

45VMS***S(L)--3

Refrigerant Shut-off Device 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 – Refrigerant Shut-off Device

A250345

About This Document.....	1
Documentation Set.....	2
Safety Signs.....	2
Explanation of Safety Signs.....	2
Explanation of Symbols Displayed on the Unit.....	2
Important Information for the Dealer and Service Personnel.....	2
Important Information for User.....	7
About the Refrigerant.....	8
Room Area Limitations.....	8
Calculation Method for Releasable Charge.....	9
Before Installation.....	9
Precautions.....	9
About the Box.....	10
Special Requirements for R-454B Units.....	12
Dimension Diagrams.....	13
Accessories and Locally Purchased Components.....	15
Install the Main Body.....	15
Different Installation Methods of the Refrigerant Shut-off Device.....	15
Horizontal-up Type.....	15
Ceiling-suspended Type.....	15
Installation of Suspension Screw Bolts.....	15
Hanging the Refrigerant Shut-off Device.....	16
Refrigerant Piping.....	16
Connecting Diagram of the Refrigerant Shut-off Device.....	17
The Procedure of Connecting Pipes.....	17
Method of Piping Flaring Connection.....	17
Checking Refrigerant Piping.....	18
Open/Close the Valves.....	20

Electrical Wiring.....	20
Safety Device Requirements.....	20
Connecting the Wiring.....	20
Connecting the Power Cord.....	22
Connecting the Mechanical Ventilation Signal Wiring.....	24
Connecting the External Alarm Wiring.....	25
Drain Pipe Installation.....	26
Drain Pipe Layout.....	26
Water Drainage Test.....	28
Mechanical Ventilation Within the Appliance Enclosure Installation.....	28
Regulatory Requirements for Mechanical Ventilation.....	29
Exhaust Duct Layout.....	29
Mechanical Exhaust Fan Selection.....	29
Configuration.....	32
Overview.....	32
Digital Display and Button Settings.....	32
Field Setting.....	33
Charging Refrigerant.....	35
Commissioning.....	37
Troubleshooting.....	37
Hand-over to the user.....	37
Technical Data.....	37
Product Information.....	37
Operation Manual.....	39
User Safety Instructions.....	39
General.....	40
Instructions for Safe Operation.....	40
About the System.....	41
Maintenance and Service.....	42
After Sales Service and Warranty.....	43
Error Code.....	44
Relocation.....	44
Disposal.....	44

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.
- Outdoor Unit installation and operation manual: Installation and operation instructions.
- Controller installation and operation manual: Installation and operation instructions.

Refer to the product manual for other accessories.

! NOTICE

- 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 possible damage to unit or nearby equipment or structure.

! WARNING

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

! NOTICE

- Is used to address practices not related to physical injury.
- Indicates a useful hint or additional information.

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 this appliance used a flammable refrigerant. If the refrigerant is leaked and exposed to an external ignition source, there is a risk of fire.
 A260214	CAUTION	This symbol shows that the manual should be read carefully.
 A260215	CAUTION	This symbol shows that only a competent service personnel should be handling this equipment with reference to the technical manual.
 A260216	CAUTION	This symbol shows that information is available such as the operating manual or installation manual.
ETRS	INFORMATION	This symbol indicates that the entire system complies with the ENHANCED TIGHTNESS REFRIGERATING SYSTEMS requirements defined by UL/CSA Standards.

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. 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.

3. Disposal of equipment using flammable refrigerants

See national regulations.

The maximum number of pieces of equipment permitted to be stored together will be determined by local regulations.

Every working procedure that affects safety means shall only be carried out by competent personnel.

Examples for such working procedures are:

- breaking into the refrigerating circuit;
- opening of sealed components;
- opening of ventilated enclosures.

Pipe-work shall be in compliance with national and local codes and standards.

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 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.

! WARNING

Detailed information on the following topics is included in the manual:

- function, operation and required servicing measures;
- specified end-of-life and replacement instructions;
- other information about REFRIGERANT DETECTION SYSTEMS

Room shall be without continuously operating open flames (for example an operating gas appliance) or other POTENTIAL IGNITION SOURCES (for example an operating electric heater, hot surfaces).

Auxiliary devices which may be a POTENTIAL IGNITION SOURCE shall not be installed in the duct work.

The appliance contains more than m1 for any refrigerating circuit, an unventilated area where the appliance using FLAMMABLE REFRIGERANTS is installed shall be so constructed that should any refrigerant leak, it will not stagnate so as to create a fire or explosion hazard.

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 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, Clause "Work procedure" to Clause "No ignition sources" 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 ground bonding.

! WARNING

Sealed electrical components shall be replaced.

Intrinsically safe components must be replaced.

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

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

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

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

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

NOTE Examples of leak detection methods are:

- bubble method,
- fluorescent agent method.

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

! CAUTION

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

Oxygen free nitrogen (OFN) shall then be purged through the system both before and during the brazing process.

When breaking into the refrigerant circuit to make repairs - or for any other purpose - conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration. The following procedure shall be adhered to:

- safely remove refrigerant following local and national regulations;
- evacuate;
- purge the circuit with inert gas (optional for A2L);
- evacuate (optional for A2L);
- continuously flush with inert gas when using flame to open circuit;
- open the circuit.

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

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

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 labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.

! 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**

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.

NOTE: 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**Hazardous Voltage**

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

Disconnect all electric power, Including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized.

! WARNING**Refrigerant Oil**

These units use 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

The appliance uses R454B refrigerant.

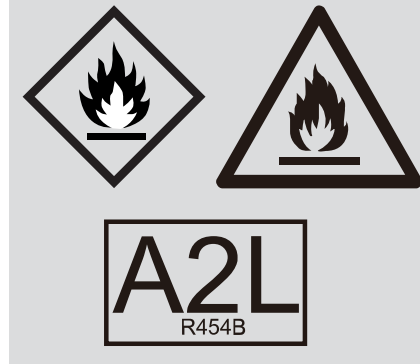


Fig. 2 – Refrigerant Symbols

! 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

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, R-454B refrigerant is classified as class A2L, which is mildly flammable. Therefore, R-454B 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.

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.

Calculation Method for Releasable Charge

When the system has no refrigerant shut-off device, the releasable charge $m_{REL}=m_c$; When the system has a refrigerant shut-off device, the releasable charge $m_{REL}=\min(m_c, \max(m_{REL-C}, m_{REL-H}, m_{REL-OFF}))$.

$$m_{REL-C}=m_{Extra-C}+m_{Basic-C}+m_{Indoor-C}$$

$$m_{REL-H}=m_{Extra-H}+m_{Basic-H}+m_{Indoor-H}$$

$$m_{REL-OFF}=m_{Extra-OFF}+m_{Basic-OFF}+m_{Indoor-OFF}$$

Table 1 – Extra Releasable Charge (m_{Extra})

Piping Outer Diameter	Releasable Charge lb/ft (kg/m)		
	Cooling Mode	Heating Mode	Off
1/4 (6.35 mm)	0.011 (0.016)	0.011 (0.016)	0.003 (0.005)
3/8 (9.52 mm)	0.029 (0.043)	0.029 (0.044)	0.008 (0.012)
1/2 (12.70 mm)	0.003 (0.004)	0.004 (0.006)	0.015 (0.022)
5/8 (15.88 mm)	0.004 (0.006)	0.007 (0.010)	0.024 (0.036)
3/4 (19.05 mm)	0.005 (0.008)	0.010 (0.014)	0.035 (0.051)
7/8 (22.23 mm)	0.007 (0.011)	0.013 (0.019)	0.048 (0.071)

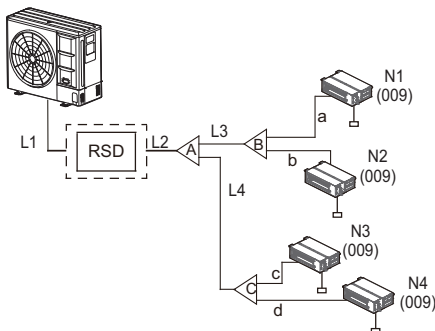


Fig. 3 – Example of the releasable charge m_{REL}

A250346

The example system consisting of 1 outdoor unit (3.0 ton) and 4 indoor units (MIH09T2MN10 × 4), as shown in Figure 2-1.

- The liquid pipe size of L1 is 3/8 in (9.52 mm), gas pipe size of L1 is 5/8 in (15.88 mm), and 65.617 ft (20 m) length for both the liquid and gas pipe.
- The liquid pipe size of L2 is 3/8 in (9.52 mm), gas pipe size of L2 is 5/8 in (15.88 mm), and 16.404 ft (5 m) length for both the liquid and gas pipe.
- The liquid pipe size of L3 is 3/8 in (9.52 mm), gas pipe size of L3 is 5/8 in (15.88 mm), and 32.808 ft (10 m) length for both the liquid and gas pipe.
- The liquid pipe size of L4 is 3/8 in (9.52 mm), gas pipe size of L4 is 5/8 in (15.88 mm), and 32.808 ft (10 m) length for both the liquid and gas pipe.
- The liquid pipe size of a is 1/4 in (6.35 mm), gas pipe size of a is 1/2 in (12.70 mm), and 49.213 ft (15 m) length for both the liquid and gas pipe.
- The liquid pipe size of b is 1/4 in (6.35 mm), gas pipe size of b is 1/2 in (12.70 mm), and 16.404 ft (5 m) length for both the liquid and gas pipe.

- The liquid pipe size of c is 1/4 in (6.35 mm), gas pipe size of c is 1/2 in (12.70 mm), and 32.808 ft (10 m) length for both the liquid and gas pipe.
- The liquid pipe size of d is 1/4 in (6.35 mm), gas pipe size of d is 1/2 in (12.70 mm), and 26.247 ft (8 m) length for both the liquid and gas pipe.

Calculate the total refrigerant charge (m_c) according to section 15 in INSTALLATION AND OPERATION MANUAL of outdoor unit.

$$m_c(lb)=0.036 \times (65.617+16.404+32.808+32.808)+0.014 \times (49.213+16.404+32.808+26.247)+6.830=13.890 \text{ lb}$$

$$m_c(kg)=0.053 \times (20+5+10+10)+0.020 \times (15+5+10+8)+3.10=6.245 \text{ kg}$$

$$m_{REL-C}(lb)=(0.029+0.004) \times (16.404+32.808+32.808)+(0.011+0.003) \times (49.213+16.404+32.808+26.247)+0.450+0.229 \times 4=5.819 \text{ lb}$$

$$m_{REL-H}(lb)=(0.029+0.007) \times (16.404+32.808+32.808)+(0.011+0.004) \times (49.213+16.404+32.808+26.247)+0.450+0.388 \times 4=6.825 \text{ lb}$$

$$m_{REL-OFF}(lb)=(0.008+0.024) \times (16.404+32.808+32.808)+(0.003+0.015) \times (49.213+16.404+32.808+26.247)+0.450+0.232 \times 4=6.247 \text{ lb}$$

$$m_{REL-C}(kg)=(0.043+0.006) \times (5+10+10)+(0.016+0.004) \times (15+5+10+8)+0.204+0.104 \times 4=2.605 \text{ kg}$$

$$m_{REL-H}(kg)=(0.044+0.010) \times (5+10+10)+(0.016+0.006) \times (15+5+10+8)+0.204+0.176 \times 4=3.094 \text{ kg}$$

$$m_{REL-OFF}(kg)=(0.012+0.036) \times (5+10+10)+(0.005+0.022) \times (15+5+10+8)+0.204+0.105 \times 4=2.850 \text{ kg}$$

$$m_{REL}(lb)=\min(m_c(lb), \max(m_{REL-C}(lb), m_{REL-H}(lb), m_{REL-OFF}(lb)))=6.825 \text{ lb}$$

$$m_{REL}(kg)=\min(m_c(kg), \max(m_{REL-C}(kg), m_{REL-H}(kg), m_{REL-OFF}(kg)))=3.094 \text{ kg}$$

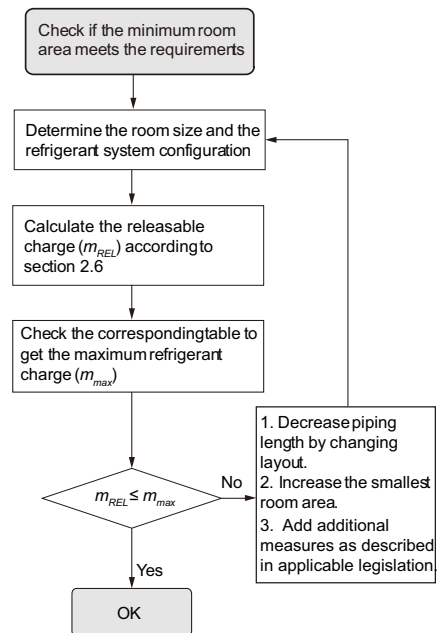


Fig. 4 – Installation Scheme Flow Chart

A250347

BEFORE INSTALLATION

Precautions

Be sure to verify in advance that the refrigerant used in installation is R-454B.

The unit will not operate correctly with a different type of refrigerant.

When moving the unit during or after unpacking, hold it using the 4 hanging brackets and avoid subjecting other parts, particularly refrigerant pipes and the control box, to force.

For more information about the installation of outdoor and indoor units, refer to the installation manual that came with each unit.

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

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. 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.

Required tools for installation work:

1. Phillips screw driver
2. Hole core drill [2.56 in (65 mm)]
3. Spanner
4. Pipe cutter
5. Knife
6. Reamer
7. Gas leak detector
8. Tape measure
9. Thermometer
10. Mega-tester
11. Electro circuit tester
12. Hexagonal wrench
13. Flaring tool
14. Pipe bender
15. Level vial
16. Metal saw
17. Gauge manifold (Charge hose: R-454B special requirement)
18. Vacuum pump (Charge hose: R-454B special requirement)
19. Torque wrench
20. Copper pipe gauge adjusting projection margin
21. Vacuum pump adapter

Table 2 – Torque Values

Outer Diameter	Torque Wrench [N·m(kgf·cm)]
1/4 in. (6.35 mm)	14.2 ~ 17.2 (144 ~ 176)
3/8 in. (9.52 mm)	32.7 ~ 39.9 (333 ~ 407)
1/2 in. (12.70 mm)	49.5 ~ 60.3 (504 ~ 616)
5/8 in. (15.88 mm)	61.8 ~ 75.4 (630 ~ 770)
3/4 in. (19.05 mm)	97.2 ~ 118.6 (990 ~ 1210)

About the Box

This section mainly introduces the subsequent operations after the SV box has been delivered to the installation site and unpacked.

This specifically includes the following information:

- Unboxing and handling the SV box.
- Taking out the accessories of the SV box.
- Dismantling the transport rack.

Check the Packing Box

At the time of delivery, check the unit for any damage.

Report any damage immediately to the carrier's claim agent.

Check whether the equipment model, specifications, and quantity match the contract. Please refer to

the (General on p40) section of the Operation Manual for SV box dimension information.

Transportation

Remember the following:

- Transport the packaged box 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:



A260081 Fragile. Handle with care.



A260082 Keep the box with its front facing upwards so as not to damage the pipes.

- Select the unit transportation path in advance.

Forklift Method

To move the unit with a forklift, insert the forks into the opening at the bottom of the unit.

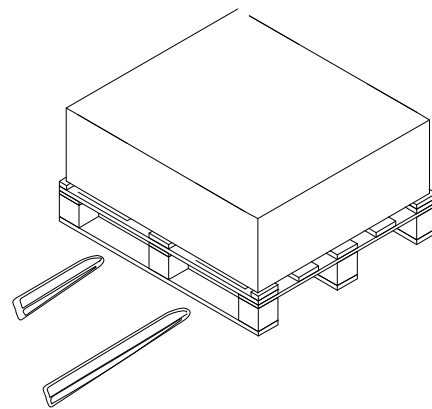


Fig. 5 – Moving with a Forklift

A260083

Unpacking the SV Box

Remove the unit from the packing materials:

- Be careful not to damage the SV box when you use a cutting tool to remove the packing box.
- Remove the packaging padding blocks that are wrapped around the SV box.

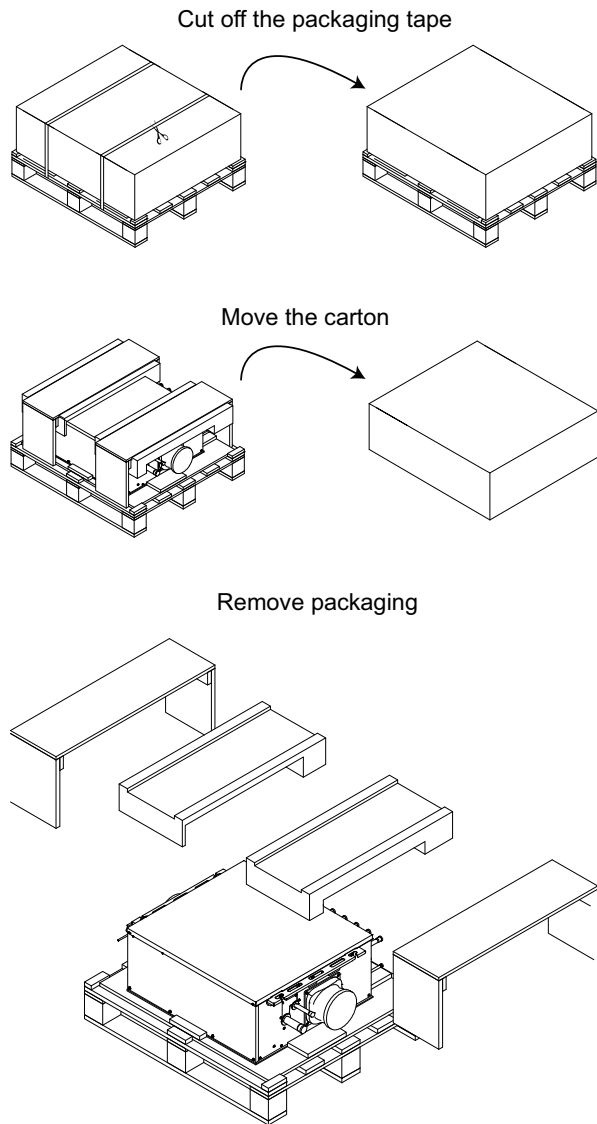


Fig. 6 – Unpacking the SV Box

A260084

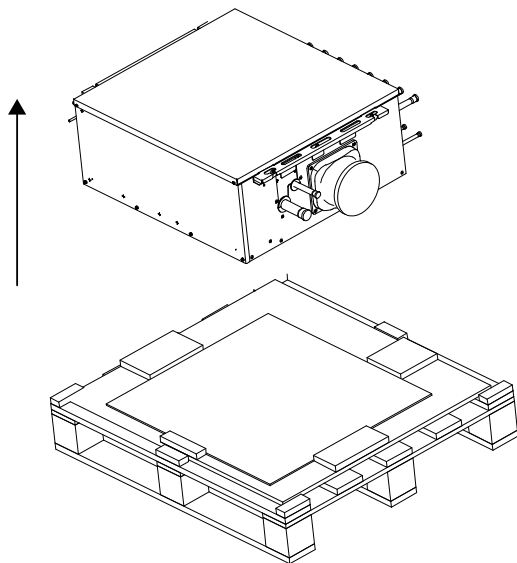


Fig. 7 – Removing the Wooden Base

A260085

!

CAUTION

-

Tear apart and throw away plastic packaging bags so that nobody, especially children, can play with them.

