4 in (20 mm).
- Slide down the cover to remove it.

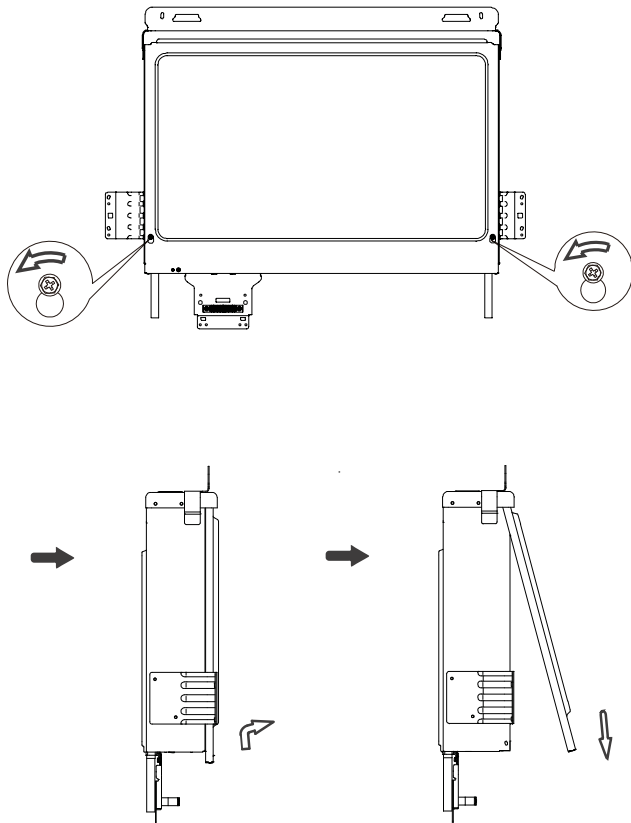


Fig. 27 – Opening the Electric Control Box (6-ton)

A260262

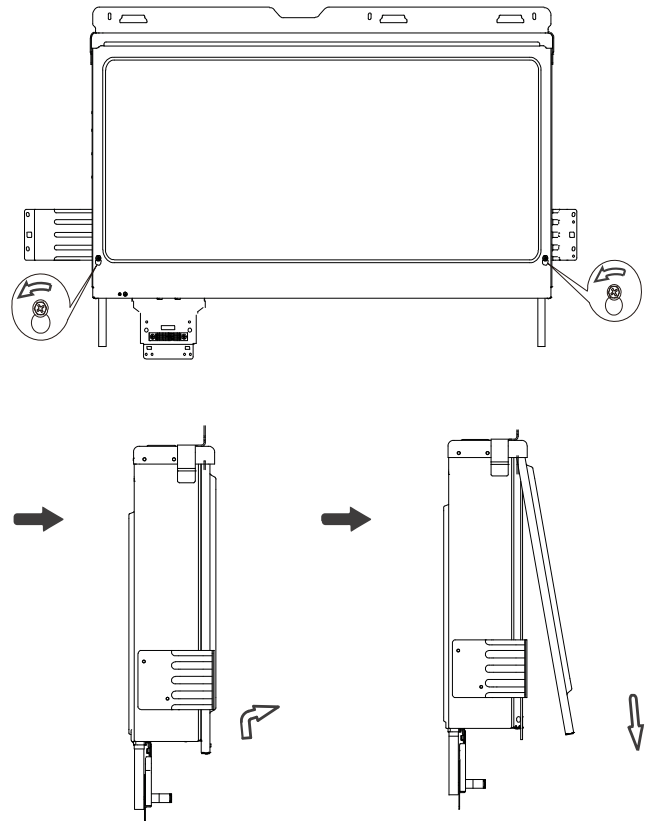


Fig. 28 – Open the Electric Control Box (10-ton)

A260263

! NOTICE

The cover is clamped to the electric control box, so be sure to remove it slowly during disassembly.

! WARNING

- To remove the entire electric control box, discharge the refrigerant from the system first, and then disconnect the pipe connecting the refrigerant radiator at the bottom of the electric control box, and remove all wiring connecting the electric control box and the internal components of the air conditioner.
- The images shown here are for illustrative purposes only and may differ from the actual product due to model differences and product upgrades. Please refer to the actual product.

Internal Components of Electric Box

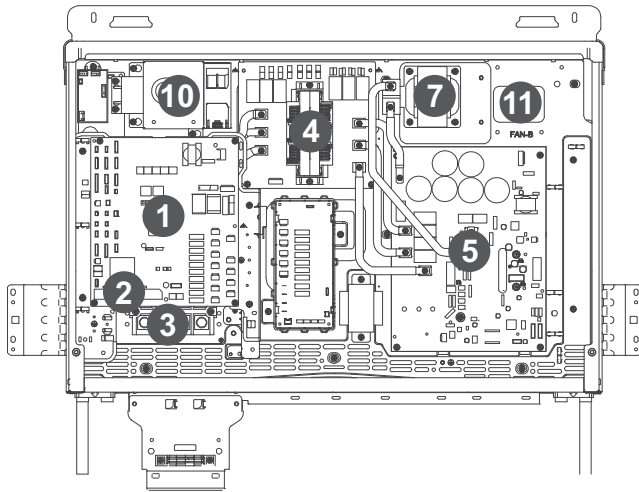


Fig. 29 – Internal Components of Electric Control Box (6-ton) A260264

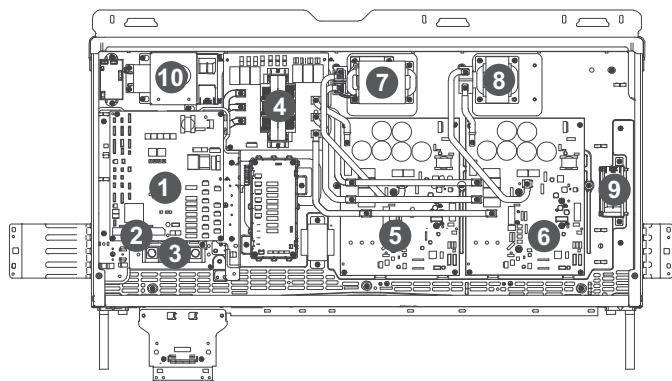


Fig. 30 – Internal Components of Electric Control Box (10-ton) A260265

The heat radiator piping of the refrigerant is connected to the system.

- (1) Main control board
- (2) Communication terminal block
- (3) Terminal block
- (4) AC filter board
- (5) Compressor & Fan drive board A
- (6) Compressor & Fan drive board B
- (7) Reactance
- (8) Reactance
- (9) Cooling fan
- (10) Cooling fan
- (11) Fan drive board

! CAUTION

- Make sure the power supply is off before you carry out any electric control installation and maintenance work.
- To remove the entire electric control box, first discharge the refrigerant from the system, and disconnect the pipe connecting the refrigerant radiator at the bottom of the electric control box. At the same time, remove all wiring connecting the electric control box and the internal components of the air conditioner.
- The images shown here are for illustrative purposes only and may differ from the actual product due to model differences and product upgrades. Please refer to the actual product.

Installing the Outdoor Unit

Preparing the Structure for Installation

- The base of the outdoor unit must use a solid concrete surface such as cement or a steel beam frame as a base.
- The base must be completely level to ensure that every point of contact is even.
- During installation, make sure the base supports the vertical folds of the front and back under plates of the chassis directly as the vertical folds of the front and back under plates are located where the actual support for the unit load is.
- No gravel layer is required when the base is built on a roof surface, but the sand and cement on the concrete surface must be level, and the base should be chamfered along the edge.
- A water drainage ditch should be set around the base to drain water around the equipment. Potential risk: slipping.
- Check the load-bearing capacity of the roof to make sure it can support the load.
- When you choose to install the piping from the bottom, the base height should be above 7-7/8 in. (200 mm.).
- Make sure the base where the unit is installed is strong enough to prevent vibrations and noise.

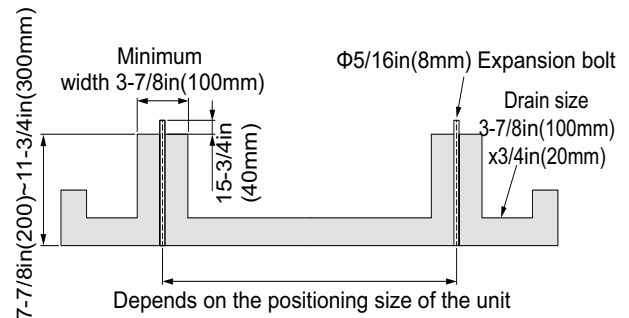


Fig. 31 – Preparing the Structure for Installation A260266

Use four ground bolts (M8) to secure the unit in place. The best option is to screw in the ground bolt until it is embedded in the base surface by at least 3 threads.

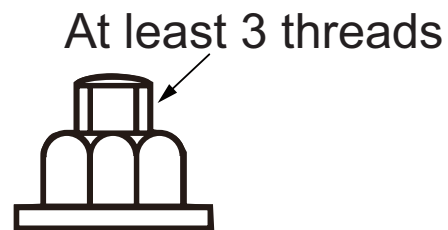


Fig. 32 – Secure the Unit With Ground Bolts A260267

Please refer to the figure below for the installation position of expansion bolts.

Please refer to the figure below for the installation position of expansion bolts.

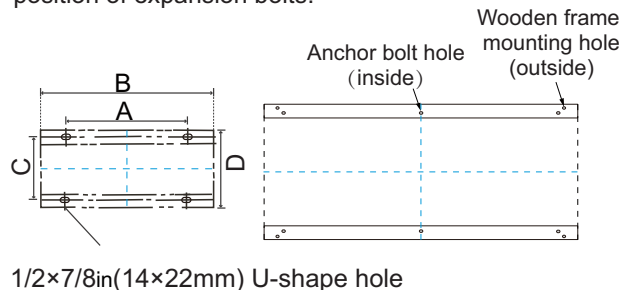


Fig. 33 – Installation Position of Expansion Bolts A260268

Table 32 – Installation Position of Expansion Bolts Dimensions

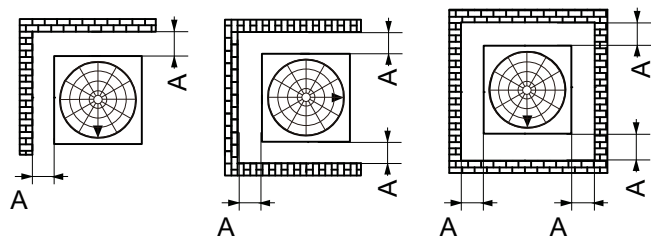
Ton	A	B	C	D	U-shaped Hole
6-10 Ton	43-1/2 (1105)	53-1/2 (1360)	28 (710)	33-1/2 (850)	Φ1/2*7/8 (Φ14*22)

Outdoor Unit Installation Space

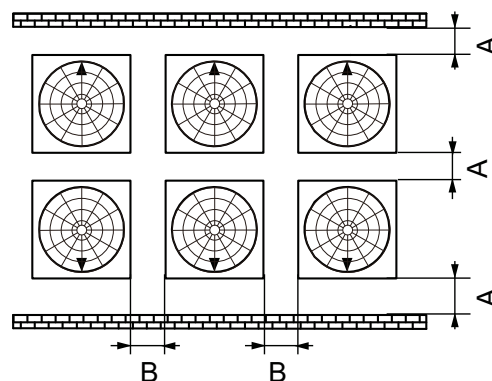
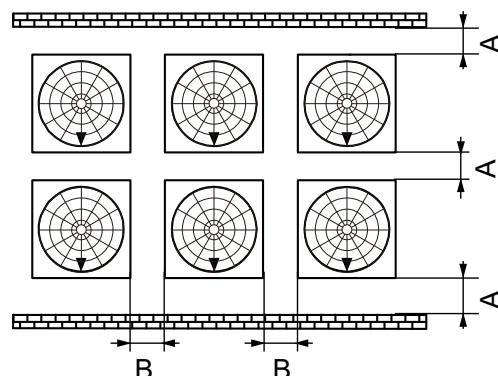
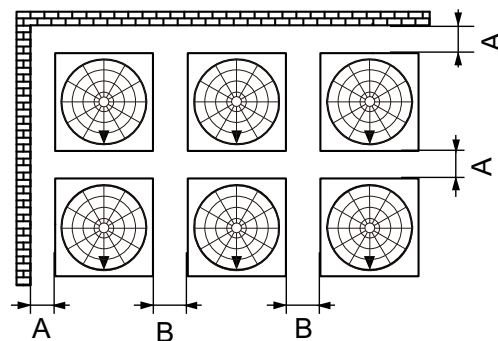
Make sure there is sufficient space around the unit for maintenance work, and the minimum space for air inlet and air outlet is reserved (see below to select a feasible method).

! NOTICE

- Ensure there is enough space for maintenance. The units in the same system must be placed at the same height.
- Outdoor units must be spaced so that sufficient air may flow through each unit. Sufficient airflow across heat exchangers is essential for outdoor units to function properly.

