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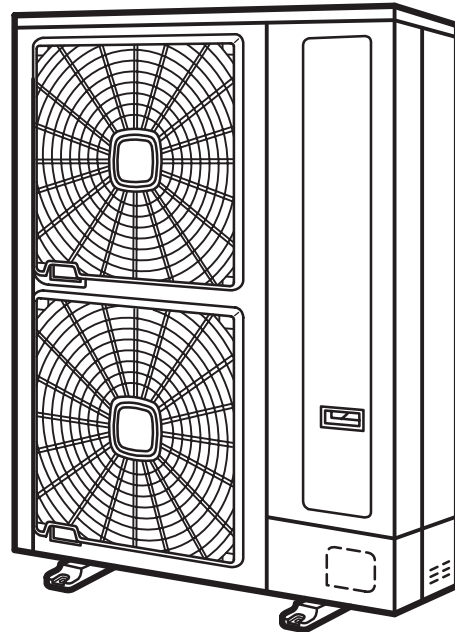
# ***Installation & Maintenance Manual***

*INVERTER-DRIVEN  
SPLIT SYSTEM  
HEAT PUMP  
AIR CONDITIONERS  
- DC INVERTER UTOPIA -*

**Models:**

**Outdoor Units;**

**RAS-3HVRNM2  
RAS-4HVRNM2  
RAS-5HVRNM2  
RAS-6HVRNM2  
RAS-7HVRNM2**



**IMPORTANT:**

*READ AND UNDERSTAND  
THIS MANUAL BEFORE  
USING THIS HEAT-PUMP  
AIR CONDITIONERS.  
KEEP THIS MANUAL FOR  
FUTURE REFERENCE.*

**P5414950**

**IMPORTANT NOTICE**

- HITACHI pursues a policy of continuing improvement in design and performance of products. The right is therefore reserved to vary specifications without notice.
- HITACHI cannot anticipate every possible circumstance that might involve a potential hazard.
- This heat pump air conditioner is designed for standard air conditioning only. Do not use this heat pump air conditioner for other purpose such as drying clothes, refrigerating foods or for any other cooling or heating process.
- Do not install the unit in the following places. It may cause a fire, deformation, corrosion or failure.
  - \* Places where oil (including machinery oil) may be present in quantities.
  - \* Places where a lot of sulfide gas drifts such as in a hot spring.
  - \* Places where inflammable gas may generate or flow.
  - \* Places where strong salty wind blows such as coast regions.
  - \* Places with an atmosphere of acidity or alkalinity.
- Do not install the unit in the place where silicon gas drifts. If the silicon gas attaches to the surface of heat exchanger, the fin surface repels water. As a result, drain water splashes outside of the drain pan and splashed water runs inside of electrical box. In the end, water leakage or electrical devices failure may occur.
- Pay attention to the following points when the unit is installed in a hospital or other facilities where an electromagnetic wave generates from a medical equipment.
  - \* Do not install the unit in the place where an electromagnetic wave is directly radiated to the electrical box, remote control cable or remote control switch.
  - \* Install the unit at least 3 meters away from an electromagnetic wave such as a radio.
- Do not install the unit in the place where the breeze directly catches animals and plants. It could adversely affect animals and plants.
- The installer and system specialist shall secure safety against the refrigerant leakage according to local regulations or standards. The following standards may be applicable, if local regulations are not available. International Organization for Standardization, ISO5149 or European Standard, EN378 or Japan Standard, KHKS0010.
- No part of this manual may be reproduced without written permission.
- It is assumed that this heat pump air conditioner will be operated and serviced by English speaking people. If this is not the case, the customer should be add safety, caution and operating signs in the native language.
- If you have any questions, contact your distributor or dealer of HITACHI.
- This manual gives a common description and information for this heat pump air conditioner which you operate as well for other models.
- This heat pump air conditioner has been designed for the following temperatures. Operate the heat pump air conditioner within this range.

Temperature		(°C)	
		Maximum	Minimum
Cooling Operation	Indoor	32 DB/23 WB	21 DB/15 WB
	Outdoor	46 DB	-5 DB
Heating Operation	Indoor	27 DB	15 DB
	Outdoor	15 WB	-20 WB

DB: Dry Bulb, WB: Wet Bulb

This manual should be considered as a permanent part of the air conditioning equipment and should remain with the air conditioning equipment.

## **CHECKING PRODUCT RECEIVED**

- **Upon receiving this product, inspect it for any shipping damage. Claims for damage, either apparent or concealed, should be filed immediately with the shipping company.**
- **Check the model number, electrical characteristics (power supply, voltage and frequency) and accessories to determine if they are correct.**

The standard utilization of the unit shall be explained in these instructions.

Therefore, the utilization of the unit other than those indicated in these instructions is not recommended.

Please contact your local agent, as the occasion arises.

HITACHI's liability shall not cover defects arising from the alteration performed by a customer without HITACHI's consent in a written form.

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## 1. Safety Summary


< Signal Words >


- Signal words are used to identify levels of hazard seriousness.

Definitions for identifying hazard levels are provided below with their respective signal words.

 : DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

 : WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

 : CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

 : NOTICE is used to address practices not related to personal injury.

**NOTE** : NOTE is useful information for operation and/or maintenance.

**⚠ DANGER**

- Do not perform the installation work, refrigerant piping work, drain pump, drain piping and electrical wiring connection without referring to our installation manual. If the instructions are not followed, it may result in a water leakage, electric shock or fire.
- Use the specified non-flammable refrigerant (R410A) to the outdoor unit in the refrigerant cycle. Do not charge material other than R410A into the unit such as hydrocarbon refrigerants (propane or etc.), oxygen, flammable gases (acetylene or etc.) or poisonous gases when installing, maintaining and moving. These flammables are extremely dangerous and may cause an explosion, fire, and injury.
- Do not pour water into the indoor or outdoor unit. These products are equipped with electrical parts. If poured, it will cause a serious electrical shock.
- Do not open the service cover or access panel for the indoor or outdoor unit without turning OFF the main power supply.
- Do not touch or adjust safety devices inside the indoor unit or outdoor unit. If these devices are touched or readjusted, it may cause a serious accident.
- Refrigerant leakage can cause difficulty with breathing due to insufficient air. Turn OFF the main switch, extinguish any naked flames and contact your service contractor, if refrigerant leakage occurs.
- Make sure that the refrigerant leakage test should be performed. Refrigerant (Fluorocarbon) for this unit is nonflammable, non-toxic and odorless. However if the refrigerant is leaked and is contacted with fire, toxic gas will generate. Also because the fluorocarbon is heavier than air, the floor surface will be filled with it, which could cause suffocation.
- The installer and system specialist shall secure safety against refrigerant leakage according to local regulations or standards.
- Use an ELB (Earth Leakage Breaker). In the event of fault, there is danger of an electric shock or fire if it is not used.
- Do not install the outdoor unit where there is high level of oil mist, flammable gases, salty air or harmful gases such as sulfur.
- For installation, firmly connect the refrigerant pipe before the compressor starts operating. For maintenance, relocation and disposal, remove the refrigerant pipe after the compressor stops.
- Do not perform a short-circuit of the protection device such as the pressure switch when operating. It may cause fire and explosion.

**! WARNING**

- Do not use any sprays such as an insecticide, lacquer, hair spray or other flammable gases within approximately one (1) meter from the system.
- If the circuit breaker or fuse is often activated, stop the system and contact your service contractor.
- Check that the ground wire is securely connected. If the unit is not correctly grounded, it lead electric shock. Do not connect the ground wiring to a gas piping, water piping, lighting conductor or ground wiring for telephone.
- Connect a fuse of specified capacity.
- Before performing any brazing work, check to ensure that there is no flammable material around. When using the refrigerant be sure to wear leather gloves to prevent cold injuries.
- Protect the wires, electrical parts, etc. from rats or other small animals. If not protected, rats may gnaw at unprotected parts and which may lead to fire.
- Fix the cables securely. External forces on the terminals could lead to fire.
- Provide a sufficiently strong foundation. If not, the unit may fall down and it may lead to injuries.
- Do not install the unit in a place where oil, vapor, organic solvent and corrosive gas (ammonia, sulfur compound and acid) may be present in quantities. It may cause refrigerant leakage due to corrosion, electrical shock, deteriorated performance and breakage.
- Perform the electrical work according to Installation Manual and all the relevant regulation and standards. If the instructions are not followed, an electrical shock and fire may occur due to insufficient capacity and inadequate performance.
- Use specified cables between units and choose the cables correctly. If not, an electrical shock or fire may occur.
- Ensure that the wiring terminals are tightened securely with the specified torques. If not, generating fire or an electrical shock at the terminal connection part may occur.

**! CAUTION**

- Do not step or put any material on the product.
- Do not put any foreign material on the unit or inside the unit.
- Provide a strong and correct foundation so that;
  - a. The outdoor unit is not on an incline.
  - b. Abnormal sound dose not occur.
  - c. The outdoor unit will not fall down due to a strong wind or earthquake.

**NOTICE**

- Do not install the indoor unit, outdoor unit, remote control switch and cable within approximately 3 meters from strong electromagnetic wave radiators such as medical equipments.
- Supply electrical power to the system to energize the crankcase heater for 12 hours before startup after a long shutdown.
- Make sure that the outdoor unit is not covered with snow or ice, before operation.
- In some cases, the packaged air conditioner may not be operated normally under the following cases.
  - \* In case that electrical power for the packaged air conditioner is supplied from the same power transformer as the device\*.
  - \* In case that the power source wires for the device\* and the packaged air conditioner are located close to each other.

Device\*: (Ex) Lift, container crane, rectifier for electric railway, inverter power device, arc furnace, electric furnace, large-sized induction motor and large-sized switch.  
It consumes a large quantity of electrical power.

Regarding the cases mentioned above, surge voltage may be inducted in the power supply wiring for the packaged air conditioner due to a rapid change in power consumption of the device and an activation of switch.

Therefore, check the field regulations and standards before performing electrical work in order to protect the power supply for the packaged air conditioner.

**NOTE**

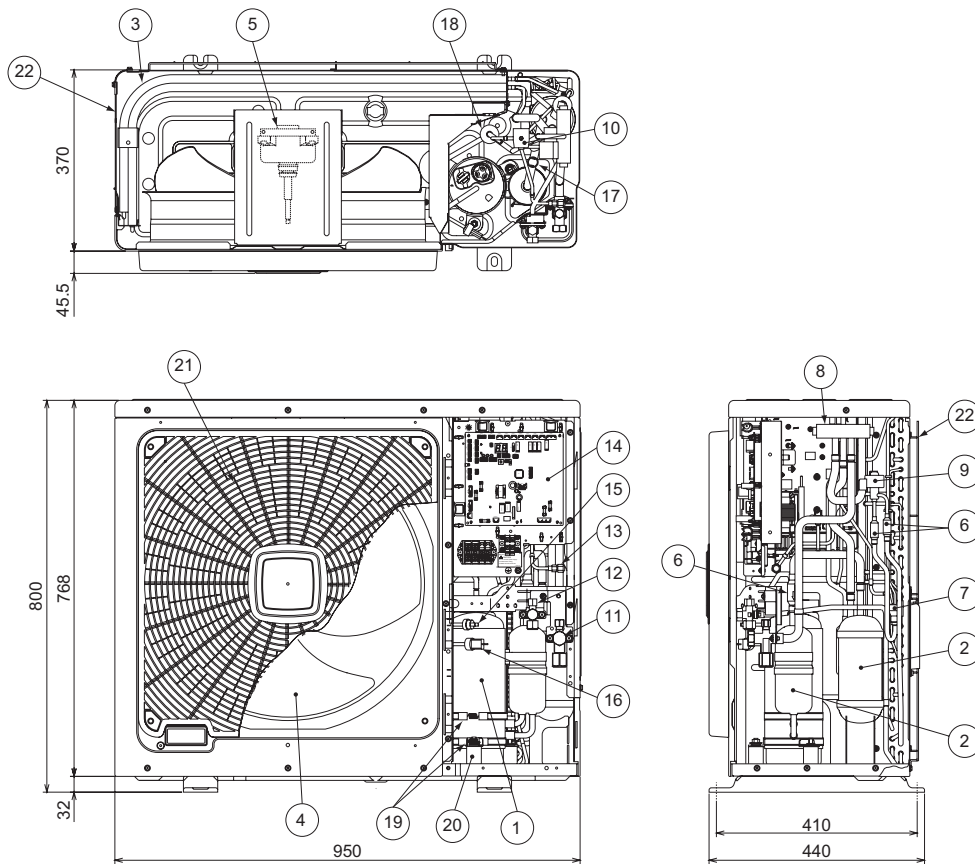
- It is recommended that the room will be ventilated every 3 to 4 hours.
- The heating capacity of the heat pump unit is decreased according to the outdoor air temperature. Therefore, it is recommended that auxiliary heating equipment be used in the field when the units is installed in a low temperature region.



## 2. Structure

### 2.1 Name of Parts

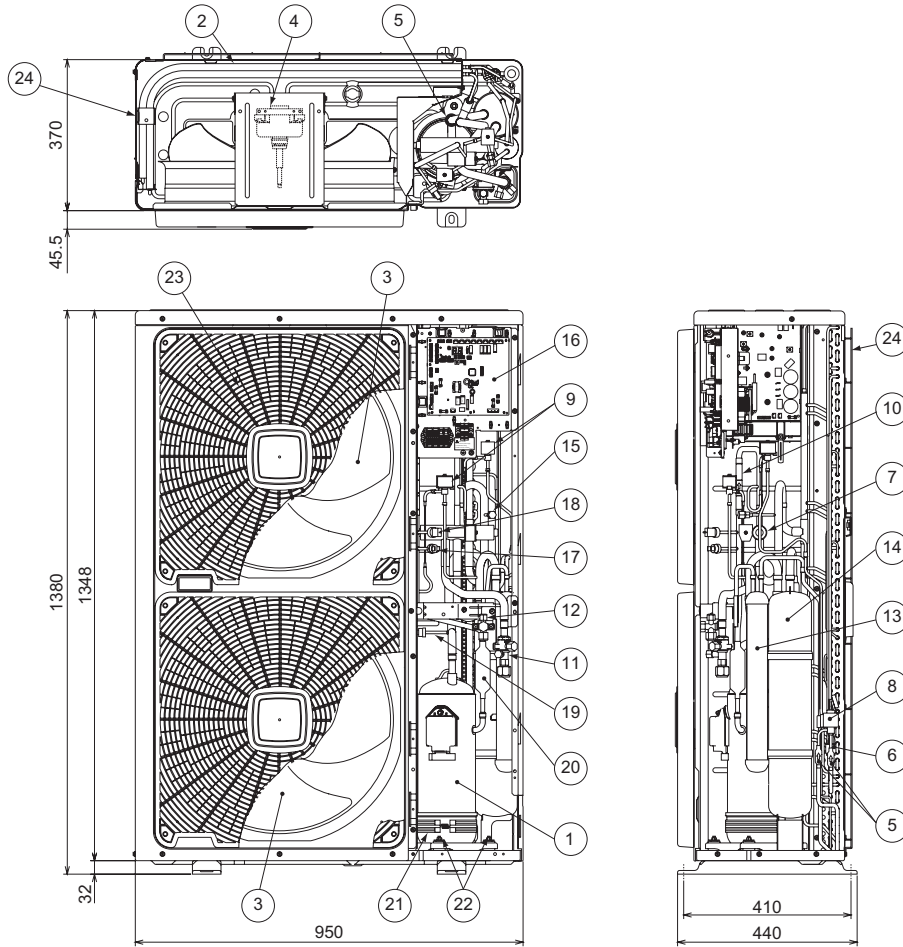
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No.	Part Name	No.	Part Name
1	Compressor	13	Check Joint
2	Accumulator	14	Electrical Box
3	Heat Exchanger	15	High Pressure Switch for Protection
4	Propeller Fan	16	Sensor for Refrigerant Pressure (High Pressure Sensor)
5	Fan Motor	17	Pressure Switch for Control
6	Strainer	18	Silencer
7	Distributor	19	Crankcase Heater (2pcs.)
8	Reversing Valve	20	Vibration Absorbing Rubber (3pcs.)
9	Micro-Computer Control Expansion Valve	21	Air Outlet
10	Solenoid Valve	22	Air Inlet
11	Stop Valve for Gas Line		
12	Stop Valve for Liquid Line		

# OUTDOOR UNIT

< 4 to 7HP >



No.	Part Name	No.	Part Name
1	Compressor	14	Accumulator
2	Heat Exchanger	15	Check Joint
3	Propeller Fan (2pcs.)	16	Electrical Box
4	Fan Motor (2pcs.)	17	High Pressure Switch for Protection
5	Strainer	18	Sensor for Refrigerant Pressure (High Pressure Sensor)
6	Distributor		
7	Reversing Valve	19	Pressure Switch for Control
8	Micro-Computer Control Expansion Valve	20	Silencer
9	Solenoid Valve	21	Crankcase Heater
10	Check Valve	22	Vibration Absorbing Rubber (4pcs.)
11	Stop Valve for Gas Line	23	Air Outlet
12	Stop Valve for Liquid Line	24	Air Inlet
13	Receiver		

2.2 Necessary Tools and Instrument List for Installation

No.	Tool	No.	Tool	No.	Tool
1	Handsaw	8	Plier	16	Cutter for Wires
2	Phillips Screwdriver	9	Pipe Cutter	17	Gas Leak Detector
3	Vacuum Pump	10	Brazing Kit	18	Leveller
4	Refrigerant Gas Hose	11	Hexagon Wrench	19	Clamper for Solderless Terminals
5	Megohmmeter	12	Spanner	20	Hoist (for Indoor Unit)
6	Copper Pipe Bender	13	Weigher	21	Ammeter
7	Manual Water Pump (for Indoor Unit)	14	Charging Cylinder	22	Voltage Meter
		15	Gauge Manifold	23	Wrench

Use tools and measuring instruments only for the new refrigerant R410A which is directly touch to refrigerant.

**⚠ DANGER**

The pressure of refrigerant R410A is 1.4 times higher than that of conventional refrigerant, impurities such as moisture, oxide film, and grease affect easily R410A. Be sure to remove any moisture, dust, different refrigerant or refrigerant oil from the refrigerant cycle. Therefore, if the specified materials are not used, it may cause explosion, injury, leakage, electrical shock or fire.

**NOTICE**

Check the design pressure for this product is 4.15MPa.  
To avoid accidental mixing of the different refrigerant or different refrigerant oil, the sizes of the charging connections have been changed.  
It is necessary to prepare the following tools before performing the installation work.

# OUTDOOR UNIT

◇: Interchangeability is available with current R22  
 X: Prohibited

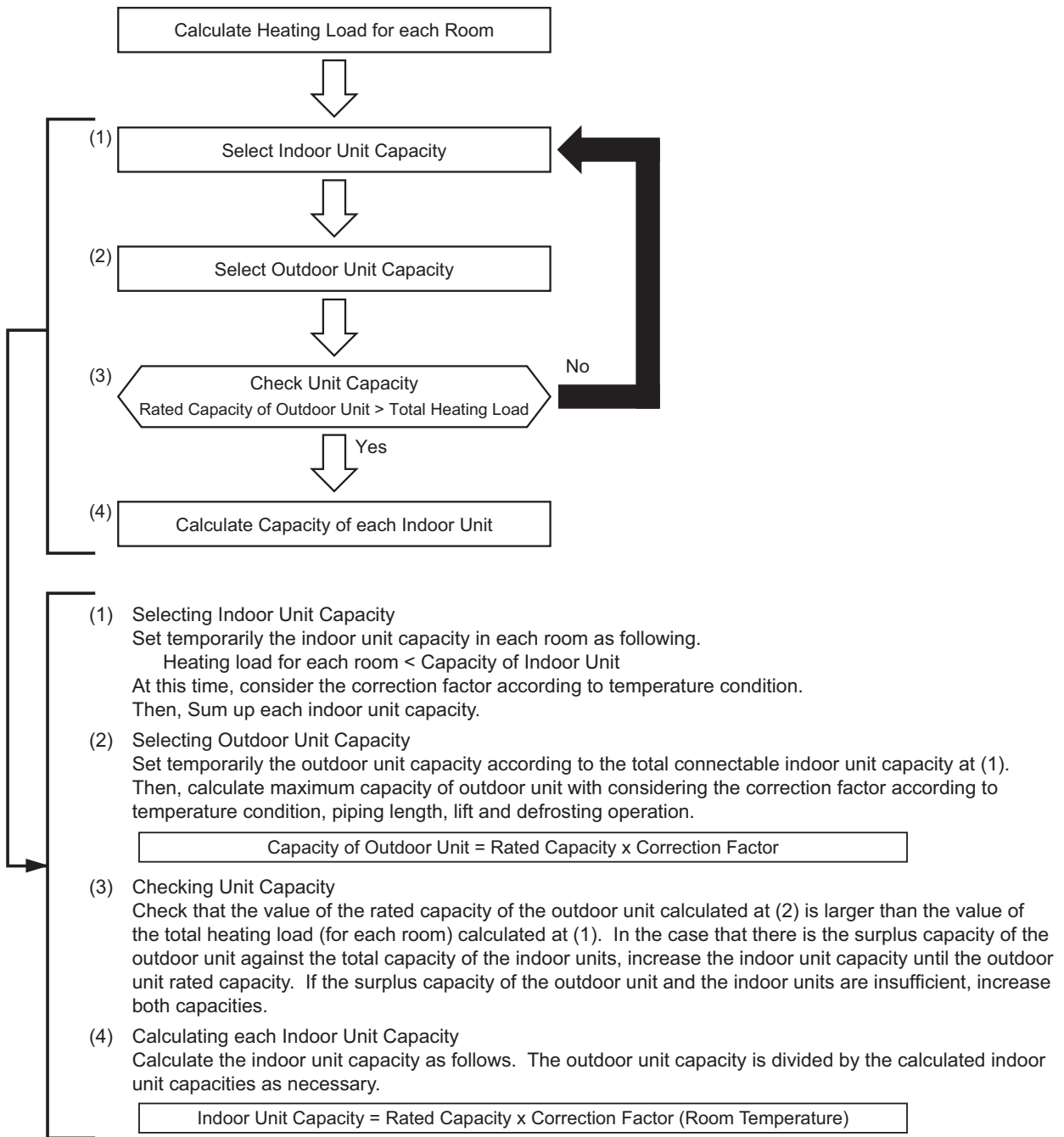
●: only for Refrigerant R410A (No Interchangeability with R22)  
 ◆: only for Refrigerant R407C (No Interchangeability with R22)

Measuring Instrument and Tool		Interchangeability with R22		Reason of Non-Interchangeability and Attention (★: Strictly Required)	Use
		R410A	R407C		
Refrigerant Pipe	Pipe Cutter Chamfering Reamer	◇	◇	-	Cutting Pipe Removing Burrs
	Flaring Tool	◇●	◇	* The flaring tools for R407C are applicable to R22. * If using flaring tube, make dimension of tube larger for R410A.	Flaring for Tubes
	Extrusion Adjustment Gauge	●	-	* In case of material 1/2H, flaring is not available.	Dimensional Control for Extruded Portion of Tube after Flaring
	Pipe Bender	◇	◇	* In case of material 1/2H, bending is not available. Use elbow for bend and braze.	Bending
	Expanding Tool	◇	◇	* In case of material 1/2H, expanding of tube is not available. Use socket for connecting tube.	Expanding Tubes
	Torque Wrench	●	◇	* For φ12.7, φ15.88, spanner size is up 2mm.	Connection of Flare Nut
		◇	◇	* For φ6.35, φ9.52, φ19.05, spanner size is the same.	
	Brazing Tool	◇	◇	* Perform correct brazing work.	Brazing for Tubes
	Nitrogen Gas	◇	◇	* Strict Control against Contamin (Blow nitrogen during brazing.)	Prevention from Oxidation during Brazing
Lubrication Oil (for Flare Surface)	●	◆	* Use a synthetic oil which is equivalent to the oil used in the refrigeration cycle. * Synthetic oil absorbs moisture quickly.	Applying Oil to the Flared Surface	
Vacuum Drying • Refrigerant Charge	Refrigerant Cylinder	●	◆	* Check refrigerant cylinder color. ★ Liquid refrigerant charging is required regarding zeotropic refrigerant.	Refrigerant Charging
	Vacuum Pump	◇	◇	★ The current ones are applicable. However, it is required to mount a vacuum pump adapter which can prevent from reverse flow when a vacuum pump stops, resulting in no reverse oil flow.	Vacuum Pumping
	Adapter for Vacuum Pump	*●	◆		
	Manifold Valve	●	◆	* No interchangeability is available due to higher pressures when compared with R22. ★ Do not use current ones to the different refrigerant. If used, mineral oil will flow into the cycle and cause sludges, resulting in clogging or compressor failure. Connection diameter is different; R410A: UNF1/2, R407C: UNF7/16.	Vacuum Pumping, Vacuum Holding, Refrigerant Charging and Check of Pressures
	Charging Hose	●	◆		
	Charging Cylinder	×	×	* Use the weight scale.	-
	Weight Scale	◇	◇	-	Measuring Instrument for Refrigerant Charging
	Refrigerant Gas Leakage Detector	*●	◆	* The current gas leakage detector (R22) is not applicable due to different detecting method.	Gas Leakage Check

\*: Interchangeability with R407C.

