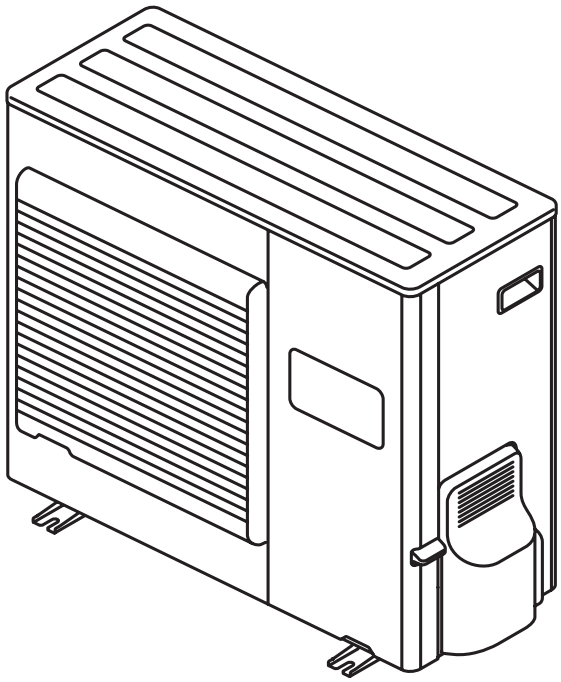
AIR CONDITIONER

English

INSTALLATION MANUAL

OUTDOOR UNIT

For authorized service personnel only.



MADE IN THAILAND

PART No. 9381069101-02

AIR CONDITIONER

INSTALLATION MANUAL

PART No. 9381069101-02

Outdoor Unit

Contents

Note: This manual outlines how to install the air conditioner described above. Handling and installation shall only be done by professionals as outlined in this manual.

1. SAFETY PRECAUTIONS

- Be sure to read this manual thoroughly before installation.
- The warnings and precautions indicated in this manual contain important information pertaining to your safety. Be sure to observe them.
- Hand this manual, together with the operating manual, to the customer. Request the customer to keep them on hand for future use, such as for relocating or repairing the product.

⚠ WARNING	Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

To avoid getting an electric shock, never touch the electrical components soon after the power supply has been turned off. After turning off the power, always wait 10 minutes or more before you touch the electrical components.

Installation of this product must be done by experienced service technicians or professional installers only in accordance with this manual. Installation by non-professional or improper installation of the product may cause serious accidents such as injury, water leakage, electric shock, or fire. If the product is installed in disregard of the instructions in this manual, it will void the manufacturer's warranty.

Do not turn on the power until all work has been completed. Turning on the power before the work is completed can cause serious accidents such as an electric shock or fire.

If refrigerant leaks when you are working, ventilate the area. If the leaking refrigerant is exposed to a direct flame, it may produce a toxic gas.

Installation must be performed in accordance with regulations, codes, or standards for electrical wiring and equipment in each country, region, or the installing place.

Do not use this equipment with air or any other unspecified refrigerant in the refrigerant lines. Excess pressure can cause a rupture.

During installation, make sure that the refrigerant pipe is attached firmly before you run the compressor. Do not operate the compressor under the condition of refrigerant piping not attached properly with 3-way valve open. This may cause abnormal pressure in the refrigeration cycle that leads to rupture and even injury.

When installing or relocating the air conditioner, do not mix gases other than the specified refrigerant (R410A) to enter the refrigerant cycle.
If air or other gas enters the refrigerant cycle, the pressure inside the cycle will rise to an abnormally high value and cause rupture, injury, etc.

For the air conditioner to work appropriately, install it as written in this manual.

To connect the indoor unit and outdoor unit, use air conditioner piping and cables available locally as standard parts. This manual describes proper connections using such installation set.

Do not modify power cable, use extension cable or branch wiring. Improper use may cause electric shock or fire by poor connection, insufficient insulation or over current.

Do not purge the air with refrigerants but use a vacuum pump to vacuum the installation.

There is no extra refrigerant in the outdoor unit for air purging.

Using the same vacuum pump for different refrigerants may damage the vacuum pump or the unit.

Use a clean gauge manifold, vacuum pump and charging hose for R410A exclusively.

Do not modify this unit, such as opening a hole in the cabinet.

During the pump-down operation, make sure that the compressor is turned off before you remove the refrigerant piping.
Do not remove the connection pipe while the compressor is in operation with 3-way valve open. This may cause abnormal pressure in the refrigeration cycle that leads to rupture and even injury.

If the power cable and the connection cable is damaged, it must be replaced by the manufacturer, its service agent or similar qualified persons in order to avoid a safety hazard.

⚠ CAUTION	Indicates a potentially hazardous situation that may result in minor or moderate injury or damage to property.

This unit must be installed by qualified personnel with a capacity certification of handling refrigerant fluids. Refer to regulation and laws in use on installation place.

Install the unit by following local codes and regulations in force in the place of installation, and the instructions provided by manufacturer.

This unit is part of a set constituting an air conditioner. The unit must not be installed alone or be installed with device not authorized by the manufacturer.

When installing pipes shorter than 5 m, sound of the outdoor unit will be transferred to the indoor unit, which will cause large operating sound or some abnormal sound.

Always use a separate power supply line protected by a circuit breaker operating on all wires with a distance between contact of 5 mm for this unit.

To protect the persons, earth (ground) the unit correctly, and use the power cable combined with an Earth Leakage Circuit Breaker (ELCB).

The units are not explosion proof, and therefore should not be installed in explosive atmosphere.

This unit contains no user-serviceable part. Always consult experienced service technician for repairing.

When moving or relocating the air conditioner, consult experienced service technicians for disconnection and reinstallation of the unit.

Children should be monitored to ensure they do not play with the device.

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

Do not touch the aluminium fins of heat exchanger built-in the indoor or outdoor unit to avoid personal injury when you install or maintain the unit.

Do not place any other electrical products or household belongings under indoor unit or outdoor unit. Dripping condensation from the unit might get them wet, and may cause damage or malfunction of the property.

2. ABOUT THIS PRODUCT

2.1. Precautions for using R410A refrigerant

⚠ WARNING

Do not introduce any substance other than the prescribed refrigerant into the refrigeration cycle. If air enters the refrigeration cycle, the pressure in the refrigeration cycle will become abnormally high and cause the piping to rupture.

If there is a refrigerant leak, make sure that it does not exceed the concentration limit. If a refrigerant leak exceeds the concentration limit, it can lead to accidents such as oxygen starvation.

Do not touch refrigerant that has leaked from the refrigerant pipe connections or other areas. Touching the refrigerant directly can cause frostbite.

If a refrigerant leak occurs during operation, immediately vacate the premises and thoroughly ventilate the area. If the refrigerant comes in contact with a flame, it produces a toxic gas.

