

45VMD

Multiport Distribution Center (MDC) for R-454B Series Variable Refrigerant Flow (VRF)

Installation and Operation Manual

NOTE: Read the entire instruction manual before starting the installation.

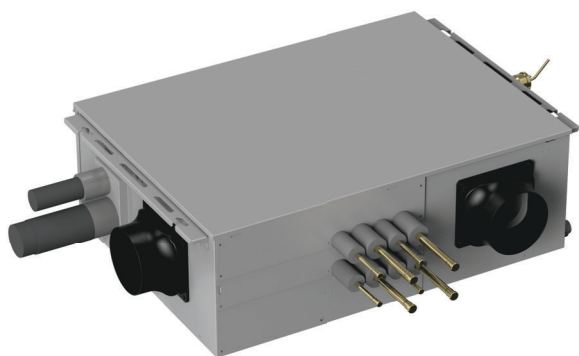


Fig. 1 – Multiport Distribution Center (MDC)

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NOTE: Mode Switch Box Original instructions Please read this manual carefully and keep it for future reference. All the pictures in this manual are for illustration purpose only.

About this document

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

Target Audience

Authorized installers + end users.

! NOTICE

This appliance is intended to be used by expert or trained users in shops, in light industry and on farms, or for commercial 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 Symbols

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

! WARNING

- Indicates a hazardous situation which, if not avoided, it could result in death or serious injury.
- Safety instruction (or equivalent) signs indicate specific safety-related instructions or procedures.

! CAUTION

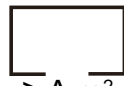
Indicates a hazardous situation which, if not avoided, it could result in minor or moderate injury.

! NOTICE

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

Symbols Displayed on Unit

Table 1 – Symbols Displayed on the Unit

   A260104	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.
 A260105	WARNING This symbol shows that appliance shall be installed, operated and stored in a room with a floor area not less than the minimum room area.
 A260106	CAUTION This symbol indicates that the operation manual should be read carefully.
 A260107	CAUTION This symbol indicates that service personnel should be handling this equipment while referencing the installation manual.
 A260108	CAUTION This symbol indicates that additional information is available in documents such as the operating manual or installation manual.
 A260109	INFORMATION This symbol indicates that the entire system complies with the ENHANCED TIGHTNESS REFRIGERATING SYSTEMS requirements defined by UL/CSA Standards.

Specific Installer Safety Instructions

Safety Instructions

Installation Site

WARNING

Follow the service space dimensions in this manual for correct installation of the unit.

WARNING

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

CAUTION

- Appliance NOT accessible to the general public, install it in a secured area, protected from easy access.
- This unit, both indoor and outdoor, is suitable for installation in a commercial and light industrial environment.

CAUTION

Excessive refrigerant concentrations in a closed room can lead to oxygen deficiency.

WARNING

If one or more rooms are connected to the unit using a duct system, make sure:

- There are no operating ignition sources (example: open flames, an operating gas appliance or an operating electric heater) in case the floor area is less than the minimum floor area A (m²).
- No auxiliary devices, which may be a potential ignition source, are installed in the duct work (example: hot surfaces with a temperature exceeding 1292°F and electric switching device);
- Only auxiliary devices approved by the manufacturer are used in the duct work.
- Air inlet AND outlet are connected directly to the same room by ducting. Do NOT use spaces such as a false ceiling as a duct for the air inlet or outlet.

Opening the Unit

WARNING

RISK OF BURNING/SCALDING

WARNING

RISK OF ELECTROCUTION

Do NOT leave the unit unattended when the service cover is removed.

Installing the MDC Box

WARNING

Fixing method of the MDC box **MUST** be in accordance with the instructions from this manual.

Connecting the Refrigerant Piping

WARNING

Field piping method **MUST** be in accordance with the instructions from this manual.

WARNING

- 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.
- Equipment piping in the occupied space shall be installed in such a way to protect against accidental damage in operation and service.

NOTICE

- Do NOT use mineral oil on flared part.
- Do NOT reuse piping from previous installations. Flared components should not be reused.
- NEVER install a drier to this unit to guarantee its lifetime. The drying material may dissolve and damage the system.

CAUTION

Install the refrigerant piping or components in a position where they are unlikely to be exposed to any substance which may corrode components containing refrigerant.

WARNING

Take sufficient precautions in case of refrigerant leakage. If refrigerant gas leaks, ventilate the area immediately. Possible risks:

- Excessive refrigerant concentrations in a closed room can lead to oxygen deficiency.
- Toxic gas might be produced if refrigerant gas comes into contact with fire.

 WARNING

- ALWAYS recover the refrigerant. Do NOT release them directly into the environment.
- During leak test, NEVER pressurize the product with a pressure higher than the maximum allowable pressure (as indicated on the nameplate of the unit).
- Do NOT vent gases into the atmosphere.

 NOTICE

- Precautions shall be taken to avoid excessive vibration or pulsation to refrigeration piping.
- Protection devices, piping and fittings shall be protected as far as possible against adverse environmental effects.
- Provision shall be made for expansion and contraction of long runs of piping.
- Piping in refrigerating systems shall be designed and installed such as to minimize the likelihood of hydraulic shock damaging the system.
- The indoor equipment and pipes shall be securely mounted and guarded such that accidental rupture of equipment or pipes cannot occur from events such as moving furniture or reconstruction activities.
- Joints made in installation between parts of refrigerant system shall be accessible for maintenance purposes.
- After the pipeline connection is completed, it is necessary to check whether the insulation between the pipeline and the machine's sheet metal is damaged. If it is damaged, a new rubber ring needs to be replaced to ensure the sealing performance.
- The idle pipes, including disconnected Liquid Pipe/High-Pressure Gas Pipe / Low-Pressure Gas Pipe of the MDC, the unused connecting pipes of indoor unit), should be sealed in accordance with local regulations. For example: On-site brazing.

Charging Procedures **WARNING**

Charging of refrigerant MUST be in accordance with the instructions from this manual.

 WARNING

- Only use R454B as refrigerant. Other substances may cause explosions and accidents.
- When charging refrigerant, ALWAYS use protective gloves and safety glasses.

 WARNING

Recharging Refrigerant: 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.

 WARNING

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.
- Extreme care shall be taken not to overfill the REFRIGERATING SYSTEM.

Electrical Installation **WARNING**

Electrical installation MUST be in accordance with the instructions from this manual.

 WARNING

- Establish proper ground. Do NOT ground the unit to a utility pipe, surge absorber, or telephone ground. Incomplete ground may cause electrical shock.
- Install the required fuses or circuit breakers.
- Considering the failure of the MDC box's refrigerant leakage monitoring due to unexpected power outage, the outdoor unit, the indoor units and the MDC 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 MDC box power outage.
- Secure the electrical wiring with cable ties so that the cables do NOT come in contact with sharp edges or piping, particularly on the high-pressure side.
- 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.
- Do NOT use taped wires, stranded conductor wires, extension cords, they can cause overheating, electrical shock or fire.

 WARNING

- All wiring MUST be performed by an authorized electrician and MUST comply with the applicable legislation.
- Make electrical connections to the fixed wiring.
- All components procured on-site and all electrical construction MUST comply with the applicable legislation
- ALWAYS use multicore cable for power supply cables.

! WARNING

If the supply cord is damaged, it MUST be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.

! CAUTION

- When connecting the power supply: connect the ground cable first, before making the connections.
- When disconnecting the power supply: disconnect the cables first, before separating the ground connection.
- The length of the conductors between the power supply tension relief and the terminal block itself MUST be as such that the wires are tightened before the ground wire is in case the power supply is pulled loose from the tension relief.

Commissioning**! 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.

Troubleshooting**! CAUTION**

- When carrying out an inspection on the switch box of the unit, ALWAYS make sure that the unit is disconnected from the mains. Turn off the respective circuit breaker.
- When a safety device was activated, stop the unit and find out why the safety device was activated before resetting it. NEVER shunt safety devices or change their values to a value other than the factory default setting. If you are unable to find the cause of the problem, call your dealer.

Special Requirements for R-454B Units**! WARNING**

The refrigerant inside this unit is mildly flammable.

! WARNING

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. The certificate of competence from an industry accredited body is required.

! WARNING

Appliance shall be installed, operated and stored in a room that meets special requirements and has an area limit.

! WARNING

- 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).
- If the appliance contains R454B refrigerant, the floor area of the room in which the appliance is stored should comply with local regulations.

! WARNING

- Do NOT use potential sources of ignition in searching for or detection of refrigerant leaks.
- Do NOT re-use joints and copper gaskets which have been used already.
- Do NOT pierce or burn refrigerant cycle parts.
- Be aware that the refrigerant inside the system is odorless.

! 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.

Information on Servicing

 CAUTION**Servicing shall be performed only by trained and certified service personnel.**

- Checks to the area: Prior to beginning work on systems containing FLAMMABLE REFRIGERANTS, safety checks are necessary to ensure that the risk of ignition is minimized. The following operations shall be completed prior to conducting work on the system.
- Work procedure: 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.
- General work area: All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided.
- Checking for presence of refrigerant: The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.
- Presence of fire extinguisher: If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO2 fire extinguisher adjacent to the charging area.
- No ignition sources: No person carrying out work in relation to a REFRIGERATING SYSTEM which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. "No Smoking" signs shall be displayed.
- Ventilated area: Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

 CAUTION

- Checks to the refrigerating equipment: Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer's technical department for assistance. The following checks shall be applied to installations: The actual REFRIGERANT CHARGE is in accordance with the room size within which the refrigerant containing parts are installed; The ventilation machinery and outlets are operating adequately and are not obstructed; If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant; Marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected; Refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components.
- Checks to electrical devices: Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised. Initial safety checks shall include: That capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking; That no live electrical components and wiring are exposed while charging, recovering or purging the system; That there is continuity of ground bonding.

Repairs to Sealed Components **WARNING****Sealed electrical components shall be replaced.****Repair to Intrinsically Safe Components** **WARNING****Intrinsically safe components must be replaced.****Detection of Flammable Refrigerants**

Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used. The following leak detection methods are deemed acceptable for all refrigerant systems:

- Electronic leak detectors may be used to detect refrigerant leaks but, in the case of FLAMMABLE REFRIGERANTS, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at 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, but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

• **NOTE** Examples of leak detection fluids:

- Bubble method;
- Fluorescent method agents.

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

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

Refrigerant Removal and Circuit Evacuation

CAUTION

Removal of refrigerant shall be according to UL/CSA/IEC 60335-2-40. 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;
- Evacuate;
- Continuously flush or purge with inert gas when using flame to open circuit;
- Open the circuit.

The refrigerant charge shall be recovered into the correct recovery cylinders. 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.

CAUTION

- 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.

CAUTION

This operation is absolutely vital if brazing operations on the pipework are to take place.

Decommissioning

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

1. Become familiar with the equipment and its operation.
2. Isolate system electrically.
3. Before attempting the procedure, ensure that:
 - Mechanical handling equipment is available, if required, for handling refrigerant cylinders;
 - All personal protective equipment is available and being used correctly;
 - The recovery process is supervised at all times by a competent person;
 - Recovery equipment and cylinders conform to the appropriate standards.
4. Pump down refrigerant system, if possible.
5. If a vacuum is not possible, it may be necessary to make a manifold so that refrigerant can be removed from various parts of the system.
6. Make sure that cylinder is situated on the scales before recovery takes place.
7. Start the recovery machine and operate in accordance with instructions.
8. Do not overfill cylinders (no more than 80% volume liquid charge).
9. Do not exceed the maximum working pressure of the cylinder, even temporarily.
10. When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
11. Recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked.

Labeling

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.

Recovery

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

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

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

The recovered refrigerant shall be processed according to local legislation in the correct recovery cylinder, and the relevant waste

transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

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.

INSTALLATION MANUAL

Precautions

- Before installing the unit, ensure that all Local, National and International regulations are satisfied, and read these “Precautions” carefully.
- The precautions described below include important items regarding safety. They must be strictly observed.
- After the installation work, perform a test run to check for any problems.
- Explain how to use and maintain the unit to the customer following the Installation and operation manual.
- Retain the Installation and operation manual.

About the Box

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

This specifically includes the following information:

- Unboxing and handling the MDC box.
- Taking out the accessories of the MDC 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 ([User Safety Instructions on p49](#)).

Transportation

- Transport the packaged unit as close as possible to its final installation site to prevent damage during the handling process.
- Take note of the following items when transporting the unit:



Fragile. Handle with care.



Keep the unit 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.

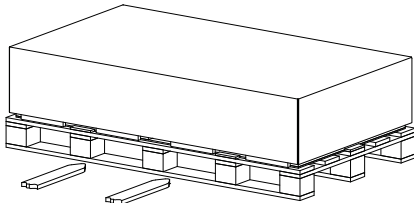


Fig. 2 – Forklift Method

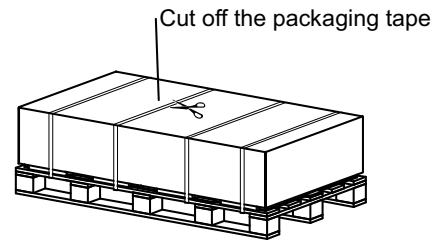
A260112

Unpacking the Outdoor Unit

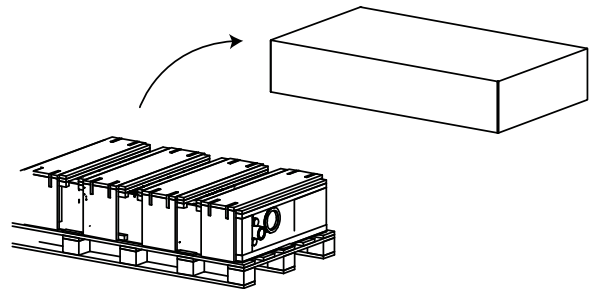
Remove the unit from the packing materials:

- Be careful not to damage the MDC box when you use a cutting tool to remove the packing box.

- Remove the packaging padding blocks that are wrapped around the MDC box.



Remove the packaging box



Packaging padding blocks and wooden boards

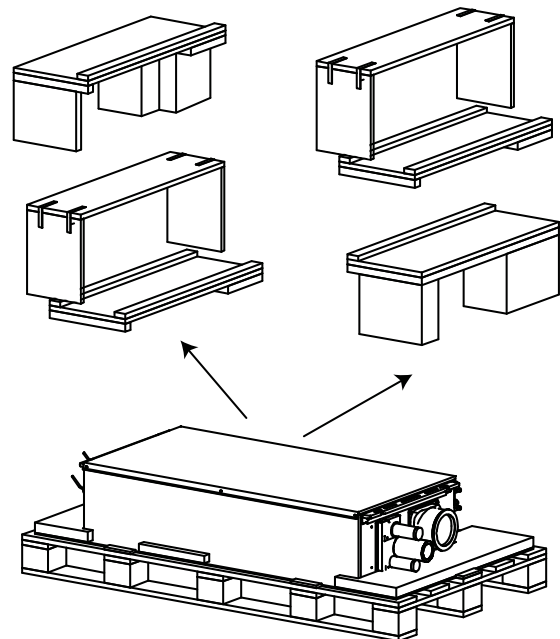


Fig. 3 – Unpacking the Outdoor Unit

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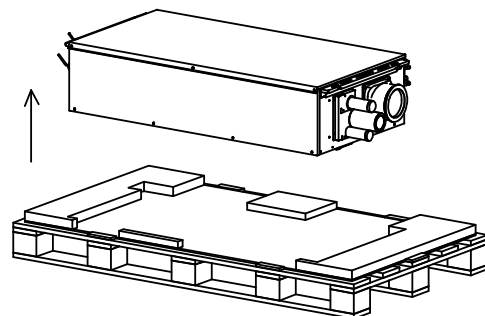


Fig. 4 – Remove the Wooden Base

A260114

! 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 2 – Accessories of Main MDC Box

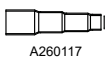
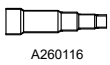
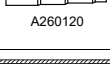
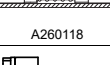
Name	Quantity	Appearance	Function
Installation and Operation	1	 A260115	Installation and operation instructions
Reducer Pipe	1	 A260116	Connected high-pressure gas pipe between main MDC and sub MDC box / high-pressure gas pipe between sub MDC box and another sub MDC box
Reducer Pipe	1	 A260117	Connected low-pressure gas pipe between main MDC and sub MDC box / low-pressure gas pipe between sub MDC box and another sub MDC box
Flexible Drainage Pipe	1	 A260118	Connected high-pressure liquid pipe between main MDC and sub MDC box / low-pressure pipe between sub MDC box and another sub MDC box
Snapping	2	 A260119	To connect the drainage port of MDC box and the PVC water pipe.

Table 3 – Accessories of Sub MDC Box

Name	Quantity	Appearance	Function
Installation and Operation	1	 A260115	Installation and operation instructions
Reducer Pipe	2	 A260116	Connected high-pressure gas pipe between main MDC and sub MDC box / high-pressure gas pipe between sub MDC box and another sub MDC box
Reducer Pipe	2	 A260117	Connected low-pressure gas pipe between main MDC and sub MDC box / low-pressure gas pipe between sub MDC box and another sub MDC box
Reducer Pipe	2	 A260120	Connected high-pressure liquid pipe between main MDC and sub MDC box / low-pressure pipe between sub MDC box and another sub MDC box
Flexible Drainage Pipe	1	 A260118	To connect the drainage port of MDC box and the PVC water pipe.
Snapping	2	 A260119	To fasten the connector between flexible drainage pipe and MDC 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 MDC Box

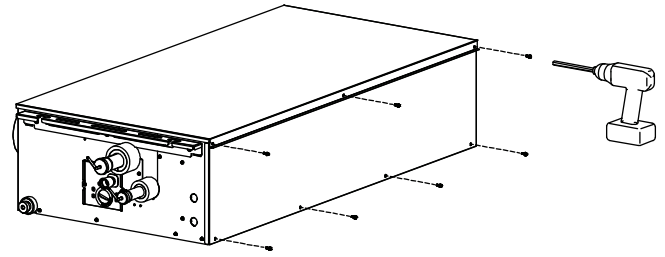


Fig. 5 – Remove the Securing Screws

A260121

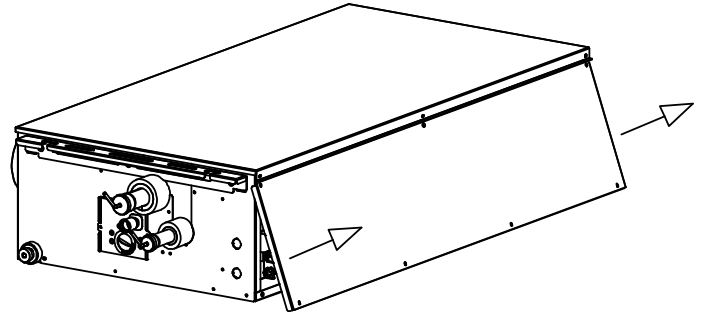


Fig. 6 – Remove the Electrical Control Box Cover (in the Direction as Shown in the Figure)

A260122

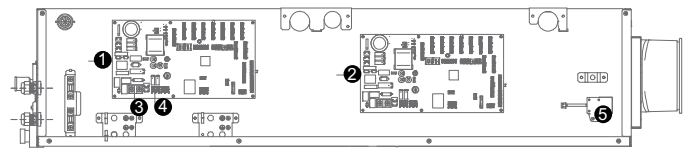
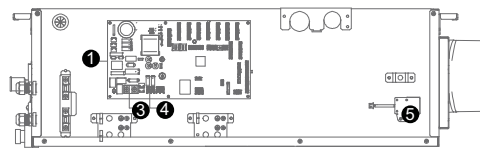


Fig. 7 – Internal Components of Electrical Box

A260123

Description of Codes

1. Main Control Board
2. Sub Control Board
3. Power Terminal Block (L1/L2)
4. Communication Terminal Block (M1/M2)
5. 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, please refer to [\(Special Requirements for R-454B Units on p5\)](#).

! NOTICE

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

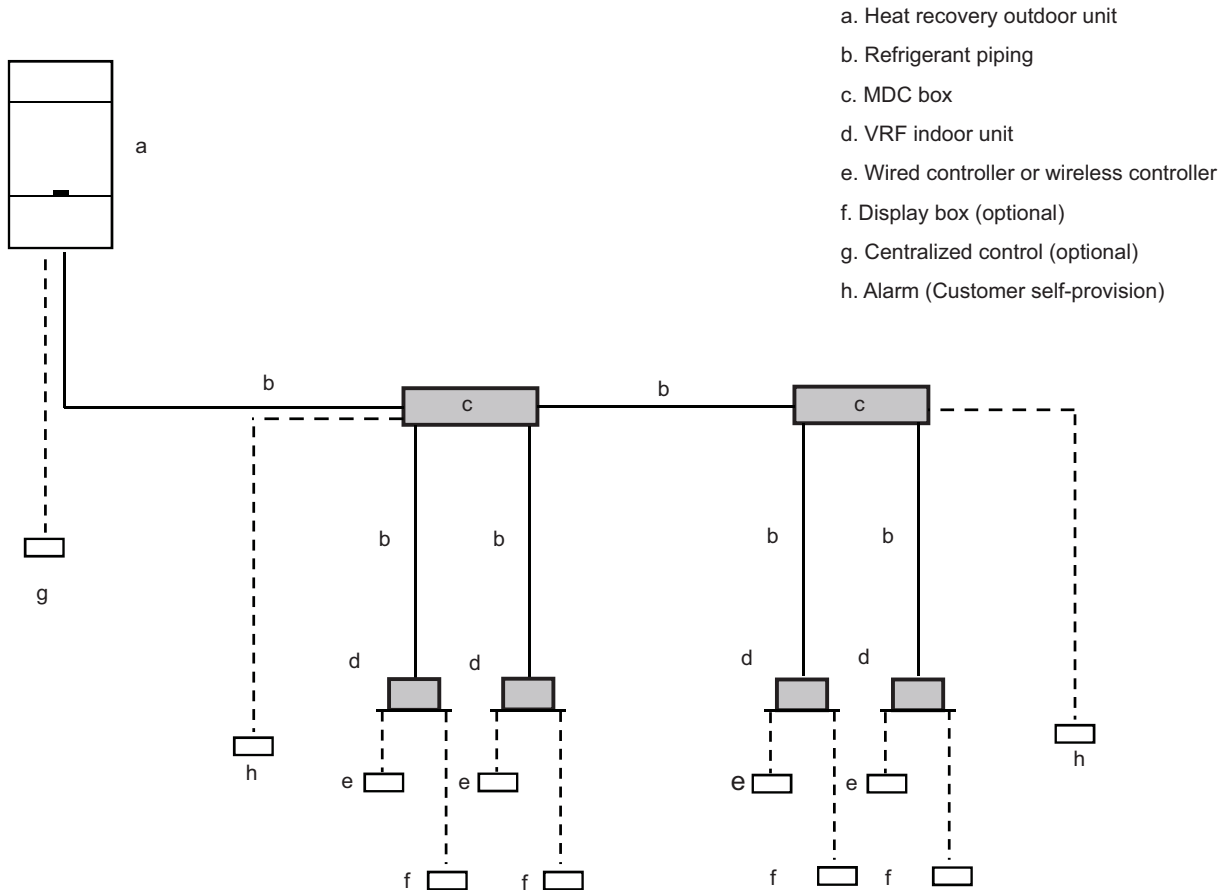


Fig. 8 – System Layout

A260127

Installation Space Requirements

! WARNING

If the appliance contains R-454B refrigerant, the floor area of the room in which the appliance is stored should comply with the applicable legislation.