### 3. Before Installation

#### 3.1 Selection of Unit Model



#### 3.2 Indoor Unit Selection for Multiple Connected Installation

- (1) The indoor unit capacity in heating mode is roughly calculated as follows.

$$\text{Indoor Unit Capacity (Heat)} = * \text{Temperature Difference} \times \text{Air Flow Volume}$$

\* (Indoor Unit Outlet Air Temperature - Indoor Unit Inlet Air Temperature)

When all multiple indoor units are operated simultaneously, the total air flow volume is increased. Therefore, the temperature difference may be smaller. Especially during the heating operation, a cold draft may be felt such as indoor units are installed to the place where the direct outlet air blows to users. The air outlet temperature shall be considered to prevent a cold draft when designing facilities.

- (2) Less than the recommended number of the indoor unit should be connected in order to prevent a cold draft during the heating operation with the system that all the indoor units are operated simultaneously.

3.3 Standard Combination of Outdoor Unit and Indoor Unit

Outdoor Unit	Indoor Unit	Single Combination	Twin Combination	Triple Combination	Quad Combination
RAS-3HVRNM2	In-the-Ceiling Type (RPI-*FSN2SQ)	RPI-3.0FSN2SQ	-	-	-
	4-Way Cassette Type (RCI-*FSN3)	RCI-3.0FSN3	RCI-1.5FSN3 x 2	-	-
	In-the-Ceiling Type (RPI-*FSN2)	-	RPI-1.5FSN2 x 2	-	-
	2-Way Cassette Type (RCD-*FSN2)	-	RCD-1.5FSN2 x 2	-	-
	Ceiling Type (RPC-*FSN2)	-	-	-	-
	Wall Type (RPK-*FSNSM2)	-	RPK-1.5FSNSM2	-	-
RAS-4HVRNM2	In-the-Ceiling Type (RPI-*FSN2SQ)	RPI-4.0FSN2SQ	-	-	-
	4-Way Cassette Type (RCI-*FSN3)	RCI-4.0FSN3	RCI-2.0FSN3 x 2	RCI-1.5FSN3 x 3	RCI-1.0FSN3 x 4
	In-the-Ceiling Type (RPI-*FSN2)	-	RPI-2.0FSN2 x 2	RPI-1.5FSN2 x 3	RPI-1.0FSN2 x 4
	2-Way Cassette Type (RCD-*FSN2)	-	RCD-2.0FSN2 x 2	RCD-1.5FSN2 x 3	RCD-1.0FSN2 x 4
	Ceiling Type (RPC-*FSN2)	-	RPC-2.0FSN2 x 2	-	-
	Wall Type (RPK-*FSNSM2)	-	RPK-2.0FSNSM2 x 2	RPK-1.5FSNSM2 x 3	RPK-1.0FSNSM2 x 4
RAS-5HVRNM2	In-the-Ceiling Type (RPI-*FSN2SQ)	RPI-5.0FSN2SQ	-	-	-
	4-Way Cassette Type (RCI-*FSN3)	RCI-5.0FSN3	RCI-2.5FSN3 x 2	RCI-1.5FSN3 x 3	RCI-1.0FSN3 x 4
	In-the-Ceiling Type (RPI-*FSN2)	-	RPI-2.5FSN2 x 2	RPI-1.5FSN2 x 3	RPI-1.0FSN2 x 4
	2-Way Cassette Type (RCD-*FSN2)	-	RCD-2.5FSN2 x 2	RCD-1.5FSN2 x 3	RCD-1.0FSN2 x 4
	Ceiling Type (RPC-*FSN2)	-	RPC-2.5FSN2 x 2	-	-
	Wall Type (RPK-*FSNSM2)	-	RPK-2.5FSNSM2 x 2	RPK-1.5FSNSM2 x 3	RPK-1.0FSNSM2 x 4
RAS-6HVRNM2	In-the-Ceiling Type (RPI-*FSN2SQ)	RPI-6.0FSN2SQ	-	-	-
	4-Way Cassette Type (RCI-*FSN3)	-	RCI-3.0FSN3 x 2	RCI-2.0FSN3 x 3	RCI-1.5FSN3 x 4
	In-the-Ceiling Type (RPI-*FSN2)	-	RPI-3.0FSN2 x 2	RPI-2.0FSN2 x 3	RPI-1.5FSN2 x 4
	2-Way Cassette Type (RCD-*FSN2)	-	RCD-3.0FSN2 x 2	RCD-2.0FSN2 x 3	RCD-1.5FSN2 x 4
	Ceiling Type (RPC-*FSN2)	-	RPC-3.0FSN2 x 2	RPC-2.0FSN2 x 3	-
	Wall Type (RPK-*FSNSM2)	-	RPK-3.0FSNSM2 x 2	RPK-2.0FSNSM2 x 3	RPK-1.5FSNSM2 x 4
RAS-7HVRNM2	In-the-Ceiling Type (RPI-*FSN2SQ)	RPI-7.0FSN2SQ	-	-	-
	4-Way Cassette Type (RCI-*FSN3)	-	-	-	-
	In-the-Ceiling Type (RPI-*FSN2)	-	-	-	-
	2-Way Cassette Type (RCD-*FSN2)	-	-	-	-
	Ceiling Type (RPC-*FSN2)	-	-	-	-
	Wall Type (RPK-*FSNSM2)	-	-	-	-

\*The single connection is subject to MEPS. Other connections are NOT acceptable.

### 3.4 Enhanced Combination of Outdoor Unit and Indoor Unit

- (1) The combination is available with the range of the following conditions. Less than the recommended number of indoor unit should be connected in order to prevent the cold draft during the heating operation with the system that all the indoor units are operated simultaneously.

Outdoor Unit Capacity		3HP	4HP	5HP	6HP	7HP
Recommended Number of Connectable Indoor Unit		≤ 2 Units	≤ 4 Units			1 Unit
Maximum Number of Connectable Indoor Unit		3 Units	5 Units	6 Units		1 Unit
Minimum Indoor Unit Capacity		1HP				7HP
Range of Combination Capacity of Indoor Unit (The case of exceeding the recommended number of connectable units)		50-120% (50-100%)				100%
Minimum Indoor Unit Capacity	In-the-Ceiling Type (RPI-*FSN2SQ)	Only 3HP	Only 4HP	Only 5HP	Only 6HP	Only 7HP
	4-Way Cassette Type (RCI-*FSN3)	1HP				-
	In-the-Ceiling Type (RPI-*FSN2)	0.8HP				-
	2-Way Cassette Type (RCD-*FSN2)	1HP				-
	Ceiling Type (RPC-*FSN2)	2HP				-
	Wall Type (RPK-*FSNSM2)	1HP				-

- (2) (Total Indoor Unit Capacity / Total Outdoor Unit Capacity) should be within the value as shown in the table above.
- (3) 1.0HP of the indoor unit is designed as the higher air flow volume than over 1.5HP of the indoor unit. Do not install a space where the cold draft may be felt (at heating).
- (4) If 4-Way Cassette Type or Ceiling Type indoor unit is connected to the outdoor unit, less than recommended number of the indoor unit should be connected. In addition, the range of the combination capacity of the indoor unit including these types should be within 100%. If the system is used in the cold area (outside temperature becomes -10°C) or under the high heating load conditions, the total indoor unit capacity should be less than 100% against the outdoor unit.
- (5) The minimum indoor unit capacity should be within the following table against the maximum indoor unit capacity in the same refrigerant cycle when multiple indoor units are connected.

Max. Indoor Unit Capacity	0.8HP	1.0HP	1.5HP	2.0HP	2.5HP	3.0HP	4.0HP	5.0HP
Min. Indoor Unit Capacity	≥ 0.8HP			≥ 1.0HP	≥ 1.5HP			≥ 2.0HP

### 4. Transportation and Handling

Transport the product as close to the installation location as practical before unpacking.

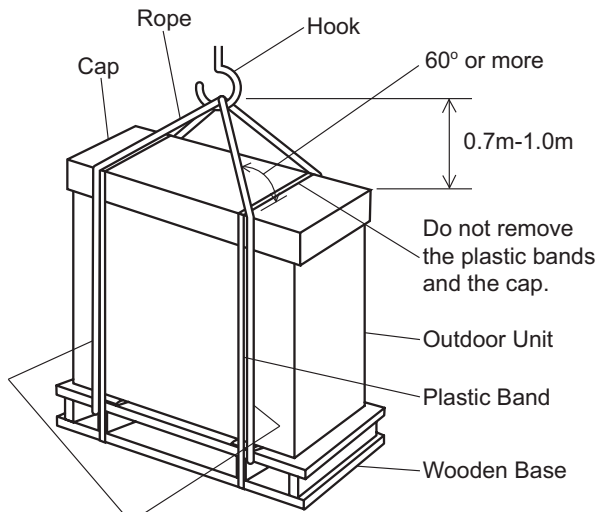
**⚠ CAUTION**

**Do not put any material on the product. Apply two lifting wires onto the outdoor unit, when lifting it by crane.**

● Hanging Method

When hanging the unit, ensure a balance of the unit, check safety and lift up smoothly.

- (1) Do not remove any packing materials.
- (2) Hang the unit under packing condition with two (2) ropes, as shown in Fig. 4.1.



Put securely the rope through both side hole of the wooden base.

Fig. 4.1 Hanging Work for Transportation

**NOTES**

- Hang the unit under packing condition with two (2) ropes.
- Check safety not to incline the unit and lift up the unit smoothly.
- Do not hook with cap of the corrugated paper frame or the plastic bands.
- If the unit is hung after unpacking, protect the unit with the crates or cloth.

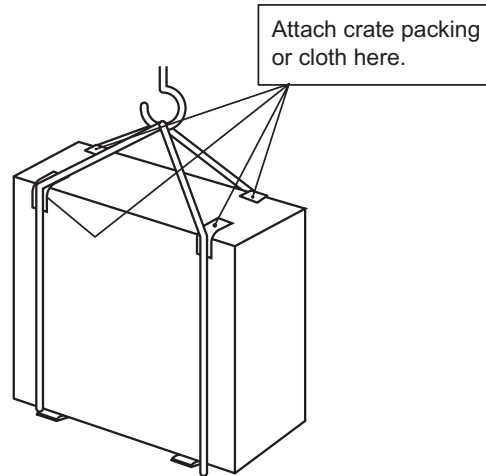
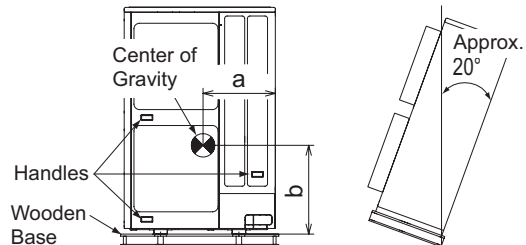


Fig. 4.2 Hanging Work without Wooden Base

- (3) When handling the unit by handle,

● Overturning Angle of Unit



Pay attention to the followings when handling the unit with handles. The outdoor units weight are shown in the table below.

- (a) Do not remove the wooden base during the transportation work.
- (b) The center of gravity is shown above.
- (c) Handle the unit to move by more than two people.

Model	Gross Weight (kg)	a (mm)	b (mm)
RAS-3HVRNM2	73	350	370
RAS-4HVRNM2	111	337	590
RAS-5HVRNM2			
RAS-6HVRNM2			
RAS-7HVRNM2	112	337	590



## 5. Outdoor Unit Installation

### 5.1 Factory-Supplied Accessories

Check to ensure that the following accessories are packed with the outdoor unit.

### NOTE

If any of these accessories are not packed with the unit, please contact your contractor.

Table 5.1 Factory-Supplied Accessories

Accessory	Q'ty	Purpose
Special Washer	4	Fixing Anchor Bolt

### WARNING

- **Install securely the outdoor unit to a strong and correct foundation. If not, it may cause injury by falling down the outdoor unit.**
- **Do not install the outdoor unit to a space where the flammable gases may occur or leak. It may cause fire.**
- **Do not put any foreign material into the outdoor unit and check to ensure that no foreign material exists in the outdoor unit before the installation and test run. Otherwise, fire or failure, etc. may occur.**
- **If the indoor unit is installed in a small room and the refrigerant gas leakage occurs, the leaked refrigerant gas fills the room and it may cause suffocation. Do not exceed the maximum permissible concentration of the refrigerant gas in the room. Consult with distributor for countermeasure such a ventilation system, etc.**

### 5.2 Initial Check

- Install the outdoor unit where good ventilation is available, and where it is dry.
- Install the outdoor unit where the sound or the discharge air from the outdoor unit does not affect neighbors or surrounding vegetation. The operating sound at the rear or right/left sides is higher than the value in the catalog at the front side.
- Check to ensure that the foundation is flat, level and sufficiently strong.
- Do not install the outdoor unit where there is a high level of oil mist, salty air or harmful gases such as sulphur.
- Do not install the outdoor unit where the electromagnetic wave is directly radiated to the electrical box.
- Install the outdoor unit as far as practical, being at least 3 meters from the electromagnetic wave radiator.

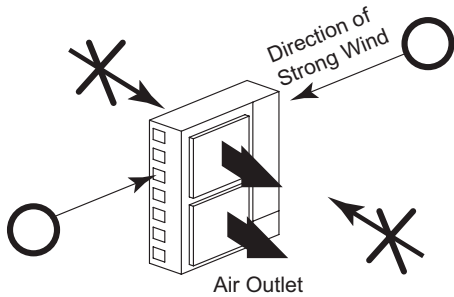
- When installing the outdoor unit in snow-covered areas, mount the field-supplied hoods at the discharge side of the outdoor unit and the inlet side of the heat exchanger.
- Install the outdoor unit where it is in the shade or it will not be exposed to direct sunshine or direct radiation from high temperature heat source.
- Do not install the outdoor unit where dust or other contamination could block the outdoor heat exchanger.
- Install the outdoor unit in a space with limited access to general public.
- Do not install the outdoor unit in a space where a seasonal wind directly blows to the outdoor heat exchanger or a wind from a building space directly blows to the outdoor fan. If installing such a space, attach the wind guard (optional).
- The drain water is discharged during the heating and defrosting operation. Pay attention to the followings.
  - \* Choose a place where well drainage is available or provide a drain ditch.
  - \* Do not install over the walkways. Condensation water may fall on people and make them slip in the cold area.
- Do not install the outdoor unit in the following places. It may cause a failure of the outdoor unit.
  - \* Places where oil (including machinery oil).
  - \* Places where a lot of sulfide gas drifts such as in hot spring.
  - \* Places where strong salty wind blows such as coast regions.
  - \* Places where an atmosphere of acidity or alkalinity.

## OUTDOOR UNIT

< Installation in Place where Strong Wind Blows to Unit >

Install the outdoor unit as followings in the case that a strong wind blows to the unit.

- Select a place where a strong wind does NOT blow to the air outlet surface and the air inlet surface.

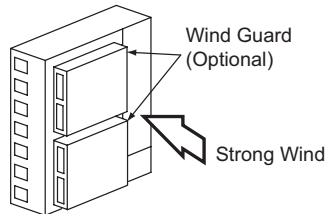


If blowing direct and strong wind to the air outlet, the needed air flow volume can not be maintained and the outdoor unit may be difficult to operate normally.

**NOTE:**

If excessively strong wind blows to the air outlet consecutively, the propeller fan may rotate in reverse so that will cause a breakage of the propeller fan.

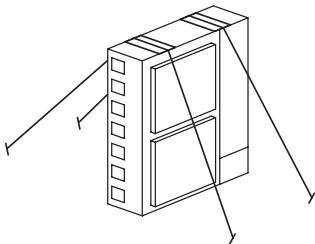
- In Case of Blowing Strong Wind to Air Outlet  
The wind guard (Optional) is available to avoid strong wind.



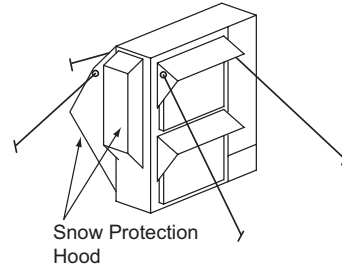
**Wind Guard Model**

Outdoor Unit	Model	Number of Set Required
3HP	WSP-335A	1
4-7HP	WSP-160A	1

- Fix the unit by wire rope to prevent overturning in the case of blowing a seasonal strong wind (typhoon, etc) to the unit.



- In Case of Installing Snow Protection Hood  
The snow protection hood shall be utilized to protect from mal-defrost in low ambient temperature (below -5°C).



Fix the unit by safety wire rope to prevent overturning.

[ Snow Protection Hood Model ]

**3HP**

Model	Number of Set Required	Type	Material	Attaching Portion
ASG-NP335FS3	1	Half	Stainless Steel Plate	Front Side
ASG-NP160BS2	1			Rear Side
ASG-NP160LS2	1			Left Side
ASG-NP335F1	1		Steel Plate	Front Side
ASG-NP80B	1			Rear Side
ASG-NP80L	1			Left Side
ASG-SP11FBS	1	Full	Stainless Steel Plate	Front Side
ASG-NP160BS2	1			Rear Side
ASG-NP160LS2	1			Left Side
ASG-SP11FB	1		Steel Plate	Front Side
ASG-NP80B	1			Rear Side
ASG-NP80L	1			Left Side

**4 - 7HP**

Model	Number of Set Required	Type	Material	Attaching Portion
ASG-NP335FS3	2	Half	Stainless Steel Plate	Front Side
ASG-NP280BS2	1			Rear Side
ASG-NP280LS2	1			Left Side
ASG-NP335F1	2		Steel Plate	Front Side
ASG-NP160B	1			Rear Side
ASG-NP160L	1			Left Side
ASG-SP11FCS	1	Full	Stainless Steel Plate	Front Side
ASG-SP11BAS	1			Rear Side
ASG-SP11LAS	1			Left Side
ASG-SP11FC	1		Steel Plate	Front Side
ASG-SP11BA	1			Rear Side
ASG-SP11LA	1			Left Side

5.3 Service Space

Install the outdoor unit with a sufficient space around the outdoor unit for operation and maintenance as shown below.

(1) Obstacles on Inlet Side

(a) Upper Side is Open.