⚠ WARNING

The basic installation work procedures are the same as conventional refrigerant models. However, pay careful attention to the following points:

- Since the working pressure is 1.6 times higher than that of conventional refrigerant (R22) models, some of the piping and installation and service tools are special. (See the table below.)
  Especially, when replacing a conventional refrigerant (R22) model with a new refrigerant R410A model, always replace the conventional piping and flare nuts with the R410A piping and flare nuts.
- Models that use refrigerant R410A have a different charging port thread diameter to prevent erroneous charging with conventional refrigerant (R22) and for safety. Therefore, check beforehand. [The charging port thread diameter for R410A is 1/2-20 UNF.]
- Be careful that foreign matter (oil, water, etc.) does not enter the piping than with refrigerant models. Also, when storing the piping, securely seal the openings by pinching, taping, etc.
- When charging the refrigerant, take into account the slight change in the composition of the gas and liquid phases. And always charge from the liquid phase where refrigerant composition is stable.

⚠ CAUTION

1 General work area
- All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out.
- Work in confined spaces shall be avoided.

2 Checking for presence of refrigerant
- The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres.
- Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.

3 Presence of fire extinguisher
- If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand.
- Have a dry powder or CO_2 fire extinguisher adjacent to the charging area.

4 No ignition sources
- No person carrying out work in relation to a refrigerating system which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion.
- All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.

5 Ventilated area
- Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work.
- A degree of ventilation shall continue during the period that the work is carried out.
- The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

6 Checks to the refrigerating equipment
- Where electrical components are being changed, they shall be fit for the purpose and to the correct specification.
- At all times the manufacturer’s maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer’s technical department for assistance.
- The following checks shall be applied to installations using flammable refrigerants :
  - the actual refrigerant charge is in accordance with the room size within which the refrigerant containing parts are installed;
  - the ventilation machinery and outlets are operating adequately and are not obstructed;
  - if an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant;
  - marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected;
  - refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

7 Checks to electrical devices
- Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures.
- If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with.
- If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used.
- This shall be reported to the owner of the equipment so all parties are advised.
- Initial safety checks shall include:
  - that capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;
  - that no live electrical components and wiring are exposed while charging, recovering or purging the system;
  - that there is continuity of earth bonding.

2.2. Special tools for R410A refrigerant

⚠ WARNING

To install a unit that uses R410A refrigerant, use dedicated tools and piping materials that have been manufactured specifically for R410A use. Because the pressure of R410A refrigerant is approximately 1.6 times higher than R22, failure to use dedicated piping material or improper installation can cause rupture or injury. Furthermore, it can cause serious accidents such as water leakage, electric shock, or fire.

Tool name	Changes
Gauge manifold	Pressure is high and cannot be measured with a conventional gauge. To prevent erroneous mixing of other refrigerants, the diameter of each port has been changed. It is recommended the gauge with seals –0.1 to 5.3 MPa (-1 to 53 bar) for high pressure. –0.1 to 3.8 MPa (-1 to 38 bar) for low pressure.
Charging hose	To increase pressure resistance, the hose material and base size were changed.
Vacuum pump	A conventional vacuum pump can be used by installing a vacuum pump adapter.
Gas leakage detector	Special gas leakage detector for HFC refrigerant R410A.

Copper pipes

It is necessary to use seamless copper pipes and it is desirable that the amount of residual oil is less than 40 mg/10 m. Do not use copper pipes having a collapsed, deformed or discoloured portion (especially on the interior surface). Otherwise, the expansion valve or capillary tube may become blocked with contaminants.
As an air conditioner using R410A incurs pressure higher than when using conventional refrigerant, it is necessary to choose adequate materials.
Thicknesses of copper pipes used with R410A are as shown in the table. Never use copper pipes thinner than that in the table even when it is available on the market.

Thicknesses of Annealed Copper Pipes (R410A)

Pipe outside diameter [mm (in.)]	Thickness [mm]
6.35 (1/4)	0.80
9.52 (3/8)	0.80
12.70 (1/2)	0.80
15.88 (5/8)	1.00

2.3. Accessories

⚠ WARNING

For installation purposes, be sure to use the parts supplied by the manufacturer or other prescribed parts. The use of non-prescribed parts can cause serious accidents such as the unit falling, water leakage, electric shock, or fire.

Keep this manual in a safe place, and do not discard any other accessories until the installation work has been completed.

2.4. Operable conditions of temperature

	Cooling mode Dry mode
Outdoor temperature	21 to *52˚C

- If this unit is operated outside the operating temperature, the protection circuits may be activated to stop the unit.

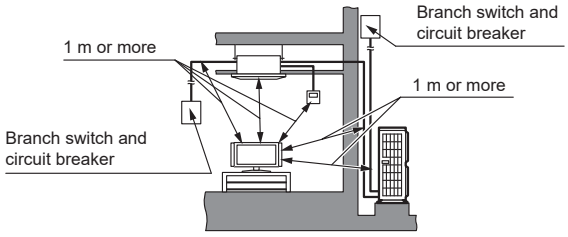
* Suction temperature of the outdoor unit.

3. INSTALLATION WORK

Make sure to obtain the customer's approval for selecting and installing the outdoor unit.

3.1. Selecting an installation location

⚠ WARNING
Securely install the outdoor unit at a location that can withstand the weight of the unit. Otherwise, the outdoor unit may fall and cause injury.
Be sure to install the outdoor unit as prescribed, so that it can withstand earthquakes and typhoons or other strong winds. Improper installation can cause the unit to topple or fall, or other accidents.
To deal with unpredictable weather conditions caused by climate change, fix the outdoor unit(s) to mounting racks or mounting lifters with bolts securely. In addition, consider reinforcing the fixing with strapping down, caging, adding fixtures, etc., so that it can withstand unpredictable high-velocity winds. Failing to follow these requirements can result in system damage, system failure, personal injury, structural damage, or other property damage. We will assume no responsibility in regards to failures, other defects, and damages incurred by improper installation, such as ignorance of regulatory guidelines or other local codes.
Do not install the outdoor unit near the edge of a balcony. Otherwise, children may climb onto the outdoor unit and fall off of the balcony.