**Fig. 34 – For Single Installation**

A260269

**Fig. 35 – Installation With Walls in Two Directions**

A260270

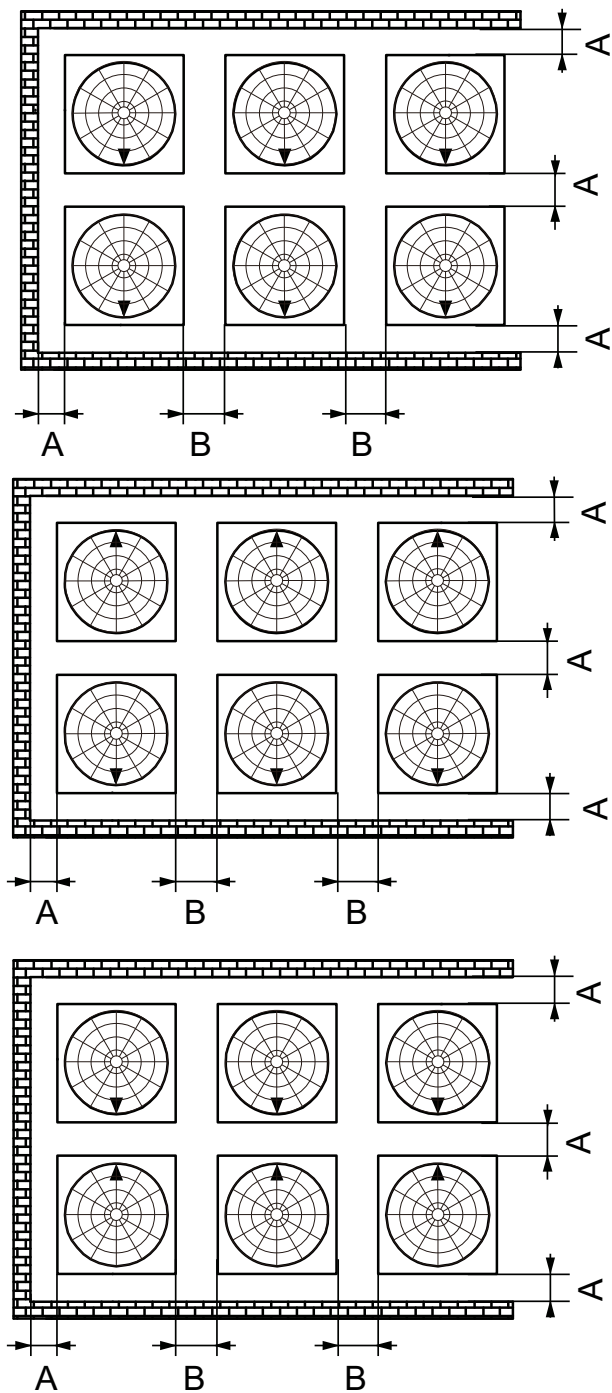


Fig. 36 – Installation With Walls in Three Directions

A260271

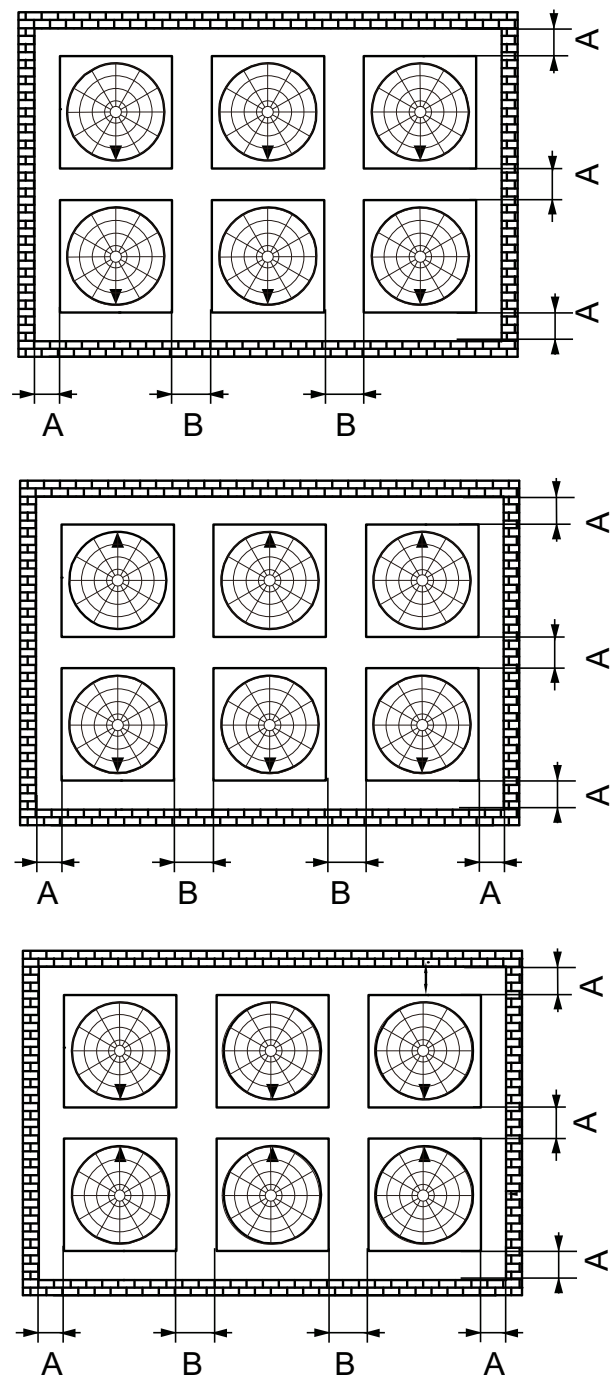
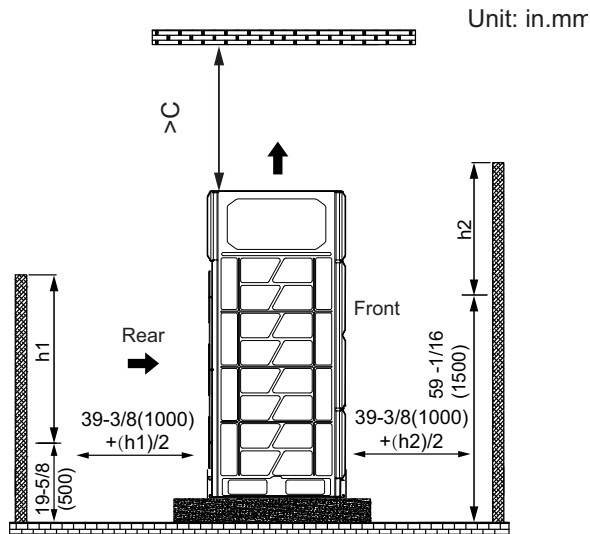


Fig. 37 – Installation With Walls in Four Directions

A260272

! CAUTION

- The arrow ▼ indicates the front of the unit in the above figures.
- $A \geq 39\text{-}3/8\text{in}(1000\text{mm})$, $19\text{-}5/8\text{in}(500\text{mm}) \geq B \geq 39\text{-}3/8\text{in}(1000\text{mm})$.
- The dimensions in the above figures provide sufficient space for operation and maintenance under normal operating conditions (refrigeration mode at an outdoor temperature of 95°F(35°C)).
- If the outdoor temperature is higher and ventilation short circuiting may occur, choose the most suitable dimensions by calculating the return air flow.
- Keep the inlet and outlet of each ODU open and avoid interference.
- If there is an obstacle in the space over the unit, the four sides of the unit should be open.



A260273

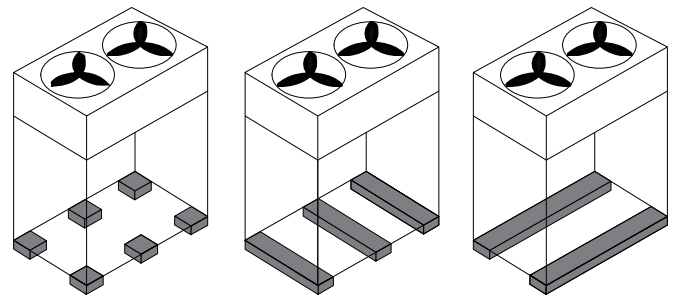
- If there are no walls in front of or behind the unit, it is necessary to reserve a space of 39-3/8in(1000mm) on both sides.
- If the front wall is higher than 59-1/16in(1500mm), a space of at least $(39\text{-}3/8\text{in}(1000\text{mm}) + (h2)/2)$ is required at the front.
- If the rear wall is higher than 19-5/8in(500mm), a space of at least $(39\text{-}3/8\text{in}(1000\text{mm}) + (h1)/2)$ is required at the back.
- When the space above the unit is less than 59-1/16in(1500mm), an air ducting device shall be installed to prevent ventilation from short circuiting.
- When the space over the unit is greater than 59-1/16in(1500mm), an air ducting device shall be installed if the air circulation is not smooth at the top of the unit.

! WARNING

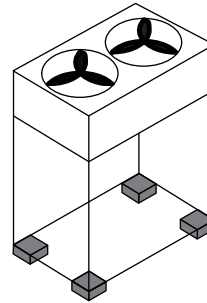
Do not install the ODU in a confined space.

Vibration Reduction of Outdoor Unit

The ODU shall be firmly fixed, and a thick rubber plate or corrugated shock-absorbing rubber cushion with a thickness of more than 3/4 in. (20 mm.) and a width of more than 3-7/8 in. (100 mm.) shall be placed between the unit and the foundation. The shock-absorbing rubber cushion must not be placed in a way that only supports the four corners of the unit. The setting requirements are shown in the figure below.



✓ Correct



× Incorrect

Fig. 38 – Vibration Reduction of Outdoor Unit

A260274

Pipe Welding

Things to Note When Connecting the Refrigerant Piping

! CAUTION

- During the test, do not exert a force greater than the maximum allowed pressure on the product (as shown on the nameplate).
- Take appropriate precautions to prevent refrigerant leakage and ventilate the area immediately if the refrigerant leaks, as high concentration of R-454B 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.

! NOTICE

- Make sure the refrigerant piping is installed in accordance with applicable laws.
- Make sure the piping and connections are not placed under pressure.
- After all the piping connections have been completed, check to make sure there is no gas leak. Use nitrogen to conduct the leak check for gas.

Connect Refrigerant Piping

Before the refrigerant piping is connected, make sure the indoor units and outdoor units are installed properly. Refrigerant piping connection procedures include:

- Connecting refrigerant piping to the outdoor unit
- Connecting refrigerant piping to the indoor unit (refer to the installation manual of the indoor unit)
- Connecting the VRF piping assembly
- Assembly for connecting refrigerant piping branch joint
- Bear in mind the following guidelines:
 - Braze
 - Stop valve is used correctly

Outdoor Refrigerant Connecting Pipe Position

The outdoor refrigerant connecting pipe position is shown in the following figure.

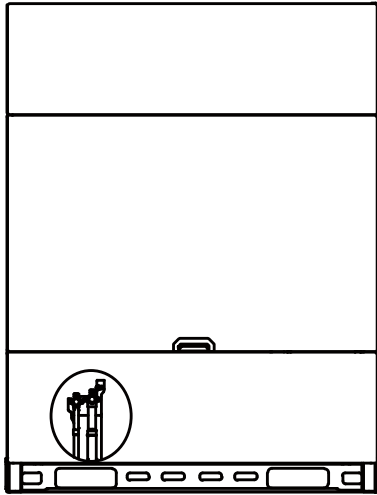


Fig. 39 – Outdoor Refrigerant Connecting Pipe Position

A260275

Connecting Refrigerant Piping to the Outdoor Unit

! NOTICE

- Note the precautions when connecting the field piping for the refrigerant. Add brazing material.
- Use the attached piping fittings when working on the pipeline engineering on site.
- After installation, make sure the piping does not come in contact with each other or the chassis.

The fittings provided as accessories can be used to complete the connection from the stop valve to the field piping.

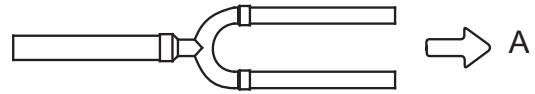
Connecting VRF Piping Assembly

! CAUTION

Incorrect installation will cause the unit to malfunction.

The branch joints should be as level as possible, and the angular error must not exceed 10°.

U type branch joint



A-direction view

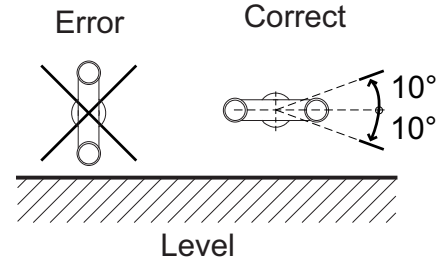


Fig. 40 – Level Branch Joints

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The branch joints come in different pipe diameters, which can be easily matched with different pipe diameters. When connecting pipes, select the pipe section with the appropriate pipe diameter, cut it in the middle with a pipe cutter and remove burrs, as shown in the figure below.

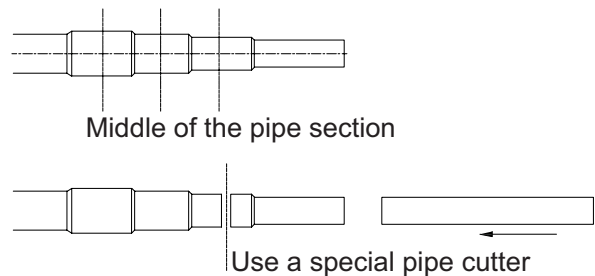
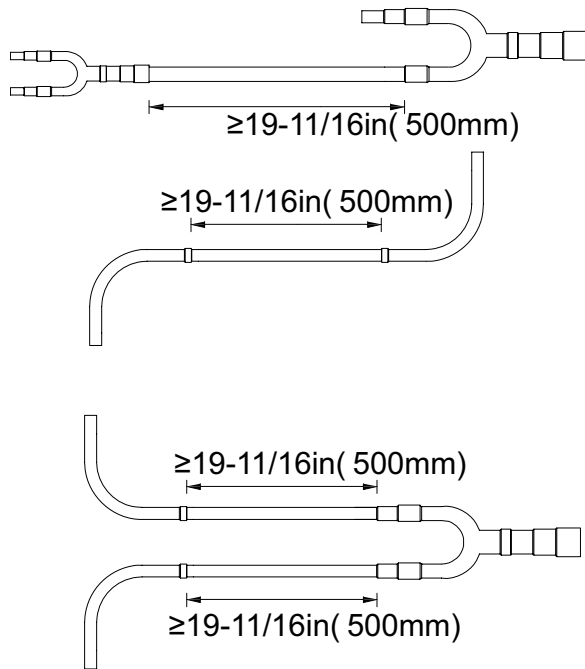


Fig. 41 – Cutting Pipes

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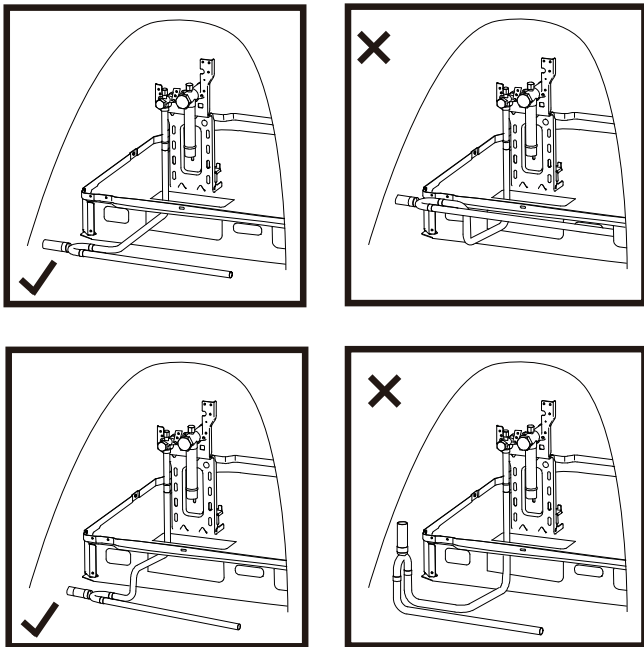
The length of the straight pipe section between the contiguous branch pipes shall be no less than 19-11/16 in. (500 mm.).

The straight pipe section behind the branch pipe end shall be no less than 19-11/16 in. (500 mm.). The length of straight pipe between two right angle bends shall be no less than 19-11/16 in. (500 mm.).

