Safety Precautions

- Read these Safety Precautions carefully to ensure correct installation.
- This manual classifies the precautions into WARNINGS and CAUTIONS.
  Be sure to follow all the precautions below: they are all important for ensuring safety.

⚠ **WARNINGS .....Failure to follow any of WARNING is likely to result in such grave consequences as death or serious injury.**

⚠ **CAUTIONS.....Failure to follow any of CAUTION may in some cases result in grave consequences.**

- The following safety symbols are used throughout this manual:

Be sure to observe this instruction.	Be sure to establish an earth connection.	Never attempt.

- After completing installation, test the unit to check for installation errors. Give the user adequate instructions concerning the use and cleaning of the unit according to the Operation Manual.

⚠ WARNINGS

- Installation should be left to the dealer or another professional.
  Improper installation may cause water leakage, electrical shock, or fire.
- Install the air conditioner according to the instructions given in this manual.
  Incomplete installation may cause water leakage, electrical shock, or fire.
- Be sure to use the supplied or specified installation parts.
  Use of other parts may cause the unit to come to lose, water leakage, electrical shock, or fire.
- Install the air conditioner on a solid base that can support the unit's weight.
  An inadequate base or incomplete installation may cause injury in the event the unit falls off the base.
- Electrical work should be carried out in accordance with the installation manual and the national electrical wiring rules or code of practice. Insufficient capacity or incomplete electrical work may cause electrical shock or fire.
- Be sure to use a dedicated power circuit. Never use a power supply shared by another appliance.
- For wiring, use a cable long enough to cover the entire distance with no connection.
  Do not use an extension cord. Do not put other loads on the power supply, use a dedicated power circuit.
  (Failure to do so may cause abnormal heat, electric shock or fire.)
- Use the specified types of wires for electrical connections between the indoor and outdoor units.
  Firmly clamp the interconnecting wires so their terminals receive no external stresses. Incomplete connections or clamping may cause terminal overheating or fire.
- After connecting interconnecting and supply wiring be sure to shape the cables so that they do not put undue force on the electrical covers or panels.
  Install covers over the wires. Incomplete cover installation may cause terminal overheating, electrical shock, or fire.
- If any refrigerant has leaked out during the installation work, ventilate the room.
  (The refrigerant produces a toxic gas if exposed to flames.)
- After all installation is complete, check to make sure that no refrigerant is leaking out.
  (The refrigerant produces a toxic gas if exposed to flames.)
- When installing or relocating the system, be sure to keep the refrigerant circuit free from substances other than the specified refrigerant (R-410A), such as air.
  (Any presence of air or other foreign substance in the refrigerant circuit causes an abnormal pressure rise or rupture, resulting in injury.)
- Be sure to establish an earth. Do not earth the unit to a utility pipe, arrester, or telephone earth.
  Incomplete earth may cause electrical shock. A high surge current from lightning or other sources may cause damage to the air conditioner.
- Be sure to install an earth leakage breaker.
  Failure to install an earth leakage breaker may result in electric shocks.

⚠ CAUTIONS

- Do not install the air conditioner in a place where there is danger of exposure to inflammable gas leakage.
  If the gas leaks and builds up around the unit, it may catch fire.
- Establish drain piping according to the instructions of this manual.
  Inadequate piping may cause flooding.
- Note for installing the outdoor unit. (For heat pump model only.)
  In cold area where the outside air temperature keep below or around freezing-point for a few days, the outdoor unit's drain may freeze.
  If so, it is recommended to install an electric heater in order to protect drain from freezing.
- Tighten the flare nut according to the specified method such as with a torque wrench.
  If the flare nut is tightened too hard, the flare nut may crack after a long time and cause refrigerant leakage.