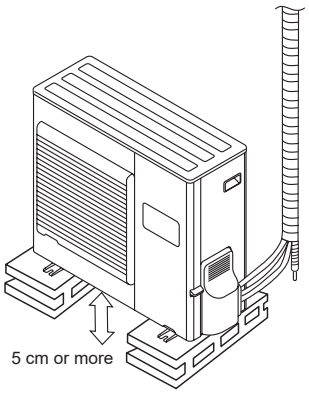
⚠ CAUTION
Do not install the outdoor unit in the following areas: • Area with high salt content, such as at the seaside. It will deteriorate metal parts, causing the parts to fail or the unit to leak water. • Area filled with mineral oil or containing a large amount of splashed oil or steam, such as a kitchen. It will deteriorate plastic parts, causing the parts to fail or the unit to leak water. • Area that generates substances that adversely affect the equipment, such as sulphuric gas, chlorine gas, acid, or alkali. It will cause the copper pipes and brazed joints to corrode, which can cause refrigerant leakage. • Area containing equipment that generates electromagnetic interference. It will cause the control system to malfunction, preventing the unit from operating normally. • Area that can cause combustible gas to leak, contains suspended carbon fibres or flammable dust, or volatile inflammables such as paint thinner or gasoline. If gas leaks and settles around the unit, it can cause a fire. • Area where small animals may live. It may cause failure, smoke or fire if small animals enter and touch internal electrical parts. • Area where animals may urinate on the unit or ammonia may be generated.
Do not tilt the outdoor unit more than 3 degrees. However, do not install the unit with it tilted towards the side containing the compressor.
Install the outdoor unit in a well-ventilated location away from rain or direct sunlight.
If the outdoor unit must be installed in an area within easy reach of the general public, install as necessary a protective fence or the like to prevent their access.
Install the outdoor unit in a location that would not inconvenience your neighbours, as they could be affected by the airflow coming out from the outlet, noise, or vibration. If it must be installed in proximity to your neighbours, be sure to obtain their approval.
If the outdoor unit is installed in a cold region that is affected by snow accumulation, snow fall, or freezing, take appropriate measures to protect it from those elements. To ensure a stable operation, install inlet and outlet ducts.
Install the outdoor unit in a location that is away from exhaust or the vent ports that discharge vapour, soot, dust, or debris.
Install the indoor unit, outdoor unit, power supply cable, connection cable, and remote controller cable at least 1 m away from a television or radio receivers. The purpose of this is to prevent TV reception interference or radio noise. (Even if they are installed more than 1 m apart, you could still receive noise under some signal conditions.) 
If children under 10 years old may approach the unit, take preventive measures so that they cannot reach the unit.
Keep the length of the piping of the indoor and outdoor units within the allowable range.
Consider the transportation route, installation space, maintenance space, and access, and install the unit in a location with sufficient space for the refrigerant piping.
For maintenance purposes, do not bury the piping.

(1) Install the outdoor unit in a location which can withstand the weight of the unit and vibration, and which can install horizontally.
(2) Provide the indicated space to ensure good airflow.
(3) If possible, do not install the unit where it will be exposed to direct sunlight. (If necessary, install a blind that does not interfere with the airflow.)
(4) Do not install the unit near a source of heat, steam, or flammable gas.
(5) During heating operation, drain water flows from the outdoor unit. Therefore, install the outdoor unit in a place where the drain water flow will not be obstructed. (Reverse cycle model only)
(6) Do not install the unit where strong wind blows or where it is very dusty.
(7) Do not install the unit where people pass.
(8) Install the outdoor unit in a place where it will be free from being dirty or getting wet by rain as much as possible.
(9) Install the unit where connection to the indoor unit is easy.

3.2. Installation dimensions

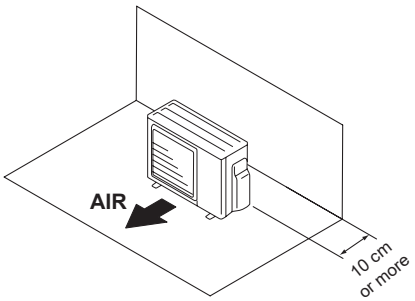
If the space is larger than that is stated, the condition will be the same as that there are no obstacles.

• Do not install it directly on the ground, otherwise it will cause failure.

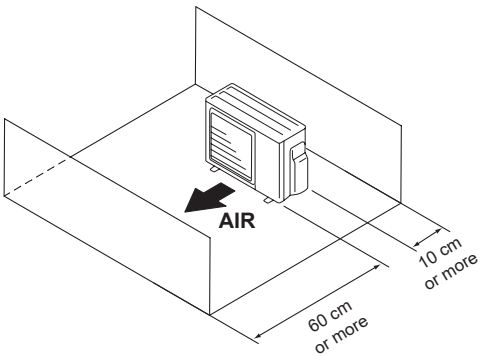


When the upward area is open

• When there are obstacles at the back side.

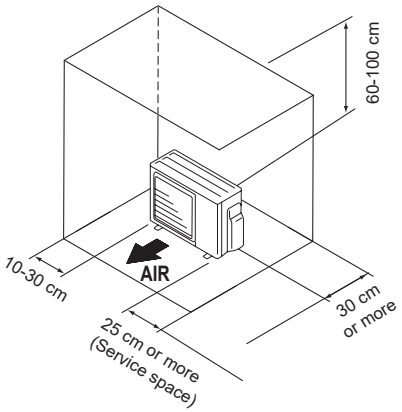


• When there are obstacles at the back and front sides.

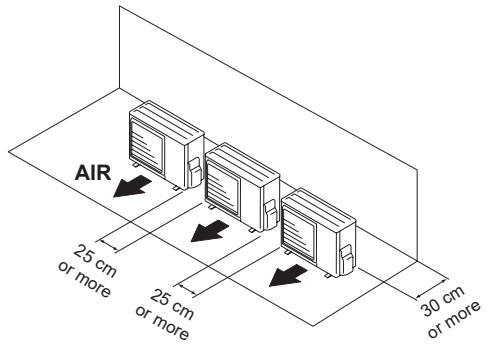


When an obstruction is present also in the upward area

• When there are obstacles at the back, side(s), and top



When there are obstacles at the back side when installing more than one unit



3.3. Placing the unit

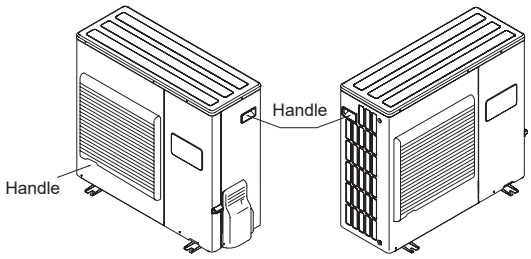
⚠ WARNING

Do not touch the fins.
Otherwise, personal injury could result.

⚠ CAUTION

When carrying the unit, hold the handles on the right and left sides and be careful.
If the outdoor unit is carried from the bottom, hands or fingers may be pinched.

- Be sure to hold the handles on the sides of the unit. Otherwise, the suction grilles on the sides of the unit may be deformed.