**Fig. 42 – Minimum Pipe Lengths**

A260278

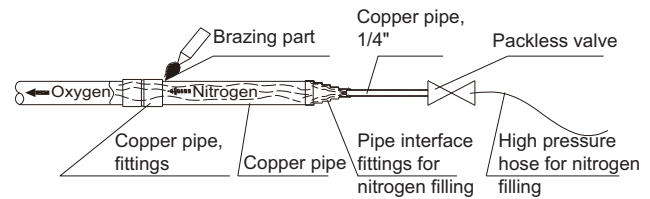
When there are multiple outdoor units, the branch joints must not be higher than the refrigerant piping as shown below:

**Fig. 43 – Branch Joint Height**

A260279

Brazing

- During brazing, use nitrogen as protection to prevent the formation of a large amount of oxide film in the pipes. This oxide film will have adverse effects on the valves and compressors in the cooling system, and may hamper normal operations.
- Use the reducing valve to set the nitrogen pressure to 0.02-0.03 MPa (a pressure that can be felt by the skin).

**Fig. 44 – Setting Nitrogen Pressure**

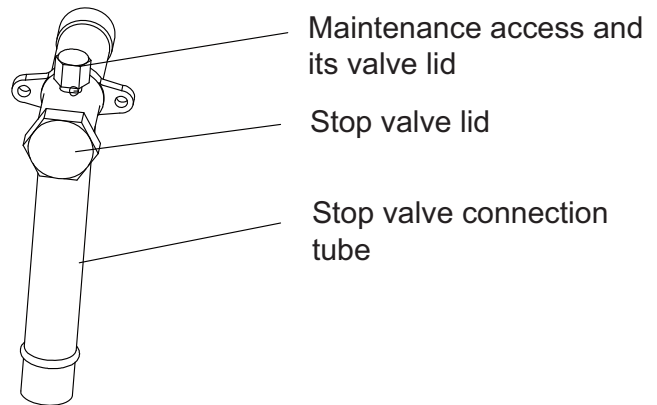
A260280

- Do not use antioxidants when brazing the pipe joints.
- Use copper-phosphorus alloys (BCuP) when brazing copper and copper, and no flux is required. When brazing copper and other alloys, flux is required. Flux produces an extremely harmful effect on the refrigerant piping system. For example, using a chlorine-based flux is used may corrode the pipes, and when the flux contains fluorine, it will degrade the frozen oil.
- During brazing, protect the valve mounting plate and wires from burning.
- Use dedicated gauges and hoses with R-454B equipment.

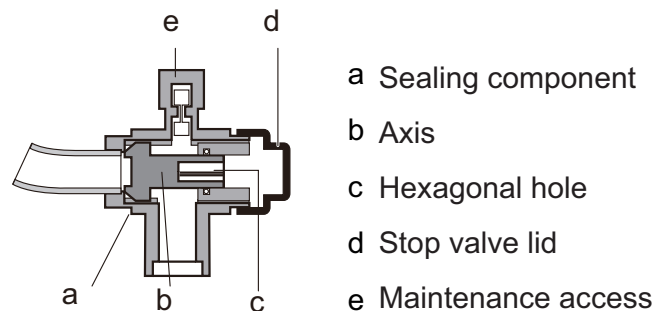
Connecting Stop Valves

Stop Valves

- The following figure shows the names of all parts required for the installation of the stop valves.
- Stop valves are closed when unit is shipped from the factory.

**Fig. 45 – Stop Valve**

A260281

**Fig. 46 – Stop Valve Components**

A260282

Using of a Stop Valve

- Remove the stop valve lid.
- Insert the hex wrench into the stop valve, and rotate the stop valve counter-clockwise.
- Stop turning when the stop valve cannot be rotated further.

Result: Valve is now open.

The fastening torque of the stop value is shown in [Table 33](#). Insufficient torque may cause the refrigerant to leak.

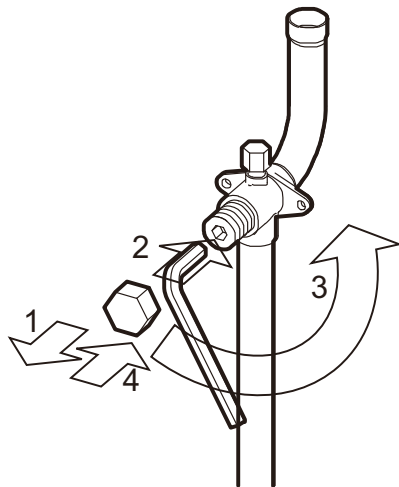


Fig. 47 – Using a Stop Valve

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Closing the Stop Valve

1. Remove the stop valve lid.
2. Insert the hex wrench into the stop valve, and rotate the stop valve clockwise.
3. Stop turning when the stop valve cannot be rotated further.

Result: Valve is now closed.

Direction to close:

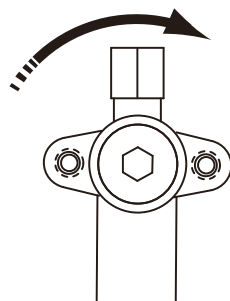


Fig. 48 – Closing a Stop Valve

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Table 33 – Fastening Torque

Stop Valve Size in. (mm.)	Tightening Torque lb·ft (turn clockwise to close)	
	Axis	Valve Body
Φ 1/2(12.7)	6.6-22	
Φ 5/8(15.9)	8.8-22	
Φ 1-1/8(28.6)	17.7-22	

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. Pipes should be flushed once the piping connections have been completed except for 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.

! 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.

The liquid and gas sides can be flushed simultaneously; alternatively, one side can be flushed first and then Steps 1 to 9 repeated for the other side. The flushing procedure is as follows:

1. Cover the inlets and outlets of the indoor units to prevent dirt from getting blown in while flushing the pipe. (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. 49).
5. Start to open the nitrogen cylinder valve and gradually increase the pressure to 0.5Mpa.
6. Allow time for nitrogen to flow as far as the 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 the 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. 50.
9. Once flushing is complete, seal all openings to prevent dust and moisture from entering.

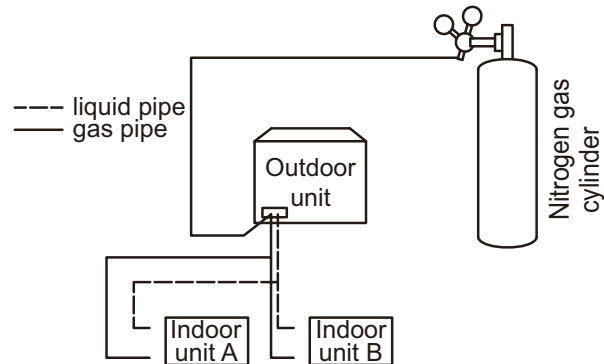


Fig. 49 – Flushing the Openings

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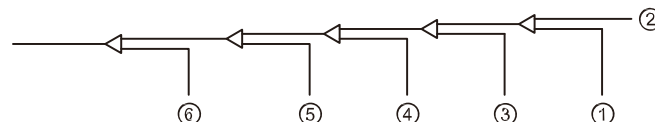


Fig. 50 – Flushing Sequence

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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.

The gas tightness test procedure is as follows:

1. Charge the indoor piping with nitrogen at 0.3Mpa through the needle valves on the liquid and gas stop valves and leave for at least 3 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 1.5Mpa and leave for at least 3 minutes. Observe the pressure gauge to check for small leakages. If there is a small leakage, the pressure gauge will drop noticeably.
3. If there are no small leakages, charge the piping with nitrogen at 4.2 MPa 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 0.01Mpa per 33.8°F (1°C) of temperature difference. Adjusted reference pressure = Pressure at pressurization + (temperature at observation – temperature at pressurization) x 0.01Mpa. 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 leak.
4. If leakage is detected, refer to the section of the manual titled “Leak detection”. Once the leak has been found and fixed, the gas tightness test should be repeated.
5. If not continuing straight to vacuum drying once the gas tightness test is complete, reduce the system pressure to 0.5-0.8MPa and leave the system pressurized until ready to carry out the vacuum drying procedure.

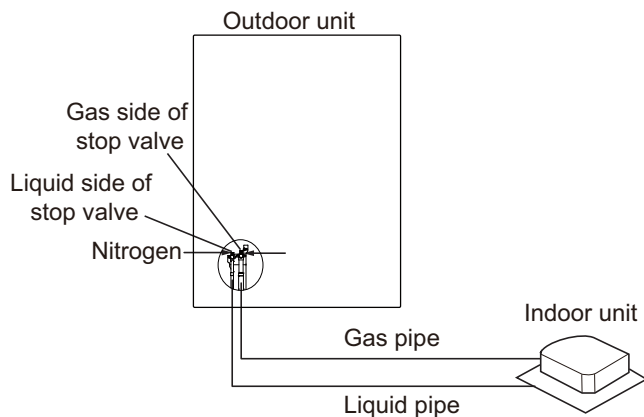


Fig. 51 – Gas Tightness Test

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Leak Detection

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.

Vacuum Drying

Vacuum drying should be performed 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 will cause abnormal operation, but particles of oxidized copper can cause compressor damage. The presence of non-condensable gases in the system will lead to pressure fluctuations and poor heat exchange performance.

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

CAUTION

- 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 pump lubricant with compressor oil could cause the compressor to malfunction. Therefore a check valve should be used to prevent vacuum pump lubricant from 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 R-454B 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 3/16 in. (5 mm.) Hg (29-3/4 in. (755 mm.) Hg below typical atmospheric pressure) the boiling point of water is 32°F (0°C). Therefore a vacuum pump capable of maintaining a pressure of -29-3/4 in. (756 mm.) Hg or lower should be used. Using a vacuum pump with a discharge over 4 L/s and a precision level of 0.02 mm. 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. After 30 minutes, close the manifold valves.
4. After a further 5 to 10 minutes check the pressure gauge. If the gauge has returned to zero, check for leakages in the refrigerant piping.
5. Re-open the manifold valves and continue vacuum drying for at least 2 hours and until a pressure difference of 0.1 MPa or more has been achieved. Once the pressure difference of at least 0.1 MPa 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, check for leakages.
6. After vacuum drying, keep the manifold connected to the master unit stop valves, in preparation for refrigerant charging.

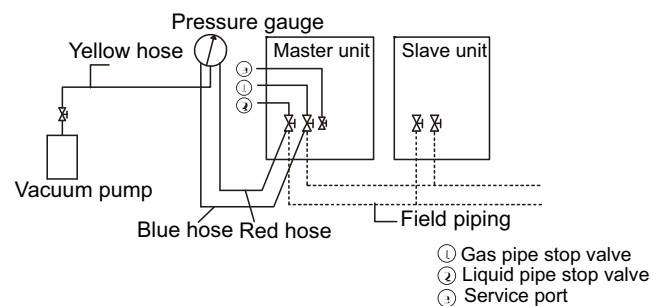


Fig. 52 – Vacuum Drying

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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 (70°C)), and polyethylene foam for the gas pipes (able to withstand temperatures of 248°F (120°C)).
- Reinforce the insulation layer of the refrigerant piping based on the installation environment.

Selection of Insulation Material Thickness

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

Table 34 – Selection of Insulation Material Thickness

Piping Size	Humidity < 80% RH Thickness	Humidity ≥ 80% RH Thickness
Φ1/4~11/2 in (Φ6.4~38.1 mm)	≥ 1/2 in ≥ 15 mm	≥ 3/4 in ≥ 20 mm
Φ1-5/8~2-1/8 in Φ41.3~54.0 mm	≥ 3/4 in ≥ 20 mm	≥ 1 in ≥ 25 mm

Pipe Wrapping

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

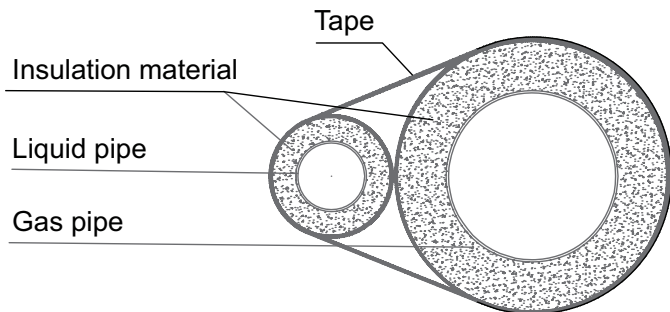


Fig. 53 – Pipe Wrapping

A260289

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 for 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 refrigerant pipe to deform or rupture.

The suspended connecting pipes shall be well supported, and the distance between supports shall not exceed 3.28 ft. (1 m.).

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 R-454B as the refrigerant. Other substances may cause explosions and accidents.
- R-454B contains fluorinated greenhouse gases, and the GWP value is 2088. Do not discharge the gas into the atmosphere.
- When charging the refrigerant, make sure you wear protective gloves and safety glasses. Be careful when you open the refrigerant piping.

! NOTICE

- If the power supply of some units is off, the charging program cannot be completed normally.
- If this is a multi-unit outdoor system, the power supply for all outdoor units should be turned on.
- 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.
- Make sure all connected indoor units have been identified.
- Charge the refrigerant only after the system has not failed the gas tightness tests and vacuum drying.
- Volume of refrigerant charged must not exceed the designed amount.

Calculating the Additional Refrigerant Charge Calculation for Liquid Piping (R1 Kg)

The additional refrigerant charge required depends on the lengths and diameters of the outdoor and indoor liquid pipes. The table below shows the additional refrigerant charge required per meter of equivalent pipe length for different diameters of pipe. The total additional refrigerant charge is obtained by summing the additional charge requirements for each of the outdoor and indoor liquid pipes, as in the following formula, where T1 to T8 represent the equivalent lengths of the pipes of different diameters. Assume 0.5 m for the equivalent pipe length of each branch joint.

Table 35 – Additional Refrigerant Charge for Liquid Piping

Liquid Piping Diameter (in. OD)	Additional Refrigerant Charge Per Meter of Equivalent Length of Liquid Piping (lb)
Φ1/4	0.044
Φ3/8	0.117
Φ1/2	0.221
Φ5/8	0.353
Φ3/4	0.529
Φ7/8	0.728

Additional refrigerant charge R1 (lb) = (T1@Φ1/4) × 0.044 + (T2@Φ3/8) × 0.117 + (T3@Φ1/2) × 0.221 + (T4@Φ5/8) × 0.353 + (T5@Φ3/4) × 0.529 + (T6@Φ7/8) × 0.728.

Calculating the Additional Refrigerant Charge Quantity for Outdoor Unit (R2 lb)

The additional refrigerant charge is required depending on the capacity of connected outdoor units. In case of a multi-outdoor-unit system, add the sum of the individual outdoor unit charge amount. Select the refrigerant quantity for each outdoor unit from the following table.