System Layout Requirements

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 MDC box and an alarm in the remote controller. The MDC 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 safety measure 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 machinery room.

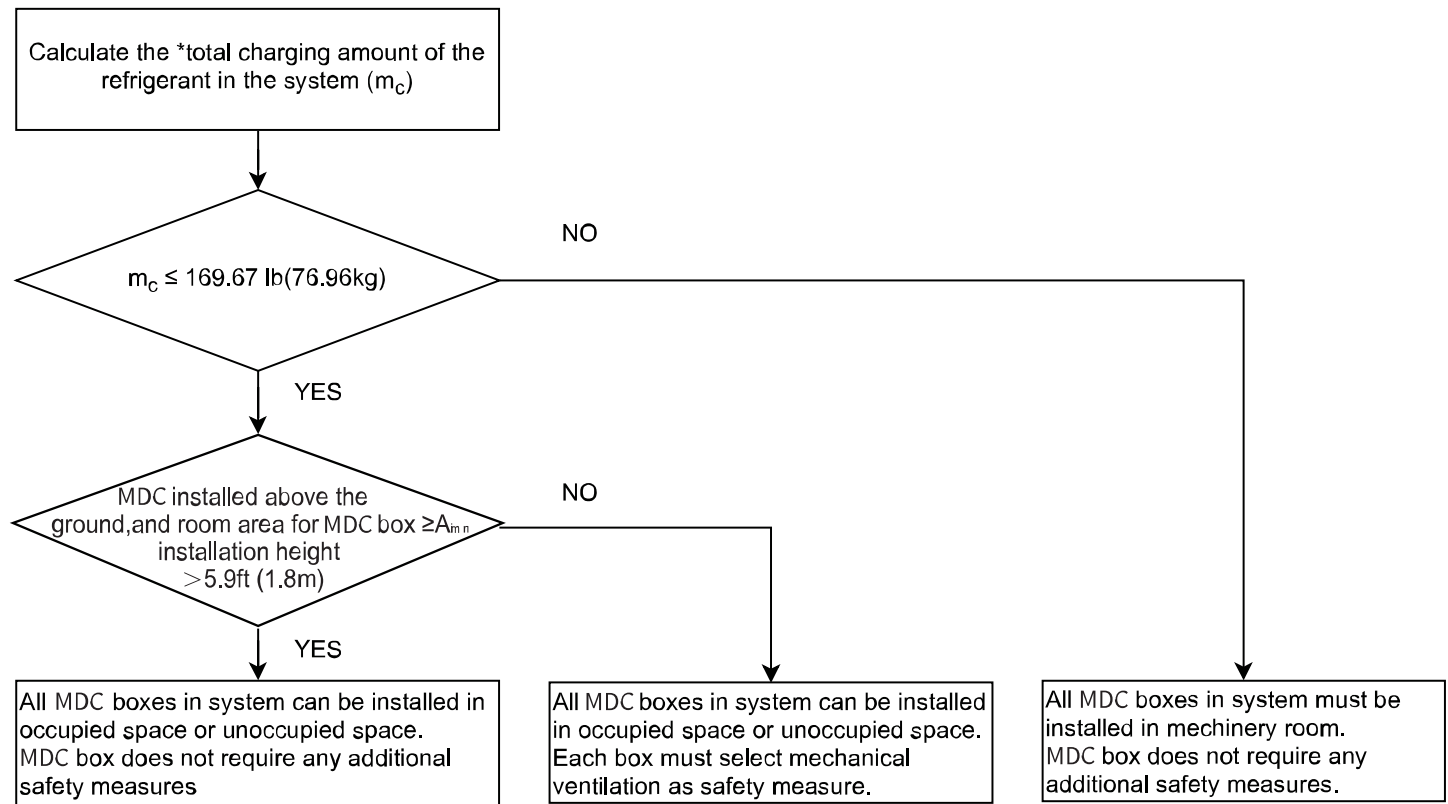
For more information refer to the installation manual delivered with the outdoor unit.

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.

MDC 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.



* For the calculation of the total refrigerant charge of the system, please refer to the rules in the outdoor unit manual.

* Machinery room needs to comply with the requirements of ASHRAE-15 and local regulations.

A260130

Fig. 9 – MDC Box Installation

Piping Installation

For installations with field applied joints that are exposed in the occupied space, these joints shall be at least one of the following:
 -mechanical joints in compliance with ISO 14903 or UL 207 (U.S. only);
 -welded or brazed joints; or -joints in enclosures that vent to the unit or to the outside. For piping installed in the occupied space, please make sure that the piping is protected against accidental damage.

WARNING

Pipework shall be protected from physical damage.

NOTICE

Installation of pipework shall be kept to a minimum.

About the Refrigerant Charge Limit

For the MDC box, the amount of refrigerant charged in the system determines its installation location and the corresponding safety measures. Please refer to the content in Fig. 9.

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

If MDC box installation selects no additional safety measure and be installed in indoor space, following requirements must be met:

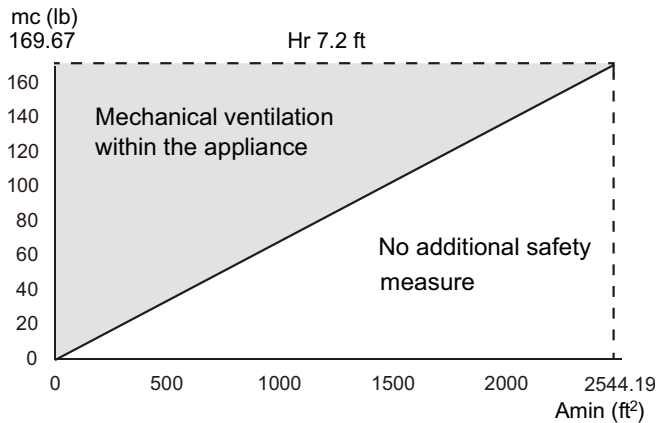
1. Total refrigerant charged in system (mc) should not exceed than 169.67 lb (76.96kg).
2. Room area must be no less than the minimum room area (Amin). Please refer to table 5.1 for the calculation of the minimum room area (Amin) and total refrigerant charged in system (mc). $A_{min} = mc / (0.5 * 0.296 * Hr)$
3. MDC box cannot be installed in spaces below the ground level.
4. MDC box needs to be hoisted. Hr depends on the installation height of the MDC box.
 - The height from floor to the MDC box between 5.9 ft (1.8m) and 7.2 ft (2.2 m) above the ground, Hr is equal to the effective room height. In this case, minimum Room area (Amin) calculated should not exceed 2690.98 ft² (250 m²).
 - The height from floor to the MDC not less than 7.2 ft (2.2 m) above the ground. Hr is equal to the height from floor to the MDC.

Table 4 – Indoor Installation Requirements (ft)

mc (lb)	Hr=5.9 ft	Hr=7.2 ft	Hr=7.9 ft	Hr=8.5 ft
	Amin (ft ²)	Amin (ft ²)	Amin (ft ²)	Amin (ft ²)
33.07	606.08	495.88	454.56	419.59
44.09	808.10	661.17	606.08	559.45
55.12	1010.13	826.47	757.59	699.32
66.14	1212.15	991.76	909.11	839.18
77.16	1414.18	1157.05	1060.63	979.04

Table 4 – Indoor Installation Requirements (ft)

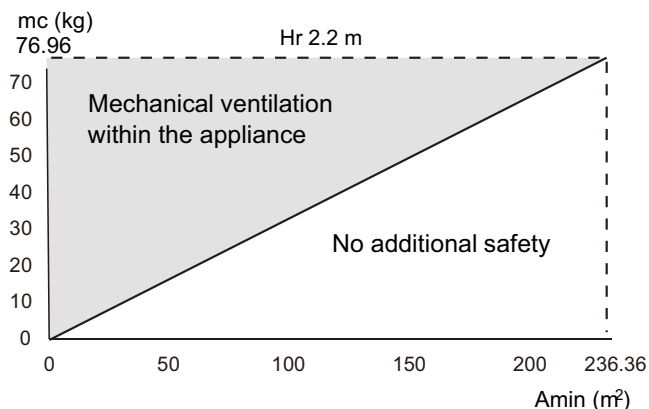
mc (lb)	Hr=5.9 ft	Hr=7.2 ft	Hr=7.9 ft	Hr=8.5 ft
	Amin (ft ²)	Amin (ft ²)	Amin (ft ²)	Amin (ft ²)
88.18	1616.20	1322.35	1212.15	1118.91
99.21	1818.23	1487.64	1363.67	1258.77
110.23	2020.25	1652.93	1515.19	1398.64
121.25	2222.28	1818.23	1666.71	1538.50
132.28	2424.30	1983.52	1818.23	1678.36
143.30	2626.33	2148.81	1969.75	1818.23
154.32	Not allowed	2314.11	2121.26	1958.09
165.35	Not allowed	2479.40	2272.78	2097.95
169.67	Not allowed	2544.19	2332.18	2152.78

**Fig. 10 – Indoor Ventilation Requirements (ft)**

A260137

Table 5 – Indoor Installation Requirements (m)

mc (kg)	Hr=1.8 m	Hr=2.2 m	Hr=2.4 m	Hr=2.6 m
	Amin (m ²)	Amin (m ²)	Amin (m ²)	Amin (m ²)
15	56.31	46.07	42.23	38.98
20	75.08	61.43	56.31	51.98
25	93.84	76.78	70.38	64.97
30	112.61	92.14	84.46	77.96
35	131.38	107.79	98.54	90.96
40	150.15	122.85	112.61	103.95
45	168.92	138.21	126.69	116.94
50	187.69	153.56	140.77	129.94
55	206.46	168.92	154.84	142.93
60	225.23	184.28	168.92	155.93
65	243.99	199.63	183.00	168.92
70	Not allowed	214.99	197.07	181.91
75	Not allowed	230.34	211.15	194.91
76.96	Not allowed	236.36	216.67	200.00

**Fig. 11 – Indoor Ventilation Requirements (m)**

A260138

! WARNING

- The space considered shall be any space which contains refrigerant-containing parts or into which refrigerant could be released.
- The room area (A) of the smallest, enclosed, occupied space shall be used in the determination of the refrigerant quantity limits.

! CAUTION

- For more detailed instructions on the installation height of the indoor unit, please refer to the corresponding installation manual.
- Indoor units cannot be installed lower than 5.9ft (1.8m) from the lowest point of the floor. If the installation height of the VRF indoor unit is less than 5.9ft (1.8m), please contact your installer or dealer to receive more information and professional advice.

! NOTICE

Room area limitations only apply to MDC box and indoor units. For more details, please refer to the MDC box and indoor unit installation manual.

Room Area Calculation Requirements

For determination of room area (A) when used to calculate the refrigerant charge limit, the following shall apply.

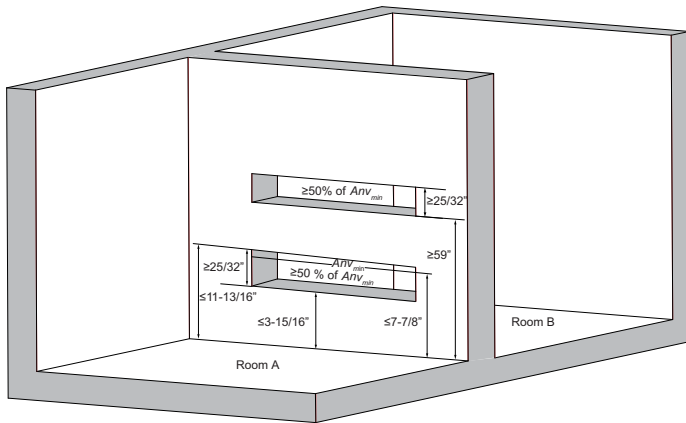
The room area (A) shall be defined as the room area enclosed by the projection to the base of the walls, partitions and doors of the space in which the appliance is installed.

Spaces connected by only drop ceilings, ductwork, or similar connections shall not be considered a single space.

Units mounted higher than 70-55/64 inches and spaces divided by partition walls that are no higher than 62-63/64 inches shall be considered a single space. Rooms on the same floor and connected by an open passageway between the spaces can be considered a single room when determining compliance to Amin, if the passageway complies with all of the following:

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

The area of the connected rooms, on the same floor connected by permanent opening in the walls and/or doors between occupied spaces, including gaps between the wall and the floor, can be considered a single room when determining compliance to Amin provided all of the following conditions are met as in Fig. 9.



A260139

Fig. 12 – Connected Rooms Qualifying as One Room

1. Low Level Opening
 - a. The opening shall not be less than Anv_{min} which is 0.13 ft² (0.012 m²) for enhanced tightness refrigerating systems.
 - b. The area of any openings above 11-13/16 inches from the floor shall not be considered in determining compliance with Anv_{min} .
 - c. At least 50% of the opening area of Anv_{min} shall be below 7-7/8 inches from the floor.
 - d. The bottom of the opening is not more than 3-15/16 inches from the floor.
 - e. The opening is a permanent opening that cannot be closed.
 - f. For openings extending to the floor the height shall not be less than 25/32 inch above the surface of the floor covering.
2. High Level Opening
 - a. The opening shall not be less than 50% of Anv_{min} .
 - b. The opening is a permanent opening that cannot be closed.
 - c. The opening shall be at least 59 inches above the floor.
 - d. The height of the opening is not less than 25/32 inch.

! NOTICE

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

! NOTICE

Our units meet the requirements for enhanced tightness refrigerating systems using A2L refrigerants.

Refrigerant Charge Limit

- The charge limit must be determined separately for each MDC box branch pipe port.

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.

This is possible because of the shut-off valves in the MDC box. The maximum amount of refrigerant that can escape in case of a leak is determined by the piping length and indoor heat exchanger size. This is directly linked to the downstream indoor unit capacity of this piping section.

In case a leak is detected in an indoor unit, the shut-off valves in the MDC box of the respective port will close. The piping section with the leak is now shut off from the rest of the system and the amount of refrigerant that can leak is significantly reduced.

1. Determine the smallest room served per branch pipe port of the MDC box.

NOTE: In case indoor units connected to the same branch pipe port are split over different rooms: the area of the smallest room needs to be considered. In case 2 branch pipe ports are combined to a single branch pipe port, they have to be considered as a single branch pipe port.

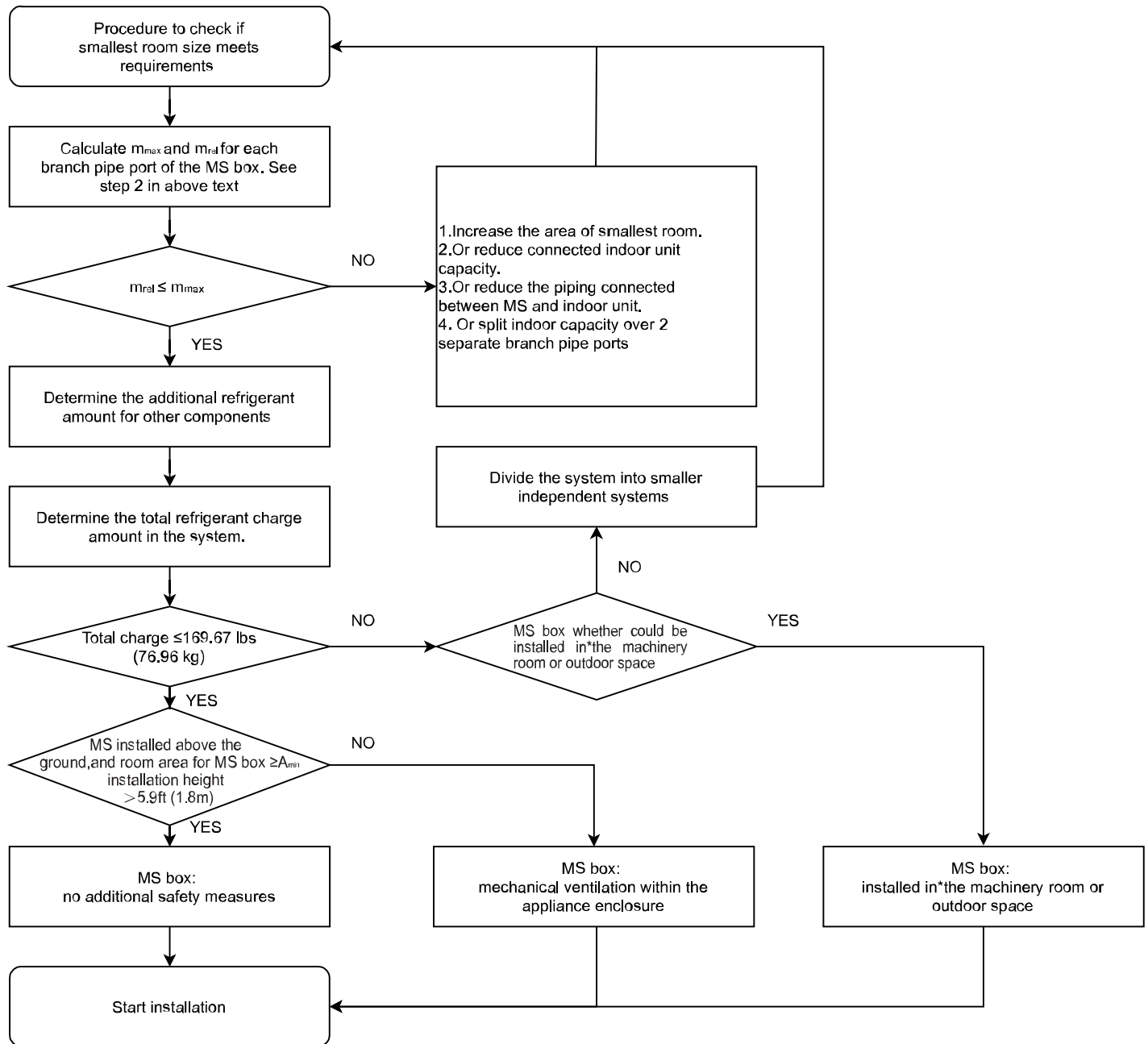
2. Calculate the allowable maximum refrigerant amount (m_{max}) and the releasable refrigerant (m_{rel}) for each branch pipe port of the MDC box.
3. If the releasable refrigerant (m_{rel}) is less than the allowable maximum refrigerant amount (m_{max}). Then proceed to next step; otherwise, the system needs to be adjusted.

The maximum refrigerant amount (m_{max}) for each port of the MDC box is determined by the smallest room served by that port. Change the installation (see choices below) can adjust the maximum refrigerant amount under each port of the MDC box.

- Increase the area of smallest room connected to the same branch pipe port.

Reduce the indoor capacity connected to the same branch pipe port to equal or below the limit.

- Reduce the piping connected between MDC and indoor unit.
 - Split indoor capacity over 2 separate branch pipe ports.
4. Calculate the additional refrigerant amount for other components (such as high-pressure pipes, liquid pipes, MDC box, outdoor units, indoor units, etc.).
 5. Determine the total refrigerant charge amount in the system.
Total refrigerant charge = Factory charge (a) + additional charge (b)
 - a. The factory charge value can be found on the nameplate.
 - b. The b value is calculated in step 4.
 6. According to UL/CSA 60335-2-40, the total refrigerant charge amount in the system MUST always be less than 169.67 lbs. (76.96 kg). This means that in case the calculated total refrigerant charge is equal to or more than 169.67 lbs. (76.96 kg). you must divide the system into smaller independent systems, or Increase other safety measures, contact your dealer for details.



*machinery room needs to comply with the requirements of ASHRAE-15 and local regulations

Fig. 13 – Flow Chart (for Each MDC Box Branch Pipe Port)

A260140

Unit Installation

Site Requirements for Installation of the MDC Box

General

- Provide sufficient space around the unit for maintenance and air circulation.
- Make sure the installation site can bear the weight and vibrations of the unit.
- Make sure the area is well ventilated.
- Make sure the unit is stable.
- MDC box should be installed in a location where the noise generated by the unit will not create an inconvenience to people.
- Choose a site that will comply with the applicable laws.
- Do not install MDC box in the following locations:
 - A place filled with mineral oil, fumes or mist, like a kitchen.

Plastic parts will age and the heat exchanger will become dirty, eventually causing the air conditioner performance to deteriorate or leak water.

Connecting pipes and copper welds will be corroded, resulting in refrigerant leakage.

- A place where there are corrosive gases, such as acid or alkaline gases.
- Connecting pipes and copper welds will be corroded, resulting in refrigerant leakage
- A place exposed to combustible gases and using volatile combustible gases such as diluent or gasoline.
- The electronics in the air conditioner may cause the surrounding gas to ignite.
- A place where there is equipment emitting electromagnetic radiation.

The control system will fail and the air conditioner will not function properly.

- A place where there is a high salt content in the air like a coastal area.
- Do not use the air conditioner in an environment where an explosion may occur.
- The unit cannot be installed on moving vehicles such as truck and ship.

Factories with major voltage fluctuations in the power supplies

- Other special environmental conditions.

- Take precautions to make sure water will not damage the installation space and environment in the event of a water leakage.

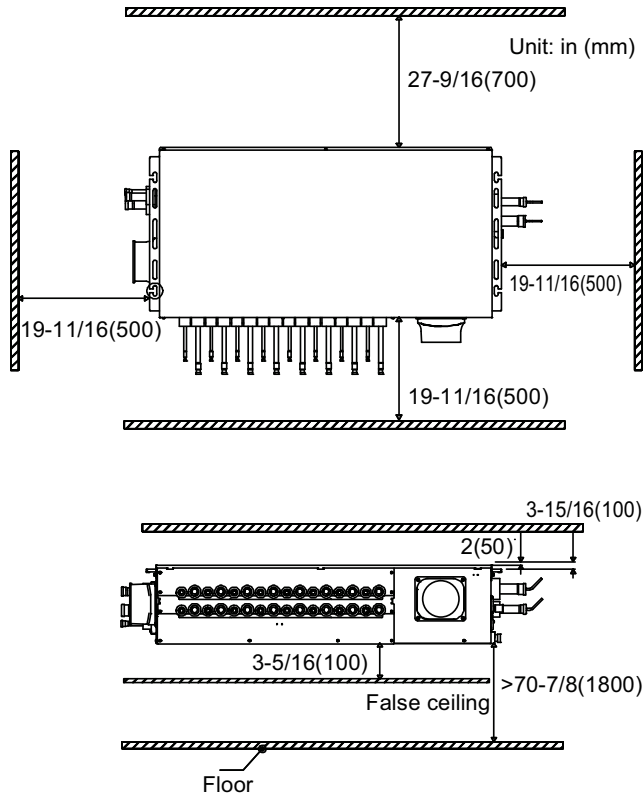


Fig. 14 – Installation Site Requirements

A260141

! NOTICE

Equipment meets the requirement for commercial and light-industrial location when professionally installed and maintained.

! CAUTION

- Appliance NOT accessible to the general public, install it in a secured area, protected from easy access.
- This equipment is NOT intended for use in residential locations and will NOT guarantee to provide adequate protection to radio reception in such locations.

! NOTICE

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

Installing the MDC Box

! WARNING

- Install the air conditioner in a location with sufficient strength to support the weight of MDC box. Take reinforcement measures when necessary.
- Ensure that appliance is mounted securely.
- MDC box may fall and cause personal injury if the location is not strong enough.
- Unstable installation may cause MDC box to fall and cause an accident.
- Before wiring/piping layout, make sure that the installation area (walls and floor) is safe and free of water, power, gas, and other hidden dangers.

Installation of Suspension Bolts

1. Using a pencil, mark the positions on the ceiling where the suspension bolts need to be fixed based on the distance between the four hanging holes on MDC box. After drilling the holes, install 4 anchors bolts and fasten them, using turnbuckle nuts connecting or welding 4 suspension bolts ($\phi 3/8$ in (10 mm)) with fully threaded bolt that is 19-5/16 in (490 mm) long to the 4 anchors bolts, and attach three nuts to the each suspension bolt, divide the nuts into two groups, with one nut on top as one group and two nuts at the bottom as another group, then install the indoor unit through the four lugs and nuts.
2. The diameter of the suspension bolt shall not be less than 10 mm (3/8 in).
3. When the length of the hanger rod exceeds 1.5 m (59-1/16 in), it is necessary to add two diagonal support rods to enhance stability.
4. Because the ceilings and other architectural structures vary, it is necessary to discuss building details with the owner.
 - a. Ceiling treatment: Reinforce the ceiling joist to make sure that the ceiling is level and to prevent ceiling vibrations.
 - b. Cut off and dismantle the ceiling joist.
 - c. Reinforce the remaining surface after the ceiling is removed. Add further reinforcements to the joist on two ends of the ceiling.
 - d. Once the main unit has been lifted and mounted, carry out the piping and wiring tasks within the ceiling.

Determine the outlet direction of the piping after the installation site has been finalized.

For sites where the ceiling is already available, first connect and put in position the refrigerant piping, water drain pipe, and connecting wires of the MDC box and wired controller before hoist and mount the unit.

! CAUTION

- High-quality carbon steel bolts (galvanized or with other anti-rust paint applied) or stainless steel bolts are used.
- How the ceiling is treated will differ with the type of building. For specific measures, please consult the building and renovation engineers.
- How the suspension bolt is secured varies according to the specific situation, and it must be secure and reliable.
- Refer to the following figure on installation using the suspension bolts.

Sites with concrete slabs

Use embedded bolts and anchor bolts



With steel frame

Directly set and use an angle iron for support.

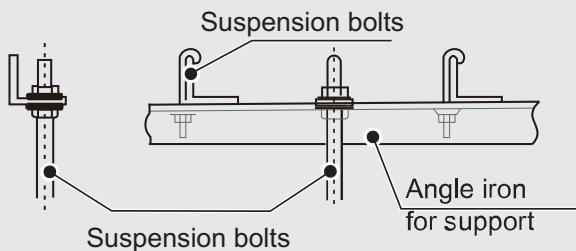


Fig. 15 – Installing Suspension Bolts

A260142

MDC Box Dimensions

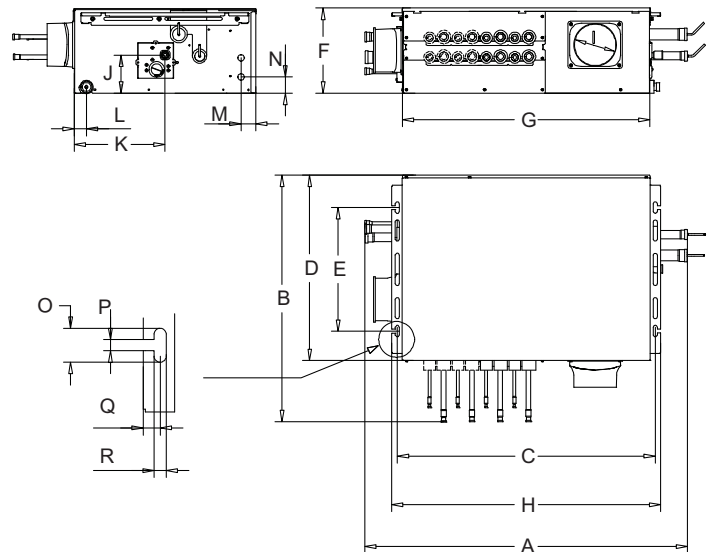


Fig. 16 – MDC Box Dimensions

A260143

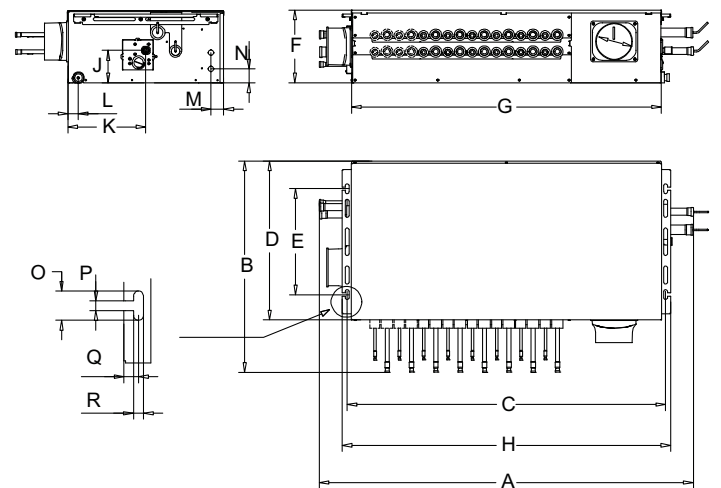


Fig. 17 – MDC Box Dimensions (Cont.)

A260144

Table 6 – MDC Box Dimensions

Model	A	B	C	D	E
45VMD004M--3 45VMD004S--3	44-13/16 (1139)	34-3/16 (869)	35-13/16 (910)	25-3/4 (654)	17-3/16 (436)
45VMD006M--3 45VMD006S--3					
45VMD008M--3 45VMD008S--3					
45VMD012M--3 45VMD012S--3					
45VMD016M--3 45VMD016S--3	60-9/16 (1539)	34-3/16 (869)	51-9/16 (1310)	25-3/4 (654)	17-3/16 (436)
Model					
45VMD004M--3 45VMD004S--3					
45VMD006M--3 45VMD006S--3					
45VMD008M--3 45VMD008S--3	11-13/16 (300)	34-1/4 (870)	37-13/32 (950)	5-7/8 (150)	5-1/4 (134)
45VMD012M--3 45VMD012S--3					
45VMD016M--3 45VMD016S--3					
Model					
45VMD004M--3 45VMD004S--3	11-13/16 (300)	50 (1270)	53-1/8 (1350)	5-7/8 (150)	5-1/4 (134)
45VMD006M--3 45VMD006S--3					
45VMD008M--3 45VMD008S--3					
45VMD012M--3 45VMD012S--3					
45VMD016M--3 45VMD016S--3	12-5/8 (320)	1-11/16 (43)	2-1/16 (52)	2-5/16 (58)	1-5/8 (40)
Model					
45VMD004M--3 45VMD004S--3					
45VMD006M--3 45VMD006S--3					
45VMD008M--3 45VMD008S--3	9/16 (14)	13/16 (20)	9/16 (14)	9/16 (14)	9/16 (14)
45VMD012M--3 45VMD012S--3					
45VMD016M--3 45VMD016S--3					
Model					
45VMD004M--3 45VMD004S--3	9/16 (14)	13/16 (20)	9/16 (14)	9/16 (14)	9/16 (14)
45VMD006M--3 45VMD006S--3					
45VMD008M--3 45VMD008S--3					
45VMD012M--3 45VMD012S--3					
45VMD016M--3 45VMD016S--3	9/16 (14)	13/16 (20)	9/16 (14)	9/16 (14)	9/16 (14)
45VMD012M--3 45VMD012S--3					
45VMD016M--3 45VMD016S--3					
Model					

MDC Box Installation

**CAUTION**

MDC box must not be too close to the ceiling. It shall be installed level or at an angle within 1° towards the drainage side. (For units without a drain pump, ensure a slope of 1/100 towards the drainage side. Do not tilt towards the non-drainage side.) Otherwise, water cannot drain smoothly and leaks can easily occur.

Keep the indoor unit free from dust or foreign particles. Use the plastic bags provided with the product to cover the unit.

1. Adjust the positions of the nuts. The size of the gap between the washer (bottom) and the ceiling should be based on the actual environment where the unit is being installed. The distance h between the lifting lug and the bottom of the suspension bolt shall be kept within the range of 1-9/16 in (40 mm) to 3-1/8 in (80 mm), so as to facilitate the pipe connection.

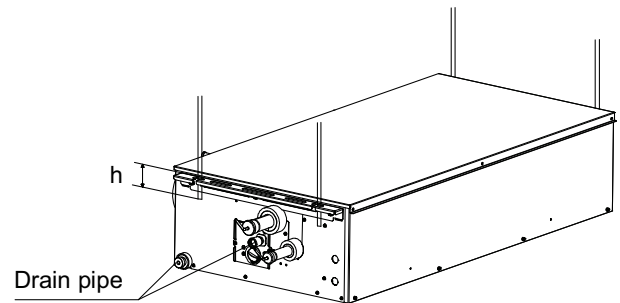
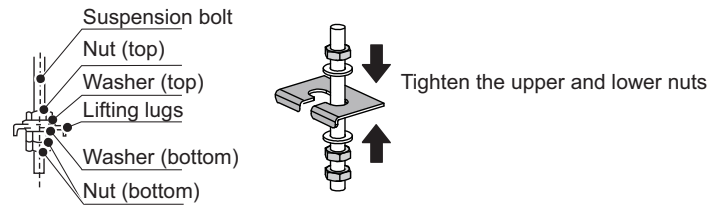


Fig. 18 – MDC Box Installation

A260145

2. Slot the suspension bolts in the oblong holes of the lifting lugs. Secure the top and bottom of lugs with washers and nuts.



3. Keep MDC box level. Use a spirit level to observe the levelness of the unit in the depth direction. Use a transparent hose to observe the water level (principle of communicating vessels) and verify the levelness of the unit in the depth direction.

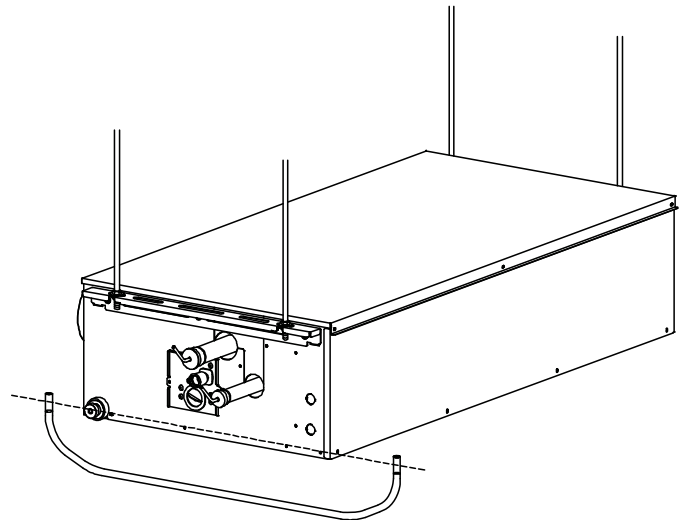


Fig. 19 – Keep MDC Box Level

A260147

4. Use a transparent hose to observe water level (principle of communicating vessels) and verify the tilt angle of the unit in the length direction. It shall be installed level or at an angle within 1° towards the drainage side. (For units without a drain pump, ensure a slope of 1/100 towards the drainage side. Do not tilt towards the non-drainage side.) Otherwise, water cannot drain smoothly and leaks can easily occur.

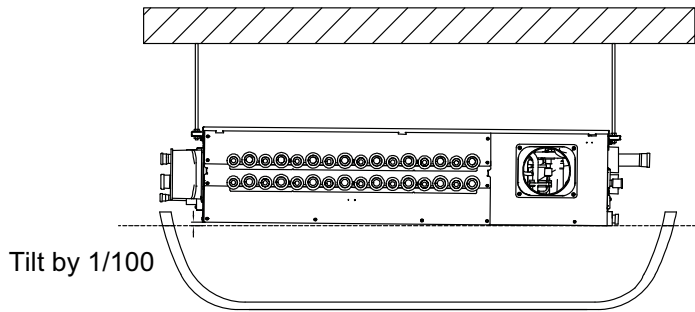


Fig. 20 – Verify the Tilt Angle

A260148

Refrigerant Piping Installation

Refrigerant Piping Requirements

! WARNING

The pipe-work including piping material, pipe routing, and installation shall include protection from physical damage in operation and service, and be in compliance with national and local codes and standards, such as ASHRAE15, ASHRAE82, IAPMO Uniform Mechanical Code, CC International Mechanical Code. Inspection prior to being covered or enclosed, or CSA B52. All field joints shall be accessible for inspection prior to being covered or enclosed.

! CAUTION

- The R-454B refrigerant pipeline system must be kept strictly clean, dry and sealed.
- Foreign materials inside pipes (including oils for fabrication) must be ≤ 30 mg/10 m.
- Calculate all piping lengths and distances.
- Special-purpose branch joints from the manufacturer should be used for all branch joints. Failing to do so may lead to severe system malfunction.

! NOTICE

- The piping and other pressure-containing parts shall be suitable for refrigerant. Use phosphoric acid deoxidized seamless copper for refrigerant.
- The amount of brazing required shall be kept to a minimum.
- As bends cause pressure loss when transporting refrigerant, the fewer bends in the system, the better it is.
- Piping length needs to take the equivalent length of bends into account.

Refrigerant Piping Material

! CAUTION

- Material: Only seamless phosphorus-deoxidized copper piping that complies with all applicable legislation should be used.
- Thicknesses: Temper grades and minimum thicknesses for different diameters of piping should comply with local regulations.
- Design pressure of R454B refrigerant is 558 Tilt by 1/100 psig (38.5bar).

Table 7 – Piping Temper Grade and Thickness

Piping Outer Diameter (in. (mm))	Minimum Thickness (in. (mm))	Temper Grade
1/4(6.35)	0.0315(0.80)	M-Type
3/8(9.52)	0.0315(0.80)	
1/2(12.7)	0.0394(1.00)	
5/8(15.88)	0.0394(1.00)	
3/4(19.05)	0.0394(1.00)	Y2-Type
7/8(22.2)	0.0394(1.00)	
1-1/8(28.6)	0.0394(1.00)	
1-3/8(34.9)	0.0492(1.25)	
1-5/8(41.3)	0.0591(1.50)	

Refrigerant Piping Selection

Reducer Pipe Between Outdoor Unit and Main MDC Box

! CAUTION

Cut the tip of the MDC box piping (both of the gas and liquid pipe), remove the gas, and then remove the brazed cap.

Cut here

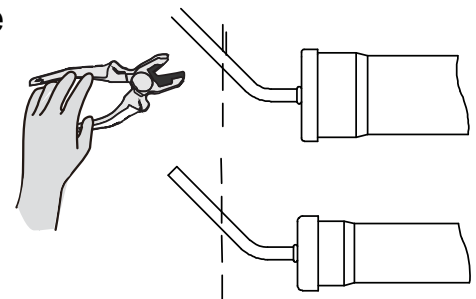


Fig. 21 – Cut the Tip of MDC Box Piping

A260149

! NOTICE

For selection of high pressure pipe/low pressure pipe between outdoor unit and main MDC box, please refer to the manual of the outdoor unit.

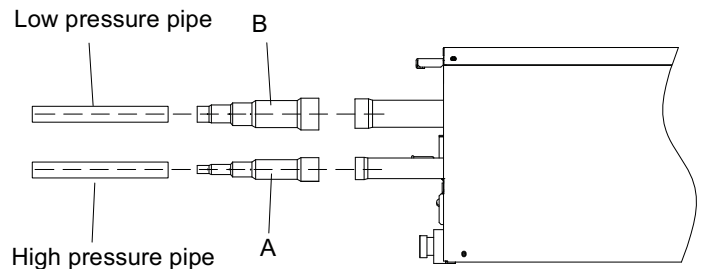


Fig. 22 – High and Low Pressure Pipe

A260150

Table 8 – Reducer Pipe Diameter

Reducer Pipe	Pipe Diameter in. (mm)
A	ID 5/8(15.88)
	ID 3/4(19.05)
B	ID 7/8(22)
	ID 1-1/8(28.58)

A260151

A	ID 3/4(19.05)
	ID 1-1/8(28.58)
B	ID 1-5/8(41.28)
	ID 7/8(22)
C	ID 1-1/2(38)

A260152

Reducer Pipe Between MDC Box and Another MDC Box

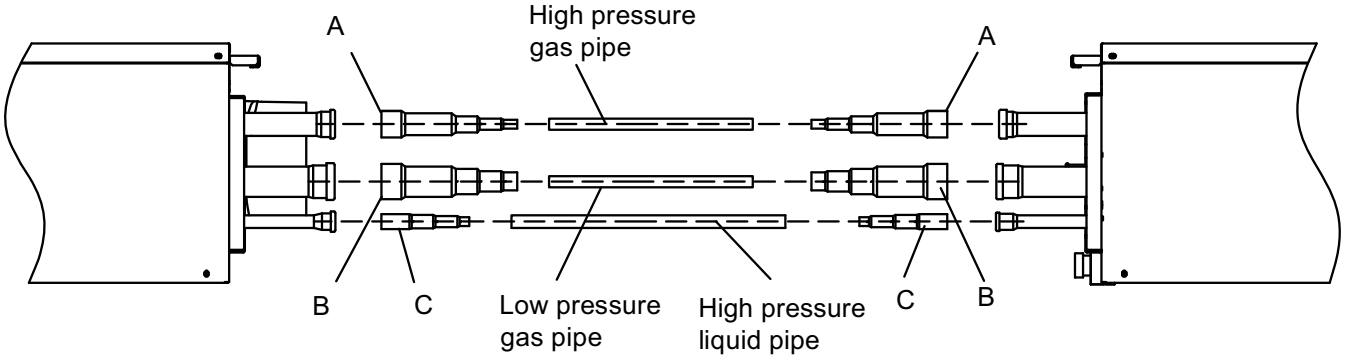


Fig. 23 – Reducer Pipe Between MDC Boxes

A260153

NOTICE

For selection of high pressure gas pipe / high pressure liquid pipe / low pressure gas pipe between MDC box and another MDC box, please refer to the manual of the outdoor unit.

Table 9 – Reducer Pipe Diameter (Cont.)

Reducer Pipe	Pipe Diameter in (mm)
C	ID 3/8(9.52)
	ID 5/8(15.88)
D	ID 3/4(19.05)
	ID 1/2(12.7)

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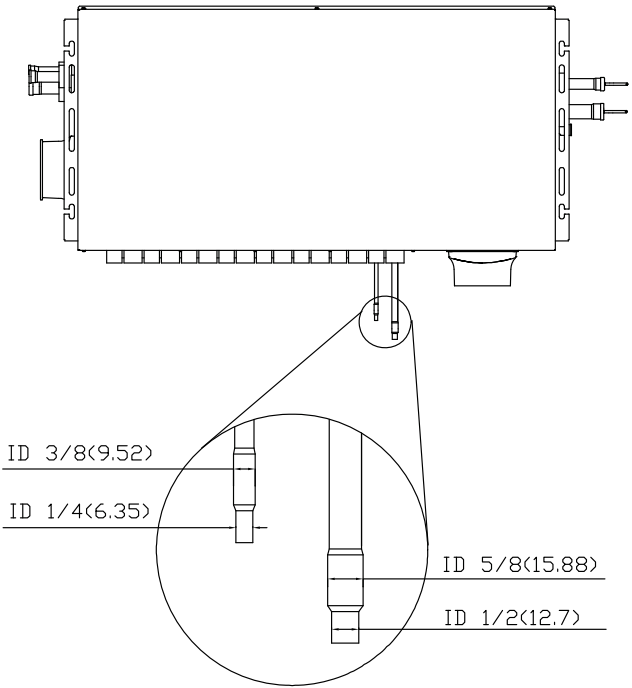


Fig. 24 – Reducer Pipe Between MDC Box and Indoor Unit

A260155

Select Parallel Indoor Units Pipe and Branch (A)

The same port in the MDC box can accommodate the parallel installation of indoor units.

Table 10 – Select Parallel Indoor Units Pipe and Branch (A)

Total Indoor unit capacity (kBtu/h)	Y branch model
≤54	45VM900043

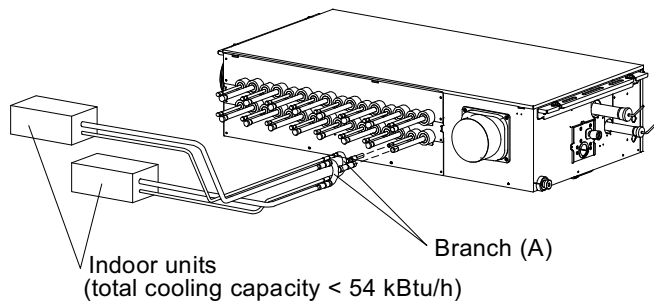


Fig. 25 – Branch A

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! NOTICE

- Up to 5 indoor units can be connected in parallel under the same port.
- The total cooling capacity of parallel indoor units cannot exceed 54 kBTu/h.
- Parallel indoor units keep same operation mode. (Heating mode priority)

Select Twinned Port Indoor Unit Pipe and Branch (B)

Select from the table below based on the capacity of the indoor unit.

Table 11 – Pipe Size Based on Capacity of Indoor Unit

Indoor unit capacity (kBTu/h)	Y branch model	Liquid side / [in.(mm)]	Gas side / [in.(mm)]
		K	L
72	45VM900043	3/8 (9.52)	5/8 (15.88)
96		3/8 (9.52)	5/8 (15.88)

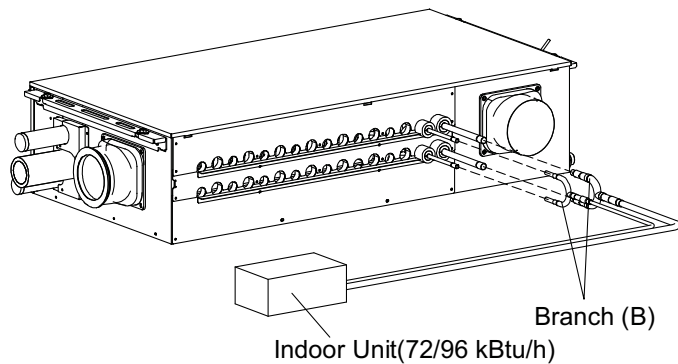


Fig. 26 – Branch B

A260157

! NOTICE

For twinned port connection, branch needs to be connected to the two pipes in the vertical direction of the MDC. For example, connecting 0# gas pipe with 1# gas pipe, 0# liquid pipe with 1# liquid pipe.

Connecting Refrigerant Piping

Things to Note When Connecting the Refrigerant Piping

! WARNING

- Compliance with national gas regulations shall be observed.
- 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

- Take appropriate precautions to prevent refrigerant leakage and ventilate the area immediately if the refrigerant leaks, as high concentration of R-454B refrigerant in an enclosed area can cause poisoning or fire.
- Refrigerant must be recovered. Do not release it into the environment. Use professional fluorine extraction equipment to extract the refrigerant from the unit.

! NOTICE

- Make sure the refrigerant piping is installed in accordance with applicable laws.
- Make sure the piping and connections are not placed under pressure.
- Before brazing, the refrigerant piping shall be flushed with oxygen free nitrogen (OFN) to remove dust, moisture and other particles. Never use outdoor unit refrigerant.
- Do not open the stop valves until confirming that all the piping connections have been completed and there are no gas leaks in the system.
- Low temperature solder alloys, such as lead/tin alloys, are not acceptable for pipe connections or any other refrigerant pressure containing purposes.
- Vacuum before welding, if necessary, to ensure that there is no R-454B residue in the piping.
- Oxygen free nitrogen (OFN) shall be purged through the system during the brazing process.

Method of Piping Brazing Connection

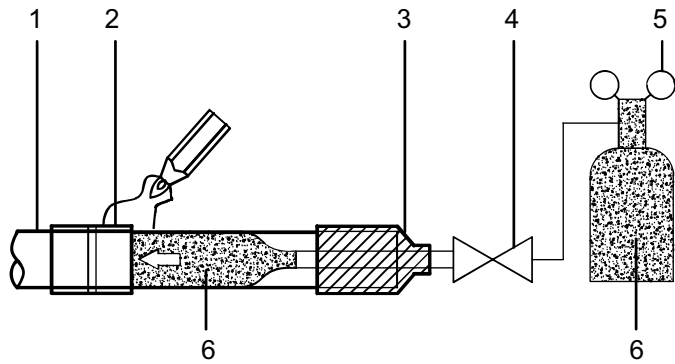
Flow the pipework with dry (oxygen-free) nitrogen 2.9 psig (20kPa) or 3 CFH (85 LPH) during brazing to avoid oxidation which may block the refrigerant piping.

Do not use anti-oxidants when brazing.

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

Use dedicated gauges and hoses with R-454B equipment.

During brazing, protect the insulation between the sheet metals and the pipes.



- 1 - Refrigerant pipe
- 2 - Part to be brazed
- 3 - Reducer
- 4 - Isolation valve
- 5 - Pressure-regulating valve
- 6 - Oxygen-free nitrogen

Fig. 27 – Piping Brazing Connection

A260158

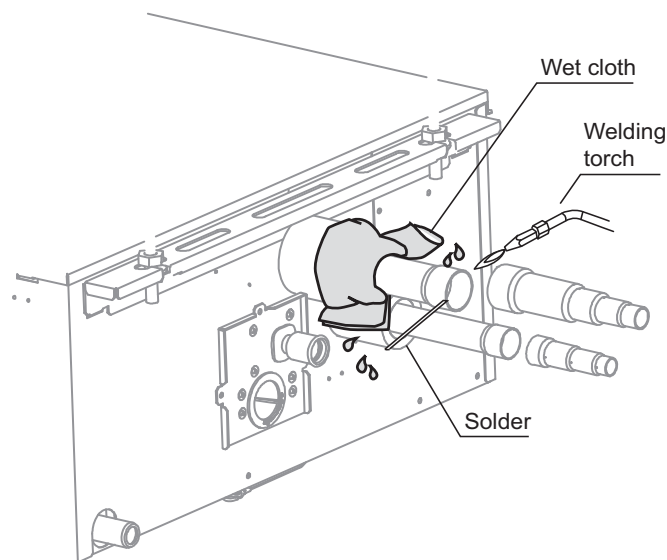
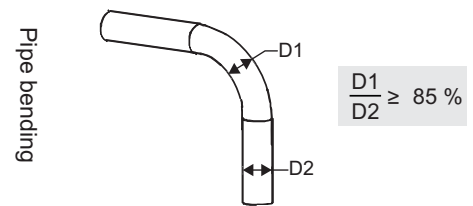


Fig. 28 – Piping Brazing Connection (Cont.)

A260159

Pipe Layout

1. The deformed pipe area must not exceed 15%.
2. A protective sleeve should be installed at the wall or floor hole.
3. The weld joint must not be inside the insulation.
4. The drill hole on the external wall must be sealed.



Pipe insulation

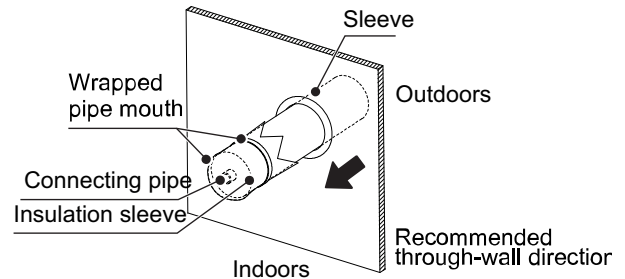
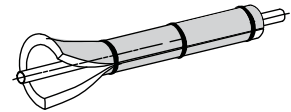
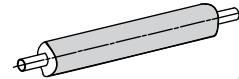


Fig. 29 – Pipe Layout

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CAUTION

- Bend and arrange pipes carefully without damaging the pipes and their insulating layers.
- Do not let the interface of the indoor unit bear the weight of the connecting pipe; otherwise, the connecting pipe may be crushed and deformed, which will affect the cooling (heating) effect, or the thermal insulation materials may be compressed, resulting in air leakage and condensation.
- Mechanical bending processing: Wider application [Φ 1/4 in (6.35 mm) to Φ 1-1/8 in (28 mm)], using spring pipe bender, manual pipe bender or electric pipe bender.
- The bending angle should not exceed 90°; otherwise, wrinkles will be formed in the pipe, which can easily break.
- The bending radius should not be smaller than 3.5D (pipe diameter) and should be as large as possible to prevent the pipe from becoming flattened or crushed.
- When mechanically bending the pipe, the pipe bender inserted into the connecting pipe must be cleaned.

Refrigerant Piping Fixing

Angle iron brackets or round steel hangers should be used for fixing. When the liquid pipe and gas pipe are suspended together, the size of the liquid pipe shall prevail.

Table 12 – Refrigerant Piping Fixing

Pipe Outer Diameter	≤13/16 (20)	13/16~1-9/16 (20~40)	≥9/16 (40)
Horizontal Pipe Distance	39-3/8 (1000)	59-1/16 (1500)	78-3/4 (2000)
Stand Pipe Distance	59-1/16 (1500)	78-3/4 (2000)	98-7/16 (2500)

Pressure Leak Test and Vacuum Drying**Equipment Connection Guide**

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

Check for Leaks: Pressure Leak Test

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

Check for Leaks: Vacuum Drying Test

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

Insulate the Refrigerant Piping

After finishing the leak test and vacuum drying, the piping must be insulated. Take into account the following points:

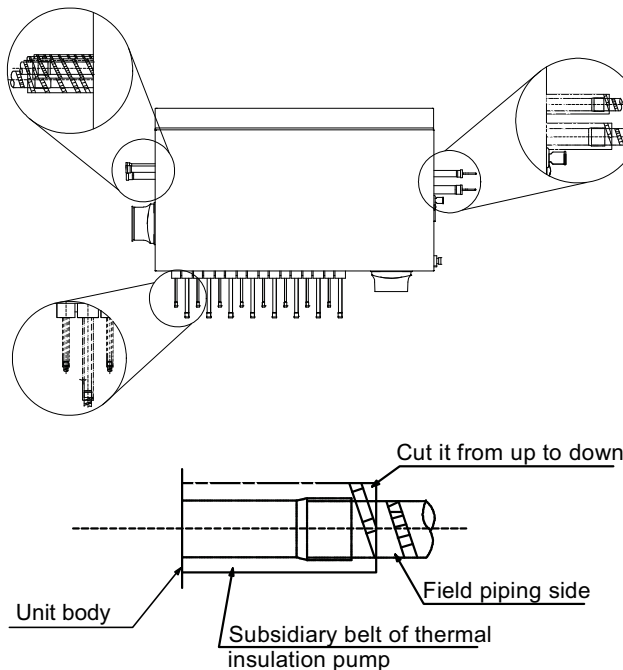
Make sure to insulate the connection piping and refrigerant branch kits entirely.

Be sure to insulate the liquid and gas piping (for all units).

Use heat resistant polyethylene foam which can withstand a temperature of 158°F. for liquid piping and low pressure piping.

Use heat resistant polyethylene foam which can withstand a temperature of 248°F. for gas piping and high pressure piping.

Reinforce the insulation on the refrigerant piping according to the installation environment.

**Fig. 30 – Insulate Refrigerant Piping**

A260161

Thickness of the Insulation Material

Condensed water may form on the surface of the insulation layer, the thickness of the insulation material should meet the following requirements.

Table 13 – Insulation Material Thickness

Piping size	Humidity<80%RH Thickness	Humidity≥80%RH Thickness
≤1-1/2(38.1)	≥9/16 (15)	≥13/16 (20)
≥1-5/8(41.3)	≥13/16 (20)	≥1 (25)

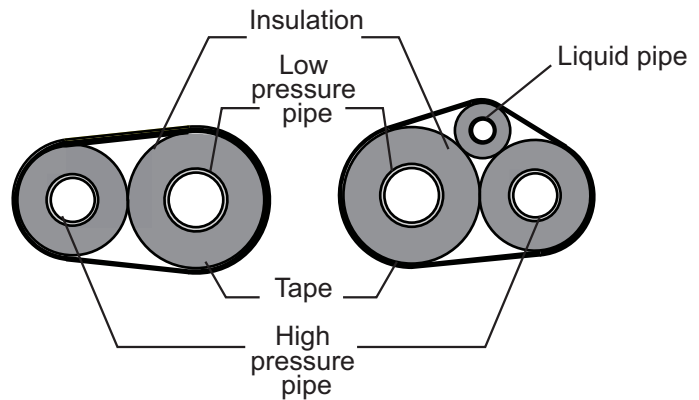
Pipe Wrapping

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

Insulate the refrigerant piping and cables as follows:

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.

**Fig. 31 – Pipe Wrapping**

A260162

NOTE: Any exposed piping might cause condensation.

Protect the Refrigerant Piping**! WARNING**

Provide adequate measures to prevent that the unit can be used as a shelter by small animals.

Small animals that make contact with electrical parts can cause malfunctions, smoke, or fire.

! CAUTION

- The refrigerant pipe will swing, expand or shrink during operations. If the pipe is not fixed, the load will be concentrated in a certain part, which may cause the refrigerant pipe to deform or rupture.
- The suspended connecting pipes shall be well supported, and the distance between supports shall not exceed 39-3/8in(1m).
- Refrigerant piping shall be protected against accidental damage, a gusset plate must be added for protection.
- Seal all gaps to prevent snow and small animals from entering the system.

Electrical Installation

Electrical Wiring Precautions

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



CAUTION

- 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.

Table 14 – Selecting and Preparing the Electrical Wiring

Main MDC Box		45VMD004M--3	45VMD006M--3	45VMD008M--3	45VMD012M--3	45VMD016M--3
Power Supply		208/230 V~1Ph-60 Hz				
MCA*		0.43	0.56	0.72	1.28	1.73
MOP†	A	15	15	15	15	15
Max Fuse of HACR Breaker	A	15	15	15	15	15
Input	W	36	48	60	108	144
Power Wiring	AWG	‡Sized per NEC and Local Codes based on Nameplate Electrical Data				
Sub MDC Box		45VMD004S--3	45VMD006S--3	45VMD008S--3	45VMD012S--3	45VMD016S--3
Power Supply		208/230 V~1Ph-60 Hz				
MCA*		0.43	0.56	0.72	1.28	1.73
MOP†		15	15	15	15	15
Max Fuse of HACR Breaker		15	15	15	15	15
Input		36	48	60	108	144
Power Wiring		‡Sized per NEC and Local Codes based on Nameplate Electrical Data				

*. MCA: Minimum Circuit Amps

†. MOP: Maximum overcurrent protection amps (A)

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

Selecting and Preparing the Electrical Wiring

1. Select the minimum diameter for each unit based on the rated current, as shown in [Table 14](#).
2. Use a circuit breaker with a spacing between polar contacts of at least 3 mm to ensure full disconnection. MOP is used to select the current circuit breaker and the residual current action circuit breaker.
3. The wire carrying capacity is for reference purposes only. The modification factor of the actual carrying capacity depends on cable type and length, lead-through method, and the environment for cable laying. The user is recommended to modify the factor according to local laws and the installation conditions.

NOTICE

- Units are suitable for use in electrical systems where voltage supplied to unit terminals is not below or above listed range limits. The voltage supplied to the unit terminal is not lower than or greater than the listed value.
- Select cable specifications according to the MCA value (the rated current in [Table 14](#)).
- MOP is maximum overcurrent protection amps and used to select the overcurrent circuit breaker and residual current circuit breaker.

Wiring Layout (Overview)

Wiring layout comprises of the power cords and communication wiring between the indoor, MDC box and outdoor units. These include the ground lines, and the shielded layer of the ground lines of the indoor units in the hyperlink communication line. See following section “Communication Wiring Layout” for an example of a wiring layout.

About Wiring Layout

NOTICE

- Power cords and communication wiring must be laid out separately, they cannot be placed in the same conduit. Use a power supply conduit to isolate if the current of the power supply is less than 10 A. If the current is greater than 10 A but less than 50 A, the spacing must exceed 19-11/16 in. (500 mm) at all times. Otherwise, it may lead to electromagnetic interference.
- Arrange the refrigerant piping, power cords and communication wiring in parallel, but do not tie the communication lines together with the refrigerant piping or power cords.
- Power cords and communication wiring should not come in contact with the internal piping so as to prevent the high temperature of the piping from damaging the wires.
- Once the wiring layout is completed, close the lid tightly to prevent the wiring and terminals from being exposed when the lid is loose.
- Fixed wiring insulation must be protected, for example, by insulating sleeving having an appropriate temperature rating.

Connecting the Communication Wiring

WARNING

- Do not connect the communication line when the power is on.
- Connect the shielding nets at both ends of the shielded wire to the sheet metal of the electronic control box.
- Do not connect the power cable to the terminal of the communication line, otherwise, the control board will be damaged.

Communication Wiring Layout

Wiring Mode

Communication wiring of indoor unit: The M1, M2 communication line should be connected in a chain starting from the outdoor unit to each MDC box, and then from the MDC box to each indoor unit.

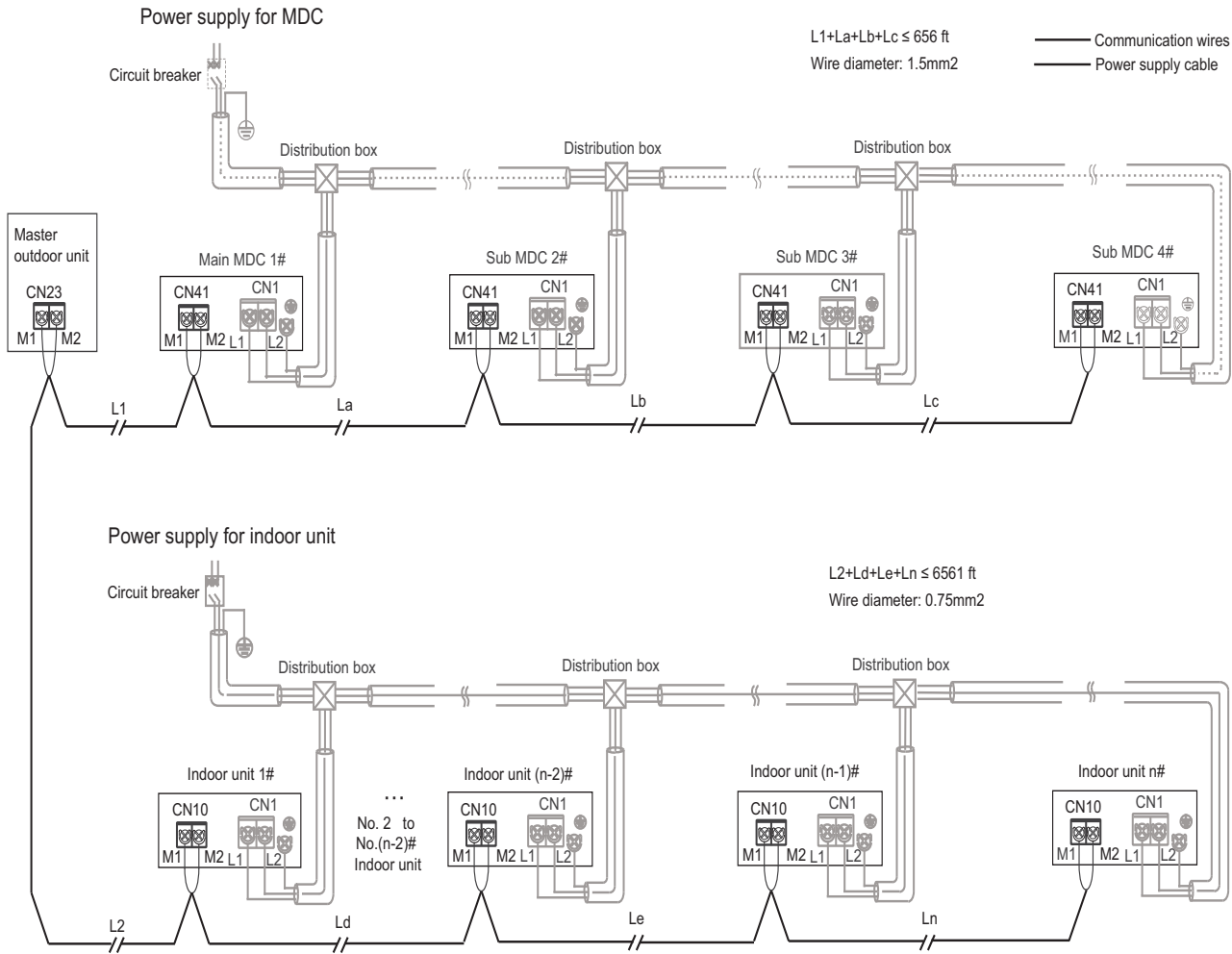


Fig. 32 – MDC Box Communication Wiring Layout Between Outdoor Unit and Indoor Unit

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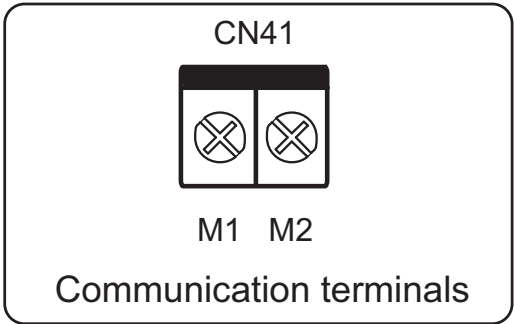


Fig. 33 – Communication Terminals

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Communication Wiring Material

The specifications of the communication line must meet the requirements of the table below.

Table 15 – Communication Wiring Material

Communication Wiring	Material	Wiring Length	Wiring Diameter
Between ODU and MDC	Ordinary PVC-sheathed flexible cable	$L \leq 656\text{ft}$ (200m)	16-2 AWG Stranded
Between MDC and MDC			
Between ODU and IDU		$L \leq 6561\text{ft}$ (2000m)	

! NOTICE

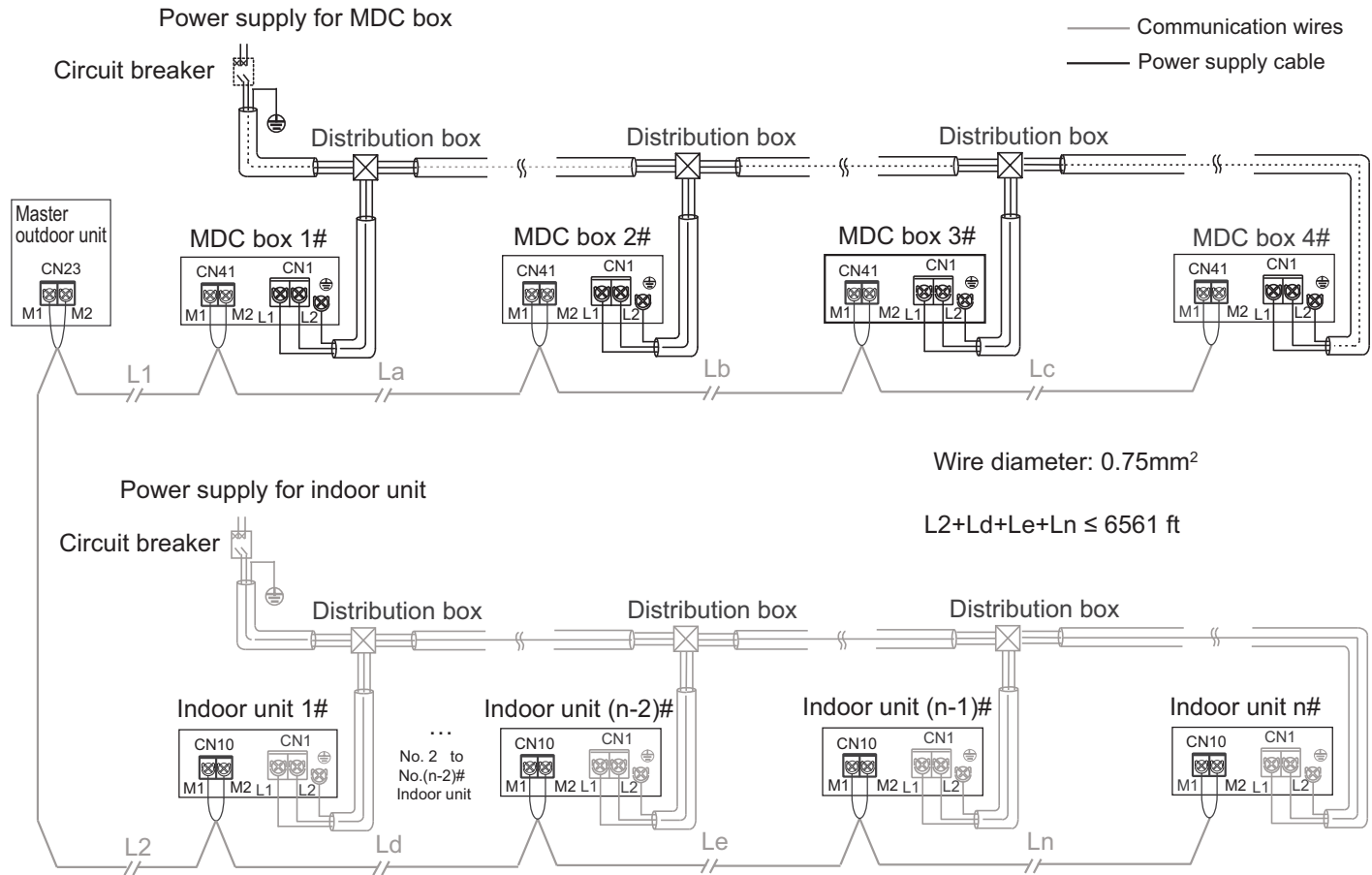
- On-site wiring must comply with the relevant regulations of the local Country/region and must be completed by professionals.
- The communication lines of the MDC box and outdoor units can only be led out and connected from the master outdoor unit.
- The outdoor units is often a parallel type of multi 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.

! NOTICE

The cross-sectional area of the communication wire core between the main outdoor unit and the main MDC should not be less than 0.0023 in²(1.5 mm²). The length of communication between ODU and all MDC must be less than 656 ft. (200 m).

Connecting the Power Cord**WARNING**

Considering the failure of the MDC valve box's refrigerant leakage monitoring due to unexpected power outage, the outdoor unit, the indoor unit and the MDC 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.

**Fig. 34 – MDC Box Power Wiring Layout**

A260165

! NOTICE

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

Connecting the Power Cord

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

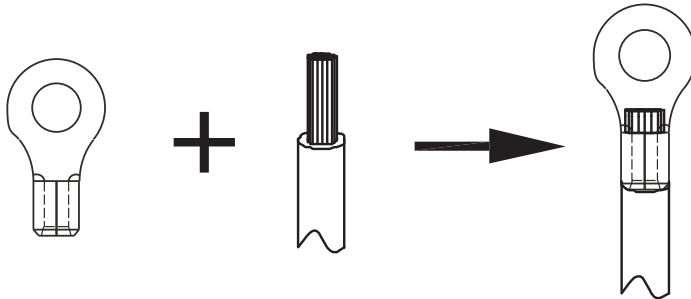


Fig. 35 – Connecting the Power Cord

A260167

! 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.

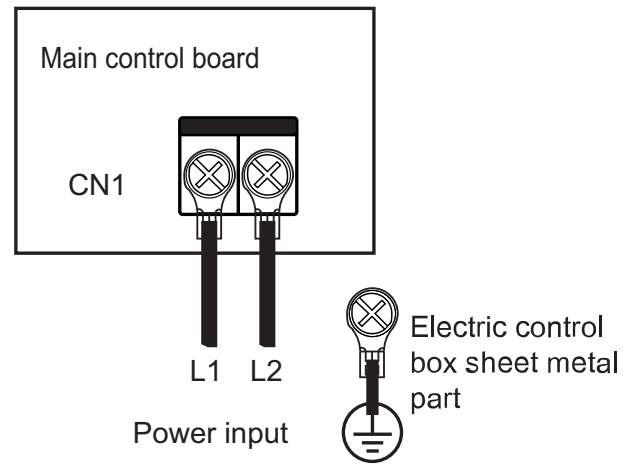


Fig. 36 – Connecting External Power Cables

A260168

The size of the screws and recommended torque are as follows:

Table 16 – 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 to terminals.

Fix the Power Cord

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

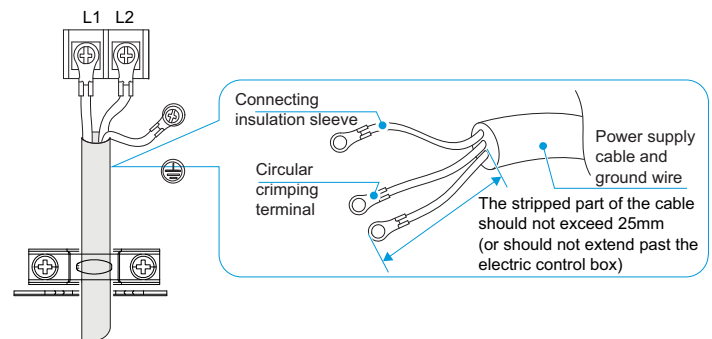


Fig. 37 – Fix the Power Cord

A260169

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 conductor to ensure that when the fixing device is loose, the ground line is still not tensioned 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 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 MDC box selects mechanical ventilation within the appliance enclosure as a safety measure, it is necessary to connect the mechanical ventilation signal wiring.

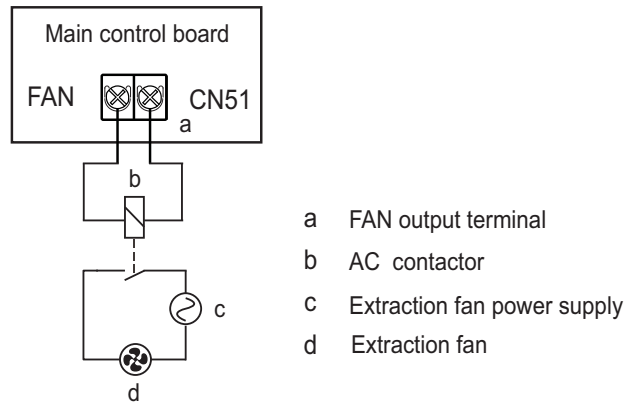


Fig. 38 – One MDC Box - One Exhaust Fan

A260170

! WARNING

The MDC box control board only outputs 230VAC switch signals to AC contactor. The power cord of the exhaust fan cannot be directly connected on the MDC 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 MDC connected in series or parallel with the same exhaust fans, the power supply of MDC needs to be connected to the same distribution box.

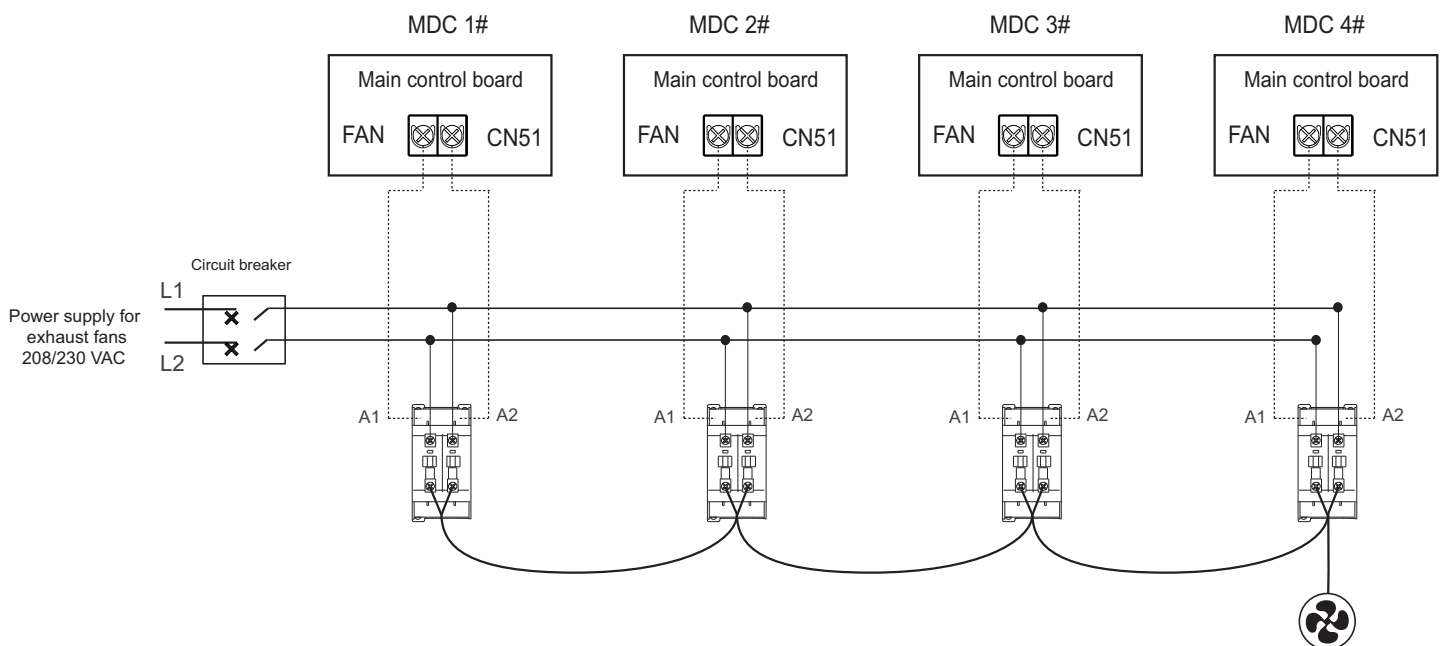


Fig. 39 – Multiple MDC Boxes in Series / Parallel (Single Phase AC Motor)

A260171

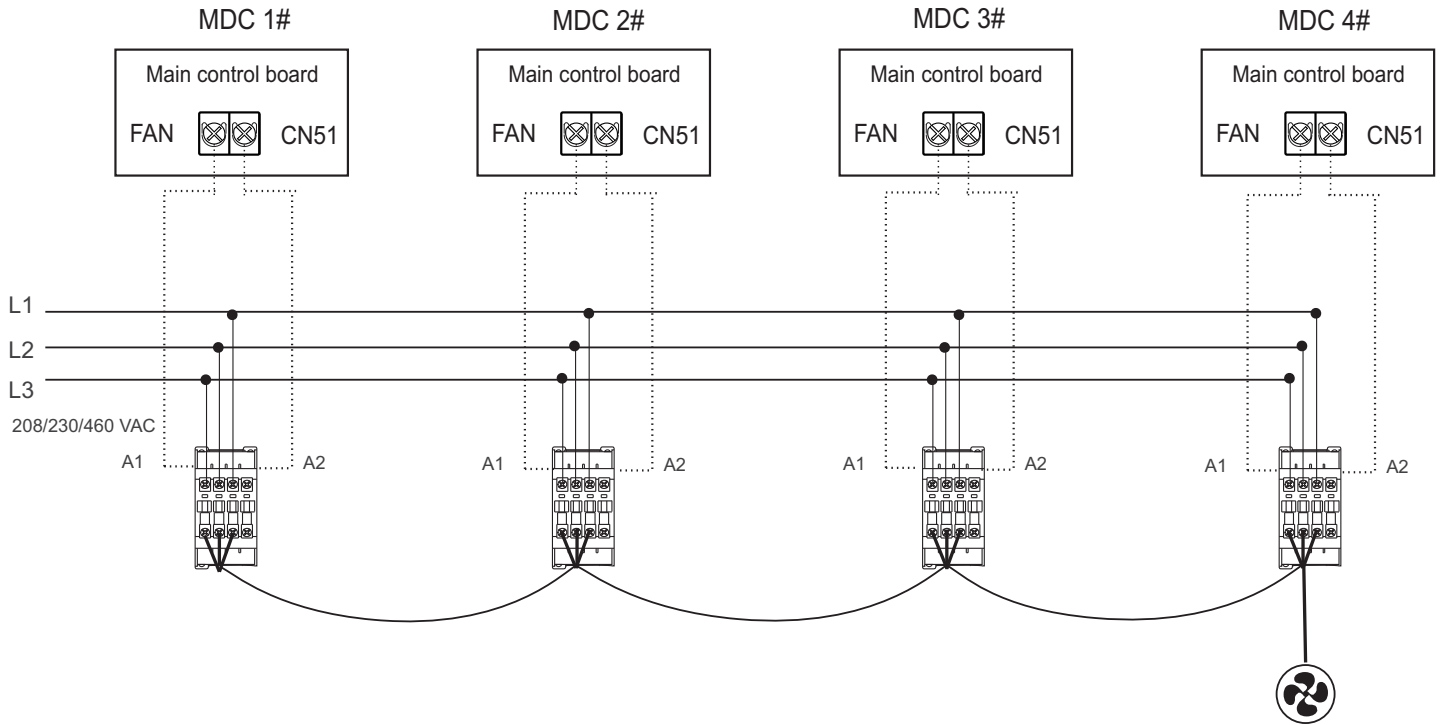


Fig. 40 – Multiple MDC Boxes in Series / Parallel (3-Phase Motor)

A260172

Connecting the External Alarm Wiring

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

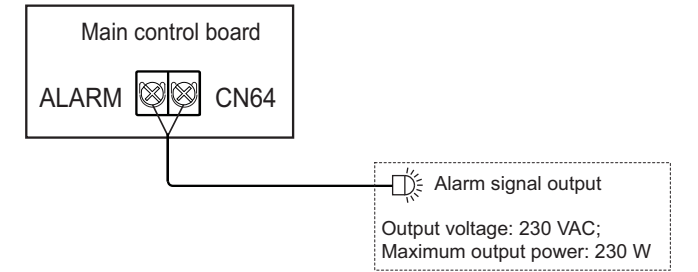


Fig. 41 – Connect External Alarm Wiring

A260173

WARNING

The MDC box control board only outputs 230VAC power to the external alarm. Please select the external alarm that matches the power supply.

Wiring Selection and Diagram

The wiring layout comprises the power cords, mechanical ventilation signal wiring, alarm wiring and communication wiring between the MDC unit and the outdoor unit. See below for the wiring layout of the MDC box.

Table 17 – Wiring Layout of MCD Box

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 of exhaust fan	2 x 16 AWG

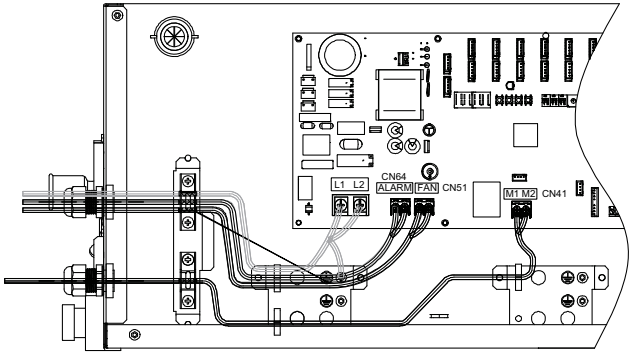


Fig. 42 – Reference Size of ALARM and FAN Ports Cord

A260174

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

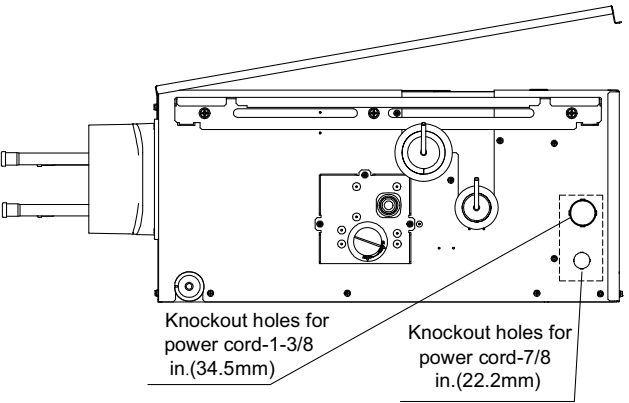


Fig. 43 – Remove the Knockout

A260175

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.

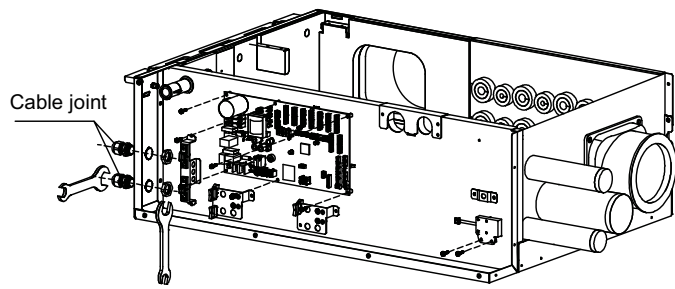


Fig. 44 – Use Cable Joint

A260176

Drain Pipe Installation

Drain Pipe Layout

- 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.

PVC drain pipe [outer diameter: 25 mm(1 in)] and insulation pipe (During on-site installation, the insulation pipe should be about 50 mm(2 in) longer than the PVC water drain pipe, so as to ensure that there is enough casing at the ends for insulation)

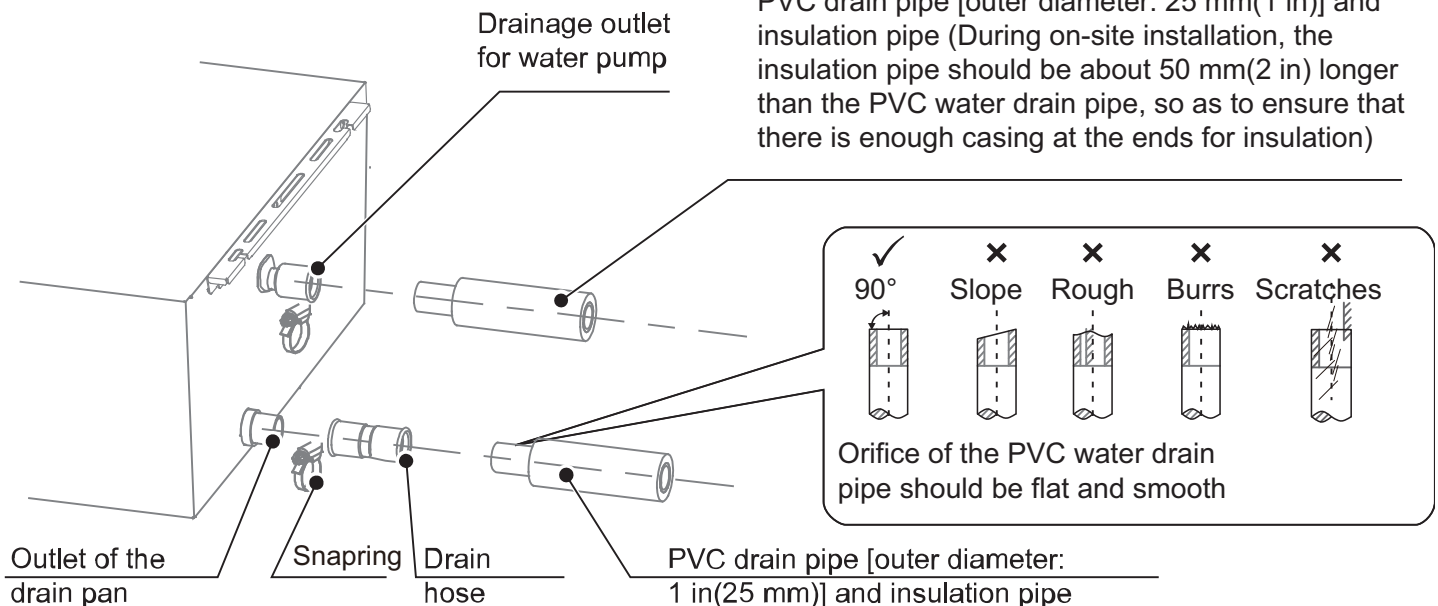
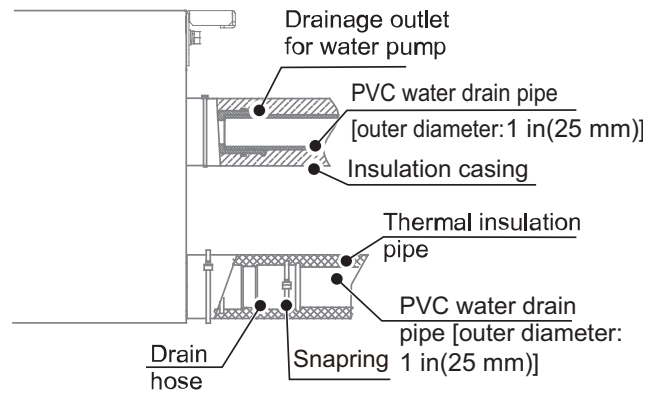
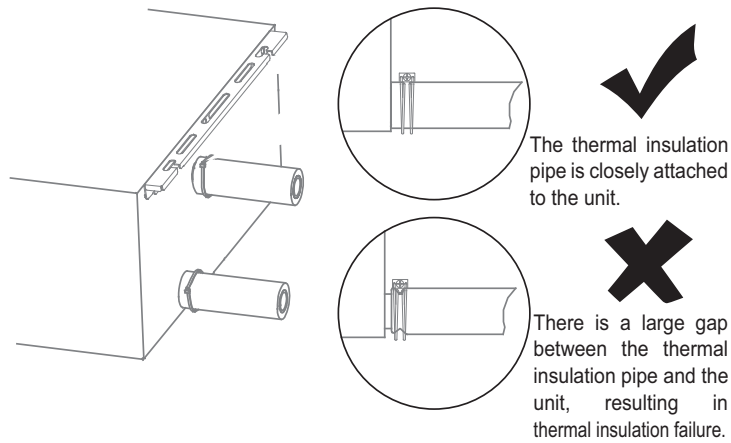


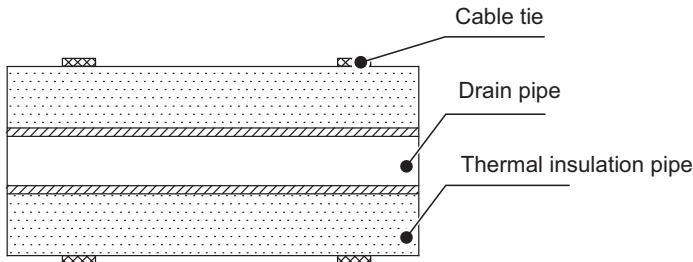
Fig. 45 – Connecting PVC Pipe to Water Pump Drainage Outlet

A260177

**Fig. 46 – Connecting Thermal Insulation Pipe**

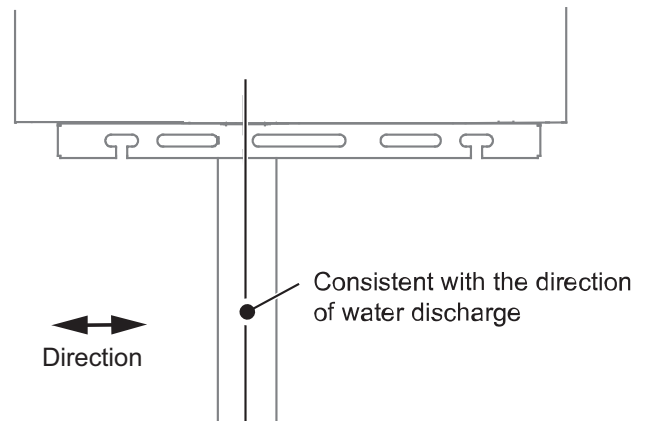
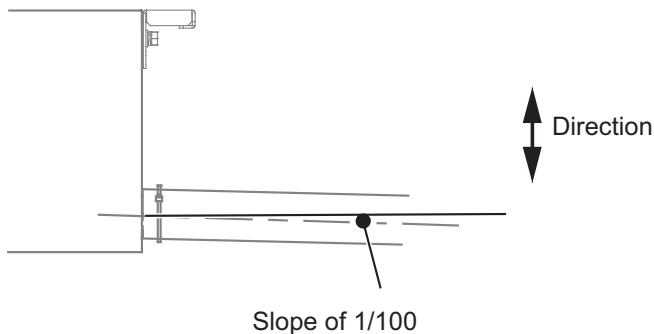
A260178

2. 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.

**Fig. 47 – Heat Insulation Pipe Wrapping**

A260179

3. 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.

**Fig. 48 – Drain Pipe Downward Slope**

A260180

4. 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).

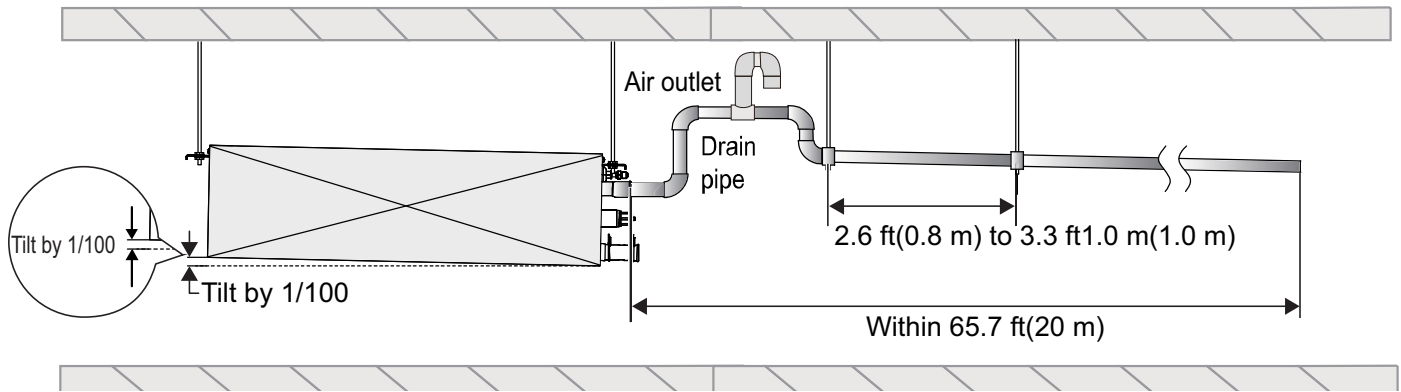


Fig. 49 – Drain Pipe Supports

A260181

5. 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.

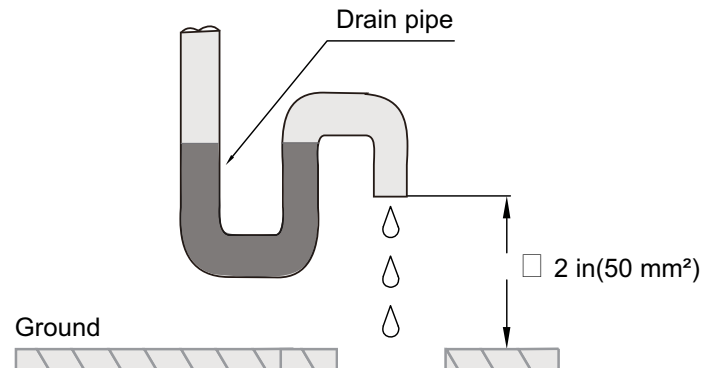
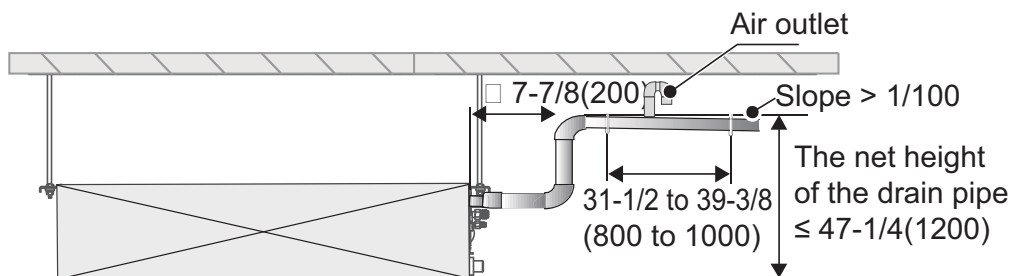


Fig. 50 – End of the Drain Pipe

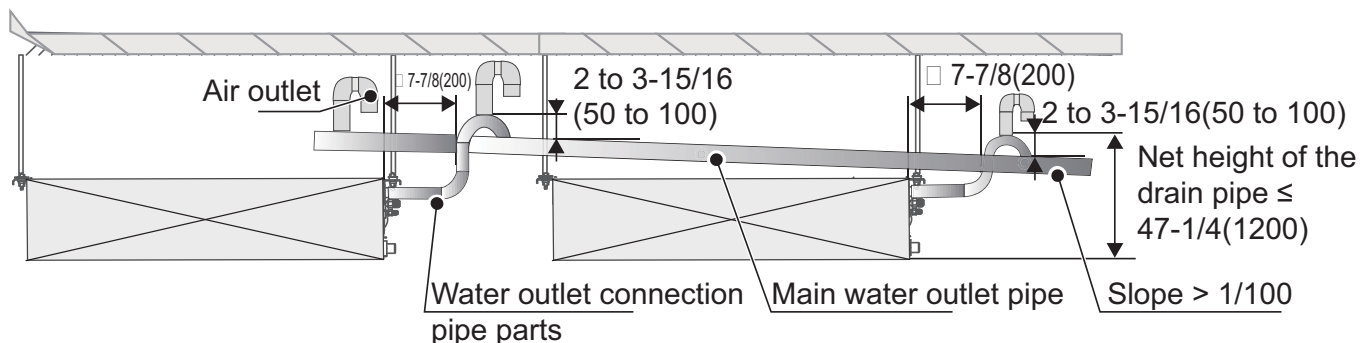
A260182

Method to drain water with the drain pump:

(Unit: in(mm))



How to connect the drain pipe for the drain pump of a single unit



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

Fig. 51 – Drain Water With the Drain Pump

A260183

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

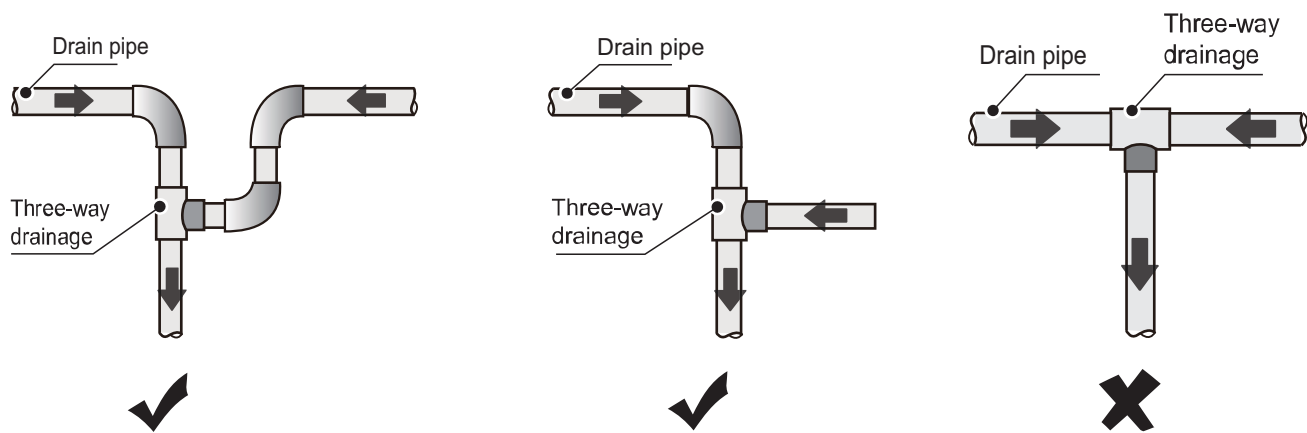
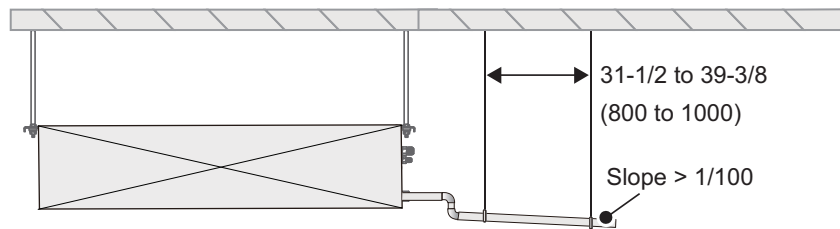
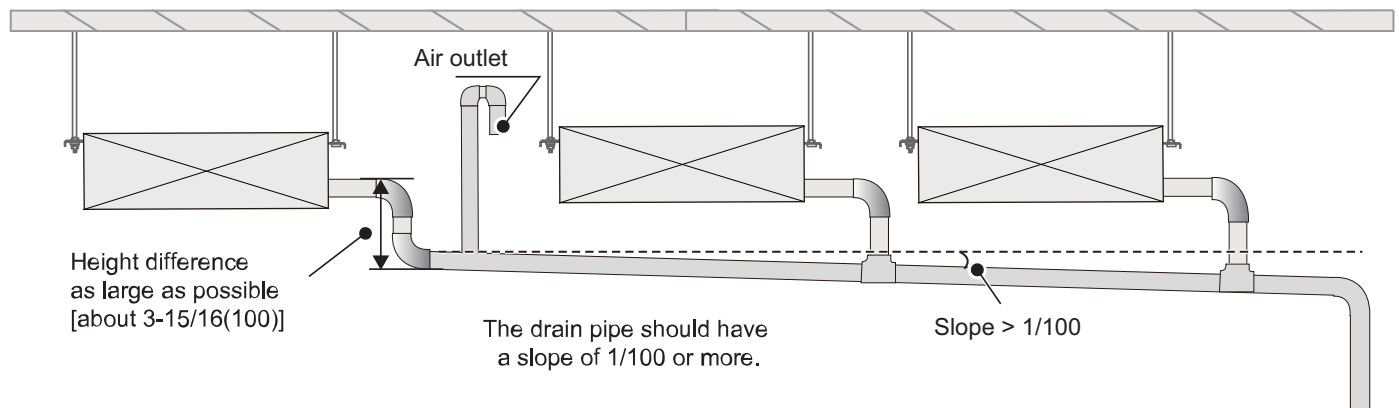


Fig. 52 – Drainage Directions

A260184

How to drain water without the drain pump:

Method to connect the drain pipe for a single unit



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

Fig. 53 – Drain Water Without Drain Pump

A260185

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 18 – Water Injection Amount

Model	Water Injection Amount in ³ (ml)
45VMD004M--3	158.7(2600)
45VMD004S--3	
45VMD006M--3	
45VMD006S--3	
45VMD008M--3	231.9(3800)
45VMD008S--3	
45VMD012M--3	
45VMD012S--3	
45VMD016M--3	231.9(3800)
45VMD016S--3	

Mechanical Ventilation Within the Appliance Enclosure Installation

When the R-454B sensor in the MDC 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 insulation 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 R454B ETRS ,9.24CFM(15.7 m³/h), and that the negative pressure inside the box is greater than 0.08 in.WG (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 MDC box when refrigerant leaks.

Exhaust Duct Layout**! WARNING**

- When the refrigerant charge of the system is less than 169.7 lbs (76.96kg), the mitigation measures of MDC should comply with the requirements of the regulations.
- When the refrigerant volume exceeds 169.7 lbs (76.96kg), 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 MDC box or by providing sufficient supplementary air around MDC box (e.g. natural openings or a dedicated opening in the false ceiling)
- Maintenance: A periodic inspection of MDC 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.

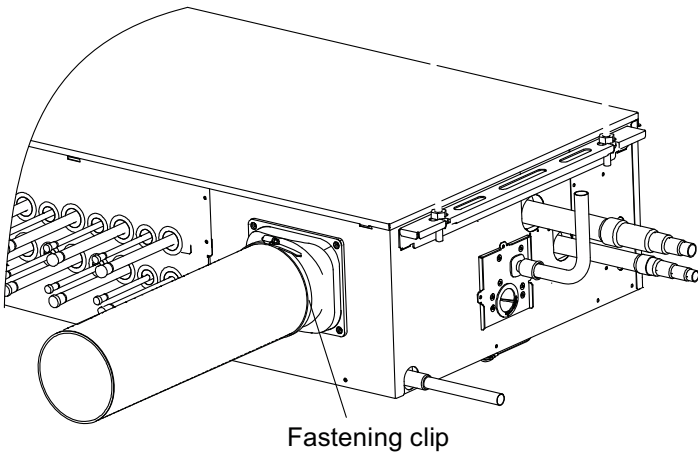


Fig. 54 – Fastening Clip

A260186

Mechanical Exhaust Fan Selection

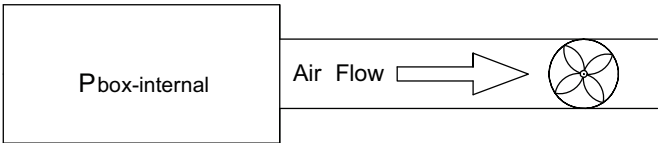
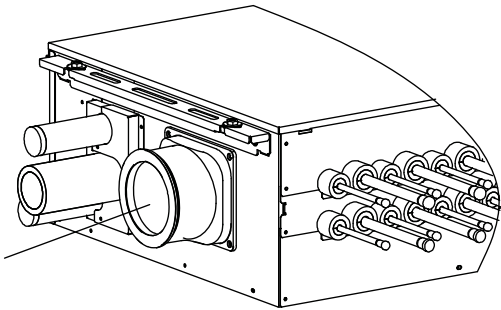


Fig. 55 – One MDC Box - One Exhaust Fan

A260187

! WARNING

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



Rubber seal

Fig. 56 – Seal Unused Air Guide

A260188

When the mechanical ventilation is in operation, P box-internal should be 0.18 in.WG (45Pa) at least lower than the ambient pressure, and Air Flow should be more than 79.41CFM (135 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 MDC box and the pressure drop generated by the components of the exhaust ducts.

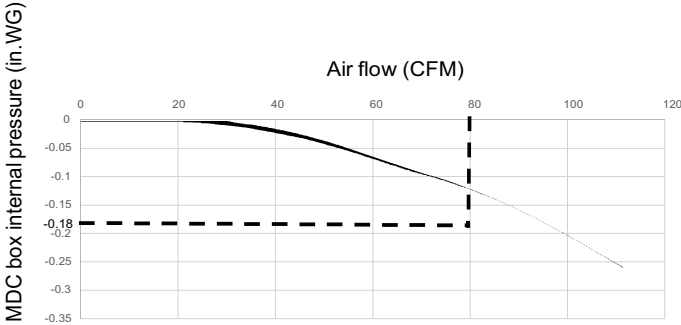
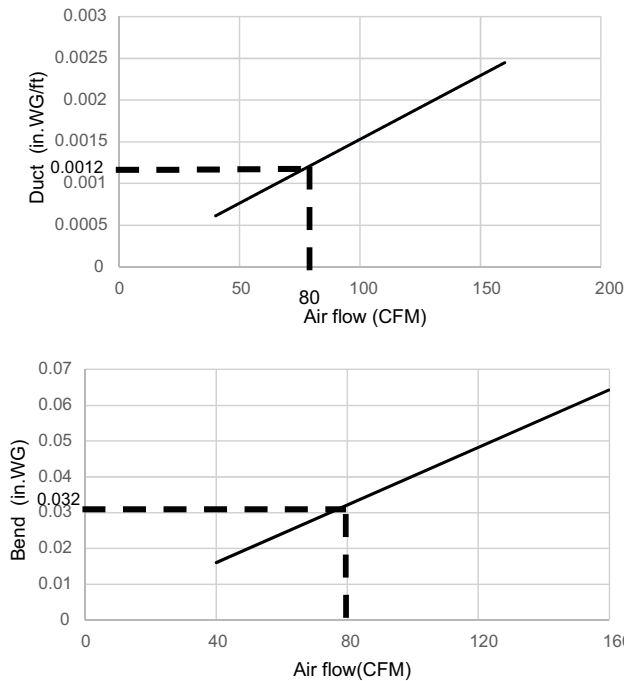


Fig. 57 – Air Flow Table

A260189

NOTE: This curve represents the static pressure inside the box when tested under an ambient pressure of 14.7 psig (101325 Pa).

For example: when the designed internal pressure of MDC box is -0.18 in.WG (-45) Pa, the corresponding air volume requirement is 135 m³/h. The resistance of the exhaust duct is as follows:

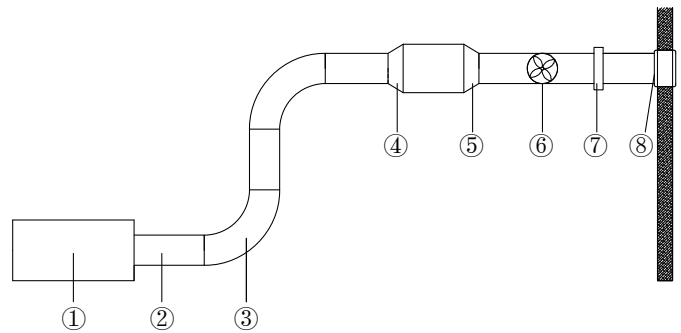
**Fig. 58 – Air Flow Tables (Cont.)**

A260190

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.

! NOTICE

- The total length of the exhaust ducts should not exceed 98 ft.
- The number of bends in the exhaust duct should not exceed 5.



- ① MDC BOX
- ② Straight pipe section of exhaust duct (Customer self-provision)
- ③ Bend of the exhaust duct (Customer self-provision)
- ④ Expansion section (Customer self-provision)
- ⑤ Reduced section (Customer self-provision)
- ⑥ Mechanical exhaust fan (Customer self-provision)
- ⑦ Non-returned valve (Customer self-provision)
- ⑧ Wall grill (Customer self-provision)

Fig. 59 – Exhaust Duct

A260191

Select a fan with the required flow of 79.41 CFM (135 m³/h) and a total pressure rise of 0.51 in.WG (126 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 been listed in local certification.

! NOTICE

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

Table 19 – Selection Calculation Case

Number	Type	Air Volume CFM (m ³ /h)	Length ft(m)	ΔP in.WG/ft(Pa/m)	ΔP in.WG(Pa)
1	MDC Box	79.41 (135)	/	/	0.18 (45)
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)	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)	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 (5)
2	Straight pipe section of exhaust duct	79.41 (135)	16.4(5)	1	0.04 (5)
7	Non-returned valve	79.41 (135)	/	/	0.04 (10)
2	Straight pipe section of exhaust duct	79.41 (135)	16.4(5)	/	0.02 (5)
8	Wall grill	79.41 (135)	/	/	0.06 (15)
Total Pressure Drop (P _{total})					0.51 (126)

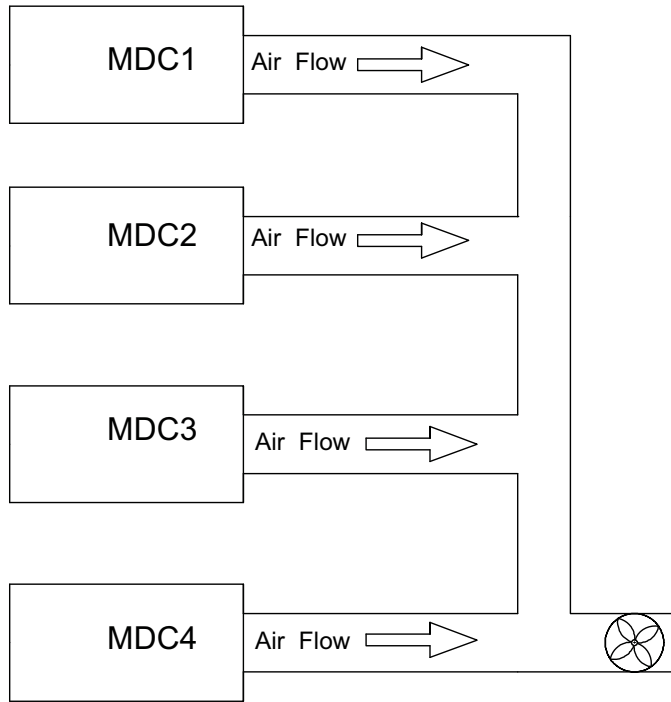


Fig. 60 – Multiple MDC Boxes in Parallel - One Exhaust Fan ^{A260192}

! WARNING

For installing multiple MDC boxes in series – one exhaust fan, the unused air guide on the MDC box need to be fitted with rubber seals (provided with the machine). Refer to Fig. 56, MDC1 need to install the rubber seal.

For more details, please contact to your dealers.

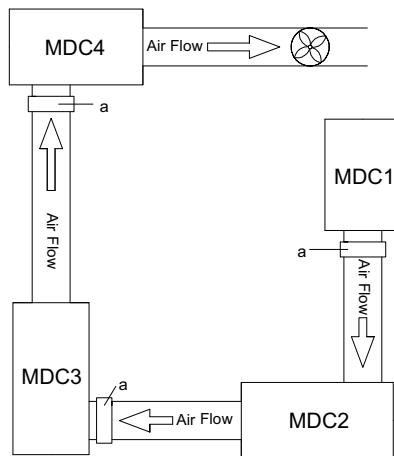
! NOTICE

- Selecting Multiple MDC boxes in parallel or in series need to meet the requirement that total internal static pressure (P_{total}) is not exceed than 1.4 in. W.G (350 Pa).
- If total internal static pressure (P_{total}) is exceed than 1.4 in. W.G (350 Pa), please add the exhaust fan and split the mechanical ventilation system.

! WARNING

For installing multiple MDC boxes in parallel – one exhaust fan, the unused air guides on each MDC box needs to be fitted with rubber seals (provided with the machine). Refer to Fig. 56, all MDC boxes need to install the rubber seals.

For more details, please contact to your dealers.



a- Non-returned valve

Fig. 61 – Multiple MDC Boxes in Series - One Exhaust Fan ^{A260193}

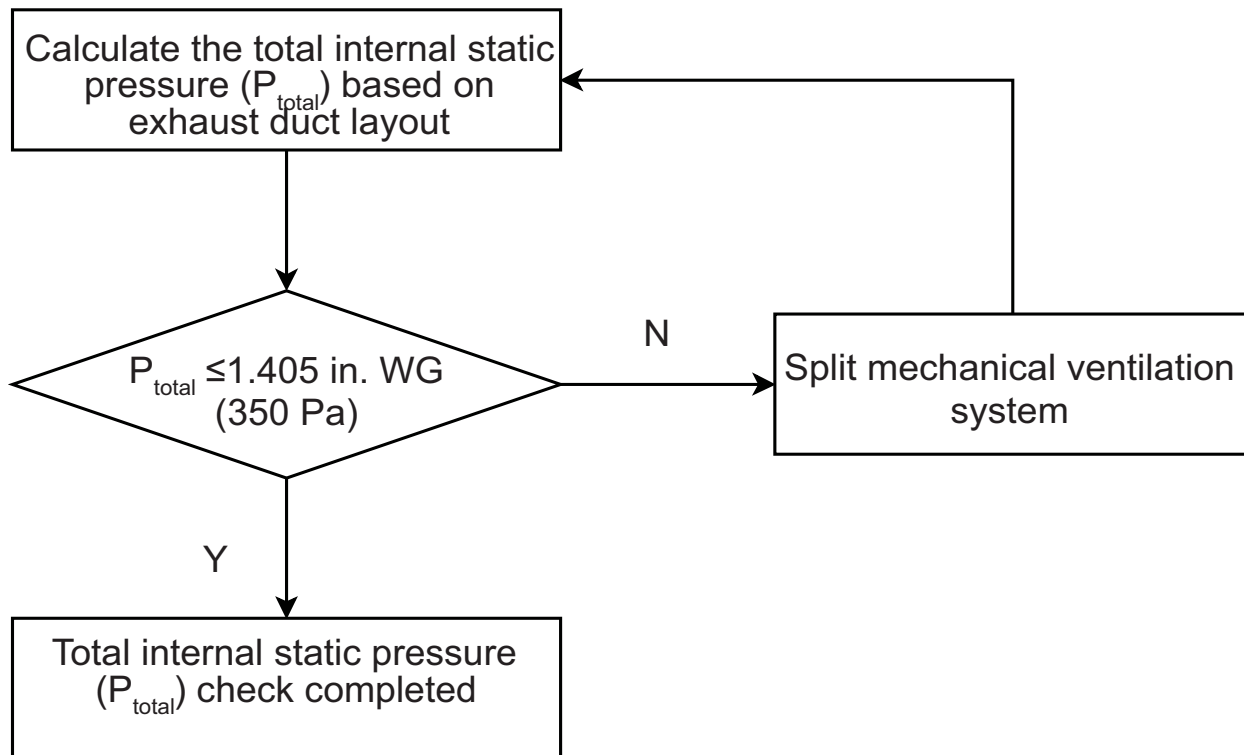


Fig. 62 – Total Static Pressure

A260194

Configuration

Overview

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

It contains the following information:

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

NOTICE

The installation personnel should read this chapter.

Digital Display and Button Settings

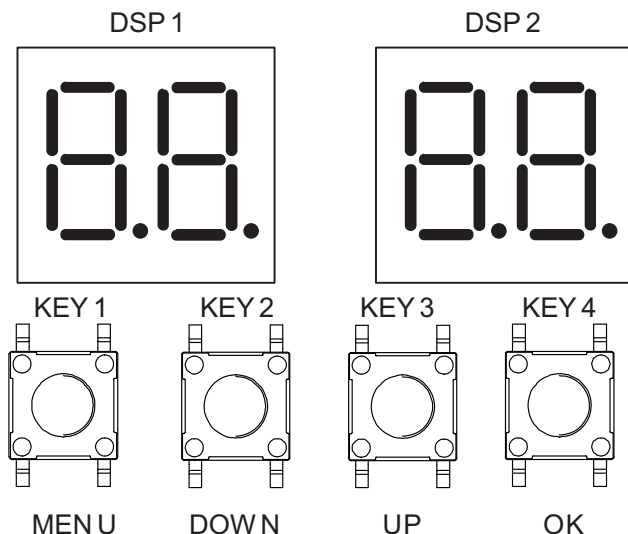


Fig. 63 – Digital Display and Button Settings

A260195

Table 20 – Digital Display Output

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

Table 21 – 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

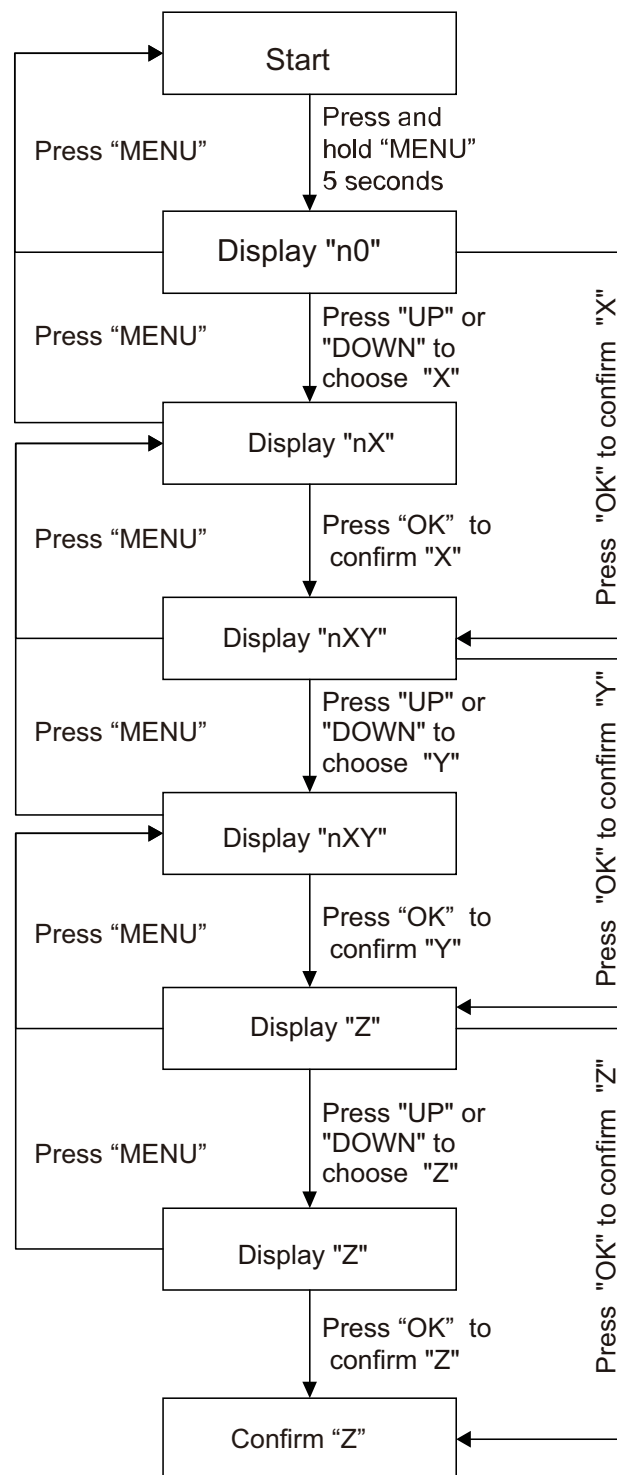
Only Main control board has the full menu functions.

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 live parts.



X-first level menu

Y-second level menu

Z-Third level menu

Fig. 64 – Menu Mode Selection Flowchart

A260196

Function Settings Checklist**! NOTICE**

For MDC12 / MDC16 (both Main and Sub MDC box), which including two PCB in electrical-control box, the menu is only effective when set on the main control board.

Table 22 – Function Settings Checklist

First Level Menu	Second Level Menu	Third Level Menu	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#	
		8	Query the indoor unit address for pipe 8#	
		9	Query the indoor unit address for pipe 9#	
		10	Query the indoor unit address for pipe 10#	
		11	Query the indoor unit address for pipe 11#	
		12	Query the indoor unit address for pipe 12#	
		13	Query the indoor unit address for pipe 13#	
		14	Query the indoor unit address for pipe 14#	
		15	Query the indoor unit address for pipe 15#	
	2	-	Query the total number of online indoor units in the system	
N1	3	-	SN Code	
		-	Remaining life of the refrigerant sensor	
		-	Exit refrigerant leakage debugging (default)	√
9	1	0	Enter refrigerant leakage debugging	
		0	EEVD-n low-temperature cooling control is ineffective	
		1	EEVD-n low-temperature cooling control is effective	√
	5	-	Manually reset to eliminate the refrigerant leakage failure	

Inspection Checklist**! NOTICE**

For MDC12 / MDC16(both Main and Sub MDC box), which including two PCB in electrical-control box, the inspection checklist is only effective when set on the main control board.

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

Table 23 – Inspection Checklist

Display	Content	Description
-	MDC address + the quantity of indoor units connected	
0	Operating indoor units quantity in this MDC Box	
1	Outdoor unit operating mode	[0]OFF [2]Cooling [3]Heating [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	Tm1	Actual temperature = DISP. Unit: °F
5	Tm2	Actual temperature = DISP. Unit: °F
6	Tm3	Actual temperature = DISP. Unit: °F
7	Tm4	Actual temperature = DISP. Unit: °F
8	H-PS1	Actual pressure = DISP. Unit: MPa
9	H-PS2	Actual pressure = DISP. Unit: MPa
10	L-PS3	Actual pressure = DISP. Unit: MPa
11	EEV1 position	Actual Value = DISP.
12	EEV2 position	Actual Value = DISP.
13	EEV3 position	Actual Value = DISP.
14	Program version	Actual Program Version

Field Setting

MDC Box Settings

! NOTICE

- The address of the main MDC box must be 1, the address of the sub-MDC box must be 2-F.
- The addresses of main MDC and sub MDC cannot be duplicated in a system.
- Only one main MDC is existed in a system.
- If MDC has two PCBs, only the ENC1 of main control board is valid.

! NOTICE

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

Table 24 – MDC Box Address Settings

Dip switch	1	Main-MDC address must be set to 1.
ENC A260197	2 to F	Sub-MDC address range from 2 to 15.

! NOTICE

Set SW1-2 to ON of MDC box, in case of connected Indoor unit sized 72-96 kBTu/h with 2 ports.

SW1	Dip switch	EEV synchronous control setting
	ON SW1-1: 0	1.Main control board EEVC/D-0 and EEVC/D-1 independent control. 2.sub control board EEVC/D-8 and EEVC/D-9 independent control.
	ON SW1-1: 1	1.Main control board EEVC/D-0 and EEVC/D-1 synchronous control. 2.Sub control board EEVC/D-8 and EEVC/D-9 synchronous control.
	ON SW1-2: 0	1.Main control board EEVC/D-2 and EEVC/D-3 independent control. 2.sub control board EEVC/D-10 and EEVC/D-11 independent control.
	ON SW1-2: 1	1.Main control board EEVC/D-2 and EEVC/D-3 synchronous control. 2.Sub control board EEVC/D-10 and EEVC/D-11 synchronous control.
SW2	Dip switch	EEV synchronous control setting
	ON SW2-1: 0	1.Main control board EEVC/D-4 and EEVC/D-5 independent control. 2.sub control board EEVC/D-12 and EEVC/D-13 independent control.
	ON SW2-1: 1	1.Main control board EEVC/D-4 and EEVC/D-5 synchronous control. 2.sub control board EEVC/D-12 and EEVC/D-13 synchronous control.
	ON SW2-2: 0	1.Main control board EEVC/D-6 and EEVC/D-7 independent control. 2.sub control board EEVC/D-14 and EEVC/D-15 independent control.
	ON SW2-2: 1	1.Main control board EEVC/D-6 and EEVC/D-7 synchronous control. 2.sub control board EEVC/D-14 and EEVC/D-15 synchronous control.

Fig. 65 – MDC EEV Synchronous Control Setting

A260198

Indoor Unit Pipeline Number Settings

! CAUTION

- Each indoor unit must be bound to the pipeline number with MDC 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 IDU electrical control box.

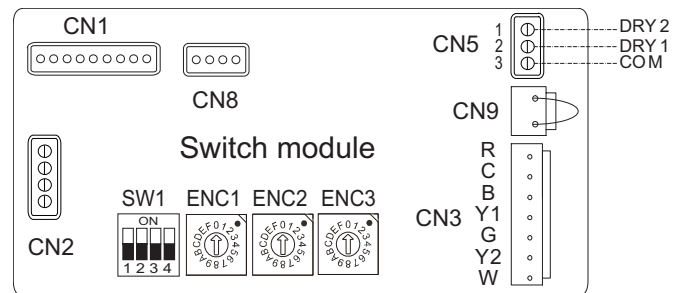


Fig. 66 – Switch Module

A260199

Table 25 – Switch Module Port Functions

Port	Attribute	Function
ENC2	Setting	Set the MDC Box address (1 to 4)
ENC3	Setting	Set the MDC Box tube number (0 to 15)

For example: A system with one MDC paired with 4 indoor units, the Indoor unit pipeline number is shown in Fig. 67.

! NOTICE

After setting the pipe number, check whether all indoor unit addresses are successfully matched with the MDC box pipe number.

See Table 22 for more details about query method.

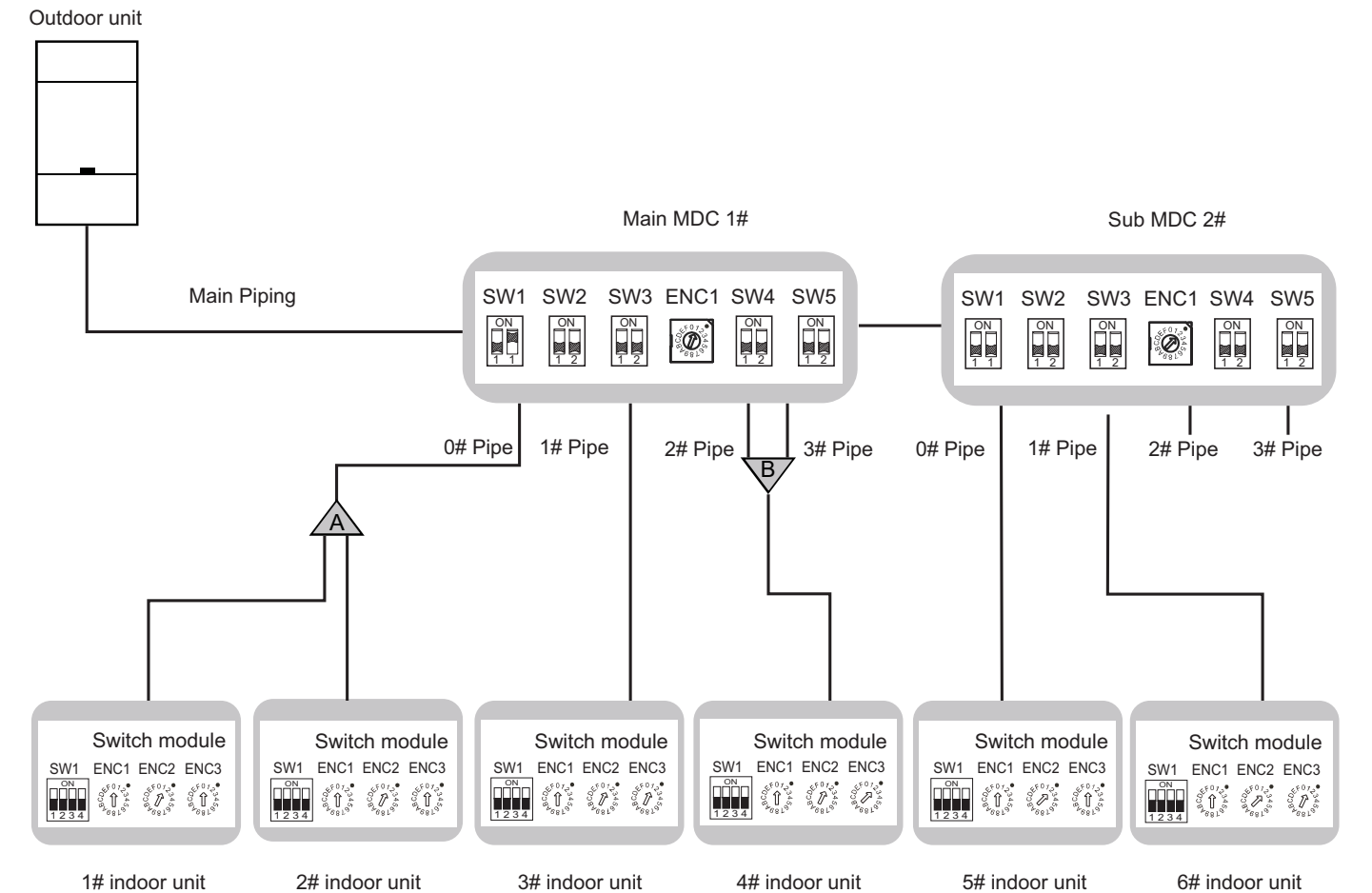


Fig. 11-4

A260200

Fig. 67 – Indoor Unit Pipeline Example

MDC Box Security Measures Confirmation

**WARNING**

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

Table 26 – MDC Box Security Measures Confirmation	
Safety Measures	Confirmation Items
Mechanical Ventilation	1. The internal pressure of each MDC BOX is below -0.18 in.WG(-45 Pa); 2. The airflow of each MDC BOX is greater than 80 CFM(135m³/h)
Alarm Signal	The alarm device (sound or light) responds.

**NOTICE**

- For test methods for internal pressure and air volume of MDC box, see (Charging Refrigerant on p42).
- Alarm equipment selected and installed by the customer.

Charging Refrigerant
Checks Before Charging the Refrigerant

**CAUTION**

Before charging the refrigerant, the safety measures of the MDC 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

**CAUTION**

- 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 27 – Refrigerant Leakage Debugging Menu Options

First Level Menu	Second Level Menu	Specified Menu Mode	Description
N1	1	0	Exit refrigerant leakage debugging (Default)
		1	Enter refrigerant leakage debugging

Step 1: Power on MDC boxes and wait for initialization.

Step 2: MDC box menu setting: Set Menu N11, press “OK,” set “1” to enter refrigerant leakage debugging.

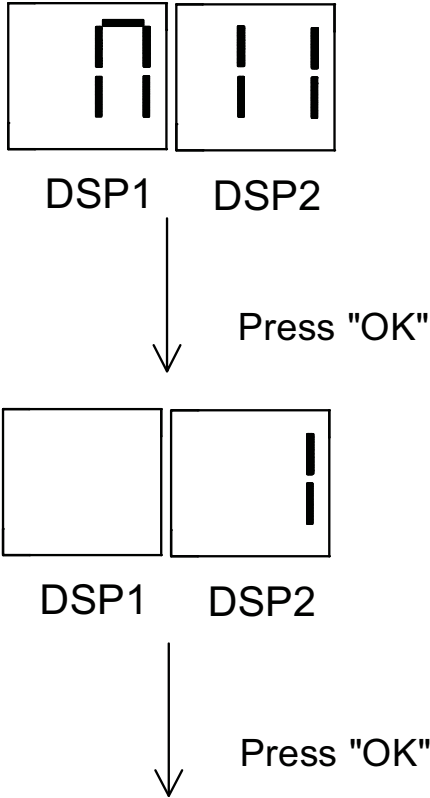


Fig. 68 – Enter Refrigerant Leakage Debugging A260201

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

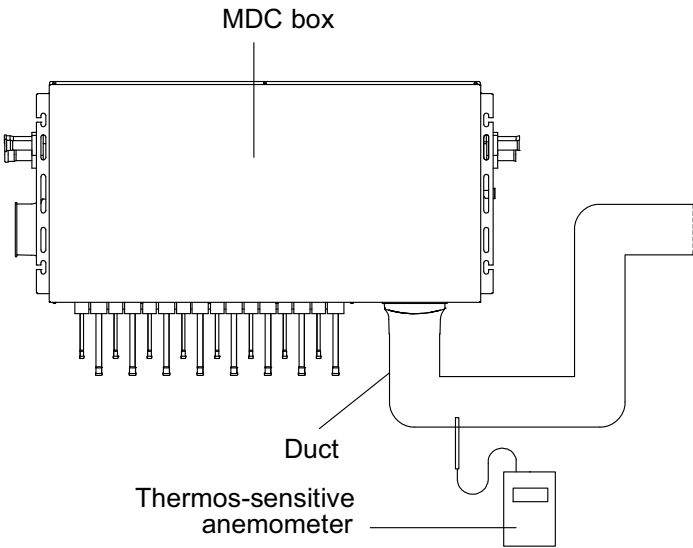


Fig. 69 – Using Thermos-sensitive Anemometer A260202

Step 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 [\(Regulatory Requirements for Mechanical Ventilation on p34\)](#).

Step 5: Set Menu N11, press “OK,” set “0” to exit refrigerant leakage debugging.

Check for Safety Measures: External Alarm (Option)

CAUTION

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

Step 1: Power on MDC boxes and wait for initialization completed.

Step 2: Set Menu N11, press “OK,” set “1” to enter refrigerant leakage debugging.

Step 3: Confirm whether the sound and light signals of the external alarm can be properly transmitted back.

Step 4: Set Menu N11, press “OK,” set “0” to exit refrigerant leakage 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 169.7 lbs (76.96 kg). This means that in case the calculated total refrigerant charge in the system is equal to or more than 169.7 lbs (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?
2. 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.
3. 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 MDC box, please refer to the fault code table in [\(Error Code on p52\)](#) for handling.

For faults in the indoor unit or MDC 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 ± 1.18 in (30 mm). The actual product shall prevail.
- Product pictures in this manual are for reference only.

Table 28 – Main MDC Box Product Dimensions

			Main MDC Box				
			45VMD004M--3	45VMD006M--3	45VMD008M--3	45VMD012M--3	45VMD016M--3
Net Dimensions	Height	A	11-13/16 (300)	11-13/16 (300)	11-13/16 (300)	11-13/16 (300)	11-13/16 (300)
	Width	B	34-1/4 (870)	34-1/4 (870)	34-1/4 (870)	50 (1270)	50 (1270)
	Depth	C	25-3/4 (654)	25-3/4 (654)	25-3/4 (654)	25-3/4 (654)	25-3/4 (654)
Packed Dimensions	Height	D	20-1/4 (515)	20-1/4 (515)	20-1/4 (515)	20-1/4 (515)	20-1/4 (515)
	Width	E	53-1/2 (1360)	53-1/2 (1360)	53-1/2 (1360)	69-1/2 (1760)	69-1/2 (1760)
	Depth	F	39-3/8 (1000)	39-3/8 (1000)	39-3/8 (1000)	39-3/8 (1000)	39-3/8 (1000)
Weight	Net Weight		116.2 (52.7)	123.9 (56.2)	130.7 (59.3)	174.6 (79.2)	189.6 (86.0)
	Gross Weight		223.1 (101.2)	229.3 (104.0)	238.5 (108.2)	316.8 (143.7)	330.3 (149.8)
Sound Pressure Level	Nominals	dB(A)	42.3	43.0	43.3	43.1	43.1

Table 29 – Sub MDC Box Product Dimensions

			Main MDC Box				
			45VMD004S--3	45VMD006S--3	45VMD008S--3	45VMD012S--3	45VMD016S--3
Net Dimensions	Height	A	11-13/16 (300)	11-13/16 (300)	11-13/16 (300)	11-13/16 (300)	11-13/16 (300)
	Width	B	34-1/4 (870)	34-1/4 (870)	34-1/4 (870)	50 (1270)	50 (1270)
	Depth	C	25-3/4 (654)	25-3/4 (654)	25-3/4 (654)	25-3/4 (654)	25-3/4 (654)
Packed Dimensions	Height	D	20-1/4 (515)	20-1/4 (515)	20-1/4 (515)	20-1/4 (515)	20-1/4 (515)
	Width	E	53-1/2 (1360)	53-1/2 (1360)	53-1/2 (1360)	69-1/2 (1760)	69-1/2 (1760)
	Depth	F	39-3/8 (1000)	39-3/8 (1000)	39-3/8 (1000)	39-3/8 (1000)	39-3/8 (1000)
Weight	Net Weight		104.9 (47.6)	112.6 (51.1)	120.2 (54.5)	163.6 (74.2)	117.9 (80.7)
	Gross Weight		211.4 (95.9)	218.7 (99.2)	226.9 (102.9)	304.2 (138.0)	316.8 (143.7)
Sound Pressure Level	Nominals	dB(A)	34.0	33.4	32.7	35.4	35.4