Accessories

Accessories supplied with the outdoor unit:

(A) Installation Manual	1	(B) Drain plug (Heat pump-Models)  There is on the bottom packing case.	1

Precautions for Selecting the Location

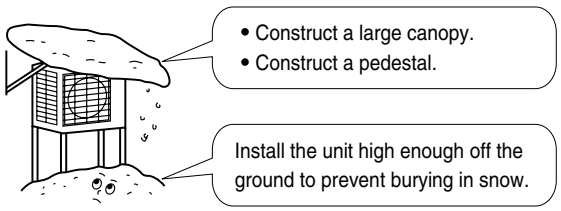
1) Choose a place solid enough to bear the weight and vibration of the unit, where the operation noise will not be amplified.
2) Choose a location where the hot air discharged from the unit or the operation noise, will not cause a nuisance to the neighbors of the user.
3) Avoid places near a bedroom and the like, so that the operation noise will cause no trouble.
4) There must be sufficient spaces for carrying the unit into and out of the site.
5) There must be sufficient space for air passage and no obstructions around the air inlet and the air outlet.
6) The site must be free from the possibility of flammable gas leakage in a nearby place. Locate the unit so that the noise and the discharged hot air will not annoy the neighbors.
7) Install units, power cords and inter-unit cables at least 3 meter away from television and radio sets. This is to prevent interference to images and sounds. (Noises may be heard even if they are more than 3 meter away depending on radio wave conditions.)
8) In coastal areas or other places with salty atmosphere of sulfate gas, corrosion may shorten the life of the air conditioner.
9) Since drain flows out of the outdoor unit, do not place under the unit anything which must be kept away from moisture.

NOTE
Cannot be installed hanging from ceiling or stacked.

■ Caution

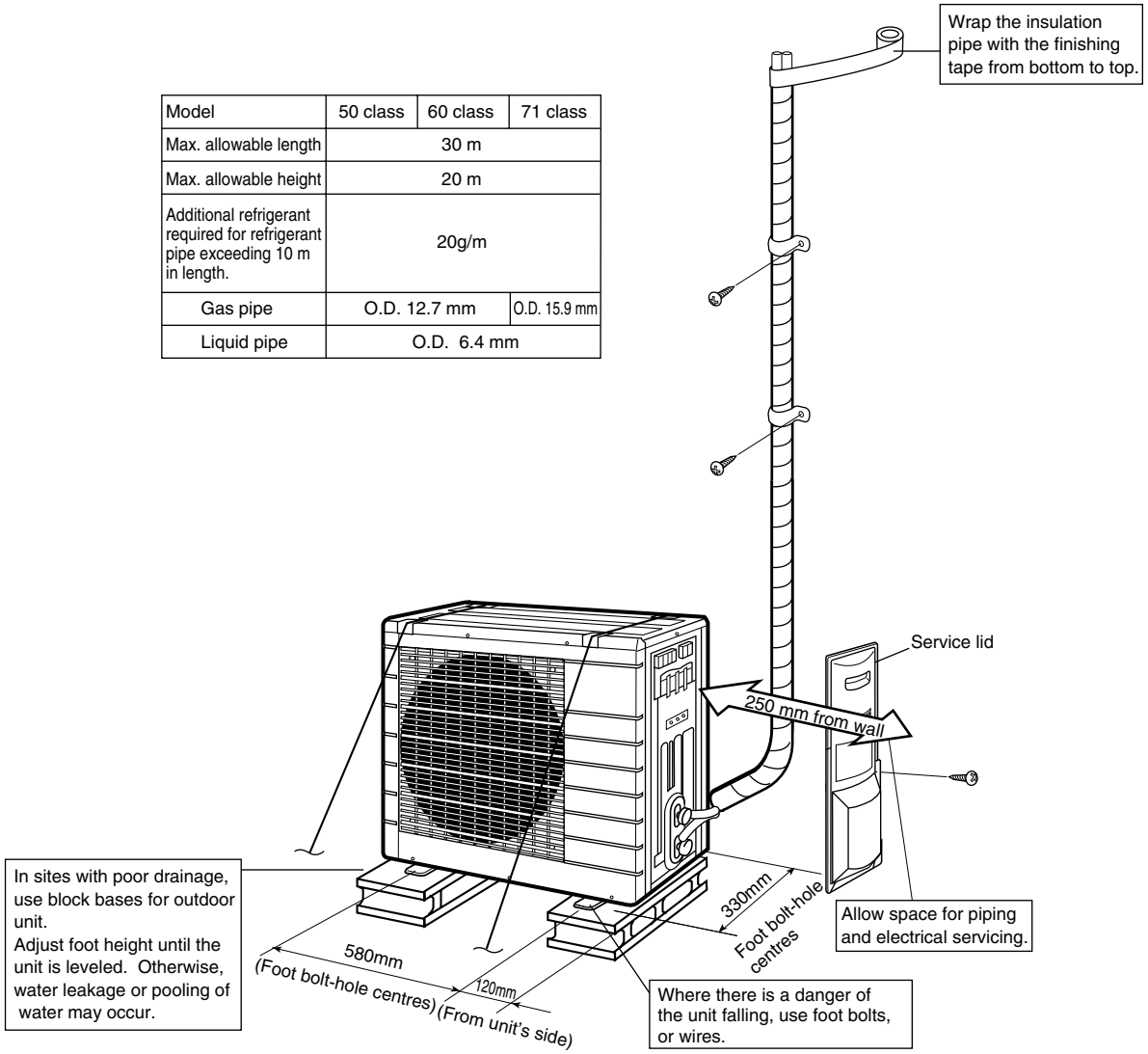
When operating the air conditioner in a low outdoor ambient temperature, be sure to follow the instructions described below.