-

Possible risk: suffocation.

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 3 – Accessories of SV Box

Name	Quantity	Outline	Function
Installation and Operation Manual	1		Installation and operation instructions
Reducer Pipe	1		Connected high-pressure pipe between outdoor unit and main SV box
Reducer Pipe	1		Connected low-pressure pipe between outdoor unit and Main SV box
Flexible Drainage Pipe	1		To connect the drainage port of SV box and the PVC water pipe.
Snapping	2		To fasten the connector between flexible drainage pipe and SV box drainage port.

!

NOTICE

-

Check if any accessory in the above figure is missing. All the accessories must be properly maintained.

-

All the fittings shall be factory fittings.

Opening the SV Box

1.

Remove the securing screws.
2.

Follow the steps as shown, open the covers and remove them.

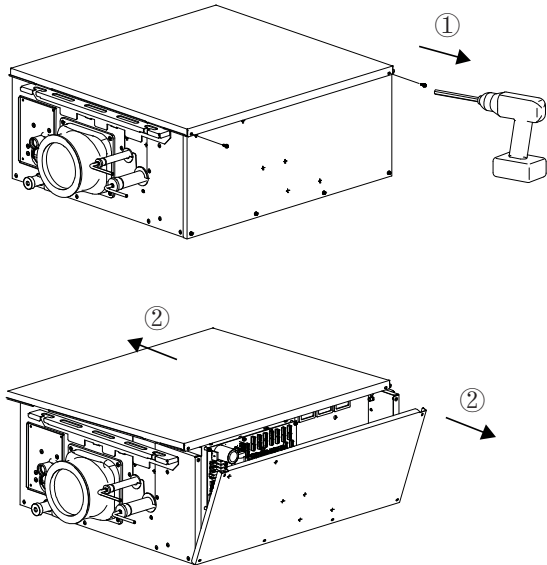


Fig. 8 – Opening the SV Box
Internal Components of Electrical Box

A260091

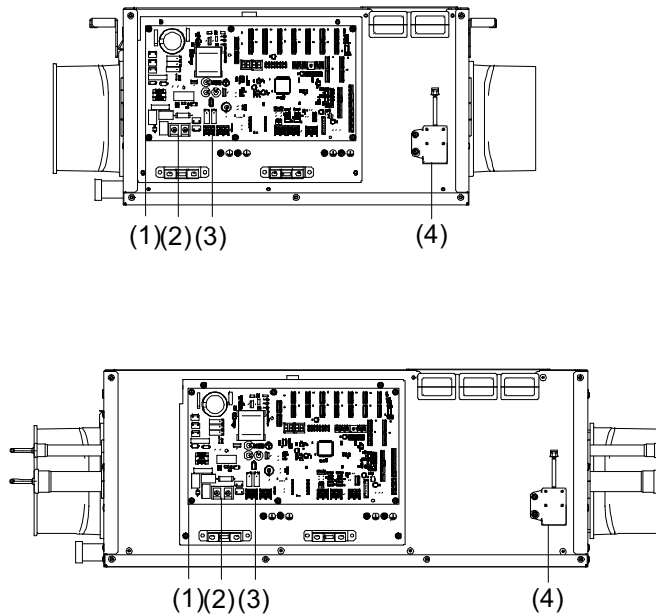


Fig. 9 – Internal Components of Electrical Box

A260092

Description of Codes:

1. Main control board
2. Power terminal block (L1/L2)
3. Communication terminal block (M1/M2)
4. Refrigerant Leakage Detective Sensor

! WARNING

- Make sure the power supply is off before you carry out any electric control installation and maintenance work.
- To remove the PCB, remove all wiring connecting on it.

! NOTICE

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.

Special Requirements for R-454B Units

System Layout

! WARNING

The installation **MUST** comply with the requirements that apply to this R-454B equipment. For more information, see [\(About the Refrigerant on p8\)](#).

! NOTICE

For an example of a system layout, see [Fig. 60](#).

The system uses R-454B refrigerant which is rated as A2L and is mildly flammable.

To comply with the requirements of enhanced tightness refrigerating systems of the UL/CSA 60335-2-40, this system is equipped with shut-off valves in the SV box and an alarm in the remote controller. The SV box designed a mechanical ventilation within the appliance enclosure as a countermeasure. In case the requirements of this manual are followed, no additional safety measures are needed.

A big range of charge and room area combinations is allowed thanks to the countermeasures that are implemented in the system by default.

Follow the installation requirements below to ensure that the complete system is compliant to legislation.

Outdoor Unit Installation

The outdoor unit has to be installed outside or in a machinery room.

For more information refer to the installation manual delivered with the outdoor unit.

Indoor Unit Installation

For installation of the indoor unit, refer to the installation and operation manual delivered with the indoor unit. For compatibility of indoor units refer to the latest version of the technical data book of outdoor unit.

SV Box Installation

Depending on the total amount of refrigerant in the system, different safety measures can be applied: no additional safety measures or mechanical ventilation within the appliance enclosure or installation in a machinery room or outdoor space.

Dimension Diagrams

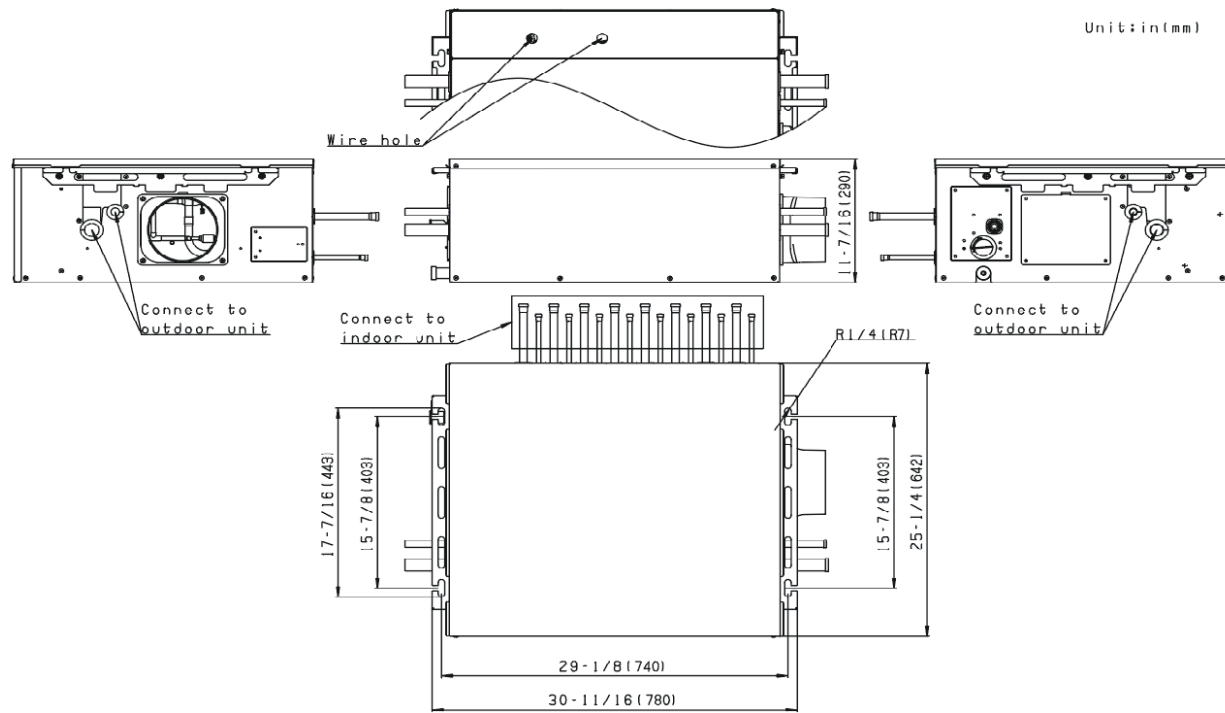


Fig. 10 – Dimensional Drawing (8-Port SV Box)

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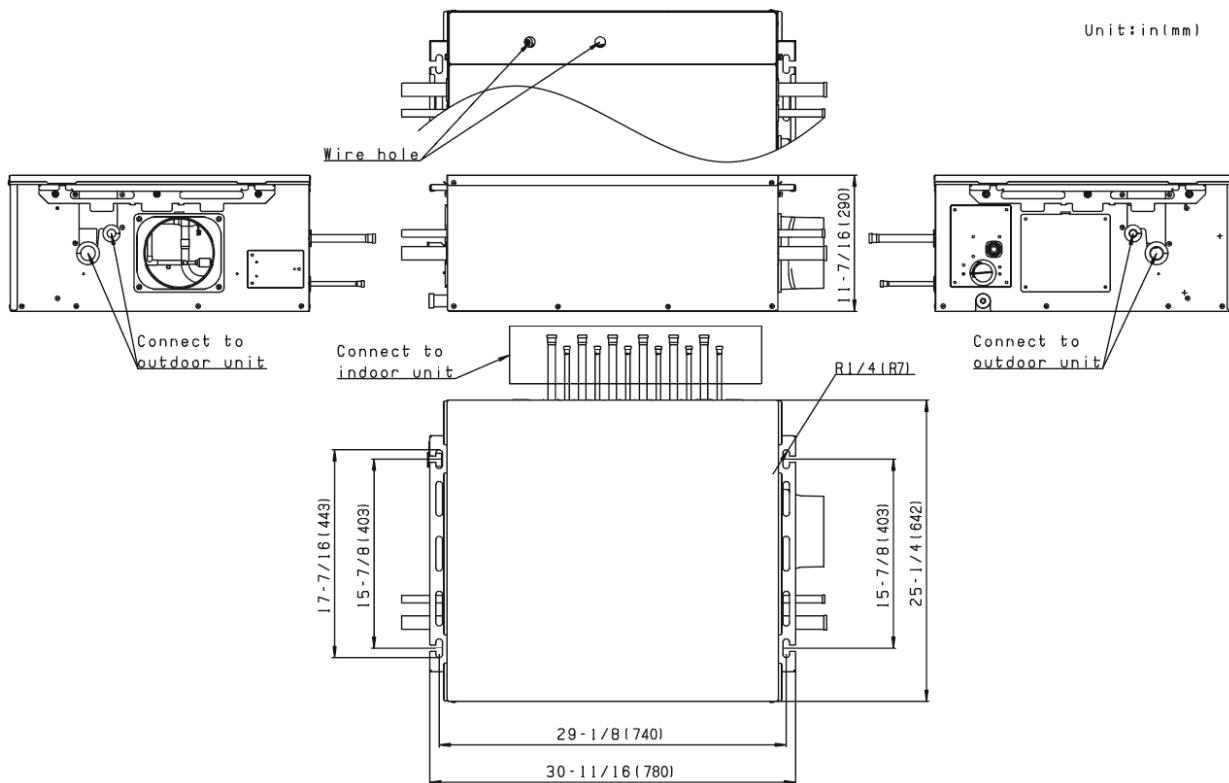


Fig. 11 – Dimensional Drawing (6-Port SV Box)

A250349

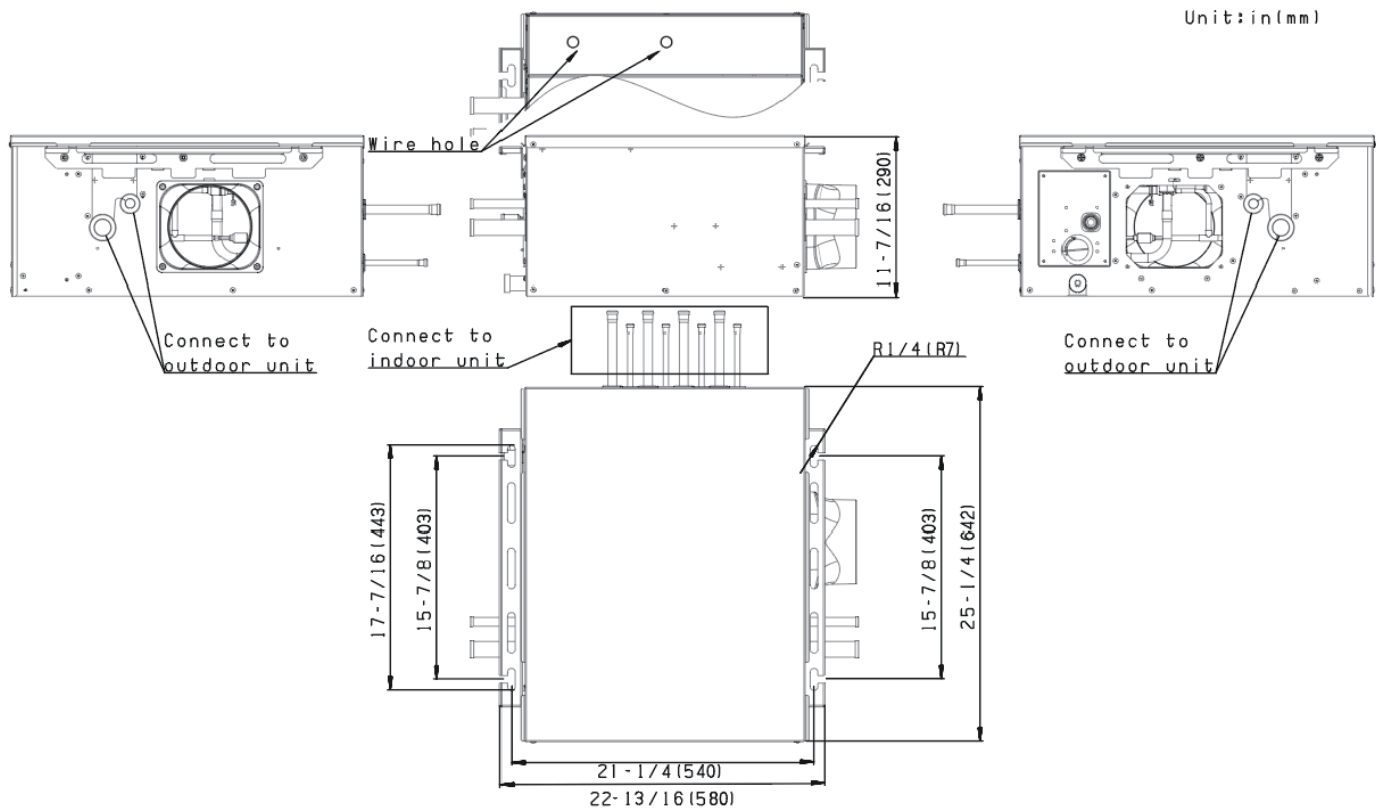


Fig. 12 – Dimensional Drawing (4-Port SV Box)

A250350

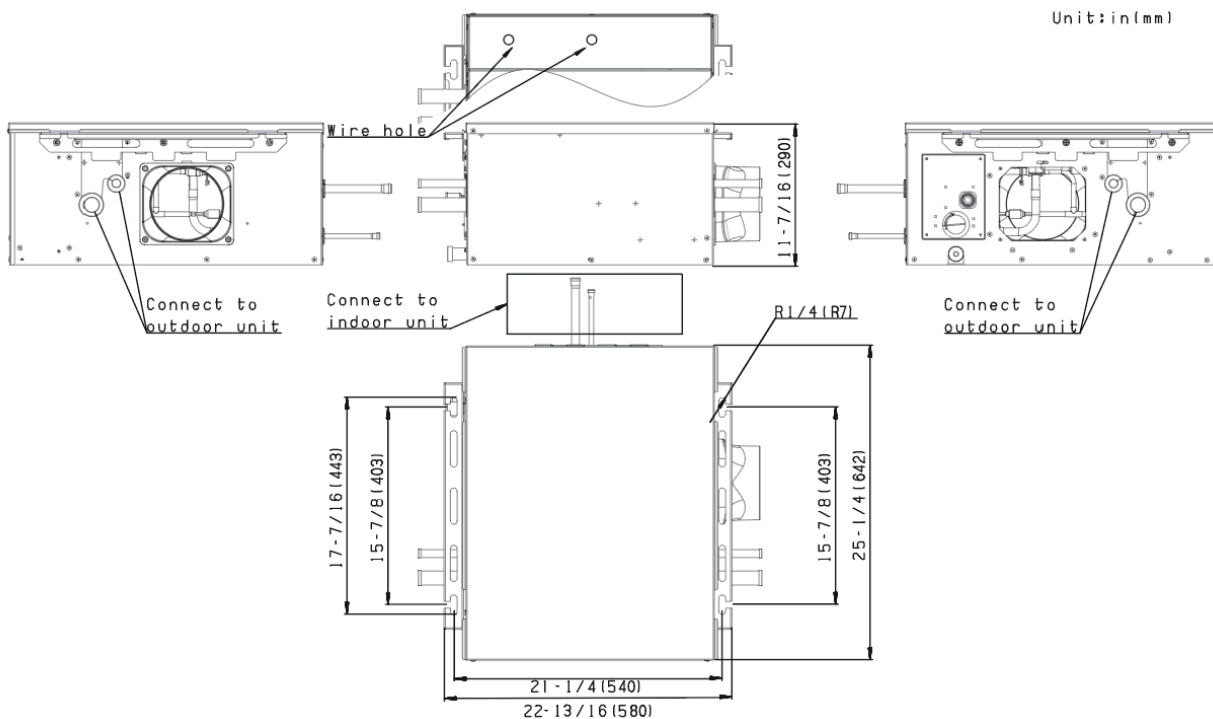


Fig. 13 – Dimensional Drawing (1-Port SV Box)

A250351

Accessories and Locally Purchased Components

Verify that the following accessories have been included in the packaging.

Table 4 – Accessories of the Refrigerant Shut-off Device

Name	Quantity	Shape	Use
Installation and Operation Manual	1		For the Refrigerant Shut-off Device installation and operation instructions.

Table 5 – Locally Purchased Components

Name	Use
PVC Drainage Pipe	Use for drainage pipe for the Refrigerant Shut-off Device; the length varies according to circumstances.
Heat-insulated pipe	The inner diameter should be the same as the relative copper pipes and PVC pipes. The thickness should be (more than) 10mm, especially near wet areas.

INSTALL THE MAIN BODY

WARNING

Install at a location which is strong enough to withstand the set's weight.

If the location is not strong enough or installation is not completed properly, the unit could fall and cause injury.

Carry out special installation work to prevent damage from strong wind or earthquakes.

If installing by halves, the set will drop and cause an accident.

Different Installation Methods of the Refrigerant Shut-off Device

This unit has three different installation types:

1. Horizontal-up type;
2. Ceiling-suspended type;
3. Wall-mounted type.

Choose the appropriate installation type according to the installation location.

Horizontal-up Type

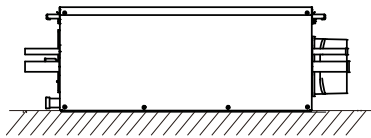


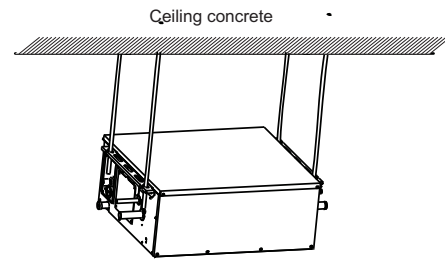
Fig. 14 – Horizontal-up Type Diagram

A250352

CAUTION

Do not install the refrigerant shut-off device in a low-lying area with water. Failure to do so may cause a short circuit in the electrical components or create a safety hazard of electric shock.