Table 36 – Additional Refrigerant Charge for Outdoor Unit

Ton	6	8	10
Additional Refrigerant Charge	0.44lb (0.2kg)	6.83lb (3.1kg)	6.83lb (3.1kg)

The additional refrigerant charge (R2 kg) = W1+W2

W1: master unit additional refrigerant charge amount;

W2: Slave unit 1 additional refrigerant charge amount;

The example below illustrates the piping selection procedure for a system consisting of three outdoor units (10Ton+10Ton). Based on the capacity of each outdoor unit, Select the refrigerant quantity from the [Table 35](#), W1=17.4 lb (7.9 kg); W2=17.4 lb (7.9 kg);. The additional refrigerant charge quantity for outdoor unit R2 =W1 +W2 =34.8 lb (15.8 kg).

Calculating the Additional Refrigerant Charge Calculation For SV Box (R3 Lb)

The required additional refrigerant charge depends on the number of SV Boxes. For systems with multiple SV Boxes, the additional amounts for each box need to be summed up. The additional amount for each box is 1.1 lb (0.5 kg)

Calculating the Additional Refrigerant Charge Calculation for Ratio of Internal and External Machines (R4 Lb)

The additional refrigerant charge is required depending on the capacity of connected indoor units/outdoor units.

Table 37 – Additional Refrigerant Charge Calculation for Ratio of Internal and External Machines

Outdoor Unit (Ton)	Indoor Unit Ratio (%)	Additional Refrigerant lb (lb/kg)
≤16	≤110%	0
≤16	110%<A≤150%	1.1(0.5)
16<Ton≤24	≤110%	0
16<Ton≤24	110%<A≤150%	1.76(0.8)

Calculating the Total Additional Refrigerant Charge Quantity (R Lb)

Total additional refrigerant charge amount (R) is equal to the sum of R1 to R4, calculate the amount of refrigerant to be charged according to the formula below:

$$R \text{ (kg)} = R1 + R2 + R3 + R4.$$

Maximum Additional Refrigerant Charge Quantity

Ensure that the total additional charge quantity should not exceed the max. additional refrigerant charge quantity.

! NOTICE

- Strictly follow the conditions shown in the above calculation method for refrigerant charging amount, and determine that the additional amount shall not exceed the maximum refrigerant additional amount shown in the Table 38. If the calculated value of additional refrigerant exceeds the limits shown in the Table 38, the total length of the pipeline construction scheme shall be shortened and the refrigerant charging amount shall be recalculated to meet the requirements shown in the Table 38.
- The maximum refrigerant addition shown in the Table 38 is based on the recommended combination.

Table 38 – Refrigerant Charge

Outdoor Unit Capacity Index	Factory Refrigerant Charge		Maximum Additional Refrigerant Charge		Maximum Refrigerant	
	lbs.	kg.	lbs.	kg.	lbs.	kg.
6	21.56	9.8	55.32	25.07	76.88	34.87
8	21.56	9.8	65.83	29.84	87.39	39.64
10	21.56	9.8	68.26	30.94	89.82	40.74
12	43.12	19.6	62.72	28.41	105.84	48.01
16	43.12	19.6	79.52	36.03	122.64	55.63
20	43.12	19.6	121.88	55.4	165	75

! NOTICE

The refrigerant charge of the system must be less than 220 lb (100 kg). This means that in case the calculated total refrigerant charge is equal to or more than 220 lb (100 kg) you must divide your multiple outdoor system into smaller independent systems, each containing less than 220 lb (100 kg) refrigerant charge. For factory charge, refer to the unit name plate.

Refrigerant Charge Amount of Outdoor Unit Before Shipment (R0 lb)

For factory charge of outdoor unit, refer to the outdoor unit name plate. In case of a multi-outdoor-unit system, calculate the total refrigerant charge before shipment of the outdoor units to be combined.

Calculate the Refrigerant Charge of the System (Rt lb)

The total refrigerant of the system (Rt) = refrigerant before shipment (R0) + additional refrigerant in the field (R). The refrigerant charge of the system must be less than 100 kg. If the calculated total refrigerant charge is equal to or more than 220 lb(100 kg) you must divide your

multiple outdoor system into smaller independent systems, each containing less than 220 lb(100 kg) refrigerant charge.

The procedure for adding refrigerant is as follows:

- Calculate additional refrigerant charge R (lb).
- Place a tank of R-454B refrigerant on a weighing scale. Turn the tank upside down to ensure the refrigerant is charged in a liquid state. (R-454B is a blend of two different chemical compounds. Charging gaseous R-454B into the system could mean that the refrigerant charged is not of the correct composition).
- After vacuum drying, the blue and red pressure gauge hoses should still be connected to the pressure gauge and the master unit stop valves.
- Connect the yellow hose from the pressure gauge to the R-454B refrigerant tank.
- 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.
- Set the weighing scale to zero.
- Open the three valves on the pressure gauge to begin charging refrigerant.
- 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.

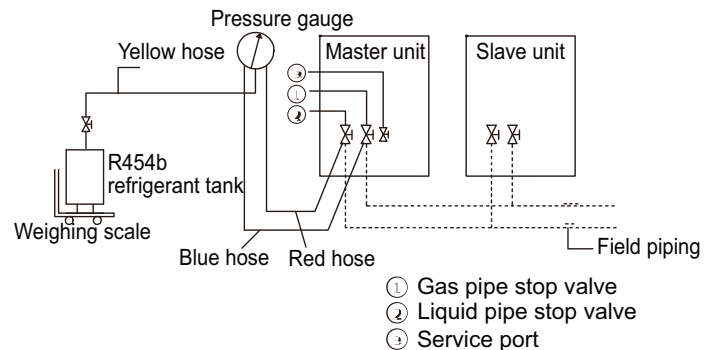


Fig. 54 – Location of Stop Valves

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Electrical Wiring

Electrical Wiring Precautions

! WARNING

- The combined indoor unit must have a R-454B refrigerant sensor.
- Take note of the risk of electrical shock during installation.
- All the electric wires and components must be installed by installation personnel with the proper electrician certification, and the installation process must comply with applicable regulations.
- Use only wires with copper cores for the connections.
- A main switch or safety device that can disconnect all polarities must be installed, and the switching device can be completely disconnected when the corresponding excessive voltage situation arises.
- Wiring must be carried out in strict accordance with what is stated in the product nameplate.
- Do not squeeze or pull the unit connection, and make sure the wiring is not in contact with the sharp edges of the sheet metal.
- Make sure the grounding connection is safe and reliable. Do not connect the ground wire to public pipes, telephone ground wires, surge absorbers and other places that are not designed for grounding. Improper grounding may cause electrical shock.
- Make sure the fuses and circuit breakers installed meet the corresponding specification requirements.
- Make sure an electric leakage protection device is installed to prevent electrical shock or fires.
- The model specifications and characteristics (anti high-frequency noise characteristics) of the electric leakage protection device are compatible with the unit to prevent frequent tripping.
- Before powering on, make sure the connections between the power cord and terminals of the components are secure, and the metallic cover of the electric control box is closed tightly.

! NOTICE

- Some power equipment may have an inverted phase or intermittent phase (such as a generator). For this type of power source, a reverse-phase protection circuit should be installed locally in the unit, as operating in the inverted phase may damage the unit.
- Do not share the same power supply line with other devices.
- The power cord may produce electromagnetic interference so you should maintain a certain distance from the equipment that may be susceptible to such interference.
- Separate the power supply for the indoor and outdoor units.
- For systems with multiple units, make sure a different address is set for each outdoor unit.

Wiring Layout

The wiring layout comprises the power cords and communication wiring between the indoor and outdoor units. These include the ground lines and the shielded layer of the ground lines of the indoor units in the communication line. See below for the wiring layout of the outdoor unit.

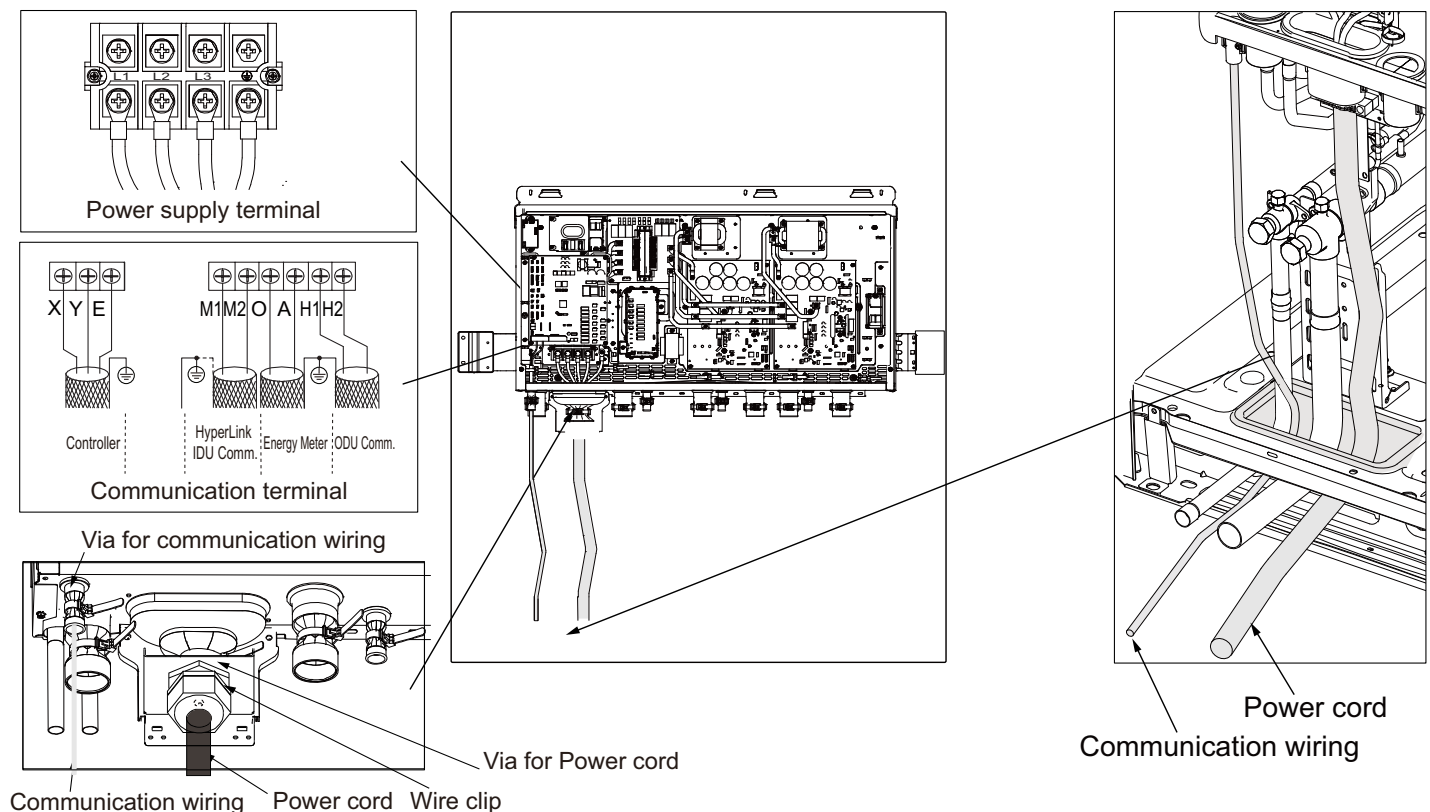


Fig. 55 – Wiring Layout

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! NOTICE

- Power cords and communication wiring must be laid out separately, they cannot be placed in the same conduit. Use a power supply conduit to isolate if the current of the power supply is less than 10 A. If the current is greater than 10 A but less than 50 A, the spacing must exceed 19-5/8 in(500 mm) at all times. Otherwise, it may lead to electromagnetic interference.
- Arrange the refrigerant piping, power cords and communication wiring in parallel, but do not tie the communication lines together with the refrigerant piping or power cords.
- Power cords and communication wiring should not come in contact with the internal piping so as to prevent the high temperature of the piping from damaging the wires.
- Once the wiring layout is completed, close the lid tightly to prevent the wiring and terminals from being exposed when the lid is loose.

Connecting the Power Cord

! NOTICE

- Do not connect the power supply to the communication terminal block. Otherwise, the whole system may fail.
- You must first connect the ground line (note that you should use only the yellow-green wire to connect to the ground, and you must turn off the power supply when you are connecting the ground line) before you connect the power cord. Before you install the screws, you must first comb through the path along the wiring to prevent any part of the wiring from becoming exceptionally loose or tight because the lengths of the power cord and ground line are not consistent.
- The wire diameter must comply with specifications, and the terminal should be tightly screwed. At the same time, do not subject the terminal to any external force.
- Tighten the terminal with an appropriate screwdriver. Screwdrivers that are too small may damage the terminal head, and cannot tighten it.
- Excessive tightening of the terminal may cause the screw thread to deform and slip, making it impossible to connect the components securely.
- Only use a ring terminal to connect the power cord. Non-standard cable connections will lead to poor contact which may in turn cause exceptional heating and burning. The figure below demonstrates both correct and incorrect connections.

- Use round-type terminals of the correct specifications to connect the power cable.

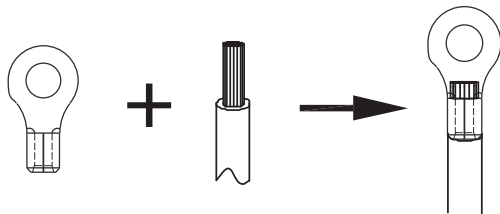


Fig. 56 – Round Type Terminals

A260292

! WARNING

When inserting the strong-current cables and communication lines into the wiring holes, they must be equipped with wiring across rings to avoid becoming worn.

- The external power cables are inserted into the wiring holes of the chassis and the electric control box, and the power cables “L1, L2, L3, G” and ground wire are connected to the power wiring board marked with “L1, L2, L3, G” and the grounding screw next to the power wiring board correspondingly.

Power supply

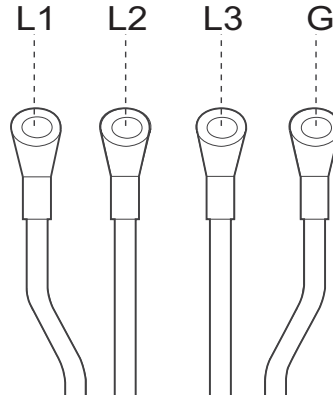
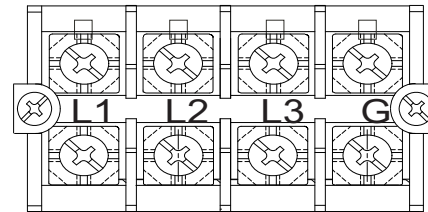


Fig. 57 – Connecting Power Cables

A260293

! WARNING

Terminals must be used for connection. Use round-type terminals of the correct specifications to connect the power cables. Do not directly connect the cable ends. Use the correct terminal, or it may cause over heating and fire.

- Fasten and fix the cables with wire clips to avoid stress on the terminals.