1) To prevent exposure to wind, install the outdoor unit with its suction side facing the wall.
2) Never install the outdoor unit at a site where the suction side may be exposed directly to wind.
3) To prevent exposure to wind, it is recommended to install a baffle plate on the air discharge side of the outdoor unit.
4) In heavy snowfall areas, select an installation site where the snow will not affect the unit.



Outdoor Unit Installation Drawings

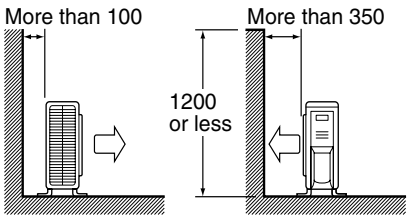
Model	50 class	60 class	71 class
Max. allowable length	30 m		
Max. allowable height	20 m		
Additional refrigerant required for refrigerant pipe exceeding 10 m in length.	20g/m		
Gas pipe	O.D. 12.7 mm		O.D. 15.9 mm
Liquid pipe	O.D. 6.4 mm		



Installation Guidelines

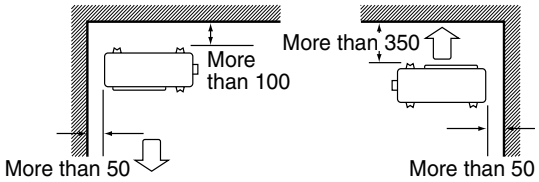
- Where a wall or other obstacle is in the path of outdoor unit's intake or exhaust airflow, follow the installation guidelines below.
- For any of the below installation patterns, the wall height on the exhaust side should be 1200 mm or less.

Wall facing one side



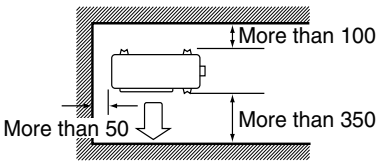
Side view

Walls facing two sides



Top view

Walls facing three sides

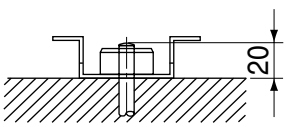


Top view

Unit: mm

Precautions on Installation

- Check the strength and level of the installation ground so that the unit will not cause any operating vibration or noise after installed.
- In accordance with the foundation drawing, fix the unit securely by means of the foundation bolts. (Prepare four sets of M8 or M10 foundation bolts, nuts and washers each which are available on the market.)
- It is best to screw in the foundation bolts until their length are 20 mm from the foundation surface.
- When installing the unit on the frame, fix water proof plate within 150 mm from the bottom of the unit to prevent water from entering.