Ceiling-suspended Type



Right

Fig. 15 – Correct Installation

A250353

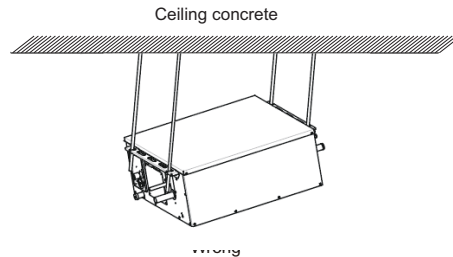


Fig. 16 – Wrong Installation

A250354

Installation of Suspension Screw Bolts

CAUTION

The bolt material is constructed of high quality carbon steel (galvanized or covered other rust preventive materials on the surface) or stainless steel.

Ceiling rust prevention measures are based on actual construction. For a detailed description please consult a building engineer.

Suspending bolts must be secured. The method varies depending on the installation scenario.

For installation scenarios of hanging screw bolts, refer to the following (Fig. 17 to Fig. 20).

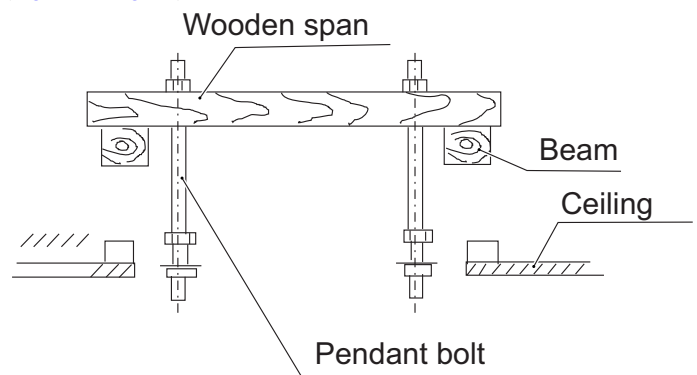
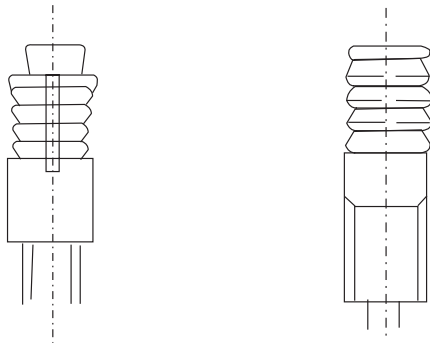


Fig. 17 – Wooden Structure

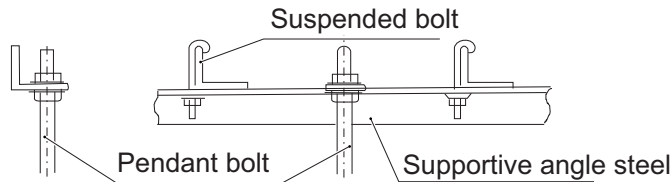
A250355

Put rectangular sticks across the beams and set pendant bolts.

**Fig. 18 – Old Concrete Rough-cast**

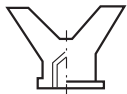
A250356

Use embedded bolts and embedded pulling plugs.

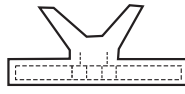
**Fig. 19 – Steel Beam and Girder Structure**

A250357

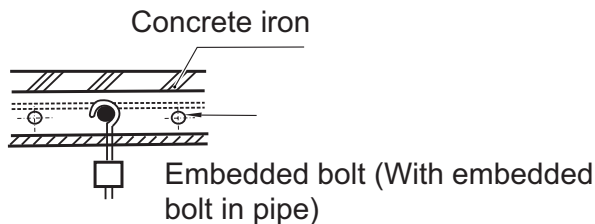
Secure and use supportive angle steel.



Flap type insert



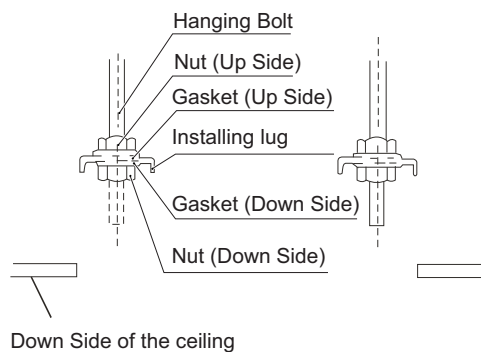
Slide type insert

**Fig. 20 – New Concrete Rough-cast**

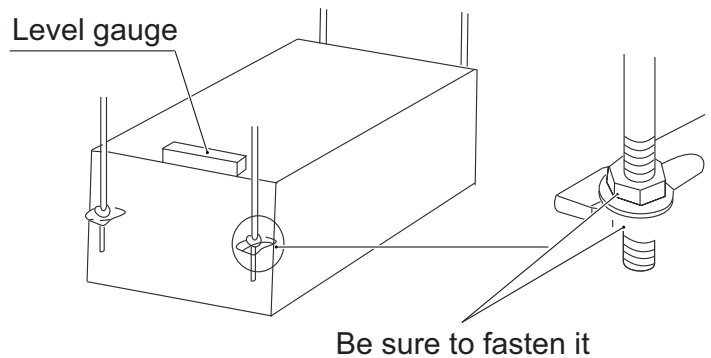
A250358

Hanging the Refrigerant Shut-off Device

1. Adjust the nut's position on the hanging bolt, the interval between the gasket (Down Side) and the ceiling should be adjusted according to actual construction circumstances. See [Fig. 21](#).
2. Hang the nut of the hanging screw bolt into the slotted hole of the installing ear.
3. Use the level gauge to confirm the unit is horizontal. (Prevent slanting towards the non-drainage side; slanting slightly towards the drainage side is preferable) See [Fig. 22](#).

**Fig. 21 – Adjusting the Nut's Site**

A250359

**Fig. 22 – Using the Level Gauge**

A250360

CAUTION

- The tilt of the unit should be within $\pm 5^\circ$ in the front/back and on the left/right.
- Be sure to install the unit with the top surface facing up.
- Do not install near bedrooms. The sound of refrigerant flowing through the piping may sometimes be audible.
- The refrigerant shut-off device cannot be installed indoors.
- When the shut-off device is installed on the outside of the room with people often walk through the location, should be installed in the shut-off device directly below the centralized drainage of the drain pan or water guide device to facilitate centralized drainage, to avoid condensate dripping to passers-by, or flow to the road affecting road conditions.

REFRIGERANT PIPING

For instructions for installing piping between the outdoor unit and the refrigerant shut-off device, selecting a indoor branch joints, and installing piping between the indoor branch joints and indoor units, refer to the installation manual included with the outdoor unit.

Before beginning the installation work, be sure to verify that the type of refrigerant used is R-454B. (The unit will not operate correctly with a different type of refrigerant.)

Insulate all of the piping, including the liquid pipes, gas pipes and each of the pipe connections. Not insulating these pipes could result in water leaks or burns.

In particular, low-temperature gas flows in the gas piping during full cooling operation, so the same amount of insulation as used for the suction gas pipes is required.

In addition, high-temperature gas flows in the gas piping, so use insulation that can withstand more than 248°F (120°C).

Select insulation material which is suited to the installation environment. For details, refer to the Engineering date book. Failure to do so could cause condensation to form on the surface of the insulation.

Connecting Diagram of the Refrigerant Shut-off Device

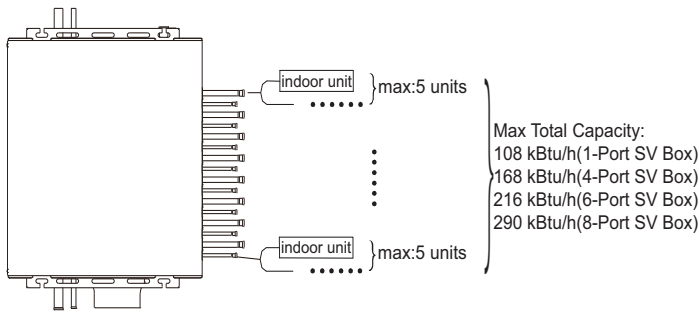


Fig. 23 – Connecting Diagram 1 for Refrigerant Shut-off Device A250361

Table 6 – Connecting Diagram 1 for Refrigerant Shut-off Device

Suitable Model	45VMS001S--3	45VMS004S--3	45VMS006L--3	45VMS008L--3
Note	1. Capacity matching with each indoor unit group is lower than 48K. 2. If the indoor units do not have auto mode function, then each group of SV can be connected with five indoor units at most for one time; otherwise, it can be connected with only one indoor unit at most. 3. Indoor units in the same group of SV can not be operated in cooling or heating mode at the same time, or operated in heating and air supplying mode at the same time, otherwise it will be mode conflict.			

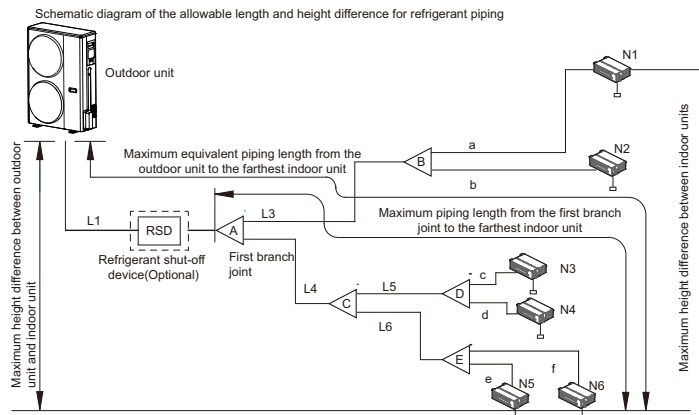


Fig. 24 – Refrigerant Piping Schematic Diagram 2 A250362

! NOTICE

- The outdoor unit connection pipe of the refrigerant shut-off device and the indoor unit connection pipe must be connected in accordance with the direction of the logo on the body of the device and cannot be reversed, otherwise the ball valve of the refrigerant shut-off device may not be opened.
- The ball valves of the refrigerant shut-off device will be closed when the refrigerant shut-off device is powered off or faulty.
- The refrigerant shut-off device must be installed on the main pipe L1, not on other indoor unit pipes.

The Procedure of Connecting Pipes

1. Measure the required length of the connective pipe, and follow these procedures to make the connective pipes. (Refer to Pipeline Connection for details)
 - a. First connect the indoor units and the outdoor unit.
 - (1.) The pipe bend should be handled carefully, without damaging the pipe and insulation layer.
 - (2.) When connecting or disconnecting the pipeline, be sure to use two spanners concurrently.

- (3.) Do not rest the weight of the connecting pipe on the adapter of the indoor unit. An excessively heavy load on the adapter of the indoor unit may deform the pipe and thus affect the cooling/heating effects.
- b. The valve of the outdoor unit should be closed completely (default factory setting). Every time you connect the pipe, unscrew the nut at the valve, and connect the flared pipe (within 5 minutes). If the nut is put away for a long time after being unscrewed from the valve, dust and other foreign substance may enter the pipeline system and cause faults.
- c. After the refrigerant pipe is connected to the indoor and outdoor units, expel air as instructed in the “Expel air” section. After expelling the air, screw on the nut at the maintenance opening.
 - (1.) Precautions for the flexible part of the pipeline
- The bend angle shall not exceed 90°. (See Fig. 25)

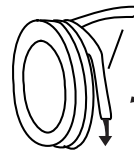
Use a thumb to bend the pipe



Minimum radius 3.94 in (100 mm)

Fig. 25 – Bending the Pipe A250363

- The bend shall preferably be in the middle of the pipe length, and a higher bend radius is preferred.
- Do not bend the flexible pipe more than 3 times.
 - (2.) Bend the thin-wall connective pipe (See Fig. 26)



Method of unleashing the spooled pipe
Straighten the pipe end

Fig. 26 – Thin-wall Connective Spooled Pipe A250364

- When bending the pipe, cut out a notch of the desired size at the bend of the adiabatic pipe, and then expose the pipe (wrap the pipe with the wrapping tape after bending it).
- The radio of the elbow pipe should be as large as possible to prevent flattening or crushing.
- Use the pipe bender to make a closed elbow pipe.
 - (3.) Use purchased copper pipe. When purchasing a copper pipe, be sure to use the heat insulation materials of the same type [with a thickness of over 0.36 in (9mm)].
- 2. Deploy the pipelines.
 - a. Drill a porthole on the wall, and put the hole sheath and hole cover through the wall.
 - b. Place the connective pipe together with the indoor & outdoor connection wires. Use wrapping tape to bind them tightly. Do not let air penetrate it, or this could lead to condensation and drops of moisture.

Method of Piping Flaring Connection

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

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

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

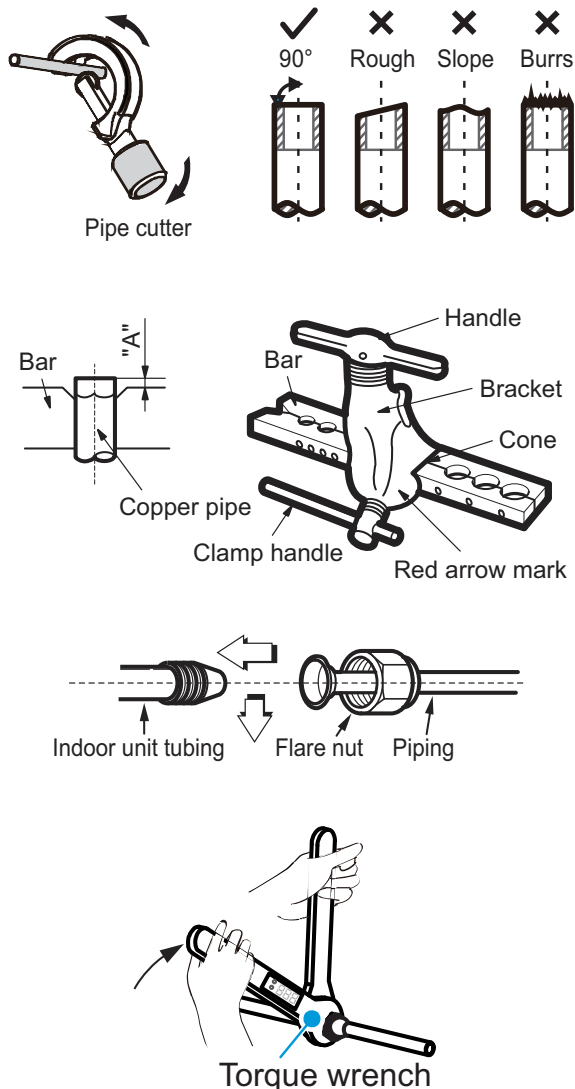


Fig. 27 – Piping Flaring Connection

A250365

CAUTION

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

Checking Refrigerant Piping

Gas Tightness Test

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

CAUTION

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

The gas tightness test procedure is as follows:

1. Charge the indoor piping with nitrogen at 44 psig (3 bar) through the needle valves on the liquid and gas stop valves and leave for at

least 10 minutes (do not open the liquid or gas stop valves). Observe the pressure gauge to check for large leakages. If there is a large leakage, the pressure gauge will drop quickly.

2. If there are no large leakages, charge the piping with nitrogen at 220 psig (15 bar) and leave for at least 10 minutes. Observe the pressure gauge to check for small leakages. If there is a small leakage, the pressure gauge will drop distinctly.
3. If there are no large leakages, charge the piping with nitrogen at 470 psig (32 bar) and leave for at least 10 minutes. Observe the pressure gauge to check for small leakages. If there is a small leakage, the pressure gauge will drop distinctly.
4. If there are no large leakages, charge the piping with nitrogen at 600 psig (41 bar) and leave for at least 1 hour. Observe the pressure gauge to check for small leakages. If there is a small leakage, the pressure gauge will drop distinctly.
5. If there are no small leakages, charge the piping with nitrogen at 470 psig (32 bar) 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 1.45 psig (0.1 bar) per 1°C of temperature difference. Adjusted reference pressure = Pressure at pressurization + (temperature at observation – temperature at pressurization) x 1.45 psig (0.1 bar). Compare the observed pressure with the adjusted reference pressure. If they are the same, the piping has passed the gas tightness test. If the observed pressure is lower than the adjusted reference pressure, the piping has a micro leakage.
6. If the leakage is detected, refer to following part “Leak detection”. Once the leak has been found and fixed, the gas tightness test should be repeated.
7. If not continuing straight to vacuum drying once the gas tightness test is complete, reduce the system pressure to 72.5-116.0 psig (5-8 bar) and leave the system pressurized until ready to carry out the vacuum drying procedure.

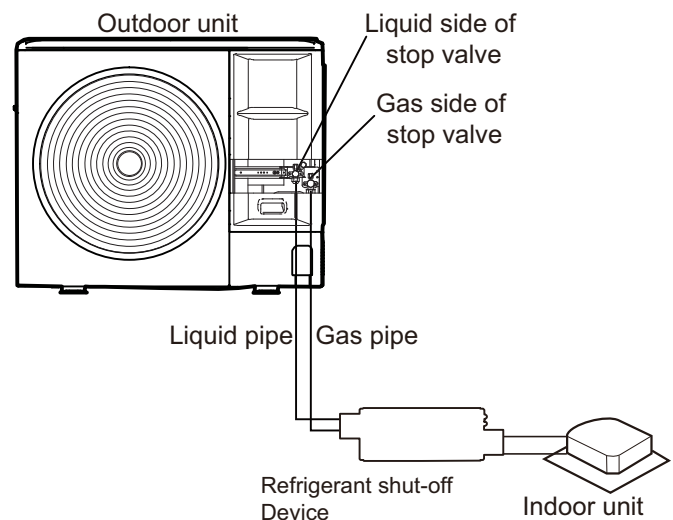


Fig. 28 – Gas Tightness Test

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Leak Test

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

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

Vacuum Drying

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

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

! NOTICE

- Before performing vacuum drying, make sure that all the outdoor unit stop valves are firmly closed.
- Once the vacuum drying is complete and the vacuum pump is stopped, the low pressure in the piping could suck vacuum pump lubricant into the air conditioning system. The same could happen if the vacuum pump stops unexpectedly during the vacuum drying procedure. Mixing of pump lubricant with compressor oil could cause compressor malfunction. Therefore, a check valve should be used to prevent vacuum pump lubricant seeping into the piping system.
- Vacuumize using a vacuum pump. Do not use refrigerant gas to discharge air.
- To prevent the entry of impurities, the 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 0.197 in (5 mm) Hg [29.7 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 -29.7 in (-756 mm) Hg or lower should be used. Using a vacuum pump with a discharge in excess of 4 L/s and a precision level of 0.02mm Hg is recommended. The vacuum drying procedure is as follows:

1. Connect the vacuum pump through a manifold with a pressure gauge to the service port of all stop valves.
2. Start the vacuum pump and then open the manifold valves to start vacuuming the system.
3. Continue vacuum drying for at least 2 hours and until a pressure difference of -14.5 psig (-1 bar) or more has been achieved. Once the pressure difference of at least -14.5 psig (-1 bar) has been achieved, continue vacuum drying for 2 hours. Close the manifold valves and then stop the vacuum pump. After 1 hour, check the pressure gauge. If the pressure in the piping has not increased, the procedure is finished. If the pressure has increased, repeat the steps 1 to 3 until all moisture has been remove.
4. After vacuum drying, keep the manifold connected to the master unit stop valves, in preparation for refrigerant charging.