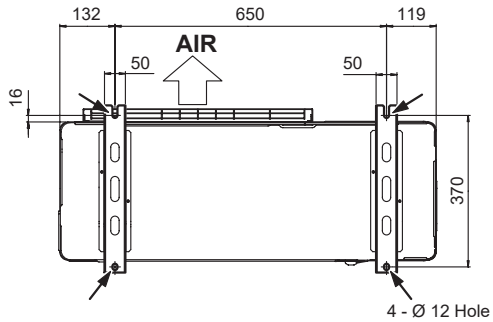


3.4. Secure the unit

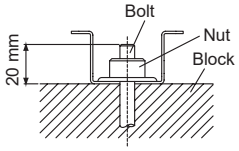
⚠ WARNING

When installing the outdoor unit where it may exposed to strong wind, fasten it securely.

(Unit : mm)



- Install 4 anchor bolts at the locations indicated with arrows in the above figure.
- To reduce vibration, do not install the unit directly on the ground. Install it on a secure base (such as concrete blocks).
- The foundation shall support the legs of the unit and have a width of 50 mm or more.
- Depending on the installation conditions, the outdoor unit may spread its vibration during operation, which may cause noise and vibration. Therefore, attach damping materials (such as damping pads) to the outdoor unit during installation.
- Install the foundation, making sure that there is enough space for installing the connection pipes.
- Secure the unit to a solid block using foundation bolts.
  (Use 4 sets of commercially available M10 bolts, nuts, and washers.)
- The bolts should protrude 20 mm.
  (Refer to the figure below.)
- If overturning prevention is required, purchase the necessary commercially available items.



4. PIPE INSTALLATION

⚠ CAUTION

Do not use mineral oil on flared part. Prevent mineral oil from getting into the system as this would reduce the lifetime of the units.

While welding the pipes, be sure to blow dry nitrogen gas through them.

The maximum lengths of this product are shown in the table. If the units are further apart than this, correct operation cannot be guaranteed.

4.1. Selecting the pipe material

⚠ CAUTION

Do not use existing pipes.

Use pipes that have clean external and internal sides without any contamination which may cause trouble during use, such as sulphur, oxide, dust, cutting waste, oil, or water.

It is necessary to use seamless copper pipes.
Material: Phosphor deoxidized seamless copper pipes.
It is desirable that the amount of residual oil is less than 40 mg/10 m.

Do not use copper pipes that have a collapsed, deformed, or discoloured portion (especially on the interior surface). Otherwise, the expansion valve or capillary tube may become blocked with contaminants.

Improper pipe selection will degrade performance. As an air conditioner using R410A incurs pressure higher than when using conventional refrigerant, it is necessary to choose adequate materials.

Thicknesses of copper pipes used with R410A are as shown in the table.
Never use copper pipes thinner than those indicated in the table even if they are available on the market.

Thicknesses of Annealed Copper Pipes (R410A)

Pipe outside diameter [mm (in.)]	Thickness [mm]
6.35 (1/4)	0.8
9.52 (3/8)	
12.70 (1/2)	
15.88 (5/8)	1.0

4.2. Pipe requirements

⚠ CAUTION

Keep the piping length between the indoor unit and outdoor unit within the allowable tolerance.

Pipe diameter <Liquid/Gas> (Standard) [mm (in.)]	6.35 (1/4) / 15.88 (5/8)
Max. piping length [m]	25
Min. piping length [m]	5
Max. height difference <Indoor unit to outdoor unit> [m]	15

- Use pipe with water-resistant heat insulation.

⚠ CAUTION

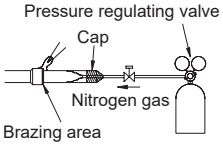
Install heat insulation around both the gas and liquid pipes. Failure to do so may cause water leaks.
Use heat insulation with heat resistance above 120 °C. (Reverse cycle model only)
In addition, if the humidity level at the installation location of the refrigerant piping is expected to exceed 70 %, install heat insulation around the refrigerant piping.
If the expected humidity level is 70-80 %, use heat insulation that is 15 mm or thicker and if the expected humidity exceeds 80 %, use heat insulation that is 20 mm or thicker.
If heat insulation is used that is not as thick as specified, condensation may form on the surface of the insulation.
In addition, use heat insulation with heat conductivity of 0.045 W/(m·K) or less (at 20 °C).

4.3. Brazing

⚠ CAUTION

If air or another type of refrigerant enters the refrigeration cycle, the internal pressure in the refrigeration cycle will become abnormally high and prevent the unit from exerting its full performance.

Apply nitrogen gas while brazing the pipes. If a pipe is brazed without applying nitrogen gas, an oxidation film will be created.
This can degrade performance or damage the parts in the unit (such as the compressor or valves).
Nitrogen gas pressure: 0.02 MPa
(= pressure felt sufficiently on the back of the hand)



For brazing material, use phosphor copper that does not require flux. Do not use flux to braze pipes. If the flux is the chlorine type, it will cause the pipes to corrode.
Furthermore, if the flux contains fluoride, it will adversely affect the refrigerant pipe system such as by degrading the refrigerant.
If fluoride is contained, quality of refrigerant deteriorates and affects the refrigerant piping system.

4.4. Pipe connection

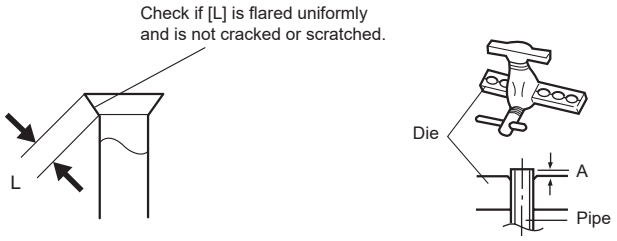
4.4.1. Protection of pipes

Protect the pipes to prevent the entry of moisture and dust.
Especially, pay attention when passing the pipes through a hole or connecting the end of a pipe to the outdoor unit.

Location	Working period	Protection method
Outdoor	1 month or more	Pinch pipes
	Less than 1 month	Pinch or tape pipes
Indoor	-	Pinch or tape pipes

4.4.2. Flaring

(1) Cut the connection pipe to the necessary length with a pipe cutter.
(2) Hold the pipe downward so that cuttings will not enter the pipe and remove the burrs.
(3) Insert the flare nut (always use the flare nut attached to the indoor and outdoor units respectively) onto the pipe and perform the flare processing with a flare tool.
Use the special R410A flare tool, or the conventional (for R22) flare tool.
When using the conventional flare tool, always use an allowance adjustment gauge and secure the A dimension shown in the table below.