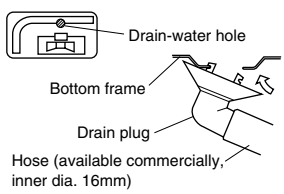
Outdoor Unit Installation

1. Installing Outdoor Unit

1) When installing the outdoor unit, refer to "Precautions for Selecting the Location" and the "outdoor Unit Installation Drawings."
2) If drain work is necessary, follow the procedures below.

2. Drain Work

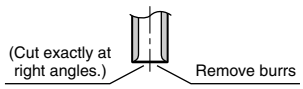
1) Use drain plug for drainage.
2) If the drain port is covered by a mounting base or floor surface, place additional foot bases of at least 30 mm in height under the outdoor unit's feet.
3) In cold areas, do not use a drain hose with the outdoor unit.
(Otherwise, drain water may freeze, impairing heating performance.)



Outdoor Unit Installation

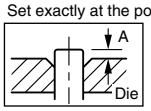
3. Flaring the Pipe End

1) Cut the pipe end with a pipe cutter.
2) Remove burrs with the cut surface facing downward so that the chips do not enter the pipe.
3) Put the flare nut on the pipe.
4) Flare the pipe.
5) Check that the flaring is properly made.



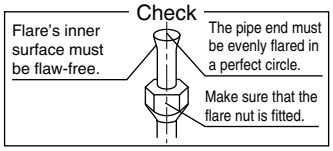
Flaring

Set exactly at the position shown below.



	Flare tool for R-410A	Conventional flare tool	
	Clutch-type	Clutch-type (Rigid-type)	Wing-nut type (Imperial-type)
A	0 ~ 0.5 mm	1.0 ~ 1.5 mm	1.5 ~ 2.0 mm

Check

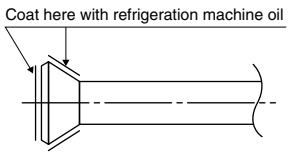


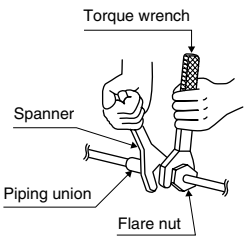
■ Warning

1) Do not use mineral oil on flared part.
2) Prevent mineral oil from getting into the system as this would reduce the lifetime of the units.
3) Never use piping which has been used for previous installations. Only use parts which are delivered with the unit.
4) Do never install a drier to this R-410A unit in order to guarantee its lifetime.
5) The drying material may dissolve and damage the system.
6) Incomplete flaring may cause refrigerant gas leakage.

4. Refrigerant Piping

1) Align the centres of both flares and tighten the flare nuts 3 or 4 turns by hand. Then tighten them fully with the torque wrenches.
   • Use torque wrenches when tightening the flare nuts to prevent damage to the flare nuts and escaping gas.
2) To prevent gas leakage, apply refrigeration machine oil on both inner and outer surfaces of the flare. (Use refrigeration oil for R-410A)





Flare nut tightening torque		
Gas side		Liquid side
1/2 inch	5/8 inch	1/4 inch
49.5~60.3N • m (505~615kgf • cm)	61.8~75.4N • m (630~770kgf • cm)	14.2~17.2N • m (144~175kgf • cm)

Valve cap tightening torque		
Gas side		Liquid side
1/2 inch	5/8 inch	1/4 inch
26.5~32.3N • m (270~330kgf • cm)	48.1~59.7N • m (490~610kgf • cm)	21.6~27.4N • m (220~280kgf • cm)