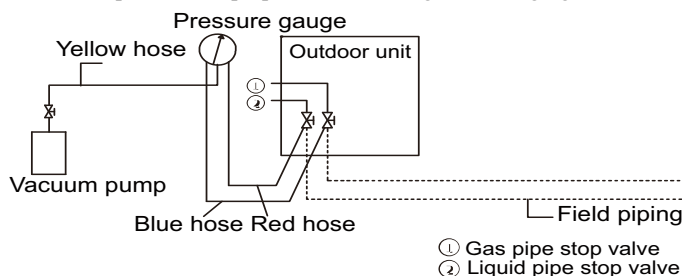


Fig. 29 – Vacuum Drying

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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 temperature 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 7 – Piping Insulation

Piping Size	Humidity<80%RH Thickness	Humidity>80%RH Thickness
1/4-1/2 in. (Φ6.35-12.70 mm)	≥0.59 in(15 mm)	≥0.79 in(20 mm)
5/8-7/8 in. (Φ15.88-22.23 mm)	≥0.79 in(20 mm)	≥0.99 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.

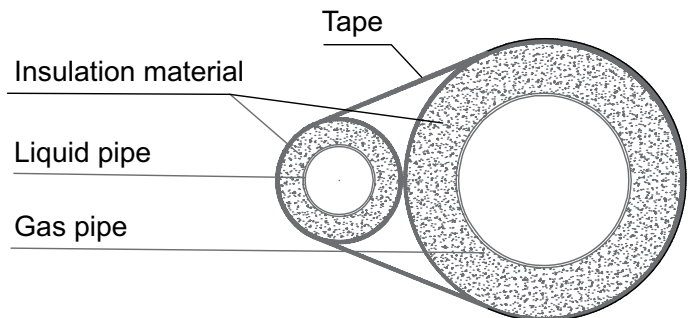


Fig. 30 – Pipe Wrapping

A250368

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

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

Protective Measures of the Pipeline

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

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

The outdoor pipes shall be protected against accidental damage. If the length of the pipe exceeds 3.28 ft (1 m), a gusset plate must be added for protection.

Seal all gaps to prevent snow and small animals from entering the system.

Open/Close the Valves

Open/Close the spools or the valves of the outdoor unit with an inner hexagon spanner.

CAUTION

- Don't use the refrigerant of the outdoor unit to create the vacuum.
- Vacuum from the gas pipes and liquid pipes of the outdoor unit and the refrigerant shut-off device when the ball valves of the refrigerant shut-off device are be closed.

ELECTRICAL WIRING

Safety Device Requirements

WARNING

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

WARNING

- Take note of the risk of electric shocks during installation.
- All the electric wires and components must be installed by a certified electrician, and the installation process must comply with applicable regulations.
- Use only wires with copper cores for the connections.
- A main breaker or safety device that can disconnect all polarities must be installed, and the breaker device can be completely disconnected in situations where there is excessive voltage.
- Wiring must be carried out in strict accordance with what is stated on 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 electric shock.
- Make sure the fuses and circuit breakers installed meet the corresponding specifications.
- Before powering the unit 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

- Do not cross-connect refrigerant piping or signal wires between VRF systems. Each VRF system must be piped and wired separately.
- Do not run signal wire and power wire in the same conduit; keep distance between the two conduits per local codes.
- 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.

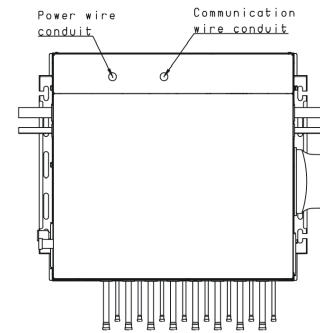


Fig. 31 – Wire Conduits

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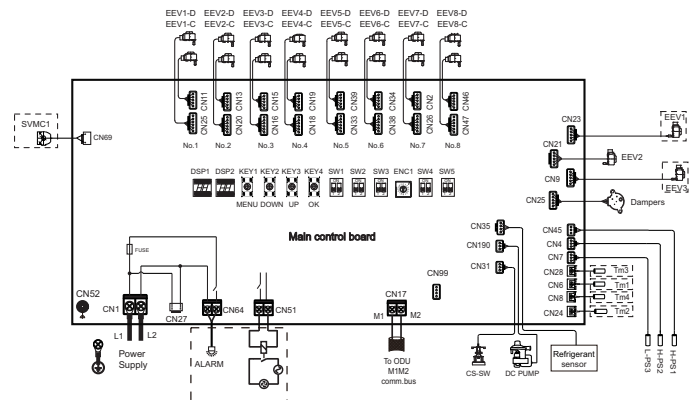


Fig. 32 – Wiring Diagram

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Connecting the Wiring

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 of inconsistencies in the lengths of the power cord and ground line.
- The wire diameter must comply with the specifications, and the terminal should be screwed tightly. Do not subject the terminal to any external force.

The power supply specifications are as follows:

Table 8 – Power Supply Specifications

Power	Phase	1-Phase
	Volt and Frequency	208/230V ~ 60Hz

1. Use copper conductors only.
2. Use insulated wire for the power cord.
3. Select circuit breaker that having a contact separation in all poles not less than 0.118 in (3 mm) providing full disconnection, where MFA is used to select the current circuit breakers and residual current operation breakers.

Table 9 – Electrical Data

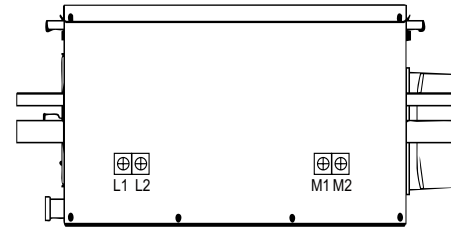
SV BOX		N10SV-01A	N10SV-04A	N10SV-06A	N10SV-08A
Power Supply		208/230V, 1 Ph, 60 Hz			
MCA*		0.3	0.43	0.56	0.72
MOCP†		15	15	15	15
Max Fuse of HACR Breaker	A	15	15	15	15
	W	20	30	40	50
Power Wiring		Sized per NEC and Local Codes based on Nameplate Electrical Data‡			

* MCA: Minimum Circuit Amps

† MOP: Maximum Overcurrent Protection amps

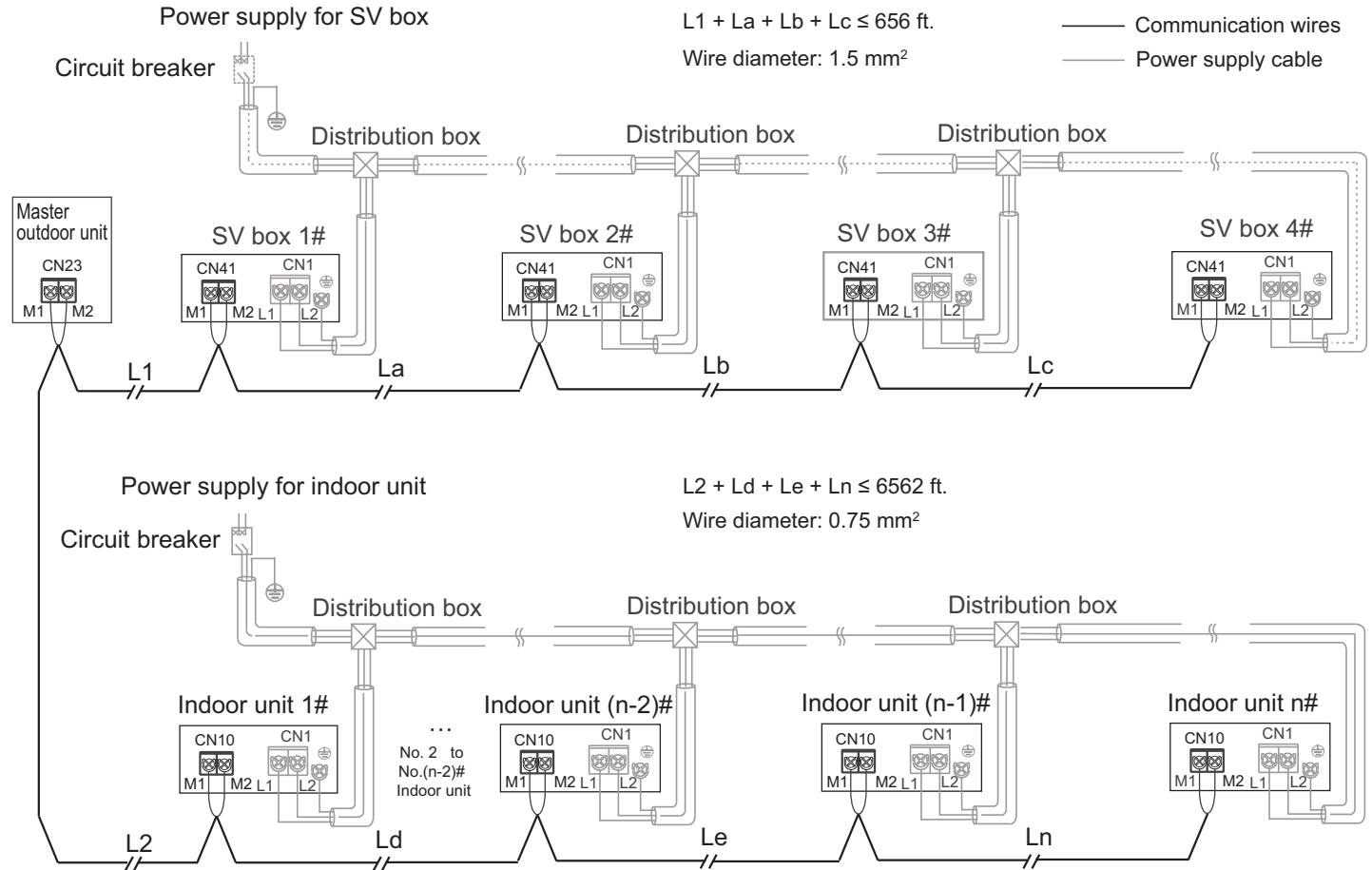
‡ When SV box connects to the exhaust fan and the external alarm equipment, the selection of power cord size also must to consider the current of both.

The power cables should be connected to the refrigerant shut-off device with the label “L1,L2”.

**Fig. 33 – Power Cables**

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Communication wiring of indoor unit: The M1, M2 communication line should be connected in a chain starting from the outdoor unit to each SV box and each indoor unit. The correct connection methods are demonstrated below:

**Fig. 34 – Communication Wiring Layout**

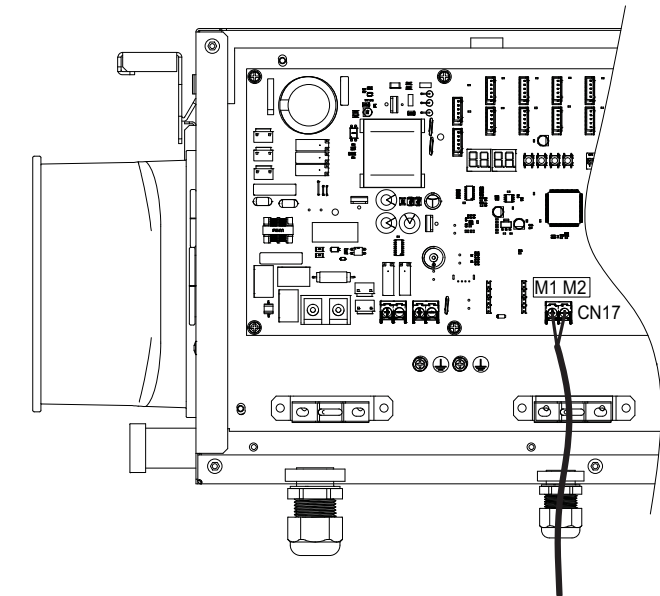


Fig. 35 – Communication Wiring Installation Diagram
NOTE: The communication line must conform to the safety extra-low voltage (SELV).

WARNING

- 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 SV box unit and outdoor units can only be led out and connected from the master outdoor unit.
- The outdoor unit is often a parallel type of multi module, and the communication lines between the outdoor units 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.

CAUTION

- The cross-sectional area of the communication wire core between the main outdoor unit and the SV box should not be less than 0.0023 in² (1.5 mm²).
- The total length of communication wire between the main outdoor unit and the all SV boxes should not be more than 200 m, otherwise, the SV box will be failure to shut off safety shut-off valve (EEVC or EEVD) during unexpected power outage.

Table 10 – Communication Wiring Material

Communication Mode	Material	Wiring Length	Wiring Diameter
Between outdoor unit and SV box	Ordinary PVC-sheathed flexible cable	L ≤ 656.2 ft. (200m)	≥ 2 x 0.0023 in ² (2 x 1.5 mm ²)
Between SV box and SV box			
Between outdoor units		L ≤ 6561.7 ft. (2,000m)	≥ 2 x 0.0012 in ² (0.75 mm ²)
Between SV box and indoor unit			

Connecting the Power Cord

Considering the failure of the SV box's refrigerant leakage monitoring due to unexpected power outage, the outdoor unit, the indoor unit and the SV box need to be connected to separate circuit breakers or fuses

respectively to ensure that the safety shut-off valve remains in the closed position during the power outage.
The correct connection methods are demonstrated below:

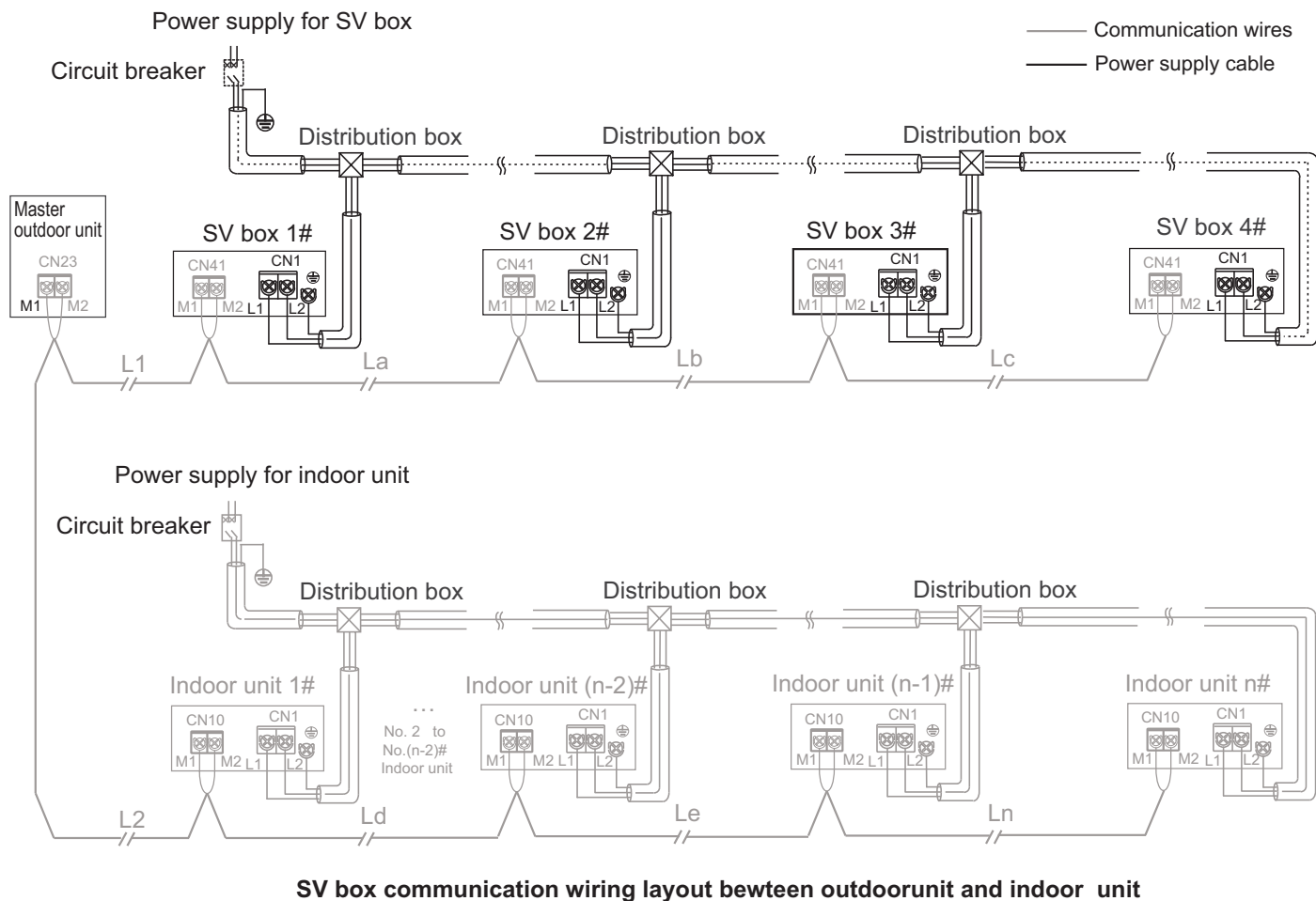


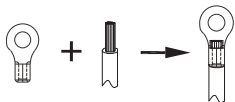
Fig. 36 – SV Box Communication Wiring Layout Between Outdoor Unit and Indoor Unit

! CAUTION

- 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.

Connecting the Power Cord

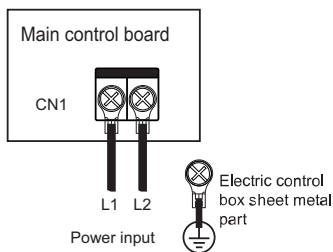
Use round-type terminals of the correct specifications to connect the power cable.



Make round-type terminals

! 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" and ground wire are connected screw with corresponding silkscreen.



Connecting the power cord

Table 11 – Size of the Screws and Recommended Torque

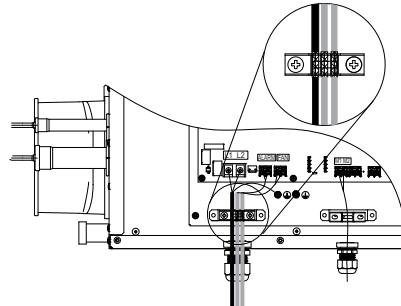
Screw Specification	Standard Value (kgf.cm)/(Nm)
M4	12.2/1.2
M8	61.2/6.0

! 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 cause overheating and fire.
- 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.

Fix the Power Cord

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



2. Confirm again that the power phase sequence is correct.
3. 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.

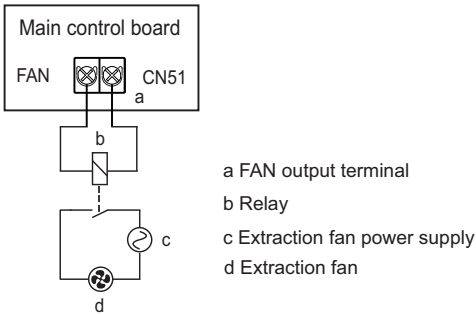
! CAUTION

- 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.

Connecting the Mechanical Ventilation Signal Wiring

When the SV box selects mechanical ventilation within the appliance enclosure as a safety measure, it is necessary to connect the mechanical ventilation signal wiring.

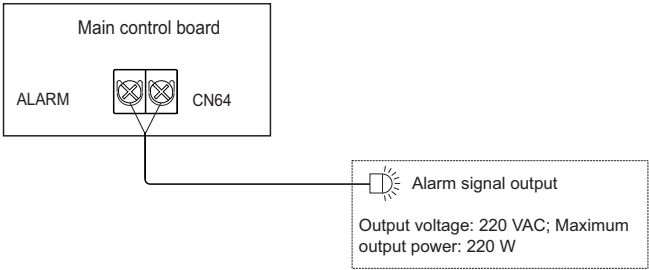
One SV box — one exhaust fan



WARNING
The SV box control board only outputs 220 VAC switch signals to AC contactor. The power cord of the exhaust fan cannot be directly connected on the SV box control board.