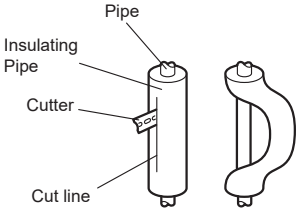
Pipe outside diameter

Pipe outside diameter	A (mm)		
	Flare tool for R410A, clutch type	Conventional (R22) flare tool	
		Clutch type	Wing nut type
6.35 mm (1/4 in.)	0 to 0.5	1.0 to 1.5	1.5 to 2.0
15.88 mm (5/8 in.)	0 to 0.5	1.0 to 1.5	2.0 to 2.5

4.4.3. Bending pipes

The pipes are shaped by your hands. Be careful not to collapse them.
Do not bend the pipes in an angle more than 90°.
When pipes are repeatedly bent or stretched, the material will harden, making it difficult to bend or stretch them anymore.
Do not bend or stretch the pipes more than three times.

- When bending the pipe, do not bend it as is. The pipe will be collapsed. In this case, cut the insulating pipe with a sharp cutter as shown on the right, and bend it after exposing the pipe. After bending the pipe as you want, be sure to put the heat insulating pipe back on the pipe, and secure it with tape.



⚠ CAUTION

To prevent breaking of the pipe, avoid sharp bends.
Bend the pipe with a radius of curvature of 150 mm or over.

If the pipe is bent repeatedly at the same place, it will break.

4.4.4. Connecting pipes

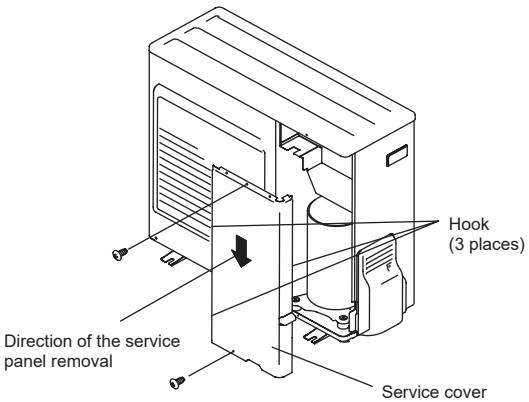
⚠ CAUTION

Be sure to install the pipe against the port on the indoor unit and the outdoor unit correctly. If the centring is improper, the flare nut cannot be tightened smoothly. If the flare nut is forced to turn, the threads will be damaged.

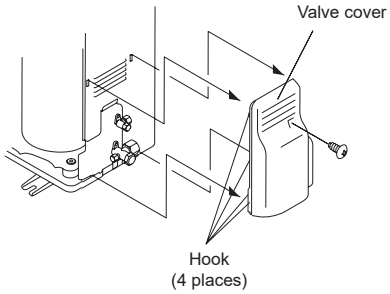
Do not remove the flare nut from the outdoor unit pipe until immediately before connecting the connection pipe.

After installing the piping, make sure that the connection pipes do not touch the compressor or outer panel. If the pipes touch the compressor or outer panel, they will vibrate and produce noise.

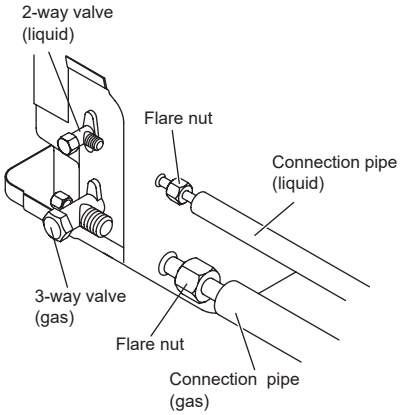
(1) Service cover removal
- Remove the two mounting screws.
- Remove the service cover by pushing downwards.

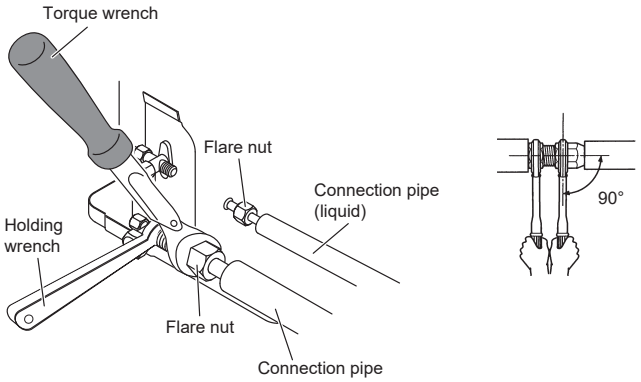


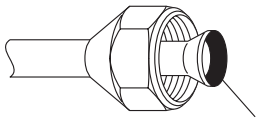
(2) Valve cover removal.
- Remove the one mounting screw.
- Remove the valve cover by sliding upward.



(3) Install the outdoor unit wall cap (supplied with the optional installation set or procured in the field) to the wall hole pipe.
(4) Connect the outdoor unit and indoor unit piping.
(5) After matching the centre of the flare surface and tightening the nut hand tight, tighten the nut to the specified tightening torque with a torque wrench.







To prevent gas leakage, coat the flare surface with alkylbenzene oil (HAB). Do not use mineral oil.

Flare nut tightening torque

Flare nut	Tightening torque
6.35 mm (1/4 in.) dia.	16 to 18 N · m (160 to 180 kgf · cm)
9.52 mm (3/8 in.) dia.	32 to 42 N · m (320 to 420 kgf · cm)
12.70 mm (1/2 in.) dia.	49 to 61 N · m (490 to 610 kgf · cm)
15.88 mm (5/8 in.) dia.	63 to 75 N · m (630 to 750 kgf · cm)

Do not remove the cap from the connection pipe before connecting the pipe.

4.5. Sealing test

⚠ WARNING
Before operating the compressor, install the pipes and securely connect them. Otherwise, if the pipes are not installed and if the valves are open when the compressor operates, air could enter the refrigeration cycle. If this happens, the pressure in the refrigeration cycle will become abnormally high and cause damage or injury.
After the installation, make sure there is no refrigerant leakage. If the refrigerant leaks into the room and becomes exposed to a source of fire such as a fan heater, stove, or burner, it produces a toxic gas.
Do not subject the pipes to strong shocks during the sealing test. It can rupture the pipes and cause serious injury.

⚠ CAUTION
Do not block the walls and the ceiling until the sealing test and the charging of the refrigerant gas have been completed.
For maintenance purposes, do not bury the piping of the outdoor unit.