Service port cap tightening torque	10.8~14.7N • m (110~150kgf • cm)

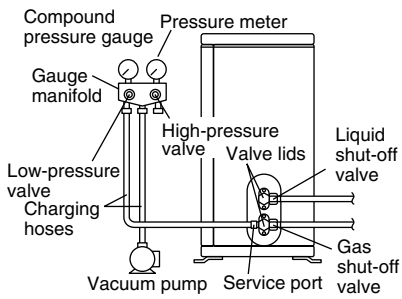
5. Purging Air and Checking Gas Leakage

• When piping work is completed, it is necessary to purge the air and check for gas leakage.

■ Warning

1) Do not mix any substance other than the specified refrigerant (R-410A) into the refrigeration cycle.
2) To prevent air pollution, a vacuum pump should be used for air purging wherever possible.
3) Refrigerant gas leaks during air purging, ventilate the room as soon as possible.
4) Use a vacuum pump for R-410A exclusively. Using the same vacuum pump for different refrigerants may damage the vacuum pump or the unit.

- If using additional refrigerant, perform air purging from the refrigerant pipes and indoor unit using a vacuum pump, then charge additional refrigerant.
- Use a hexagonal wrench (4 mm) to operate the shut-off valve rod.
- All refrigerant pipe joints should be tightened with a torque wrench at the specified tightening torque.



1) Connect projection side (on which worm pin is pressed) of charging hose (which comes from gauge manifold) to gas shut-off valve's service port.

↓

2) Fully open gauge manifold's low-pressure valve (Lo) and completely close its high-pressure valve (Hi).
(High-pressure valve subsequently requires no operation.)

↓

3) Do vacuum pumping and make sure that the compound pressure gauge reads –0.1MPa (–76 cmHg)*1.

↓

4) Close gauge manifold's low-pressure valve (Lo) and stop vacuum pump.
(Keep this state for a few minutes to make sure that the compound pressure gauge pointer does not swing back.)*2.

↓

5) Remove valve lids from liquid shut-off value and gas shut-off valve.

↓

6) Turn the liquid shut-off valve's rod 90 degrees counterclockwise with a hexagonal wrench to open valve.
Close it after 5 seconds, and check for gas leakage.
Using soapy water, check for gas leakage from indoor unit's flare and outdoor unit's flare and valve rods.
After the check is complete, wipe all soapy water off.

↓

7) Disconnect charging hose from gas shut-off valve's service port, then fully open liquid and gas shut-off valves.
(Do not attempt to turn valve rod beyond its stop.)

↓

8) Tighten valve lids and service port cap for the liquid and gas shut-off valves with a torque wrench at the specified torques.

*1. Pipe length vs. vacuum pump run time

Pipe length	Up to 15 metres	More than 15 metres
Run time	Not less than 10 min.	Not less than 15 min.

*2. If the compound pressure gauge pointer swings back, refrigerant may have water content or a loose pipe joint may exists. Check all pipe joints and retighten nuts as needed, then repeat steps 2) through 4).

Outdoor Unit Installation

6. Refilling The Refrigerant

Check the type of refrigerant to be used on the machine nameplate.

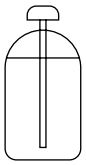
Precautions when adding R410A

Fill from the liquid pipe in liquid form.

It is a mixed refrigerant, so adding it in gas form may cause the refrigerant composition to change, preventing normal operation.

1) Before filling, check whether the cylinder has a siphon attached or not. (It should have something like “liquid filling siphon attached” displayed on it.)

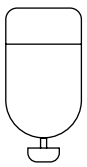
Filling a cylinder with an attached siphon



Stand the cylinder upright when filling.

There is a siphon pipe inside, so the cylinder need not be upside-down to fill with liquid.

Filling other cylinders



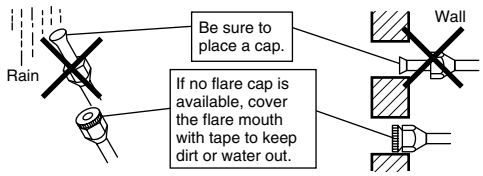
Turn the cylinder upside-down when filling.