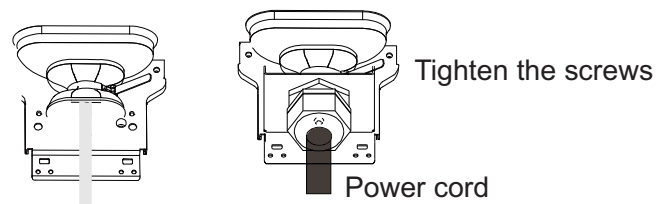


Fig. 58 – Fasten With Wire Clips

A260294

- Confirm again that the power phase sequence is correct and properly restore the protecting cover of the power cable.
- After the communication line and power cable are connected, cover the sheet metal of the electric control box cover, and tie the wiring across the ring tightly with a tightening tape.

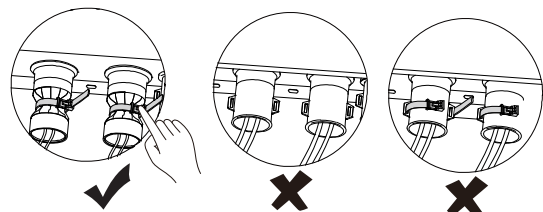


Fig. 59 – Use Tightening Tape

A260295

! WARNING

- Select a proper torque according to the screw size.
- Torque which is too small may cause poor contact, resulting in heating of the terminals and fire. Torque that is too large may damage the screws and power supply terminals.

Table 39 – Screw Size and Recommended Torque

Screw Specification	Standard Value (kgf.cm)/(Nm)
M4	12.2/1.2
M8	61.2/6.0

! CAUTION

- During installation, the ground line shall be longer than the current carrying conductor to ensure that when the fixing device is loose, the ground line is still not stressed and can be reliably grounded.
- After installation, close the cover of the electric control box, tighten the screws and seal the wiring hole with a tightening tape. Otherwise, the heat dissipation of the electric control box may be affected, which could shorten the service life of the unit.
- When inserting the strong-current cables and communication lines into the wiring holes, they must be equipped with wiring across rings. Otherwise, they may become worn out by the sheet metal and cause electric leakage or short circuiting.
- The electric control box is fully enclosed. After installation, close the cover of the electric control box, tighten the screws and seal the wiring hole with a tightening tape. Otherwise, the heat dissipation of the electric control box may be affected, which could shorten the service life of the unit.

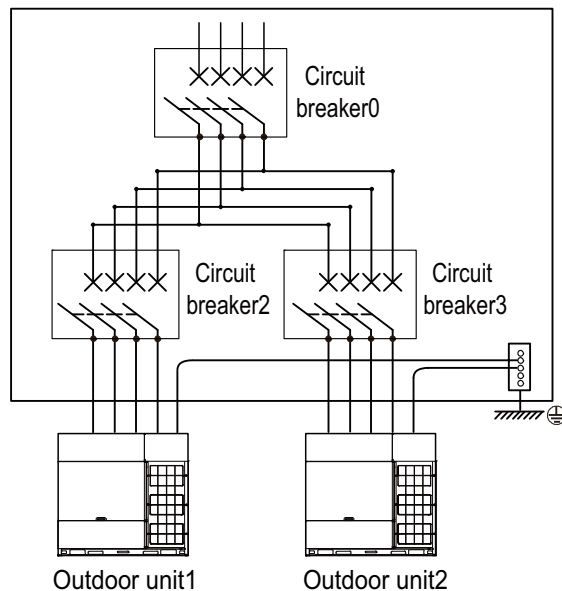


Fig. 60 – Outdoor Unit Wiring Diagram

A260296

! WARNING

- Do not connect the ground line of the lightning rod to the unit shell. The ground lines of the lightning rod and the power cable must be configured separately.
- Each unit shall be equipped with a circuit breaker for protection against short circuiting and abnormal overload. In addition, the indoor and ODUs shall be equipped with individual main circuit breakers to connect or disconnect the main power supply of the indoor and ODUs.

Connecting the Communication Wiring

! WARNING

- Do not connect the communication line when the power is on.
- Connect the shielding nets at both ends of the shielded wire to the sheet metal terminal of the electronic control box.
- Do not connect the power cable to the terminal of the communication line, otherwise, the motherboard will be damaged.
- It is forbidden to reverse the connection of the two communication ports (to up IDU) and (to down IDU) of the repeater.

! CAUTION

- On-site wiring must comply with the relevant regulations of the local Country/region and must be completed by professionals.
- The communication lines of the indoor and ODUs can only be led out and connected from the master ODU.
- The ODU is often a parallel type of multi module, and the communication lines between the ODUs must be connected in a series.
- When a single communication line is not long enough, the joint must be crimped or soldered, and the copper wire at the joint shall not be exposed.

Before connecting the communication wiring, please select the appropriate communication mode according to the type of indoor unit and refer to the following table.

! NOTICE

For the system, the EMI effect of the communication line M1M2 can be improved by adding a magnetic ring. The installation is shown in the figure below. The magnetic ring needs to be fixed with the communication line (it can be wound for two turns), and placed in the electric control box and secured with a wire clamp.

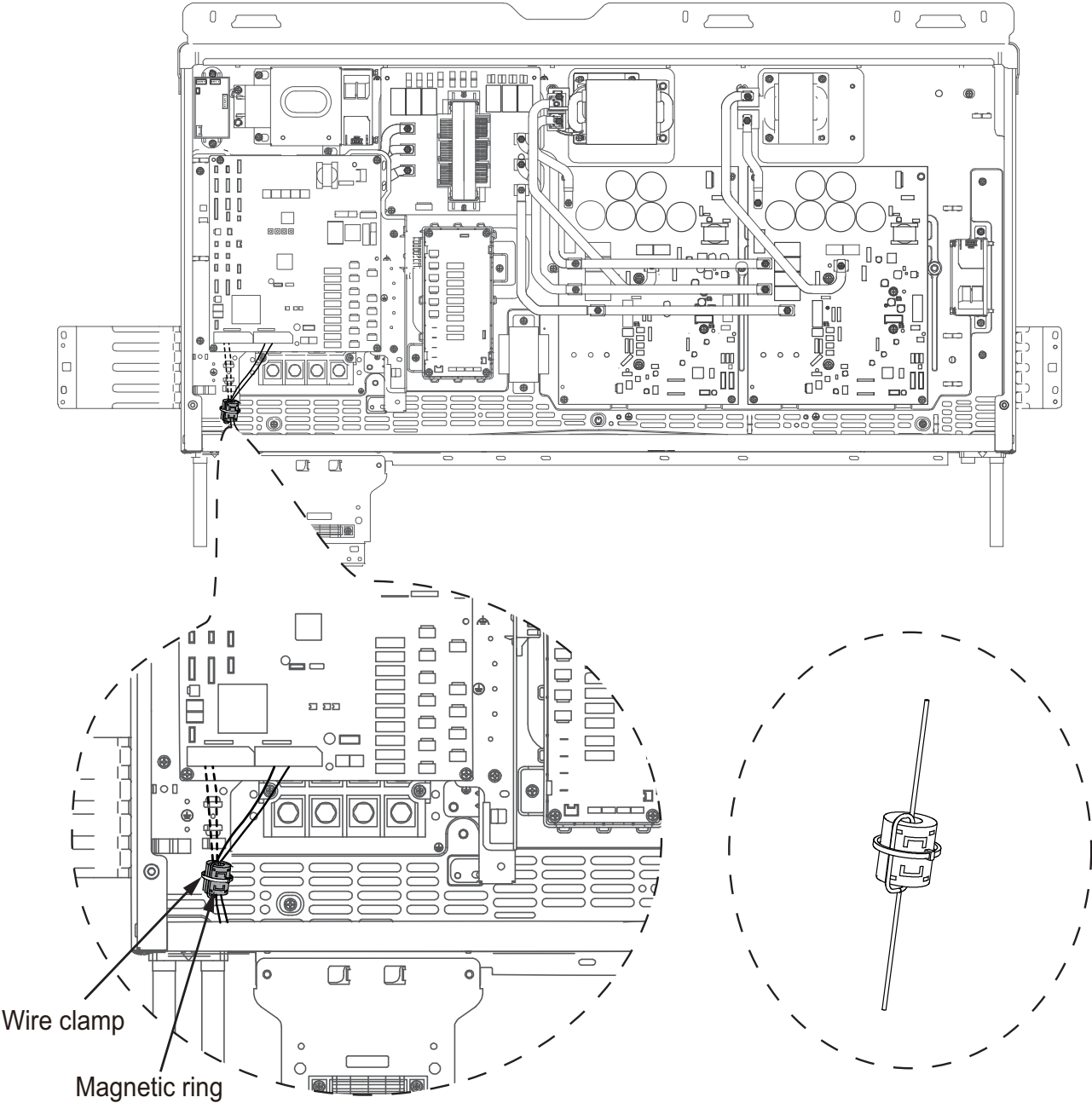


Fig. 61 – Communication Wiring Installation

A260297

Table 40 – Communication Wiring Material

Communication Mode	Type of Wire	Number of Cores and Wire Diameter (AWG)	Total Length of Communication Wire
HyperLink (M1 M2) communication (The IDUs in a system can be powered separately)	Ordinary PVC-sheathed flexible cable	2x16AWG	L≤1968 ft. (600 m.) (2 repeaters are required)
HyperLink (M1 M2) communication (All IDUs in a system must be powered through a uniform power supply)	Ordinary PVC-sheathed flexible cable	2x16AWG	L≤6562 ft. (2000 m.)

$L1+La+Ln \leq 6562$ ft(2000 m). Communication wiring 2*16AWG

— Communication wire
— Power wire

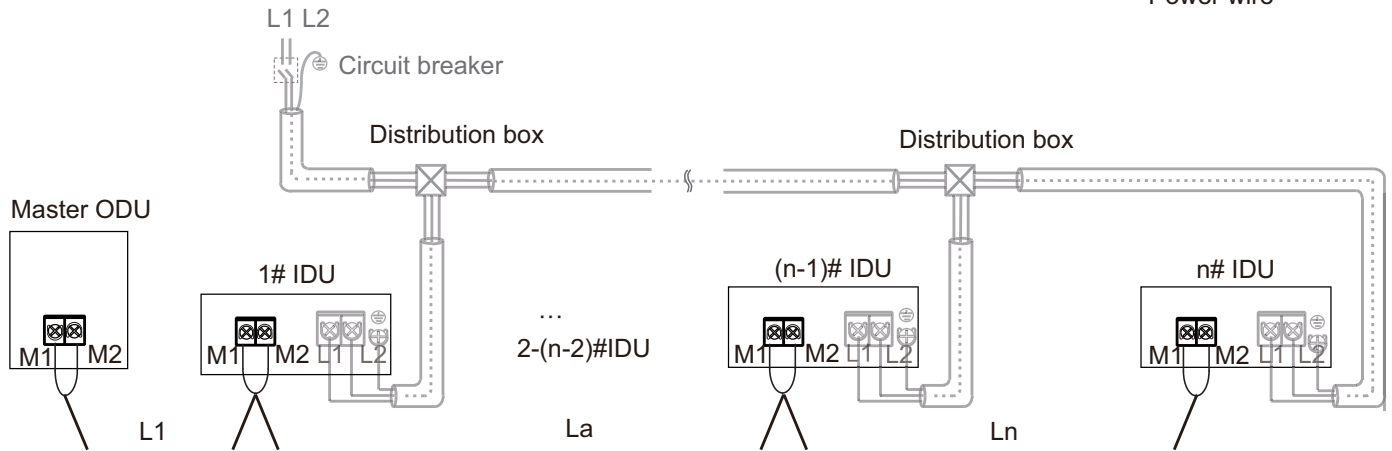


Fig. 62 – Communication Wiring Installation (cont.)

A260298

! CAUTION

- Keep the power on/off for all IDUs.
- Do not connect the HyperLink (M1 M2) communication line to the D1D2 communication line.
- If the HyperLink (M1 M2) communication is available and is required in the system, you will need to enable the function on the master ODU. For details, refer to [Test Run Implementation on p62](#).
- The communication wiring (M1 M2) must through the magnetic ring from the main board to the IDUs.
- When the system selects HyperLink (M1M2) communication, it is forbidden to connect build-out resistor to the end indoor unit, otherwise the communication will fail.

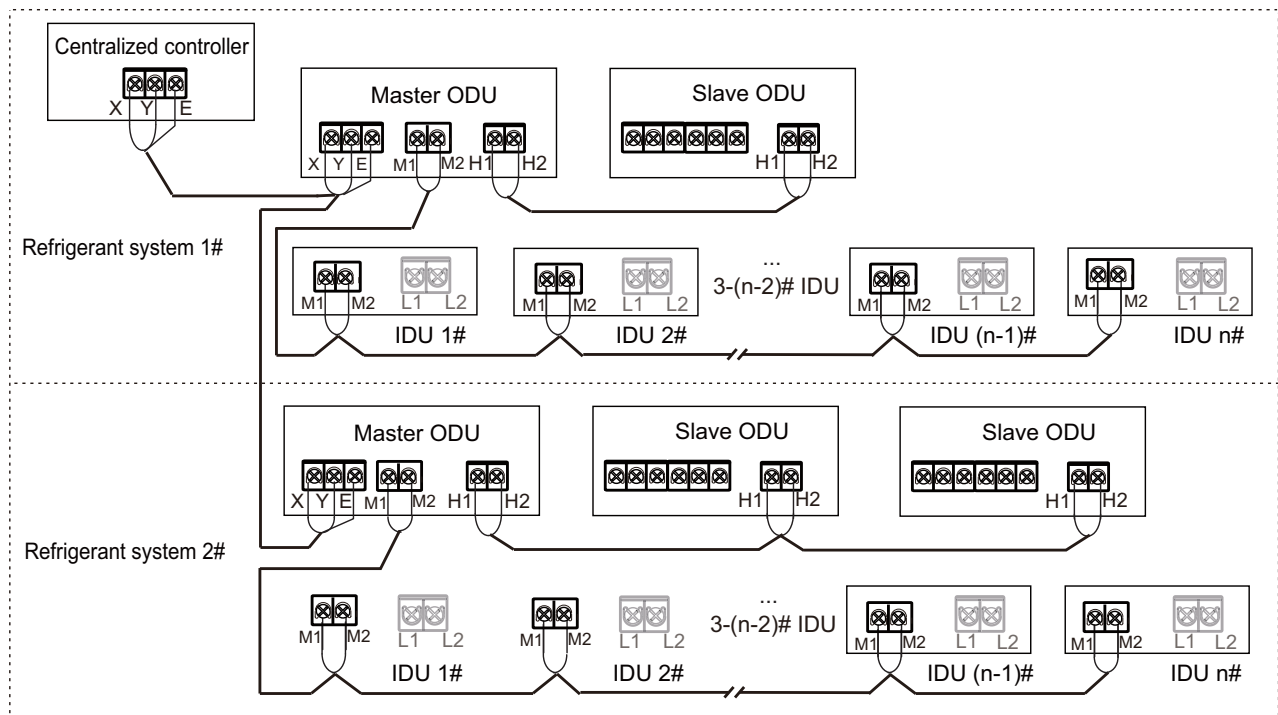


Fig. 63 – XYE, H1H2 Communication Wiring

A260299

! CAUTION

- The H1H2 communication lines of the outdoor unit should be connected in a chain starting from the master unit to the last slave unit. The XYE communication lines of the outdoor unit should be connected to the master unit.
- The cross-sectional area of each core of the communication wiring is not less than 0.75 mm², and the length must not exceed 3937 ft. (1200 m.).
- Connect the shielding nets at both ends of the shielded wire to the sheet metal terminal of the electronic control box.