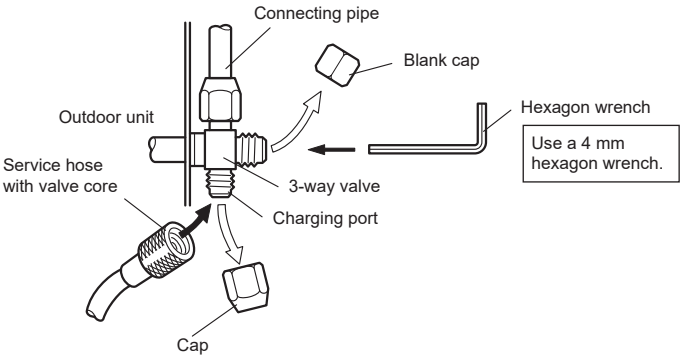
- After connecting the pipes, perform a sealing test.
- Make sure that the 3-way valves are closed before performing a sealing test.
- Pressurize nitrogen gas to 4.15 MPa to perform the sealing test.
- Add nitrogen gas to both the liquid pipes and the gas pipes.
- Check all flare connections and welds. Then, check that the pressure has not decreased.
- Compare the pressures after pressurizing and letting it stand for 24 hours, and check that the pressure has not decreased.
  * When the outdoor air temperature changes 5 °C, the test pressure changes 0.05 MPa. If the pressure has dropped, the pipe joints may be leaking.
- If a leak is found, immediately repair it and perform the sealing test again.
- After completing the sealing test, release the nitrogen gas from both valves.
- Release the nitrogen gas slowly.

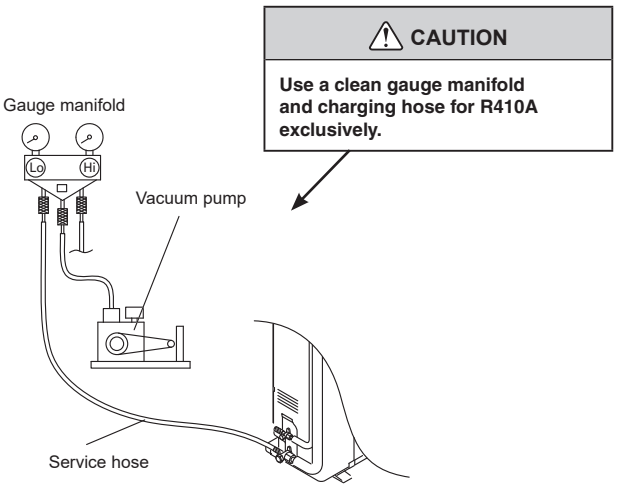
4.6. Vacuum process

⚠ CAUTION
Perform a refrigerant leakage test (air tightness test) to check for leaks using nitrogen gas while all valves in the outdoor unit are closed. (Use the test pressure indicated on the nameplate.)
Be sure to evacuate the refrigerant system using a vacuum pump.
The refrigerant pressure may sometimes not rise when a closed valve is opened after the system is evacuated using a vacuum pump. This is caused by the closure of the refrigerant system of the outdoor unit by the electronic expansion valve. This will not affect the operation of the unit.
If the system is not evacuated sufficiently, its performance will drop.
Use a clean gauge manifold and charging hose that were designed specifically for use with R410A. Using the same vacuum equipment for different refrigerants may damage the vacuum pump or the unit.
Do not purge the air with refrigerants, but use a vacuum pump to evacuate the system.

(1) Check that the valves are closed by removing the blank caps from the gas and liquid pipes.
(2) Remove the charging port cap, and connect the gauge manifold and the vacuum pump to the charging valve with the service hoses.
(3) Vacuum the indoor unit and the connecting pipes until the pressure gauge indicates –0.1 MPa (–76 cmHg).
(4) When –0.1 MPa (–76 cmHg) is reached, operate the vacuum pump for at least 60 minutes.
(5) Disconnect the service hoses and fit the charging port cap to the charging valve to the specified torque. (Refer to below table)
(6) Remove the blank caps, and fully open the 3-way valves with a hexagon wrench [Torque: 6 to 7 N·m (60 to 70 kgf·cm)].
(7) Tighten the blank caps of the 3-way valve to the specified torque.

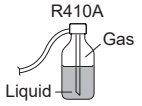
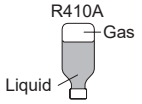
Pipe outside diameter		Tightening torque
Blank cap	6.35 mm (1/4 in.)	20 to 25 N·m (200 to 250 kgf·cm)
	9.52 mm (3/8 in.)	20 to 25 N·m (200 to 250 kgf·cm)
	12.70 mm (1/2 in.)	28 to 32 N·m (280 to 320 kgf·cm)
	15.88 mm (5/8 in.)	30 to 35 N·m (300 to 350 kgf·cm)
Charging port cap		12.5 to 16 N·m (125 to 160 kgf·cm)





4.7. Additional charging

⚠ WARNING
When moving and installing the air conditioner, do not mix gas other than the specified refrigerant R410A inside the refrigerant cycle. If air or other gas enters the refrigerant cycle, the pressure inside the cycle will rise to an abnormally high value and cause breakage, injury, etc.

⚠ CAUTION
After vacuuming the system, add refrigerant.
Do not reuse recovered refrigerant.
When charging the refrigerant R410A, always use an electronic scales for refrigerant charging (to measure the refrigerant by weight). Adding more refrigerant than the specified amount will cause a malfunction.
When charging the refrigerant, take into account the slight change in the composition of the gas and liquid phases, and always charge from the liquid phase side whose composition is stable. Adding refrigerant through the gas pipe will cause a malfunction.
Check if the steel cylinder has a siphon installed or not before filling. (There is an indication “with siphon for filling liquid” on the steel cylinder.) **Filling method for cylinder with siphon**    Set the cylinder vertical and fill with the liquid. (Liquid can be filled without turning bottom up with the siphon inside.) **Filling method for other cylinders**    Turn bottom up and fill with liquid. (Be careful to avoid turning over the cylinder.)
Be sure to use the special tools for R410A for pressure resistance and to avoid mixing of impure substances.
If the units are further apart than the maximum pipe length, correct operation cannot be guaranteed.
Make sure to back closing valve after refrigerant charging. Otherwise, the compressor may fail.
Minimize refrigerant release to the air. Excessive release is prohibited under the Freon Collection and Destruction Law.

Additional charging amount

Refrigerant suitable for a piping length of 7.5 m is charged in the outdoor unit at the factory.
When the piping is longer than 7.5 m, additional charging is necessary.
For the additional amount, see the table below.

Pipe length	Less than 7.5 m	10 m	20 m	25 m	g/m
Additional charge amount	None	50 g	250 g	350 g	20 g/m

4.8. Gas leakage inspection

⚠ CAUTION
After connecting the piping, check the joints for gas leakage with gas leak detector.