(mm)

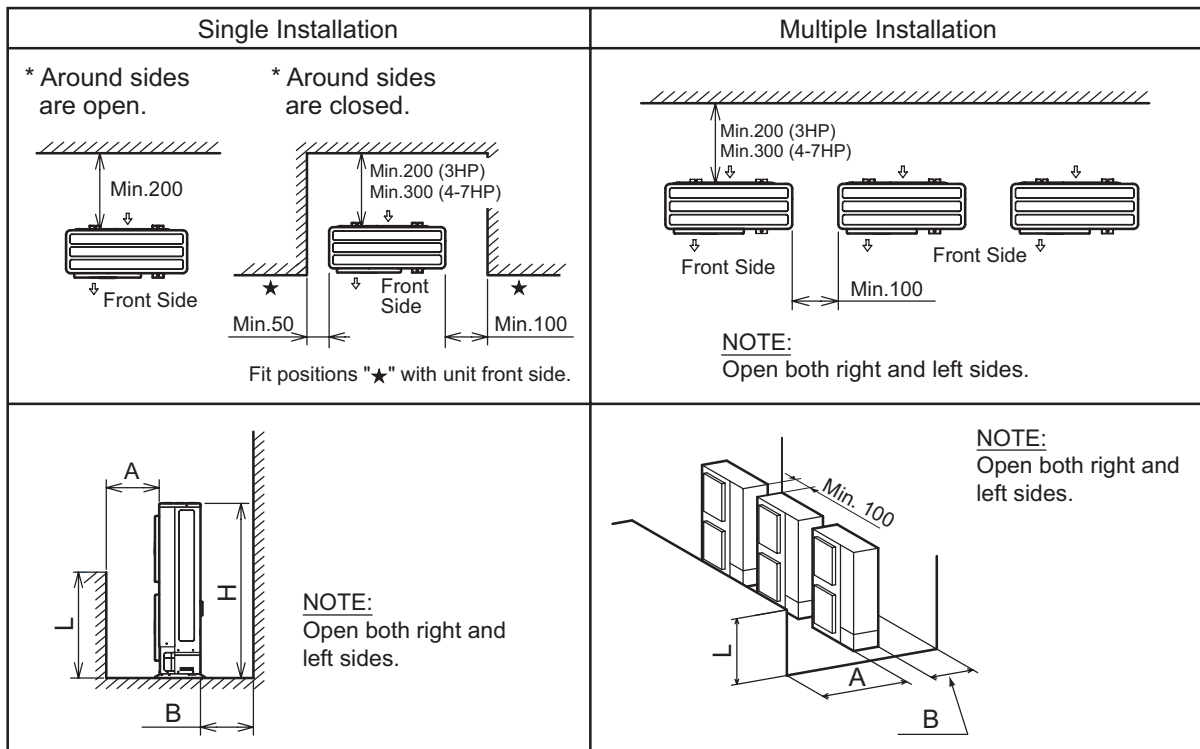


Fig. 5.1 Installation Space (1)

(b) Obstacles in Above

(mm)

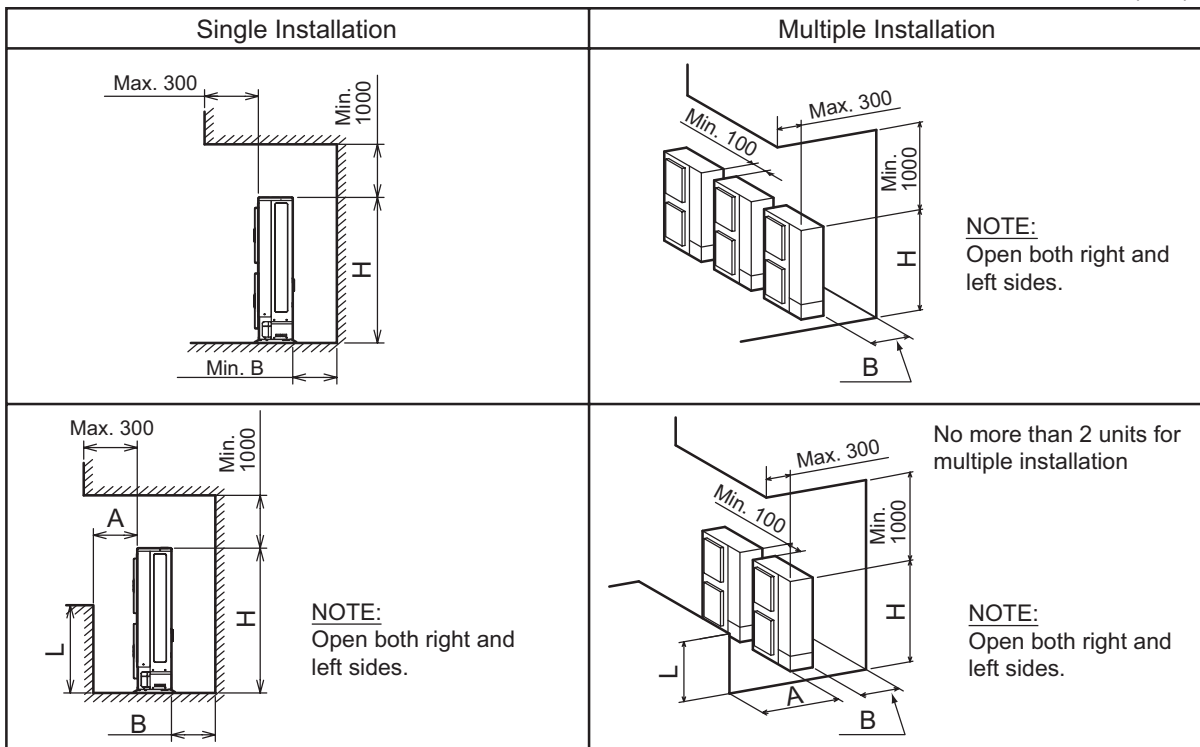


Fig. 5.2 Installation Space (2)

(2) Obstacles on Discharge Side

(a) Upper Side is Open.

(mm)

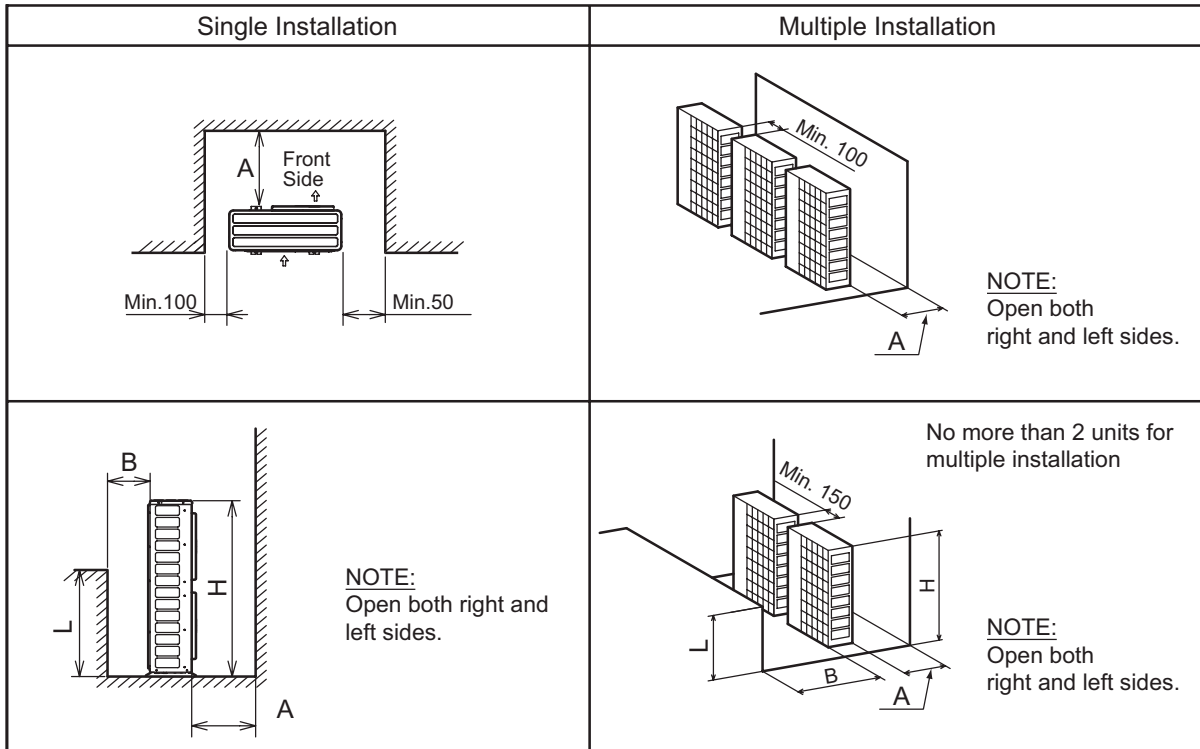


Fig. 5.3 Installation Space (3)

(3) Obstacles in Right and Left

(a) Upper Side is Open.

(mm)

(b) Obstacles in Above

(mm)

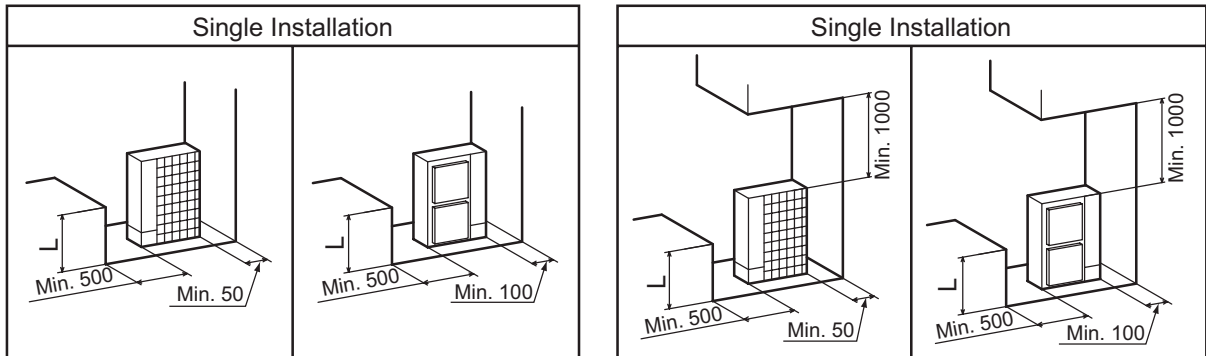
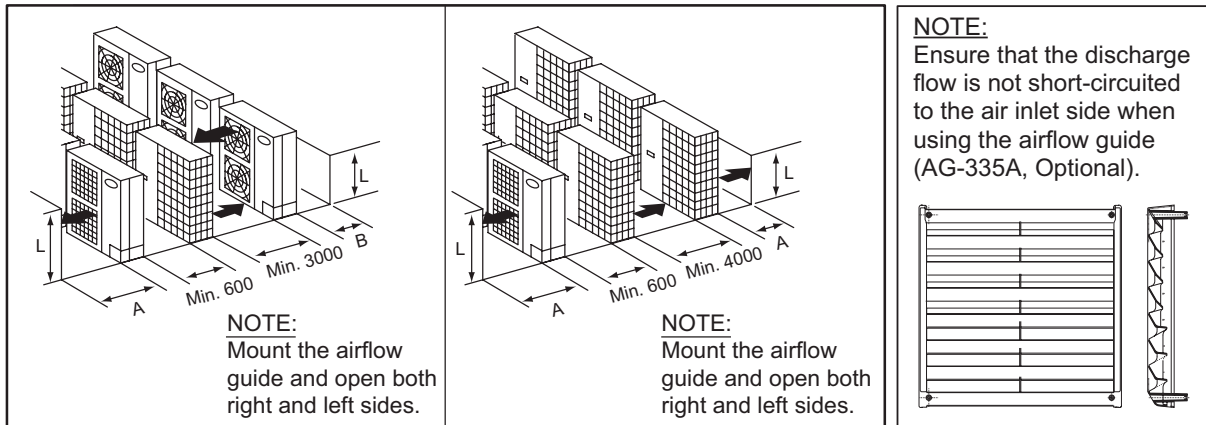


Fig. 5.4 Installation Space (4)

(4) Multi-Row and Multiple Installations



**NOTE**

- If L is larger than H, mount the units on a base so that H is greater or equal to L.  
In this situation ensure that the base is closed and does not allow the airflow to short circuit.  
In each case, install the outdoor unit so that the discharge flow is not short-circuited.
- The airflow guide (Optional) is required when there are interferences in both front and rear side of the outdoor unit.
- The installation of multi-row and multiple outdoor units should be up to 3 outdoor units on a roof, etc. Use the airflow guide (Optional) in order to prevent short-circuiting if more than 3 outdoor units are installed.

L	A	B
$0 < L \leq 1/2H$	600 or more	300 or more
$1/2H < L \leq H$	1400 or more	350 or more

**5.4 Installation Work**

- (1) Secure the outdoor unit with the anchor bolts.

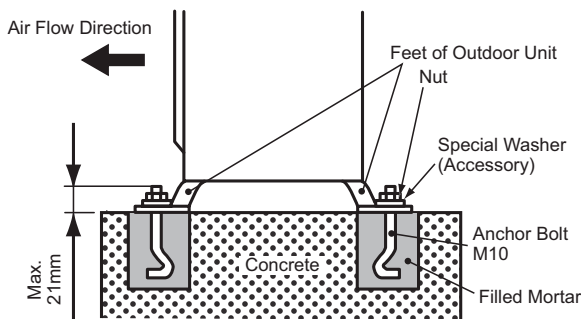


Fig. 5.5 Installation of Anchor Bolts

Fix the outdoor unit to the anchor bolts with special washer of factory-supplied accessory.

- (2) When installing the outdoor unit, fix the unit by anchor bolts. Refer to Fig. 5.6 regarding the location of fixing holes.

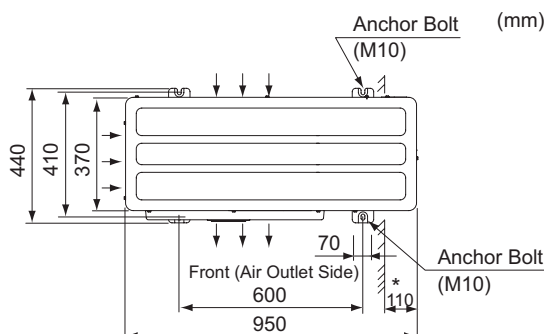


Fig. 5.6 Position of Anchor Bolts

**NOTE:**

When the mark \* dimension is secured, the piping work from bottom side is easy without interference of foundation.

- (3) Example of fixing outdoor unit by anchor bolts.

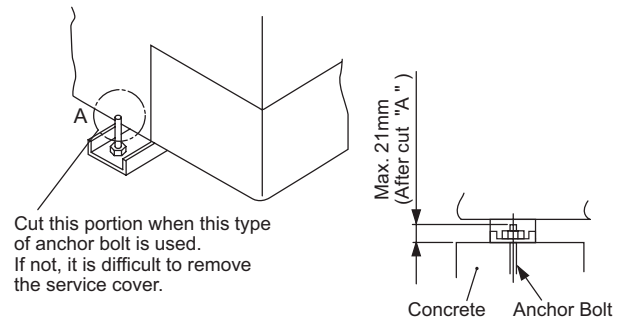


Fig. 5.7 Fixing Example

- (4) Fix the outdoor unit firmly so that declining, making noise, and falling down by strong wind or earthquake is avoided.

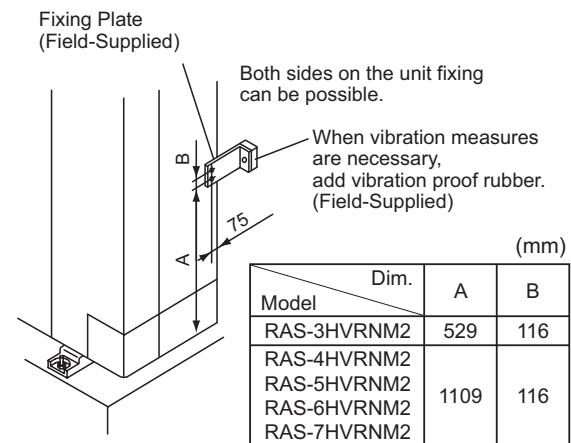
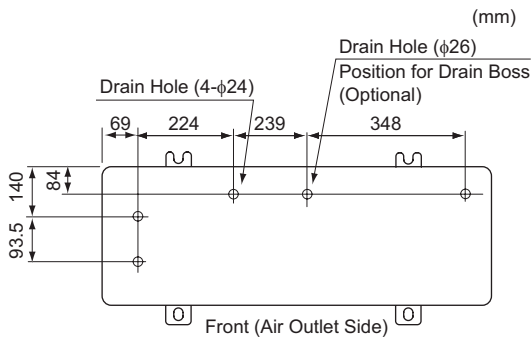


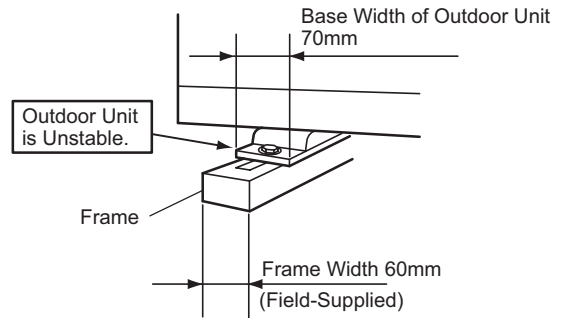
Fig. 5.8 Additional Fixing Arrangement

- (5) The drain water is discharged during the heating and defrosting operation. Choose a place where well drainage is available, or provide a drain ditch.
- (6) When installing the unit on a roof or a veranda, the drain water sometimes turns to ice in a cold morning. Therefore, avoid draining in an area where people often use because it is slippery. If installing such the area, provide a second drain pan and perform the drainage.
- (7) Use the drain boss set (Optional, DBS-26(L)) when the drain piping work is required to the outdoor unit. Pay attention that the drain boss set can not be used in a snow and a cold area.

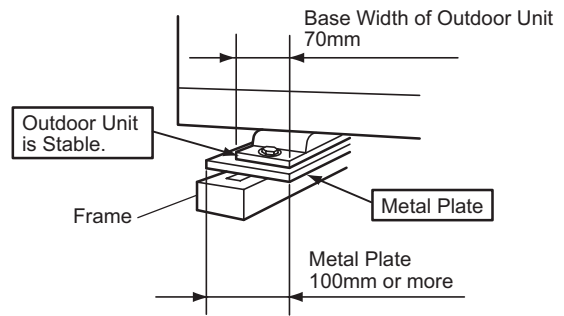


- (8) The whole of the base of the outdoor unit should be installed on a foundation. When using vibration-proof mat, it should also be positioned the same way. When installing the outdoor unit on a field-supplied frame, use metal plates to adjust the frame width for stable installation as shown in Fig. 5.9.

**Incorrect**



**Correct**



Recommended Metal Plate Size (Field-Supplied)

Material: Hot-Rolled Mild Steel Plate (SPHC)  
Plate Thickness: 4.5T

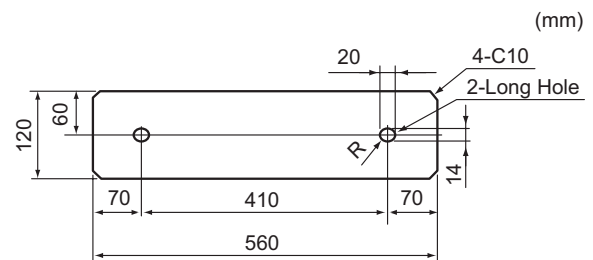


Fig. 5.9 Frame and Base Installation

**CAUTION**

Aluminum fins have very sharp edges. Pay attention to the fins to avoid any injury.

**NOTE**

Install the outdoor unit on a roof or in an area where people except service engineers can not touch the outdoor unit.

## 6. Refrigerant Piping Work

### DANGER

- Use the specified non-flammable refrigerant (R410A) to the outdoor unit in the refrigerant cycle. Do not charge material other than R410A into the unit such as hydrocarbon refrigerants (propane or etc.), oxygen, flammable gases (acetylene or etc.) or poisonous gases when installing, maintaining and moving. These flammables are extremely dangerous and may cause an explosion, fire, and injury.

### WARNING

- If the indoor unit is installed in a small room and the refrigerant gas leakage occurs, the leaked refrigerant gas fills the room and it may cause suffocation. Do not exceed the maximum permissible concentration of the refrigerant gas in the room. Consult with distributor for countermeasure such a ventilation system, etc.
- Make sure that the refrigerant leakage test shall be performed. The refrigerant (Fluorocarbon R410A) for this unit is nonflammable, non-toxic and odorless. However if the refrigerant is leaked and contacted with fire, toxic gas will generate. Also because the fluorocarbon is heavier than air, the floor surface will be filled with it, which could cause suffocation.
- Perform securely the refrigerant piping work before operating the compressor. Remove the refrigerant piping after the compressor is stopped when repairing, replacing or rejecting. If the refrigerant piping is not installed completely, the stop valve is opened and the compressor is operated, air will be charged to the refrigerant piping. As a result, an explosion, fire or injury will occur by being abnormally high pressure in the refrigerant cycle.
- Perform the brazing work after removing securely any flammable materials. If not, it may cause fire.
- Check to ensure that no pressure exists inside the stop valve before removing the flange.

### CAUTION

- Wear leather gloves when handling the refrigerant. If the refrigerant splashes directly to hands, it may be the cause of frostbite.
- Tighten the flare nut according to the specified torque. Do not apply excessive force to the flare nut when tightening. If applied, the flare nut may crack due to aged deterioration and refrigerant leakage may occur.

### NOTICE

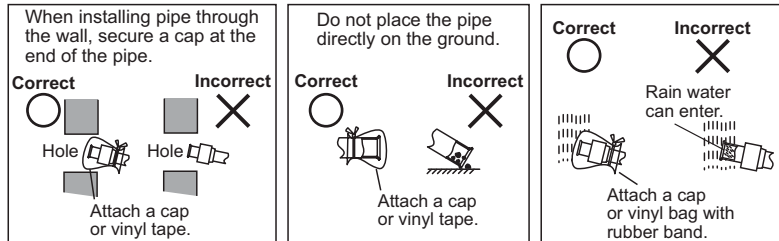
Ensure to connect the piping among the units in the same refrigerant cycle.

**6.1 Piping Materials**

- (1) Prepare locally-supplied copper pipes.
- (2) Select the piping size from the Table 6.1 and Table 6.2.
- (3) Select clean copper pipes. Make sure there is no dust and moisture inside of the pipes. Blow the inside of the pipes with nitrogen or dry air, to remove any dust or foreign materials before connecting pipes. Do not use any tools which produce a lot of swarf such as a saw or a grinder.

**NOTICE**

● Notice for Refrigerant Pipe Ends



- Cap the end of the pipe when the pipe is to be inserted through a hole.
- Do not put pipes on the ground directly without a cap or vinyl tape at the end of the pipe.