CAUTION

- The selection of the AC contactor should be based on the MCA of the fan.AC contactor should be met explosion-proof requirement.
- The signal wiring diameter should be no less than 0.75 square millimeters.
- The wire diameter of the power cord (L1/L2/L3) needs to be selected based on the MCA of the exhaust fan.
- For SV box connected in series or parallel with the same exhaust fans, the power supply of SV box needs to be connected to the same distribution box.



WARNING

- The SV box control board only outputs 220 VAC power to the external alarm. Please select the external alarm that matches the power supply.
- The external alarm could not be connected to two or more SV boxes simultaneously.

Wiring Selection and Diagram

Table 12 – Reference Size of Alarm and Fan Ports Power Cord

Port	Item	Function	Copper Core PVC Insulated Wire Size of AWG
CN64	ALARM	Connection to the external alarm	2 x 16 AWG
CN51	FAN	Connection to AC contactor or exhaust fan	2 x 16 AWG

The wiring layout comprises the power cords, mechanical ventilation signal wiring, alarm wiring and communication wiring between the SV box unit and the outdoor unit.

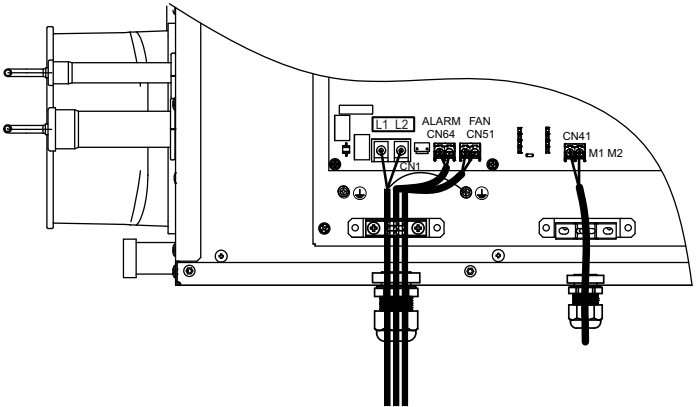


Fig. 39 – Wiring Layout of the SV Box

Use diagonal pliers to remove the Knockout for the power cord and the communication wiring.

Use cable joint (Customer self-provision) to prevent short circuits and breaks caused by the wear of the communication lines and power lines against the edges of the sheet metal.

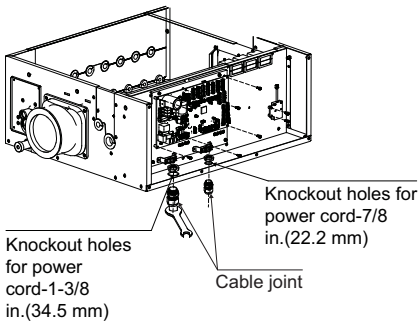


Fig. 37 – Multiple SV boxes in series/parallel (single phase motor)

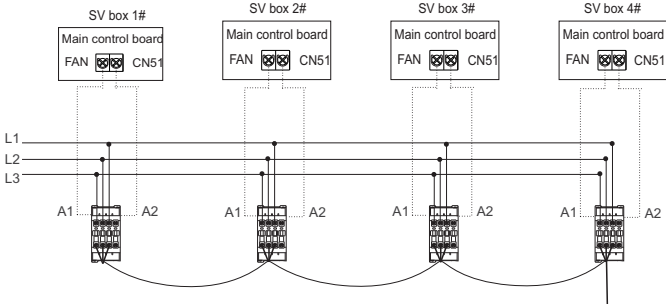


Fig. 38 – Multiple SV boxes in series / parallel (3-phase motor)

Connecting the External Alarm Wiring

When the SV box selects external alarm as a safety measure, it is necessary to connect the external alarm wiring.

DRAIN PIPE INSTALLATION

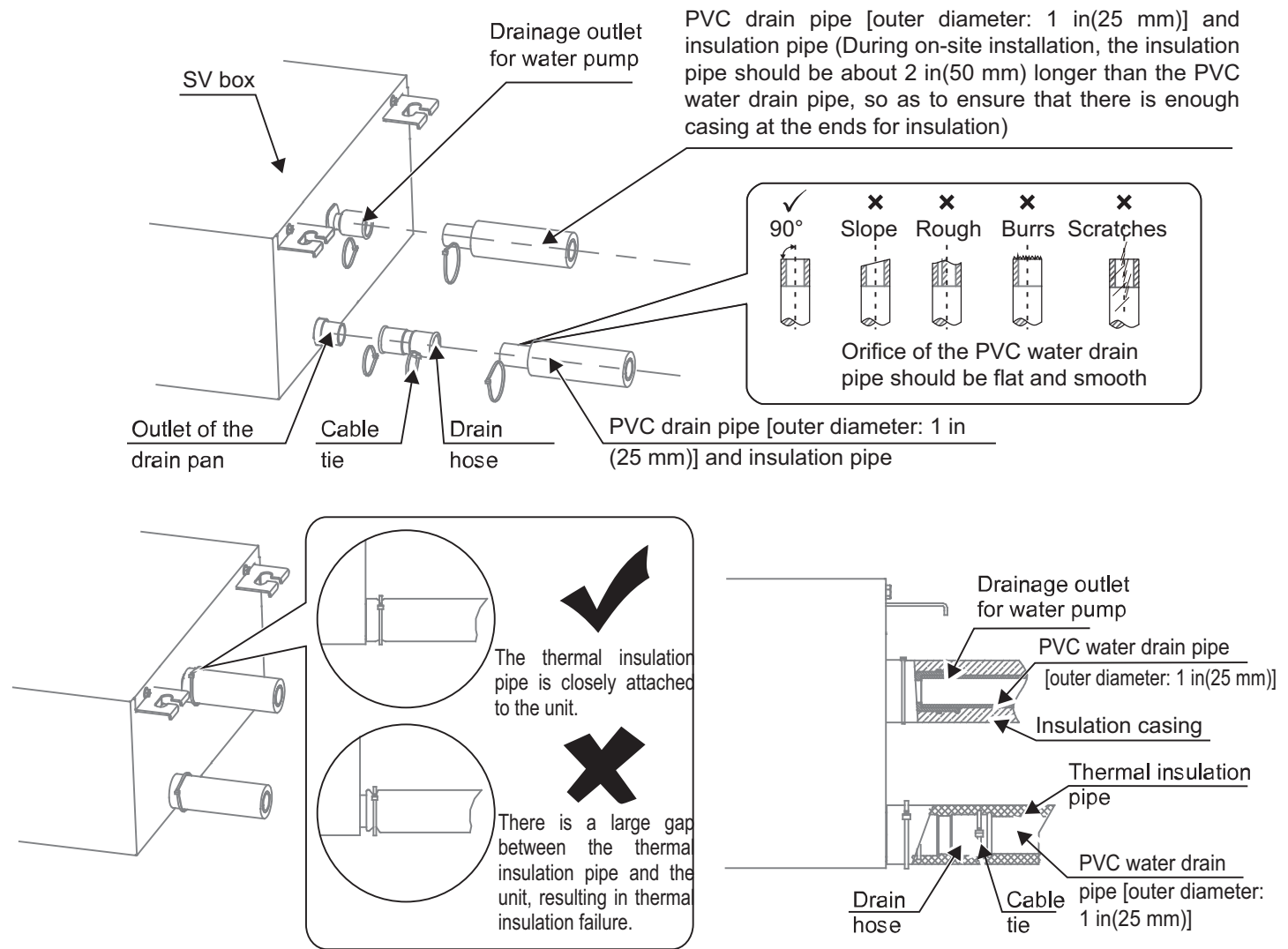
Drain Pipe Layout

CAUTION

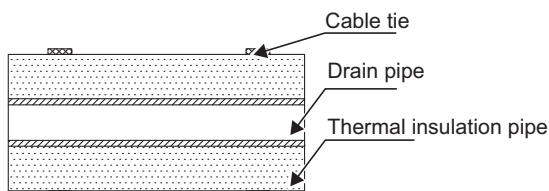
- Before installation of the drain pipe, determine its direction and elevation to avoid intersection with other pipelines to ensure that the slope is straight.
- The highest point of the drain pipe should be equipped with a vent port to ensure the smooth drainage of condensate water, and the vent port must face downwards to prevent dirt from entering the pipe.
- Do not connect the drain pipe to the wastewater pipe, sewage pipe, or other pipes that produce corrosive gases or odors. Otherwise, the indoor unit (especially the heat exchanger) may be corroded and odor may enter the room, negatively impacting the heat exchange effects and user experience. The user will assume responsibility for any consequences resulting from failure to abide by instructions.
- After the pipeline connection is completed, a water test and a full water test should be done to check whether the drainage is smooth and whether the pipeline system leaks.
- The air conditioner drain pipe must be installed separately from other sewage pipes, rainwater pipes and drain pipes in the building.
- Adverse slope, convex and concave pipes are prohibited, as improper airflow will cause poor drainage.
- Drain pipes need to be evenly wrapped with thermal insulation pipes to prevent condensation.
- All joints of the drainage system must be sealed to prevent water leakage.
- Please connect the drain pipes in the following ways. Improper installation of the pipes may result in water leakage and damage to furniture and property.

1. Connect a PVC pipe to the water pump outlet, and fasten it with a cable tie. Then push the thermal insulation pipe until it is closely attached to the indoor unit, and finally fasten the end with a cable tie.

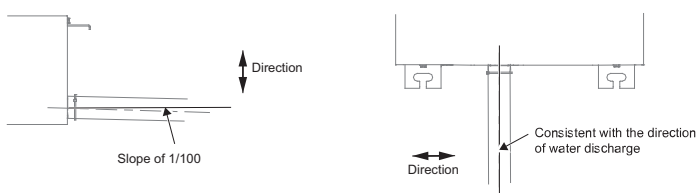
The connection between the two ends of the drain pipes and the connection of the water pump outlet need to be fastened with a cable tie, in combination with PVC/rubber adhesives. Pay attention to the instructions for the use of the adhesives to prevent corrosion to the EPDM rubber. Use hard PVC adhesives for connecting to other water piping. Check that the connections are tight with no leakage.



- The water pump connecting pipe and drain pipe (in the indoor part) must be wrapped with heat insulation pipe evenly and bound with cable ties to prevent air from entering and producing condensate.

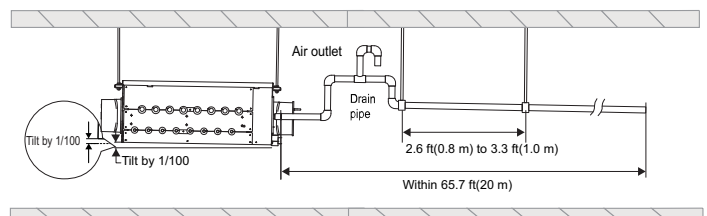


- To prevent water from flowing back into the air conditioner when it stops running, the drain pipe should be inclined downward to the outdoor side (drainage side), with a downward slope of 1/100 or above. The drain pipe should be positioned in the same direction as the drainage outlet of the unit in the left and right direction, so that the drain pipe does not expand and collect water; otherwise, it may cause abnormal noise.

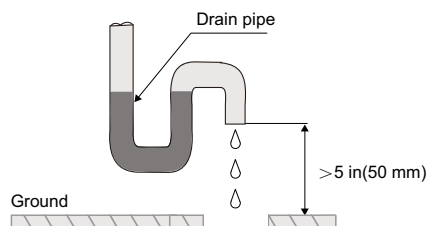


- When connecting the drain pipe, do not pull the drain pipe forcefully, or it may become loose. The lateral length of the drain

pipe should be within 65.7 ft (20 m), and a support point should be set every 2.6 ft (0.8 m) to 3.3 ft (1.0 m) to avoid air resistance caused by the deformation of the drain pipe. The drain pipe shall be equipped with a support point every 4.9 ft (1.5 m) to 6.6 ft (2.0 m).



- The end of the drain pipe must be more than 2 in. (50 mm) above the ground or from the base of the water drainage slot. In addition, do not submerge it in water. To drain the condensed water directly into a ditch, the water drain pipe must bend upwards to form a U-shaped water plug to stop odors from entering the room via the water drain pipe.



Method to drain water with the drain pump:

Unit: in(mm)

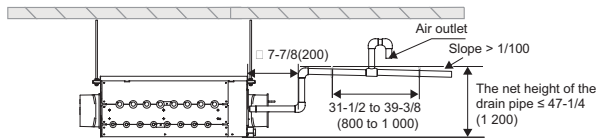


Fig. 40 – Single Unit Drain Pipe Connection

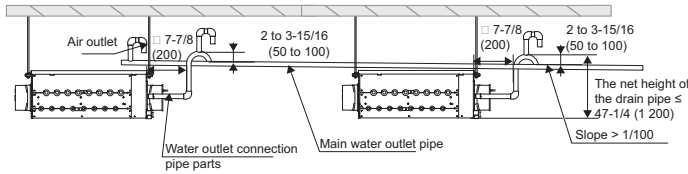


Fig. 41 – Multiple Unit Drain Pipe Connection

Drain pipes from drain pumps of multiple units are connected to the main drainage pipe to be discharged through the sewage pipe.

Inconsistent drainage directions must be prevented for horizontal drain pipes to avoid adverse slopes and poor drainage.

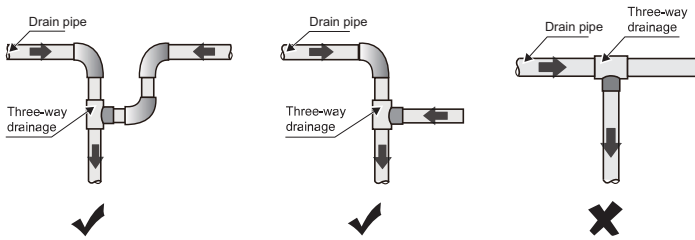


Fig. 42 – Inconsistent Drainage Directions Prevention

How to drain water without drain pump:

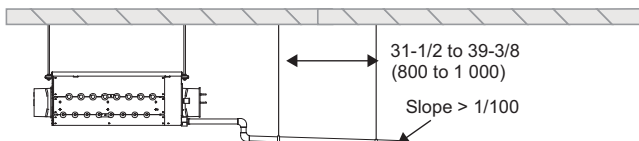


Fig. 43 – Single Unit Drain Pipe Connection to Main Drain

Drain pipes from multiple units are connected to the main drain pipe to be drained through the sewage pipe.

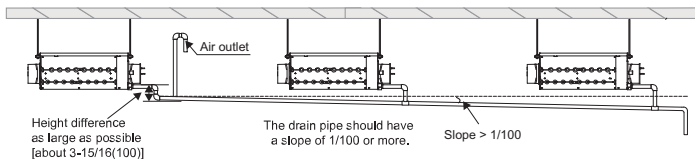


Fig. 44 – Multiple Units Drain Pipe Connection to Main Drain

Water Drainage Test

CAUTION

- Before the test, make sure that the water drain piping is smooth, and check that each connection is properly sealed.
- Conduct the water drainage test in a new room before the ceiling is plastered.
- Inject water into the drain pan with the water injection pipe. The amount of water injected is shown in the table below.
- Connect the power supply, and set the air conditioner to operate in cooling mode. Check whether drainage outlets normally drain water (based on drain pipe length, water will be drained 1 minute later), and check connectors for leakage.
- If water is drained through the indoor unit drain pump, loosen the water cover (black round plastic piece) on the unit during the drainage test and check whether the drain pump is operating. If the drain pump has not been started, check whether the drain pump has malfunctioned. **Note:** The drain pump only starts when water level switch is protecting. After the water drainage test is completed, install the water cover assembly in position. For details on the water cover assembly and the water injection pipe, see figure below.

Table 13 – Water Injection Amount

Model	Water Injection Amount in ³ (mL)
45VMS001S--3	280.6(4,600)
45VMS004S--3	
45VMS006L--3	
45VMS008L--3	396.5(6,500)

MECHANICAL VENTILATION WITHIN THE APPLIANCE ENCLOSURE INSTALLATION

When the R-454B sensor in the SV box detects a refrigerant leak, it will activate the safety measures. This includes activating the fan output signal to trigger an extraction fan to operate, activating the external sound and light alarm signal and display an error message on the wired controllers and display boxes of the connected indoor units.

Regulatory Requirements for Mechanical Ventilation

! WARNING

- The motors, exhaust ducts and related accessories used for mechanical ventilation must comply with the local regulations and requirements.
- Before installing the mechanical ventilation system, it is necessary to ensure that the rubber gaskets between the box sheet metals and the copper pipes are in good condition. The box body's sheet metal parts are firmly fixed together.
- Before the mechanical ventilation installation is completed, it is necessary to confirm whether the air volume of the box meets the requirements stipulated in the regulations (For R-454B ETRS, 15.7m³/h), and that the negative pressure inside the box is greater than 0.0029 Psig (20 Pa). If either of the above requirements is not met, a fan with a larger air volume needs to be replaced the length of the exhaust duct needs to be reduced, or the bends in the exhaust duct needs to be reduced, until both requirements are met simultaneously
- Make sure the air outlet of exhaust duct is not facing predominant wind direction. Add a non-return valve in front of the air outlet to prevent outdoor air from flowing back in. Incoming wind will disrupt the exhaust efficiency of SV box when refrigerant leaks.

Exhaust Duct Layout

! WARNING

- When the refrigerant charge of the system is less than 169.66 lb (76.96 kg), the mitigation measures of SV box should comply with the requirements of the regulations.
- When the refrigerant volume exceeds 169.66 lb (76.96 kg), the solution of using mechanical ventilation within the appliance enclosure as the sole mitigation measure does not comply with the requirements of the UL/CSA standards. For more details, please consult your dealer.
- Except non-return valve, keep any required ventilation openings clear of obstruction.

! NOTICE

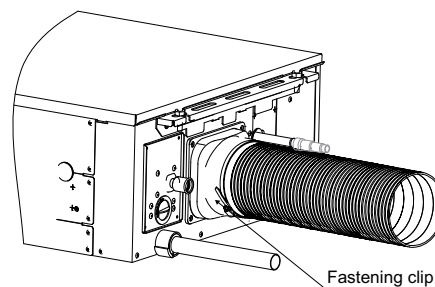
- Before installation, it is necessary to reasonably assess the length of the exhaust duct and the number of bends based on the conditions of the installation site.
- The layout of the exhaust ducts should take into account minimizing the length of the ducts and the number of bends.

! WARNING

- Exhaust ducts: The exhaust ducts must vent outside the building. Avoid that dirt, dust and small animals can enter the ductwork and lead to an obstruction. Example: Install a non-return valve, grill, filter or other component in the evacuation duct.
- Motors: The extraction fan cannot act as an ignition source during normal operation. Example: Brushed DC motors cause sparks and are not allowed.
- Supplementary air: Make sure that sufficient supplementary air is available for the extraction of a refrigerant leak. The extraction airflow rate must be maintained for at least 6.5 hours. This is achieved by providing a sufficiently large air volume around SV box or by providing sufficient supplementary air around SV box (e.g. natural openings or a dedicated opening in the false ceiling)
- Maintenance: A periodic inspection of SV box is required, where the test run is repeated. Maintain the ventilation ducts unobstructed to prevent dust and dirt from accumulating and blocking the path.