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
- Using the Check function

! NOTICE

The installation personnel should read this chapter.

Digital Display and Button Settings

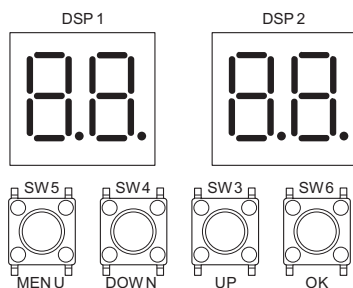


Fig. 64 – Digital Display and Button Settings

A260300

Table 41 – Digital Display Output

Outdoor unit state	Parameters displayed on DSP1	Parameters displayed on DSP2
Standby	Unit's address	The number of indoor units in communication with the outdoor units
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 42 – Function of Buttons SW3 to SW6

Button	Function
SW3 (UP)	In menu mode: previous and next buttons for menu modes.
SW4 (DOWN)	Not in menu mode: previous and next buttons for system check information.
SW5 (MENU)	Enter / exit menu mode.
SW6 (OK)	Confirm to enter specified menu mode.

Menu Mode

Only master unit has the full menu functions, slave units only have error code checking and cleaning functions.

1. Press and hold the SW5 “MENU” button for 5 seconds to enter menu mode, and the digital display displays “n1”.
2. Press the SW3 / SW4 “UP / DOWN” button to select the first level menu “n1”, “n2”, “n3”, “n4” or “nb”.

3. Press the SW6 “OK” button to enter the specified first level menu, for example, enter “n4” mode.
4. Press the SW3 / SW4 “UP / DOWN” button to select the second level menu from “n41” to “n47”.
5. Press the SW6 “OK” button to enter the specified second level menu, for example, enter “n43” mode.
6. Press the SW3 / SW4 “UP / DOWN” button to select the specified menu mode code.
7. Press the SW6 “OK” button to enter the 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.

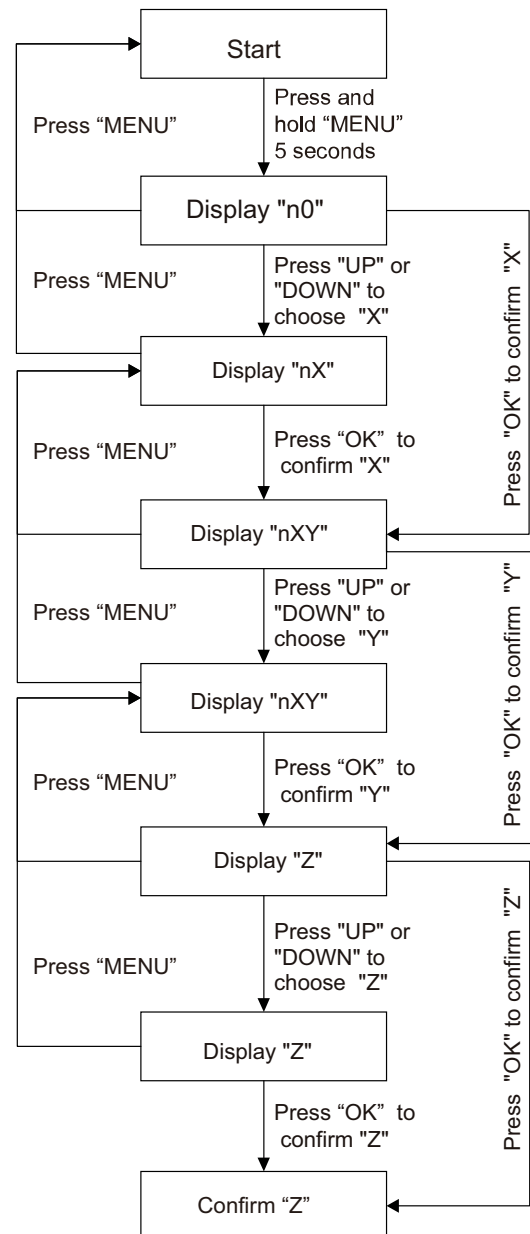


Fig. 65 – Menu Mode Selection Flowchart

A260301

Table 43 – Menu Mode

First Level Menu	Second Level Menu	Specified Menu Mode	Description	Default
n0	0	0	Query history error	-
		1	Cleaning history error	
	1	0	Query Indoor unit's address	
		1	Query SV Box unit's address	
		2	Query the address of Indoor unit in power-off condition	
		3	Query Indoor unit address of refrigerant leakage	
		4	Query SV Box address of refrigerant leakage	
		5	Query Indoor unit address with an unconfigured pipeline number	
	2	1	Driver's version (compressor and fan displayed in turn)	
	4	-	Accumulated running time of compressor	
	0	-	Shield C26 and C28 error in 3 hours	
n1	1	0	Cooling Test	-
		1	Heating Test	
		2	Test running	
		4	System refrigerant quantity detection	
		0	Refrigerant recovery to outdoor unit	
	2	1	Refrigerant recovery to indoor unit	
		2	Balance system refrigerant	
		-	Vacuum mode	
	5	-	Set No.63(VIP) indoor unit address	
	6	-		
n2	0	0	Automatic priority mode	X
		1	Cooling priority mode	-
		2	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	
	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	
		6	Silent mode 6	
		7	Silent mode 7	
		8	Silent mode 8	
		9	Silent mode 9	
		A	Silent mode 10	
		B	Silent mode 11	
		C	Silent mode 12	
		D	Silent mode 13	
		E	Silent mode 14	
	2	0	0Pa static pressure	X
		1	20Pa static pressure	-
		2	40Pa static pressure (Customized)	
		3	60Pa static pressure (Customized)	
		4	80Pa static pressure (Customized)	
		5	100Pa static pressure (Customized)	
		6	120Pa static pressure (Customized)	
	3	40	Power limitation mode, Maximum current =MCA * setting value	-
		41		
		42		
		~		
		98		
		99		
		100		X
	4	0	Meta function unavailable	-
		1	Meta function available	X
	5	0	Celsius unit	-
		1	Fahrenheit unit	X
	6	0	Anti-auto snow-blowing mode	X
		1	Auto snow-blowing mode 1	-
		2	Auto snow-blowing mode 2	
	7	0	Auto dust-clean function unavailable	X
		1	Auto dust-clean function available	-
	8	0	Dry contact closing effective	X
		1	Dry contact opening effective	-
	9	0	Mode Switching temperature: 50°F (10°C)	X
		1	Mode Switching temperature: 60.8°F (16°C)	-
		2	Mode Switching temperature: 69.8°F (21°C)	

Table 43 – Menu Mode

First Level Menu	Second Level Menu	Specified Menu Mode	Description	Default
n3	2	0	0m level difference between indoor unit and outdoor unit	X
		1	20m level difference between indoor unit and outdoor unit	-
		2	40m level difference between indoor unit and outdoor unit	
		3	60m level difference between indoor unit and outdoor unit	
		4	80m level difference between indoor unit and outdoor unit	
		5	100m level difference between indoor unit and outdoor unit	
		6	110m level difference between indoor unit and outdoor unit	
	4	0	Normal	X
		1	High sensible heat mode	-
		2	Low temperature mode	-
	7	0	Internal ambient temperature sensor	X
		1	External ambient temperature sensor	-
n4	0	-	Set address of outdoor unit	-
	1	-	Set Network address of outdoor unit	0
	2	-	Set number of indoor units	1
	3	-	Set number of SV Box	1
	4	0	Auto addressing	-
		1	Clear address	-
	0	0	Compressor and fan backup running unavailable	-
n5	0	1	Compressor and fan backup running available	X
		0	Sensors backup running unavailable	-
	1	1	Sensors backup running available (Manual)	X
		2	Sensors backup running available (Automatic)	-
	2	1	Backup operation time setting (2 days)	-
		0	Backup operation time setting (1 day)	
		2	Backup operation time setting (3 days)	
		3	Backup operation time setting (4 days)	
		4	Backup operation time setting (5 days)	
		5	Backup operation time setting (6 days)	
		6	Backup operation time setting (7 days)	X
n8	7	0	Low noise defrosting mode unavailable	X
		1	Low noise defrosting mode available	-
	A	0	Non	-
		1	Branch Pipe shut-off	-
		2	Main Pipe shut-off	X
n9	1	0	Rotation function unavailable	-
		1	Compressor rotation function available	X
		2	Outdoor unit rotation function available	
		3	Compressor + outdoor unit rotation function available	
	5	-	Release central controller emergency stop	-
	7	0	Digital electricity meter	X
		1	Pulse electricity meter	-
	9	0	Non forced test running	X
		1	Forced test running	-
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)	
		5	Dry contact 1 function selection (Refrigerant Leakage)	-
	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)	
		5	Dry contact 2 function selection (Refrigerant Leakage)	-
	2	0	Dry contact 3 function selection (Operation signal)	-
		1	Dry contact 3 function selection (Alarm signal)	X
		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)	

UP/DOWN System Check Button

Before pressing the UP or DOWN button, allow the system to operate steadily for more than an hour. Every time you press the UP or DOWN button, the parameters listed in the following table will be displayed in sequence.

Table 44 – Display Parameters

Display	Content	Description
--	Standby (ODU address+ IDU quantity)/frequency/special status	
0	ODU address	[0~3]
1	ODU capacity	Unit: Ton
2	Quantity of ODUs	[1~2]*
3	Quantity of IDUs	[1~64]
4	Total capacity of ODU system	Displayed on master ODU only†

Table 44 – Display Parameters

Display	Content	Description
5	Target frequency of this ODU	Displacement frequency‡
6	Target frequency of ODU system	Displacement frequency=DISP.×10
7	Actual frequency of compressor A	Actual frequency
8	Actual frequency of compressor B	Actual frequency

Table 44 – Display Parameters

Display	Content	Description
9	Operating mode	[0] OFF
		[2] Cooling
		[3] Heating
		[5] main cooling
		[6] main heating
10	Fan speed 1	Unit: RPM
11	Fan speed 2	Unit: RPM
12	T2 Average	Unit: °F
13	T2B Average	Unit: °F
14	T3	Unit: °F
15	T4	Unit: °F
16	T5	Unit: °F
17	T6A	Unit: °F
18	T6B	Unit: °F
19	T7C1	Unit: °F
20	T7C2	Unit: °F
21	T71	Unit: °F
22	T72	Unit: °F
23	T8	Unit: °F
24	Ntc_max	Unit: °F
25	T9	Unit: °F
26	TL	Unit: °F
27	Discharge superheat degree	Unit: °F
28	Primary current	Actual current = DISP./10 Unit: A
29	Inverter compressor A current (A)	Actual current = DISP./10 Unit: A
30	Inverter compressor B current (A)	Actual current = DISP./10 Unit: A
31	EEVA position	Actual Value = DISP. *24
32	EEVB position	Actual Value = DISP. *24
33	EEVC position	Actual Value = DISP. *4
34	EEVD position	Actual Value = DISP. *4
35	High pressure of unit	Actual Pressure = DISP. /100 Unit: MPa
36	Low pressure of unit	Actual Pressure = DISP. /100 Unit: MPa
37	Quantity of online IDUs	Actual quantity
38	Quantity of running IDUs	Actual quantity
39	Heat exchanger status	[0]OFF
		[1] C1: Condenser. Running
		[2] D1: Condenser. Not running
		[3] Reserved
		[4] E1: Evaporator. Running
		[5] Reserved
40	Special mode	[6] F2: Evaporator. Not running
		[0] Not in special mode
		[1] Oil return
		[2] Defrost
		[3] Startup
		[4] Stop
		[5] Quick check
		[6] Reserved

Table 44 – Display Parameters

Display	Content	Description
41	Silent mode	[0~15], 15 represents the most silent
42	Static pressure mode	[0] 0 in.WG [1] 0.08 in.WG [2] 0.16 in.WG [3] 0.24 in.WG [4] 0.32 in.WG [5] 0.40 in.WG [6] 0.48 in.WG
43	TES	Actual temperature = DISP. Unit: °F
44	TCS	Actual temperature = DISP. Unit: °F
45	DC Voltage	Actual voltage Unit: V
46	AC Voltage	Actual voltage Unit: V
47	Quantity of cooling mode IDUs	
48	Quantity of heating mode IDUs	
49	Capacity of cooling mode IDUs	
50	Capacity of heating mode IDUs	
51	Refrigerant volume	[0] No result
		[1] Reserved
		[2] Significantly insufficient
		[3] Normal
		[4] Slightly excessive
		[5] Reserved
52	Dirty blockage rate	[0~10], 10 represents the worst
53	Fan error	
54	Software version	
55	Last error code	

*. Available for master unit.

†. Only available for master unit, displayed on slave units has no sense.

‡. Need to convert to current compressor output volume, example:

compressor output volume is 55,

Target frequency = Actual frequency * 55 / 60.

Commissioning

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 test run.

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

The test run usually includes the following stages:

1. Review the section titled “Checklist Before Test Run”.
2. Implement the test run.
3. If necessary, correct the errors before the test run completes with exceptions.
4. Run the system

Things to Note During Test Run

! WARNING

During the test run, the outdoor unit operates at the same time as the SV boxes and indoor units connected to it. It is very dangerous to debug the SV boxes or indoor units during the test run. Do not insert fingers, sticks, or other items into the air inlet or outlet. Do not remove the fan mesh cover. When the fan rotation is set at a high speed, it may cause bodily injury.

! NOTICE

Note that the required input power may be higher when this unit is run for the first time. This phenomenon is due to the compressor which needs to run for 50 hours before it can achieve a stable operating and power consumption state. 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.

! NOTICE

The test run can be carried out when the ambient temperature is within the required range as in Fig. 66.