● Cautions for Piping Connection Work

- (1) Connect the indoor/outdoor units with refrigerant pipes. Fix the pipes and pay attention not to contact with weak materials such as ceiling. (Otherwise, abnormal sound may be heard due to the vibration of the piping.)
- (2) Apply refrigerant oil slightly on the sheet surface of the pipe and flare nut before the flaring work. And then tighten the flare nut with the specified tightening torque using two spanners. Perform the flaring work on the liquid piping side before the gas piping side. Check the gas leakage after the flaring work.

Apply Refrigerant Oil.



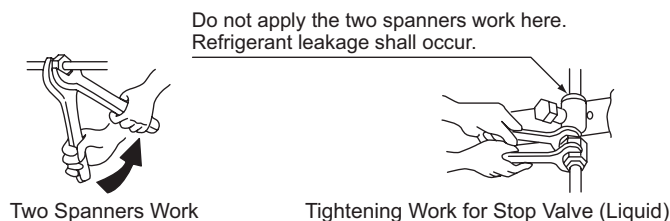
**NOTE:**

Refrigerant oil is field-supplied.

[Ethereal Oil FVC50K (3HP), FVC68D (4-7HP) (Idemitsu Kousan Co. Ltd.)]

- (3) In case that temperature and humidity inside the ceiling exceed 27°C/RH80%, apply additional insulation (approx. 10mm thickness) to the accessory insulation. It prevents dew condensation on the surface of the insulation (refrigerant pipe only).
- (4) Perform the air-tight test (4.15MPa for the test pressure).
- (5) Perform cold insulation work by insulating and taping the flare connection and reducer connection. Also insulate all the refrigerant pipes.

● When tightening the flare nut, use two spanners.



**CAUTION**

**Do not apply excessive force to the flare nut when tightening. If applied, the flare nut may crack due to aged deterioration and refrigerant leakage may occur. Use the specified tightening torque.**



Table 6.1 Piping Size of Outdoor Unit

Outdoor Unit HP	Gas	Liquid	Max. Piping Length	Max Lift between Outdoor Unit and Indoor Unit
3	φ15.88	φ9.52	Actual Length ≤ 50m Equivalent Length ≤ 70m	O.U is Higher than I.U ≤ 30m I.U is Higher than O.U ≤ 20m
4 to 7	φ15.88	φ9.52	Actual Length ≤ 75m Equivalent Length ≤ 95m	O.U is Higher than I.U ≤ 30m I.U is Higher than O.U ≤ 20m

I.U.: Indoor Unit  
O.U.: Outdoor Unit

Table 6.2 Piping Size of Indoor Unit

(mm)

Indoor Unit HP	Gas	Liquid
0.8 to 1.5	φ12.7	φ6.35
2.0	φ15.88	φ6.35
2.5 to 7.0	φ15.88	φ9.52

- Piping Thickness and Material  
Use the pipe as below.

(mm)

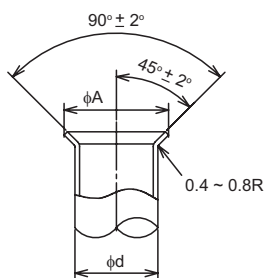
Diameter	R410A	
	Thickness	Material
φ6.35	0.8	O material
φ9.52	0.8	O material
φ12.7	0.8	O material
φ15.88	1.0	O material

**CAUTION**

**Material is based on JIS B8607.  
Do not use a thin pipe other than shown in the left table.**

## 6.2 Flaring and Joint

- Flaring Dimension  
Perform the flaring work as shown below.



(mm)

Diameter (φd)	A +0 -0.4
	R410A
6.35	9.1
9.52	13.2
12.7	16.6
15.88	19.7

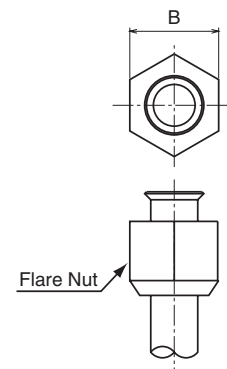
- Joint Selection  
If you use 1/2H material, you can not perform the flaring work. In this case, use a joint selected from the chart below.

< Minimum Thickness of Joint (mm) >

Diameter	R410A
φ6.35	0.5
φ9.52	0.6
φ12.7	0.7
φ15.88	0.8
φ19.05	0.8

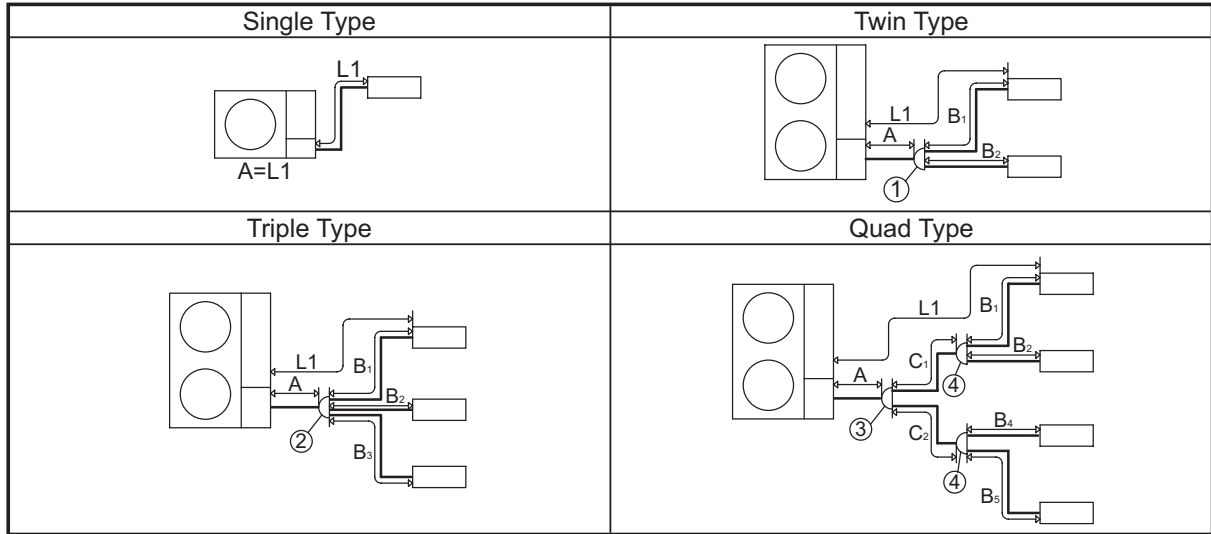
< Flare Nut Dimension B (mm) >

Diameter	R410A
φ6.35	17
φ9.52	22
φ12.7	26
φ15.88	29
φ19.05	36



**6.3 Pipe Selection**

- (1) Select the piping as followings according to the combination of the outdoor unit and the indoor unit(s). In the case that more than 5 indoor units are connected to the outdoor unit, select the line branch. (Refer to “Piping Work for Line Branch” on the next page.)



● **Piping Size Selection**

Outdoor Unit	Piping Size													
	A		B1-B5						C1-C2					
	Gas	Liquid	Indoor Unit Capacity								Total Indoor Unit Capacity after ④ Branch Pipe			
			1.0-1.5HP		2.0HP		2.5-7.0HP		≤ 2.5HP		> 2.5HP			
			Gas	Liquid	Gas	Liquid	Gas	Liquid	Gas	Liquid	Gas	Liquid		
3HP	φ15.88	φ9.52	φ12.7	φ6.35	φ15.88	φ6.35	φ15.88	φ9.52	-	-	-	-		
4-7HP	φ15.88	φ9.52	φ12.7	φ6.35	φ15.88	φ6.35	φ15.88	φ9.52	φ12.7	φ6.35	φ15.88	φ9.52		

● **Piping Length and Branch Piping Selection**

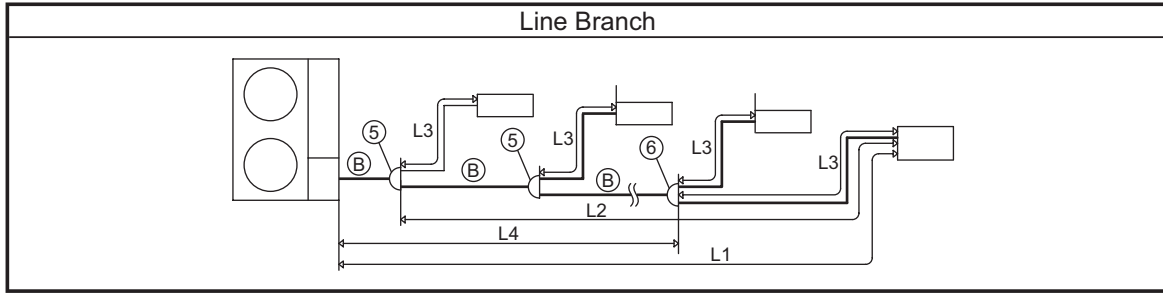
Outdoor Unit	Piping Length							Height Difference between O.U. and I.U.		Branch Piping				
	Max. Piping Length		Total Piping Length			Piping Length after 1st Branch	Main Piping Length A (Twin, Triple, Quad)	O.U. is Higher.	O.U. is Lower.	Twin	Triple	Quad		
			Total Actual Length of All Liquid Piping									Actual Length of B or B+C	①	②
	L1	Twin	Triple	Quad	Total I.U. Capacity after Branch Piping									
					Actual Length	Equivalent Length				≤ 2.5HP	> 2.5HP			
3HP	50	70	60	-	-	10				Take enough Length more than B-C	30		20	TW-52AN
4-6HP	75	95	85	95	95	10	30	20	TW-52AN		TG-53AN	TW-52AN	TW-22AN	TW-52AN
7HP	75	95	-	-	-	-	30	20	-		-	-	-	-

I.U.: Indoor Unit, O.U.: Outdoor Unit

**NOTES:**

- The liquid piping and the gas piping shall be the same piping length and the same piping way.
- Install the branch piping near the indoor unit.
- Install the branch piping to be the equal piping length to each indoor unit (B1=B2=B3, B4=B5, C1=C2).  
If the piping length is not equal because of building structure, the difference of the piping length shall be within 8m.  
(B1-B2), (B2-B3), (B3-B1), (B4-B5) = within 8m  
(B1+C1) – (B4+C2), (B1+C1) – (B5+C2), (B2+C1) – (B4+C2), (B2+C1) – (B5+C2) = within 8m
- Install the piping which the height difference of the piping length between the indoor units should be 0.  
If the height difference is not 0 because of building structure, the difference of the piping length should be within 10m.

● Piping Work for Line Branch



● Piping Length and Branch Piping Selection

Outdoor Unit		3HP	4HP	5HP	6HP	7HP
Refrigerant Piping Length: L1	Actual Length	50	75	75		
	Equivalent Length	70	95	95		
Piping Length from 1st Branch to each Indoor Unit: L2		20	30	30	-	
Piping Length from Branch to Indoor Unit: L3		10	10	10	-	
Height Difference Outdoor / Indoor (Outdoor Unit is Higher / Lower.)		30 / 20	30 / 20	30 / 20		
Height Difference Indoor / Indoor		10	10	10	-	
Total Piping Length: Total of L3+L4		60	95	95	-	
Multi-kit Model	⑤	MW-NP102AN				-
	⑥	MW-NP102AN				-

● Piping Selection

Main Piping Diameter ( Ⓑ )

Outdoor Unit Capacity	Gas / Liquid
3-6HP	φ15.88 / φ9.52

Piping between Multi-kit and Indoor Unit (L3)

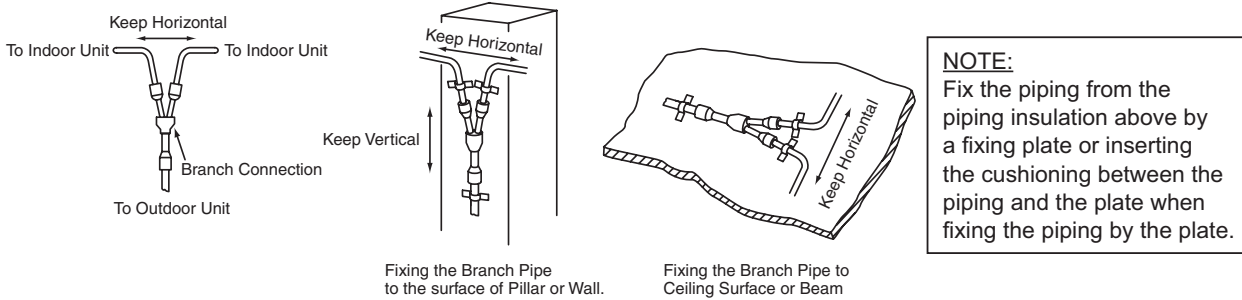
Indoor Unit Capacity	Gas / Liquid
1-1.5HP	φ12.7 / φ6.35
2HP	φ15.88 / φ6.35
2.5-5HP	φ15.88 / φ9.52

\* Select φ12.7 liquid piping if the piping length is over 70m or more than 5 indoor units are connected to the outdoor unit.

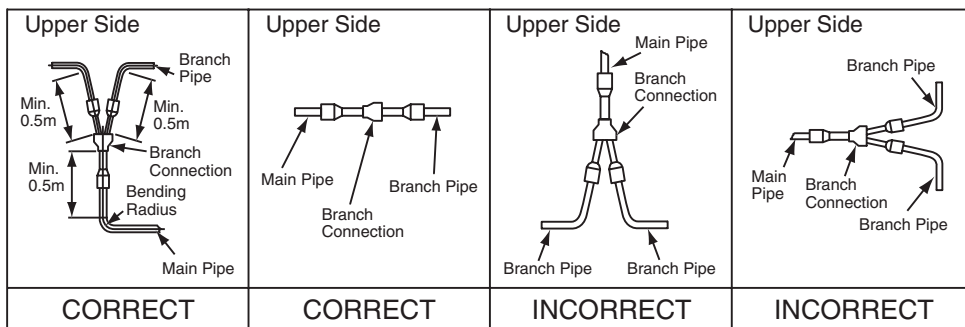
- (2) Use the branch pipe kit surely to the distributing pipe.  
Do not use the T-Joint. Fix the branch pipes horizontally to the pillar, wall or ceiling.

**NOTE:**

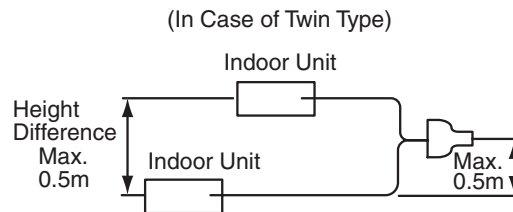
Wrap the branch pipes with an insulation or a pad and then fix them on the wall with the fixing plates.



● Installation Posture of Branch Pipes



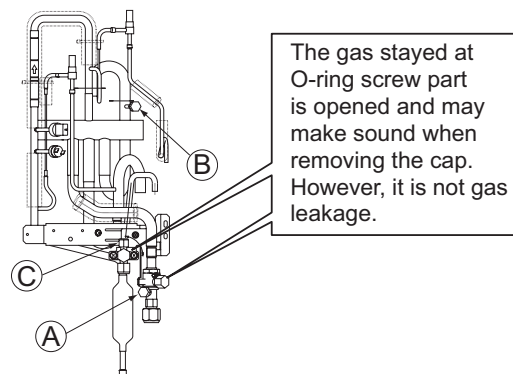
- (3) Ensure the branch pipes position and height difference between indoor units according to the right figure.



- (4) Pressure Measurement by Check Joint

Use the check joint (the gas stop valve "A" and the piping "B") to measure the pressure. In this time, connect a manifold gauge according to the table below because high and low pressures are interchanged depending on the operation (cooling or heating).

	Cooling	Heating
Check Joint of Gas Stop Valve (A)	Low Pressure	High Pressure
Check Joint of Piping (B)	High Pressure	Low Pressure
Check Joint of Liquid Stop Valve (C)	Exclusive for Vacuum Pump and Refrigerant Charge	



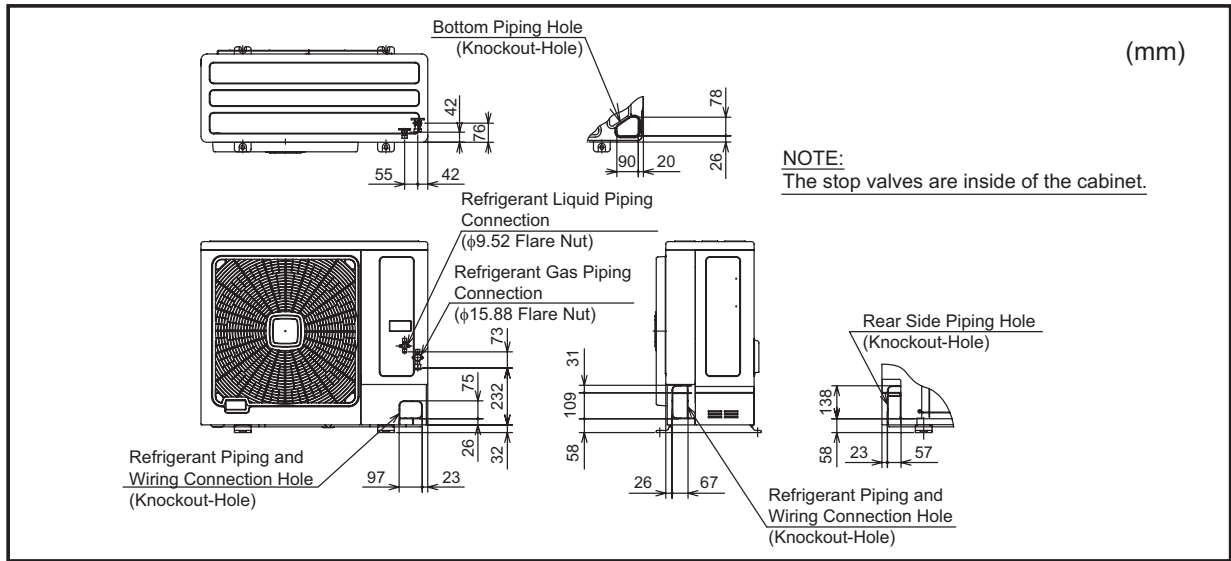
**NOTE:**

Pay attention not to splash the refrigerant and the oil to the electrical box or the electrical parts when removing the charge hose.

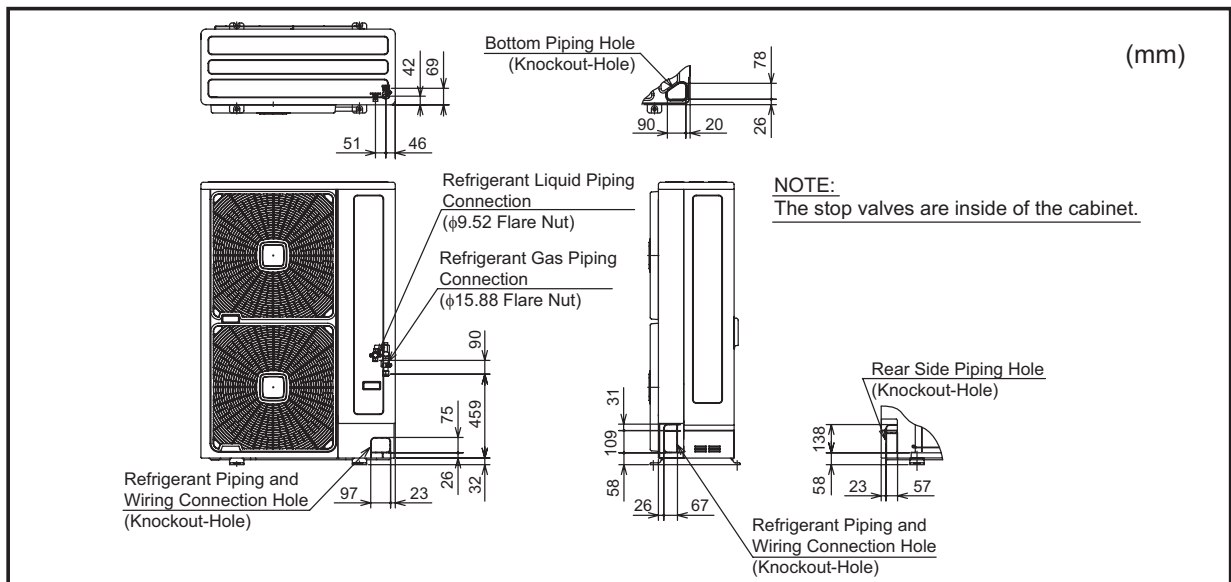
### 6.4 Piping Connection

● Stop Valves Position

< 3HP >



< 4 to 7HP >



● Pipes can be connected from 4 directions.

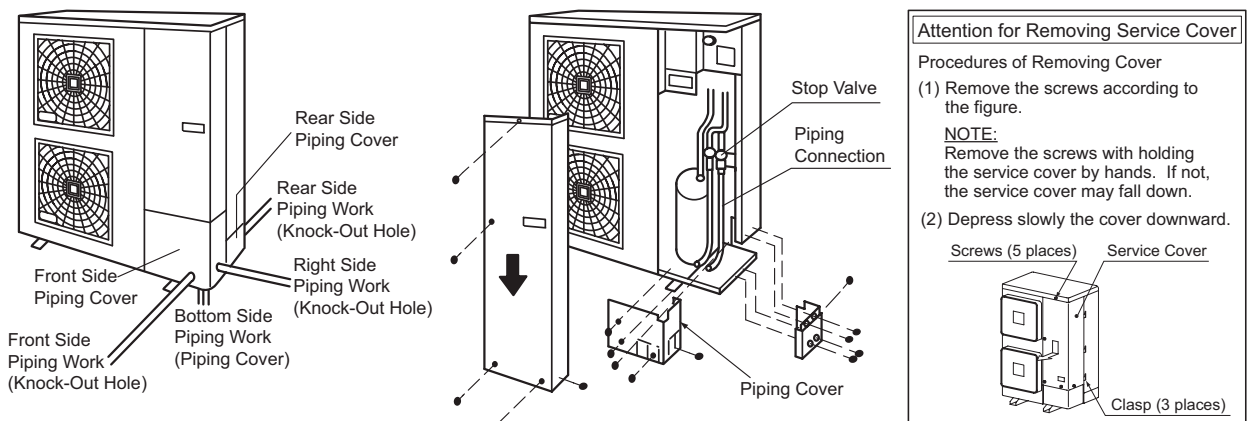
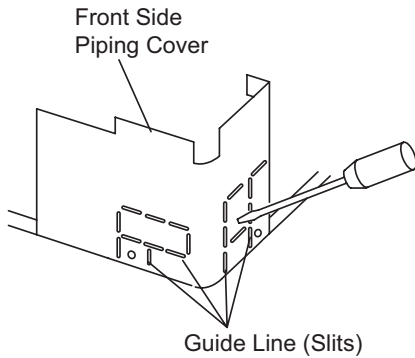


Fig. 6.1 Piping Direction

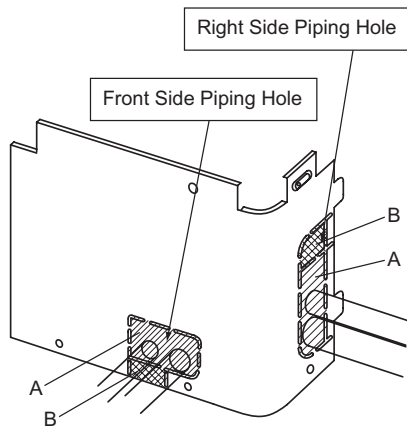
- (1) Pipes can be connected from 4 directions as shown Fig. 6.1. Make a knock-out hole in the front pipe cover or bottom base to pass through the hole.