- Be sure to use the R410A tools to ensure pressure and to prevent foreign objects entering.

7. Refrigerant Piping Work

7-1 Cautions on Pipe Handling

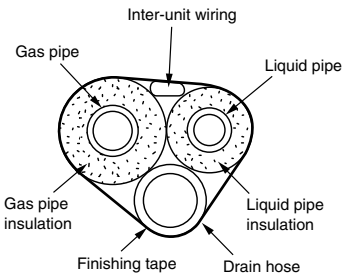
1) Protect the open end of the pipe against dust and moisture.
2) All pipe bends should be as gentle as possible. Use a pipe bender for bending.
   (Bending radius should be 30 to 40 mm or larger.)



7-2 Selection of Copper and Heat Insulation materials

When using commercial copper pipes and fittings, observe the following:

1) Insulation material: Polyethylene foam
   Heat transfer rate: 0.041 to 0.052kW/mK (0.035 to 0.045 kcal/mh°C)
   Refrigerant gas pipe’s surface temperature reaches 110°C max.
   Choose heat insulation materials that will withstand this temperature.
2) Be sure to insulate both the gas and liquid piping and to provide insulation dimensions as below.



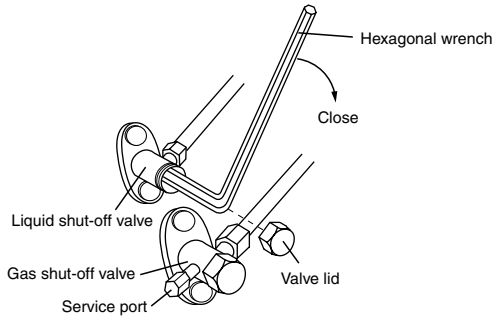
Gas side		Liquid side	Gas pipe thermal insulation		Liquid pipe thermal insulation
50/60 class	71 class	50/60/71 class	50/60 class	71 class	50/60/71 class
O.D. 12.7mm	O.D. 15.9mm	O.D. 6.4mm	I.D. 14-16mm	I.D. 16-20mm	I.D. 8-10mm
Thickness 0.8mm	Thickness 1.0mm	Thickness 0.8mm	Thickness 10mm Min.		

- Use separate thermal insulation pipes for gas and liquid refrigerant pipes.

Pump Down Operation

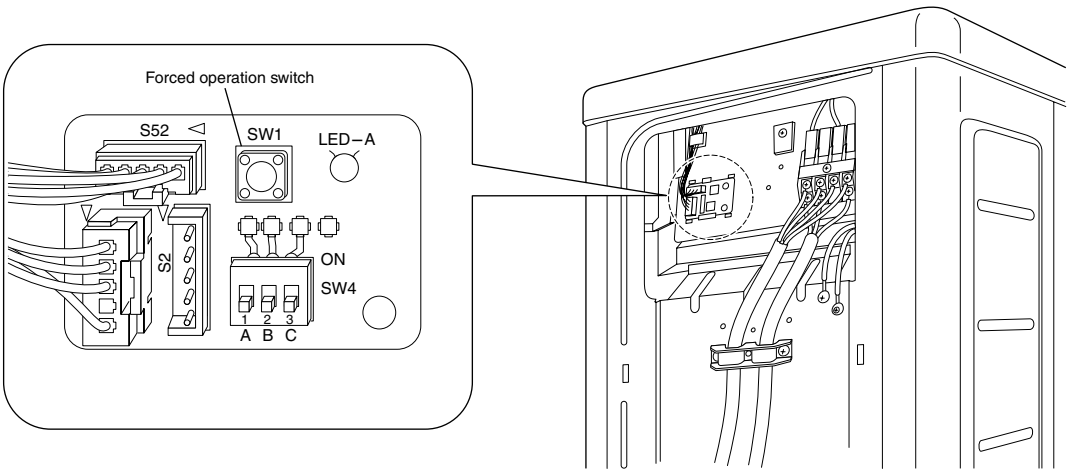
In order to protect the environment, be sure to pump down when relocating or disposing of the unit.