⚠ WARNING
During installation, make sure that the refrigerant pipe is attached firmly before you run the compressor. Do not operate the compressor under the condition of refrigerant piping not attached properly with 2-way or 3-way valve open. This may cause abnormal pressure in the refrigeration cycle that leads to breakage and even injury.
During the pump-down operation, make sure that the compressor is turned off before you remove the refrigerant piping. Do not remove the connection pipe while the compressor is in operation with 2-way or 3-way valve open. This may cause abnormal pressure in the refrigeration cycle that leads to breakage and even injury.
When installing and relocating the air conditioner, do not mix gases other than the specified refrigerant (R410A) to enter the refrigerant cycle. If air or other gas enters the refrigerant cycle, the pressure inside the cycle will rise to an abnormally high value and cause breakage, injury, etc.

5. ELECTRICAL WIRING

5.1. Notes for electrical wiring

⚠ WARNING
Wiring connections must be performed by a qualified person in accordance with the specifications. The voltage rating for this product is 220-240 V at 50 Hz. It should be operated within the range of 198 to 264 V.
Before connecting the wires, make sure the power supply is OFF.
Use a dedicated power supply circuit. Insufficient power capacity in the electrical circuit or improper wiring may cause electric shock or fire.
Install a breaker at the power supply for each outdoor unit. Improper breaker selection can cause electric shock or fire.
Install a leakage circuit breaker in accordance with the related laws and regulations. An improperly installed electrical box cover can cause serious accidents such as electric shock or fire through exposure to dust or water.
A circuit breaker is installed in the permanent wiring. Always use a circuit that can trip all the poles of the wiring and has an isolation distance of at least 3 mm between the contacts of each pole.
Use designated cables and power cables. Improper use may cause electric shock or fire by poor connection, insufficient insulation, or over current.
Do not modify power cable, use extension cable or branch wiring. Improper use may cause electric shock or fire by poor connection, insufficient insulation or over current.
Connect the connector cable securely to the terminal. Check no mechanical force bears on the cables connected to the terminals. Faulty installation can cause a fire.
Use ring terminals and tighten the terminal screws to the specified torques, otherwise, abnormal overheating may be produced and possibly cause serious damage inside the unit.
Make sure to secure the insulation portion of the connector cable with the cable clamp. Damaged insulation can cause a short circuit.
Fix cables so that cables do not make contact with the pipes (especially on high pressure side). Do not make power supply cable and transmission cable come in contact with valves (Gas).
Never install a power factor improvement condenser. Instead of improving the power factor, the condenser may overheat.
Be sure to perform the earthing (grounding) work. Do not connect earthing (grounding) wires to a gas pipe, water pipe, lightning rod or earthing (grounding) wire for a telephone. • Connection to a gas pipe may cause a fire or explosion if gas leaks. • Connection to a water pipe is not an effective earthing (grounding) method if PVC pipe is used. • Connection to the earthing (grounding) wire of a telephone or to a lightning rod may cause a dangerously abnormal rise in the electrical potential if lightning strikes. Improper earthing (grounding) work can cause electric shocks.
Securely install the electrical box cover on the unit. An improperly installed service panel can cause serious accidents such as electric shock or fire through exposure to dust or water.

⚠ CAUTION
The primary power supply capacity is for the air conditioner itself, and does not include the concurrent use of other devices.
Do not start operation until the refrigerant is charged completely. The compressor will fail if it is operated before the refrigerant piping charging is complete.
Transmission cable between indoor unit and outdoor unit is 220-240 V.
Be sure not to remove thermistor sensor etc. from power wiring and connection wiring. Compressor may fail if operated while removed.
Start wiring work after closing branch switch and over current breaker.
Use an earth leakage breaker that is capable of handling high frequencies. Because the outdoor unit is inverter controlled, a high-frequency earth leakage breaker is necessary to prevent a malfunction of the breaker itself.
When using an earth leakage breaker that has been designed solely for earth (ground) fault protection, be sure to install a fuse-equipped switch or circuit breaker.
Do not connect the AC power supply to the transmission line terminal board. Improper wiring can damage the entire system.
Do not use crossover power supply wiring for the outdoor unit.
If the temperature surrounding the breaker is too high, the amperage at which the breaker cuts out may decrease.

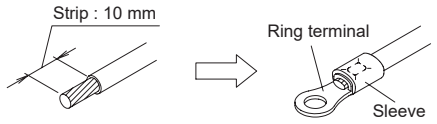
How to connect wiring to the terminal

Caution when wiring cable

When stripping off the coating of a lead wire, always use a special tool such as a wire stripper. If there is no special tool available, carefully strip the coating with a knife etc.

(1) Use ring terminals with insulating sleeves as shown in the figure below to connect to the terminal block.

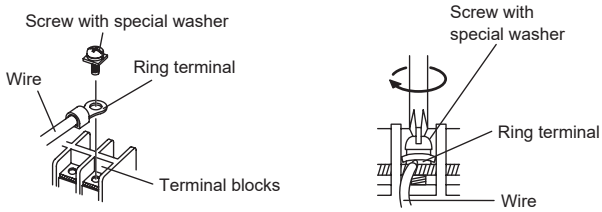
(2) Securely clamp the ring terminals to the wires using an appropriate tool so that the wires do not come loose.



(3) Use the specified wires, connect them securely, and fasten them so that there is no stress placed on the terminals.

(4) Use an appropriate screwdriver to tighten the terminal screws. Do not use a screwdriver that is too small, otherwise, the screw heads may be damaged and prevent the screws from being properly tightened.

(5) Do not tighten the terminal screws too much, otherwise, the screws may break.



(6) See the table below for the terminal screw tightening torques.

Tightening torque [N·m (kgf·cm)]	
M4 screw	1.2 to 1.8 (12 to 18)
M5 screw	2.0 to 3.0 (20 to 30)

5.2. Selecting circuit breaker and wiring

⚠ CAUTION
Be sure to install a breaker with specified capacity.
Before the electrical working, confirm electrical standards and regulations in each country, region, or installing place. Then select appropriate cables and breakers that comply with them.

Voltage rating	220-240 V~ 50 Hz
Operating range	198 to 264 V

Cable	Conductor size [mm^2] (*1)	Type	Remarks
Power supply cable	2.5-3.5	Type60245 IEC66	2 Cable + Ground (Earth)
Connection cable	Refer to the installation manual of the indoor unit for the connection cable specifications.		

*1: Selected sample: Select the correct cable type and size according to the country or region's regulations.

Max. wire length: Set a length so that the voltage drop is less than 2%. Increase the wire diameter when the wire length is long.

Breaker capacity (*1) [A]	Earth leakage breaker (*2) [mA]
30	30

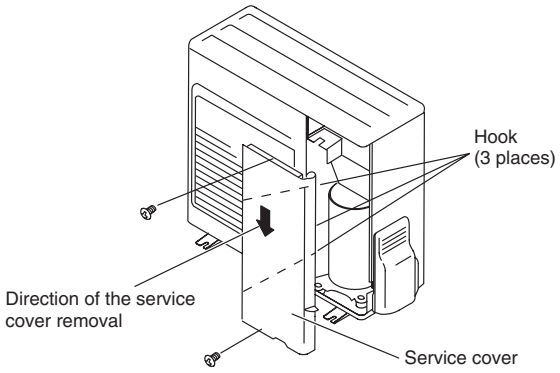
*1: Select the appropriate breaker of the described specification according to the national or regional standards.