! WARNING

- The ducts and accessories (customer self-provision) for mechanical ventilation are must comply with the local regulations and requirements.
- Based on the material and length of the air ducts, an appropriate fixing plan should be formulated on site to ensure the ventilation effect.
- The air guide and the exhaust duct need to be firmly connected using fastening clip.



Mechanical Exhaust Fan Selection

One SV box – one exhaust fan

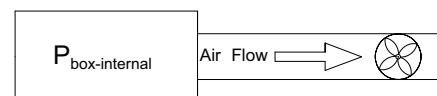
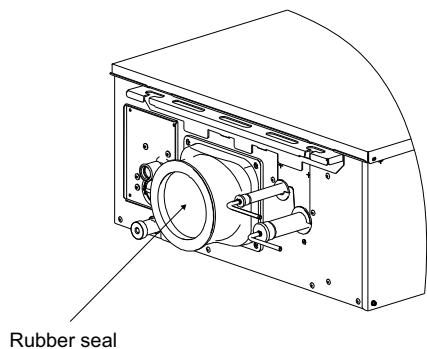


Fig. 10-2

! WARNING

Each SV box equipped with two air guides. For installing one SV box – one exhaust fan, the unused air guide need to be fitted with rubber seal (provided with the machine).



When the mechanical ventilation is in operation, P box-internal should be 0.0029 Psig (20 Pa) at least lower than the ambient pressure, and Air Flow should be more than 9.83 CFM (16.7 m³/h). In order to select the fan, a calculation has to be performed to find the pressure capacity required. The total pressure drop in the evacuation channel consists of multiple parts: the pressure drop generated by the SV box and the pressure drop generated by the components of the exhaust ducts.

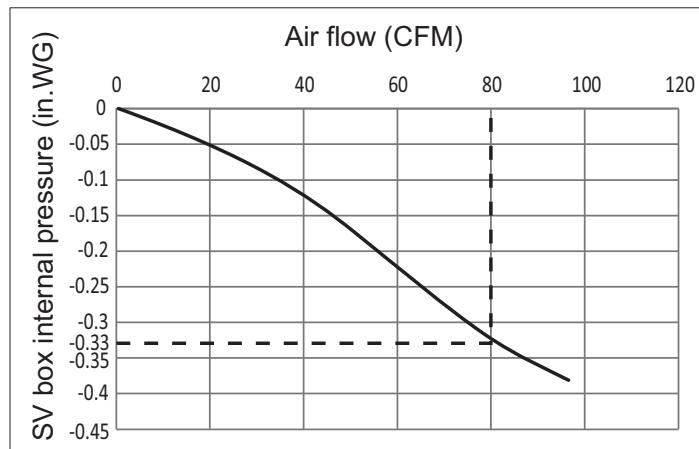


Fig. 45 – Pressure-Volume Curves for SV BOX(45VMS001S--3, 45VMS004S--3, 45VMS006L--3)

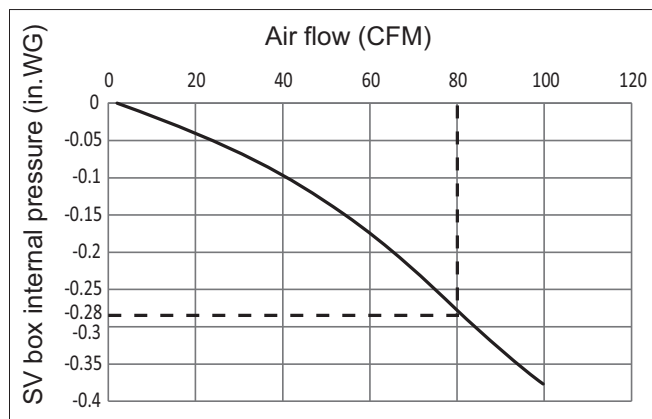


Fig. 46 – Pressure-Volume Curves for SV BOX(45VMS008L--3)

NOTE: This curve represents the static pressure inside the box when tested under an ambient pressure of 14.7 psig (101 325 Pa).

For example: when the designed internal pressure of SV box is -0.28 in.WG (-68) Pa, the corresponding air volume requirement is 135 m³/h. The resistance of the exhaust duct is as follows:

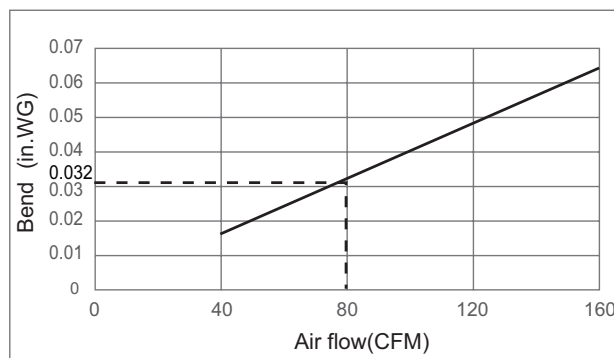
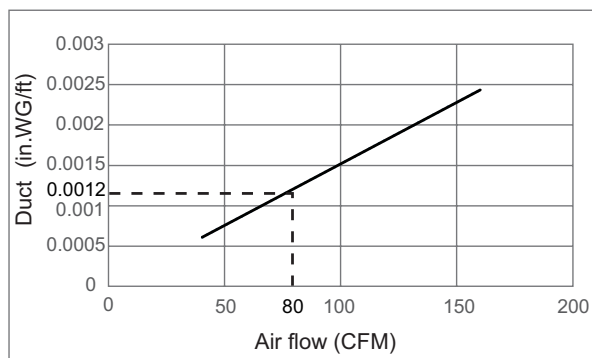


Fig. 47 – Resistance of Exhaust Duct

! NOTICE

- The total length of the exhaust ducts should not exceed than 30 m.
- The number of bends in the exhaust duct should not exceed 5.

Use the curves, with instructions how to read them, of the manufacturer of the components to find the pressure drop generated by all components in the exhaust duct.

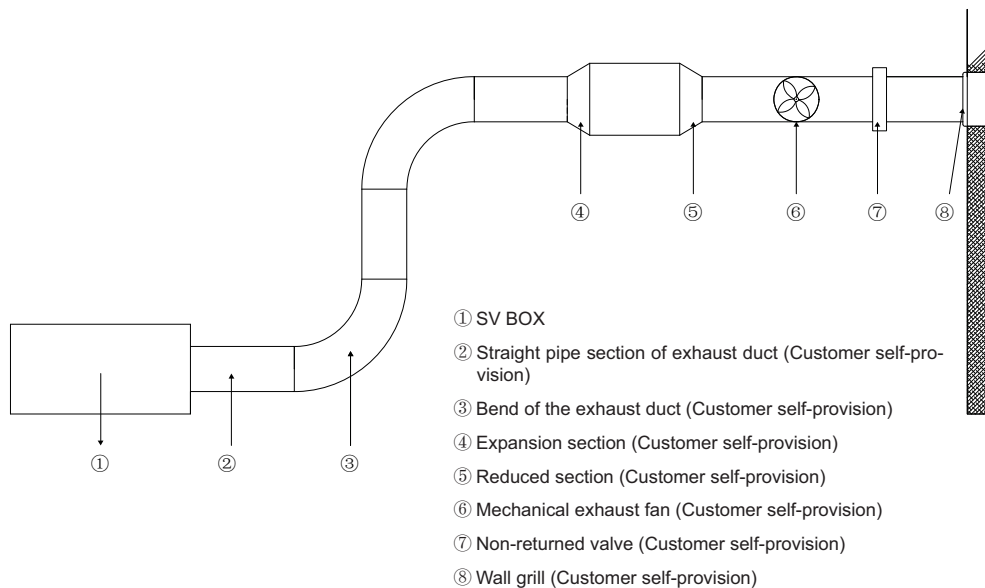


Fig. 48 – Exhaust Duct Components

Table 14 – Selection Calculation Case

No.	Type	Air Volume CFM (m ³ /h)	Length ft(m)	ΔP In.WG/ft (Pa/m)	ΔP In.WG(Pa)
1	SV Box	79.41 (135)	/	/	0.28 (70)
2	Straight pipe section of exhaust duct	79.41 (135)	16.4(5)	0.0012 (1)	0.02 (5)
3	Bend of the exhaust duct	79.41 (135)	/	/	0.03 (8)
2	Straight pipe section of exhaust duct	79.41 (135)	16.4(5)	0.0012 (1)	0.02 (5)
3	Bend of the exhaust duct	79.41 (135)	/	/	0.03 (8)
2	Straight pipe section of exhaust duct	79.41 (135)	16.4(5)	0.0012 (1)	0.02 (5)
4	Expansion section	79.41 (135)	/	/	0.02 (5)
2	Straight pipe section of exhaust duct	79.41 (135)	16.4(5)	0.0012 (1)	0.02 (5)
5	Reduced section	79.41 (135)	/	/	0.02 (6)
2	Straight pipe section of exhaust duct	79.41 (135)	16.4(5)	0.0012 (1)	0.02 (5)
7	Non-returned valve	79.41 (135)	/	/	0.04 (10)
2	Straight pipe section of exhaust duct	79.41 (135)	16.4(5)	0.0012 (1)	0.02 (5)
8	Wall grill	79.41 (135)	/	/	0.06 (15)
Total Pressure Drop (P _{total})					0.6(152)

Select a fan with the required flow of 79.41 CFM (135 m³/h) and a total pressure rise of 0.6 in.WG (152 Pa).

NOTE: For ease of installation we recommend to use in-line duct fans.

! WARNING

The motors for mechanical ventilation must comply with the local regulations and requirements, and have already obtained the certificates that are in line with local certification requirements.

! NOTICE

The manufacturer of mechanical exhaust fan should provide the static pressure and air volume curve for model selection confirmation.

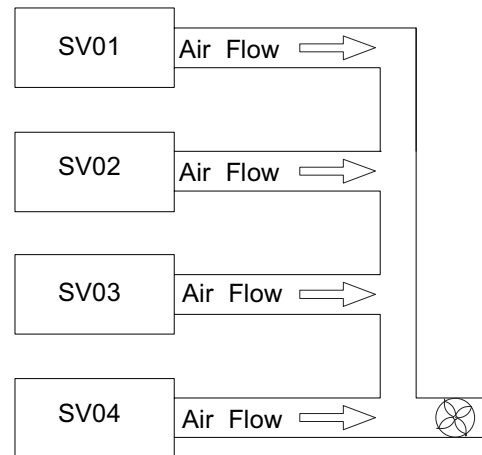
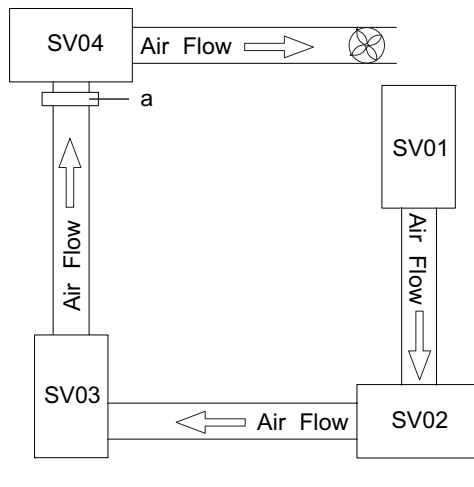


Fig. 49 – Multiple SV Boxes in Parallel — One Exhaust Fan

! WARNING

For installing multiple SV boxes in parallel – one exhaust fan, the unused air guides on each SV boxes need to be fitted with rubber seals (provided with the machine). Refer to fig.10-5, all SV boxes need to install the rubber seals.

For more details, please contact your dealers.



a- Non-returned valve

Fig. 50 – Multiple SV Boxes in Series — One Exhaust Fan

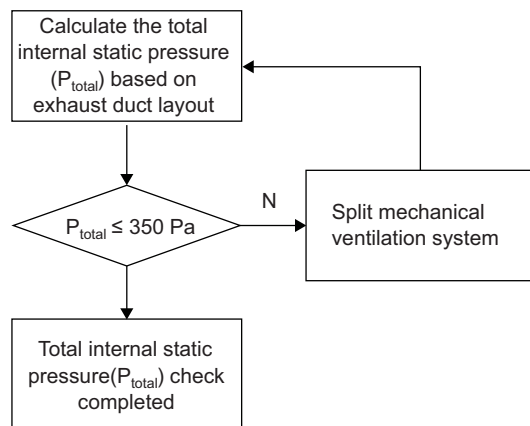
WARNING

For installing multiple SV boxes in series – one exhaust fan, the unused air guide on the SV box need to be fitted with rubber sealing ring (provided with the machine). Refer to Fig. 47, SV1 need to install the rubber seal.

For more details, please contact your dealers.

NOTICE

- Selecting Multiple SV boxes in parallel or in series need to meet the requirement that total internal static pressure P_{total} does not exceed 350 Pa.
- If total internal static pressure P_{total} does exceed 350 Pa, please add the exhaust fan and split the mechanical ventilation system.



CONFIGURATION

Overview

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

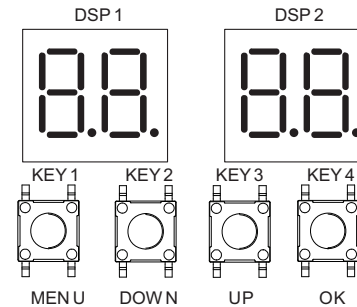
It contains the following information:

- Implement field settings
- Optimized operation
- Using the Leak Check function

NOTICE

The installation personnel should read this section.

Digital Display and Button Settings

**Fig. 51 – Digital Display****Table 15 – Digital Display Output**

Outdoor Unit State	Parameters Displayed on DSP1	Parameters Displayed on DSP2
Standby and normal operation	The address of SV box	The number of indoor units in communication with the SV box
Error or protection	Placeholder and error or protection code	
In menu mode	Display menu mode code	
System check	Display system check code	

Table 16 – Function of Buttons Key1 to Key4

Button	Function
KEY1 (MENU)	Enter / exit menu mode.
KEY2 (DOWN)	In menu mode: previous and next buttons for menu modes. Not in menu mode: previous and next buttons for system check information.
KEY3 (UP)	
KEY4 (OK)	Confirm to enter specified menu mode.

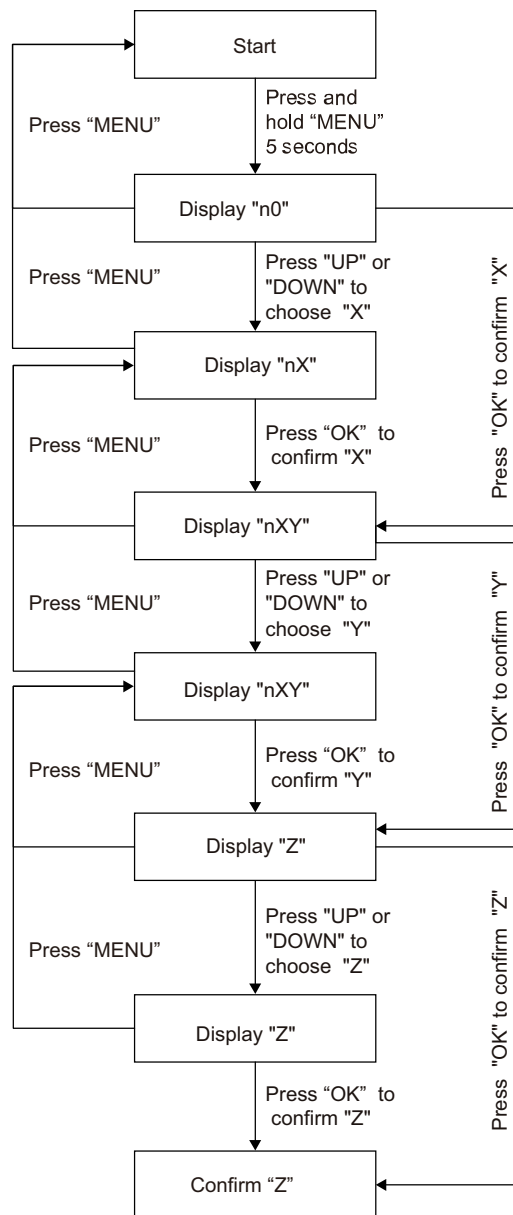
Menu Mode

Only Main has the full menu functions, slave units only have error codes check and cleaning functions.

1. Long press KEY1 “MENU” button for 5 seconds to enter menu mode, and the digital display displays “n0”.
2. Press KEY2 / KEY3 “DOWN / UP” button to select the first level menu “n0”, “n1”, “n2” or “n9”.
3. Press KEY4 “OK” button to enter specified first level menu, for example, enter “n2” mode.
4. Press KEY2 / KEY3 “DOWN / UP” button to select the second level menu from “n20” to “n23”.
5. Press KEY4 “OK” button to enter specified second level menu, for example, enter “n23” mode.
6. Press KEY2 / KEY3 “DOWN / UP” button to select the specified menu mode code.
7. Press KEY4 “OK” button to enter specified menu mode.

CAUTION

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



X-first level menu

Y-second level menu

Z-Third level menu

Fig. 52 – Menu Mode Selection Flowchart**Function Settings Checklist****Table 17 – Function Settings Checklist**

First Level Menu	Second Level Menu	Specified Menu Mode	Description	Default
N0	0	0	Query Historical Faults	
		1	Clear Historical Faults	
	1	0	Query the indoor unit address for pipe 0#	
		1	Query the indoor unit address for pipe 1#	
		2	Query the indoor unit address for pipe 2#	
		3	Query the indoor unit address for pipe 3#	
		4	Query the indoor unit address for pipe 4#	
		5	Query the indoor unit address for pipe 5#	
		6	Query the indoor unit address for pipe 6#	
		7	Query the indoor unit address for pipe 7#	
	2	-	Query the total number of online indoor units in the system	
N1	1	3	SN Code	
		4	Remaining Life of the Refrigerant Sensor	
		-	Exit Refrigerant Leak Debugging (default)	✓
9	5	1	Enter Refrigerant Leak Debugging	
		-	Manually reset to eliminate the refrigerant leakage fault	

Inspection Checklist

Every time you press the UP or DOWN button, the parameters listed in the following table will be displayed in sequence.

Table 18 – Inspection Checklist

Display	Content	Description
-	SV BOX address + the quantity of indoor units connected	
0	Operating indoor units quantity in this SV Box	
1	Outdoor unit operating mode	0] OFF [2] Cooling [3] Heating [4] Mandatory cooling [29] Main cooling [30] Main heating
2	High-Pressure of outdoor unit	Actual pressure=DISP. Unit: MPa
3	Low-Pressure of outdoor unit	Actual pressure=DISP. Unit: MPa
4	Program version	Actual program version

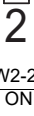
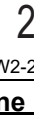
Field Setting**SV Box Address Settings**

For the method of setting the SV box address, please refer to the wiring nameplate of the SV box.

Table 19 – SV Box Address Settings

	0	The display shows the U38 error code, which means the SV Box address is not set.
	1-F	SV box address ranges from 1 to F.