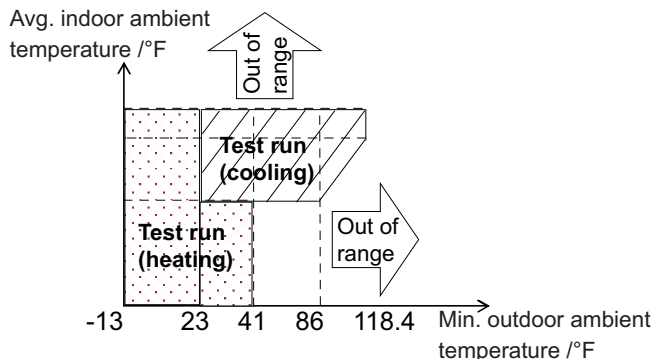


Fig. 66 – Ambient Temperature Require Range

A260302

During the test run, the outdoor units, SV boxes and indoor units will start at the same time. Make sure all the preparations for the outdoor units, SV boxes and indoor units have been completed.

Checklist Before Test Run

Once this unit is installed, check the following items first. After all the following checks have been completed, you must shut down the unit. This is the only way to start the unit again.

☐	Installation Check if the unit is installed correctly to prevent strange noises and vibrations when the unit starts.
☐	Field wiring Based on the wiring schematic and the relevant regulations, make sure the field wiring is based on the instructions described in section 5.10 on connecting wires.
☐	Ground line Make sure the earth line is connected correctly, and the grounding terminal is tight.
☐	Insulation test of the main circuit Use the megameter of 500V, apply a voltage of 500V DC between the power terminal and the ground terminal. Check that the insulation resistance is above 2 MΩ. Do not use the megameter on the transmission line.
☐	Fuses, circuit breakers, or protection devices Check that the fuses, circuit breakers, or locally installed protection devices comply with the size and type specified in the requirements for safety devices. Make sure you use fuses and protection devices.
☐	Internal wiring Visually inspect if the connections between the electrical component box and the interior of the unit is loose, or if the electrical components are damaged.
☐	Piping dimensions and insulation Make sure the installation piping dimensions are correct, and that insulation work can be carried out normally.
☐	Stop valve Make sure the stop valve is open on both the liquid, low pressure and high pressure gas sides.
☐	Equipment damage Check for damaged components and extruded piping inside the unit.
☐	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.
☐	Oil leak Check if there is oil leaking from the compressor. If there is an oil leak, try to repair the leak. If the repair is not successful, please call the local agent.
☐	Air inlet/outlet Check for paper, cardboard or any other material that may obstruct the air inlet and outlet of the equipment.
☐	Add additional refrigerant The amount of refrigerant to be added to this unit should be marked on the "Confirmation Table" which is located on the front cover of the electrical control box.
☐	Installation date and field settings Make sure the installation date is recorded on the label of the electric control box cover, and the field settings are recorded as well.

Fig. 67 – Checklist Before Test Run

A260303

About Test Run

The following procedures describe the test run of the whole system. This operation checks and determines the following items:

- Check if there is a wiring error (with the communication check of the indoor unit).
- Check if the stop valve is open.

- Determine the length of the pipe.

! NOTICE

- Before you start the compressor, it may take 10 minutes to achieve a uniform cooling state.
- During the test run, the sound of the cooling mode in operation or the solenoid valve may become louder, and there may be changes in the displayed indicators. This is not a malfunction.

Test Run Implementation

1. Make sure all the settings you need to configure are completed. See [Maintenance After the Unit has Been Shut Down for a Long Period on p22](#) on the implementation of the field settings.
2. Turn on the power supply of the outdoor unit and the indoor units.

! NOTICE

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.

Specific procedures for the test run are as follows:

Step 1: Power on

Cover the lower panel of the ODU, and power on all IDUs and ODU.

Step 2: Enter commissioning mode

When the ODU is first powered on, it displays “- . - . - .”, which means the unit is not commissioned. Long press the “DOWN” and “UP” buttons simultaneously for 5s on the master ODU to enter commissioning mode.

Step 3: Set the number of IDUs in a system

The digital display of the master ODU displays “01 01”, where 1st and 2nd digits always on, 3rd and 4th digits flashing. The 3rd and 4th digits represent the number of IDUs, the initial value is 1, short press the “DOWN” or “UP” button to change the number. Once the number of IDUs has been set, short press the “OK” button to confirm and automatically proceed to the next step.

Step 4: Select the system communication protocol

Enter the communication protocol setting interface, the digital display of master ODU displays “02 0”, where the 1st and 2nd digits always on, the 3rd digit off, the 4th digit flashing. The 4th digit of the digital display represents the communication protocol type, the initial value is 0. Short press the “DOWN” or “UP” button to change the communication protocol.

If the system is all R-454B IDUs, and the IDUs and ODUs are connected by PQ communication, please select protocol RS-485 (P Q) communication, and set the 4th digit of the master ODU digital display to 0; ODU factory default protocol RS-485 (P Q) communication.

If the system has a non-R-454B IDUs, and the IDUs and ODUs are connected by PQE communication, please select the non protocol RS-485 (P Q E) communication and set the 4th digit of the master ODU digital display to 1.

If the system is all R-454B IDUs, the IDUS and ODUs are connected by M1M2 communication, and all IDUs are powered uniformly, please select the HyperLink (M1M2) communication + indoor unit uniform power supply, and set the 4th digit of the master ODU digital display to 2.

If the system is all R-454B IDUs, the IDUS and ODUs are connected by M1M2 communication, and there is separate power supply for IDUS, please select the HyperLink (M1M2) communication + indoor unit separate power supply, and set the 4th digit of the master ODU digital display to 3.

Once the communication protocol has been set, short press the “OK” button to confirm and automatically proceed to the next step.

Step 5: IDUs and ODUs address setting

Enter the auto addressing function, the digital display of master ODU flashes “AU Ad” and “X YZ” in rotation. “AU Ad” means the auto addressing is in progress, “X” represents the address of the ODU, “YZ” represents the number of detected IDUs; the auto addressing takes about 5-7 minutes, and automatically proceed to the next step after completion.

Step 6: System initialization

Entering system initialization, the digital display of master ODU flashes “INIt” and “X YZ” in rotation. “INIt” means initialization is in progress, “X” represents the address of the ODU, “YZ” represents the number of detected IDUs; the system initialization takes about 3-5 minutes, and automatically proceed to the next step after completion.

Step 7: Test run

During a test run, the system automatically diagnoses the air outlet static pressure of the ODU, the stop valve status, the consistency of the refrigerant piping and communication wiring, and the installation environment. For a properly installed and connected system, the test run will last for about 40 to 60 minutes. In this process, the ODU digital display will show “STP1” to “STP7”. After the test run, the digital display will show “End”, 10 seconds after which the system will automatically proceed to the next step.

In case of an abnormal shutdown of the ODU during the test run, the digital display will show the error code. Please troubleshoot according to the troubleshooting guide. After troubleshooting, the test run will restart through the menu “n11-2” on the master unit until the digital display shows “End” and the system proceeds to the next step. Then, the test run is completed.

Step 8: Complete

Upon completion of the test run, the system will enter the standby mode, and the digital display will show “X YZ” where X represents the ODU address and YZ represents the number of IDU(s) detected. Then, the unit can start properly.

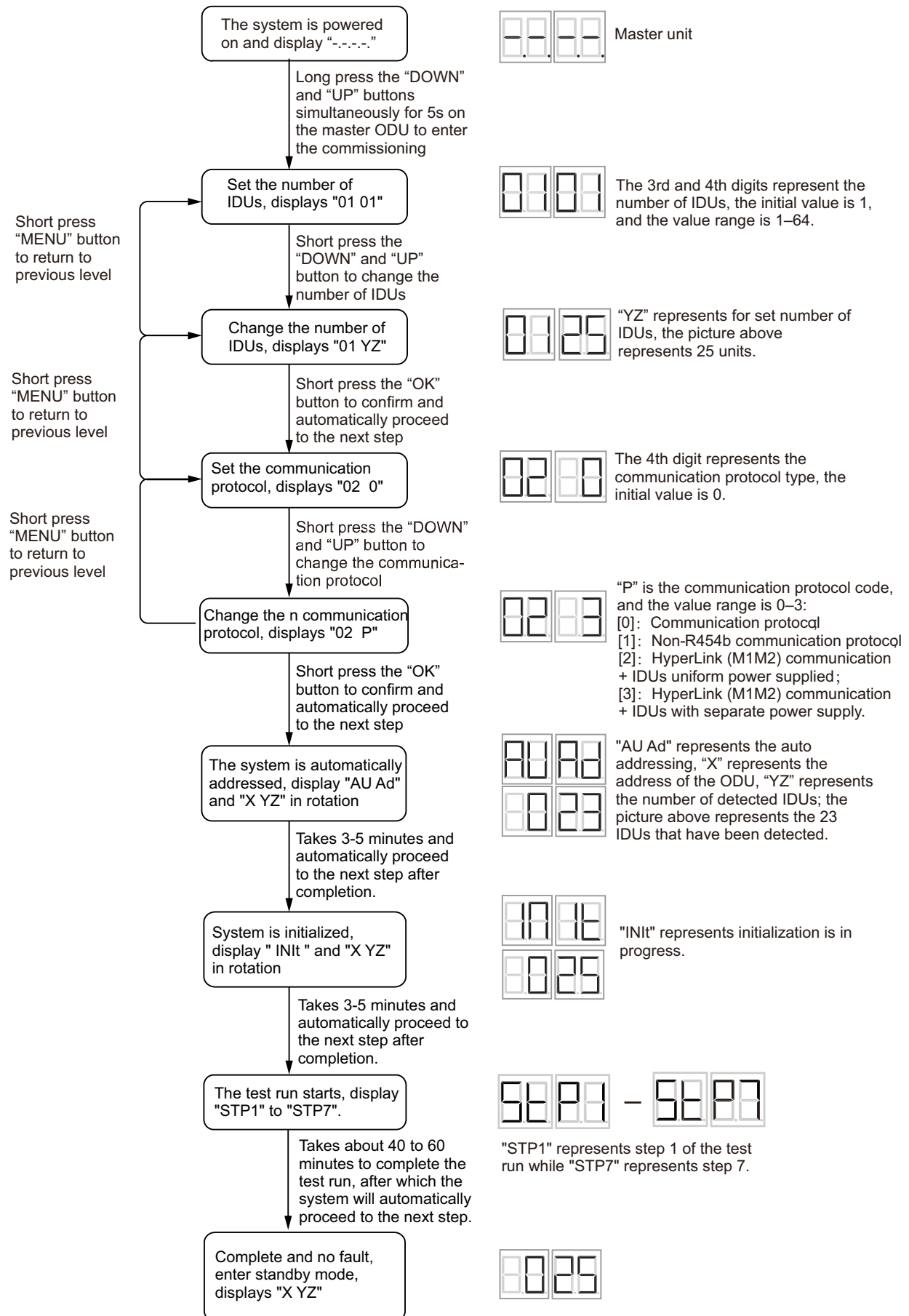


Fig. 68 – Commissioning Flowchart

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Rectifications After Test Run is Completed with Exceptions

The test run 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. Try to conduct the test run again to check that the exception has been corrected.

NOTICE

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

Operating This Unit

Once the installation of this unit is completed, and the test run of the outdoor and indoor units is done, 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.

Maintenance and Repair

NOTICE

Arrange for the installation personnel or service agent to carry out maintenance once every year.

Overview

This chapter contains the following information:

- Take electrical hazards preventive measures during system maintenance and repair.
- Recovery operation for refrigerant.

Safety Precautions for Maintenance

NOTICE

Before you carry out any maintenance or repair work, touch the metal parts of the unit to dissipate static electricity and protect the PCB.

Prevent Electrical Hazards

When maintaining and repairing the inverter:

1. Do not open the cover of the electrical component box within 5 minutes after the power is switched off.
2. Verify that the power supply is switched off before you use the measuring instrument to measure the voltage between the main capacitor and the main terminal to ensure that the capacitor voltage in the main circuit is less than 36 VDC. The position of the main terminal has been shown in the Wiring nameplate (The port of CN38 on the compressor drive board).
3. Before you come in any contact with the circuit board or components (including the terminals), make sure that static electricity in your own body is eliminated. You can touch the sheet metal of the outdoor unit to achieve this. If conditions permit, please wear an anti-static bracelet.
4. During maintenance, pull out the plug connecting to the power cord of the fan to prevent the fan from rotating when it is windy outside. Strong winds will cause the fan to rotate and generate electricity which can charge the capacitor or terminals, leading to an electric shock. At the same time, do take note of any mechanical damage. The blades of a fan rotating at high speed are very dangerous and cannot be operated by one person alone.

5. Once the maintenance is completed, remember to reconnect the plug to the terminal; otherwise, a fault will be reported for the main control board.
6. When the unit is power on, the fan of the unit with auto snow-blowing function will run periodically, so make sure the power supply is off before touching the unit.
Please refer to the wiring schematic on the back of the box cover of the electrical component box for the relevant details.

Technical Data

Dimensions

NOTICE

- Product dimensions may vary slightly due to different panels and the tolerance is $\pm 1-3/16$ in. (30 mm.). The actual product shall prevail.
- Product pictures in this manual are for reference only.