After removing the pipe cover from the unit, punch out the holes following the guide line with a screwdriver and a hammer.

Then, cut the edge of the holes and attach insulation (Field-Supplied) for cables and pipes protection.



- (a) Front and Right Side Piping Work  
Select the correct knock-out size depending on whether it is for power wiring or transition wiring.

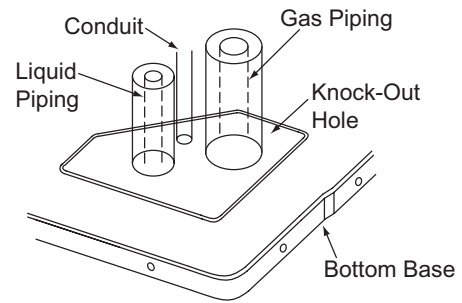


It is available to correct the liquid or gas piping, power source cable less than 14mm<sup>2</sup> and control cable from "A" part. When using conduit, remove "A" and "B" parts. Check to the tube size before removing "A" and "B" parts.

**NOTE:**

Protect cables and pipes from the edge of the cover by insulations, etc. (Field-Supplied).

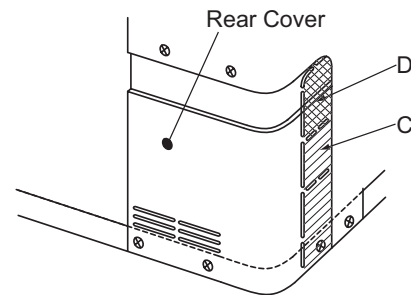
- (b) Bottom Side Piping Work  
After removing bottom of the piping cover, perform piping and wiring works.



**NOTE:**

Prevent the cables from coming into direct contact with the piping.

- (c) Rear Side Piping Work  
After removing the rear side piping cover, punch out the "C" holes along the guide line. When using a racking cover or conduit, remove "D" part after checking these diameters.



**NOTE:**

To avoid injury, protect cables and pipes with adequate insulation (Field-Supplied).

**NOTICE**

Consider and install the unit to secure the space of the piping hole part during the right side piping and the rear side piping work.

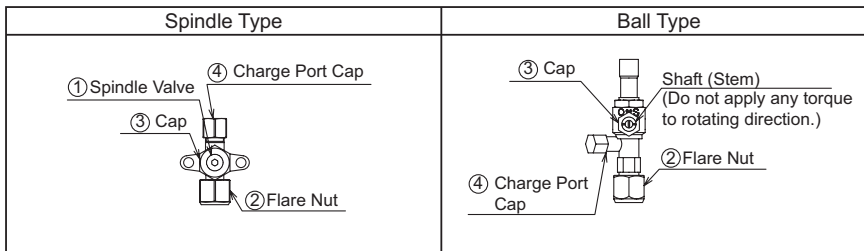
< Example >

Punch out "D" holes (top of the guide line of the piping cover ) during the right side cable and the rear side piping work. It is available to install cables and pipes inside the unit without interfering.

- (2) Install securely the piping cover not to be included water in the unit. Prevent gaps of pipes and the electrical cables by insulation (Field-Supplied).  
Cut the lower side guide line of the piping cover when attaching the insulation. It makes easy the attaching work.
- (3) Use a pipe bender or elbow (Field-Supplied) for bending work when connecting pipe.

< Operation of Stop Valves >

- (1) Remove the stop valve cap before performing the air tight test after connecting the flare nut. Tighten the spindle valve in clockwise according to the following table "Tightening Torque of Stop Valves."
- (2) Tighten the flare nut according the specified torque. If the tightening torque is excessive, it may cause refrigerant leakage from the spindle part.
- (3) Perform the air tight test after the tightening work. It is more effective to perform this work after fix the flare nuts for the piping connection to the stop valves.
- (4) Use the charging hose for the check joint connection. When removing the charging hose from the check joint, a sound may be heard by a small quantity of refrigerant leak. However it is not abnormality. Do not apply excessive force to the end of opening the spindle. (Tightening Torque:  $\leq 5.0\text{N}\cdot\text{m}$ )



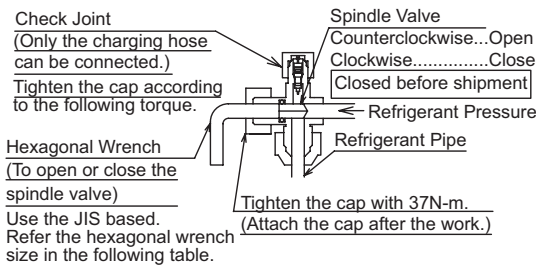
● Tightening Torque of Stop Valves

(N-m)

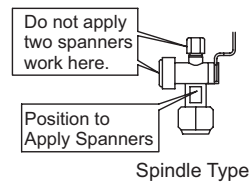
Outdoor Unit	① Spindle Valve		② Flare Nut		③ Cap		④ Check Joint for Service Port	
	Gas	Liquid	Gas	Liquid	Gas	Liquid	Gas	Liquid
3HP	9-11	7-9	68-82	34-42	33-42	33-42	14-18	14-18
4-7HP	-	7-9	68-82	34-42	20-25	33-42	14-18	14-18

Spindle Type

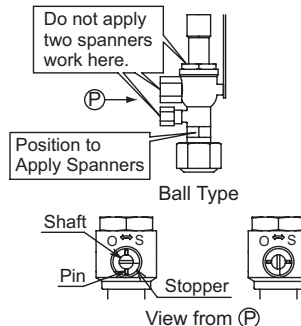
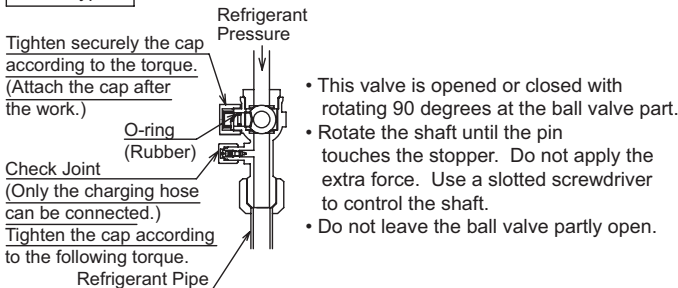
Perform the work after warming the spindle part by a dryer etc. when controlling the stop valve in an cold area. (O-ring of the spindle part will harden at the low temperature and the refrigerant leakage may occur.)



Use securely two spanners at the following position when removing or installing the pipe. If not, refrigerant leakage will occur.



Ball Type



● Hexagonal Wrench Size for Spindle Valve

(mm)

Outdoor Unit	Gas	Liquid
3HP	5	4
4-7HP	-	4

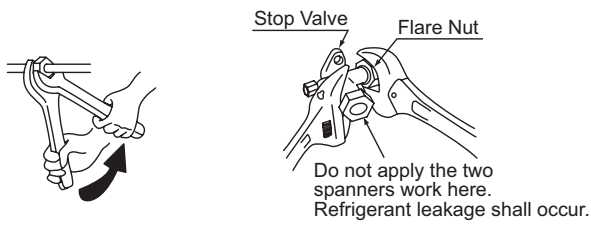
**6.5 Connecting Refrigerant Pipings**

- (1) The stop valve has been closed before shipment, however, make sure that the stop valves are closed completely.
- (2) Connect the indoor unit and the outdoor unit with field-supplied refrigerant piping. Suspend the refrigerant piping at certain points and prevent the refrigerant piping from touching the weak part of the building such as wall, ceiling, etc.  
(If touched, abnormal sound may occur due to the vibration of the piping. Pay special attention in case of short piping length.)
- (3) Apply the oil thinly at the seat surface of the flare nut and pipe before tightening. And when tightening the flare nut, use two spanners.

Refrigerant Oil is field-supply.

〔 Model: FVC68D (Ether Oil)  
Manufacturer: IDEMITSU KOSAN Co., Ltd. 〕

The specified tightening torque are as shown in the table.



Two Spanners Work

Tightening Work for Stop Valve

Table 6.3 Tightening Work of Flare Nut

Required Torque	(Based on JIS B8607)
Pipe Size	Tightening Torque
φ6.35 (1/4")	14-18 N.m
φ9.52 (3/8")	34-42 N.m
φ12.7 (1/2")	49-61 N.m
φ15.88 (5/8")	68-82 N.m
φ19.05 (3/4")	100-120 N.m

- (4) Check gas leakage at flare connections.
- (5) Wrap insulations at the each flare nut connection and piping, and wind a tape for the insulation.



## 7. Electrical Wiring

### **WARNING**

- The electrical wiring work must be performed by authorized installers. If not performing the electrical work completely or a capacity shortage of the power circuit, it may cause an electric shock or fire.
- Perform the electrical work according to each regulation of region and “Installation & Maintenance Manual” of the outdoor unit, and the dedicated electrical circuit must be utilized. If not performing the electrical wiring work completely or a capacity shortage of the power circuit, it will cause an electric shock or fire.
- Utilize the specified cables for wiring between the outdoor unit and the indoor units. Selecting incorrect cables will cause an electric shock or fire.
- Turn OFF the main power switch to the indoor unit and the outdoor unit and wait for more than 3 minutes before electrical wiring work or a periodical check is performed.
- Check to ensure that the indoor fan and the outdoor fan have stopped before electrical wiring work or a periodical check is performed.
- Protect the wires, electrical parts, etc. from rats or other small animals. If not protected, rats may gnaw at unprotected parts and which may lead to fire.
- Avoid the wirings from touching the refrigerant pipes, plate edges and electrical parts inside the unit. If not do, the wires will be damaged and at the worst, fire will occur.
- Use a medium sensing speed type ELB (Earth Leakage Breaker, activation speed of 0.1 sec. or less). If not used, it will cause an electric shock or fire.
- Fix the cables securely. External forces on the terminals could lead to fire.
- Tightly clamp wires by the cord clamp after the wiring is completed to the terminal board. In addition, run securely wires through the wiring hole. If not completed, it may cause fire by biting wires.
- Tighten screws according to the following torque. If tightening work is not completed, it may cause heat generation, an electric shock or fire.

M4:	1.0 to 1.3 N-m
M5:	2.0 to 2.4 N-m
M6:	4.0 to 5.0 N-m
M8:	9.0 to 11.0 N-m
M10:	18.0 to 23.0 N-m

## 7.1 General Check

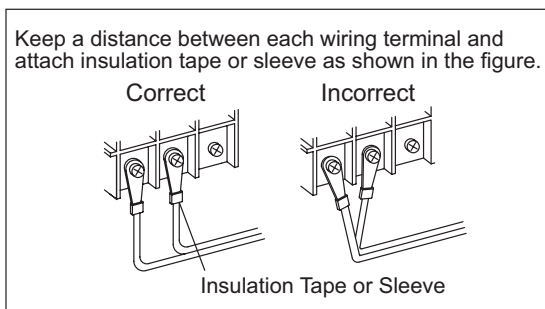
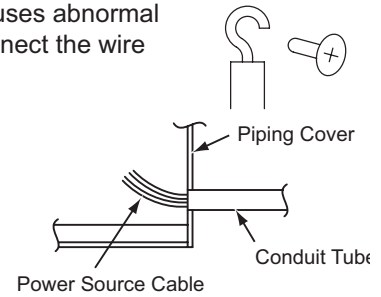
- (1) Make sure that the field-selected electrical components (main power switches, circuit breakers, wires, conduit connectors and wire terminals) have been properly selected according to the electrical data indicated in Table 7.2 Wiring Capacity and Size. Make sure that the components comply with National Electrical Code (NEC).
  - Supply the electrical power to each outdoor unit. An ELB, fuse and main switch should be used for each outdoor unit. If not, it will cause fire or an electrical shock.
  - The power source for the indoor unit and outdoor unit should be provided separately. Connect a power source wiring to each indoor unit group to be connected to the same outdoor unit. (Max. capacity of one indoor unit group is 6HP.)
- (2) Check to ensure that the power supply voltage is within  $\pm 10\%$  of the rated voltage. If the power supply voltage is too low, the system cannot be started due to the voltage drop.
- (3) Check the size of the electrical wires.
- (4) In some cases, the packaged air conditioner may not be operated normally under the following cases.
  - In case that the packaged air conditioner is supplied with the same power transformer as the device with high electricity consumption\*
  - In case that the power source wires for the device\* and the packaged air conditioner are located close to each other.
    - \* (ex) Lift, container crane, rectifier for electric railway, inverter power device, arc furnace, electric furnace, large-sized induction motor and large-sized switch.For the cases mentioned above, induction surge of the power supply wiring for the packaged air conditioner may occur due to a rapid change in electricity consumption of the device and an activation of switch. Therefore check the field regulations and standards before performing electrical work in order to protect the power supply wiring for the packaged air conditioner.
- (5) Check to ensure that the earth wires of the outdoor unit and the indoor units are connected.
- (6) Check to ensure that the electrical resistance is more than 1 megohm, by measuring the resistance between ground and the terminal of the electrical parts. If not, do not operate the system until the electrical leakage is found and repaired.

### 7.2 Wiring Connection

The wiring connection of the indoor unit should be performed according to "Installation & Maintenance Manual" of the indoor unit. The wiring connection of the outdoor unit is shown in Fig.7.1.

## NOTICE

- Do not use a solderless terminal when a single wire is used. If used, it causes abnormal heating at the caulking portion of the terminal. If a single wire is used, connect the wire direct as shown in the figure.
- When using a conduit tube, do NOT lead it in the outdoor unit. If the conduit tube touches the compressor and refrigerant cycle in the outdoor unit, it may cause to damage them.



Make a loop of the wires so that disconnecting the wirings for replacing parts is not required.

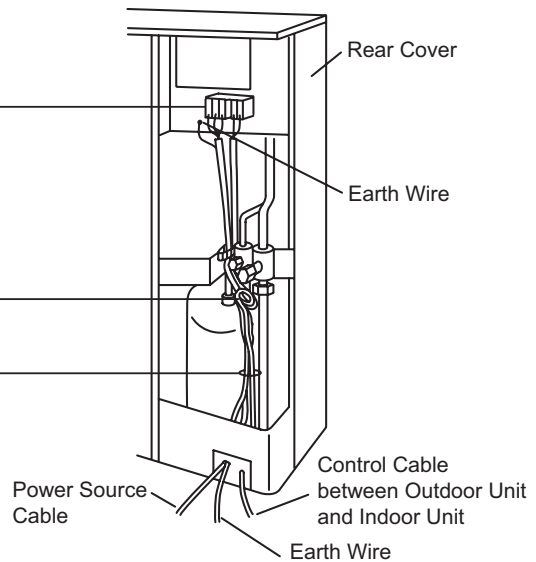
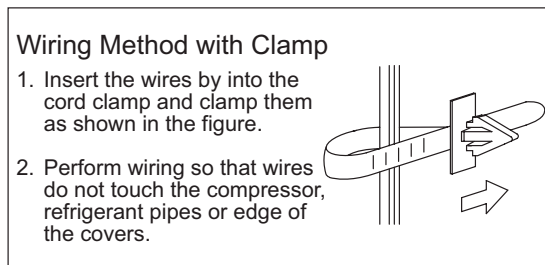
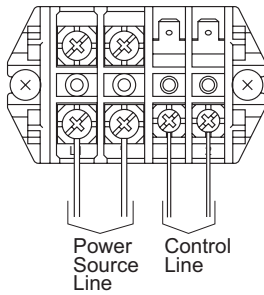
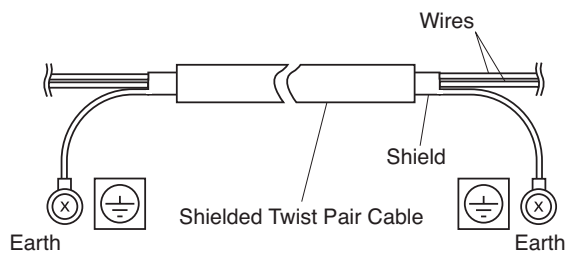


Fig. 7.1 Wiring Connection of Outdoor Unit

- (1) Connect the power source cables (L1 and L2 (N) phases) to the terminal board correctly.



- (2) Do not connect the power source cables to the control line. It will cause a burnout of the printed circuit board.
- (3) Connect the control cables between the indoor unit and the outdoor unit, as shown in Fig. 7.2 to 7.4.  
Check to ensure that the terminal for power source cable (Terminals "L1" to "L1" and "N" to "N" of each terminal board: AC220-240V) between the indoor unit and the outdoor unit coincide correctly. If not, some component will be damaged.
- (4) Use the shielded twist pair cable for control between the outdoor unit and the indoor units. They are connected to the terminals 1 and 2 of the terminal boards. The remote control switch cable is connected to the terminals A and B of each indoor unit terminal board.
- (5) When installing the unit in Australia, connect the both ends of shielded twist pair cable (remote control switch cable and control cable) to the earth as shown below.



**NOTES:**

1. When the total wiring length for control cable between the outdoor unit and the indoor unit and between indoor units is less than 100m, the normal wiring (more than 0.75mm<sup>2</sup>) except the twist pair cable is available. (Except for Australia)
2. The total wiring length for the remote control switch can be extended up to 500m. If the total wiring length less than 30m, the normal wiring (0.3mm<sup>2</sup>) except the twist pair cable is available. (Except for Australia)

**NOTICE**

- Connect correctly the power source line phases.  
3-Phase 4 Wires: L1, N  
3-Phase 3 Wires: L1, L2
- In the case of 3-Phases 4 Wires type  
The power source must be applied from L1 line and N line. If applied from L1-L2, L1-L3, the electrical parts will be damaged.
- The control cable between the indoor unit and the outdoor unit does not have any polarity. Do not apply an excessively high voltage to the cable (Rated Voltage 5V). It may cause failure.
- The remote control switch cable (Field-Supplied) does not have any polarity. Do not apply an excessively high voltage to the cable (Rated Voltage 5V). It may cause failure.

**! WARNING**

- **Install an ELB in the power source. If ELB is not used, it will cause electric shock or fire at the worst.**
- **The tightening torque of each screw shall be as follows. Keep the tightening torque below when wiring work.**  

M4:	1.0 to 1.3 N-m
M5:	2.0 to 2.5 N-m
M6:	4.0 to 5.0 N-m
M8:	9.0 to 11.0 N-m
M10:	18.0 to 23.0 N-m
- **Connect earth wires for the outdoor / indoor unit to prevent an electrical shock or an unexpected accident. The earth resistance must be less than 1 megohm. The earth work must be performed by authorized installers.**
- **Turn completely OFF the power source to prevent an electrical shock when opening the service cover to perform the electrical work or the maintenance.**
- **Pay attention not to bite electrical wirings when attaching the service cover. It may cause an electrical shock or fire.**

**NOTICE**

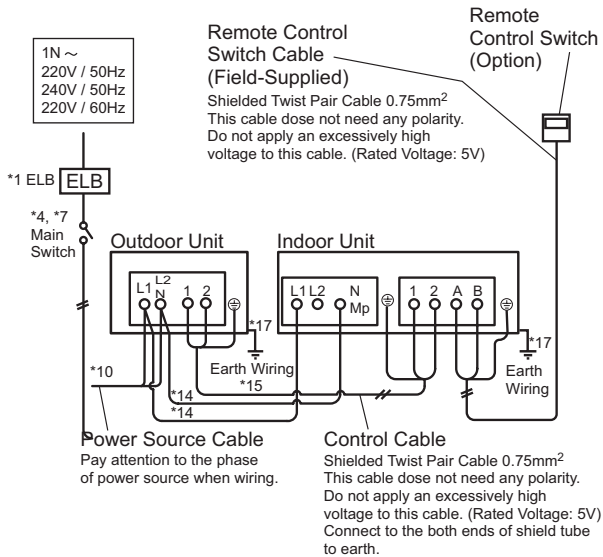
- Maintain the rated voltage for the power source. It may be harmful to the unit if the voltage is either too high or too low.
- Take enough capacity for the power source. If not, the operation can not be started by the wide voltage reduction.

Use CASE B method wiring for Australia.

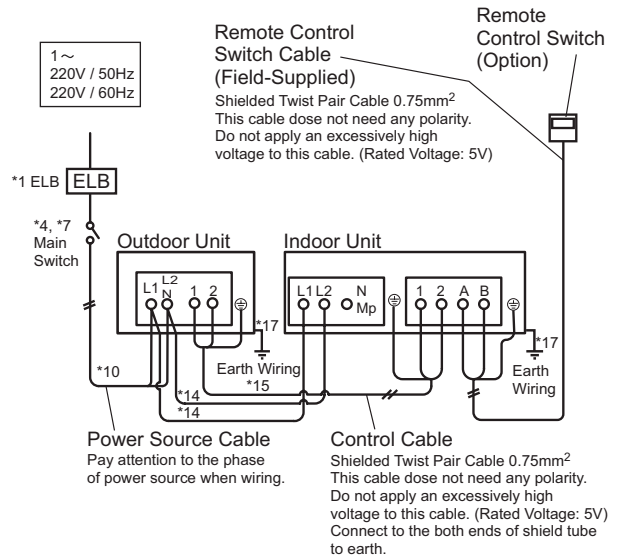
The control cable length between the outdoor unit and the indoor unit shall be less than 75m.