*2: Select the breaker that enough load current can pass through it.

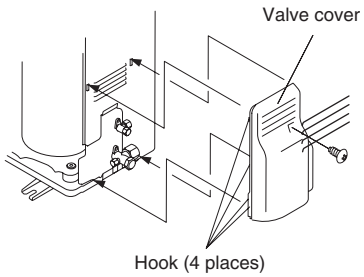
- Before starting work check that power is not being supplied to all poles of the indoor unit and outdoor unit.
- Install all electrical works in accordance to standard.
- Install the disconnect device with a contact gap of at least 3mm in all poles nearby the units. (Both indoor unit and outdoor unit)
- Wiring size must comply with the applicable local and national code.

5.3. Wiring method

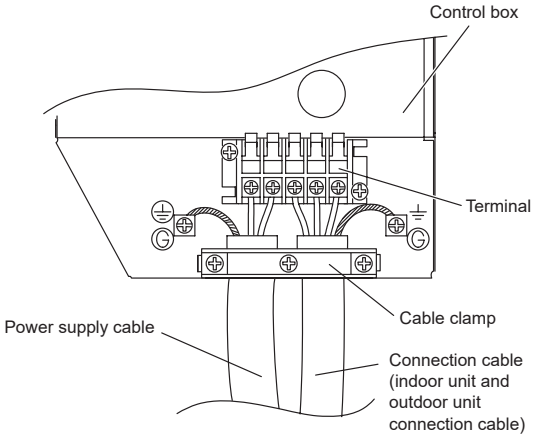
(1) Service cover removal
- Remove the two mounting screws.
- Remove the service cover by pushing downwards.

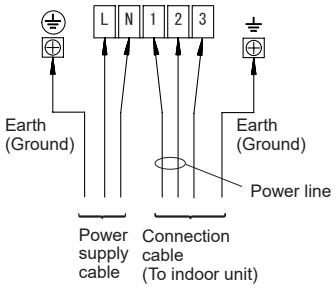


(2) Valve cover removal.
- Remove the one mounting screw.
- Remove the valve cover by sliding upward.

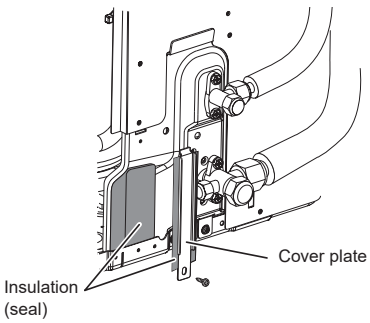


(3) Connect the power supply cable and the connection cable to terminal.

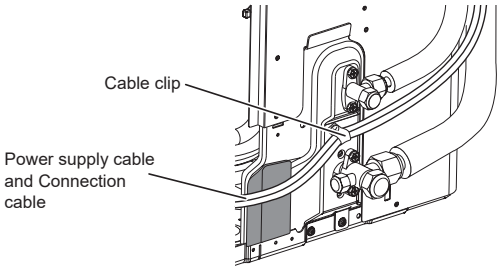




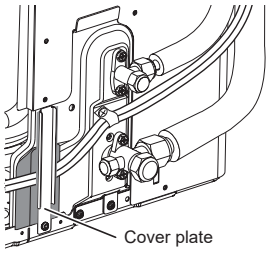
(4) Remove the cover plate.



(5) Fix the power supply cable and connection cable with the cable clip of the base of the valves.

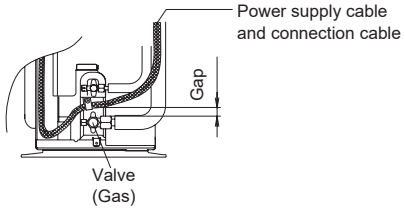


(6) Attach the cover plate.

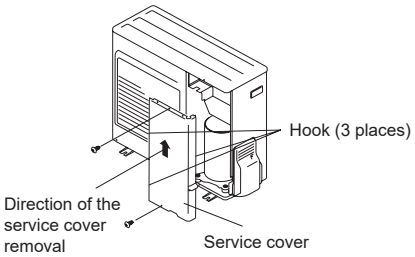


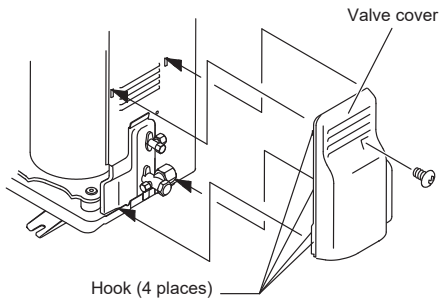
⚠ CAUTION

Fix cables so that cables do not make contact with the pipes (especially on high pressure side).
Do not make power supply cable and connection cable come in contact with valve (Gas).



(7) Put the service cover and valve cover back after completion of the work.





6. TEST RUN

Perform test run as described in the installation manual of the indoor unit.

7. CHECK LIST

Check items during test operation.

☐ Is the outdoor unit making any abnormal noise or vibrating significantly?
☐ Is the cold air or hot air blowing from indoor unit according to the operation mode?
☐ Check that the “ERROR” LED blinks. If, it has displayed, check the error content as per 8. LED DISPLAY.
☐ Operate the unit according to the operating manual provided with the indoor unit, and check that it is operating normally.

8. PUMP DOWN

⚠ WARNING

During the pump-down operation, make sure that the compressor is turned off before you remove the refrigerant piping. Do not remove the connection pipe while the compressor is in operation with 2 or 3 way valve open. This may cause abnormal pressure in the refrigeration cycle that may lead to breakage or injury.

To avoid discharging refrigerant into the atmosphere at the time of relocation or disposal, recover refrigerant by doing the cooling operation or forced cooling operation according to the following procedure. (When the cooling operation cannot start in winter, and so on, start the forced cooling operation.)

(1) Do the air purging of the charge hose by connecting the charging hose of gauge manifold to the charging port of 3-way valve (large) and opening the low-pressure valve slightly.

(2) Close the valve stem of 2-way valve (small) completely.

(3) Start the cooling operation or forced cooling operation as described in the installation manual of the indoor unit.

(4) Close the valve stem of 3-way valve (large) when the reading on the compound pressure gauge becomes 0.05~0 MPa (0.5 ~ 0 kg/cm²).

(5) Stop the operation as described in the installation manual of the indoor unit.