Table 20 – SV Box EEV Synchronous Control Setting

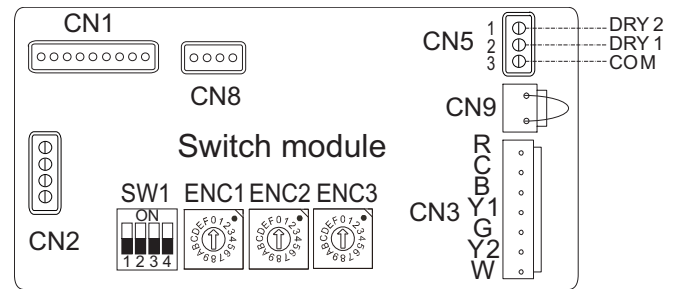
SW1	Dip Switch	EEV Synchronous Control Setting
	On  1 SW1-1: 0	Default, EEVC/D-0 and EEVC/D-1 independent control.
	ON  1 SW1-1: 1	SV box EEVC/D-0 and EEVC/D-1 synchronous control.
	ON  2 SW1-2: 0	Default, EEVC/D-2 and EEVC/D-3 independent control.
	ON  2 SW1-2: 1	SV box EEVC/D-2 and EEVC/D-3 synchronous control.
	On  1 SW2-1: 0	Default, EEVC/D-4 and EEVC/D-5 independent control.
	ON  1 SW2-1: 1	SV box EEVC/D-4 and EEVC/D-5 synchronous control.
	ON  2 SW2-2: 0	Default, EEVC/D-6 and EEVC/D-7 independent control.
SW2	ON  2 SW2-2: 1	SV box EEVC/D-6 and EEVC/D-7 synchronous control.

Indoor Unit Pipeline Number Settings**! CAUTION**

- Each indoor unit must be bound to the pipeline number with SV box.
- The method of setting the Indoor unit pipeline number settings, please refer to installation manual of the indoor units.

! NOTICE

The indoor unit Switch module is located inside the indoor unit electrical control box.

**Fig. 53 – Indoor Unit Switch Module**

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Table 21 – Indoor Unit Switch Module Port Functions

Port	Attribute	Function
ENC2	Setting	Set the SV box address (1 to F)
ENC3	Setting	Set the SV box tube number (0 to F)

For example: A system with one SV box paired with 4 indoor units, the Indoor unit pipeline number is shown in Fig. 54.

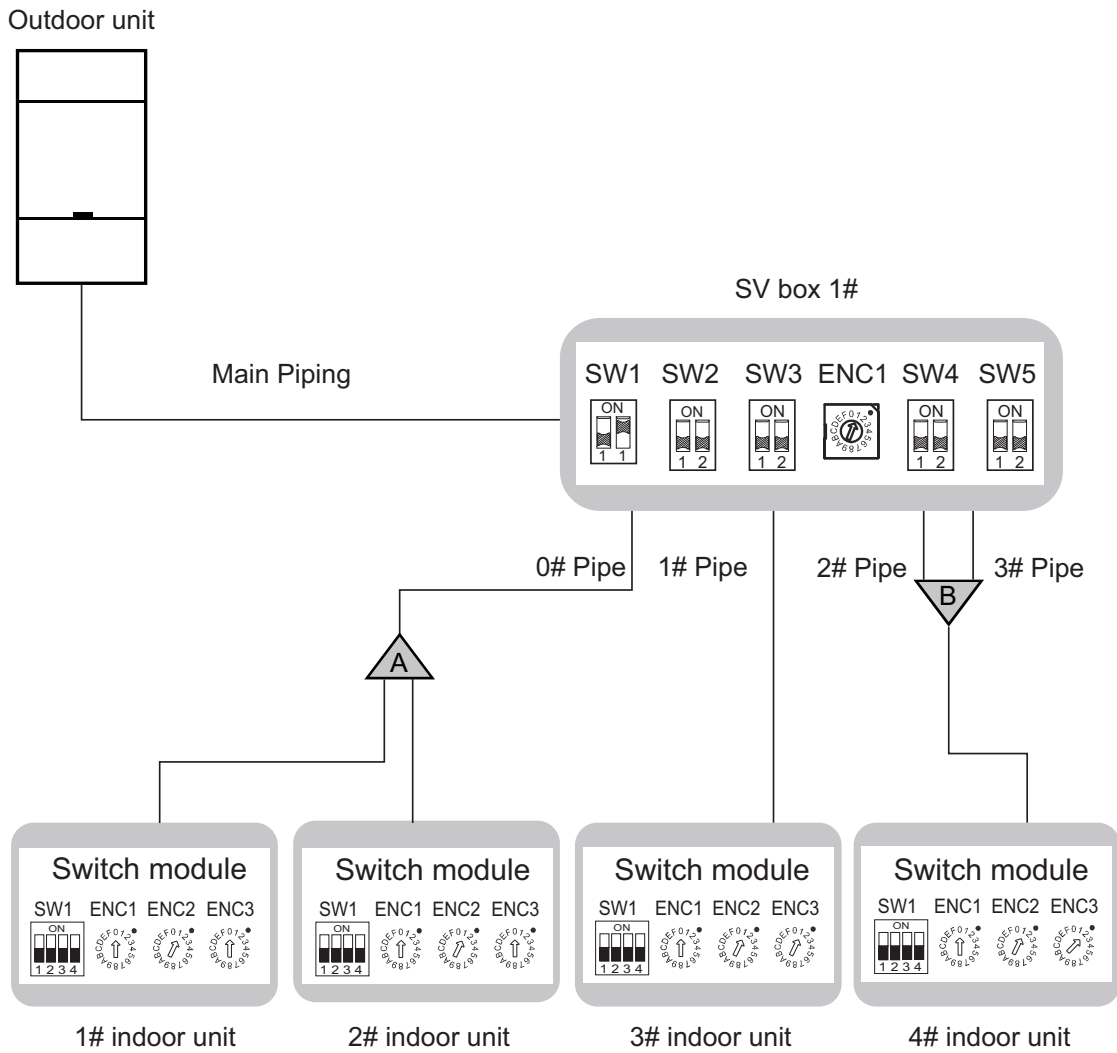


Fig. 54 – Indoor Unit Pipeline Number

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NOTICE

- After setting the pipe number, check whether all indoor unit addresses are successfully matched with the SV box pipe number.
- See [Table 17](#) for more details about query method.

Sv Box Security Measures Confirmation

The SV box must confirm that the required safety measures are properly installed before charging refrigerant.

CAUTION

If SV box is equipped with safety measures such as mechanical exhaust or alarm output, these safety measures inspection must be carried out.

Table 22 – SV Box Security Measures Confirmation

Safety Measures	Confirmation Items
Mechanical ventilation	1. The internal pressure of each SV BOX is below -45 Pa; 2. The airflow of each SV BOX is greater than 135 m³/h;
Alarm signal	The alarm device (sound or light) responds.

NOTICE

- For the test methods for internal pressure and air volume of SV box, see the following section.
- Alarm equipment selected and installed by the customer.

Charging Refrigerant
Checks Before Charging the Refrigerant

WARNING

Before charging the refrigerant, the safety measures of the SV box need to be tested to ensure that any leakage during the refrigerant charging process can be detected promptly and the corresponding safety measures can be activated.

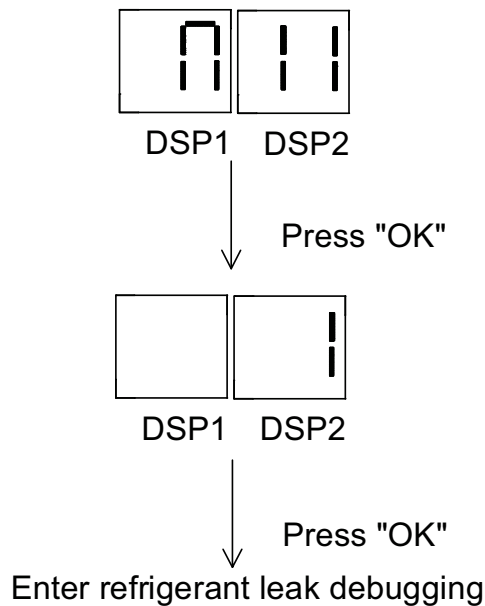
Check for Safety Measures:**Mechanical Ventilation Within the Appliance Enclosure****! WARNING**

- Before charging refrigerant, it is required to perform a test run that simulates a refrigerant leak.
- The installers need to conduct the airflow rate test and provide the accurate data.

Table 23 – SV Box Field Settings (for Main Control Board of SV Box)

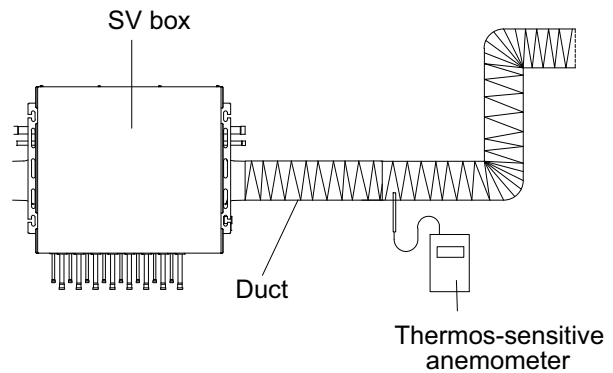
First Level Menu	Second Level Menu	Specified Menu Mode	Description
N1	1	0	Exit Refrigerant Leak Debugging (Default)
		1	Enter Refrigerant Leak Debugging
	3	0	Enable Enclosure Ventilation is effective (Default)
		1	Enable Enclosure Ventilation is ineffective
	4	0	Confirm Debugging Not Completed (Default)
		1	Confirm Debugging Completed

1. Power on SV boxes and wait for initialization completed.
2. SV box menu setting: Set Menu N11, press “OK,” set “1” to enter refrigerant leak debugging.

**Fig. 55 – Refrigerant Leak Debugging**

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3. Measure the airflow rate at the outlet of exhaust duct with thermos-sensitive anemometer.

**Fig. 56 – Measuring Airflow Rate**

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4. Record the test data. Based on the actual duct diameter and the measured air velocity, the air flow can be converted. Confirm whether the data meets the requirements stipulated in Regulatory Requirements for Mechanical Ventilation section.
5. Set Menu N11, press “OK,” set “0” to exit refrigerant leak debugging.

Check for Safety Measures: External Alarm (Optional)**! WARNING**

The intensity of the external alarm's sound and light must comply with the requirements of local regulations.

1. Power on SV boxes and wait for initialization completed.
2. Set Menu N11, press “OK,” set “1” to enter refrigerant leak debugging.
3. Confirm whether the sound and light signals of the external alarm can be properly transmitted back.
4. Set Menu N11, press “OK,” set “0” to exit refrigerant leak debugging.

Pressure Leak Test and Vacuum Drying

The refrigerant charging operation is carried out on the outdoor unit. For the calculation of the refrigerant addition amount of the system, please refer to the outdoor unit installation manual.

According to UL/CSA 60335-2-40, the total refrigerant charge amount in the system MUST always be less than 76.96 [kg]. This means that in case the calculated total refrigerant charge in the system is equal to or more than 76.96 kg you must divide the system into smaller independent systems, or Increase other safety measures, contact your dealer for details.

Precautions When Charging Refrigerant**! WARNING**

- Only use R-454B as refrigerant. Other substances may cause explosions and accidents.
- R-454B contains fluorinated greenhouse gases. Its global warming potential (GWP) value is 466. Do NOT vent these gases into the atmosphere.
- When charging refrigerant, ALWAYS use protective gloves and safety glasses.
- For more details, please refer to the outdoor unit installation manual.

Checks After Charging Refrigerant

1. Is the amount of refrigerant, that has been added, recorded on the refrigerant charge label?

- 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 working pressure. No leak shall be detected.
- In case a leak is detected, recover the refrigerant and repair the joint.

COMMISSIONING

After installation and once the field settings are defined, the installer is obliged to verify correct operation. Therefore a test run must be performed according to the procedures described below.

For more details, please refer to the outdoor unit installation manual.

TROUBLESHOOTING

If an error code appears on the digital display of the SV box, please refer to the fault code table in Chapter 20 for handling.

For faults in the indoor unit or SV box, please refer to the installation and operation manual of the corresponding equipment.

HAND-OVER TO THE USER

Once the test run is finished and the unit operates properly, please make sure the following is clear for the user:

- Make sure that the user has the printed documentation and ask him/her to keep it for future reference.
- Explain the user how to properly operate the system and what to do in case of problems.
- Show the user what to do for the maintenance of the unit.

TECHNICAL DATA

Product Information

! NOTICE

- Product dimensions may vary slightly due to different panels and the tolerance is ± 30 mm. The actual product shall prevail.
- Product pictures in this manual are for reference only.
- The following table sizes are the maximum form factor of the product.

Table 24 – Product Information

			SV Box			
			45VMS001S--3	45VMS004S--3	45VMS006L--3	45VMS008L--3
Net Dimensions	Height	in(mm)	11-5/8(295)	11-5/8(295)	11-5/8(295)	11-5/8(295)
	Width	in(mm)	28-3/8(720)	28-3/8(720)	36-1/4(920)	36-1/4(920)
	Depth	in(mm)	30-11/16(780)	30-11/16(780)	30-11/16(780)	30-11/16(780)
Packed Dimensions	Height	in(mm)	18-7/8(480)	18-7/8(480)	18-7/8(480)	18-7/8(480)
	Width	in(mm)	31-7/8(810)	31-7/8(810)	39-3/4(1,010)	39-3/4(1,010)
	Depth	in(mm)	35-13/16(910)	35-13/16(910)	35-13/16(910)	35-13/16(910)
Weight	Net Weight	lb(kg)	51.1(25)	62.9(28.6)	82.5(37.4)	87.9(39.9)
	Gross Weight	lb(kg)	111.77(50.7)	122.13(55.4)	143.52(65.1)	148.37(67.3)
Sound Pressure Level	Nominal	dB(A)	48	48	48	48

Unit: in(mm)

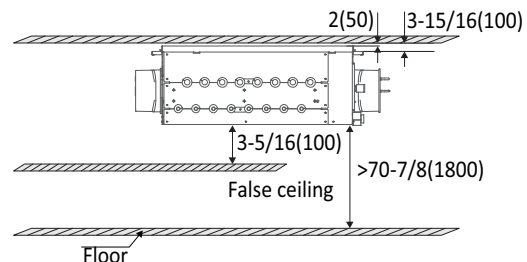
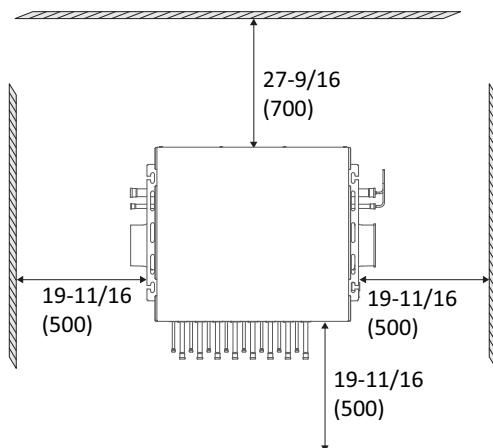


Fig. 57 – Installation Space: SV Box

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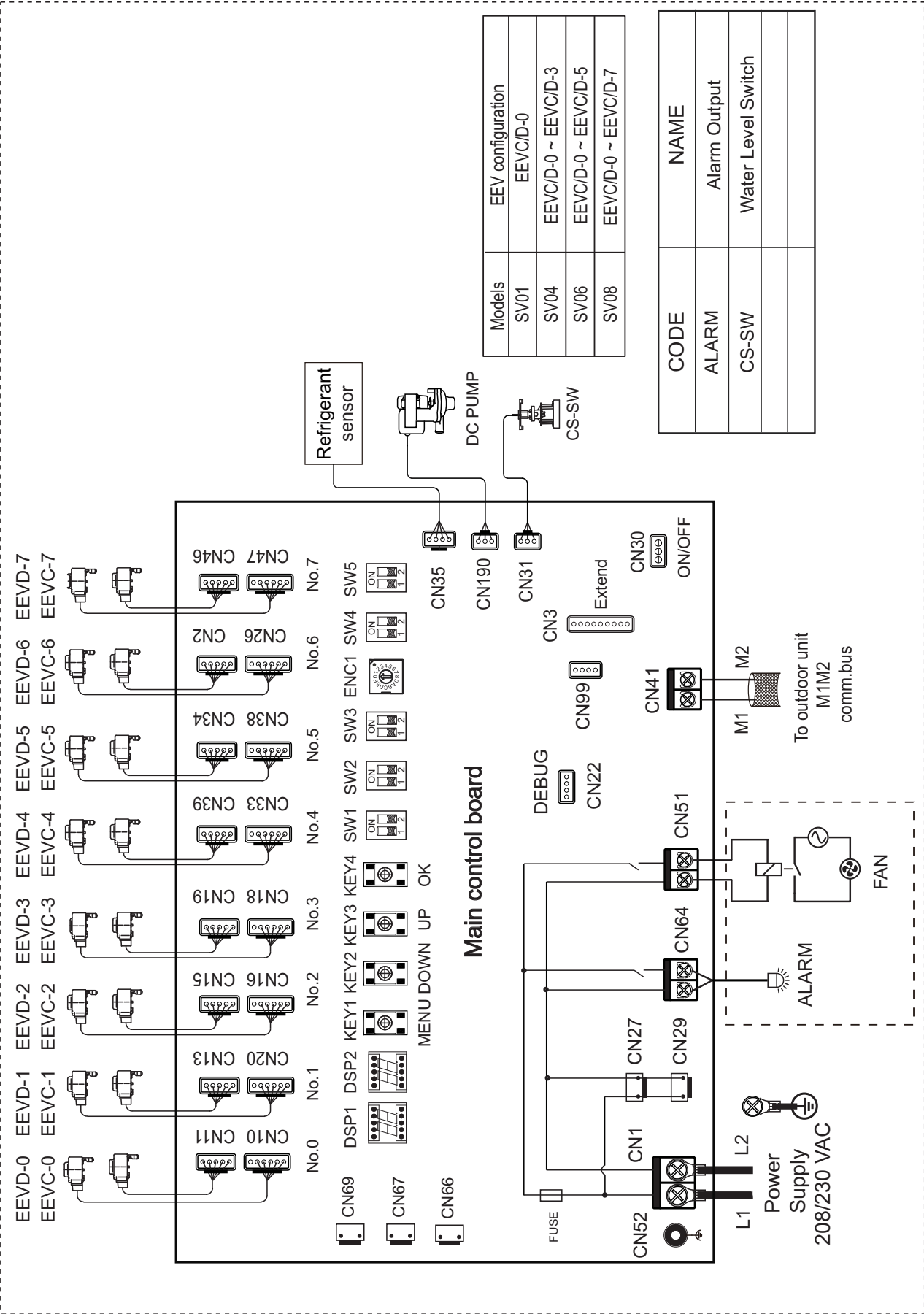