< CASE A >

Power Source Type: 3 Phase 4 Wires

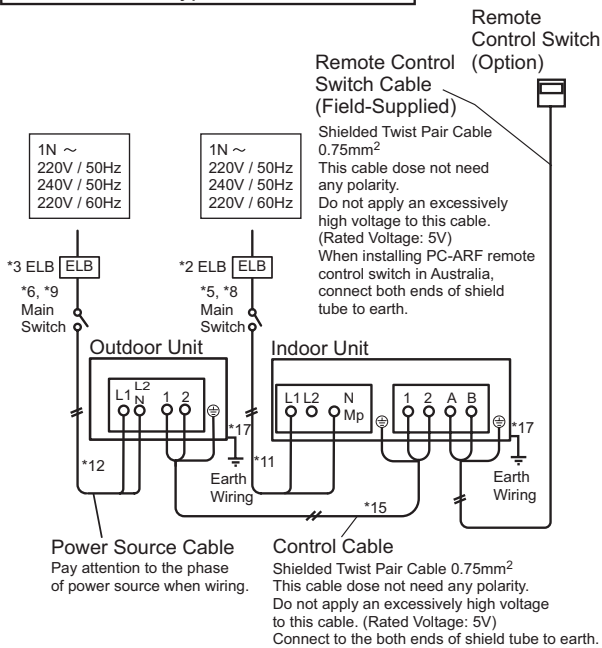


Power Source Type: 3 Phase 3 Wires



< CASE B >

Power Source Type: 3 Phase 4 Wires



Power Source Type: 3 Phase 3 Wires

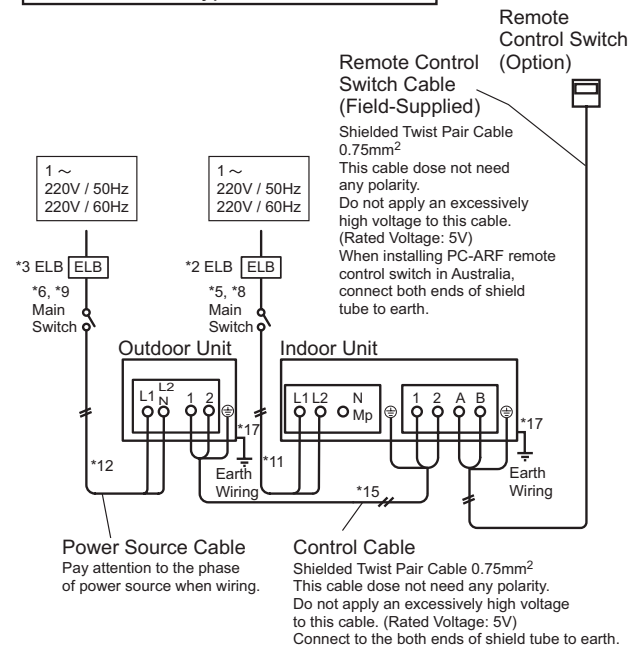
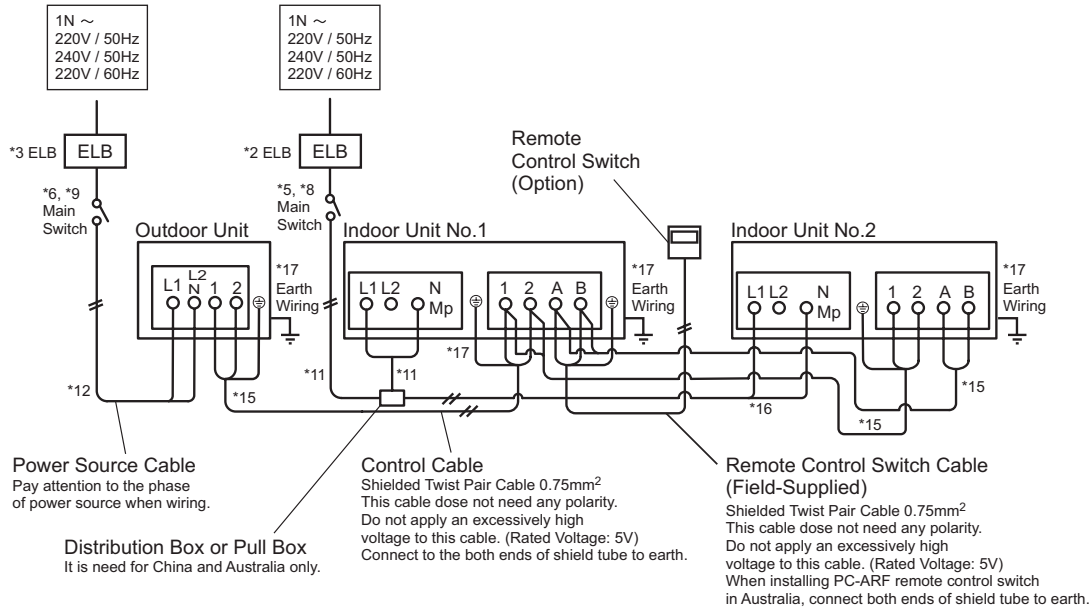


Fig. 7.2 Wiring Connection for Single Type between Indoor Unit and Outdoor Unit

# OUTDOOR UNIT

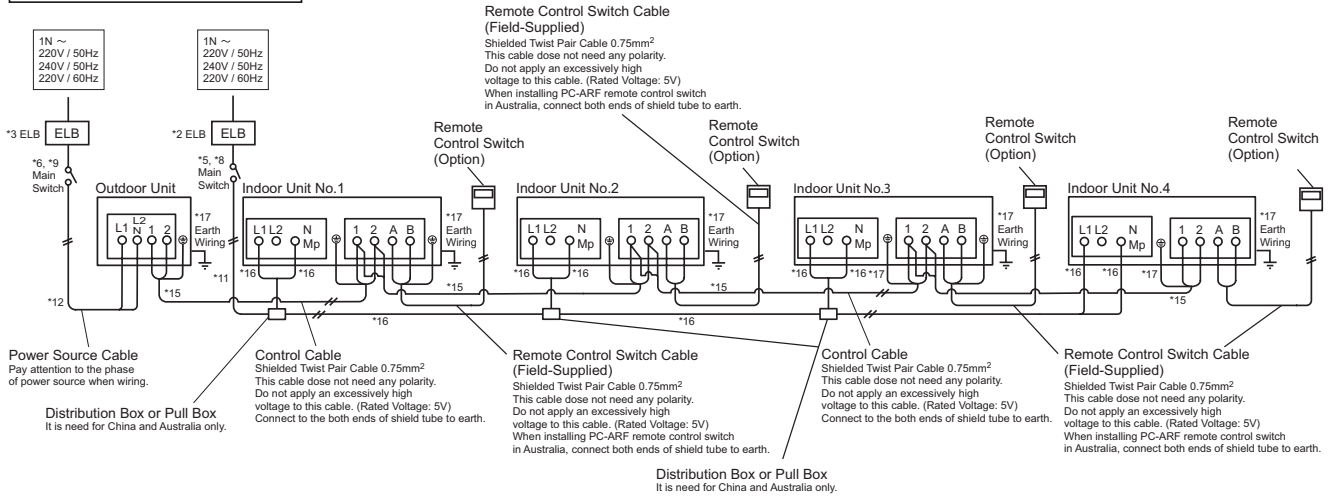
Power Source Type: 3 Phase 4 Wires



**NOTE:** Other wiring methods are same as the single type.

Fig. 7.3 Multiple Combinations for Simultaneous Operation (CASE B)

Power Source Type: 3 Phase 4 Wires

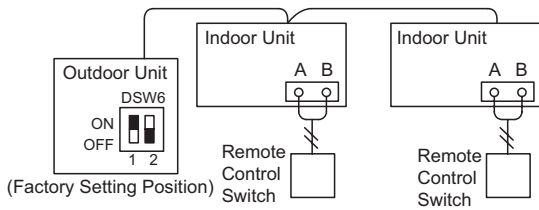


**NOTE:** Other wiring methods are same as the single type.

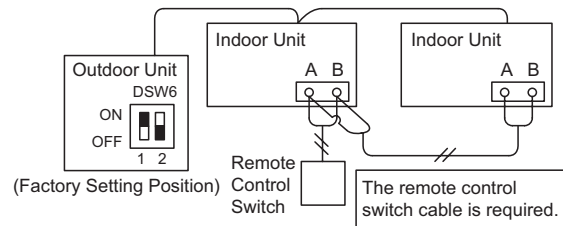
Fig. 7.4 Multiple Combinations for Individual Operation (CASE B)

● Remote Control Switch Connecting Diagram

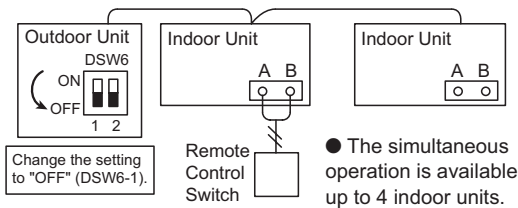
(a) Installing Remote Control Switch to each Unit with Individual Operation Setting



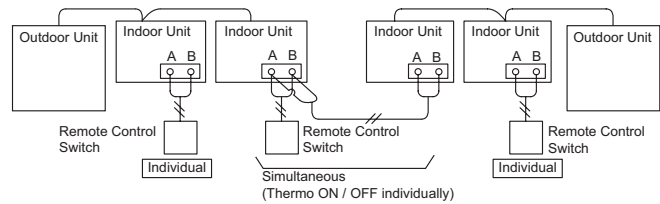
(b) Installing One Remote Control Switch with Individual Operation Setting



(c) Simultaneous Operation



(d) Connecting Remote Control Switch in Case of Connecting between Refrigerant Cycles

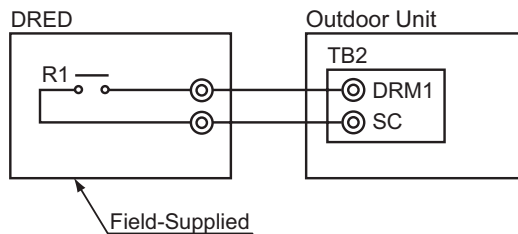


● Connection between Demand Response Enabling Device (DRED) and Outdoor Unit

This function is supported Australian Standard "Demand response capabilities and supporting technologies for electrical products" AS 4755.3.1:2008.

AS 4755	Mode 1 <input checked="" type="checkbox"/>	Mode 2 <input type="checkbox"/>	Mode 3 <input type="checkbox"/>
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When the input terminals DRM1 and SC are short-circuited, the compressor is forcibly stopped and the indoor unit(s) is put under Thermo-OFF condition. The remote control switch display remains the running mode with the stoppage code No. 10.



Wiring Diagram between DRED and Outdoor Unit

**NOTES:**

1. If the demand control (ON/OFF) with only time conditions is set, it is recommended to set the time according to the load, not the constant setting time all through the year. The minimum set interval for demand or forcible stoppage should be 30 minutes or more in consideration of the compressor's start-stop frequency and energy-saving.
2. When demand control (ON/OFF) is set, it is required to set the optional function setting. Select the setting condition "0" to "1" at the Defrost Control in Demand Mode "F i". Refer to item 10.3 in detail of setting.

**CAUTION**

**Do not connect the power source cable or control cable to DRM1 and SC terminals. It will cause a burnout of the printed circuit board.**

(6) The recommended breaker sizes etc. are shown in Table 7.1.

Table 7.1 Recommended Electrical Parts

Wiring Connection		ELB	Main Switch		Power Supply Wiring Capacity	Intermediate Wiring between I.U. and O.U.		Intermediate Wiring between I.U. and I.U.	Earth Wiring
			Normal Current	Fuse Capacity		Power Source	Control Cable		
Connecting Power Source to O.U. only		*1	*4	*7	*10	*14	*15	*16	*17
Connecting Power Source to O.U. and I.U. separately	Indoor Unit	*2	*5	*8	*11	-	*15	*16	*17
	Outdoor Unit	*3	*6	*9	*12	-	*15	*16	*17

ELB: Earth Leakage Breaker

I.U.: Indoor Unit

O.U.: Outdoor Unit

**NOTES:**

1. Install main switch and ELB for each system separately. Select the high response type ELB that is acted within 0.1 second.
2. Separate the control wiring (\*15) between the outdoor unit and the indoor unit more than approximately 5 ~ 6cm from power supply wiring (\*11 and \*14). Do not use a coaxial cable.

(7) In the case that a conduit tube for field-wiring is not used, fix rubber bushes with adhesive on the panel.



**Table 7.2 Recommended Wiring Capacity and Size**

**Single Type**

Term (measure)	ELB (A)			Normal Current of Main Switch (A)			Fuse Capacity of Main Switch (A)			Wiring Capacity (mm <sup>2</sup> )					
	CASE A	CASE B Indoor	CASE B Outdoor	CASE A	CASE B Indoor	CASE B Outdoor	CASE A	CASE B Indoor	CASE B Outdoor	Power Supply			Between O.U. and I.U.		Earth Wiring
										CASE A	CASE B Indoor	CASE B Outdoor	Power Source Cable	Control Cable	
Model	*1	*2	*3	*4	*5	*6	*7	*8	*9	*10	*11	*12	*14	*15	*17
RAS-3HVRNM2	32	5	32	40	5	40	32	5	32	4	0.75	4	0.75	0.75	2.0
RAS-4HVRNM2	50	5	40	60	5	50	50	5	40	10	0.75	6	0.75	0.75	3.5
RAS-5HVRNM2	50	5	40	60	5	50	50	5	40	10	0.75	6	0.75	0.75	3.5
RAS-6HVRNM2	50	5	40	60	5	50	50	5	40	10	0.75	6	0.75	0.75	3.5
RAS-7HVRNM2	50	10	40	60	10	50	50	10	40	10	0.75	6	0.75	0.75	3.5

**Twin Type**

Term (measure)	ELB (A)			Normal Current of Main Switch (A)			Fuse Capacity of Main Switch (A)			Wiring Capacity (mm <sup>2</sup> )						
	CASE A	CASE B Indoor	CASE B Outdoor	CASE A	CASE B Indoor	CASE B Outdoor	CASE A	CASE B Indoor	CASE B Outdoor	Power Supply			Between O.U. and I.U. Between I.U. and I.U.		Earth Wiring	
										CASE A	CASE B Indoor	CASE B Outdoor	Power Source Cable	Control Cable		Power Source Cable
Model	*1	*2	*3	*4	*5	*6	*7	*8	*9	*10	*11	*12	*14	*15	*16	*17
RAS-3HVRNM2	32	5	32	40	5	40	32	5	32	4	0.75	4	0.75	0.75	0.75	2.0
RAS-4HVRNM2	50	5	40	60	5	50	50	5	40	10	0.75	6	0.75	0.75	0.75	3.5
RAS-5HVRNM2	50	5	40	60	5	50	50	5	40	10	0.75	6	0.75	0.75	0.75	3.5
RAS-6HVRNM2	50	5	40	60	5	50	50	5	40	10	0.75	6	0.75	0.75	0.75	3.5

**Triple Type**

Term (measure)	ELB (A)			Normal Current of Main Switch (A)			Fuse Capacity of Main Switch (A)			Wiring Capacity (mm <sup>2</sup> )						
	CASE A	CASE B Indoor	CASE B Outdoor	CASE A	CASE B Indoor	CASE B Outdoor	CASE A	CASE B Indoor	CASE B Outdoor	Power Supply			Between O.U. and I.U. Between I.U. and I.U.		Earth Wiring	
										CASE A	CASE B Indoor	CASE B Outdoor	Power Source Cable	Control Cable		Power Source Cable
Model	*1	*2	*3	*4	*5	*6	*7	*8	*9	*10	*11	*12	*14	*15	*16	*17
RAS-4HVRNM2	50	5	40	60	5	50	50	5	40	10	0.75	6	0.75	0.75	0.75	3.5
RAS-5HVRNM2	50	5	40	60	5	50	50	5	40	10	0.75	6	0.75	0.75	0.75	3.5
RAS-6HVRNM2	50	5	40	60	5	50	50	5	40	10	0.75	6	0.75	0.75	0.75	3.5

**Quad Type**

Term (measure)	ELB (A)			Normal Current of Main Switch (A)			Fuse Capacity of Main Switch (A)			Wiring Capacity (mm <sup>2</sup> )						
	CASE A	CASE B Indoor	CASE B Outdoor	CASE A	CASE B Indoor	CASE B Outdoor	CASE A	CASE B Indoor	CASE B Outdoor	Power Supply			Between O.U. and I.U. Between I.U. and I.U.		Earth Wiring	
										CASE A	CASE B Indoor	CASE B Outdoor	Power Source Cable	Control Cable		Power Source Cable
Model	*1	*2	*3	*4	*5	*6	*7	*8	*9	*10	*11	*12	*14	*15	*16	*17
RAS-4HVRNM2	50	5	40	60	5	50	50	5	40	10	0.75	6	0.75	0.75	0.75	3.5
RAS-5HVRNM2	50	5	40	60	5	50	50	5	40	10	0.75	6	0.75	0.75	0.75	3.5
RAS-6HVRNM2	50	5	40	60	5	50	50	5	40	10	0.75	6	0.75	0.75	0.75	3.5

ELB: Earth Leakage Breaker  
 I.U.: Indoor Unit  
 O.U.: Outdoor Unit

■ Field Minimum Wire Sizes for Power Source

Model	Power Source	Maximum Current	Power Source Cable Size		Transmitting Cable Size	
			IEC 60335-1 *1	MLFC *2	IEC 60335-1 *1	MLFC *2
RPI-3.0FSN2SQ RPI-4.0FSN2SQ RPI-5.0FSN2SQ RPI-6.0FSN2SQ	240V/1 $\phi$ /50Hz	5A	0.75mm <sup>2</sup>	0.5mm <sup>2</sup>	0.75mm <sup>2</sup>	0.5mm <sup>2</sup>
RPI-7.0FSN2SQ		7A				
RCI-1.0FSN3 RCI-1.5FSN3 RCI-2.0FSN3 RCI-2.5FSN3 RCI-3.0FSN3 RCI-4.0FSN3 RCI-5.0FSN3 RCI-6.0FSN3	220-240V/1 $\phi$ /50Hz 220V/1 $\phi$ /60Hz	5A	0.75mm <sup>2</sup>	0.5mm <sup>2</sup>	0.75mm <sup>2</sup>	0.5mm <sup>2</sup>
RAS-3HVRNM2	220-240V/1 $\phi$ /50Hz 220V/1 $\phi$ /60Hz	23A	4.0mm <sup>2</sup>	2.0mm <sup>2</sup>		
RAS-4HVRNM2 RAS-5HVRNM2 RAS-6HVRNM2 RAS-7HVRNM2		32A	6.0mm <sup>2</sup>	3.5mm <sup>2</sup>		

\* Refer to the NOTES for selection of the power source cable size.

**NOTES:**

- 1) Follow local codes and regulations when selecting field wires.
- 2) The wire sizes marked with \*1 in the table above are selected at the maximum current of the unit according to the European Standard, IEC 60335-1. Use the wires which are not lighter than the ordinary tough rubber sheathed flexible cord (code designation H05RN-F) or ordinary polychloroprene sheathed flexible cord (code designation H05RN-F).
- 3) The wire sizes marked with \*2 in the table are selected at the maximum current of the unit according to the wire, MLFC (Flame Retardant Polyflex Wire) manufactured by Hitachi Cable Ltd., Japan.
- 4) Use a shielded cable for the transmitting circuit and connect it to ground.
- 5) In the case that power cables are connected in series, add each unit maximum current and select wires below.

**Selection According to IEC 60335-1**

Current i (A)	Wire Size (mm <sup>2</sup> )
$i \leq 6$	0.75
$6 < i \leq 10$	1
$10 < i \leq 16$	1.5
$16 < i \leq 25$	2.5
$25 < i \leq 32$	4
$32 < i \leq 40$	6
$40 < i \leq 63$	10
$63 < i$	*3

**Selection According to MLFC (at Cable Temperature of 60°C)**

Current i (A)	Wire Size (mm <sup>2</sup> )
$i \leq 15$	0.5
$15 < i \leq 18$	0.75
$18 < i \leq 24$	1.25
$24 < i \leq 34$	2
$34 < i \leq 47$	3.5
$47 < i \leq 62$	5.5
$62 < i \leq 78$	8
$78 < i \leq 112$	14
$112 < i \leq 147$	22

\*3: In the case that current exceeds 63A, do not connect cables in series.

















**⚠ CAUTION**

**Install a multi-pole main switch with a space of 3.5mm or more between each phase.**

## 8. Setting of Dip Switch

TURN OFF all power source before setting.

Without turning OFF, the switches do not work and the contents of the setting are invalid. Mark of "■" indicates the position of dip switches. Set the dip switches according to the figure below.

DSW1	DSW2	DSW3
Test Operation	Ref. Piping Length / Optional Function Setting	Capacity Setting
 ON 1 2 3 4 OFF Factory Setting	 ON 1 2 3 4 5 6 OFF Factory Setting	 ON 1 2 3 4 5 6 OFF RAS-3HVRNM2
 ON 1 2 3 4 OFF Cooling	 ON 1 2 3 4 5 6 OFF Piping Length ≤ 5m	 ON 1 2 3 4 5 6 OFF RAS-4HVRNM2
 ON 1 2 3 4 OFF Heating	 ON 1 2 3 4 5 6 OFF Piping Length ≥ 30m	 ON 1 2 3 4 5 6 OFF RAS-5HVRNM2
 ON 1 2 3 4 OFF Cooling for Intermediate Season	 ON 1 2 3 4 5 6 OFF Optional Function Setting	 ON 1 2 3 4 5 6 OFF RAS-6HVRNM2
 ON 1 2 3 4 OFF Heating for Intermediate Season	 ON 1 2 3 4 5 6 OFF External Input / Output Setting Mode	 ON 1 2 3 4 5 6 OFF RAS-7HVRNM2
 ON 1 2 3 4 OFF Forced Stop of Compressor		



● **Setting for Transmitting**

It is required to set the outdoor unit Nos., refrigerant cycle Nos. and end terminal resistance for this H-LINK or H-LINK II system.