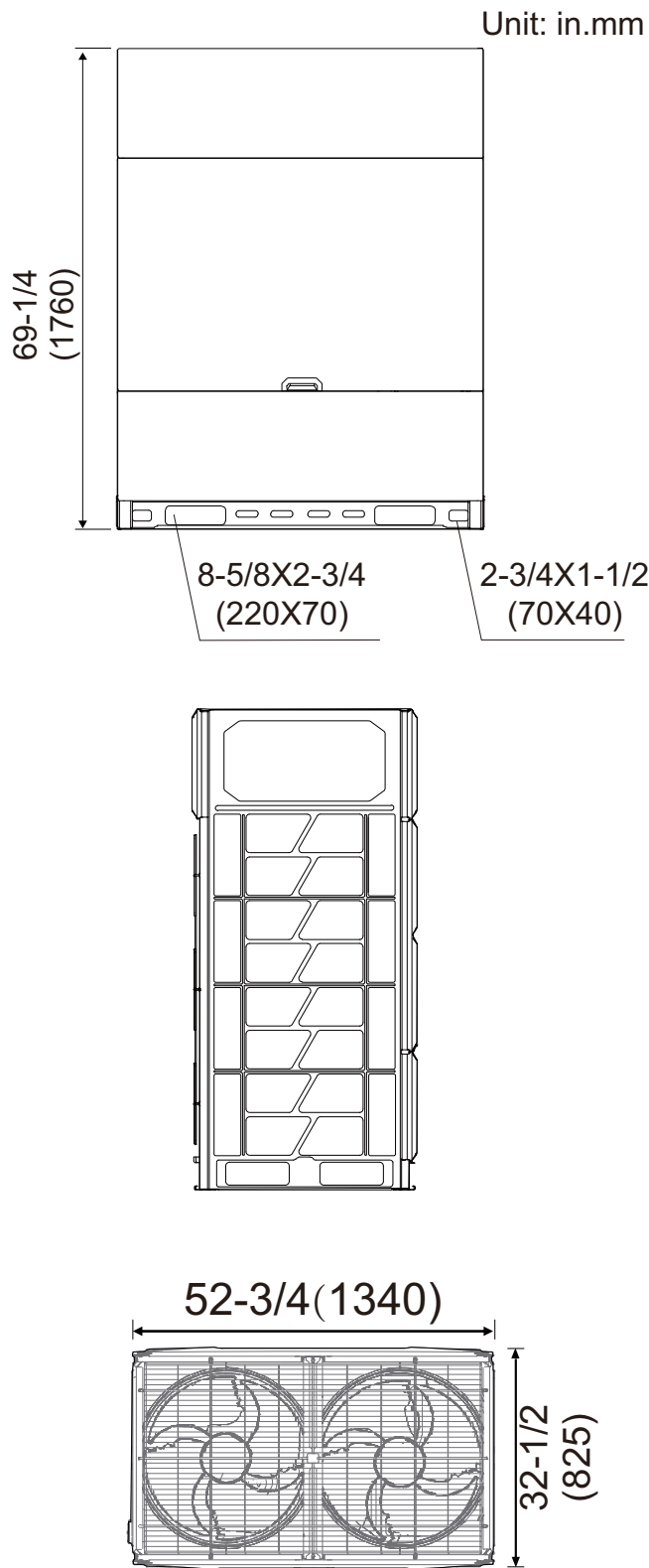
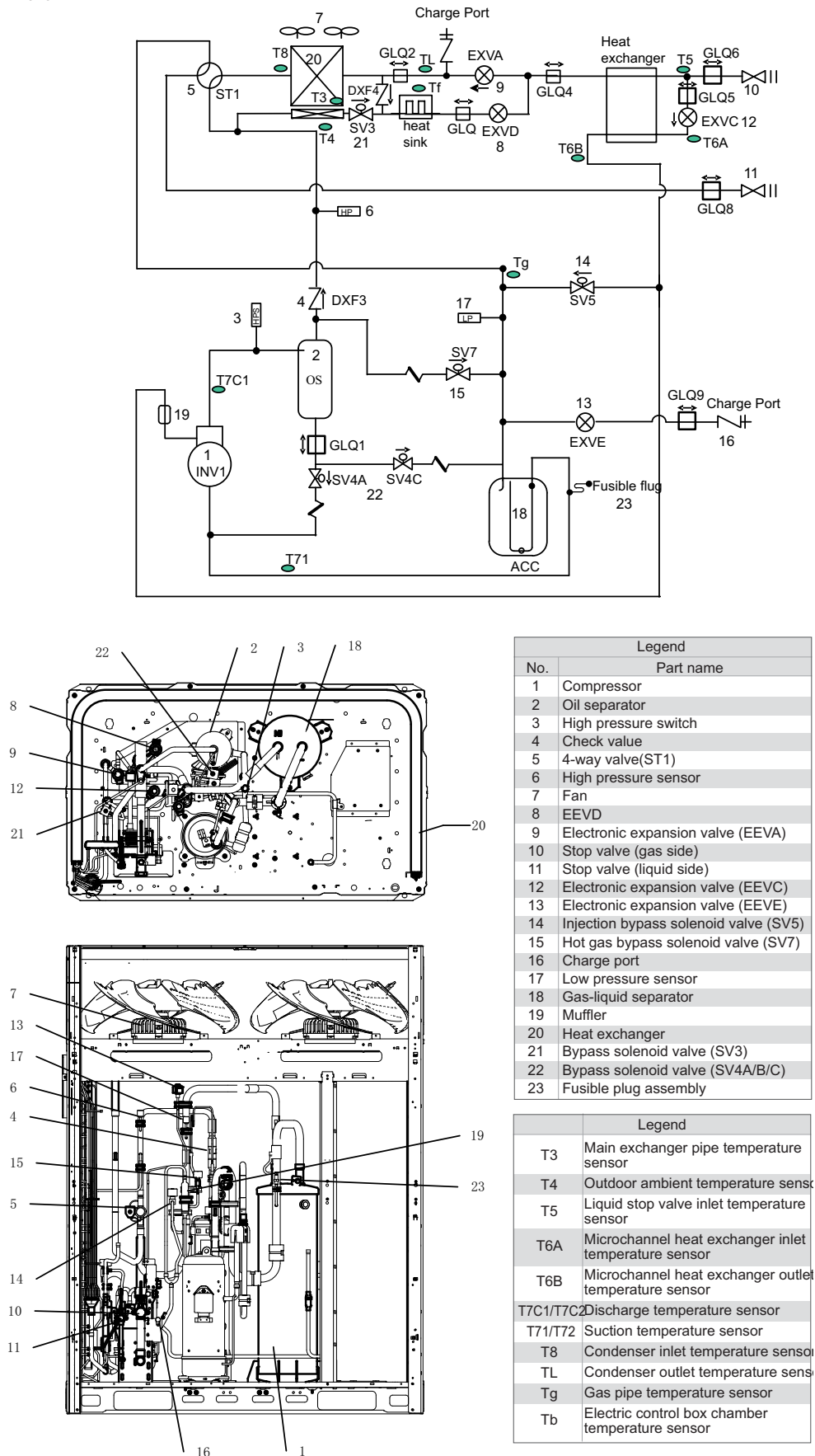


Fig. 69 – Product Dimensions

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Component Layout and Refrigerant Circuits

6Ton

**Fig. 70 – Component Layout and Refrigerant Circuit (6-ton)**

A260306

8/10Ton

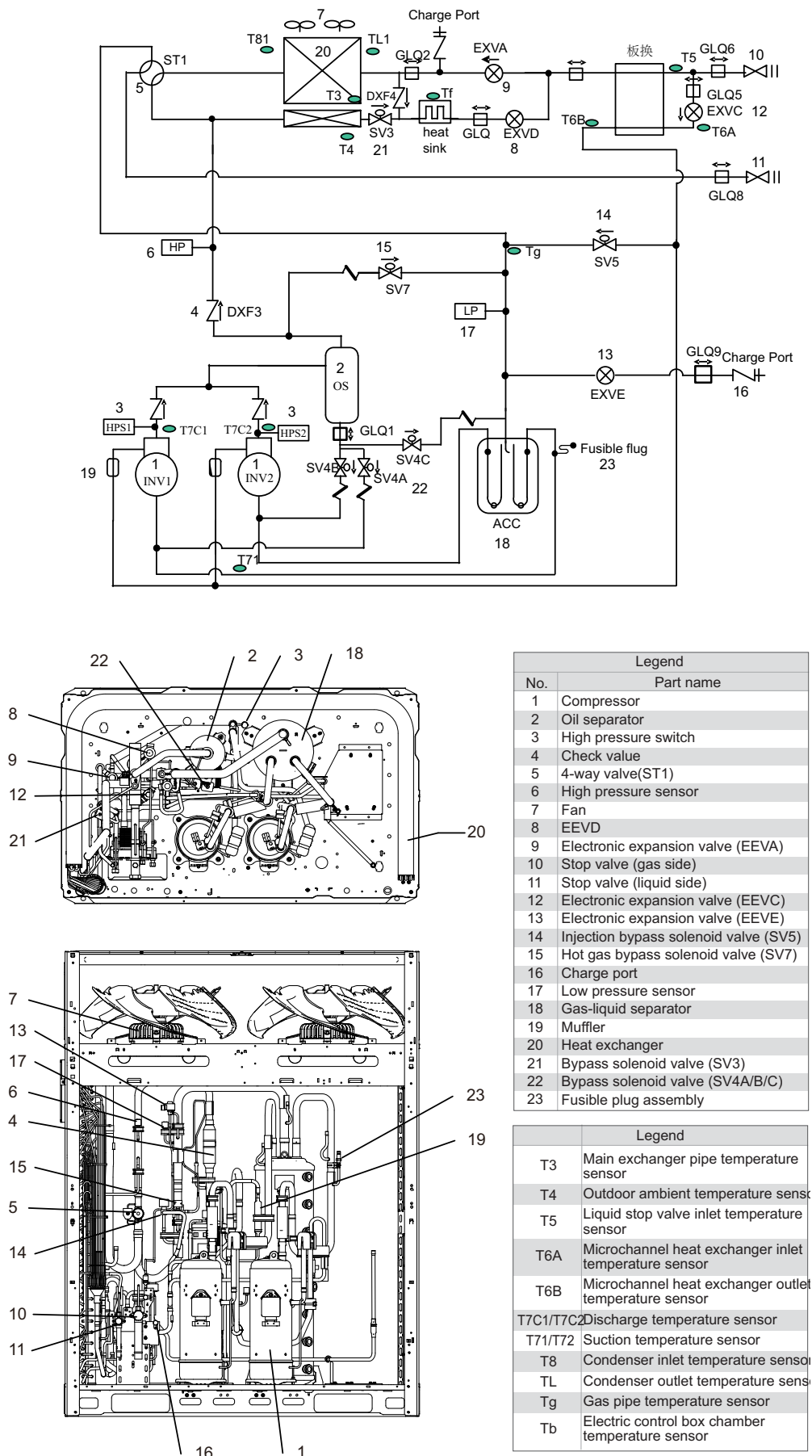


Fig. 71 – Component Layout and Refrigerant Circuits (10-ton)

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Outdoor Unit Ducting

The following principles shall be followed when installing the air guide device:

- Before installing outdoor unit ducting, be sure to remove the unit's steel mesh cover; otherwise, airflow will be adversely affected.
- Each duct should contain no more than one bend.
- Vibration isolation should be added to the connection between the unit and the ducting to avoid vibration/noise.

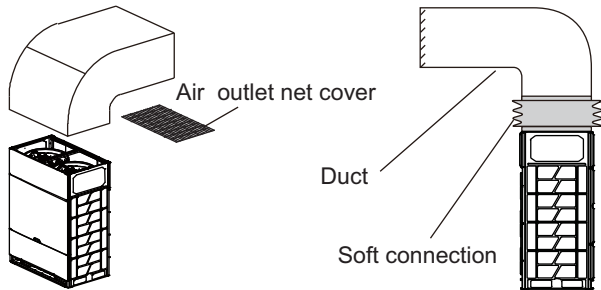
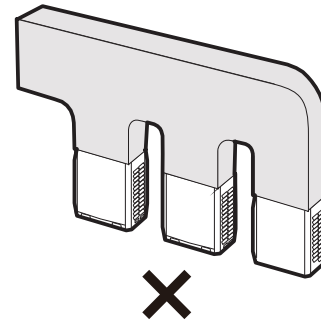


Fig. 72 – Outdoor Unit Ducting

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- The addition of louvers will affect the air output of the unit, so the use of louvers is not recommended. If you want to use a louver, please keep the shutter angle below 15° and ensure that the effective opening rate of the shutter is more than 90%.
- If more than one outdoor unit needs ducting, each outdoor unit should have independent ducting. A single ducting cannot be shared by multiple outdoor units.
- According to the actual static pressure of the outdoor unit ducting, select an appropriate static pressure mode. Refer to [Maintenance After the Unit has Been Shut Down for a Long Period on p22](#).



Option A: Transverse ducting

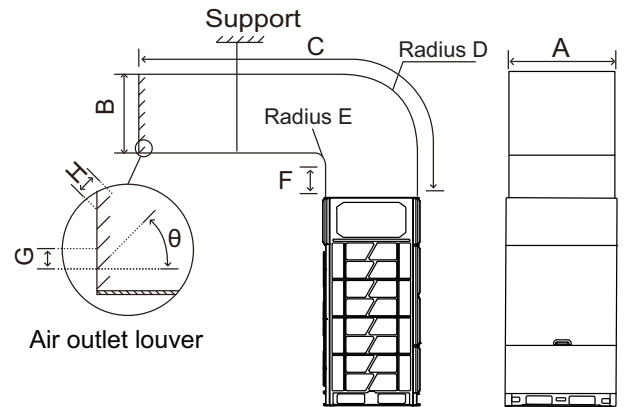


Fig. 73 – Outdoor Unit Ducting (cont.)

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Table 45 – Outdoor Unit Ducting Dimensions (in. (mm.))

Ton	6-10 Ton	Ton	6-10 Ton
A	50-3/4(1290)	F	≥9-7/8(250)
B	30-3/8(770) ≤ B ≤ 31-1/2(800)	θ	≤15°
C	≤118-1/8(3000)	G	≥3-7/8(100)
D	E+30-3/8(770)	H	≤3-1/2(90)
E	≥11-3/4(300)		

Option B: Longitudinal ducting

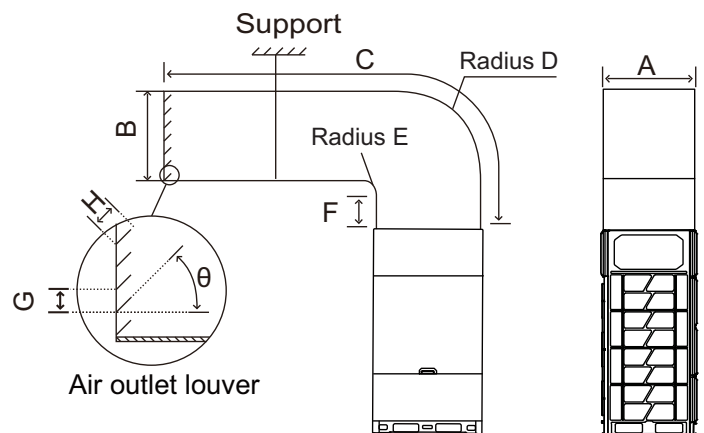


Fig. 74 – Outdoor Unit Ducting - Longitudinal

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Table 46 – Outdoor Unit Ducting Longitudinal Dimensions (in. (mm.))

Ton	6-10 Ton	Ton	6-10 Ton
A	30-3/8(770)	F	≥9-7/8(250)
B	51-1/2(1310)	θ	≤15°
C	≤118-1/8(3000)	G	≥3-7/8(100)
D	E+50-3/4(1290)	H	≤3-1/2(90)
E	≥11-3/4(300)		

Fan Performance

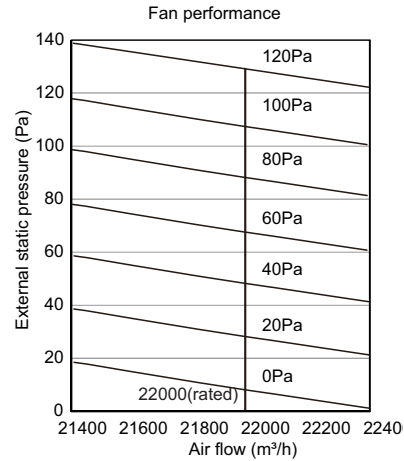


Fig. 75 – Fan Performance

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! NOTICE

Static pressure exceeds 20Pa needs to be customized.

NOTES: