

Air-Conditioners For Building Application

OUTDOOR UNIT

PURY-M-YXM-A(-BS)

PURY-EM-YXM-A/TR(-BS)

For use with R32

INSTALLATION MANUAL

INSTALLATIONSHANDBUCH

MANUEL D'INSTALLATION

INSTALLATIEHANDLEIDING

MANUAL DE INSTALACIÓN

MANUALE DI INSTALLAZIONE

ΕΓΧΕΙΡΙΔΙΟ ΟΔΗΓΙΩΝ ΕΓΚΑΤΑΣΤΑΣΗΣ

MANUAL DE INSTALAÇÃO

INSTALLATIONSMANUAL

INSTALLATIONSHANDBOK

MONTAJ ELKÍTABI

РЪКОВОДСТВО ЗА МОНТАЖ

PODRECZNIK INSTALACJI

INSTALLASJONSHÅNDBOK

ASENNUSOPAS

РУКОВОДСТВО ПО УСТАНОВКЕ

ПОСІБНИК З УСТАНОВЛЕННЯ

PŘÍRUČKA K INSTALACI

NÁVOD NA INŠTALÁCIU

TELEPÍTÉSI KÉZIKÖNYV

PRIROČNIK ZA NAMESTITEV

MANUAL CU INSTRUCȚIUNI DE INSTALARE

PAIGALDUSJUHEND

MONTĀŽAS ROKASGRĀMATA

MONTAVIMO VADOVAS

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UPUTSTVO ZA UGRADNJU

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Note: This symbol mark is for related countries only.

This symbol mark is according to the directive 2012/19/EU Article 14 Information for users and Annex IX.

Your MITSUBISHI ELECTRIC product is designed and manufactured with high quality materials and components which can be recycled and reused.

This symbol means that electrical and electronic equipment, at their end-of-life, should be disposed of separately from your household waste.

Please, dispose of this equipment at your local community waste collection/recycling centre.

In the European Union there are separate collection systems for used electrical and electronic product.

Please, help us to conserve the environment we live in!

1. Safety precautions

- ▶ Read and observe the safety precautions below and the instructions provided on the labels affixed to the unit.
- ▶ Retain this manual for future reference. Make sure that this manual is passed on to the end users.
- ▶ All refrigerant piping work, electrical work, air-tightness test, and brazing work must be performed by qualified personnel.
- ▶ Incorrect use may result in serious injury.

MEANINGS OF SYMBOLS DISPLAYED ON THE UNIT

	WARNING (Risk of fire)	This unit uses flammable refrigerant. If refrigerant leaks and comes in contact with fire or heating part, it will create harmful gas and there is risk of fire.
	Read the OPERATION MANUAL carefully before operation.	
	Service personnel are required to carefully read the OPERATION MANUAL and INSTALLATION MANUAL before operation.	

	WARNING	: indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	CAUTION	: indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
	CAUTION	: addresses practices not related to personal injury, such as product and/or property damage.

1-1. General precautions

WARNING

The Heating, Ventilation, Air Conditioning and Refrigeration (HVACR) system of which the Mitsubishi Electric products form a part shall be designed and installed by duly qualified engineering and trade professionals in accordance with the following requirements:

- (a) applicable laws including building codes (such as Mechanical, Electrical and Plumbing codes), permits and health and safety legislation;
- (b) installation restrictions and operating procedures described in the installation instructions of this Installation Manual and the Databook;
- (c) the New Design Tool software of Mitsubishi Electric Corporation;
- (d) specific requirements of A2L class refrigerant handling including: flammability, ventilation, leak detection, protective equipment, training and storage; and
- (e) good trade practices.

MITSUBISHI ELECTRIC CORPORATION cannot be held responsible for personal injury, property damage, including any malfunction or accident caused by any failure to meet the above requirements.

Do not use any refrigerant other than the type indicated in the manuals for the unit and on the nameplate.

- Doing so will cause the unit or pipes to burst, or result in an explosion or fire during use, during repairs, or at the time of disposal of the unit.
 - It may also be in violation of applicable laws.
 - MITSUBISHI ELECTRIC CORPORATION cannot be held responsible for malfunctions or accidents resulting from the use of the wrong type of refrigerant.
-

Do not use the unit in an unusual environment.

- If the unit is used in areas exposed to large amounts of oil, steam, organic solvents, or corrosive gases (such as ammonia, sulfuric compounds, or acids), or areas where acidic/alkaline solutions or special chemical sprays are used frequently, it may significantly reduce the performance and corrode the internal parts, resulting in refrigerant leakage, water leakage, injury, electric shock, malfunction, smoke, or fire.
-

Do not change the settings of the safety or protection devices.

- Forcing the unit to operate by disabling the safety devices, such as the pressure switch or the thermal switch, may result in bursting, fire, or explosion.
 - Operating the unit with a safety device whose settings have been changed may result in bursting, fire, or explosion.
 - Using safety devices other than those specified by Mitsubishi Electric may result in bursting, fire, or explosion.
-

Do not wet the electrical parts.

- Doing so may result in current leakage, electric shock, malfunction, or fire.
-

Do not touch the electrical parts, switches, or buttons with wet fingers.

- Doing so may result in electric shock, malfunction, or fire.
-

Do not touch the refrigerant pipes and refrigerant line components with bare hands during and immediately after operation.

- The refrigerant in the pipes will be very hot or very cold, resulting in frostbite or burns.
-

Do not touch the electrical parts with bare hands during and immediately after operation.

- Doing so may result in burns.
-

Ventilate the room while servicing the unit.

- If the refrigerant leaks, oxygen deficiency may result. If the leaked refrigerant comes in contact with a heat source, toxic gas will be generated.
-

If you notice any abnormality (e.g., a burning smell), stop the operation, turn off the power switch, and consult your dealer.

- Continuing the operation may result in electric shock, malfunction, or fire.
-

Properly install all required covers and panels on the terminal box and the control box.

- If dust or water enters the unit, this may result in electric shock or fire.
-

Periodically check the unit base for damage.

- If the damage is left uncorrected, the unit will fall and cause serious injury.
-

Consult your dealer for the proper disposal of the unit.

- The refrigerant oil and the refrigerant in the unit will pose a risk of environmental pollution, fire, or explosion.
-

Do not make any modifications or alterations to the unit. Consult your dealer for repair.

- Improper repair or modification may result in water leakage, electric shock, smoke, or fire.
-

Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.**The unit shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater.)****Do not pierce or burn.****Be aware that refrigerants may not contain an odour.****The unit shall be properly stored to prevent mechanical damage.****Before inspecting the inside of the control box, turn off the power, keep the unit off for at least 10 minutes.**

Refrigerant R32 is flammable. Do not use a naked-flame type detector.

Refrigerant leak detection sensor shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25% maximum) is confirmed.

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

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.

Do not turn off the power to all the related units even when they are not in use, except when it smells burnt or during maintenance or inspection.

Do not place flammable objects or use flammable spray near the unit.

Keep fire away from the unit.

Take safety measures against refrigerant leakage in accordance with the following.

- The latest local laws and regulations
 - Data Book for outdoor unit
 - Refrigerant leaks will cause oxygen deficiency. (Installing a gas leak detector is recommended.)
 - If the refrigerant gas comes into contact with a flame, poisonous gases and fire may result.
-

Review the installation environment of the safety devices if you change the room layout.

Maintain the installation environment of the safety devices.

Inspect the safety devices regularly.

When installing an indoor unit or a BC controller, implement safety measures for the installation space based on the concentration factor (CF) obtained from Equation 1 or by referring to Table 1. If the floor area A of the indoor unit or the BC controller installation space exceeds 250 m², use A = 250 m² for calculations. If the indoor unit or the BC controller is installed at a height of 1.8 m or less from the floor, an air circulation system must always be in operation on site in accordance with IEC60335-2-40 GG10.4.

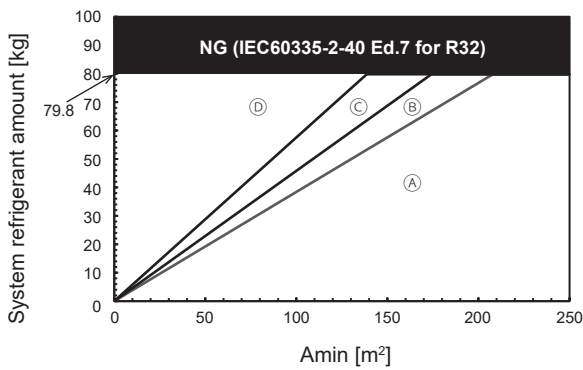
- $CF = mc / (A \times LFL \times Hr)$...Equation 1
- mc: Refrigerant charge in the system
- Hr: Height from the floor to the unit
- A: Floor area of the indoor unit or the BC controller installation space
- LFL: Lower Flammability Limit (R32)
- (Refer to IEC60335-2-40 Ed.7.)

Table 1
Refrigerant concentration and required safety measure

	CF	Lowest underground floor of the building	Spaces except lowest underground floor of the building
(A)	$CF \leq 0.5$	No additional safety measures	No additional safety measures
(B)	$0.5 < CF \leq 0.597$	One additional safety measure	No additional safety measures
(C)	$0.597 < CF \leq 0.75$	One additional safety measure (except alarm)	One additional safety measure (except alarm)
(D)	$0.75 < CF$	NG	Alarm + Ventilation

* For details, use the results calculated by the New Design Tool software of Mitsubishi Electric Corporation.

Fig. 1
Refrigerant concentration and required safety measure
(height of ceiling space = 2.5 m)



- Please be aware that this product does not have built-in safety measures for installation.
- The system is CB-Listed for the ETRS (Enhanced Tightness Refrigerating System). Therefore, please note that the installation requirements indicated in Fig.1 are mitigated compared to local building code.
- For safety reasons, do not install a shut off valve kit of other manufacturers in the refrigerant circuit to prevent equipment failure.

! CAUTION

Children should be supervised to ensure that they do not play with the appliance.

Do not operate the unit with the panels and guards removed.

- Rotating, hot, or high-voltage parts may cause injury, electric shock, or fire.

Do not touch fans, heat exchanger fins, or the sharp edges of components with bare hands.

- Doing so may result in injury.

Wear protective gloves when working on the unit.

- Failure to do so may result in injury.
- High-pressure pipes poses a risk of burns if touched with bare hands while the unit is in operation.

1-2. Precautions for transporting the unit

! WARNING

When lifting the unit, pass the slings through the four designated sling holes.

- Improper lifting will cause the unit to topple or fall, resulting in serious injury.

! CAUTION

Do not lift the unit with the PP bands that are used on some products.

- Doing so may result in injury.

Observe the restrictions on the maximum weight that a person can lift, which is specified in local regulations.

- Failure to do so may result in injury.

1-3. Precautions for unit installation

! WARNING

Do not install the unit where combustible gas may leak.

- If combustible gas accumulates around the unit, fire or explosion may result.

Do not allow children to play with the packing materials.

- Suffocation or serious injury may result.

Cut up the packing materials before disposal.

All installation work must be performed by qualified personnel in accordance with this manual.

- Improper installation may result in refrigerant leakage, water leakage, serious injury, electric shock, or fire.
-

If the air conditioner is installed in a small room, take measures to prevent the refrigerant concentration from exceeding the safety limit in the event of refrigerant leakage.

- Consult your dealer regarding the appropriate measures to prevent the allowable concentration from being exceeded. If the refrigerant leaks and the allowable concentration is exceeded, hazards due to a lack of oxygen in the room will result.
-

Install the unit in accordance with the instructions to minimize the risk of damage from earthquakes and strong winds.

- Improper installation will cause the unit to topple, resulting in serious injury.
-

The unit must be securely installed on a structure that can sustain its weight.

- Failure to do so will cause the unit to fall, resulting in serious injury. Abnormal vibrations that result from improper installation can generate abnormal sound and damage the pipes, resulting in refrigerant gas leakage.
-

Install the following safety devices according to system refrigerant amount, volume of installation space or residential space, and installation position.

- Safety shut off valve, mechanical ventilation device, and safety alarm
-

Use the supplied or specified parts for installation.

CAUTION

Seal all openings around pipes and wires to keep out small animals, rainwater, or snow.

- Failure to do so may result in current leakage, electric shock, or damage to the unit.
-

Outdoor unit with salt-resistant specification is recommended to use in a place where it is subject to salt air.

Even when the unit with salt-resistant specification is used, it is not completely protected against corrosion.

Salt-resistant unit is resistant to salt corrosion, but not salt-proof.

Install the salt-resistant unit out of direct exposure to sea breeze, and minimize the exposure to salt water mist.

Periodically wash salt deposits off the unit, especially when the unit is installed in a coastal area.

Periodically check the unit, and apply anti-rust agent and replace corroded parts as necessary.

1-4. Precautions for piping work

WARNING

Before heating the brazed sections, remove the gas and oil that are trapped in the pipes.

- Failure to do so may generate fire, resulting in serious injury.
-

Do not purge the air using refrigerant. Use a vacuum pump to evacuate the system.

- Residual gas in the refrigerant lines will cause bursting of the pipes or an explosion.
-

Do not use oxygen, flammable gas, or a refrigerant containing chlorine for air-tightness testing.

- Doing so may result in an explosion. Chlorine will deteriorate the refrigerant oil.
-

When installing or relocating the unit, do not allow air or any substance other than the specified refrigerant to enter the refrigerant lines.

- Any substance other than the specified refrigerant may cause abnormally high pressure in the refrigerant lines, resulting in bursting of the pipes or an explosion.
-

After the installation has been completed, check for refrigerant leaks.

- If the refrigerant leaks, oxygen starvation may result. If the leaked refrigerant comes in contact with a heat source, toxic gas will be generated.
-

After completion of field piping for split systems, the field pipework shall be pressure tested with an inert gas and then vacuum tested prior to refrigerant charging, according to the following requirements;

- The minimum test pressure for the low side of the system shall be the low side design pressure and the minimum test pressure for the high side of the system shall be the high side design pressure, unless the high side of the system, cannot be isolated from the low side of the system in which case the entire system shall be pressure tested to the low side design pressure.

Field-made refrigerant joints indoors shall be tightness tested. The test method shall have a sensitivity of 3 grams per year of refrigerant or better under a pressure of at least 0.25 times the MAXIMUM ALLOWABLE PRESSURE. No leak shall be detected.

When breaking into the refrigerant circuit to make repairs or for any other purpose, the following procedure shall be adhered to.

- safely remove refrigerant following local and national regulations;
- 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 if venting is not allowed by local and national codes. 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.

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

Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimise the amount of refrigerant contained in them.

Cylinders shall be kept in an appropriate position according to the instructions.

Ensure that the REFRIGERATING SYSTEM is earthed prior to charging the system with refrigerant.

Indicate the refrigerant charge on the label when charging is complete.

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

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

Recover the refrigerant from the unit in accordance with applicable local regulations.

You must be careful about the stagnation of leaked refrigerant depending on the installation conditions. Follow the instructions below.

- When removing the unit, be sure to perform refrigerant recovery or pump down before removing the piping to ensure there is no residual refrigerant in the refrigerant circuit. Never use heat or fire when removing the unit. If you need to use fire, ensure there is no residual refrigerant in the refrigerant circuit.

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

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

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

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

Do not heat the unit while the refrigerant circuit contains the refrigerant gas.

Do not use halide torch gas leak detectors.

Carry a gas leak detector when working on the unit.

Ventilate the room and prepare a fire extinguisher when using tools that use fire.

If the gas leak detector reacts, immediately stop using tools that use fire and ventilate the room.

1-5. Precautions for electrical wiring

WARNING

Include some slack in the power cables.

- Failure to do so may break or overheat the cables, resulting in smoke or fire.
-

Connections must be made securely and without tension on the terminals.

- Improperly connected cables may break, overheat, or cause smoke or fire.
-

Tighten all terminal screws to the specified torque.

- Loose screws and contact failure may result in smoke or fire.
-

Electrical work must be performed by qualified personnel in accordance with local regulations and the instructions provided in this manual. Only use the specified cables and dedicated circuits.

- Inadequate power source capacity or improper electrical work will result in electric shock, malfunction, or fire.
-

Install an earth leakage breaker on the power supply of each unit.

- Failure to do so may result in electric shock or fire.
-

Only use properly rated breakers (an earth leakage breaker, local switch <a switch + fuse that meets local electrical codes>, or overcurrent breaker).

- Failure to do so may result in electric shock, malfunction, smoke, or fire.
-

Only use standard power cables of sufficient capacity.

- Failure to do so may result in current leakage, overheating, smoke, or fire.
-

Proper grounding must be provided by qualified personnel.

- Improper grounding may result in electric shock, fire, explosion, or malfunction due to electrical noise. Do not connect the ground wire to gas or water pipes, lightning rods, or telephone ground wires.
-

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.

Have all electric work done by a licensed electrician according to “Electric Facility Engineering Standard” and “Interior Wire Regulations” and the instructions given in this manual and always use a dedicated power supply.

The appliance shall be installed in accordance with national wiring regulations.

Install an earth leakage breaker for inverter circuits on the power source.

CAUTION

After the wiring work has been completed, measure the insulation resistance, and make sure that it reads at least 1 MΩ.

- Failure to do so may result in electric leakage, malfunction, or fire.
-

When using shielded cables, insulate the shielding part.

1-6. Precautions for relocating or repairing the unit

WARNING

Only qualified personnel must relocate or repair the unit. Do not attempt to disassemble or alter the unit.

- Failure to do so will result in refrigerant leakage, water leakage, serious injury, electric shock, or fire.

Do not service the unit in the rain.

- Doing so may result in electric leakage, electric shock, wire shorting, malfunction, smoke, or fire.

During inspection, check the pipe supports and insulation materials, and repair or replace the ones that are found to have deteriorated.

1-7. Additional precautions

CAUTION

To reduce the risk of failures of the compressor or valves, follow the instructions below to prevent abrasive components contained in sandpaper or cutting tools, hard foreign matter in concrete, gravel, etc. from entering the refrigerant circuit.

- To deburr pipes, use a reamer or other deburring tools, not sandpaper or sanding tools that use abrasive materials.
- To cut pipes, use a pipe cutter, not a grinder or other tools that use abrasive materials.
- When cutting or deburring pipes, do not allow cutting chips or other foreign matters to enter the pipes.
- If cutting chips or other foreign matters entered pipes, wipe inside the pipes to remove them.

Do not turn off the power immediately after stopping operation.

- Wait for at least five minutes after the unit has stopped before turning off the power. Failure to do so may result in drain water leakage or the mechanical failure of sensitive parts.

The unit must be periodically inspected by a dealer or qualified personnel.

- If dust or dirt accumulates inside the unit, the drain pipes may become clogged, and water leakage from the pipes may wet the surroundings and generate odours.

Turn on the power at least 12 hours before starting operation. Keep the power turned on throughout the operating season.

- Insufficient energizing will result in malfunction.

Do not use the air conditioner for special purposes (e.g. keeping food, animals, plants, precision devices, or art objects in a room).

- Such items could be damaged or deteriorated.

Collect the refrigerant and properly dispose of it in accordance with local regulations.

Do not install the unit on or over items that are subject to water damage.

- When the room humidity exceeds 80% or if the drain pipe is clogged, condensation may collect and drip from the indoor unit onto the ceiling or floor.

Drain piping must be installed by a dealer or qualified personnel to ensure proper drainage.

- Improper drain piping may cause water leakage, resulting in damage to furniture and other surroundings.

Take appropriate measures against electrical noise interference when installing the unit in hospitals or radio communication facilities.

- Inverter, high-frequency medical, or wireless communication equipment as well as power generators may cause the air conditioning system to malfunction. The air conditioning system may also adversely affect the operation of these types of equipment by creating electrical noise.

Insulate pipes to prevent condensation.

- Condensation may collect and drip from the unit onto the ceiling or floor.

Keep the service valves closed until refrigerant charging is completed.

- Failure to do so will damage the unit.

Place a wet towel on the service valves before brazing the pipes to keep the temperature of the valves from rising above 120°C (248°F).

- Failure to do so may result in equipment damage.

Keep the flame out of contact with the cables and metal sheet when brazing the pipes.

- Failure to do so may result in burnout or malfunction.

Use the following tools specifically designed for use with the specified refrigerant: Gauge manifold, charge hose, gas leak detector, check valve, refrigerant charge base, vacuum gauge, and refrigerant recovery equipment.

- Gas leak detectors for conventional refrigerants will not react to a refrigerant that does not contain chlorine.
- If the specified refrigerant is mixed with water, refrigerant oil, or another refrigerant, the refrigerant oil will deteriorate and the compressor will malfunction.
- If tools are used for both R32 and R410A, perform a nitrogen purge to remove refrigerant oil or other substances on the tools before using them.
Nitrogen purge method
Set the nitrogen pressure to 1.0 MPa (145 psi) and purge with nitrogen for 10 seconds. Close the hole on the other side of the tool with a rag.

Use a vacuum pump with a check valve.

- If the vacuum pump oil flows back into the refrigerant lines, the refrigerant oil may deteriorate and the compressor may malfunction.

Keep tools clean.

- If dust, dirt, or water accumulates on the charging hose or the flare processing tool, the refrigerant will deteriorate and the compressor will malfunction.

Use refrigerant piping made of phosphorus deoxidized copper (copper and copper alloy seamless pipes) that meets local requirements. Pipe joints should also meet local requirements. Keep the inner and outer surfaces of the pipes clean and free of sulphur, oxides, dust/dirt, shaving particles, oils, moisture, or any other contaminants.

- Contaminants on the inside of the refrigerant piping will cause the refrigerant oil to deteriorate and cause the compressor to malfunction.

Store pipes indoors, and keep both ends of the pipes sealed until just before making a flare connection or brazing. (Store elbows and other joints in plastic bags.)

- If dust, dirt, or water enters the refrigerant lines, the refrigerant oil will deteriorate and the compressor will malfunction.

Braze the pipes with a nitrogen purge to avoid oxidation.

- Oxidized flux inside the refrigerant pipes will cause the refrigerant oil to deteriorate and cause the compressor to malfunction.

Do not use existing refrigerant piping.

- The old refrigerant and refrigerant oil in the existing piping contain a large amount of chlorine, which will cause the refrigerant oil in the new unit to deteriorate and cause the compressor to malfunction.

If a large electric current flows due to a malfunction or faulty wiring, earth leakage breakers on the unit side and on the upstream side of the power supply system could both operate. Depending on the importance of the system, separate the power supply system or take protective coordination of breakers.

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.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Only qualified personnel may touch the USB port in the control box.

1-8. Precautions for R32 system

The air conditioner uses R32, a mildly flammable refrigerant. This system is supported by the safety standard complying with the Enhanced Tightness Refrigerant System of IEC60335-2-40. Install the unit according to the following requirements so that the system can satisfy the standards.

- For piping connection, use a mechanical joint (brazing and flare connection, etc.) complying with the latest version of ISO14903. Ensure that the piping installed in a room is securely protected from damage due to an external force.
- When the power sources of the outdoor unit, indoor unit, and BC controller are different, power the outdoor unit last.
- LEAK DETECTION SYSTEM installed. Unit must be powered except for service.
- A refrigerant sensor is required for this system. When it detects a refrigerant leak, the system closes the shut off valves.
- To activate the safety measures in case the refrigerant sensor fails, as specified in EN 378, enable the EN 378-compliant setting No. 962 after completing a test run.
 - * This setting alone does not ensure full compliance with EN 378. Follow the detailed specifications in EN 378 when installing the system.
 - * For the setting method, refer to section 11-2.
- The indoor unit is equipped with a refrigerant sensor.
- Take appropriate measures when servicing the air conditioner. Otherwise, the air conditioner may not operate.
- The sensor must be replaced after it detects a refrigerant leak. Refer to the installation manual of the indoor unit.
- Refrigerant sensors can be disabled in some indoor units when some requirements are satisfied. Refer to the installation manual of the indoor unit for details of disabling the refrigerant sensor.
- Pay special attention to the place of installation, such as basement, etc. where refrigeration gas can accumulate, since refrigerant is heavier than the air.
 - Refrigerant stagnation may cause a fire. Take measures on site such as air circulation equipment so that the refrigerant concentration does not exceed the allowable limit.
- For some indoor units, an alarm will go off when a refrigerant leak is detected. Additionally, an alarm is available by installing the optional MA remote controller with alarm. For details, refer to the manual of each optional part.
- Safety measures vary depending on the system refrigerant amount. Refer to the Data Book for details.

2. About the product

- The outdoor unit described in this manual is air-conditioning equipment that is designed only for human comfort.
- The numeric values in the unit model name (e.g., PURY-M***YXM-A, PURY-EM***YXM-A) indicate the capacity index of the unit.
- This unit uses R32 refrigerant.
- In this manual, the following terms are used, depending on the systems as shown in the table below.

	R2 system
Controllers that are connected to indoor units	BC controller
Heating medium on the indoor unit side	Refrigerant

3. Combination of outdoor units

(1) M models

Outdoor unit model	Combination of outdoor units	
PURY-M200YXM-A(-BS)	-	-
PURY-M250YXM-A(-BS)	-	-
PURY-M300YXM-A(-BS)	-	-
PURY-M350YXM-A(-BS)	-	-
PURY-M400YXM-A(-BS)	-	-
PURY-M450YXM-A(-BS)	-	-
PURY-M500YXM-A(-BS)	-	-
PURY-M400YSXM-A(-BS)	PURY-M200YXM-A(-BS)	PURY-M200YXM-A(-BS)
PURY-M450YSXM-A(-BS)	PURY-M200YXM-A(-BS)	PURY-M250YXM-A(-BS)
PURY-M500YSXM-A(-BS)	PURY-M250YXM-A(-BS)	PURY-M250YXM-A(-BS)
PURY-M550YSXM-A(-BS)	PURY-M250YXM-A(-BS)	PURY-M300YXM-A(-BS)
PURY-M600YSXM-A(-BS)	PURY-M300YXM-A(-BS)	PURY-M300YXM-A(-BS)
PURY-M650YSXM-A(-BS)	PURY-M300YXM-A(-BS)	PURY-M350YXM-A(-BS)
PURY-M700YSXM-A(-BS)	PURY-M350YXM-A(-BS)	PURY-M350YXM-A(-BS)
PURY-M750YSXM-A(-BS)	PURY-M350YXM-A(-BS)	PURY-M400YXM-A(-BS)
PURY-M800YSXM-A(-BS)	PURY-M400YXM-A(-BS)	PURY-M400YXM-A(-BS)
PURY-M850YSXM-A(-BS)	PURY-M400YXM-A(-BS)	PURY-M450YXM-A(-BS)
PURY-M900YSXM-A(-BS)	PURY-M450YXM-A(-BS)	PURY-M450YXM-A(-BS)
PURY-M950YSXM-A(-BS)	PURY-M450YXM-A(-BS)	PURY-M500YXM-A(-BS)
PURY-M1000YSXM-A(-BS)	PURY-M500YXM-A(-BS)	PURY-M500YXM-A(-BS)

* "Twinning Kit" is required to connect combination units on site.

(2) EM models

Outdoor unit model	Combination of outdoor units	
PURY-EM200YXM-A/TR(-BS)	-	-
PURY-EM250YXM-A/TR(-BS)	-	-
PURY-EM300YXM-A/TR(-BS)	-	-
PURY-EM350YXM-A/TR(-BS)	-	-
PURY-EM400YXM-A/TR(-BS)	-	-
PURY-EM450YXM-A/TR(-BS)	-	-
PURY-EM500YXM-A/TR(-BS)	-	-
PURY-EM400YSXM-A/TR(-BS)	PURY-EM200YXM-A/TR(-BS)	PURY-EM200YXM-A/TR(-BS)
PURY-EM450YSXM-A/TR(-BS)	PURY-EM200YXM-A/TR(-BS)	PURY-EM250YXM-A/TR(-BS)
PURY-EM500YSXM-A/TR(-BS)	PURY-EM250YXM-A/TR(-BS)	PURY-EM250YXM-A/TR(-BS)
PURY-EM550YSXM-A/TR(-BS)	PURY-EM250YXM-A/TR(-BS)	PURY-EM300YXM-A/TR(-BS)
PURY-EM600YSXM-A/TR(-BS)	PURY-EM300YXM-A/TR(-BS)	PURY-EM300YXM-A/TR(-BS)
PURY-EM650YSXM-A/TR(-BS)	PURY-EM300YXM-A/TR(-BS)	PURY-EM350YXM-A/TR(-BS)
PURY-EM700YSXM-A/TR(-BS)	PURY-EM350YXM-A/TR(-BS)	PURY-EM350YXM-A/TR(-BS)
PURY-EM750YSXM-A/TR(-BS)	PURY-EM350YXM-A/TR(-BS)	PURY-EM400YXM-A/TR(-BS)
PURY-EM800YSXM-A/TR(-BS)	PURY-EM400YXM-A/TR(-BS)	PURY-EM400YXM-A/TR(-BS)
PURY-EM850YSXM-A/TR(-BS)	PURY-EM400YXM-A/TR(-BS)	PURY-EM450YXM-A/TR(-BS)
PURY-EM900YSXM-A/TR(-BS)	PURY-EM450YXM-A/TR(-BS)	PURY-EM450YXM-A/TR(-BS)
PURY-EM950YSXM-A/TR(-BS)	PURY-EM450YXM-A/TR(-BS)	PURY-EM500YXM-A/TR(-BS)
PURY-EM1000YSXM-A/TR(-BS)	PURY-EM500YXM-A/TR(-BS)	PURY-EM500YXM-A/TR(-BS)

* "Twinning Kit" is required to connect combination units on site.

4. Specifications

(1) M models

• Single modules

Model	M200YXM	M250YXM	M300YXM	M350YXM	M400YXM	M450YXM	M500YXM	
Sound power level ^{*1*2}	75.0 dB<A>	78.0 dB<A>	80.0 dB<A>	78.0 dB<A>	82.0 dB<A>	83.0 dB<A>	87.0 dB<A>	
External static pressure	0 Pa ^{*3}							
Indoor unit	Total capacity		50% to 150% ^{*4}					
	Model		M10 to M250					
	Maximum quantity		14	18	22	25	29	33
Operation temperature (Cooling)	Indoor	W.B.	+15.0°C to +24.0°C (+59.0°F to +75.0°F)					
	Outdoor	D.B.	-5.0°C to +52.0°C (+23.0°F to +126.0°F)					
Operation temperature (Heating)	Indoor	D.B.	+15.0°C to +27.0°C (+59.0°F to +81.0°F)					
	Outdoor	W.B.	-25.0°C to +15.5°C (-13.0°F to +60.0°F)					

• Combination modules

Model	M400YSXM	M450YSXM	M500YSXM	M550YSXM	M600YSXM	M650YSXM	M700YSXM	
Sound power level ^{*1*2}	79.0 dB<A>	80.0 dB<A>	82.0 dB<A>	83.0 dB<A>	84.0 dB<A>	83.0 dB<A>	82.0 dB<A>	
External static pressure	0 Pa ^{*3}							
Indoor unit	Total capacity		50% to 150% ^{*4}					
	Model		M10 to M250					
	Maximum quantity		29	33	36	40	44	47
Operation temperature (Cooling)	Indoor	W.B.	+15.0°C to +24.0°C (+59.0°F to +75.0°F)					
	Outdoor	D.B.	-5.0°C to +52.0°C (+23.0°F to +126.0°F)					
Operation temperature (Heating)	Indoor	D.B.	+15.0°C to +27.0°C (+59.0°F to +81.0°F)					
	Outdoor	W.B.	-25.0°C to +15.5°C (-13.0°F to +60.0°F)					

Model	M750YSXM	M800YSXM	M850YSXM	M900YSXM	M950YSXM	M1000YSXM
Sound power level ^{*1*2}	84.0 dB<A>	86.0 dB<A>	86.0 dB<A>	87.0 dB<A>	89.0 dB<A>	91.0 dB<A>
External static pressure	0 Pa ^{*3}					
Indoor unit	Total capacity		50% to 150% ^{*4}			
	Model		M10 to M250			
	Maximum quantity		50	50	50	50
Operation temperature (Cooling)	Indoor	W.B.	+15.0°C to +24.0°C (+59.0°F to +75.0°F)			
	Outdoor	D.B.	-5.0°C to +52.0°C (+23.0°F to +126.0°F)			
Operation temperature (Heating)	Indoor	D.B.	+15.0°C to +27.0°C (+59.0°F to +81.0°F)			
	Outdoor	W.B.	-25.0°C to +15.5°C (-13.0°F to +60.0°F)			

*1 Cooling mode

*2 The sound pressure level is measured by the conventional method in JIS for reference purpose.

*3 To enable the high static pressure setting, set the dipswitch on the main board as follows.

	SW6-5: ON	SW6-5: OFF
SW6-4: ON	80 Pa ^{*5}	60 Pa ^{*5}
SW6-4: OFF	30 Pa ^{*5}	0 Pa

*4 If the total capacity exceeds 150%, consult the Data Book.

*5 30 Pa setting is available in all models.

60 Pa setting is available in models M200 to M450.

80 Pa setting is available in models M200 to M400.

(2) EM models

• Single modules

Model	EM200YXM	EM250YXM	EM300YXM	EM350YXM	EM400YXM	EM450YXM	EM500YXM	
Sound power level *1*2	75.0 dB<A>	78.0 dB<A>	80.0 dB<A>	78.0 dB<A>	82.0 dB<A>	83.0 dB<A>	87.0 dB<A>	
External static pressure	0 Pa *3							
Indoor unit	Total capacity		50% to 150% *4					
	Model		M10 to M250					
	Maximum quantity		14	18	22	25	29	33
Operation temperature (Cooling)	Indoor	W.B.	+15.0°C to +24.0°C (+59.0°F to +75.0°F)					
	Outdoor	D.B.	-5.0°C to +52.0°C (+23.0°F to +126.0°F)					
Operation temperature (Heating)	Indoor	D.B.	+15.0°C to +27.0°C (+59.0°F to +81.0°F)					
	Outdoor	W.B.	-25.0°C to +15.5°C (-13.0°F to +60.0°F) *6					

• Combination modules

Model	EM400YSXM	EM450YSXM	EM500YSXM	EM550YSXM	EM600YSXM	EM650YSXM	EM700YSXM	
Sound power level *1*2	79.0 dB<A>	80.0 dB<A>	82.0 dB<A>	83.0 dB<A>	84.0 dB<A>	83.0 dB<A>	82.0 dB<A>	
External static pressure	0 Pa *3							
Indoor unit	Total capacity		50% to 150% *4					
	Model		M10 to M250					
	Maximum quantity		29	33	36	40	44	47
Operation temperature (Cooling)	Indoor	W.B.	+15.0°C to +24.0°C (+59.0°F to +75.0°F)					
	Outdoor	D.B.	-5.0°C to +52.0°C (+23.0°F to +126.0°F)					
Operation temperature (Heating)	Indoor	D.B.	+15.0°C to +27.0°C (+59.0°F to +81.0°F)					
	Outdoor	W.B.	-25.0°C to +15.5°C (-13.0°F to +60.0°F) *6					

Model	EM750YSXM	EM800YSXM	EM850YSXM	EM900YSXM	EM950YSXM	EM1000YSXM
Sound power level *1*2	84.0 dB<A>	86.0 dB<A>	86.0 dB<A>	87.0 dB<A>	89.0 dB<A>	91.0 dB<A>
External static pressure	0 Pa *3					
Indoor unit	Total capacity		50% to 150% *4			
	Model		M10 to M250			
	Maximum quantity		50	50	50	50
Operation temperature (Cooling)	Indoor	W.B.	+15.0°C to +24.0°C (+59.0°F to +75.0°F)			
	Outdoor	D.B.	-5.0°C to +52.0°C (+23.0°F to +126.0°F)			
Operation temperature (Heating)	Indoor	D.B.	+15.0°C to +27.0°C (+59.0°F to +81.0°F)			
	Outdoor	W.B.	-25.0°C to +15.5°C (-13.0°F to +60.0°F) *6			

*1 Cooling mode

*2 The sound pressure level is measured by the conventional method in JIS for reference purpose.

*3 To enable the high static pressure setting, set the dipswitch on the main board as follows.

	SW6-5: ON	SW6-5: OFF
SW6-4: ON	80 Pa *5	60 Pa *5
SW6-4: OFF	30 Pa *5	0 Pa

*4 If the total capacity exceeds 150%, consult the Data Book.

*5 30 Pa setting is available in all models.

60 Pa setting is available in models EM200 to EM450.

80 Pa setting is available in models EM200 to EM400.

*6 For single module EM350 to 500 models and combination module EM650 to 1000 models, when using at outdoor temperatures below -20°C, the total connected capacity of the indoor units must be 100% or more of the outdoor unit's capacity, and a snow hood must be installed.

5. Package contents

The table below lists all the parts and their quantities included in the package.

	Tie band
M/EM200	4
M/EM250	4
M/EM300	4
M/EM350	4
M/EM400	4
M/EM450	4
M/EM500	4

6. Transporting the unit

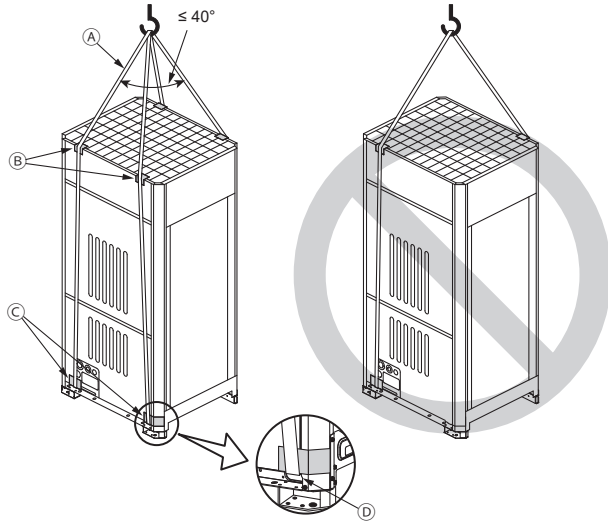
WARNING

When lifting the unit, pass the slings through the four designated sling holes.

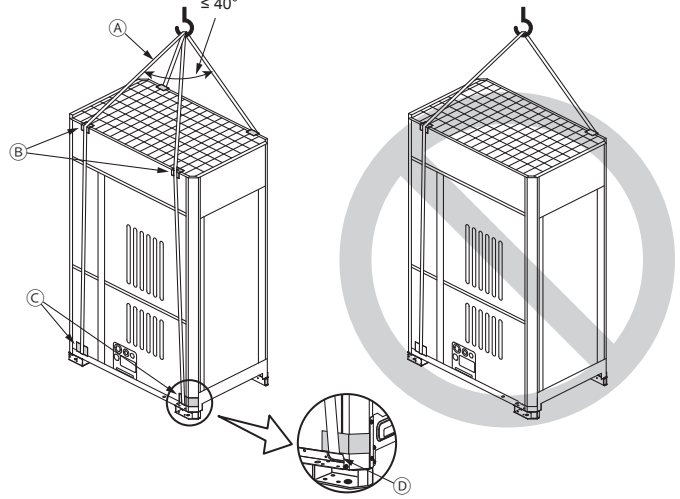
- Improper lifting will cause the unit to topple or fall, resulting in serious injury.

- Always use two slings to lift up the unit. Each sling must be at least 8 m (26 ft) long and must be able to support the weight of the unit.
- Put protective pads between slings and the unit where the slings touch the unit at the base to protect the unit from being scratched.
- Make sure that the angles between slings at the top are less than 40 degrees.

M200, M250, M300, EM200, EM250, EM300



M350, M400, M450, M500, EM350, EM400, EM450, EM500



- Ⓐ Slings (Min. 8 m (26 ft) x 2)
- Ⓑ Protective pads
(two each in the front and back)
- Ⓒ Protective pads
(two each in the front and back)
- Ⓓ Sling holes
(two each in the front and back)

7. Installation location

⚠ WARNING

Do not install the unit where combustible gas may leak.

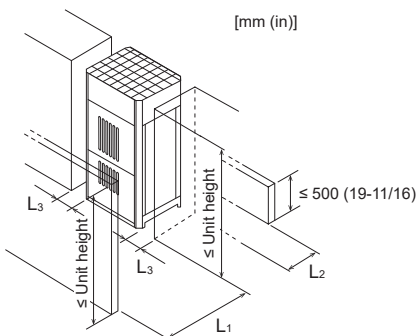
- If combustible gas accumulates around the unit, fire or explosion may result.
- Note that refrigerant gas is heavier than air and will therefore tend to collect in low spots such as basements.
- When an indoor unit that draws in outside air exits near the outdoor unit, be careful not to affect the normal operation of the indoor unit.
- When the amount of drain water is excessive, drain water comes out of the outdoor unit along the panel during heating operation. Provide sufficient space around the unit according to the instructions below.
- Installing the outdoor unit in an indoor space with small air intake windows may result in insufficient air flow. Install the unit where sufficient air flow is available. When installing the unit outdoors, also ensure that sufficient air flow is maintained.
- For indoor installation of the outdoor unit, additional measures can be necessary to comply with the applicable legislation.
- Sufficient free space is required around the unit for maintenance, dissipation of heat from the unit, and dissipation of condensation heat. Select a location where the following conditions are met. Not leaving enough free space around the unit can compromise the cooling/heating performance of the unit.
- Select a space to install the outdoor unit in consideration of short-cycling caused by seasonal winds and winds that pass through tall buildings. Particularly, when the unit is used in low ambient temperature conditions and is subject to outside winds or is affected by the surrounding walls that can lead to short-cycling, take appropriate measures such as installing a snow hood. Depending on the installation conditions, more space or other construction work than is specified here may be required. Conduct an air-flow analysis as necessary to ensure that the unit is operated within the operation range beforehand.

en

7-1. Single unit installation

When installing the unit, provide sufficient space as shown in the figure below. If the height of the walls around the unit exceeds the height limit, add half of the height that exceeds the limit ($h/2$) to L_1 , L_2 , and L_3 as shown in the table below. When the unit is installed adjacent to the building wall, space must be left open in two directions. A space of at least 300 mm (11-13/16 in) must be left between the unit and the wall, and 200 mm (7-14/16 in) on the side of the unit.

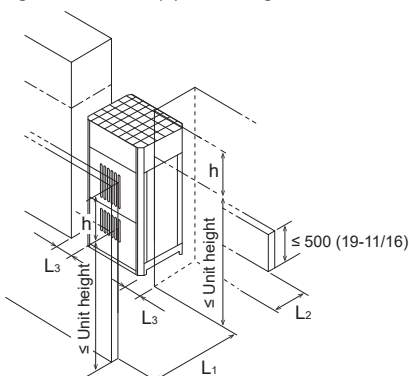
(1) When all walls are within their height limits*.



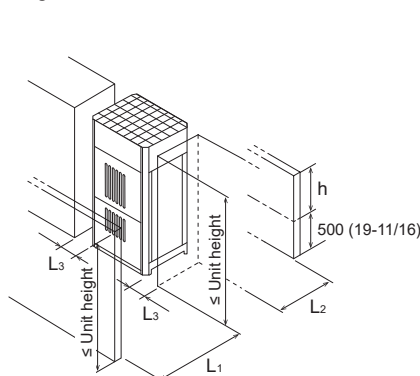
	Required minimum distance [mm (in)]		
	L ₁ (Front)	L ₂ (Rear)	L ₃ (Right/Left)
When the distance behind the unit (L ₂) needs to be small	450 (17-3/4)	100 (3-15/16)	50 (2)
When the distance to the right or left (L ₃) needs to be small	450 (17-3/4)	300 (11-13/16)	20 (13/16)

(2) When one or more walls exceed their height limits*.

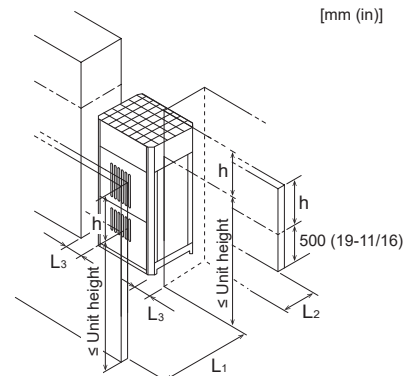
When the wall(s) at the front and/or the right/left exceed(s) their height limits



When the wall at the rear exceeds its height limit



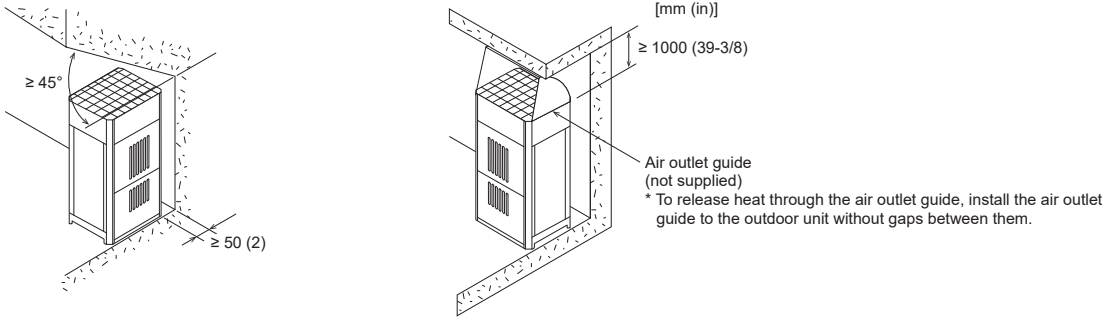
When all walls exceed their height limits



If the height of the walls around the unit exceeds the height limit, add half of the height that exceeds the limit ($h/2$) to L_1 , L_2 , and L_3 as shown in the table below.

	Required minimum distance [mm (in)]		
	L ₁ (Front)	L ₂ (Rear)	L ₃ (Right/Left)
When the distance behind the unit (L ₂) needs to be small	450 (17-3/4) + $h/2$	100 (3-15/16) + $h/2$	50 (2) + $h/2$
When the distance to the right or left (L ₃) needs to be small	450 (17-3/4) + $h/2$	300 (11-13/16) + $h/2$	20 (13/16) + $h/2$

(3) When there are overhead obstacles

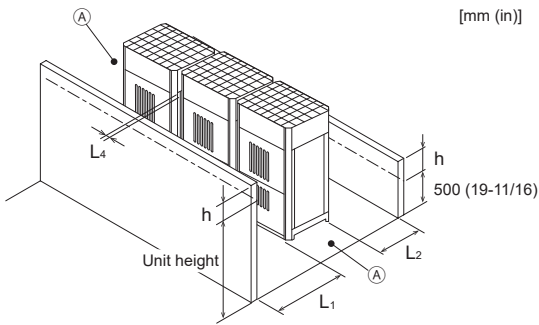


7-2. Multiple unit installation

- When installing multiple units, make sure to take into consideration factors such as providing enough space for people to pass through, ample space between blocks of units, and sufficient space for airflow. (The areas marked with (A) in the figures below must be left open.)
- In the same way as with the single unit installation, if the height of the walls around the unit exceeds the height limit, add half of the height that exceeds the limit ($h/2$) to L_1 , L_2 , and L_3 as shown in the table below. When installing the unit adjacent to a building wall, ensure that at least two directions are open, with a rear space of at least 300 mm and a side space of at least 200 mm. When installing the units side by side, ensure a space of at least 400 mm between the units.
- If there are walls in the front and rear of the block of units, up to six units can be installed consecutively side by side, and a space of 1000 mm (39-3/8 in) or more must be left between each block of six units.

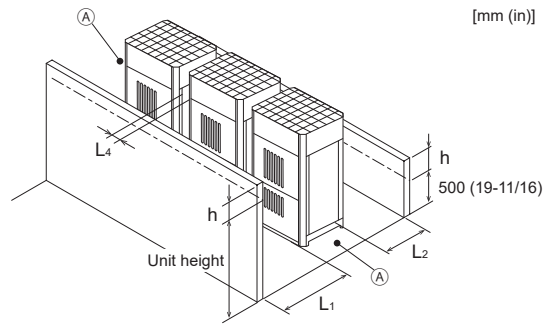
(1) Side-by-side installation

When the distances between the units (L_4) need to be small



Required minimum distance [mm (in)]		
L_1 (Front)	L_2 (Rear)	L_4 (Between)
$450 (17-3/4) + h/2$	$300 (11-13/16) + h/2$	$40 (1-10/16)$

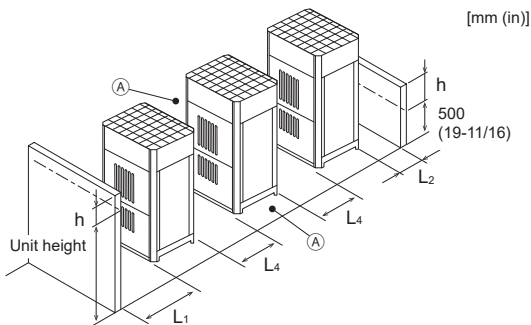
When the distance behind the block of units (L_2) needs to be small



Required minimum distance [mm (in)]		
L_1 (Front)	L_2 (Rear)	L_4 (Between)
$450 (17-3/4) + h/2$	$100 (3-15/16) + h/2$	$100 (3-15/16)$

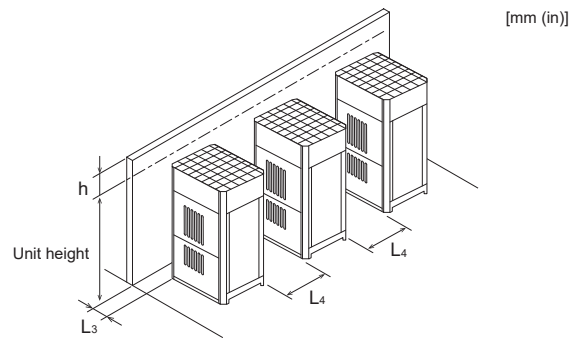
(2) Face-to-face installation

When there are walls in the front and rear of the block of units



Required minimum distance [mm (in)]		
L_1 (Front)	L_2 (Rear)	L_4 (Between)
$450 (17-3/4) + h/2$	$100 (3-15/16) + h/2$	$450 (17-3/4)$

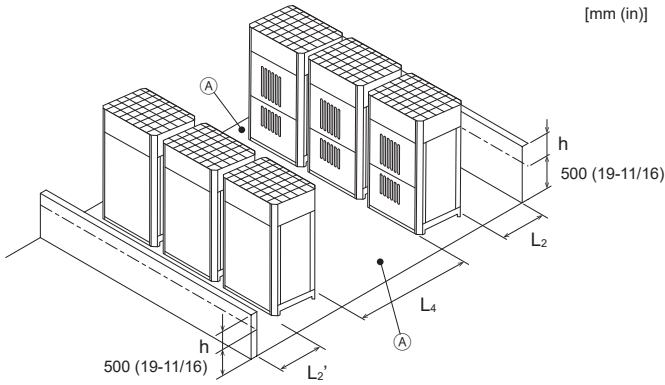
When there is a wall on either the right or left side of the block of units



Required minimum distance [mm (in)]	
L_3 (Right/Left)	L_4 (Between)
$20 (13/16) + h/2$	$450 (17-3/4)$

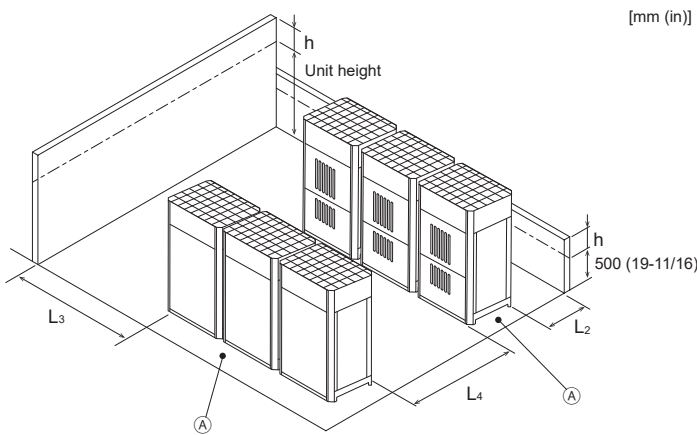
(3) Combination of face-to-face and side-by-side installations

When there are walls in the front and rear of the block of units



Required minimum distance [mm (in)]		
L ₂ (Rear)	L ₂ ' (Rear)	L ₄ (Between)
300 (11-13/16) + h/2	300 (11-13/16) + h/2	900 (35-7/16)

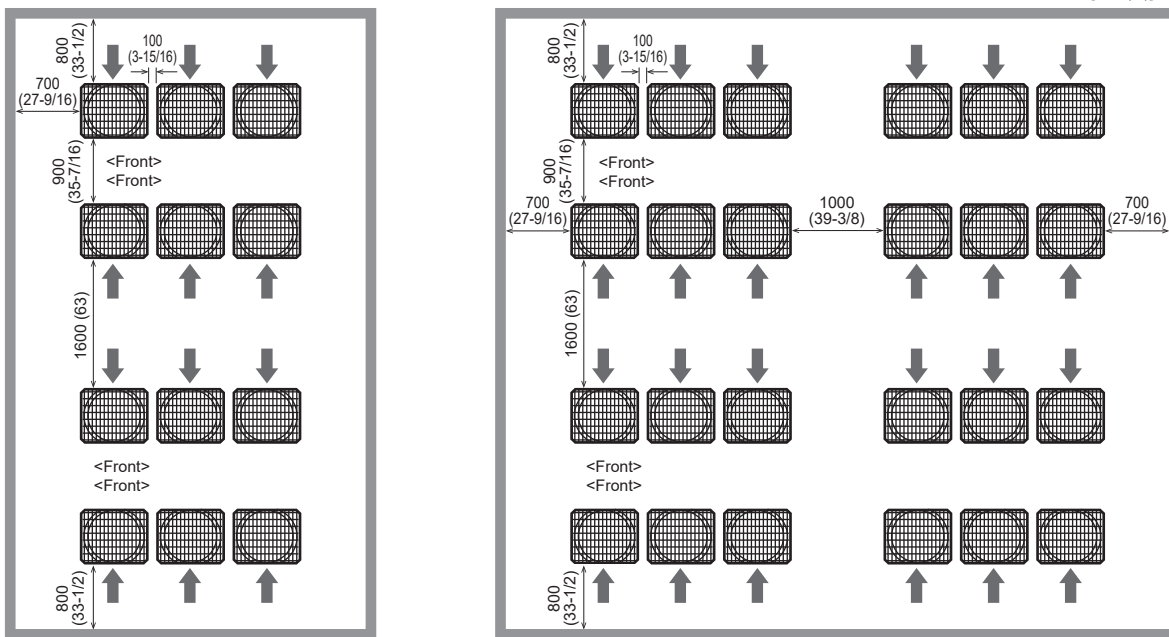
When there are two walls in an L-shape



Required minimum distance [mm (in)]		
L ₂ (Rear)	L ₃ (Right/Left)	L ₄ (Between)
300 (11-13/16) + h/2	1000 (39-3/8) + h/2	900 (35-7/16)

Ⓐ Leave open in two directions.

(4) Example of installation in a walled-in area



↑ The height of the wall should be equal to or lower than the top of the outdoor unit.

↑ The height of the wall should be equal to or lower than the top of the outdoor unit.

* When installing the outdoor unit in a walled-in area, in addition to the above restrictions, adhere to the installation restrictions for locations where refrigerant can stagnate specified in section 7-3-4.

7-3. Restrictions on installation environment of outdoor units

If the outdoor unit is installed in a place where the refrigerant easily stagnates, the refrigerant may burn in the case of refrigerant leakage. Be sure to follow the installation restrictions below.

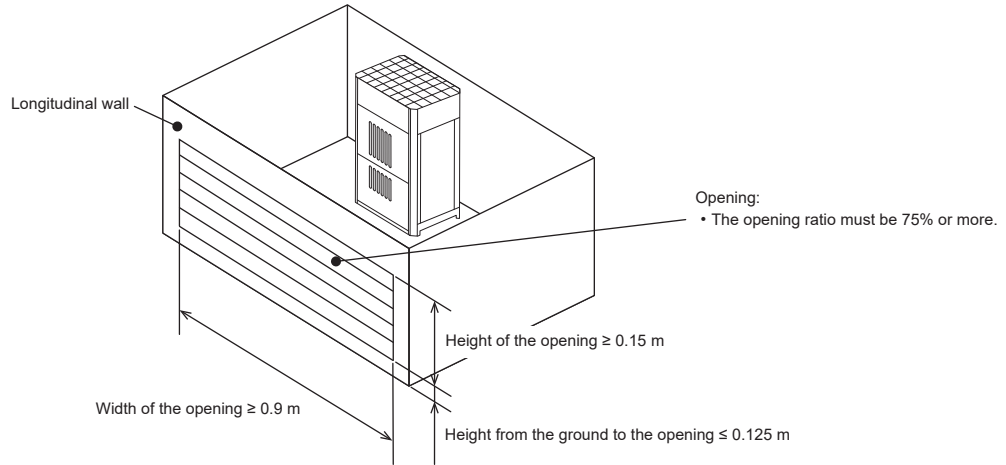
When installing the outdoor units in such places, do not install combustion appliances such as boilers together. Leaked refrigerant may catch fire.

7-3-1. Restrictions when installing outdoor units in a machine room

If the outdoor unit is installed in a machine room, refer to ISO 5149-3:2014 Clause 5 and ISO 5149-3:2014/AMD1:2021, 5.13, 5.14 and 5.15 and install the unit.

7-3-2. Restrictions when installing outdoor units in louvered space

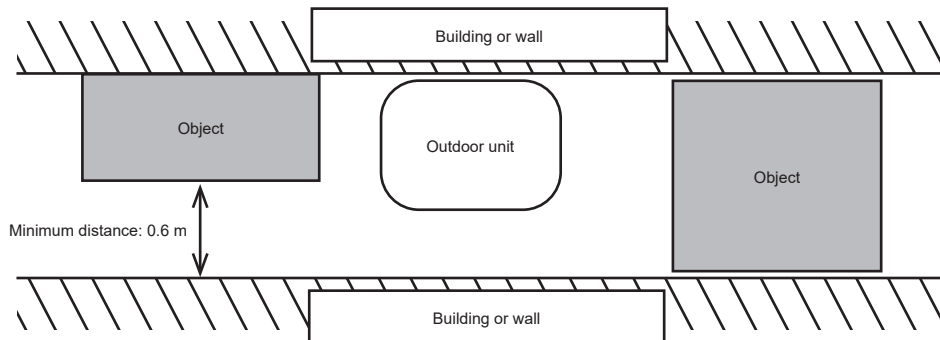
When installing the outdoor unit in louvered space as shown in the figure below, follow the conditions for the openings described in the figure.



7-3-3. Restrictions when installing outdoor units in a confined space

When installing the outdoor unit in a confined space as shown in the figure below, be sure to leave a clearance of at least 0.6 m to prevent the stagnating refrigerant from reaching a high concentration and becoming flammable.

Refer to the specified page for details on the required surrounding space for the outdoor unit. (Refer to 7-1 and 7-2.)



7-3-4. Restrictions when installing outdoor units in locations where refrigerant can stagnate

When installing the outdoor unit in locations where refrigerant can stagnate (e.g., walled-in areas or semi-basements), in addition to the locations mentioned in sections 7-3-1 to 7-3-3, install mechanical ventilation devices. If the following equation is satisfied, install the mechanical ventilation device as shown in the figure below.

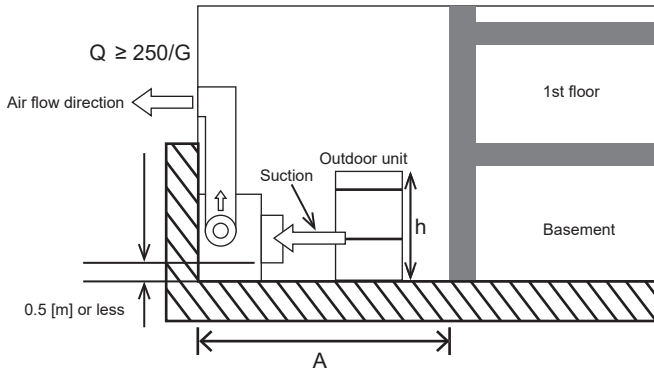
The outdoor unit is not equipped with a refrigerant leak sensor or an agitation function to activate the fan in the event of a refrigerant leak.

$$m > 0.5 \times G \times A \times h_e$$

* If this expression is satisfied, install the ventilation device shown below.

* Use a detector suitable for the refrigerant being used and interlock it with a mechanical ventilation device, or use a mechanical ventilation device that operates continuously.

m: Total amount of refrigerant [kg]
 G: LFL (lower flammability limit) = 0.307 [kg/m³]
 A: Recessed area (excluding the area of the building) [m²]
 h: Product height [m]
 h_e: Value obtained by multiplying the product height h by 0.8 [m]



Q: Ventilation flow rate [m³/h]
 G: LFL (lower flammability limit) = 0.307 [kg/m³]
 However, the height of the bottom of the duct must be 0.5 [m] or less.
 * Do not install any devices that could be an ignition source inside the duct.

If there are applicable local rules or regulations, compare them with the restrictions mentioned above and take the safer measures when installing the outdoor units.

8. Foundation work

⚠ WARNING

Install the unit in accordance with the instructions to minimize the risk of damage from earthquakes and strong winds.

- Improper installation will cause the unit to topple, resulting in serious injury.

To reduce the vibration of the unit operation, irrespective of the cause of the vibration such as earthquakes and strong winds, perform the foundation work in accordance with the installation instructions (including the instructions for installing anti-vibration rubber pads) provided in this section.

The unit must be securely installed on a structure that can sustain its weight.

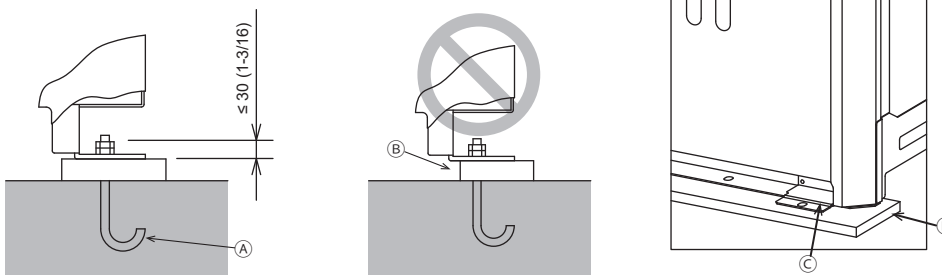
- Failure to do so will cause the unit to fall, resulting in serious injury. Abnormal vibrations that result from improper installation can generate abnormal sound and damage the pipes, resulting in refrigerant gas leakage.

Take adequate measures against natural disasters including earthquakes and windstorms so that the unit will not fall or tip over. Consult your local specialist for safety measures to be taken.

- When performing the foundation work, make sure that the floor surface has sufficient strength and carefully route pipes and wires in consideration of the water drainage that will be required when the unit is operated.
- If considering routing the pipes and wires across the bottom of the unit, make sure that the base is at least 100 mm (3-15/16 in) high so that the through-holes will not be blocked.
- Provide a strong base of concrete or angle iron. If a stainless steel base is used, insulate the area between the base and the outdoor unit by putting a rubber cushion or by applying an electrically insulated coating to prevent the base from rusting.
- Install the unit on a level surface.
- With some types of installation, unit vibration and sound will be transmitted to the floors and walls. Excessive vibrations can damage the pipes, resulting in refrigerant gas leakage. Take measures to prevent vibration (such as using anti-vibration rubber pads).
- Securely bolt down the unit as illustrated below so that it will not fall over when subject to wind gusts or earthquakes.

[mm (in)]

(1) Without a detachable leg

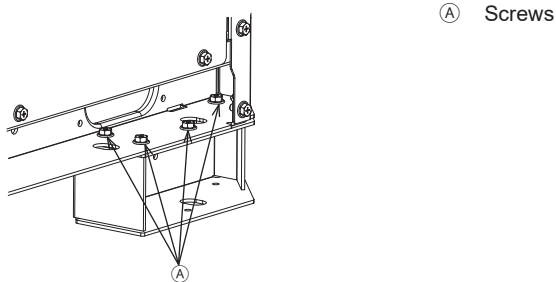


(2) With a detachable leg



- (A) M12 anchor bolt (not supplied)
* Required specification for M12 anchor bolt: Tensile load of 5.6 kN or more to withstand the short-term load caused by earthquakes or strong winds
- (B) (Incorrect installation) The corner section is not securely received.
- (C) Fixing bracket for M12 hole-in anchor bolt (not supplied) (to be fixed with three M5 self-tapping screws)
* Required specification for M12 hole-in anchor bolt: Tensile load of 6.7 kN or more to withstand the short-term load caused by earthquakes or strong winds
Use the fixing bracket with sufficient strength.
- (D) Anti-vibration rubber pad
(The pad needs to be large enough to cover the entire width of each unit leg.)
- (E) Detachable leg

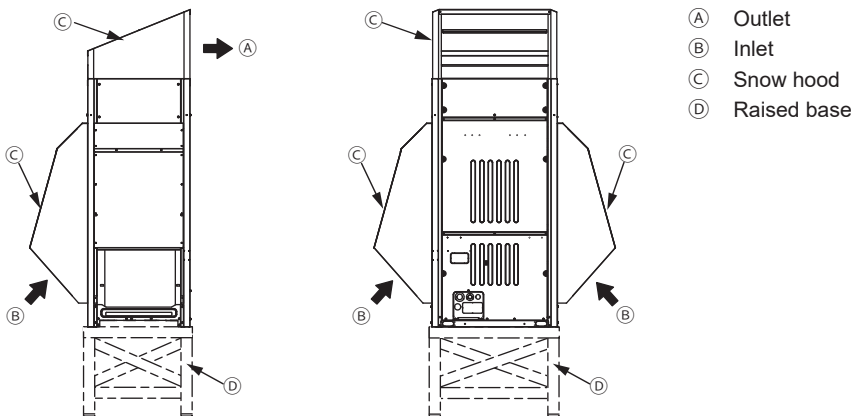
- Make sure that the corner section is securely received. If not, the unit legs could bend.
- The detachable legs must be properly supported by both the anti-vibration rubber pads and the base so that the unit legs will not be deformed or the refrigerant gas will not leak from the unit pipes. When the detachable legs are not used, all the bottom corners of the unit must still be supported by both the anti-vibration rubber pads and the base. Abnormal vibrations that result from improper installation can generate abnormal sound and damage the pipes, resulting in refrigerant gas leakage.
- The length of the projecting part of the anchor bolt should be 30 mm (1-3/16 in) or less.
- This unit is not designed to be anchored with post-installed anchor bolts unless fixing brackets are installed at the bottom four locations.
- To remove the detachable legs on site, unscrew the screws shown in the figure below. If the unit leg coating is damaged when the detachable leg is removed, repair the coating on site.



- Take adequate measures against wind or snow in cold or windy areas to ensure the proper operation of the unit. Failing to install a snow hood may cause the unit to malfunction, leading to serious issues such as gas leak due to freezing of the heat exchanger or insufficient cooling/heating. In any of the following cases, install a snow hood:

- (1) The unit may be exposed to snow accumulation.
- (2) The unit may be exposed to strong winds.
- (3) The outside temperature could drop below -20°C (-4°F).
* Applicable when single module EM350 to EM500 models or combination module EM650 to EM1000 models are used.
- (4) The unit operates in cooling mode at 10°C (50°F) or lower.

Material: Galvanized steel plate 1.2T
 Painting: Overall painting with polyester powder
 Color: (M model) Munsell 3.0Y 7.8/1.1 (same as the unit color)
 (EM model) Munsell 5Y8/1 (same as the unit color)



- Install the unit so that the wind will not blow directly against the inlet and outlet.
- If necessary, install the unit on a raised base of the following specifications (not supplied) to prevent damage from snow.

Material: Angle iron (Build a structure that snow and wind can pass through.)
 Height: Expected maximum snowfall plus 500 mm (19-11/16 in)
 Width: Within the unit width (If the raised base is too wide, snow will accumulate on the raised base.)

- When the unit is used in a cold region and the heating operation is continuously performed for a long time when the outside air temperature is below freezing, install a heater on the raised base or take other appropriate measures to prevent water from freezing on the raised base.
- If a drain pan for centralized drainage is used in cold regions, install the drain pan so that freezing does not damage the equipment.
- When installing a snow hood, take pressure loss into consideration to prevent airflow from decreasing.
- Avoid installing a trestle or other structure under the drainage hole in the bottom plate as much as possible.
- If icicles form on the bottom plate, regularly remove them to prevent them from reaching the trestle or ground and growing under the outdoor unit.

9. Refrigerant piping work

WARNING

Do not use any refrigerant other than the type indicated in the manuals for the unit and on the nameplate.

- Doing so will cause the unit or pipes to burst, or result in an explosion or fire during use, during repairs, or at the time of disposal of the unit.
 - It may also be in violation of applicable laws.
 - MITSUBISHI ELECTRIC CORPORATION cannot be held responsible for malfunctions or accidents resulting from the use of the wrong type of refrigerant.
-

After the installation has been completed, check for refrigerant leaks.

- If the refrigerant leaks, oxygen starvation may result. If the leaked refrigerant comes in contact with a heat source, toxic gas will be generated.
-

CAUTION

Wear protective gloves when working on the unit.

- Failure to do so may result in injury.
 - High-pressure pipes poses a risk of burns if touched with bare hands while the unit is in operation.
-

CAUTION

To reduce the risk of failures of the compressor or valves, follow the instructions below to prevent abrasive components contained in sandpaper or cutting tools, hard foreign matter in concrete, gravel, etc. from entering the refrigerant circuit.

- To deburr pipes, use a reamer or other deburring tools, not sandpaper or sanding tools that use abrasive materials.
 - To cut pipes, use a pipe cutter, not a grinder or other tools that use abrasive materials.
 - When cutting or deburring pipes, do not allow cutting chips or other foreign matters to enter the pipes.
 - If cutting chips or other foreign matters entered pipes, wipe inside the pipes to remove them.
-

Use the following tools specifically designed for use with the specified refrigerant: Gauge manifold, charge hose, gas leak detector, check valve, refrigerant charge base, vacuum gauge, and refrigerant recovery equipment.

- Gas leak detectors for conventional refrigerants will not react to a refrigerant that does not contain chlorine.
 - If the specified refrigerant is mixed with water, refrigerant oil, or another refrigerant, the refrigerant oil will deteriorate and the compressor will malfunction.
 - If tools are used for both R32 and R410A, perform a nitrogen purge to remove refrigerant oil or other substances on the tools before using them.
Nitrogen purge method
Set the nitrogen pressure to 1.0 MPa (145 psi) and purge with nitrogen for 10 seconds. Close the hole on the other side of the tool with a rag.
-

Do not use existing refrigerant piping.

- The old refrigerant and refrigerant oil in the existing piping contain a large amount of chlorine, which will cause the refrigerant oil in the new unit to deteriorate and cause the compressor to malfunction.

9-1. Restrictions

- Existing refrigerant piping must not be used because the design pressure for systems using R32 is higher than that for systems using other types of refrigerants.
- Do not install outdoor unit piping when it is raining.
- Do not use special detergents for washing piping.
- Always observe the restrictions on refrigerant piping (such as pipe size, pipe length, and vertical separation distance) to prevent equipment failure or a decline in heating/cooling performance.
- Refer to the Data Book for restrictions on the piping length.
- Support the on-site pipes near the outdoor unit at 0.5-meter intervals or less, and at 2-meter intervals or less in other areas. Support the pipes so that the bending part is securely fixed in place.
- Do not install solenoid valves to prevent oil backflow and compressor start-up failure.
- Do not install a sight glass because it may show improper refrigerant flow. If a sight glass is installed, inexperienced technicians that use the glass may overcharge the refrigerant.
- Refrigerant pipes may expand or shrink due to temperature fluctuations of the refrigerant inside the pipes. When installing long straight pipes, provide expansion loops or offsets to absorb the thermal expansion of the pipes.

- The pipe from multiple outdoor units must be installed so that oil will not accumulate in the pipe under certain conditions. Refer to the figures below for details.

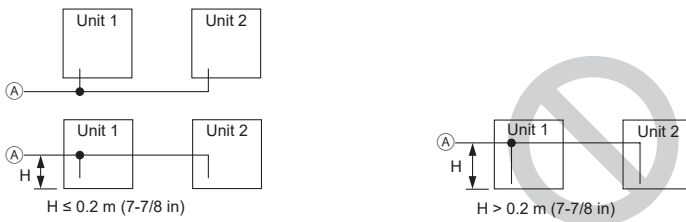
* Small dots in the figures indicate branching points.

(A) To a BC controller

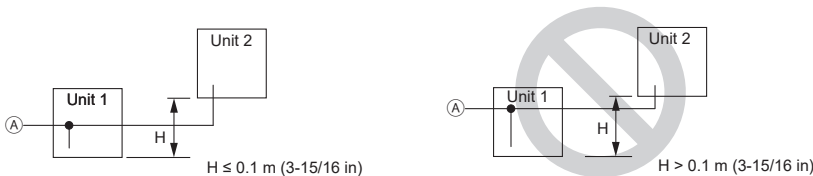
- The pipe from the outdoor units must be inclined downward to the indoor unit side. In the figure on the right, because the pipe is inclined upward, the oil in the pipe accumulates when Unit 1 is in operation and Unit 2 is stopped.



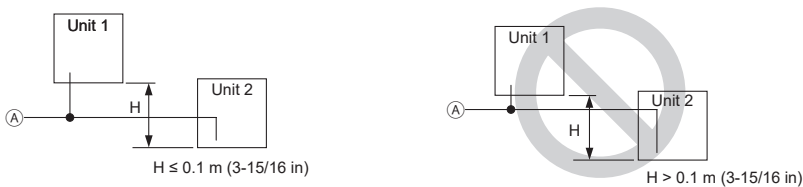
- The distance between the unit bottom and the pipe (H) must be 0.2 m ($7\text{-}7/8\text{ in}$) or below. In the figure on the right, because the distance is more than 0.2 m ($7\text{-}7/8\text{ in}$), the oil accumulates in Unit 1 when Unit 2 is in operation and Unit 1 is stopped.



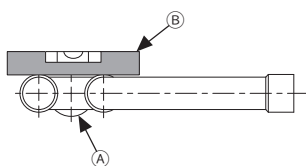
- The vertical separation between units (H) must be 0.1 m ($3\text{-}15/16\text{ in}$) or below. In the figure on the right, because the distance is more than 0.1 m ($3\text{-}15/16\text{ in}$), the oil accumulates in Unit 1 when Unit 2 is in operation and Unit 1 is stopped.



- The vertical separation between units (H) must be 0.1 m ($3\text{-}15/16\text{ in}$) or below. In the figure on the right, because the distance is more than 0.1 m ($3\text{-}15/16\text{ in}$), the oil accumulates in Unit 2 when Unit 1 is in operation and Unit 2 is stopped.

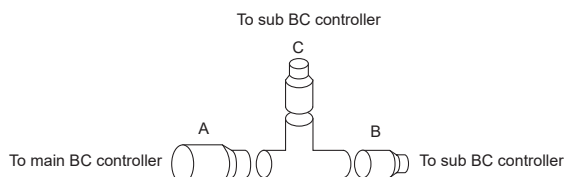


- The Twinning kit must be installed horizontally using a level vessel to avoid unit damage.



(A) Twinning kit
(B) Level vessel

- Restriction on installing the 2-Branch Joint Pipe between main BC and sub BC on the high-pressure piping, low-pressure piping, and liquid piping.
 - When the total capacity of indoor units exceeds M80, use the joint piping kit (model name: CMY-R170M-E) to connect the units.

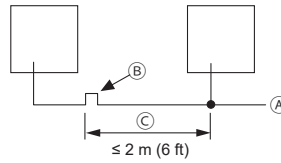
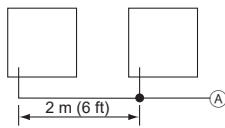


- Regarding the 2-Branch Joint Pipe between main BC and sub BC on the high-pressure/low-pressure/liquid piping, A and B must be installed horizontally, and C must be installed upward higher than the horizontal plane of A and B.

- If the length of the pipe between the branching point and the outdoor unit exceeds 2 m (6 ft), provide a trap within 2 m (6 ft) from the branching point.

The trap must be at least 200 mm (7-7/8 in) in height. (high-pressure pipe only) If there is no trap, oil can accumulate inside the pipe, causing a shortage of oil and may damage the compressor.

* Small dots in the figures indicate branching points.



- (A) To a BC controller
- (B) Trap (high-pressure pipe only)
- (C) High-pressure pipe

9-2. Pipe selection

CAUTION

Use refrigerant piping made of phosphorus deoxidized copper (copper and copper alloy seamless pipes) that meets local requirements. Pipe joints should also meet local requirements. Keep the inner and outer surfaces of the pipes clean and free of sulphur, oxides, dust/dirt, shaving particles, oils, moisture, or any other contaminants.

- Contaminants on the inside of the refrigerant piping will cause the refrigerant oil to deteriorate and cause the compressor to malfunction.

Use refrigerant pipes for use with R32 refrigerant system. Piping for systems for use with other types of refrigerants may not be able to be used. Use refrigerant pipes with the thicknesses specified in the table below.

Size [mm (in)]	Radial thickness [mm (mil)]	Type
ø6.35 (ø1/4)	0.8 (32)	Type-O
ø9.52 (ø3/8)	0.8 (32)	Type-O
ø12.7 (ø1/2)	0.8 (32)	Type-O
ø15.88 (ø5/8)	1.0 (40)	Type-O
ø19.05 (ø3/4)	1.2 (48)	Type-O
	1.0 (40)	Type-1/2H or H
ø22.2 (ø7/8)	1.0 (40)	Type-1/2H or H
ø25.4 (ø1)	1.0 (40)	Type-1/2H or H
ø28.58 (ø1-1/8)	1.0 (40)	Type-1/2H or H
ø31.75 (ø1-1/4)	1.1 (44)	Type-1/2H or H
ø34.93 (ø1-3/8)	1.2 (48)	Type-1/2H or H
ø41.28 (ø1-5/8)	1.4 (56)	Type-1/2H or H

9-3. Twinning kit selection

Select appropriate twinning kits (sold separately), referring to the sections below.

* Use an adapter, if necessary, to connect a refrigerant pipe to a twinning pipe of a different diameter.

9-3-1. 2-Branch Joint Pipe

A 2-Branch Joint Pipe is used to connect multiple indoor units to a port, or to connect sub BC controllers.

2-Branch Joint Pipe between BC controllers and indoor units

Total capacity of downstream indoor units	Kit model
200 or below	CMY-Y102SS-G2
201 to 250	CMY-Y102LS-G2

2-Branch Joint Pipe between main and sub BC controllers

Total capacity of downstream indoor units	Kit model
350 or below	CMY-R201S-G
351 to 600	CMY-R202S-G
601 to 650	CMY-R203S-G
651 to 1000	CMY-R204S-G
1001 or above	CMY-R205S-G

9-3-2. Joint Pipe Kit

A Joint Pipe Kit is used to connect an indoor unit of 100 model or above.

Indoor unit model	Kit model
100 to 250	CMY-R170M-E

* When connecting 100 through 250 models of indoor units to two ports, set the dipswitch SW1-2 on the BC controller to ON.

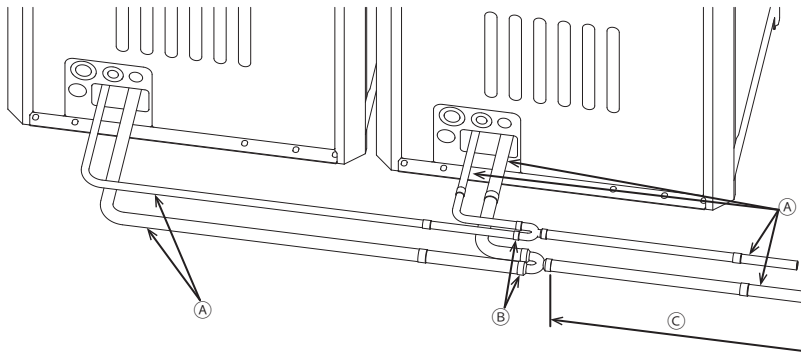
9-3-3. Outdoor unit twinning kit

Outdoor unit twinning kit is used to combine multiple outdoor units.

Total capacity of outdoor units	Kit model
(E)M400 to (E)M650YSXM	CMY-R100VBK4
(E)M700 to (E)M1000YSXM	CMY-R200VBK4

9-4. Pipe connection example

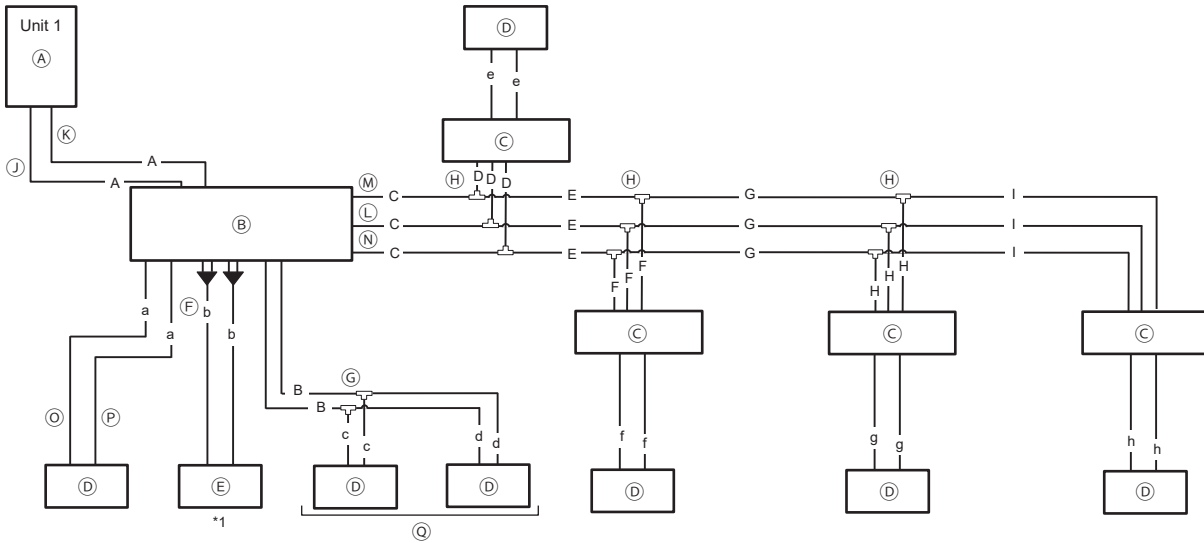
9-4-1. Example of pipe connection between outdoor units



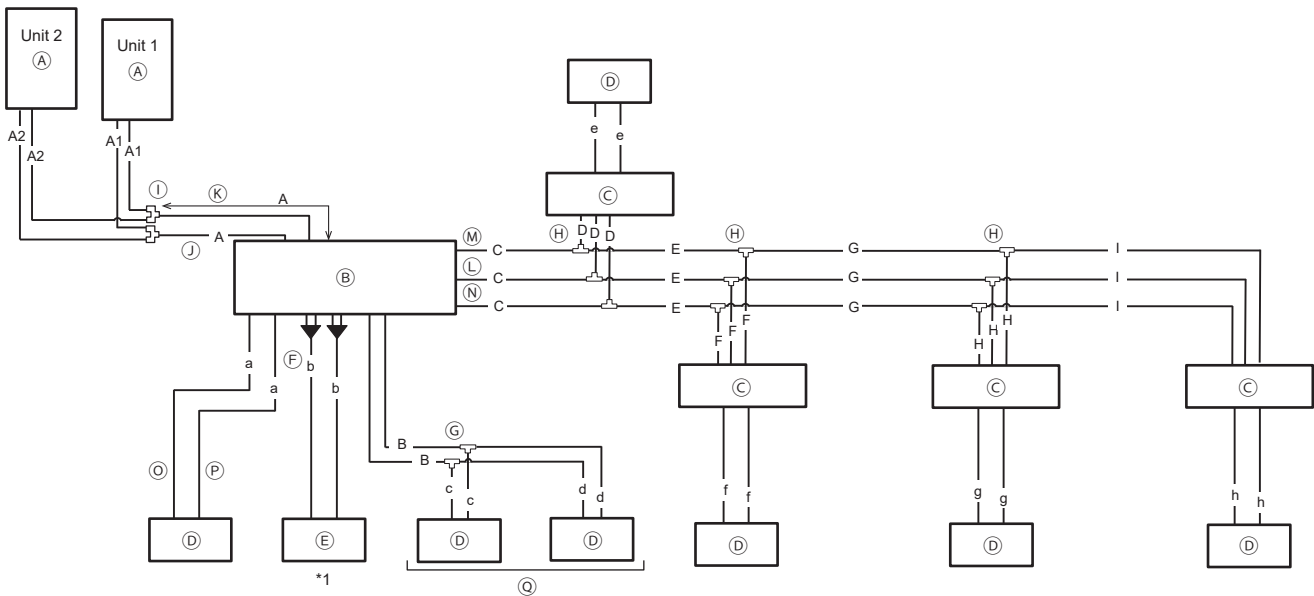
- Ⓐ On-site piping
- Ⓑ Twinning Kit
- Ⓒ The pipe section before the twinning pipe must have at least 500 mm (19-11/16 in) of straight section.

9-4-2. Example of pipe connection between an outdoor unit and BC controller, and between a BC controller and indoor unit (R2 system)

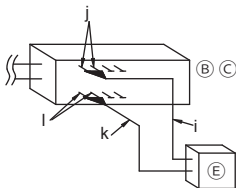
Single modules



Combination modules



*1



- (A) Outdoor unit
- (B) BC controller (Main)
- (C) BC controller (Sub)
- (D) Indoor unit (Total capacity of downstream indoor units: 10 to 80)
- (E) Indoor unit (Total capacity of downstream indoor units: 100 to 250)
- (F) Joint Pipe Kit
- (G) 2-Branch Joint Pipe between BC controller and indoor units
- (H) 2-Branch Joint Pipe between main and sub BC controllers
- (I) Outdoor unit twinning kit
- (J) High-pressure pipe (A, A1, A2)
- (K) Low-pressure pipe (A, A1, A2)
- (L) High-pressure pipe (C, D, E, F, G, H, I)
- (M) Low-pressure pipe (C, D, E, F, G, H, I)
- (N) Liquid pipe (C, D, E, F, G, H, I)
- (O) Liquid pipe (a, b, c, d, e, f, g, h)
- (P) Gas pipe (a, b, c, d, e, f, g, h)
- (Q) Up to three units for 1 port
Total capacity: 80 or below. (All the indoor units connected to the same port must be operated in the same mode.)

Unit model	Combination unit		Pipe A		Pipe A ₁ ^{*1}		Pipe A ₂ ^{*1}	
	Unit 1	Unit 2	High-pressure	Low-pressure	High-pressure	Low-pressure	High-pressure	Low-pressure
(E)M200YXM	-	-	ø15.88 (5/8)	ø19.05 (3/4)	-	-	-	-
(E)M250YXM	-	-	ø19.05 (3/4)	ø22.2 (7/8)	-	-	-	-
(E)M300YXM	-	-	ø19.05 (3/4)	ø22.2 (7/8)	-	-	-	-
(E)M350YXM	-	-	ø19.05 (3/4)	ø28.58 (1-1/8)	-	-	-	-
(E)M400YXM	-	-	ø22.2 (7/8)	ø28.58 (1-1/8)	-	-	-	-
(E)M450YXM	-	-	ø22.2 (7/8)	ø28.58 (1-1/8)	-	-	-	-
(E)M500YXM	-	-	ø22.2 (7/8)	ø28.58 (1-1/8)	-	-	-	-
(E)M400YSXM	(E)M200	(E)M200	ø22.2 (7/8)	ø28.58 (1-1/8)	ø15.88 (5/8)	ø19.05 (3/4)	ø15.88 (5/8)	ø19.05 (3/4)
(E)M450YSXM	(E)M250	(E)M200	ø22.2 (7/8)	ø28.58 (1-1/8)	ø19.05 (3/4)	ø22.2 (7/8)	ø15.88 (5/8)	ø19.05 (3/4)
(E)M500YSXM	(E)M250	(E)M250	ø22.2 (7/8)	ø28.58 (1-1/8)	ø19.05 (3/4)	ø22.2 (7/8)	ø19.05 (3/4)	ø22.2 (7/8)
(E)M550YSXM	(E)M300	(E)M250	ø22.2 (7/8) ^{*2}	ø28.58 (1-1/8)	ø19.05 (3/4)	ø22.2 (7/8)	ø19.05 (3/4)	ø22.2 (7/8)
(E)M600YSXM	(E)M300	(E)M300	ø22.2 (7/8) ^{*2}	ø28.58 (1-1/8)	ø19.05 (3/4)	ø22.2 (7/8)	ø19.05 (3/4)	ø22.2 (7/8)
(E)M650YSXM	(E)M350	(E)M300	ø28.58 (1-1/8)	ø28.58 (1-1/8)	ø19.05 (3/4)	ø28.58 (1-1/8)	ø19.05 (3/4)	ø22.2 (7/8)
(E)M700YSXM	(E)M350	(E)M350	ø28.58 (1-1/8)	ø34.93 (1-3/8)	ø19.05 (3/4)	ø28.58 (1-1/8)	ø19.05 (3/4)	ø28.58 (1-1/8)
(E)M750YSXM	(E)M400	(E)M350	ø28.58 (1-1/8)	ø34.93 (1-3/8)	ø22.2 (7/8)	ø28.58 (1-1/8)	ø19.05 (3/4)	ø28.58 (1-1/8)
(E)M800YSXM	(E)M400	(E)M400	ø28.58 (1-1/8)	ø34.93 (1-3/8)	ø22.2 (7/8)	ø28.58 (1-1/8)	ø22.2 (7/8)	ø28.58 (1-1/8)
(E)M850YSXM	(E)M450	(E)M400	ø28.58 (1-1/8)	ø41.28 (1-5/8)	ø22.2 (7/8)	ø28.58 (1-1/8)	ø22.2 (7/8)	ø28.58 (1-1/8)
(E)M900YSXM	(E)M450	(E)M450	ø28.58 (1-1/8)	ø41.28 (1-5/8)	ø22.2 (7/8)	ø28.58 (1-1/8)	ø22.2 (7/8)	ø28.58 (1-1/8)
(E)M950YSXM	(E)M500	(E)M450	ø28.58 (1-1/8)	ø41.28 (1-5/8)	ø22.2 (7/8)	ø28.58 (1-1/8)	ø22.2 (7/8)	ø28.58 (1-1/8)
(E)M1000YSXM	(E)M500	(E)M500	ø28.58 (1-1/8)	ø41.28 (1-5/8)	ø22.2 (7/8)	ø28.58 (1-1/8)	ø22.2 (7/8)	ø28.58 (1-1/8)

*1 If the combination units 1 and 2 are in a different order as listed in the table, make sure to use the pipes of appropriate size for the situation.

*2 If the length of "High-pressure pipe A" exceeds 65 m (213 ft), use the ø28.58 (ø1-1/8) pipes for all pipes after 65 m (213 ft).

Total capacity of indoor units	Pipe	
	Liquid	Gas
	80 or below	ø9.52 (ø3/8)

Total model number of downstream indoor units	Pipe		
	High-pressure	Low-pressure	Liquid
200 or below	ø15.88 (ø5/8)	ø19.05 (ø3/4)	ø9.52 (ø3/8)
201 to 300	ø19.05 (ø3/4)	ø22.2 (ø7/8)	ø9.52 (ø3/8)
301 to 350	ø19.05 (ø3/4)	ø28.58 (ø1-1/8)	ø12.7 (ø1/2)
351 to 400	ø22.2 (ø7/8)	ø28.58 (ø1-1/8)	ø12.7 (ø1/2)
401 to 600	ø22.2 (ø7/8)	ø28.58 (ø1-1/8)	ø15.88 (ø5/8)
601 to 650	ø28.58 (ø1-1/8)	ø28.58 (ø1-1/8)	ø15.88 (ø5/8)
651 to 800	ø28.58 (ø1-1/8)	ø34.93 (ø1-3/8)	ø19.05 (ø3/4)
801 to 1000	ø28.58 (ø1-1/8)	ø41.28 (ø1-5/8)	ø19.05 (ø3/4)
1001 or above	ø34.93 (ø1-3/8)	ø41.28 (ø1-5/8)	ø19.05 (ø3/4)

Capacity index of indoor unit	Pipe	
	Liquid	Gas
10, 15, 20, 25, 32, 40, 50	ø6.35 (ø1/4)	ø12.7 (ø1/2)
63, 71, 80	ø6.35 (ø1/4) ^{*1}	ø15.88 (ø5/8)
100, 125, 140	ø9.52 (ø3/8)	ø15.88 (ø5/8)
200	ø9.52 (ø3/8)	ø19.05 (ø3/4)
250	ø9.52 (ø3/8)	ø22.2 (ø7/8)

*1 If the length of the liquid pipe exceeds the following restriction, use the one size larger pipe.

63 model	40 m
71 model	40 m
80 model	35 m

Capacity index of indoor unit	Liquid pipe		Gas pipe	
	i	j	k	l
100	ø9.52 (ø3/8)	ø9.52 (ø3/8)	ø15.88 (ø5/8)	ø15.88 (ø5/8)
125	ø9.52 (ø3/8)	ø9.52 (ø3/8)	ø15.88 (ø5/8)	ø15.88 (ø5/8)
140	ø9.52 (ø3/8)	ø9.52 (ø3/8)	ø15.88 (ø5/8)	ø15.88 (ø5/8)
200	ø9.52 (ø3/8)	ø9.52 (ø3/8)	ø19.05 (ø3/4)	ø15.88 (ø5/8)
250	ø9.52 (ø3/8)	ø9.52 (ø3/8)	ø22.2 (ø7/8)	ø15.88 (ø5/8)

* If the length of high-pressure pipe or liquid pipe exceeds the restriction, use the one size larger pipe. Refer to the BC controller Installation Manual for details.

9-5. Piping connections and valve operations

WARNING

Before heating the brazed sections, remove the gas and oil that are trapped in the pipes.

- Failure to do so may generate fire, resulting in serious injury.
-

Ventilate the room while servicing the unit.

- If the refrigerant leaks, oxygen deficiency may result. If the leaked refrigerant comes in contact with a heat source, toxic gas will be generated.
-

CAUTION

Store pipes indoors, and keep both ends of the pipes sealed until just before making a flare connection or brazing. (Store elbows and other joints in plastic bags.)

- If dust, dirt, or water enters the refrigerant lines, the refrigerant oil will deteriorate and the compressor will malfunction.
-

Keep the service valves closed until refrigerant charging is completed.

- Failure to do so will damage the unit.
-

Place a wet towel on the service valves before brazing the pipes to keep the temperature of the valves from rising above 120°C (248°F).

- Failure to do so may result in equipment damage.
-

Keep the flame out of contact with the cables and metal sheet when brazing the pipes.

- Failure to do so may result in burnout or malfunction.
-

Braze the pipes with a nitrogen purge to avoid oxidation.

- Oxidized flux inside the refrigerant pipes will cause the refrigerant oil to deteriorate and cause the compressor to malfunction.
-

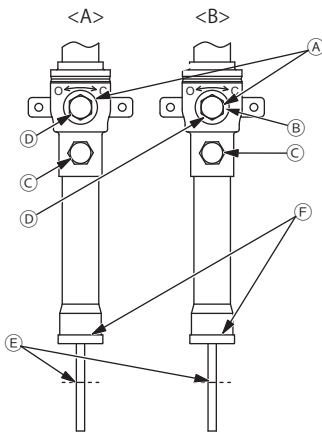
Wear protective gloves when working on the unit.

- Failure to do so may result in injury.
-

9-5-1. Removing the pinched connecting pipes

The unit is shipped with the pinched connecting pipes attached to the high- and low-pressure side service valves to prevent gas leakage. Take the following steps ① through ③ to remove the pinched connecting pipes before connecting refrigerant pipes to the outdoor unit.

- ① Check that the service valves are fully closed (turned clockwise all the way).
- ② Remove the gas in the pinched connecting pipes, and drain out all the refrigerant oil. (See ⑤ below.)
- ③ Remove the pinched connecting pipes. (See ⑥ below.)



<A> Refrigerant service valve (high-pressure/brazed)

 Refrigerant service valve (low-pressure/brazed)

(A) Valve shaft

The unit is shipped with the valve closed. Keep the valve closed while connecting pipes or evacuating the system. Open the valve upon completion of this work.

Turn the shaft counterclockwise as far as it will go (90°) to open the valve, and clockwise to close it.

(B) Stopper pin

Prevents the shaft from turning 90° or more.

(C) Service port

Through the service ports, you can charge refrigerant, remove the gas in the pinched connecting pipes, or evacuate the system. (Tightening torque 16 N·m)

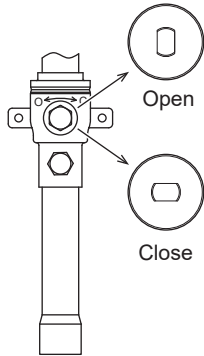
(D) Cap

Remove the cap before turning the shaft. Put the cap back on upon completion of all work.

(E) Severed section of the pinched connecting pipe

(F) Brazed section of the pinched connecting pipe

Opening or closing direction of the valve
(high-pressure or low-pressure/brazed)



Shaft

The shaft is fully closed by default.

Keep it fully closed during piping installation and vacuum drying, and fully open it after completing the installation.

<When opening>

- Turn the shaft counterclockwise.
- Turn the shaft until it stops.

<When closing>

- Turn the shaft clockwise.
- Turn the shaft until it stops.

- Refer to the table below for the tightening torque of the cap.

	Refrigerant service valve piping size (mm)	Cap (N·m)
High-pressure or low-pressure side	ø28.58	22

9-5-2. Connecting pipes

- The refrigerant pipe from the outdoor unit is branched at the pipe end, and each branch is then connected to an indoor unit.

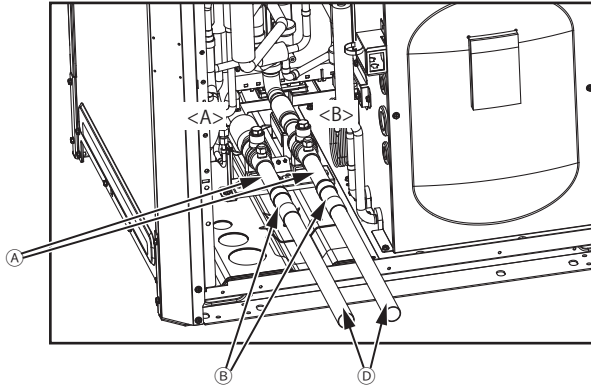
		Connecting method
Indoor unit		Brazed or flared
Outdoor unit	High-pressure pipe	Brazed
	Low-pressure pipe	Brazed
Branched section		Brazed

- When connecting pipes, make sure the service valves are completely closed.
- Commercially available pipes often contain dust or debris. Always blow them clean with a dry inert gas.
- Take care to prevent dust, water or other contaminants from entering the pipes during installation.
- Reduce the number of bending portions as much as possible, and make the bending radius as big as possible.
- Do not use any commercially available anti-oxidizing agents since they may cause pipe corrosion and degrading of the refrigerant oil. Please contact Mitsubishi Electric for more details.
- Make sure that the pipes are not in contact with each other, unit panels, or base plates.
- Refer to the twinning kit Installation Manual for how to install the twinning kit.

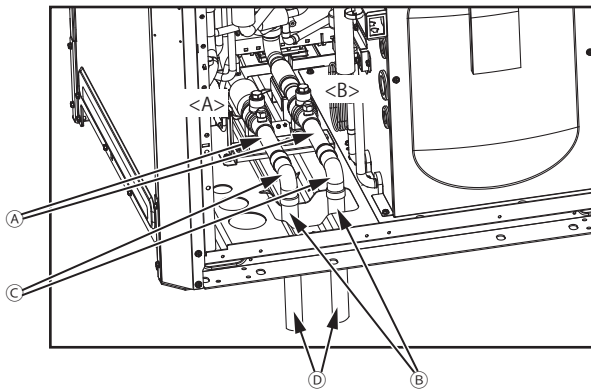
<Refrigerant piping connection examples>

• Obtain joints and elbows on site as necessary according to the pipe diameter, and connect the pipes as shown in the figures below.

(1) When routing the pipes through the front of the unit



(2) When routing the pipes through the bottom of the unit

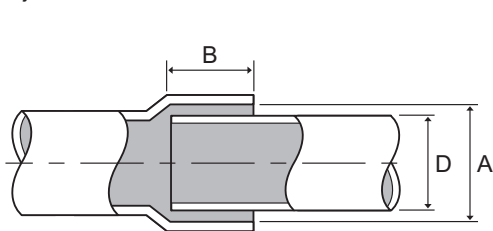


- <A> High-pressure side
- Low-pressure side
- Ⓐ Refrigerant service valve pipe
- Ⓑ Reducer etc.
- Ⓒ Elbow
- Ⓓ On-site pipe

<Reference> Size of refrigerant pipes

	On-site piping [mm (in)]		Service valve piping [mm (in)]	
	High-pressure side	Low-pressure side	High-pressure side	Low-pressure side
(E)M200	ø15.88 (ø5/8)	ø19.05 (ø3/4)	ø28.58 (ø1-1/8)	ø28.58 (ø1-1/8)
(E)M250	ø19.05 (ø3/4)	ø22.2 (ø7/8)		
(E)M300		ø28.58 (ø1-1/8)		
(E)M350				
(E)M400	ø22.2 (ø7/8)	ø28.58 (ø1-1/8)		
(E)M450				
(E)M500				

• When connecting pipes, satisfy the minimum insertion depth requirement for copper pipe joint, and the gap between the pipe outer wall and the joint inner wall as follows.



Pipe size (D)	Minimum insertion depth (B)	Gap (A-D)
5 or more, less than 8	6 (1/4)	0.05 to 0.35
8 or more, less than 12	7 (5/16)	
12 or more, less than 16	8 (3/8)	0.05 to 0.45
16 or more, less than 25	10 (7/16)	
25 or more, less than 35	12 (1/2)	0.05 to 0.55
35 or more, less than 45	14 (9/16)	

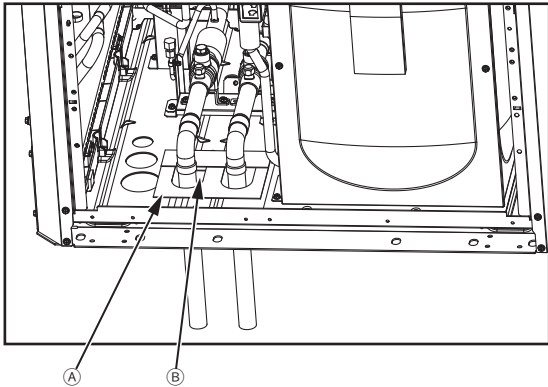
- Do not use a low-temperature brazing material as it is not strong enough.
- When re-brazing the connections, use the same brazing material.
- Use the proper flux based on the base material type, shape, brazing type, and brazing method.
- Keep the heated area to a minimum and braze the pipes at the appropriate temperature.
- To prevent a fire, cover the pipes with a metal sheet and place a wet towel on the pipes.
- After brazing pipes, do not splash water on the pipes to cool them down.
- Avoid giving mechanical shock to the pipes until the brazed sections have solidified.
- Make sure to check the components of the antioxidant before use. The components must not corrode the pipes if mixed with the refrigerant or refrigerant oil.

9-5-3. Sealing the openings around the pipes

! WARNING

Seal all openings around pipes and wires to keep out small animals, rainwater, or snow.

- Failure to do so may result in current leakage, electric shock, or damage to the unit.



- (A) Example of closure materials (not supplied)
- (B) Fill the openings

9-6. Air-tightness test

! WARNING

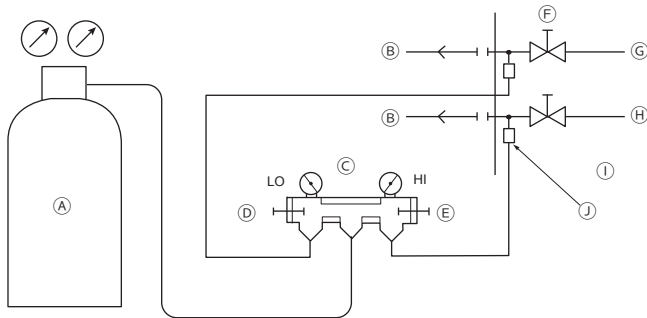
Do not use oxygen, flammable gas, or a refrigerant containing chlorine for air-tightness testing.

- Doing so may result in an explosion. Chlorine will deteriorate the refrigerant oil.

After refrigerant pipe installation is completed, check the system for leaks by conducting an air-tightness test. If there is a leak, the composition of the refrigerant will change and the performance will drop.

<Air-tightness test procedures>

- ① Make sure the service valves are closed.
- ② Add pressure to the refrigerant pipes through the service ports of the high- and low-pressure pipes.
* Pressurize to the design pressure (4.15 MPa) using nitrogen gas.
- ③ If the pressure holds for one day and does not decrease, the pipes have passed the test and there are no leaks. If the pressure decreases, there is a leak. Look for the source of the leak by spraying a bubbling agent (e.g., Gupoflex) on the flared or brazed sections.
- ④ Wipe off the bubbling agent.



- (A) Nitrogen gas
- (B) To indoor unit
- (C) Gauge manifold
- (D) Low pressure knob
- (E) High pressure knob
- (F) Service valve
- (G) Low-pressure pipe
- (H) High-pressure pipe
- (I) Outdoor unit
- (J) Service port

- An air tightness test can be performed before turning on the power since the BC controller is shipped with the valve open. If the system (including the BC controller) has already been turned on, first turn off the power to the outdoor unit or heat source unit, then turn off the power to the BC controller and the indoor units to perform an air tightness test and vacuum drying. When turning on the power, start the BC controller and indoor units first, then start the outdoor unit or heat source unit.

9-7. Thermal insulation for pipes

CAUTION

Insulate pipes to prevent condensation.

- Condensation may collect and drip from the unit onto the ceiling or floor.

Insulate the high- and low-pressure pipes, and liquid and gas pipes separately with polyethylene foam insulation materials. Inadequate insulation may cause condensation to drip. Pipes in the ceiling are especially vulnerable to condensation and require adequate insulation.

9-7-1. Insulation material

- Check that the insulation materials meet the standards in the table below.

Between an outdoor unit and BC controller

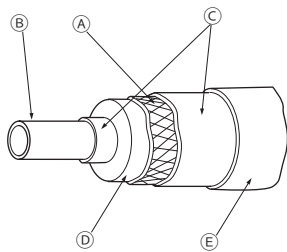
	High-pressure pipe	Low-pressure pipe
Thickness [mm (in)]	Min. 10 (7/16)	Min. 20 (13/16)
Heat resistance	Min. 120°C (248°F)	

Between a BC controller and indoor unit

	Pipe size [mm (in)]	
	ø6.35 (ø1/4)–ø25.4 (ø1)	ø28.58 (ø1-1/8)–ø38.1 (ø1-1/2)
Thickness [mm (in)]	Min. 10 (7/16)	Min. 15 (5/8)
Heat resistance	Min. 120°C (248°F)	

* The insulation thickness may need to be increased in high-temperature/humidity conditions.

* Even when specifications are defined by your client, the standards in the table should be met.

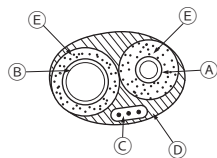
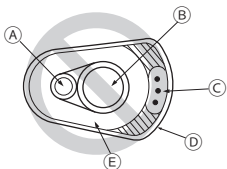


- (A) Steel wire
- (B) Pipe
- (C) Oily mastic asphalt or asphalt
- (D) Insulation material A
- (E) Outer covering B

Insulation material A	Glass fiber + Steel wire	
	Adhesive + Heat-resistant polyethylene foam + Adhesive tape	
Outer covering B	Indoor	Vinyl tape
	Under the floor and exposed	Waterproof hemp cloth + Bronze asphalt
	Outdoor	Waterproof hemp cloth + Zinc plate + Oily paint

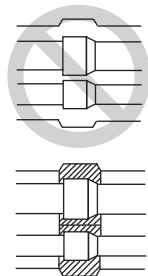
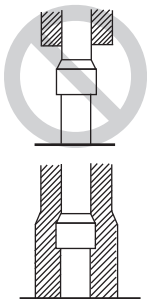
* If a polyethylene cover is used as an outer covering, asphalt roofing is not necessary.

- Insulate the high-pressure or liquid pipe and the low-pressure or gas pipe separately.
- Do not insulate the electric wires.



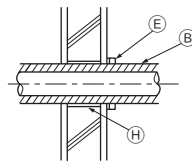
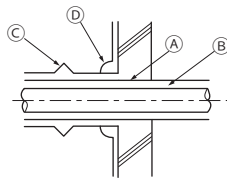
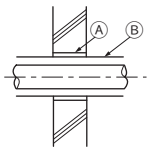
- (A) High-pressure pipe or liquid pipe
- (B) Low-pressure pipe or gas pipe
- (C) Electric wire
- (D) Finishing tape
- (E) Insulation material

- Make sure that the pipe connections all the way from the indoor unit are properly insulated.

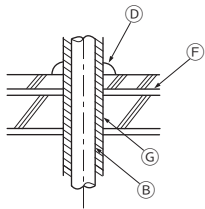


9-7-2. Insulation for the section of the pipe that goes through a wall

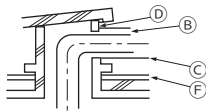
- (1) Inner wall (concealed) (2) Outer wall (3) Outer wall (exposed)



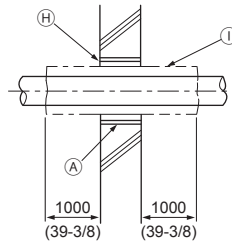
- (4) Floor (waterproof)



- (5) Rooftop pipe shaft



- (6) Protecting the penetrating parts in a fire limit zone or through a parting wall



[mm (in)]

- (A) Sleeve
- (B) Insulation material
- (C) Lagging
- (D) Caulking material
- (E) Band
- (F) Waterproof layer
- (G) Sleeve with a flange
- (H) Caulk with a nonflammable material such as mortar.
- (I) Nonflammable insulation material

• When caulking the gaps with mortar, cover the section of the pipe that goes through the wall with a metal sheet to prevent the insulation material from sagging. For this section, use nonflammable insulation and covering materials. (Vinyl tape should not be used.)

9-8. Evacuation of the system



WARNING

Do not purge the air using refrigerant. Use a vacuum pump to evacuate the system.

- Residual gas in the refrigerant lines will cause bursting of the pipes or an explosion.

CAUTION

Use a vacuum pump with a check valve.

- If the vacuum pump oil flows back into the refrigerant lines, the refrigerant oil may deteriorate and the compressor may malfunction.

When using a vacuum pump, ventilate the surrounding area.

<Evacuation procedures>

- ① Evacuate the system from both service ports, using a vacuum pump with the service valves closed.
- ② After the vacuum reaches 650 Pa (abs) (0.0943 psi/5 Torr), continue evacuation for at least one hour. When the outdoor temperature drops below 1°C (or when the saturation pressure drops below 656 Pa (abs) (0.0951 psi/5 Torr)), continue evacuation for another 1 hour after the vacuum degree has reached the saturated vapor pressure of the water (ice) at the outdoor temperature. When performing evacuation at a low outdoor temperature, use a vacuum gauge appropriate for the temperature range.

Degree of vacuum (reference)

Outdoor temperature	-20°C (-4°F)	-15°C (5°F)	-10°C (14°F)	-5°C (23°F)	0°C (32°F)
Degree of vacuum	0.77 Torr (103 Pa)	1.24 Torr (165 Pa)	1.95 Torr (260 Pa)	3.01 Torr (402 Pa)	4.58 Torr (611 Pa)

* The degrees of vacuum shown above are obtained based on the saturated vapor pressure of ice.

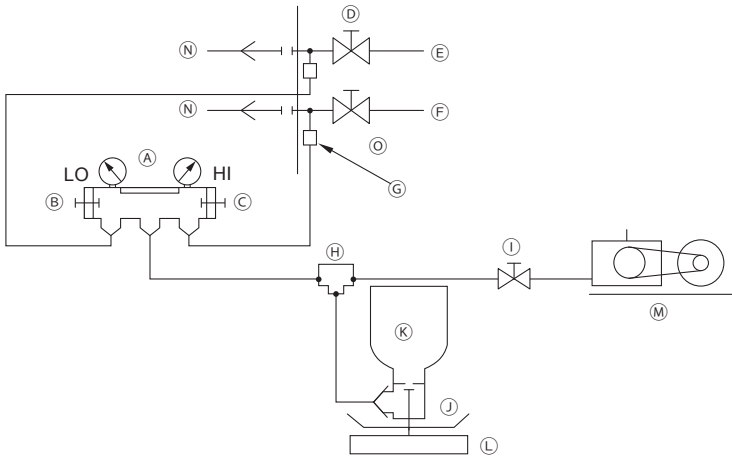
* In a system using water heat exchangers, circulate water to prevent the water from freezing during evacuation.

- ③ Stop the vacuum pump and leave it for an hour.
- ④ Verify that the vacuum has not increased by more than 130 Pa (0.01886 psi/1 Torr).
- ⑤ If the vacuum has increased by more than 130 Pa, water infiltration is suspected. Pressurize the system with dry nitrogen gas up to 0.05 MPa (gauge) (7.25 psi/375 Torr). Repeat ① though ⑤ until the vacuum is increased by 130 Pa or below. If the results persist, then perform the "Triple Evacuation" below.

<Triple Evacuation>

- ① Evacuate the system to 533 Pa (abs) (0.07729 psi/4 Torr) from both service ports, using a vacuum pump.
- ② Pressurize the system with dry nitrogen gas up to 0 Pa (gauge) (0 psi/0 Torr) from the discharge service port.

- ③ Evacuate the system to 200 Pa (abs) (0.029 psi/1.5 Torr) from the suction service port, using a vacuum pump.
- ④ Pressurize the system with dry nitrogen gas up to 0 Pa (gauge) (0 psi/0 Torr) from the discharge service port.
- ⑤ Evacuate the system from both service ports, using a vacuum pump.
- ⑥ After the vacuum reaches 66.7 Pa (abs) (0.09672 psi/5 Torr), stop the vacuum pump and leave it for an hour. A vacuum of 66.7 Pa must be maintained for at least one hour.
- ⑦ Verify that the vacuum has not increased for at least 30 minutes.



- Ⓐ Gauge manifold
- Ⓑ Low pressure knob
- Ⓒ High pressure knob
- Ⓓ Service valve
- Ⓔ Low-pressure pipe
- Ⓕ High-pressure pipe
- Ⓖ Service port
- Ⓗ Three-way joint
- Ⓘ Valve (vacuum pump)
- Ⓝ Valve (for charging refrigerant)
- Ⓚ Refrigerant tank
- Ⓛ Scale
- Ⓜ Vacuum pump
- Ⓝ To indoor unit
- Ⓞ Outdoor unit

- Use a scale that can measure down to 0.1 kg (0.1 oz).
- Recommended vacuum gauge: ROBINAIR 14830A Thermistor Vacuum Gauge or Micron Gauge
- Do not use a gauge manifold to measure the vacuum pressure.
- Use a vacuum pump capable of attaining a vacuum of 65 Pa (abs) within five minutes of operation.
- An air tightness test can be performed before turning on the power since the BC controller is shipped with the valve open. If the system (including the BC controller) has already been turned on, first turn off the power to the outdoor unit or heat source unit, then turn off the power to the BC controller and the indoor units to perform an air tightness test and vacuum drying. When turning on the power, start the BC controller and indoor units first, then start the outdoor unit or heat source unit.

9-9. Additional refrigerant charge

The table below summarizes the factory-charged amount of refrigerant, the maximum amount of refrigerant to be added on site, and the maximum total amount of refrigerant in the system.

[kg (oz)]

Unit model	Factory-charged amount	Maximum amount to be added on site	Maximum total amount in the system
M200YXM	8.0 (282)	23.0 (811)	31.0 (1093)
M250YXM	8.0 (282)	27.4 (966)	35.4 (1248)
M300YXM	8.0 (282)	28.3 (998)	36.3 (1280)
M350YXM	9.3 (328)	27.9 (984)	37.2 (1312)
M400YXM	9.3 (328)	28.6 (1008)	37.9 (1336)
M450YXM	9.3 (328)	28.6 (1008)	37.9 (1336)
M500YXM	9.3 (328)	28.6 (1008)	37.9 (1336)
M400YSXM	16.0 (564)	42.6 (1503)	58.6 (2067)
M450YSXM	16.0 (564)	43.5 (1534)	59.5 (2098)
M500YSXM	16.0 (564)	45.3 (1598)	61.3 (2162)
M550YSXM	16.0 (564)	46.2 (1630)	62.2 (2194)
M600YSXM	16.0 (564)	46.6 (1644)	62.6 (2208)
M650YSXM	17.3 (610)	45.3 (1598)	62.6 (2208)
M700YSXM	18.6 (656)	44.2 (1559)	62.8 (2215)
M750YSXM	18.6 (656)	44.2 (1559)	62.8 (2215)
M800YSXM	18.6 (656)	45.3 (1598)	63.9 (2254)
M850YSXM	18.6 (656)	45.4 (1601)	64.0 (2257)
M900YSXM	18.6 (656)	45.9 (1619)	64.5 (2275)
M950YSXM	18.6 (656)	46.5 (1640)	65.1 (2296)
M1000YSXM	18.6 (656)	46.7 (1647)	65.3 (2303)

Unit model	Factory-charged amount	Maximum amount to be added on site	Maximum total amount in the system
EM200YXM	5.3 (186)	25.7 (907)	31.0 (1093)
EM250YXM	5.3 (186)	30.1 (1062)	35.4 (1248)
EM300YXM	5.3 (186)	31.0 (1094)	36.3 (1280)
EM350YXM	6.3 (222)	30.9 (1090)	37.2 (1312)
EM400YXM	6.3 (222)	31.6 (1114)	37.9 (1336)
EM450YXM	6.3 (222)	31.6 (1114)	37.9 (1336)
EM500YXM	6.3 (222)	31.6 (1114)	37.9 (1336)
EM400YSXM	10.6 (373)	48.0 (1694)	58.6 (2067)
EM450YSXM	10.6 (373)	48.9 (1725)	59.5 (2098)
EM500YSXM	10.6 (373)	50.7 (1789)	61.3 (2162)
EM550YSXM	10.6 (373)	51.6 (1821)	62.2 (2194)
EM600YSXM	10.6 (373)	52.0 (1835)	62.6 (2208)
EM650YSXM	11.6 (409)	51.0 (1799)	62.6 (2208)
EM700YSXM	12.6 (444)	50.2 (1771)	62.8 (2215)
EM750YSXM	12.6 (444)	50.2 (1771)	62.8 (2215)
EM800YSXM	12.6 (444)	51.3 (1810)	63.9 (2254)
EM850YSXM	12.6 (444)	51.4 (1813)	64.0 (2257)
EM900YSXM	12.6 (444)	51.9 (1831)	64.5 (2275)
EM950YSXM	12.6 (444)	52.5 (1852)	65.1 (2296)
EM1000YSXM	12.6 (444)	52.7 (1859)	65.3 (2303)

- Safety measures vary depending on the system refrigerant amount. Refer to the Data Book for details.
- Both refrigerant overcharge and undercharge will cause problems. Charge the system with the proper amount of refrigerant. Record the added refrigerant amount on the label attached to the control box panel and the spec label for future servicing.

9-9-1. Calculation of the amount of additional refrigerant

- The amount of refrigerant to be added depends on the size and the total length of the high-pressure piping and liquid piping.
- Calculate the amount of refrigerant to be charged according to the formula below.
- Round up the calculation result to the nearest 0.1 kg (0.1 oz).
- The refrigerant amount in the high-pressure piping between the main and sub BC is not included in the calculation of the total additional refrigerant amount.

(1) Units "m" and "kg" (In an R2 system)

<Formula>

- When the piping length from the outdoor unit to the farthest indoor unit is 30.5 m (100 ft) or shorter

Amount of additional charge (kg)	=	High-pressure pipe ø28.58 total length × 0.32 (kg/m)	+	High-pressure pipe ø22.2 total length × 0.20 (kg/m)	+	High-pressure pipe ø19.05 total length × 0.14 (kg/m)	+	High-pressure pipe ø15.88 total length × 0.099 (kg/m)	+	Liquid pipe ø19.05 total length × 0.26 (kg/m)	+	Liquid pipe ø15.88 total length × 0.17 (kg/m)	+	Liquid pipe ø12.7 total length × 0.11 (kg/m)	+	Liquid pipe ø9.52 total length × 0.054 (kg/m)	+	Liquid pipe ø6.35 total length × 0.020 (kg/m)
		Main or sub BC controller	Amount (kg/unit)	Total capacity of connected indoor units		Amount (kg) (to be added for indoor unit)												
		MA-type	3.1	80 or below	1.8													
		MB-type	0.8	81 to 160	2.3													
				161 to 290	2.7													
				291 to 390	3.2													
				391 to 510	4.1													
				511 to 630	4.5													
				631 to 710	5.4													
				711 to 800	7.2													
				801 to 890	8.1													
				891 to 1070	9.0													
				1071 to 1250	10.8													
				1251 or above	12.6													

* Certain types of indoor units will require additional refrigerant charge. See the separate document titled "Additional refrigerant charge," which is available for download at <http://www.mitsubishielectric.com/dg/libim/>. Access the site, and enter the region and the outdoor unit model (not the indoor unit model) to be connected to see the document.

- When the piping length from the outdoor unit to the farthest indoor unit is longer than 30.5 m (100 ft)

Amount of additional charge (kg)	=	High-pressure pipe ø28.58 total length × 0.30 (kg/m)	+	High-pressure pipe ø22.2 total length × 0.19 (kg/m)	+	High-pressure pipe ø19.05 total length × 0.13 (kg/m)	+	High-pressure pipe ø15.88 total length × 0.090 (kg/m)	+	Liquid pipe ø19.05 total length × 0.24 (kg/m)	+	Liquid pipe ø15.88 total length × 0.16 (kg/m)	+	Liquid pipe ø12.7 total length × 0.10 (kg/m)	+	Liquid pipe ø9.52 total length × 0.050 (kg/m)	+	Liquid pipe ø6.35 total length × 0.018 (kg/m)
		Main or sub BC controller	Amount (kg/unit)	Total capacity of connected indoor units		Amount (kg) (to be added for indoor unit)												
		MA-type	3.1	80 or below	1.8													
		MB-type	0.8	81 to 160	2.3													
				161 to 290	2.7													
				291 to 390	3.2													
				391 to 510	4.1													
				511 to 630	4.5													
				631 to 710	5.4													
				711 to 800	7.2													
				801 to 890	8.1													
				891 to 1070	9.0													
				1071 to 1250	10.8													
				1251 or above	12.6													

* When the piping length from the outdoor unit to the farthest indoor unit is longer than 30.5 m (100 ft), additional refrigerant charge shown in "Additional refrigerant charge" is not necessary.

(2) Units "ft" and "oz" (In an R2 system)

<Formula>

- When the piping length from the outdoor unit to the farthest indoor unit is 30.5 m (100 ft) or shorter

Amount of additional charge (oz)	=	High-pressure pipe ø1-1/8 total length × 3.45 (oz/ft)	+	High-pressure pipe ø7/8 total length × 2.16 (oz/ft)	+	High-pressure pipe ø3/4 total length × 1.51 (oz/ft)	+	High-pressure pipe ø5/8 total length × 1.07 (oz/ft)		
	+	Liquid pipe ø3/4 total length × 2.80 (oz/ft)	+	Liquid pipe ø5/8 total length × 1.83 (oz/ft)	+	Liquid pipe ø1/2 total length × 1.19 (oz/ft)	+	Liquid pipe ø3/8 total length × 0.59 (oz/ft)	+	Liquid pipe ø1/4 total length × 0.22 (oz/ft)
	+	Main or sub BC controller		Amount (oz/unit)		Total capacity of connected indoor units		Amount (oz) (to be added for indoor unit)		
		MA-type		110		80 or below		64		
		MB-type		29		81 to 160		82		
						161 to 290		96		
						291 to 390		113		
						391 to 510		145		
						511 to 630		159		
						631 to 710		191		
						711 to 800		254		
						801 to 890		286		
						891 to 1070		318		
						1071 to 1250		381		
						1251 or above		445		

* Certain types of indoor units will require additional refrigerant charge. See the separate document titled "Additional refrigerant charge," which is available for download at <http://www.mitsubishielectric.com/ldg/libim/>. Access the site, and enter the region and the outdoor unit model (not the indoor unit model) to be connected to see the document.

- When the piping length from the outdoor unit to the farthest indoor unit is longer than 30.5 m (100 ft)

Amount of additional charge (oz)	=	High-pressure pipe ø1-1/8 total length × 3.23 (oz/ft)	+	High-pressure pipe ø7/8 total length × 2.05 (oz/ft)	+	High-pressure pipe ø3/4 total length × 1.40 (oz/ft)	+	High-pressure pipe ø5/8 total length × 0.97 (oz/ft)		
	+	Liquid pipe ø3/4 total length × 2.59 (oz/ft)	+	Liquid pipe ø5/8 total length × 1.73 (oz/ft)	+	Liquid pipe ø1/2 total length × 1.08 (oz/ft)	+	Liquid pipe ø3/8 total length × 0.54 (oz/ft)	+	Liquid pipe ø1/4 total length × 0.20 (oz/ft)
	+	Main or sub BC controller		Amount (oz/unit)		Total capacity of connected indoor units		Amount (oz) (to be added for indoor unit)		
		MA-type		110		80 or below		64		
		MB-type		29		81 to 160		82		
						161 to 290		96		
						291 to 390		113		
						391 to 510		145		
						511 to 630		159		
						631 to 710		191		
						711 to 800		254		
						801 to 890		286		
						891 to 1070		318		
						1071 to 1250		381		
						1251 or above		445		

* When the piping length from the outdoor unit to the farthest indoor unit is longer than 30.5 m (100 ft), additional refrigerant charge shown in "Additional refrigerant charge" is not necessary.

9-9-2. Charging additional refrigerant

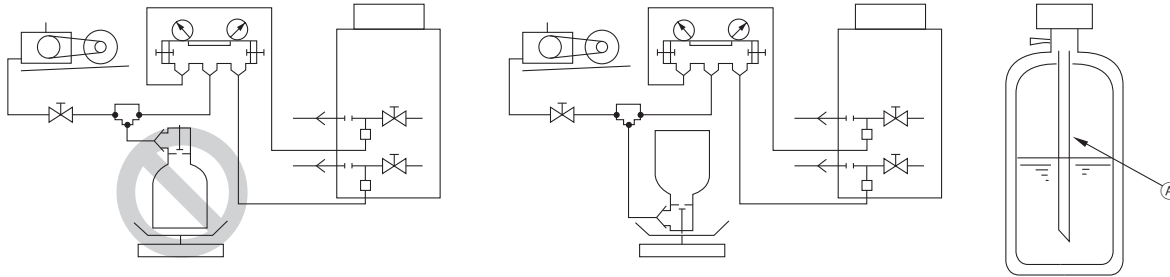
Charge the calculated amount of refrigerant in the liquid state to the unit through the service port after the completion of piping work. Upon completion of all work, securely tighten all service port caps and shaft caps to prevent refrigerant leakage.

<Notice>

- Do not vent the refrigerant into the atmosphere.
- Refer to the table below for the appropriate tightening torque.

Pipe size [mm (in)]	Shaft cap (N·m)	Service port cap (N·m)
ø15.88 (ø5/8)	32.5	12
ø28.58 (ø1-1/8)	22	16

- If the refrigerant tank does not have a siphon pipe, charge the liquid refrigerant with the tank upside-down as shown in the figure below.



Ⓐ Siphon pipe

- After evacuation and refrigerant charging, ensure that the service valves are fully open. Do not operate the unit with the service valves closed.

9-10. Precautions for refrigerant recovery

If you need to recover refrigerant with the system shut down, you must turn off the power to the outdoor unit and then turn off the power to all other equipment. (If the BC controller or indoor unit is turned off first, the shut off valve may close, resulting in insufficient refrigerant recovery and potential injuries from a refrigerant burst or similar incidents while removing the unit.)

10. Electrical work

⚠ WARNING

Electrical work must be performed by qualified personnel in accordance with local regulations and the instructions provided in this manual. Only use the specified cables and dedicated circuits.

- Inadequate power source capacity or improper electrical work will result in electric shock, malfunction, or fire.

Proper grounding must be provided by qualified personnel.

- Improper grounding may result in electric shock, fire, explosion, or malfunction due to electrical noise. Do not connect the ground wire to gas or water pipes, lightning rods, or telephone ground wires.

10-1. Before electrical work

- When performing electrical work, refer to the indoor unit or controller installation manuals as well.
- Bear in mind ambient conditions (ambient temperature, direct sunlight, rain water, etc.) when proceeding with the wiring and connections.
- When opening or closing the front panel of the control box, do not let it come into contact with any of the internal components.
- Specific wiring requirements should adhere to the wiring regulations of the region.
- Include some slack in the wiring for the control box on the indoor and outdoor units, because these boxes are sometimes removed at the time of service work.

10-2. Power cables and device capacity

⚠ WARNING

Include some slack in the power cables.

- Failure to do so may break or overheat the cables, resulting in smoke or fire.

Install an earth leakage breaker on the power supply of each unit.

- Failure to do so may result in electric shock or fire.

Only use properly rated breakers (an earth leakage breaker, local switch <a switch + fuse that meets local electrical codes>, or overcurrent breaker).

- Failure to do so may result in electric shock, malfunction, smoke, or fire.

Only use standard power cables of sufficient capacity.

- Failure to do so may result in current leakage, overheating, smoke, or fire.

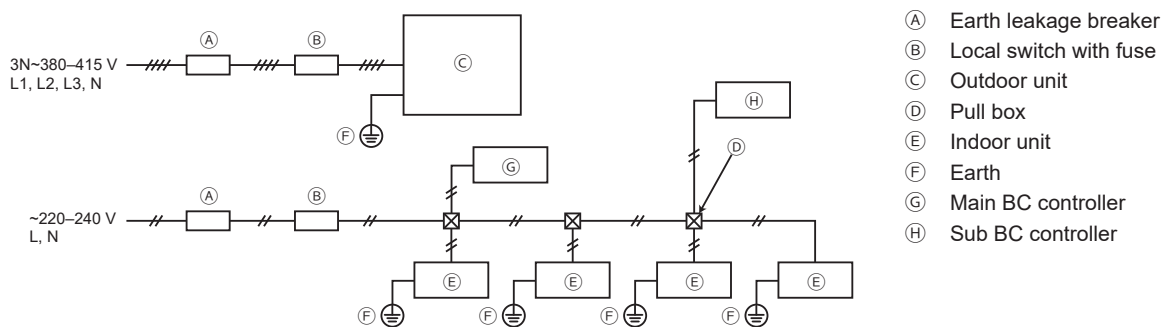
Tighten all terminal screws to the specified torque.

- Loose screws and contact failure may result in smoke or fire.

CAUTION

If a large electric current flows due to a malfunction or faulty wiring, earth leakage breakers on the unit side and on the upstream side of the power supply system could both operate. Depending on the importance of the system, separate the power supply system or take protective coordination of breakers.

- Wiring example



- Be sure to use the appropriate type of overcurrent breaker. Note that generated overcurrent may include some amount of direct current.
- Select the type of breaker for an inverter circuit as an earth leakage breaker. (Mitsubishi Electric NV-C series or its equivalent)
- The earth leakage breaker should be used in combination with a local switch.
- Do not connect the power cables L1, L2, and L3 to N. Ensure the correct phase sequence. (L1, L2, L3, and N)
- If the power cable is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.
- Use dedicated power cables for the outdoor unit and indoor unit. Ensure OC and OS are wired individually.
- For the power source wiring for the indoor units or the BC controller, refer to the respective installation manuals.

• Power cable size, device capacity, and system impedance

(If local regulations do not specify the minimum power cable size or device capacity, follow the values in the table below.)

		Minimum size [mm ² (AWG)]			Earth leakage breaker	Local switch (A)		Overcurrent breaker (NFB) (A)	Maximum allowable system impedance
		Power cable	Power cable after branching point	Earth wire		Capacity	Fuse		
Outdoor unit	M200	4.0 (12)	–	4.0 (12)	30 A 100 mA 0.1 sec. or less	25	25	30	*1
	M250	4.0 (12)	–	4.0 (12)	30 A 100 mA 0.1 sec. or less	32	32	30	*1
	M300	4.0 (12)	–	4.0 (12)	30 A 100 mA 0.1 sec. or less	32	32	30	0.273 Ω
	M350	6.0 (10)	–	6.0 (10)	40 A 100 mA 0.1 sec. or less	40	40	40	0.265 Ω
	M400	10.0 (8)	–	10.0 (8)	60 A 100 mA 0.1 sec. or less	63	63	60	0.238 Ω
	M450	10.0 (8)	–	10.0 (8)	60 A 100 mA 0.1 sec. or less	63	63	60	0.238 Ω
	M500	10.0 (8)	–	10.0 (8)	60 A 100 mA 0.1 sec. or less	63	63	60	0.217 Ω

		Minimum size [mm ² (AWG)]			Earth leakage breaker	Local switch (A)		Overcurrent breaker (NFB) (A)	Maximum allowable system impedance
		Power cable	Power cable after branching point	Earth wire		Capacity	Fuse		
Outdoor unit	EM200	4.0 (12)	–	4.0 (12)	30 A 100 mA 0.1 sec. or less	25	25	30	*1
	EM250	4.0 (12)	–	4.0 (12)	30 A 100 mA 0.1 sec. or less	32	32	30	*1
	EM300	4.0 (12)	–	4.0 (12)	30 A 100 mA 0.1 sec. or less	32	32	30	0.273 Ω
	EM350	6.0 (10)	–	6.0 (10)	40 A 100 mA 0.1 sec. or less	40	40	40	0.266 Ω
	EM400	10.0 (8)	–	10.0 (8)	60 A 100 mA 0.1 sec. or less	63	63	60	0.240 Ω
	EM450	10.0 (8)	–	10.0 (8)	60 A 100 mA 0.1 sec. or less	63	63	60	0.240 Ω
	EM500	10.0 (8)	–	10.0 (8)	60 A 100 mA 0.1 sec. or less	63	63	60	0.217 Ω

*1 Meets technical requirements of IEC 61000-3-3.

* Refer to the indoor unit installation manual and instruction book for details about cable size and breaker capacity on the indoor unit.

- The wire size is the minimum value for metal conduit wiring. If the voltage drops, use a wire that is one size thicker in diameter. Make sure the power-supply voltage does not drop more than 10%. Make sure that the voltage imbalance between the phases is 2% or less.
- Power supply cords of parts of appliances for outdoor use shall not be lighter than polychloroprene sheathed flexible cord (design 60245 IEC57). For example, use wiring such as YZW.
- The user must ensure that this unit is connected only to a power supply system which fulfils the requirement above. If necessary, the user can ask the public power supply company for the system impedance at the interface point.
- This unit complies with IEC 61000-3-12 provided that the short-circuit power S_{sc} is greater than or equal to S_{sc}^{*1} at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with a short-circuit power S_{sc} greater than or equal to S_{sc}^{*1} .

*1 S_{sc}

Model	S_{sc} (MVA)
M200	1.85
M250	1.85
M300	2.29
M350	2.35
M400	2.62
M450	2.62
M500	2.88

Model	S_{sc} (MVA)
EM200	1.84
EM250	1.84
EM300	2.29
EM350	2.35
EM400	2.60
EM450	2.60
EM500	2.87

10-3. Control cable specifications

• Transmission cable

Type	2-core shielded cable CVVS, CPEVS, or MVVS
Size	1.25 mm ² (AWG 16), or ϕ 1.2 mm or above
Length	Max. 200 m (656 ft)
Remarks	The maximum allowable length of transmission cables via outdoor units (both centralized control transmission cables and indoor-outdoor transmission cables) is 500 m (1640 ft)*1. The maximum allowable length of transmission cables from the power supply unit to each outdoor unit or to the system controller is 200 m (656 ft).

* Do not use a single multiple-core cable to connect indoor units that belong to different refrigerant systems. The use of a multiple-core cable may result in signal transmission errors and malfunctions.

* Ensure shield continuity when extending the transmission cable.

*1 When extending the length of the transmission cables to 1000 m (3280 ft), consult your dealer.

• Remote controller cable

MA remote controller	
Type	2-core cable VCTF, VCTFK, CVV, VVR, VVF, or VCT
Size	0.3 to 1.25 mm ² (AWG 22 to 16)
Length	Max. 200 m (656 ft)

* For installation restrictions, refer to the installation manual of the applicable remote controller.

10-4. System configuration

- Unit code and the maximum number of connectable units

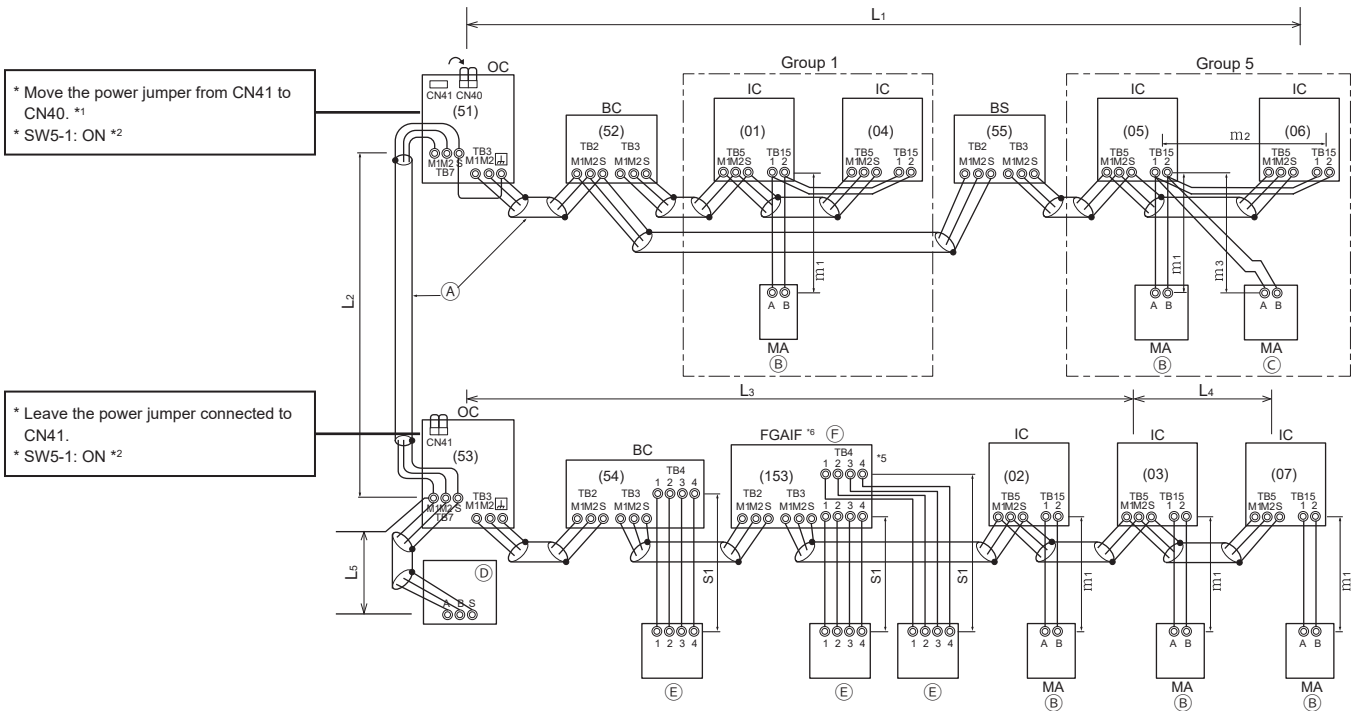
Unit type	Code	Number of connectable units
Outdoor unit	Main unit	OC
	Sub unit	OS
Indoor unit	IC	Maximum 50 units per OC (depends on the unit model)
BC controller	Main	BC
	Sub	BS
Remote controller	RC	0 to 2 units per group
Transmission booster unit	RP	0 to 2 units per OC

* A transmission booster may be required depending on the number of connected indoor units. The outdoor unit does not support PAC-SF46EPA but PAC-SF46EPA-G only.
 * The outdoor units in the same refrigerant circuit are automatically designated as OC and OS. The outdoor units are designated as OC and OS in the order of capacity from large to small (if two or more units have the same capacity, in the order of address from small to large).

System configuration example

* The numbers in the parentheses in the figures below indicate address numbers.

(1) When MA remote controllers are connected



- (A) Shielded cable
- (B) Main remote controller
- (C) Sub remote controller
- (D) System controller
- (E) Sensor and alarm kit
- (F) Power supply interface for alarm kit

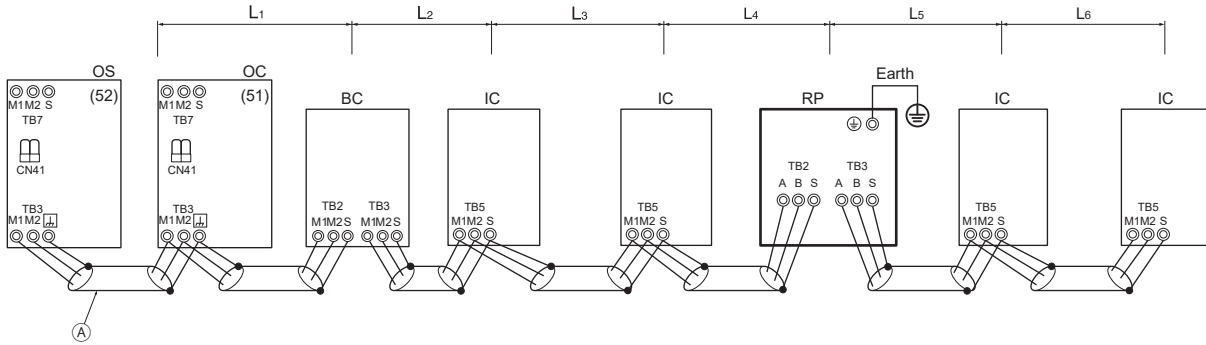
*1 When a power supply unit is not connected to the centralized control transmission cable, move the power jumper from CN41 to CN40 on only one of the outdoor units. When the System controller is connected to TB7 side, connect a power supply unit to TB7 side. If a power supply unit cannot be used, connect the System controller to TB3 side. Up to three System controllers can be connected to TB3 side.
 *2 If a system controller is used, set SW5-1 on all of the outdoor units to ON.
 *3 When the PAR-4"x"MA series ("x" represents 2 or later) is connected to a group, no other MA remote controllers can be connected to the same group.

Maximum allowable length of control cables

Transmission cables via outdoor units	$L_1 + L_2 + L_3 + L_4$, $L_1 + L_2 + L_5 \leq 500$ m (1640 ft)*4
Transmission cables	L_1 , $L_3 + L_4$, $L_2 + L_5 \leq 200$ m (656 ft)
Remote controller cables	$m_1 + m_2$, $m_1 + m_2 + m_3 \leq 200$ m (656 ft)
Transmission cables from a sensor and alarm kit	$S_1 \leq 40$ m (131 ft)

*4 When extending the length of the transmission cables to 1000 m (3280 ft), consult your dealer.
 *5 Necessary when the refrigerant sensors on the BC and BS are added to comply with EN 378.
 *6 The power supply interface for alarm kit has eight terminals TB4A to TB4H on its terminal block TB4.

(2) When a transmission booster unit is connected



(A) Shielded cable

*1 Daisy-chain terminals (TB3) on outdoor units together in the same refrigerant system.

*2 Leave the power jumper connected to CN41. When connecting a system controller to the transmission line (TB7) for centralized control, refer to (1), (2), or DATA BOOK.

Maximum allowable length of control cables

Transmission cables	$L_1 + L_2 + L_3 + L_4 + L_5 + L_6 \leq 200 \text{ m (656 ft)}$
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10-5. Wiring connections in the control box



WARNING

Connections must be made securely and without tension on the terminals.

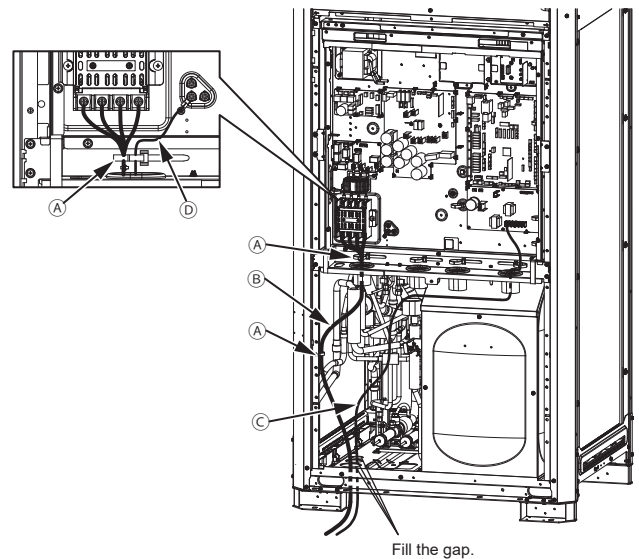
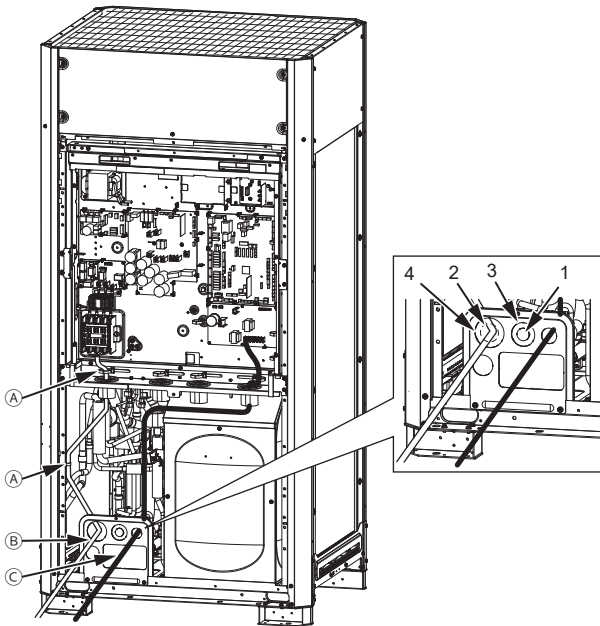
- Improperly connected cables may break, overheat, or cause smoke or fire.

10-5-1. Threading power cable through the knockout hole

- Open the front panel when performing wiring work.
- Punch out the knockout holes at the bottom of the front panel or base with a hammer. Use the appropriate knockout hole according to the size of the power cable, referring to the table below.

(1) When routing the wiring through the front of the unit

(2) When routing the wiring through the bottom of the unit



Power cable size (mm ²)	Knockout hole to be used
2, 3.5, 5.5	Knockout hole 1
8, 14	Knockout hole 2
21, 26, 33	Knockout hole 3
53, 67, 84	Knockout hole 4

- (A) Cable strap
 - (B) Power cable
 - (C) Transmission cable
 - (D) Ground wire that connects Control Box
- The length of the section after the cable access hole must be at least 1100 mm (43 in).

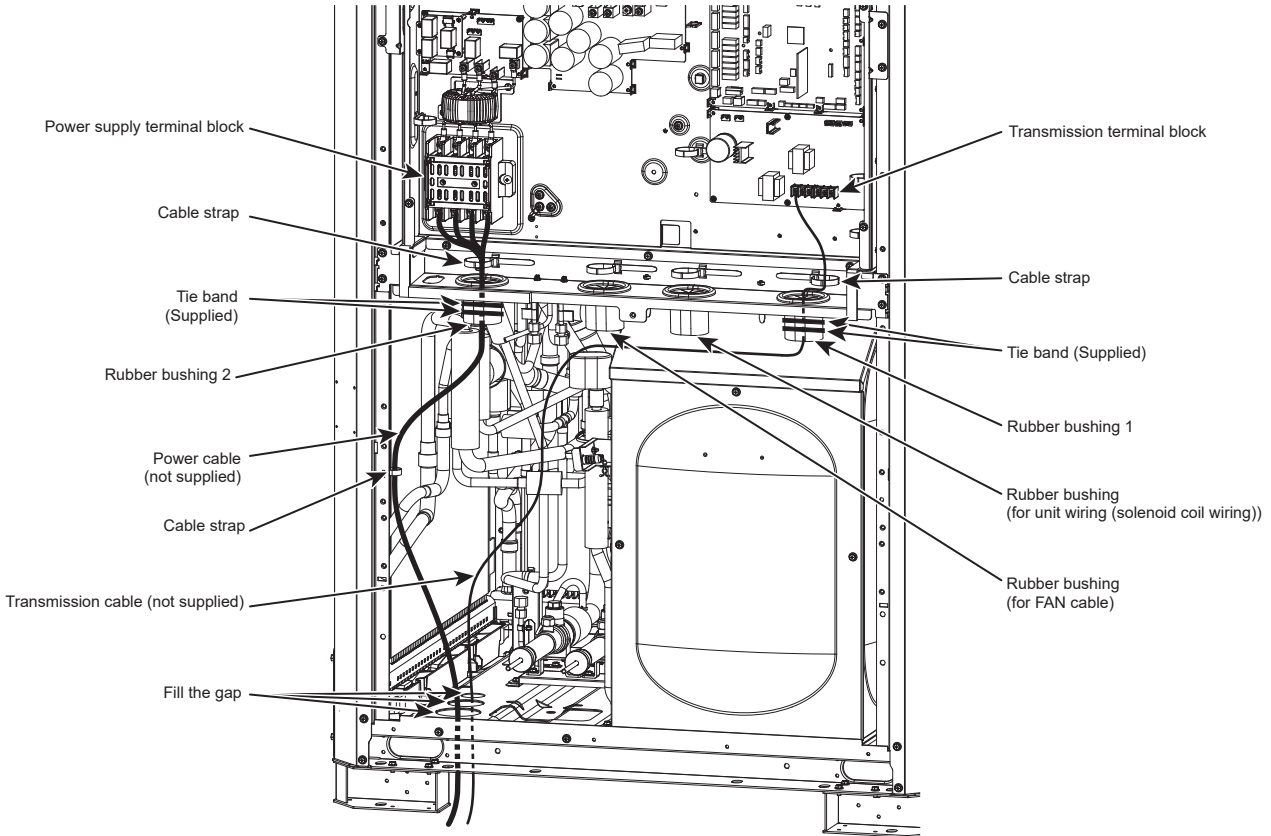
<Notice>

- Install the transmission cable as shown in the figure above so that the cable is long enough for the Control Box to be moved for servicing.
- If there are any gaps around the power cable and transmission cable, please be sure to fill these in with a suitable material to prevent snow from entering, which may cause damage to the electrical parts, and to protect your hands from direct contact with cables.
- When putting the power cable through the knockout hole without using a conduit tube, deburr the hole and protect the power cable with protective tape.
- Use a conduit tube to narrow down the opening if there is a possibility of small animals entering the unit.
- When taking the conduit tube out from the bottom part of the unit, caulk around the tube opening to prevent water infiltration.

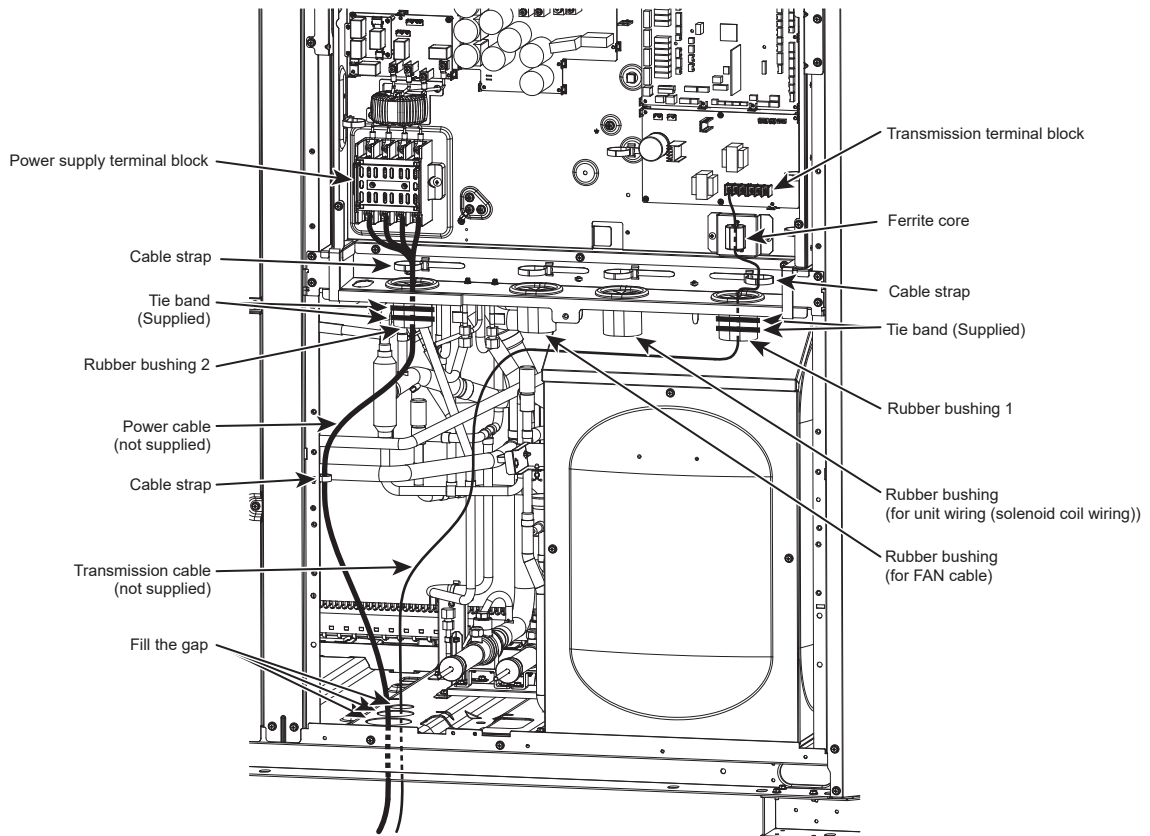
10-5-2. Fixing the cables in place

Route the cables as shown in the figures below.

- (E)M200 to 300YXM



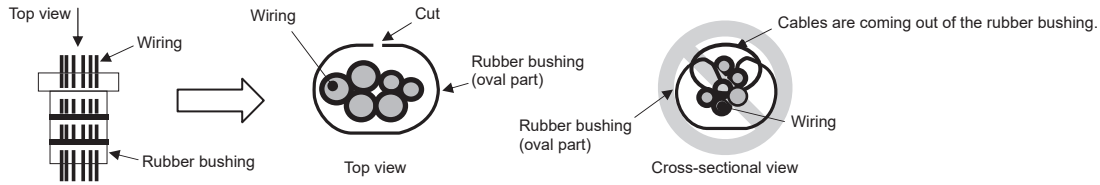
- (E)M350 to 500YXM



Take the procedure below.

- ① Thread the power cable through the rubber bushing 1. (See *1 and *2 below.)
- ② Thread the unit wiring (sensor wiring) and the transmission cable through the rubber bushing 2. (See *1 and *2 below.)
- ③ Hold the power cable and the transmission cable in place respectively with the cable straps.
- ④ Secure each rubber bushing with the supplied tie band. (See *3 below.)

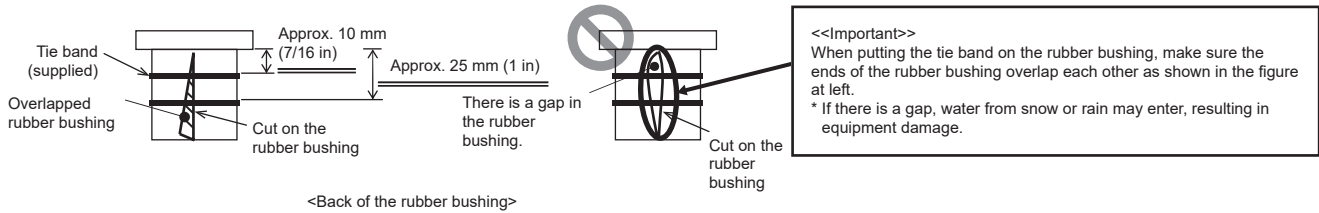
*1 Make sure the cables are not coming out of the rubber bushing cut.



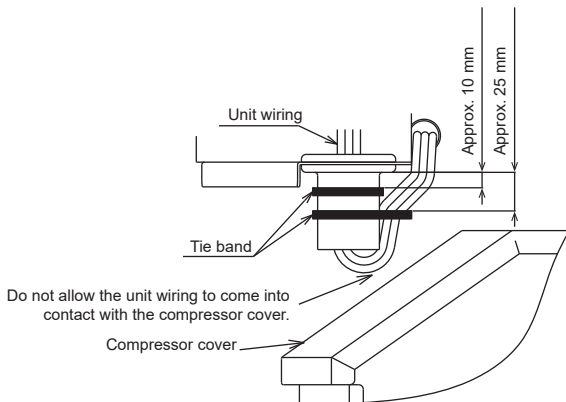
*2 When threading the wiring through the rubber bushing, make sure the rubber bushing will not come off the sheet metal on the control box.



*3 When tying the supplied tie band around the rubber bushing, make sure to leave no gap between the ends.



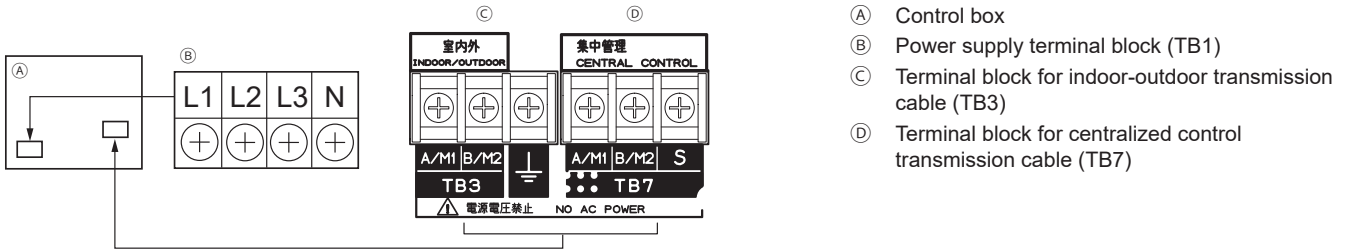
*4 Secure the unit wiring with the supplied tie band to prevent the wiring from coming into contact with the compressor cover.



- When securing the rubber bushing with the tie band, ensure that the band and the cut on the back of the rubber bushing overlap to fill the gap. Leaving a gap may allow snow or water to enter, causing the devices to malfunction.
- Do not allow the unit wiring to come into contact with the compressor cover. Failure to do so may cause the wiring and cover to rub against each other, resulting in a short circuit and equipment failure.

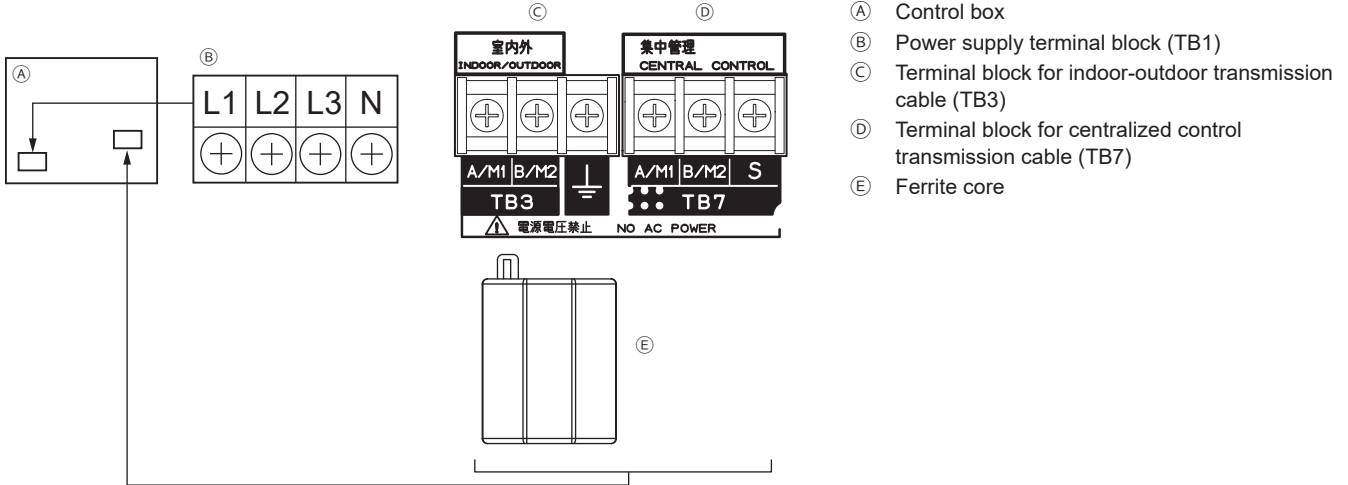
10-5-3. Connecting the cables

(1) (E)M200-300

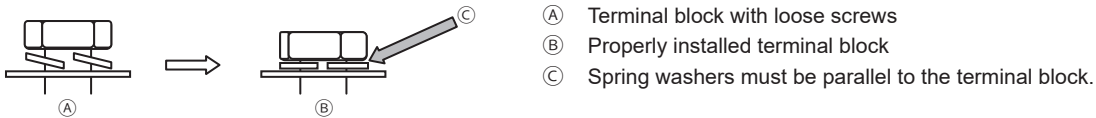


- (A) Control box
- (B) Power supply terminal block (TB1)
- (C) Terminal block for indoor-outdoor transmission cable (TB3)
- (D) Terminal block for centralized control transmission cable (TB7)

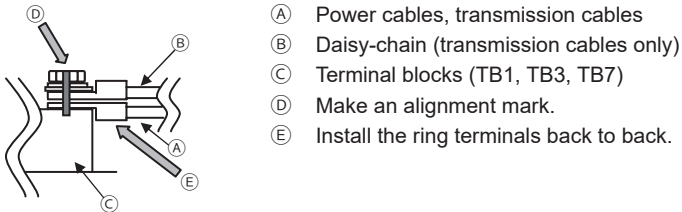
(2) (E)M350-500



- (A) Control box
- (B) Power supply terminal block (TB1)
- (C) Terminal block for indoor-outdoor transmission cable (TB3)
- (D) Terminal block for centralized control transmission cable (TB7)
- (E) Ferrite core



- (A) Terminal block with loose screws
- (B) Properly installed terminal block
- (C) Spring washers must be parallel to the terminal block.