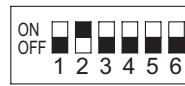
● **Setting of Refrigerant Cycle No.**

In the same refrigerant cycle, set the same refrigerant cycle No. for the outdoor unit and the indoor units as shown below.

As for setting indoor unit refrigerant cycle No., set the RSW2 and DSW5 on the indoor unit PCB.

	Ref. Cycle No. Setting	
	10 digit	1 digit
		 Setting Position Set by inserting slotted screwdriver into the groove.
<b>Outdoor Unit</b>	<b>DSW4</b>	<b>RSW1</b>
<b>Indoor Unit (H-LINK II)</b>	<b>DSW5</b>	<b>RSW2</b>

Ex.: In the Case of Setting Refrigerant Cycle No. 25



Turn ON No. 2 pin.

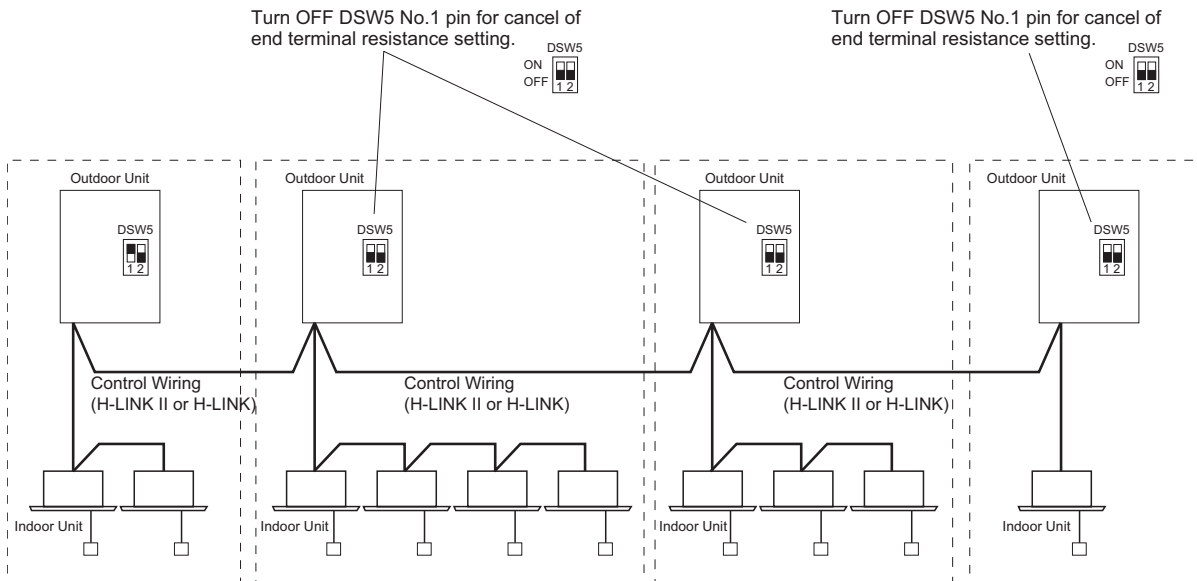
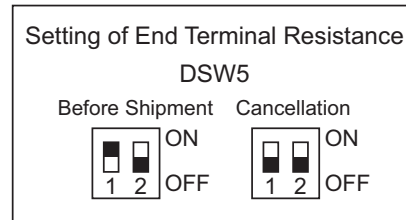


Set Dial No.5.

DSW and RSW setting before shipment is 0. Maximum in setting refrigerant cycle No. is 63.

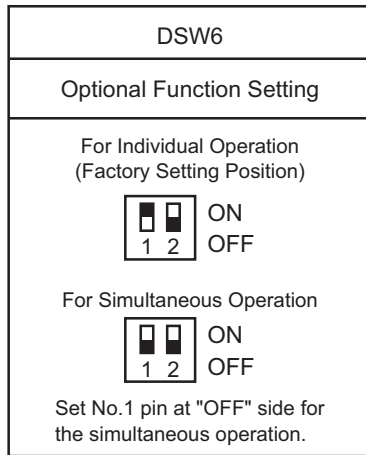
● **Setting of End Terminal Resistance**

Before shipment, No. 1 pin of DSW5 is set at "ON" side. In the case that the outdoor units quantity in the same H-LINK or H-LINK II is 2 or more, set No. 1 pin of DSW5 at "OFF" side from the 2nd refrigerant group outdoor unit. If only one outdoor unit is used, no setting is required.



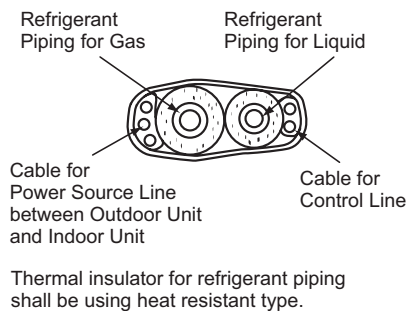
< Setting of Multiple Indoor Units Simultaneous Operation >

Before the outdoor unit is shipped, No. 1 pin of DSW6 is set at "ON" side for the individual operation. If the simultaneous operation is required when installing the multiple indoor units, No. 1 pin of DSW6 is set at "OFF" side.



**NOTICE**

- The electrical wiring connection may differ depending on the indoor unit type, so that should be performed according to "Installation & Maintenance Manual" of the indoor unit.
- In the case of the combination of twin, triple or quad, select "Case B" of the wiring method if the total transition wiring length is more than 75m. Regarding Australia, the wiring method shall be performed "Case B" even if the total transition wiring length is less than 75m.



- Use 2 core cable (equivalent to following cables: VCTF, VCT, CVV, MVVS, VVR or VVF, size: 0.75mm<sup>2</sup> to 1.25mm<sup>2</sup> (manufactured by HITACHI Cable Co. Ltd.)) or 2 core twist pair cable (equivalent to following cables: KPEV or KPEV-S (manufactured by HITACHI Cable Co. Ltd.)) for the control cable between the outdoor unit and the indoor unit.  
The total cable length should be less than 1000m.

- Use 2 core twist pair cable (equivalent to following cables: KPEV or KPEV-S) for the remote control switch cable and the control cable between indoor units. The total cable length should be less than 500m. If the total length of the cable is less than 30m, other cables can be used (the cable size is 0.3mm<sup>2</sup>).
- Earth securely one side of the shielded twist pair cable when using it (equivalent to following cables: MVVS, KPEV-S) for the control cable between the outdoor unit and the indoor unit, and for the control cable between indoor units. (When installing the unit in Australia, earth the both ends of shielded twist pair cable.)
- Attention for Control Wiring Work between Outdoor Unit and Indoor Unit (for Case A and Case B)  
Take the distance more than 5 to 6cm between the control cable and power source cables. Therefore, do not use the coaxial cable. In addition, in the case that the other machinery power source cables and the control cable are installed in parallel, take the distance more than 1.5m between them.  
If not separating the other machinery power source cables and the control cable, separate by running the power source cable through the metal conduit (earth the one side).

**9. Additional Refrigerant Charge**

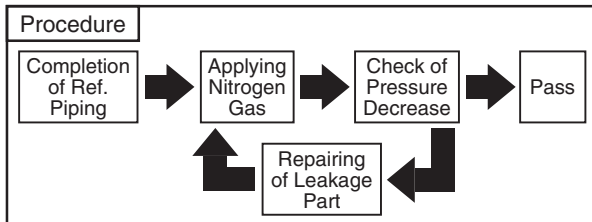
**9.1 Air-Tight Test**

- (1) Check to ensure that the stop valves are closed completely before air-tight test.  
 < Tightening Check of Stop Valves >  
 After connecting the pipe, remove the cap of the stop valve for the gas line and the liquid line. Tighten the open-close spindle in the close direction. The tightening torque for the spindle is shown in the following.

● Tightening Torque of Stop Valves (N-m)

Outdoor Unit	Spindle Valve	
	Gas	Liquid
3HP	9-11	7-9
4-7HP	-	7-9

- (2) Connect the manifold gauge using charging hoses with a vacuum pump or a nitrogen cylinder to the check joints of the liquid line and the gas line stop valves. Perform the air-tight test. Do not open the stop valves. Apply nitrogen gas pressure of 4.15MPa.



- (3) Check for any gas leakage at the flare nut connections or blazed parts by using a foaming agent or gas leak detector.

**NOTICE**

Do NOT use a household detergent as forming agent which the components is not clear.

Recommended Forming Agent	Manufacturer
Güproflex	Yokogawa & CO.,Ltd

- (4) Insulate the gas piping side and the liquid piping side.
- (5) Wrap the insulation at each flare nut connection and wind a tape for insulation.

**⚠ DANGER**

**Be sure to use Nitrogen Gas for air-tight test. If other gases such as oxygen gas, acetylene gas or fluorocarbon gas are accidentally used, it may cause explosion or gas intoxication.**

**9.2 Vacuum Pump and Refrigerant Charge**

- (1) Connect a manifold gauge to the check joints at the both sides.

Continue the vacuum pumping work until the pressure reaches -0.1MPa (-756mmHg) or lower for one to two hours.

After the vacuum pumping work, stop the manifold valve's valve, stop the vacuum pump and leave it for one hour. Check to ensure that the pressure in the manifold gauge does not increase. In addition, tighten securely the cap for the check joint according to the following tightening torque.

Gas Stop Valve: 9.0 to 14.0 N-m

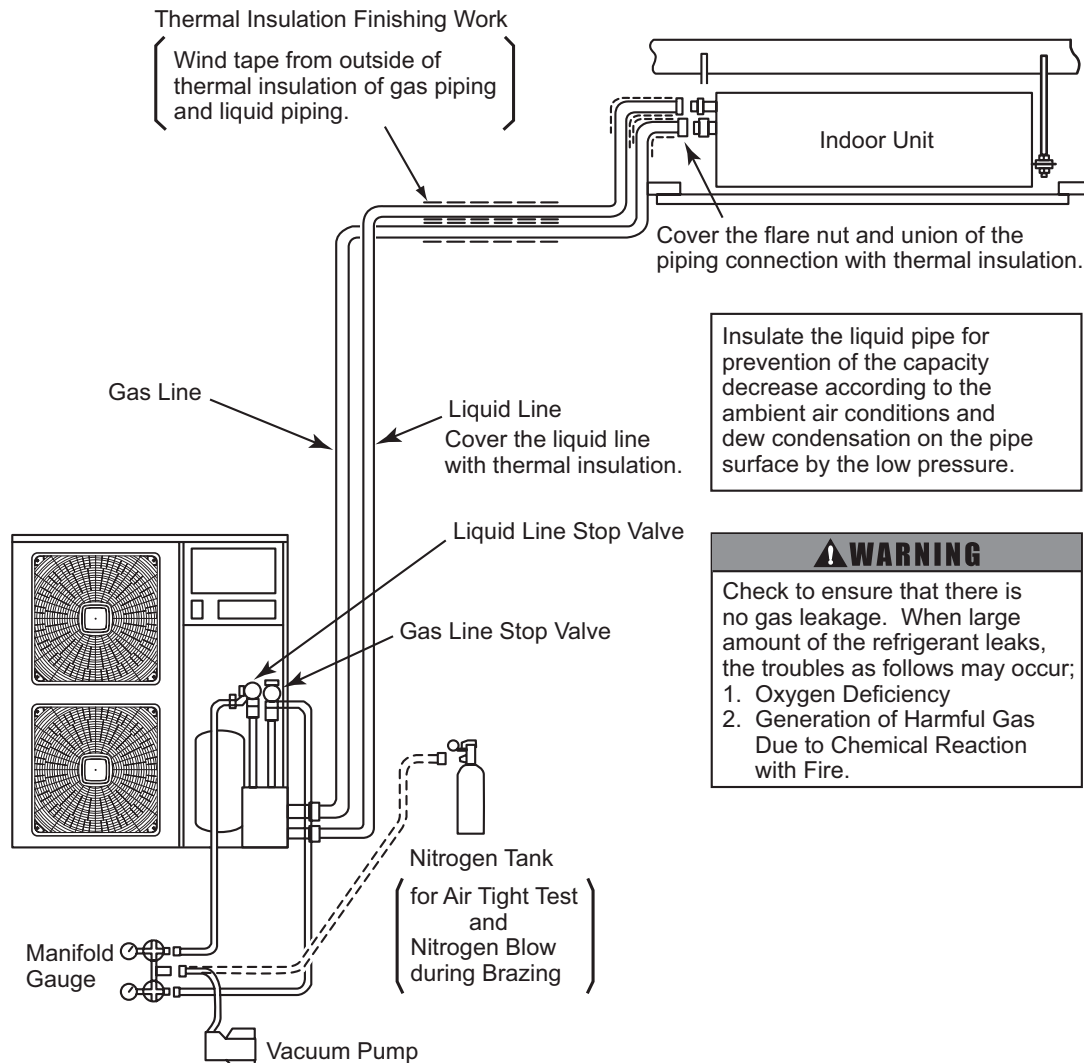
Liquid Stop Valve: 14.0 to 18.0 N-m

**NOTES:**

1. Use tools or measuring instruments exclusive for the refrigerant R410A.
2. If vacuum degree of -0.1MPa (-756mmHg) is not available, it is considered that leakage or moisture exists. Check for any gas leakage once again. If no leakage exists, operate the vacuum pump for one to two hours. If moisture remains inside the piping, it may cause a compressor malfunction.
- (2) This system is not necessary to charge refrigerant less than 30m of the actual piping length. If the total piping length is more than 30m, it is necessary additional refrigerant charge.
- (3) Changing Work  
 After vacuum pumping work, check that the gas stop valve and the liquid stop valve are fully closed. Charge the additional refrigerant (refer to item 9.3) from the check joint of the liquid stop valve (Charging Refrigerant Amount Tolerance: 0.5kg). If the specified refrigerant quantity can not be charged, follow the procedure below.
  - (a) Fully open the stop valve for the gas line.
  - (b) Operate the compressor at the cooling mode and add the refrigerant from the check joint of the liquid stop valve. At this time, the liquid stop valve is slightly opened (Charging Refrigerant Amount Tolerance: 0.5kg).
  - (c) After the refrigerant is charged, fully open the liquid stop valve and the gas stop valve.

## NOTICE

- The gas stayed at the screw part of O-ring is opened and may make sound when removing the cap. However, it is not gas leakage.
- Use a charging hose because the check joint can not be connected to the flare nut.
- Use the specified non-flammable refrigerant (R410A) to the outdoor unit. Do not charge material other than R410A into the unit.



## NOTICE

Do not use refrigerant, which is charged to the outdoor unit once, to the air purge. It may cause malfunction by the insufficient refrigerant.

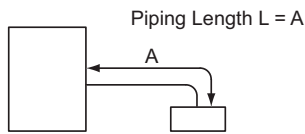
**9.3 Refrigerant Charging Quantity**

Although the refrigerant has been charged into this unit, the additional charge is required according to the piping length. In the case of the actual piping length is more than 30m, determine the additional refrigerant quantity according to the following procedure, and charge it into the system. Record the additional refrigerant quantity to facilitate maintenance and servicing activities thereafter.

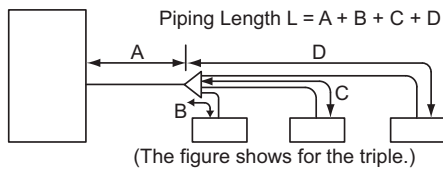
< Calculating Method of Additional Refrigerant Charge >

Calculate the piping length L (m).

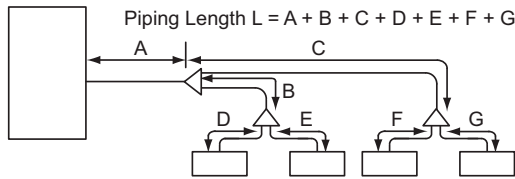
< For Single Type >



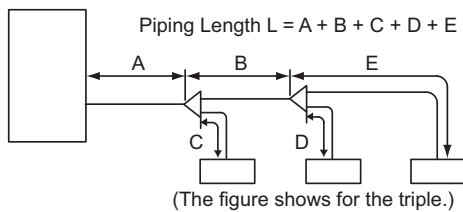
< For Twin and Triple Type >



< For Quad Type >



< For Line Branch >



- Calculate the additional refrigerant charge quantity according to the table below.

Outdoor Unit	Ref. Charging Quantity Before Shipment	Chargeless Length (m) : ℓ	Correction Value of Additional Ref. Amount P	Max. Additional Ref. Charge Quantity (kg)
3HP	2.3	30	0.04	1.2
4HP	4.1		0.06	3.9
5HP	4.2		0.06	3.9
6HP	4.2		0.06	3.9
7HP	5.0		0.06	2.7

**NOTE:**

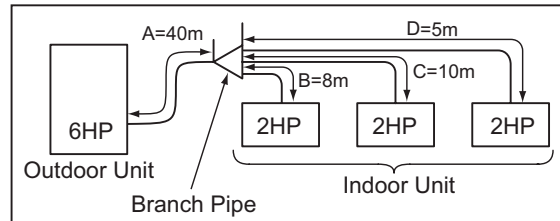
Some refrigerant charge calculations differ when installing Wall Type with the expansion valve kit. Refer the calculation to "Installation & Maintenance Manual" of the indoor unit.

- (a) The additional refrigerant charge is NOT required in the case that the chargeless length is within 30m ( $L \leq 30m$ ).
- (b) The additional refrigerant charge is required in the case that the chargeless length is more than 30m ( $L > 30m$ ). Calculate the additional refrigerant charge quantity as follow.

$$W \text{ (Additional Ref. Charge Quantity)} = (L - \ell) \times P$$

- L: Piping Length
- ℓ: Chargeless Length (Refer to the table above.)
- P: Correction Value of Additional Ref. Amount (Refer to the table above.)

< EXAMPLE for 6HP and Triple >



$$\begin{aligned} \text{Piping Length } L &= A + B + C + D \\ &= 40 + 8 + 10 + 5 = 63 \end{aligned}$$

Chargeless Length ℓ: 30  
Correction Value of Additional Ref. Amount P: 0.06

Additional Charge Quantity W:

$$\begin{aligned} W &= (L - \ell) \times P \\ &= (63 - 30) \times 0.06 \\ &= 1.98 \text{ (kg)} \end{aligned}$$

**NOTE:**

Ensure that the additional charge quantity should not be exceeded the maximum additional refrigerant charge quantity.



● Dip Switch Setting

The dip switch of DSW2 is required according to the piping length as shown below.

DSW2		
Before Shipment	Piping Length ≤ 5m	Piping Length ≥ 30m

\* Mark of "■" in the above indicates the position of dip switches.  
 \* No.3 to 6 pins are for the other functions.

**CAUTION**

Turn OFF all the power supply of the outdoor unit and indoor unit before Dip Switch setting. If not, the setting is invalid.

● The DC INVERTER UTOPIA is used the refrigerant R410A.

- (1) It is prohibited to emit fluorocarbons to the atmosphere without permission.
- (2) The refrigerant must be collected when disposed or some refrigerant cycle component replaced of the unit.
- (3) The variety and the quantity of refrigerant are mentioned in the specification and the refrigerant label (Caution Label). After the refrigerant charge work is completed, record the total refrigerant quantity\*.

\*Total Refrigerant Quantity =  
 Refrigerant Charge Quantity Before Shipment + Additional Refrigerant Charge Quantity at Field

**NOTICE**

- At the test run, fully open the spindle. If not fully opened, the devices will be damaged.
- An excess or a shortage of refrigerant is the main cause of trouble to the units. Charge the correct refrigerant quantity according to the description of label at the inside of the service cover.

**WARNING**

● Check for refrigerant leakage in detail. If a large refrigerant leakage occurs, it will cause difficulty with breathing or harmful gases would occur if fire was being used in the room.

● Maximum Permissible Concentration of HFC GAS R410A

(1) The refrigerant R410A is an incombustible and non-toxic gas.

However, if leakage occurs and gas fills a room, it may cause suffocation.

The maximum permissible concentration of HFC gas, R410A in air is 0.3 kg/m<sup>3</sup>, according to the refrigeration and air conditioning facility standard (KHK S 0010) by the KHK (High Pressure Gas Protection Association) Japan. Therefore, some effective measure must be taken to lower the R410A concentration in air below 0.3 kg/m<sup>3</sup> in case of leakage. As for R410A, this consideration is applied similarly.

(2) Calculation of Refrigerant Concentration

(A) Calculate the total quantity of refrigerant R (kg) charged in the system connecting all the indoor units of objective rooms.

(B) Calculate the room space where this unit is to be installed V (m<sup>3</sup>) of each objective room.

(C) Calculate the refrigerant concentration C (kg/m<sup>3</sup>) of the room according to the following equation.

$$\frac{R: \text{Total Quantity of Charged Refrigerant (kg)}}{V: \text{Room Space Where This Unit Is to Be Installed (m}^3\text{)}} = C: \text{Refrigerant Concentration} \leq 0.3 \text{ (kg/m}^3\text{)}$$

If local codes or regulations are specified, follow them.

<Example>

British Standard BS4434 1989  
 Commercial Office  
 Building Class D Occupancy  
 C = 0.17 (kg/m<sup>3</sup>)

**10. Test Run**

10.1 Before Test Run

**! WARNING**

**An electrical shock will occur by residual voltage.**

- **Disconnect the power source completely before starting the maintenance for electrical parts.**
- **Check to ensure that no residual voltage is existed after disconnecting the power source.**

**NOTICE**

- The unit can not be operated in the reversed phase of the power source.  
When connecting the reversed phase of the power source, the alarm code "05" will be indicated. Reconnect the phases correctly.
- Do not operate the system until all the check points have been cleared.
  - (A) Check to ensure that the electrical resistance (Insulation Resistance) is more than 1 megohm, by measuring the resistance between ground and the terminal of the electrical parts. If not, do not operate the system until the electrical leakage is found and repaired according to the "About Insulation Resistance".
  - (B) Check to ensure that the stop valves of the outdoor unit are fully opened, and then start the system.
  - (C) When the power source line is disconnected, the unit is not operated. Check to ensure the power source and the power-supply facility.
  - (D) Check to ensure that the power source has been turned ON for more than 12 hours, to warm the compressor oil by the crankcase heater. If not, the unit can not be operated for maximum 4 hours.
  - (E) Check the following working range.