Fig. 58 – Wiring Diagram: SV Box

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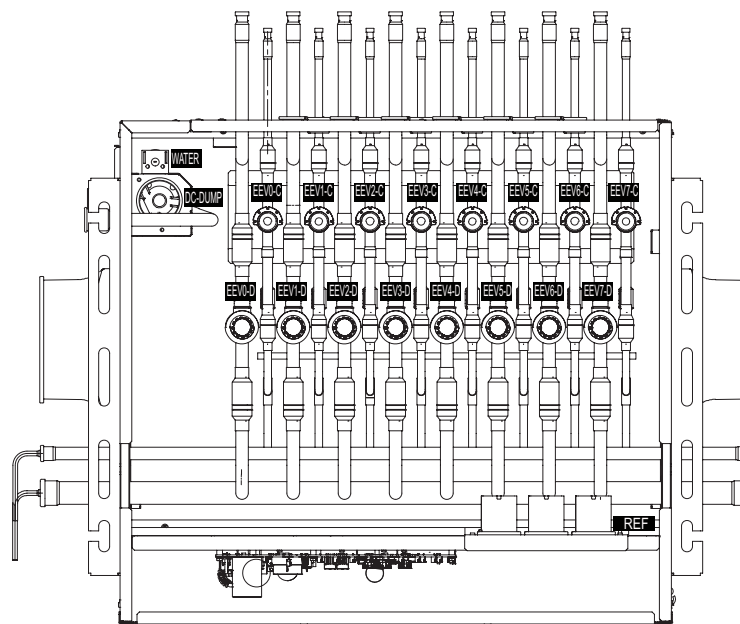
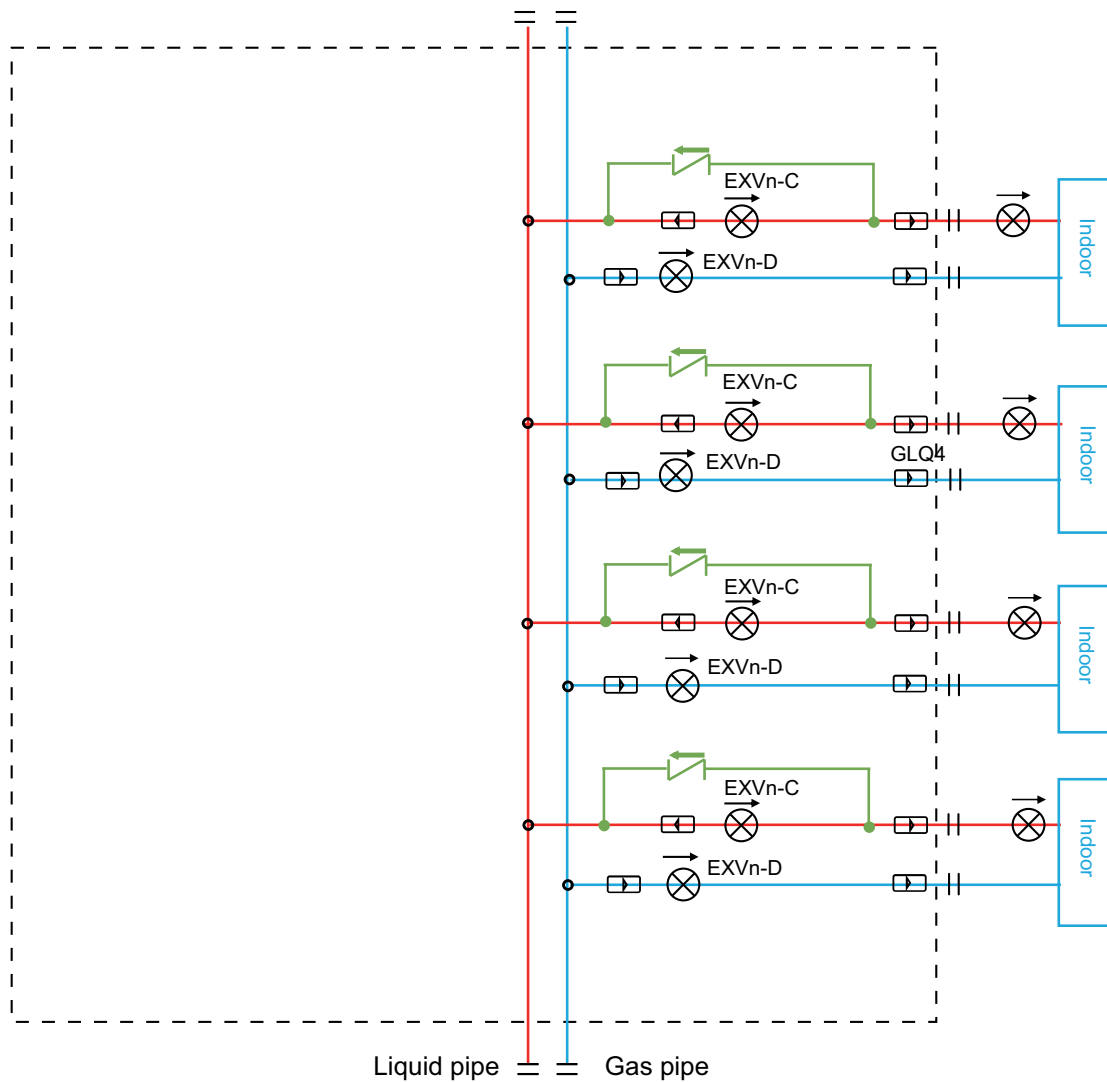


Fig. 59 – Component Layout and Refrigerant Circuits

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OPERATION MANUAL

User Safety Instructions

Always observe the following safety instructions and regulations.

General

WARNING

- If you are NOT sure how to operate the unit, contact your installer and dealer.
- This unit should not be operated by people who lack sufficient physical strength, cognitive sense or mental ability, or who lack experience and knowledge.

WARNING

To prevent electrical shocks or fire:

- Do NOT rinse the unit.
- Do NOT operate the unit with wet hands.
- Do NOT place any objects containing water on the unit.

CAUTION

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



- Units are marked with the following symbol:  This means that electrical and electronic products may NOT be mixed with unsorted household waste. Do NOT try to dismantle the system yourself: the dismantling of the system, treatment of the refrigerant, of oil and of other parts MUST be done by an authorized installer and MUST comply with applicable legislation.
- Units MUST be treated at a specialized treatment facility for reuse, recycling and recovery. By ensuring this product is disposed of correctly, you will help to prevent potential negative consequences for the environment and human health. For more information, contact your installer or local authority.

Instructions for Safe Operation

WARNING

Make sure installation, servicing, maintenance, repair and applied materials follow the instructions from manufacturer and, in addition, comply with applicable legislation and are performed by qualified persons only.

In America UL 60335-2-40 is the applicable standard.

WARNING

Do NOT install operating ignition sources (example: open flames, an operating gas appliance or an operating electric heater) in the duct work.

WARNING

- The unit is equipped with a refrigerant leak detection system for safety. To be effective, the unit MUST be electrically powered at all times after installation, except for maintenance.
- 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 without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).
- Do not pierce or burn.
- Be aware that refrigerants may not contain an odor.

CAUTION

- NEVER touch the internal parts of the controller.
- Do NOT remove the front panel.
- Some parts inside are dangerous to touch and appliance problems may happen. For checking and adjusting the internal parts, contact your dealer.
- Do NOT operate the system when using a room fumigation-type insecticide. Chemicals could collect in the unit, and endanger the health of people who are hypersensitive to chemicals.
- It is unhealthy to expose your body to the air flow for a long time.

NEVER touch the internal parts of the controller.

Do NOT remove the front panel.

Some parts inside are dangerous to touch and appliance problems may happen. For checking and adjusting the internal parts, contact your dealer.

Do NOT operate the system when using a room fumigation-type insecticide. Chemicals could collect in the unit, and endanger the health of people who are hypersensitive to chemicals.

It is unhealthy to expose your body to the air flow for a long time.

CAUTION

- Do NOT insert fingers, rods or other objects into the air inlet or outlet. Do NOT remove the fan guard. When the fan is rotating at high speed, it will cause injury.
- It is dangerous to inspect the unit while the system is operating.
- Make sure to turn OFF the main switch before executing any maintenance task.
- After a long use, check the unit stand and fitting for damage. If damaged, the unit may fall and result in injury.

WARNING

NEVER replace a fuse with a fuse of a wrong ampere ratings or other wires when a fuse blows out. Use of wire or copper wire may cause the unit to break down or cause a fire.

About the Refrigerant

! WARNING

- Do NOT modify, disassemble, remove, reinstall or repair the unit yourself as incorrect dismantling or installation may cause an electrical shock or fire. Contact your dealer.
- In case of accidental refrigerant leaks, make sure there are no naked flames.
- The refrigerant itself is entirely safe, non-toxic and mildly flammable, but it will generate toxic gas when it accidentally leaks into a room where combustible air from fan heaters, gas cookers, etc. is present.
- Always have qualified service personnel confirm that the point of leakage has been repaired or corrected before resuming operation.

! WARNING

- The appliance shall be stored in a room without continuously operating ignition sources (example: open flames, an operating gas appliance or an operating electric heater).
- The refrigerant inside this unit is mildly flammable.

Troubleshooting

! WARNING

- Stop operation if anything unusual occurs (burning smells etc.).
- Leaving the unit running under such circumstances may cause breakage, electrical shock or fire. Contact your dealer.

! WARNING

- The refrigerant inside the unit is mildly flammable, but normally does NOT leak. If the refrigerant leaks in the room and comes in contact with fire from a burner, a heater, or a cooker, this may result in fire, or the formation of a harmful gas.
- Turn OFF any combustible heating devices, ventilate the room, and contact the dealer where you purchased the unit.
- Do NOT use the unit until a service person confirms that the part from which the refrigerant leaked has been repaired.

About the System

Do NOT use the system for other purposes. In order to avoid any quality deterioration, do NOT use the unit for cooling precision instruments, food, plants, animals, or works of art.

The unit uses R-454B refrigerant which is rated as A2L and is mildly flammable. For compliance with the requirements for enhanced tightness refrigerating systems and UL 60335-2-40 the installer must take extra measures.

The indoor unit part of this heat recovery system can be used for heating/cooling applications.

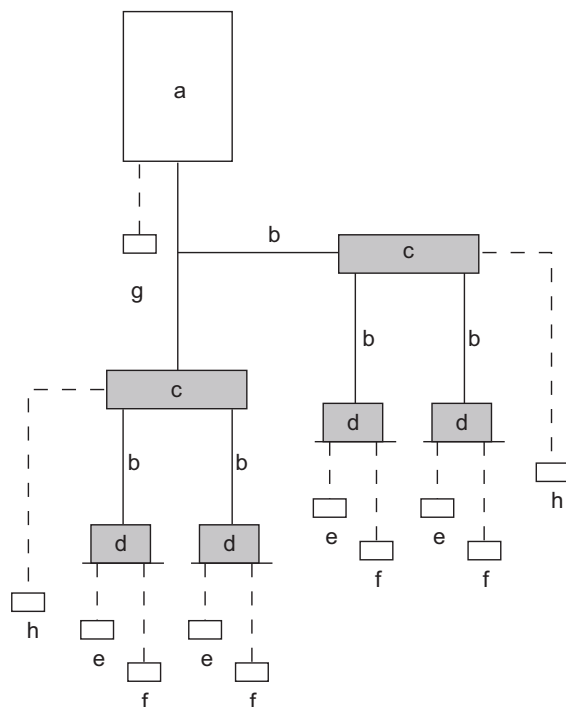
System Layout

The complete system can be divided into several sub-systems.

These sub-systems have 100% independence regarding the selection of cooling and heating operation, and each consists of one individual branch set of a SV box unit, and all indoor units connected downstream.

! NOTICE

The following figure is an example and may NOT completely match your system layout.



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

Fig. 60 – System Layout

A260079

SV Box Layout

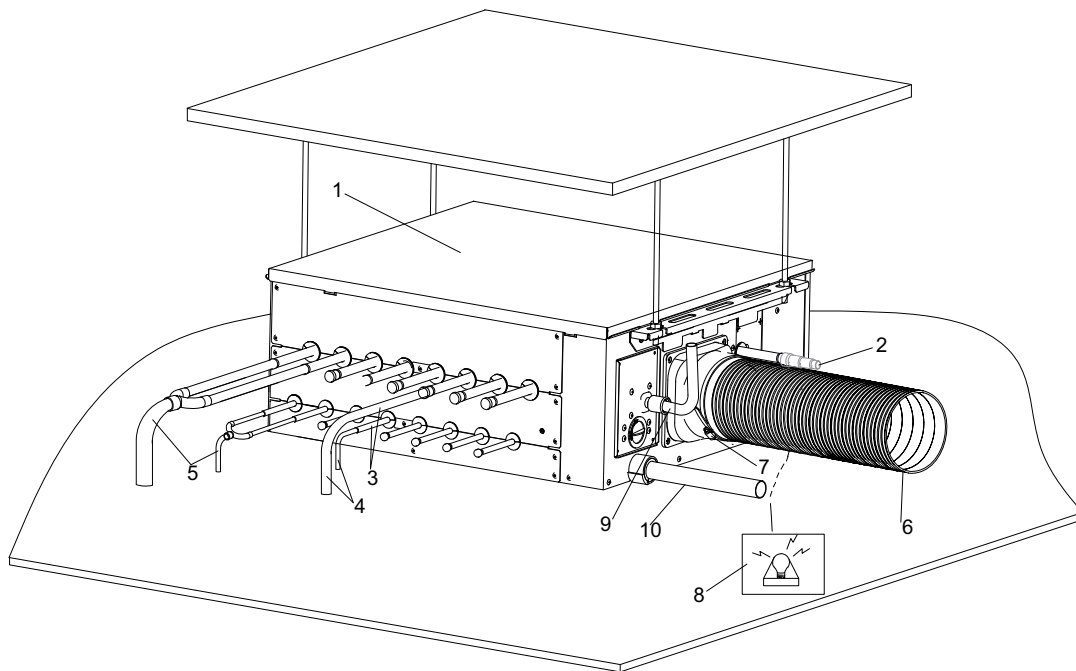


Fig. 61 – SV Box Layout

A260080

1. SV box
2. Reducer pipe (high-pressure / low-pressure pipe between outdoor unit and main SV box)
3. Reducer pipe (liquid /gas pipes between SV box and indoor units)
4. Gas /Liquid pipes (between SV box and indoor units)
5. *Branch pipe A (for the indoor unit that cooling capacity is exceed than 54 kBtu/h)
6. *Duct for mechanical ventilation
7. Fastening clip
8. *External alarm
9. *Drain pipe for mechanical drainage
10. *Drain pipe for natural drainage

*To be purchased separately on site.

! NOTICE

- All the optional accessories should be from local dealer.
- The selection of mechanical ventilation motors and ducts should comply with the requirements of UL/CSA certification.
- The selection of the sound and light alarm signal should comply with the requirements of UL/CSA certification.
- For optional accessories such as wired controllers, please refer to the manuals of these accessories.
- All the figures in the manual explain only the general appearance and functions of the product. The appearance and functions of the purchased product may not be completely consistent with those listed in the figures. Please refer to the actual product.

Maintenance and Service

! WARNING

- SV box and indoor unit are equipped with refrigerant leak detection system for safety.
- To be effective, SV box and indoor unit **MUST** be electrically powered at all times after installation, except for maintenance.

! NOTICE

- NEVER inspect or service the unit by yourself. Ask a qualified service person to perform this work.
- All operators or refrigeration circuit maintenance personnel should obtain valid certificates issued by industry recognized evaluation agencies to recognize their qualifications for safe disposal of refrigerants as required by industry recognized evaluation standards. Every working procedure that affects safety means shall only be carried out by competent persons. If other professionals are needed to assist in maintaining and repairing equipment, they should be supervised by personnel qualified to use flammable refrigerants.
- Do NOT wipe the controller operation panel with benzene, thinner, chemical dust cloth, etc. The panel may get discolored or the coating peeled off. If it is heavily dirty, soak a cloth in water-diluted neutral detergent, squeeze it well and wipe the panel clean. Wipe it with another dry cloth.

About the Refrigerant

! NOTICE

The appliance uses R-454B refrigerant. R-454B contains fluorinated greenhouse gases. Its global warming potential (GWP) value is 466. Do NOT vent these gases into the atmosphere.

! WARNING

The R-454B refrigerant sensor must be replaced after every detection or at the end of its lifetime. Only the refrigerant leakage detective sensor specified by the manufacturer can be replaced. Only authorized persons may replace the sensor.

! WARNING

- Functionality of refrigerant leakage detective sensor are periodically automatically checked. In case of malfunction, an error code will be displayed on the user interface.
- The R-454B refrigerant leakage detective sensor may incorrectly detect substances other than R-454B refrigerant. Avoid using chemical substances (e.g. organic solvents, hair spray, paint) in high concentrations, in the close proximity of the SV box unit because this may cause mis-detection of the refrigerant leakage detective sensor.

About the Refrigerant Leakage Detective Sensor**! WARNING**

The R-454B refrigerant leakage sensor must be replaced after every detection or at the end of its lifetime. Only the refrigerant leakage detective sensor specified by the manufacturer can be replaced. Only authorized persons may replace the sensor.

! NOTICE

- Functionality of refrigerant leakage detective sensor are periodically automatically checked. In case of malfunction, an error code will be displayed on the user interface.
- The R-454B refrigerant leakage sensor may incorrectly detect substances other than R-454B refrigerant. Avoid using chemical substances (e.g. organic solvents, hair spray, paint) in high concentrations, in the close proximity of the SV box unit because this may cause mis-detection of the refrigerant leakage detective sensor.

! NOTICE

The sensor has a lifetime of 15 years. The user interface displays error “DC1” 3 months before the end of the sensor lifetime and error “EC1” after the end of the sensor lifetime. For more information, contact your dealer.

After Sales Service and Warranty**Warranty Period**

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

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

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

- The complete model name of the unit.
- The manufacturing number (stated on the nameplate of the unit).
- The installation date.
- The symptoms or malfunction, and details of the defect.

Recommended Maintenance and Inspection

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

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

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

The results of the inspection and measures taken afterwards shall be included in the logbook.

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

! WARNING

- Do NOT modify, disassemble, remove, reinstall or repair the unit yourself as incorrect dismantling or installation may cause an electrical shock or fire. Contact your dealer.
- In case of accidental refrigerant leaks, make sure there are no naked flames. The refrigerant itself is entirely safe, non-toxic and mildly flammable, but it will generate toxic gas when it accidentally leaks into a room where combustible air from fan heaters, gas cookers, etc. is present. Always have qualified service personnel confirm that the point of leakage has been repaired or corrected before resuming operation.

! WARNING

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

Shorter Maintenance and Replacement Cycle

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

The unit is used in the following situations:

- Temperature and humidity fluctuations are outside the normal range.
- Large power fluctuations (voltage, frequency, waveform distortion etc.).
- Frequent collisions and vibrations.
- The air may contain dust, salt, harmful gases or oils.
- Frequently turning the unit on and off or operating the unit for too long (in places where the air conditioning is on for 24 hours a day).

Maintenance After Long Shutdown

For example, in early summer or winter.

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

Error Code

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 25 – Error Codes

Error Code	Error Description	Manual Restart Required
A11	Refrigerant leakage protection	NO
AB1	SV box power failure fault	YES
C12	SV box address is repeated	NO
C21	Communication fault between SV box and Outdoor unit	NO
U38	SV box has no address information (address code set to 0)	YES
U39	SV box port mismatch fault	NO
dC1	Refrigerant leakage sensor service life less than 6 months	/
EC1	Refrigerant leakage sensor fault	NO
EC2	Refrigerant leakage sensor service life exceeded	NO
6bxx	EEVn-C fault, xx represents pipe number	YES
7bxx	EEVn-D fault, xx represents pipe number	YES
b36	Water level sensor fault	NO

Relocation

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

Disposal

This unit uses hydrogen fluorocarbons. Please contact the dealer when you want to dispose of this unit. Dismantling of the system, treatment of the refrigerant, oil and other parts MUST comply with applicable legislation. Do NOT try to dismantle the system yourself. Units MUST be treated at a specialized treatment facility for reuse, recycling and recovery.