Installation Space: MDC Box

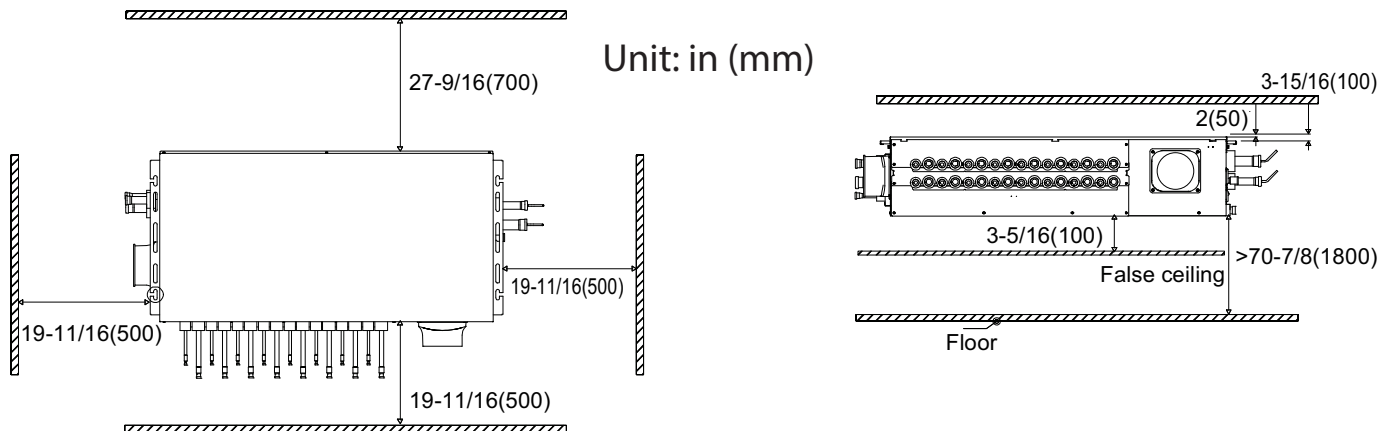


Fig. 70 – Installation Space: MDC Box

A260203

Wiring Diagram: MDC Box

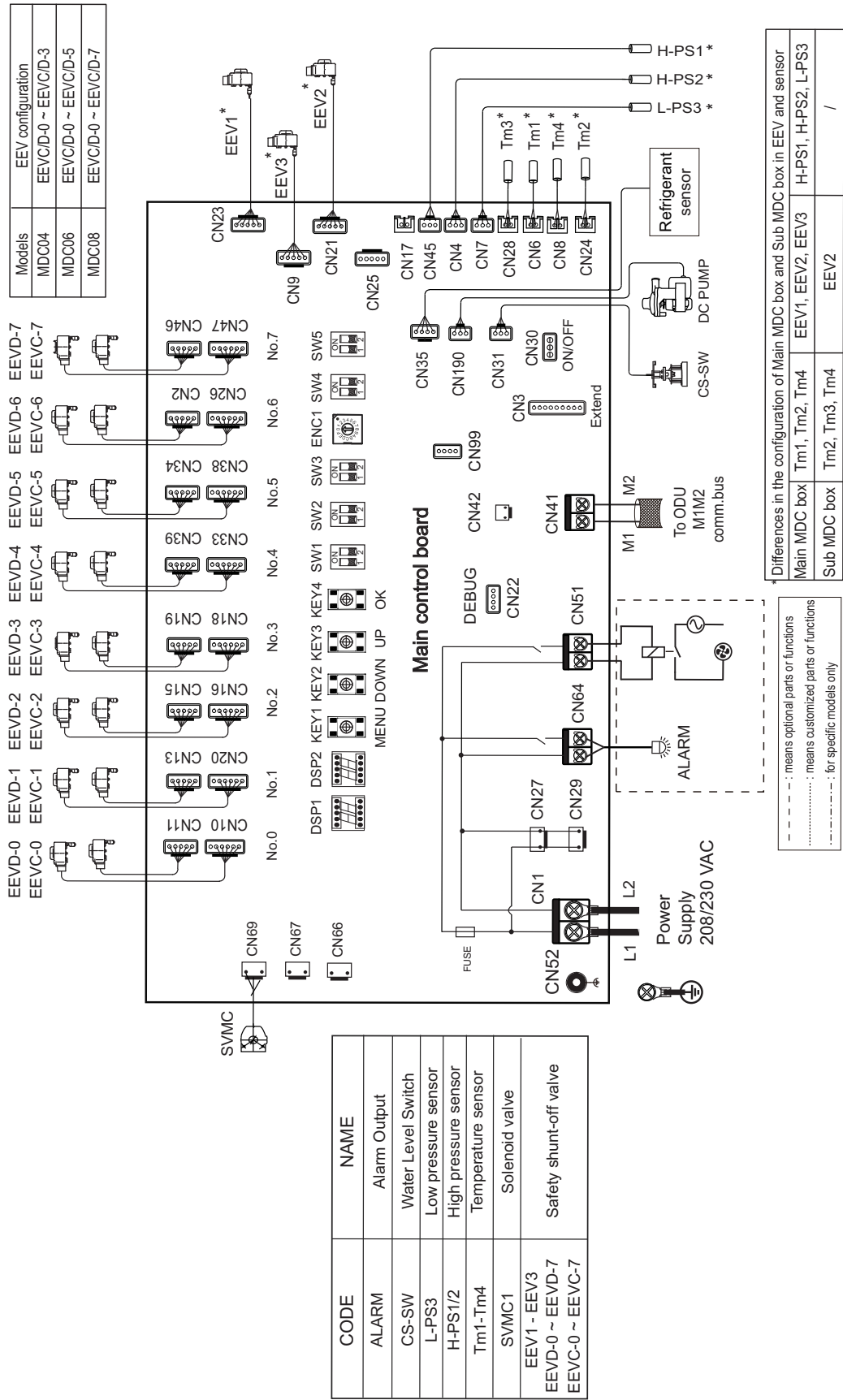


Fig. 71 – Wiring Diagram: MDC Box

A260204

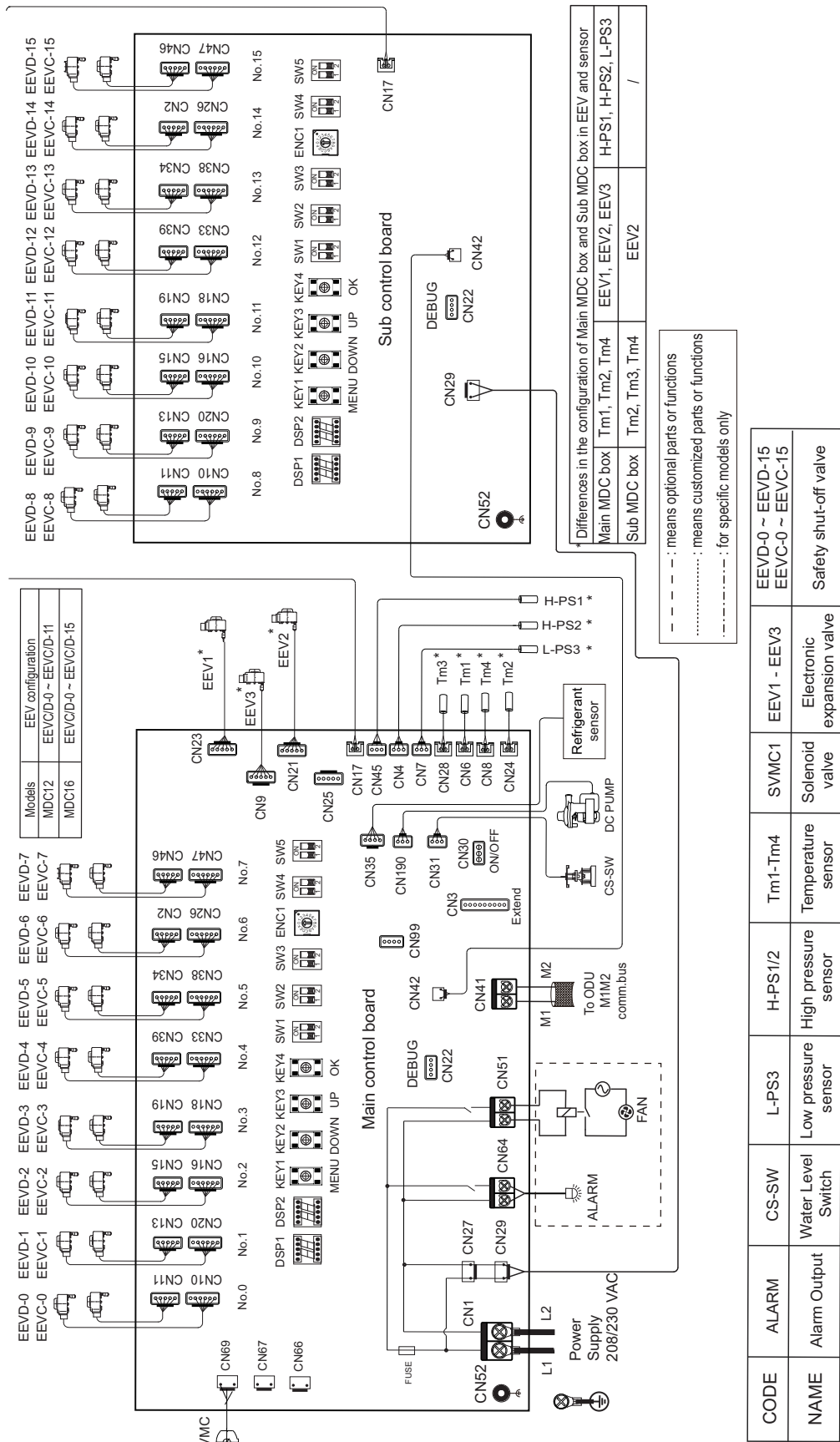
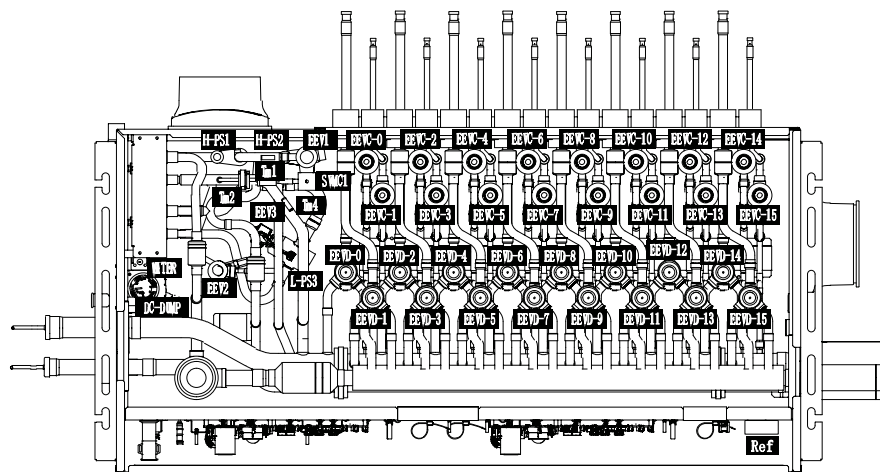
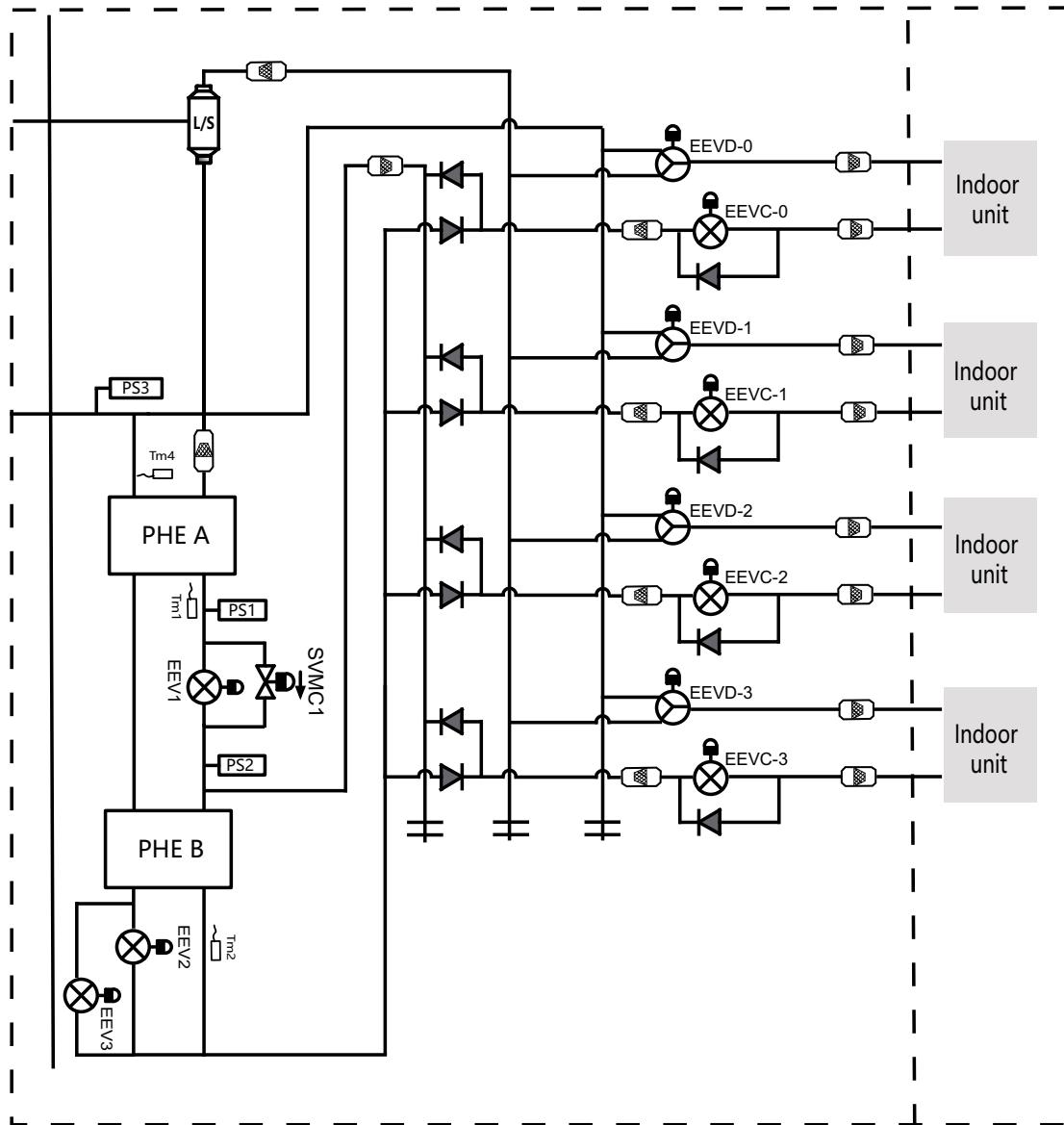


Fig. 72 – Wiring Diagram: MDC Box (cont.)

Component Layout and Refrigerant Circuits**Fig. 73 – For Main MDC Box**

A260206

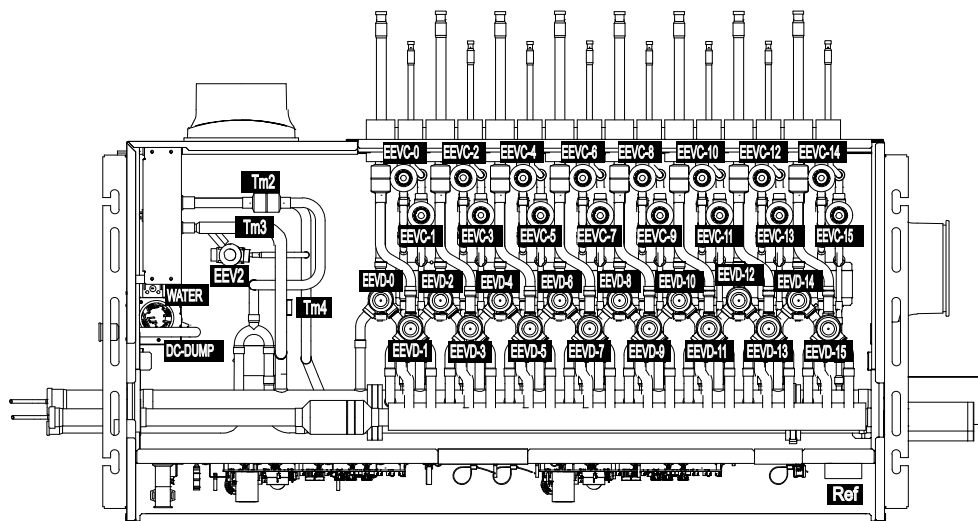
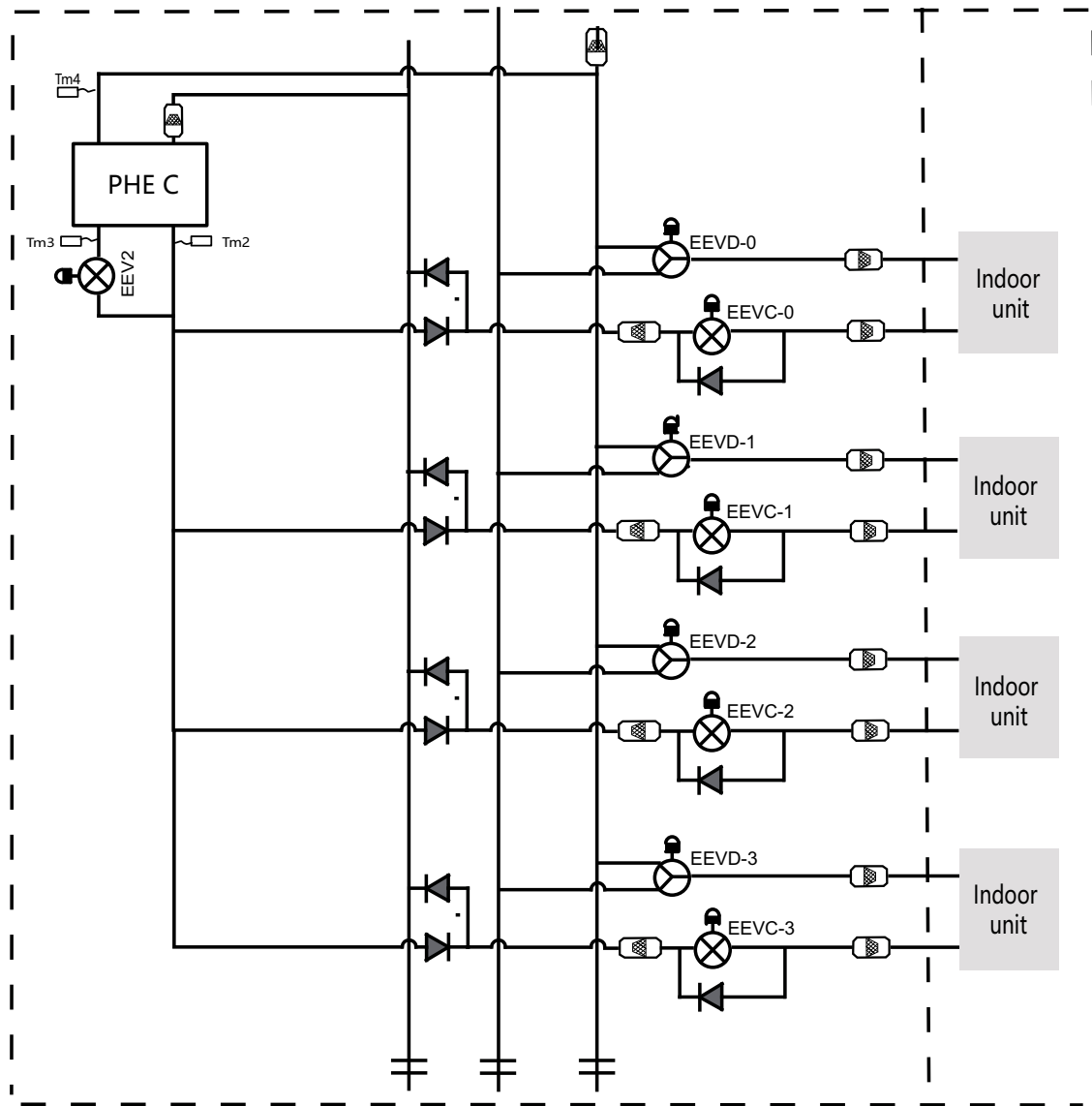


Fig. 74 – For Sub MDC Box

A260207

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 (including children). For their own safety, they should not use this unit unless they are supervised or guided by someone who is in charge of their safety. Children must be monitored to ensure that they do not play with this product.

WARNING

Children SHALL NOT play with the appliance.

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:

A260208

- 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 MDC box, and all indoor units connected downstream.

! NOTICE

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

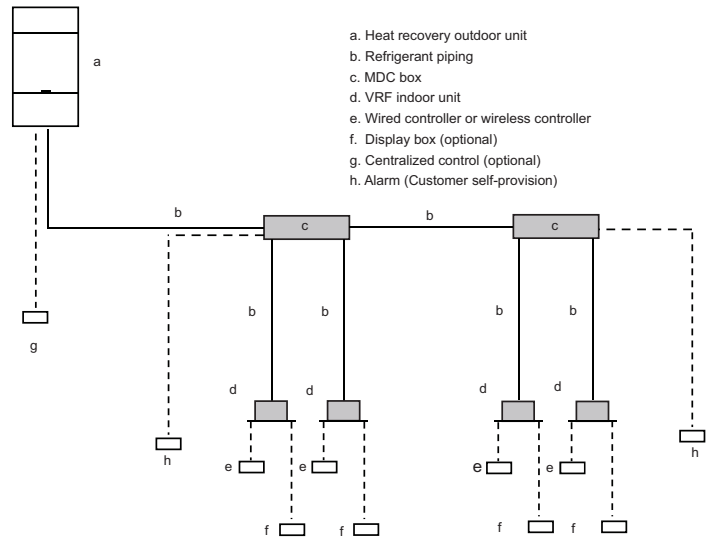


Fig. 75 – System Layout

A260209

MDC Box Layout

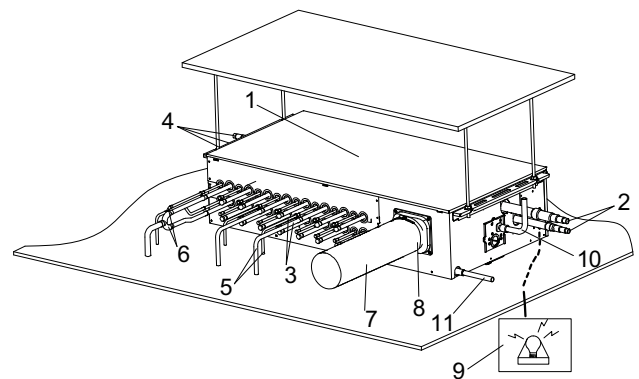


Fig. 76 – MDC Box Layout

A260210

1. MDC box
 2. Reducer pipe (high-pressure / low-pressure pipe between outdoor unit and main MDC box)
 3. Port for connecting indoor unit.
 4. Reducer pipe (high-pressure gas / low-pressure gas / high-pressure liquid between MDC box and another MDC box)
 5. Gas /Liquid pipes (between MDC box and indoor units)
 6. *Branch pipe A (for the indoor unit that cooling capacity is exceed than 54kBtu/h)
 7. *Duct for mechanical ventilation
 8. *Fastening clip
 9. *External alarm
 10. *Drain pipe for mechanical drainage
 11. *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, 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

- MDC box and indoor unit are equipped with refrigerant leak detection system for safety.
- To be effective, MDC 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 MDC unit because this may cause misdetection of the refrigerant leakage detective sensor.

! NOTICE

The refrigerant 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 in accordance with instructions.

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 Before Long Shutdown

For example, at the end of winter and summer.

- Run the indoor unit in the fan mode for about half a day to dry the internal parts of the unit.
- Clean the air filter and external shell of the unit.
- Please contact the installation or maintenance personnel to clean the air filter and external shell of the indoor unit.

The installation/operation manual of the specialized indoor unit includes maintenance tips and cleaning procedures. Make sure that the clean air filter is installed in its original position.

Maintenance After Long Shutdown

- For example, in early summer or winter.

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

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 30 – Error Codes

Error Code	Error Description	Manual Restart Required
A11	Main control board: refrigerant leakage protection. Sub control board: SW3-1 or SW4-1 dialing on sub control board setting error.	NO
Ab1	Power failure.	YES
b36	CS-SW failure or DC pump failure.	NO
C12	Box address duplication.	NO
C21	Communication failure between box and outdoor unit.	NO
C31	Main control board: Communication failure between sub control board and main control board. Sub control board: Communication failure between Box and Outdoor unit, or between sub control board and main control board.	NO
dC1	Refrigerant sensor service life less than 6 months.	/
EC1	Refrigerant sensor failure.	NO
EC2	Refrigerant sensor service life exceeded.	NO
P11	H-PS1 or H-PS2 sensor failure.	NO
P12	High-Pressure abnormal protection.	NO
P21	L-PS3 sensor failure.	NO
U38	Box has no address. (ENC1 dialing code not set)	YES
U39	Box port mismatch.	NO
xb01	EEVx failure. "x" represents EEV number.	YES
6bxx	EEVC-n failure or box port mismatch. "xx" represents pipe number. n="xx".	YES
7bxx	EEVD-n failure or box port mismatch. "xx" represents pipe number. n="xx".	YES
xF22	Tmx temperature sensor failure or ENC1 dialing setting error "x" represents temperature sensor number.	NO
xP71	EEPROM failure on PCB x, "x" represents PCB address.	YES

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.