- (A) Power cables, transmission cables
- (B) Daisy-chain (transmission cables only)
- (C) Terminal blocks (TB1, TB3, TB7)
- (D) Make an alignment mark.
- (E) Install the ring terminals back to back.

<Notice>

- Connect the cables respectively to the power supply terminal block and the transmission terminal block. Erroneous connection does not allow the system to operate.
- Never connect the power cable to the transmission terminal block. If connected, electrical parts will be damaged.
- Transmission cables should be (5 cm (2 in) or more) apart from the power cable so that it is not influenced by electric noise from the power cable. (Do not put the transmission cables and the power cable in the same conduit.)
- Follow the tightening torque for each screw type as shown below. Be careful not to use excessive torque as this could damage the screw.
Terminal block (M6 screw): 2.75 [N·m]
Terminal block (TB3, TB7 (M3.5 screw)): 0.82 [N·m]
- When tightening the screws, do not push the driver strongly to avoid damaging the screw.
- Make an alignment mark with a permanent marker across the screw head, washer, and terminal after tightening the screws.

Take the procedure below to connect the cables.

- ① Connect the indoor-outdoor transmission cable to TB3.
If multiple outdoor units are connected to the same refrigerant system, daisy-chain TB3 (M1, M2, ground) on the outdoor units. The indoor-outdoor transmission cable to the indoor unit should be connected to TB3 (M1, M2, ground) of only one of the outdoor units. Connect the shield to the ground terminal.
- ② For (E)M350-500, connect the transmission cables through ferrite cores to TB3.

- ③ Connect the centralized control transmission cables (between the centralized control system and the outdoor units of different refrigerant systems) to TB7.
If multiple outdoor units are connected to the same refrigerant system, daisy-chain TB7 (M1, M2, S) on all outdoor units.*1 Connect the shield to the S terminal.
*1 If TB7 on the outdoor units in the same refrigerant system are not daisy-chained, connect the centralized control transmission cable to TB7 on the OC. If the OC is out of order, or if centralized control is being conducted during a power supply shut-off, daisy-chain TB7 on the OC and OS. (In the case that the outdoor unit whose power jumper CN41 on the control board has been replaced with CN40 is out of order or the power is shut-off, centralized control will not be conducted even when TB7 is daisy-chained.)
- ④ When a power supply unit is not connected to the centralized control transmission cable, move the power jumper from CN41 to CN40 on only one of the outdoor units. When the System controller is connected to TB7 side, connect a power supply unit to TB7 side. If a power supply unit cannot be used, connect the System controller to TB3 side. Up to three System controllers can be connected to TB3 side.
- ⑤ On the outdoor unit whose power jumper was moved from CN41 to CN40, short circuit the S terminal and the ground terminal.
- ⑥ Connect terminals M1 and M2 of the transmission terminal block on the indoor unit that has the lowest address in the group to the terminal block on the remote controller.
- ⑦ When a system controller is connected, set SW5-1 on all outdoor units to ON.
- ⑧ Fix the cables securely in place with the cable strap below the terminal block.

10-6. Address setting

- Set the address setting switch as follows.



	Address setting method	Address
Indoor unit (Main, Sub)	Assign the lowest address to the main indoor unit in the group, and assign sequential addresses to the rest of the indoor units in the same group.	01 to 50
Outdoor unit (OC, OS)	Assign sequential addresses to the outdoor units in the same refrigerant system. * To set the address to 100, the address setting switch must be set to 50.	51 to 100
BC controller	Assign unused address within the setting range. * To set the address to 100, the address setting switch must be set to 50.	51 to 100
Power Supply Interface	Assign unused address within the setting range. * To set the address to 200, the address setting switch must be set to 50.	151 to 200
MA remote controller	Address setting is not required. (The Main/Sub setting is required.)	—

* The outdoor units in the same refrigerant circuit are automatically designated as OC and OS. The outdoor units are designated as OC and OS in the order of capacity from large to small (if two units have the same capacity, in the order of address from small to large).

* The BC controller address should generally be set to 1 + the address of the outdoor unit and heat source unit. However, if this would result in it having the same address as another outdoor unit and heat source unit, set the address between 51 and 100, making sure that it is different from the address of other controllers.

Outdoor unit

- Rotary switch

	
SWU2 (Tens digit)	SWU1 (Ones digit)

11. Test run

11-1. Before a test run

CAUTION

After the wiring work has been completed, measure the insulation resistance, and make sure that it reads at least 1 M Ω .

- Failure to do so may result in electric leakage, malfunction, or fire.

Before starting operation, leave the power on for the time periods shown in the table below. Keep the power turned on throughout the operating season.

Time to leave the power on before starting operation

Minimum outside temperature	Time
Minimum outside temperature < 0°C	16 hours
0°C ≤ Minimum outside temperature < 15°C	12 hours
15°C ≤ Minimum outside temperature < 30°C	10 hours
30°C ≤ Minimum outside temperature	8 hours

- Insufficient energizing will result in malfunction.

Do not turn off the power to the air conditioning units even during periods when they are not in use, unless it is necessary for maintenance or installation. Doing so may disable safety devices.

- Turn on the indoor units, the shut off valve kit (power supply interface for alarm kit), the BC controller, and the transmission booster first, and then turn on the outdoor units.
- Before performing a test run, turn off the power to the outdoor unit, and disconnect the power cable from the power supply terminal block to measure the insulation resistance.
- Measure the insulation resistance between the power supply terminal block and the earth with a 500 V ohmmeter, and make sure it is at least 1 M Ω .
- If the insulation resistance is 1 M Ω or above, connect the power cable to the power supply terminal, and turn on the power for at least the number of hours indicated in the table before starting operation. If the insulation resistance is below 1 M Ω , do not operate the unit, and check the compressor for a earth fault.
- While the unit is turned on, the compressor will remain energized even when it is stopped.
- The insulation resistance between the power supply terminal block and the earth may drop to near 1 M Ω immediately after installation or when the main power to the unit has been turned off for a long time because of the stagnation of refrigerant in the compressor.
- By turning on the main power and energizing the unit for the number of hours indicated in the table or longer, the refrigerant in the compressor will evaporate and the insulation resistance will rise.
- Do not apply an ohmmeter voltage to the terminal block for transmission cables. Doing so will damage the control board.
- Do not measure the insulation resistance of the transmission terminal block of the unit remote controller.
- Check for refrigerant leakage and for loose power cables and transmission cables.
- Check that the high-pressure side and low-pressure side service valves are fully open. Tighten the valve caps.
- Check the phase order of the power supply and the interphase voltage. If the voltage is out of the $\pm 10\%$ range, or if the voltage imbalance is more than 2%, discuss the countermeasure with the customer.
- When a transmission booster unit is connected, turn on the transmission booster unit before turning on the outdoor unit. If the outdoor unit is turned on first, the refrigerant circuit connection information will not be properly verified. If the outdoor unit is turned on first, turn on the transmission booster unit and then power reset the outdoor unit.
- When a power supply unit is connected to the centralized control transmission cable, or when power is supplied from a system controller with a power-supply function, perform a test run with the power supply unit being energized. Leave the power jumper connected to CN41.
- When power is turned on or after power recovery, performance may degrade for approximately 30 minutes.
- When turning on the power, start the BC controllers, indoor units, and shut off valve kit (power supply interface for alarm kit) first, then start the outdoor units or the heat source units.
- LEAK DETECTION SYSTEM installed. Unit must be powered except for service.
 - The BC controller has a safety function to prevent refrigerant leakage by closing the shut off valve on the BC controller when the unit's refrigerant leakage sensor detects refrigerant leakage.

11-2. Function setting

Make function settings by setting the dipswitches SW4, SW6, and SWP3 on the main board.

Write down the switch settings on the electrical wiring diagram label on the control box front panel for future reference when the control box needs to be replaced.

- Take the following steps to make EN 378-compliant setting, temperature unit (°C or °F) setting, or indoor unit 200% connection setting.

- Set the 10th bit of SW6 to ON.
- Set SW4 as shown in the table below to select the setting items. (The setting item No. will be displayed on LD301.)
- Press SWP3 for two seconds or longer to change the settings. (The settings can be checked on LD3.)

	Setting item No.	SW4 0: OFF, 1: ON *1										Setting (LD3 display) *2	
		1	2	3	4	5	6	7	8	9	10	Unlit	Lit
EN 378-compliant setting *3	962	0	1	0	0	0	0	1	1	1	1	Disabled	Enabled
Temperature unit setting	921	1	0	0	1	1	0	0	1	1	1	°C	°F
Indoor unit 200% connection setting	775	1	1	1	0	0	0	0	0	1	1	Disabled	Enabled

*1 Make the SW4 setting after the unit is energized.

*2 This will blink while the system is starting up.

*3 When using combined units, make the setting for OC only.
The setting is disabled by default.

- Make various function settings by setting SW5 and SW6, referring to the table below.

	Setting content	Setting		Switch setting timing
		OFF	ON	
SW5-1	Centralized control switch	Without connection to the centralized controller	With connection to the centralized controller	Before being energized
SW5-2	Deletion of connection information	Normal control	Deletion	Before being energized
SW5-3	–	Preset before shipment		–
SW5-4	–			–
SW5-5	–			–
SW5-6	–			–
SW5-7	–			–
SW5-8	–	–	–	–

	Setting content	Setting		Switch setting timing
		OFF	ON	
SW6-1	–	–	–	–
SW6-2	–	–	–	–
SW6-3	–	–	–	–
SW6-4	High static pressure setting	Refer to *1.	Refer to *1.	Before being energized
SW6-5				
SW6-6	–	–	–	–
SW6-7	Low-noise mode selection	Performance priority	Low-noise priority	Any time after being energized
SW6-8	Selection of Low-noise or Demand	Low-noise (Night)	Demand	Before being energized
SW6-9	Selection of Diagnostic display or Function detail setting	Refer to *2.	Refer to *2.	Any time after being energized
SW6-10				

* Do not change the factory settings of SW5-3 through SW5-8.

* Unless otherwise specified, leave the switch to OFF where indicated by "–," which may be set to OFF for a reason.

*1

	SW6-5: ON	SW6-5: OFF
SW6-4: ON	80 Pa *3	60 Pa *3
SW6-4: OFF	30 Pa *3	0 Pa

*2

	SW6-10: ON	SW6-10: OFF
SW6-9: ON	–	LED (7seg) No. 1024 to 2047
SW6-9: OFF	Function setting No. 0 to 1023	LED (7seg) No. 0 to 1023

*3 30 Pa setting is available in all models.

60 Pa setting is available in models (E)M200 to (E)M450.

80 Pa setting is available in models (E)M200 to (E)M400.

11-3. Operation characteristics in relation to the refrigerant charge

It is important to have a clear understanding of the characteristics of refrigerant and the operation characteristics of air conditioners before attempting to adjust the refrigerant charge in a given system.

- During cooling operation, the amount of refrigerant in the accumulator is the smallest when all indoor units are in operation.
- During heating operation, the amount of refrigerant in the accumulator is the largest when all indoor units are in operation.
- Refrigerant undercharge creates a tendency for the discharge temperature to rise.
- Changing the amount of refrigerant in the system while there is refrigerant in the accumulator has little effect on the discharge temperature.
- The higher the high pressure level, the more likely it is for the discharge temperature to rise.
- The lower the low pressure level, the more likely it is for the discharge temperature to rise.
- When the amount of refrigerant in the system is adequate, the compressor shell temperature is 10 to 60°C (50 to 140°F) higher than the low-pressure saturation temperature. If the temperature difference between the compressor shell temperature and low-pressure saturation temperature is 5°C (41°F) or less, refrigerant overcharge is suspected.

11-4. Operation check

The following symptoms are normal and do not indicate a problem.

Events	Display on remote controller	Cause	
The auto vane automatically switches air flow direction.	Normal display	The auto vane may switch over to horizontal air flow operation from vertical air flow operation in cooling mode if the vertical air flow operation has been running for one hour. At defrost in heating mode or immediately after heating start-up/shutdown, the auto vane automatically switches to horizontal air flow for a short time.	
The fan speed automatically changes during heating operation.	Normal display	The fan operates at Very Low speed when the thermostat is turned off, and automatically changes over to the preset speed according to the timer setting or refrigerant temperature when the thermostat is turned on.	
The fan stops during heating operation.	"Defrost"	The fan remains stopped during the defrost cycle.	
The fan keeps running after the unit has stopped.	No display	After the unit has stopped during heating operation, the fan operates for one minute to exhaust heat.	
At the beginning of heating operation, the fan cannot be manually set.	"Stand By"	The fan operates at Very Low speed for five minutes after heating operation starts or until the refrigerant temperature reaches 35°C (95°F), then the fan operates at Low speed for two minutes, and finally the fan operates at the preset speed.	
When the main power is turned on, the display as shown right appears on the remote controller for about five minutes.	"HO" or "PLEASE WAIT" blinks.	The system is starting up. Wait until "HO" or "PLEASE WAIT" stops blinking and goes off then try again.	
The drain pump keeps running after the unit has stopped.	No display	The drain pump remains in operation for three minutes after the unit in cooling mode has stopped. The drain pump goes into operation when drain water is detected, even when the unit is stopped.	
The indoor unit emits noise when switching from heating to cooling and vice versa.	Normal display	R2 system	This is a normal sound of the refrigerant circuit operating properly.
Immediately after startup, the indoor unit emits the sound of liquid flowing.	Normal display	Unstable flow of the heating medium produces a sound. This is temporary and does not imply a problem.	
In a short while after the outdoor unit stops, the unit makes a clicking sound.	No display	After the unit stops and before the unit performs pressure equalization, the pressure difference temporarily becomes small and the check valve may vibrate and make a sound. This is temporary and does not imply a problem.	
Drain water comes out of the outdoor unit from the bottom part of the heat exchanger.	No display	This ensures proper drainage of drain water in case the drain water freezes and remains in the outdoor unit during the heating operation at low ambient temperature.	

11-5. After a test run

To activate the safety measures in case the refrigerant sensor fails, as specified in EN 378, enable the EN 378-compliant setting No. 962 after completing a test run.

See "11-2. Function setting" for the settings of No. 962.

After enabling No. 962, turn off all bits of SW4 and the bits of SW6 to SW10, then check that the FLAG 4 on the Control Board LED display is lit.

12. Inspection and maintenance

WARNING

Only qualified personnel must relocate or repair the unit. Do not attempt to disassemble or alter the unit.

- Failure to do so will result in refrigerant leakage, water leakage, serious injury, electric shock, or fire.
- While the unit is turned on, the compressor will remain energized even when it is stopped. Before inspecting the inside of the control box, turn off the power, keep the unit off for at least 10 minutes, and check that the inverter main circuit voltage (the voltage across the electrolytic capacitor or the voltage between the inverter board FTP and FTN) has dropped to 20 VDC or less. (It takes about 10 minutes to discharge electricity after the power supply is turned off.)
- Control boxes house high-voltage and high-temperature electrical parts. They may still remain energized or hot after the power is turned off.
- Perform the service after disconnecting the fan board connector (CNINV) or the connector (CNIV1) and connector (CNIV2).
(To plug or unplug connectors, check that the outdoor unit fan is not rotating and that the inverter main circuit voltage (the voltage across the electrolytic capacitor or the voltage between the inverter board FTP and FTN) has dropped to 20 VDC or below. The capacitor may collect a charge and cause an electric shock when the outdoor unit fan rotates in windy conditions. Refer to the wiring nameplate for details.)
Reconnect the fan board connector (CNINV) or the connector (CNIV1) and connector (CNIV2) after servicing.
- Unit components may be damaged after long use of the unit, resulting in a performance drop or the unit becoming a safety hazard. To use the unit safely and maximize its life, it is recommended that a maintenance contract with a dealer or qualified personnel be signed. If the contract is signed, service technicians will periodically inspect the unit to identify any damage at an early stage, and take appropriate measures.
- When the outdoor unit is installed on the waterproof sheet, the sheet may become dirty due to the copper component seeped out from the unit. In this case, installing a drain pan for centralized drainage is recommended.
- Do not touch the small boards mounted upright on each board. Applying excessive pressure to them may damage the electronic components mounted on them.
- For the maintenance and inspection intervals, refer to the Service Handbook.

13. Rating plate information

(1) M models

• Single modules

Model	M200YXM	M250YXM	M300YXM	M350YXM	M400YXM	M450YXM	M500YXM
Unit combination	–	–	–	–	–	–	–
Refrigerant (R32)	8.0 kg	8.0 kg	8.0 kg	9.3 kg	9.3 kg	9.3 kg	9.3 kg
Allowable pressure (PS)	HP: 4.15 MPa, LP: 2.26 MPa						
Net weight	265 kg	265 kg	266 kg	322 kg	327 kg	327 kg	327 kg

• Combination modules

Model	M400YSXM		M450YSXM		M500YSXM		M550YSXM	
Unit combination	M200YXM	M200YXM	M200YXM	M250YXM	M250YXM	M250YXM	M250YXM	M300YXM
Refrigerant (R32)	8.0 kg	8.0 kg	8.0 kg	8.0 kg	8.0 kg	8.0 kg	8.0 kg	8.0 kg
Allowable pressure (PS)	HP: 4.15 MPa, LP: 2.26 MPa							
Net weight	265 kg	265 kg	265 kg	265 kg	265 kg	265 kg	265 kg	266 kg

Model	M600YSXM		M650YSXM		M700YSXM	
Unit combination	M300YXM	M300YXM	M300YXM	M350YXM	M350YXM	M350YXM
Refrigerant (R32)	8.0 kg	8.0 kg	8.0 kg	9.3 kg	9.3 kg	9.3 kg
Allowable pressure (PS)	HP: 4.15 MPa, LP: 2.26 MPa					
Net weight	266 kg	266 kg	266 kg	322 kg	322 kg	322 kg

Model	M750YSXM		M800YSXM		M850YSXM	
Unit combination	M350YXM	M400YXM	M400YXM	M400YXM	M400YXM	M450YXM
Refrigerant (R32)	9.3 kg	9.3 kg	9.3 kg	9.3 kg	9.3 kg	9.3 kg
Allowable pressure (PS)	HP: 4.15 MPa, LP: 2.26 MPa					
Net weight	322 kg	327 kg	327 kg	327 kg	327 kg	327 kg

Model	M900YSXM		M950YSXM		M1000YSXM	
Unit combination	M450YXM	M450YXM	M450YXM	M500YXM	M500YXM	M500YXM
Refrigerant (R32)	9.3 kg	9.3 kg	9.3 kg	9.3 kg	9.3 kg	9.3 kg
Allowable pressure (PS)	HP: 4.15 MPa, LP: 2.26 MPa					
Net weight	327 kg	327 kg	327 kg	327 kg	327 kg	327 kg

(2) EM models

• Single modules

Model	EM200YXM	EM250YXM	EM300YXM	EM350YXM	EM400YXM	EM450YXM	EM500YXM
Unit combination	–	–	–	–	–	–	–
Refrigerant (R32)	5.3 kg	5.3 kg	5.3 kg	6.3 kg	6.3 kg	6.3 kg	6.3 kg
Allowable pressure (PS)	HP: 4.15 MPa, LP: 2.26 MPa						
Net weight	272 kg	272 kg	273 kg	312 kg	317 kg	317 kg	317 kg

• Combination modules

Model	EM400YSXM		EM450YSXM		EM500YSXM		EM550YSXM	
Unit combination	EM200YXM	EM200YXM	EM200YXM	EM250YXM	EM250YXM	EM250YXM	EM250YXM	EM300YXM
Refrigerant (R32)	5.3 kg	5.3 kg	5.3 kg	5.3 kg	5.3 kg	5.3 kg	5.3 kg	5.3 kg
Allowable pressure (PS)	HP: 4.15 MPa, LP: 2.26 MPa							
Net weight	272 kg	272 kg	272 kg	272 kg	272 kg	272 kg	272 kg	273 kg

Model	EM600YSXM		EM650YSXM		EM700YSXM	
Unit combination	EM300YXM	EM300YXM	EM300YXM	EM350YXM	EM350YXM	EM350YXM
Refrigerant (R32)	5.3 kg	5.3 kg	5.3 kg	6.3 kg	6.3 kg	6.3 kg
Allowable pressure (PS)	HP: 4.15 MPa, LP: 2.26 MPa					
Net weight	273 kg	273 kg	273 kg	312 kg	312 kg	312 kg

Model	EM750YSXM		EM800YSXM		EM850YSXM	
Unit combination	EM350YXM	EM400YXM	EM400YXM	EM400YXM	EM400YXM	EM450YXM
Refrigerant (R32)	6.3 kg	6.3 kg	6.3 kg	6.3 kg	6.3 kg	6.3 kg
Allowable pressure (PS)	HP: 4.15 MPa, LP: 2.26 MPa					
Net weight	312 kg	317 kg	317 kg	317 kg	317 kg	317 kg

Model	EM900YSXM		EM950YSXM		EM1000YSXM	
Unit combination	EM450YXM	EM450YXM	EM450YXM	EM500YXM	EM500YXM	EM500YXM
Refrigerant (R32)	6.3 kg	6.3 kg	6.3 kg	6.3 kg	6.3 kg	6.3 kg
Allowable pressure (PS)	HP: 4.15 MPa, LP: 2.26 MPa					
Net weight	317 kg	317 kg	317 kg	317 kg	317 kg	317 kg