1) Remove the valve lids from liquid shut-off valve and gas shut-off valve.
2) Carry out forced cooling operation.
3) After five to ten minutes, close the liquid shut-off valve with a hexagonal wrench.
4) After two to three minutes, close the gas shut-off valve and stop forced cooling operation.



Forced cooling operation

1) Press the Forced Operation switch (SW1) to begin forced cooling. Press the Forced Operation switch (SW1) again to stop forced cooling.



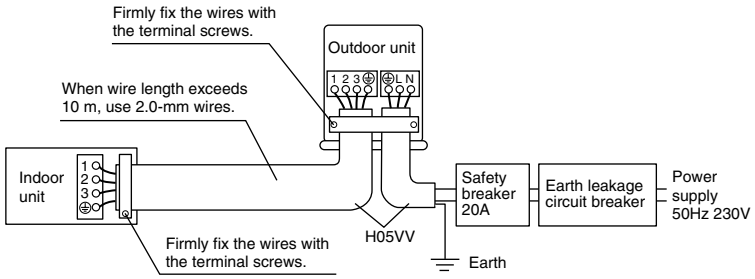
Wiring

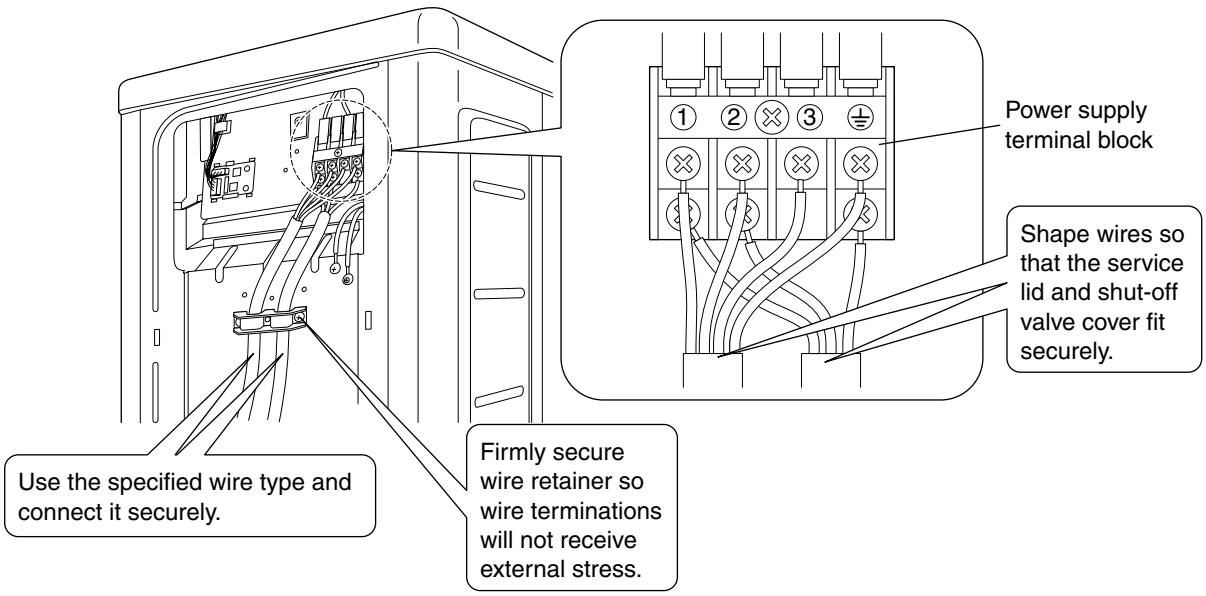
■ Warning

Do not use tapped wires, stand wires, extensioncords, or starburst connections, as they may cause overheating, electrical shock, or fire.

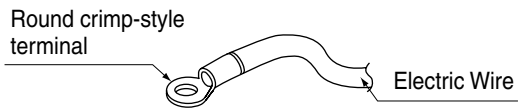
- Do not turn ON the safety breaker until all work is completed.

1) Strip the insulation from the wire (20 mm).
2) Connect the connection wires between the indoor and outdoor units **so that the terminal numbers match.** Tighten the terminal screws securely. We recommend a flathead screwdriver be used to tighten the screws.



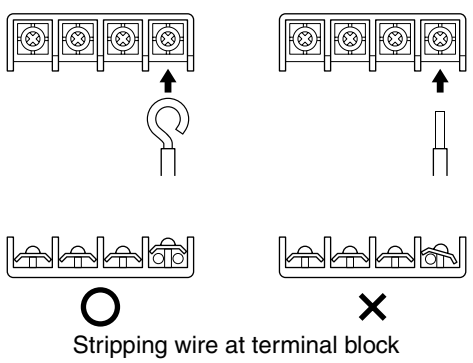


Observe the notes mentioned below when wiring to the power supply terminal board.
Precautions to be taken for power supply wiring
(Use a round crimp-style terminal for connection to the power supply terminal board. In case it cannot be used due to unavoidable reasons, be sure to observe the following instruction.)

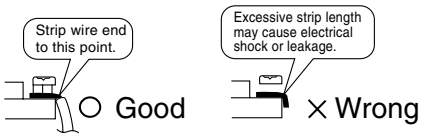


■ Caution

When connecting the connection wires to the terminal board using a single core wire, be sure to perform curling.
Problems with the work may cause heat and fires.



Stripping wire at terminal block



3) Pull the wire and make sure that it does not disconnect. Then fix the wire in place with a wire stop.

Test Run and Final Check

1. Trial Operation and Testing.

1-1 Measure the supply voltage and make sure that it falls in the specified range.

1-2 Trial operation should be carried out in either cooling or heating mode.

■ For Heat pump

- In cooling mode, select the lowest programmable temperature; in heating mode, select the highest programmable temperature.
  1) Trial operation may be disabled in either mode depending on the room temperature.
  2) After trial operation is complete, set the temperature to a normal level (26°C to 28°C in cooling mode, 20°C to 24°C in heating mode).
  3) For protection, the system disables restart operation for 3 minutes after it is turned off.

■ For Cooling only

- Select the lowest programmable temperature.
  1) Trial operation in cooling mode may be disabled depending on the room temperature.
  2) After trial operation is complete, set the temperature to a normal level (26°C to 28°C).
  3) For protection, the unit disables restart operation for 3 minutes after it is turned off.

1-3 Carry out the test operation in accordance with the Operation Manual to ensure that all functions and parts are working properly.

- The air conditioner requires a small amount of power in its standby mode. If the system is not to be used for some time after installation, shut off the circuit breaker to eliminate unnecessary power consumption.
- If the circuit breaker trips to shut off the power to the air conditioner, the system will restore the original operation mode when the circuit breaker is opened again.

2. Test Items.

Test Items	Symptom	Check
Indoor and outdoor units are installed properly on solid bases.	Fall, vibration, noise	
No refrigerant gas leaks.	Incomplete cooling/heating function	
Refrigerant gas and liquid pipes and indoor drain hose extension are thermally insulated.	Water leakage	
Draining line is properly installed.	Water leakage	
System is properly earthed.	Electrical leakage	
The specified wires are used for interconnecting wire connections.	Inoperative or burn damage	
Indoor or outdoor unit's air intake or exhaust has clear path of air. Shut-off valves are opened.	Incomplete cooling/heating function	
Indoor unit properly receives remote control commands.	Inoperative	