	Cooling Operation	Heating Operation
I.U. Suction Air Temperature	≥ 15 °C WB	≤ 27 °C DB
O.U. Suction Air Temperature	≥ -5 °C DB	≤ 15 °C WB

\*DB: Dry Bulb, WB: Wet Bulb

- (F) Connect a manifold gauge in order to measure the pressure from the check joint according to item 6.3 "(4) Pressure Measurement by Check Joint".

- Pay attention to the following items while the system is running.
  - (A) Do not touch any of the parts by hand at the discharge gas side, since the compressor chamber and the pipes at the discharge side are heated higher than 90°C.
  - (B) **DO NOT PUSH THE BUTTON OF THE MAGNETIC SWITCH(ES).** It will cause a serious accident.
- Do not touch any electrical components for more than three minutes after turning OFF the main switch.

< About Insulation Resistance >

Check to ensure that the insulation resistance is more than 1 megohm by measuring the resistance between ground and the terminal of the electrical parts by a megohm meter.

- (1) If the total unit insulation resistance is lower than 1 megohm, the compressor insulation resistance may be low due to retained refrigerant in the compressor. This may occur if the unit has not been used for long periods. If the insulation resistance of the unit is lower than 1 megohm or the earth leakage breaker is activated, check following items.

Checking Detail:

- (A) Disconnect the cables for the compressor and measure the insulation resistance of the compressor itself. If the resistance value is over 1 megohm, the insulation failure has occurred at other electrical parts.
- (B) If the insulation resistance is lower than 1 megohm, disconnect the compressor cable from the inverter PCB. Then, turn on the main power to apply current to the crankcase heater. After applying current for more than 3 hours, measure the insulation resistance again. If the insulation resistance is more than 1 megohm, there is no problem to the compressor and reconnect the cables for compressor. If not, it is considered the compressor failure. (Depending the air conditions, pipe length or refrigerant conditions, it may be necessary to apply the current for a longer period of time.)

**NOTE:**

When reconnecting the cables to the compressor, pinch the crimp terminal with long-nose pliers to ensure that it is securely fastened.

- (2) Check the recommended size of the ELB shown in Table 7.1 and 7.2.  
Select high-sensitive high speed ELB when the rated sensitive current is less than 30 mA. (The motion time should be within 0.1 second.)

Table 10.1 Test Run and Maintenance Record

MODEL:	SERIAL No.	COMPRESSOR MFG. No.																																																			
CUSTOMER'S NAME AND ADDRESS:		DATE:																																																			
<p>1. Is the rotation direction of the indoor coil fan correct? <input style="float: right;" type="checkbox"/></p> <p>2. Is the rotation direction of the outdoor coil fan correct? <input style="float: right;" type="checkbox"/></p> <p>3. Are there any abnormal compressor sounds? <input style="float: right;" type="checkbox"/></p> <p>4. Has the unit been operated at least twenty (20) minutes? <input style="float: right;" type="checkbox"/></p> <p>5. Check Room Temperature</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Inlet:</td> <td style="width: 15%; border-bottom: 1px solid black;">No. 1 DB</td> <td style="width: 15%; border-bottom: 1px solid black;">/WB</td> <td style="width: 15%; border-bottom: 1px solid black;">°C<sub>i</sub></td> <td style="width: 15%; border-bottom: 1px solid black;">No. 2 DB</td> <td style="width: 15%; border-bottom: 1px solid black;">/WB</td> <td style="width: 15%; border-bottom: 1px solid black;">°C<sub>i</sub></td> </tr> <tr> <td>Outlet:</td> <td style="border-bottom: 1px solid black;">DB</td> <td style="border-bottom: 1px solid black;">/WB</td> <td style="border-bottom: 1px solid black;">°C<sub>i</sub></td> <td style="border-bottom: 1px solid black;">DB</td> <td style="border-bottom: 1px solid black;">/WB</td> <td style="border-bottom: 1px solid black;">°C<sub>i</sub></td> </tr> </table> <p>6. Check Outdoor Ambient Temperature</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Inlet:</td> <td style="width: 15%; border-bottom: 1px solid black;">DB</td> <td style="width: 15%; border-bottom: 1px solid black;">°C<sub>i</sub></td> <td style="width: 15%; border-bottom: 1px solid black;">WB</td> <td style="width: 15%; border-bottom: 1px solid black;">°C</td> </tr> <tr> <td>Outlet:</td> <td style="border-bottom: 1px solid black;">DB</td> <td style="border-bottom: 1px solid black;">°C<sub>i</sub></td> <td style="border-bottom: 1px solid black;">WB</td> <td style="border-bottom: 1px solid black;">°C</td> </tr> </table> <p>7. Check Refrigerant Temperature</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">Liquid Temperature:</td> <td style="border-bottom: 1px solid black;">_____</td> <td style="width: 5%;">°C</td> </tr> <tr> <td>Discharge Gas Temperature:</td> <td style="border-bottom: 1px solid black;">_____</td> <td>°C</td> </tr> </table> <p>8. Check Pressure</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">Discharge Pressure:</td> <td style="border-bottom: 1px solid black;">_____</td> <td style="width: 5%;">MPa</td> </tr> <tr> <td>Suction Pressure:</td> <td style="border-bottom: 1px solid black;">_____</td> <td>MPa</td> </tr> </table> <p>9. Check Voltage</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">Rated Voltage:</td> <td style="border-bottom: 1px solid black;">_____</td> <td style="width: 5%;">V</td> </tr> <tr> <td>Operating Voltage:</td> <td style="border-bottom: 1px solid black;">L<sub>1</sub>-N or L<sub>1</sub>-L<sub>2</sub></td> <td>V<sub>i</sub></td> </tr> <tr> <td>Starting Voltage:</td> <td style="border-bottom: 1px solid black;">_____</td> <td>V</td> </tr> </table> <p>10. Check Compressor Input Running Current</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">Input:</td> <td style="border-bottom: 1px solid black;">_____</td> <td style="width: 5%;">kW</td> </tr> <tr> <td>Running Current:</td> <td style="border-bottom: 1px solid black;">_____</td> <td>A</td> </tr> </table> <p>11. Is the refrigerant charge adequate? <input style="float: right;" type="checkbox"/></p> <p>12. Do the operation control devices operate correctly? <input style="float: right;" type="checkbox"/></p> <p>13. Do the safety devices operate correctly? <input style="float: right;" type="checkbox"/></p> <p>14. Has the unit been checked for refrigerant leakage? <input style="float: right;" type="checkbox"/></p> <p>15. Is the unit clean inside and outside? <input style="float: right;" type="checkbox"/></p> <p>16. Are all cabinet panels fixed? <input style="float: right;" type="checkbox"/></p> <p>17. Are all cabinet panels free from rattles? <input style="float: right;" type="checkbox"/></p> <p>18. Is the filter clean? <input style="float: right;" type="checkbox"/></p> <p>19. Is the heat exchanger clean? <input style="float: right;" type="checkbox"/></p> <p>20. Are the stop valves open? <input style="float: right;" type="checkbox"/></p> <p>21. Does the drain water flow smoothly from the drain pipe? <input style="float: right;" type="checkbox"/></p>			Inlet:	No. 1 DB	/WB	°C <sub>i</sub>	No. 2 DB	/WB	°C <sub>i</sub>	Outlet:	DB	/WB	°C <sub>i</sub>	DB	/WB	°C <sub>i</sub>	Inlet:	DB	°C <sub>i</sub>	WB	°C	Outlet:	DB	°C <sub>i</sub>	WB	°C	Liquid Temperature:	_____	°C	Discharge Gas Temperature:	_____	°C	Discharge Pressure:	_____	MPa	Suction Pressure:	_____	MPa	Rated Voltage:	_____	V	Operating Voltage:	L <sub>1</sub> -N or L <sub>1</sub> -L <sub>2</sub>	V <sub>i</sub>	Starting Voltage:	_____	V	Input:	_____	kW	Running Current:	_____	A
Inlet:	No. 1 DB	/WB	°C <sub>i</sub>	No. 2 DB	/WB	°C <sub>i</sub>																																															
Outlet:	DB	/WB	°C <sub>i</sub>	DB	/WB	°C <sub>i</sub>																																															
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Starting Voltage:	_____	V																																																			
Input:	_____	kW																																																			
Running Current:	_____	A																																																			

**10.2 Test Run**

This test run method is for the wired remote control switch (Model: PC-ARF.) The details for the operating PC-ARF should be referred to "Installation & Maintenance Manual" of itself (attached with PC-ARF.)

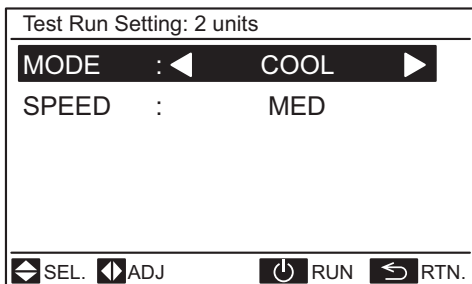
- (1) Check to ensure that stop valves (gas and liquid) of the outdoor unit are fully opened. (In the case of combined outdoor units, check to ensure that all stop valves of the outdoor units are fully opened.)
- (2) Perform the test run of indoor units one by one sequentially, and then check the accordance of the refrigerant piping system and the electrical wiring system. (If the multiple indoor units are operated simultaneously, the system can not be inspected the system accordance.)
- (3) Perform the test run according to the following procedure. Ensure that the unit is operated without any problem.

**NOTE:**

In the case that 2 remote control switches (main and sub) are installed to the system, perform the test run from the main remote control switch.

- (a) Press and hold "☰" (menu) and "↵" (return) simultaneously for at least 3 seconds. The test run menu will be displayed.
  - When using other remote control switches (PC-AR, PC-LH3A or PC-ARH, etc.), perform the test run according to the attached Installation & Maintenance Manual of each.
- (b) Select "Test Run" by pressing "△▽" and press "OK". The test run screen will be displayed.

Test Run Screen



- The total number of indoor units connected is indicated on the LCD (Liquid crystal display). The case of the twin combination (one (1) set with two (2) indoor units) is indicated "2 units", and the triple combination (one (1) set with three (3) indoor units) is indicated "3 units".

**NOTE:**

When "00 unit" is indicated, the auto-address function may be performing. Cancel "Test Run" mode and set it again.

- If the indicated number is not equal to the actual connected number of indoor units, the auto-address function is not performed correctly due to incorrect wiring, the electric noise, etc.

Turn OFF the power supply, and correct the wiring after checking the following points (Do not repeat turning ON and OFF within 10 seconds.)

- \* The power supply for the indoor unit is NOT turned ON or the incorrect wiring.
- \* Loose Connection between Indoor Units or Remote Control Switch
- \* Incorrect Setting of Indoor Unit Address (The indoor unit address is overlapped.)

(c) Start Test Run.

- Press "⏻" (run/stop). The test run operation will be started. The operation mode, the air flow volume, the air flow direction and the test run time are available to set at the test run screen. Select the item by pressing "△▽" and set the detail by pressing "◀▶".

The default setting of the test run time is set 2-hour OFF timer.

- Check the temperature conditions. The unit operation can not be performed if the conditions are out of range. Refer the working range to item 10.1 (E). < Example >

The cooling operation is not operated if the outdoor temperature is less than -5 °C DB.

- (d) Press "△" or "▽", select "LOUV." and select "🌀" (auto swing) by pressing "◀" or "▶". The auto swing operation will be started. Check the operating sound at the louvers. If abnormal sound is generated from louvers, it may be a deformation of the air panel due to incorrect installing. In this case, install the air panel again without a deformation. If abnormal sound is not generated, press "◀" or "▶" again to stop the auto swing operation.

- (e) The temperature detections by the thermistors are invalid though the protection devices are valid during the test run. If an alarm occurs, refer to Table 10.2, Alarm Code and perform for troubleshooting. Then perform the test run again.

- (f) According to the label "Checking Method by 7-Segment Display" attached to the rear side of the service cover of the outdoor unit, check the temperature, the pressure and the operation frequency of specified portions, and check the connected indoor unit numbers by 7-segment displays.
- (g) To finish the test run, wait for 2 hours (as default setting) or press "⏻" (run / stop) switch again.
- Flashing the operation lamp for 2 seconds ON and 2 seconds OFF is for abnormality of the transmitting between the indoor unit and the remote control switch (loosening or disconnecting connector, disconnecting wires, or incorrect wiring etc.)
  - Small sound may be heard from the outdoor unit after turning ON the power source because the electrical expansion valve is activated to adjust the opening. Therefore, there is no abnormality of the unit.
  - Sound may be heard from the outdoor unit for seconds after running or stopping the compressor, starting or finishing the defrosting, etc. It generates because of the pressure difference inside the piping from the compressor. Therefore, there is no abnormality of the unit.
- (4) In the case of the twin, triple and quad combination, check the air outlet temperature of each indoor unit. If there is the large different air flow temperature between each units (cooling: approx. more than 10deg, heating: approx. more than 20deg.), it may be the failure of the refrigerant piping work. Thus, recheck the refrigerant piping.

 **WARNING**

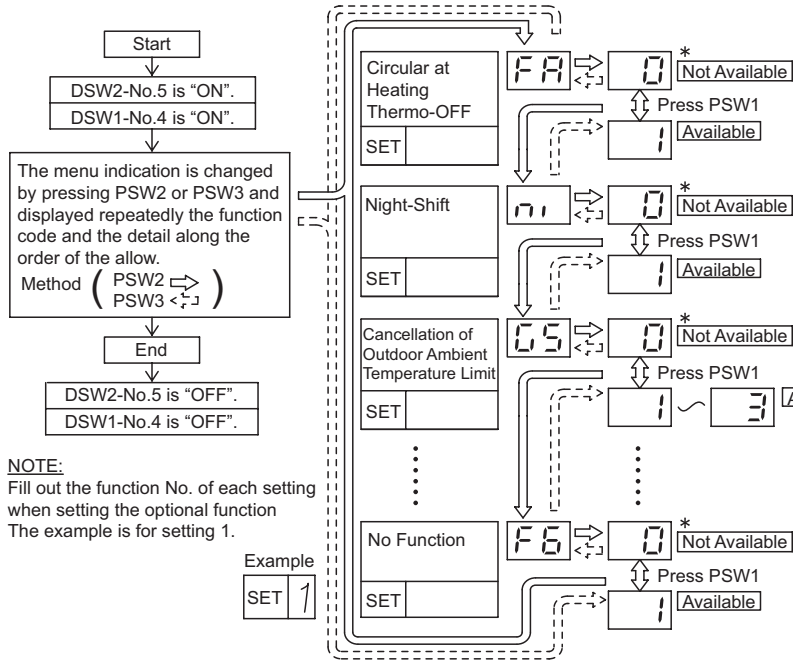
**Do NOT operate the air conditioners to check the electrical wiring, etc until the preparation of the test run is completed.**

---

**10.3 Optional Function Setting**

< Function Setting Method >

The function setting should be performed during the outdoor unit stoppage.  
This setting is not available during External Input / Output Setting.



\* The setting before shipment is "0" (Not Available).

**NOTE:**  
Fill out the function No. of each setting when setting the optional function  
The example is for setting 1.

Example  
SET 1

**⚠ WARNING**  
When controlling the switch on PCB, pay attention not touch to other electrical parts. It will cause an electrical shock.

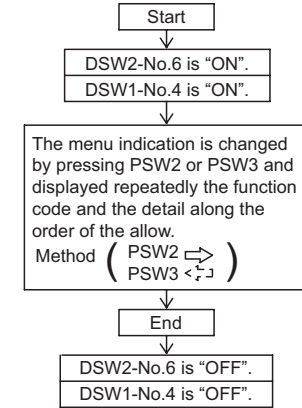
No.	7-Segment Display		Setting Item	
	SEG2	SEG1		
1	FA	1	Circular at Heating Thermo-OFF	
2	n1	1	Night-Shift	
3	05	1	Cancellation of Outdoor Ambient Temperature Limit For heating	
		2		For cooling
		3		For cooling / heating
4	do	1	No Function	
5	bu	1	SLo (Fan Speed) Defrost Setting	
6	Hf	1	No Function	
7	nu	1	Capacity Adjustment for Long Piping	
8	Hc	1	Compressor Frequency Control Target Value for Cooling	
9	Hh	1	Compressor Frequency Control Target Value for Heating	
10	sc	1	No Function	
11	s1	1	Indoor Expansion Valve Opening Change for Stoppage Indoor Unit in Heating Mode 1	
		2	Indoor Expansion Valve Opening Change for Stoppage Indoor Unit in Heating Mode 2	
12	so	1	Indoor Expansion Valve Opening Change for Thermo-OFF Indoor Unit in Heating Mode 1	
		2	Indoor Expansion Valve Opening Change for Thermo-OFF Indoor Unit in Heating Mode 2	

No.	7-Segment Display		Setting Item
	SEG2	SEG1	
13	c1	1	Indoor Expansion Valve Initial Opening of Indoor Unit in Heating Mode 1
		2	Indoor Expansion Valve Initial Opening of Indoor Unit in Heating Mode 2
14	db	1	Low Noise Setting
15	de	1	Demand Function Setting
16	ue	1	Wave Function Setting
17	fb	1	Cold Draft Protection 1
		2	Cold Draft Protection 2
18	e1	1	Cancellation of Hot Gas Bypass Control
19	ds	1	Forcibly Stoppage after Defrost Operation
20	f1	1	Defrost Control in Demand Mode
21	f2	1	No Function
22	f3	1	No Function
23	f4	1	No Function
24	f5	1	No Function
25	f6	1	No Function

**NOTE:**  
When setting the compressor frequency control target (No.8 or 9), the operation noise may be increased 3 to 5dB.

< External Input / Output Setting Method >

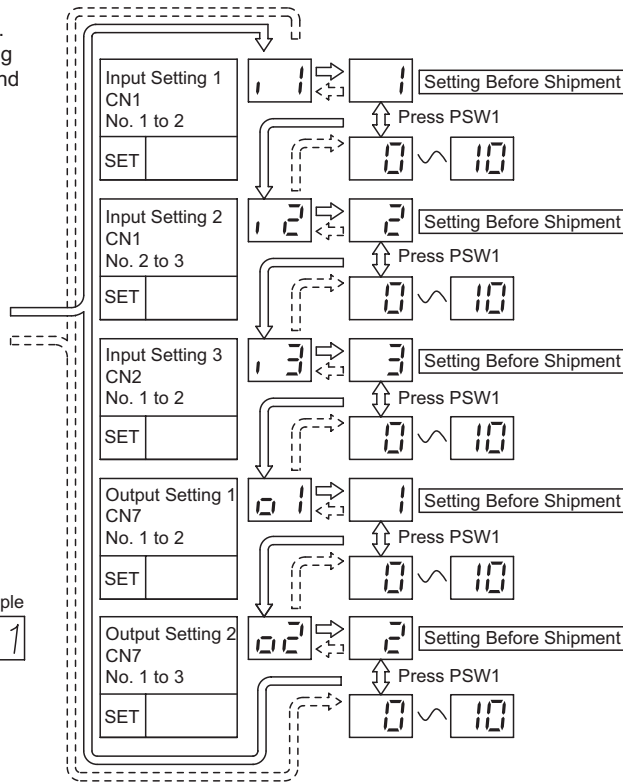
The setting should be performed during the outdoor unit stoppage. This setting is not available during the operation, the check mode and the function setting.



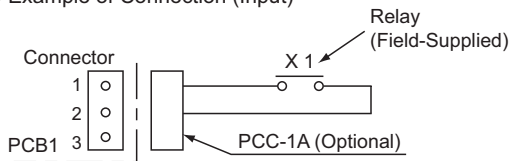
NOTES:

- Fill out the function No. of each setting when setting the optional function. The example is for setting 1. 

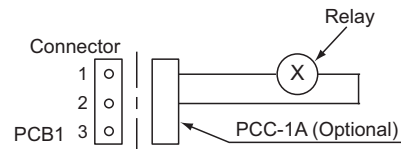
SET	1
-----	---
- The same function can not be set to a different input terminal. If set, the setting of the larger input No. is not available.



● Example of Connection (Input)



● Example of Connection (Output)



● Specifications of Relay

Specifications	Remarks
Mini-Power Relay MY1F (or 2F) made by OMRON Co.	220V / 240V

● Specifications of Relay

Specifications
Mini-Power Relay LY2F DC12V made by OMRON Co.

SEG1	Input	Output
0	No Setting	No Setting
1	Fix Heating Mode	Operation Signal
2	Fix Cooling Mode	Alarm Signal
3	Demand Stoppage *1)	Compressor ON Signal
4	-	Defrost Signal
5	Forcedly Stoppage *1)	-
6	Demand Current Control 60%	-
7	Demand Current Stoppage 70%	-
8	Demand Current Stoppage 80%	-
9	Demand Current Stoppage 100%	-
10	No Setting	-

**⚠ WARNING**

When controlling the switch on PCB, pay attention not touch to other electrical parts. It will cause an electrical shock.

NOTE:

In the case of applying the DRED function, a connector CN2 is not available for input setting.

\*1): In the case of selecting "Demand Stoppage" or "Forcedly Stoppage", set the function setting "F I" to "I".

Table 10.2 Alarm Code

Code	Category	Content of Abnormality	Leading Cause
01	Indoor Unit	Activation of Protection Device (Float Switch)	Activation of Float Switch (High Water Level in Drain Pan, Abnormality of Drain Pipe, Float Switch or Drain Pan)
02	Outdoor Unit	Activation of Protection Device (High Pressure Cut)	Activation of PSH (Pipe Clogging, Excessive Refrigerant, Inert Gas Mixing, Fan Motor Locking at Cooling Operation)
03	Transmission	Abnormality between Indoor and Outdoor	Incorrect Wiring, Loose Terminals, Disconnect Wire, Blowout of Fuse, Outdoor Unit Power OFF
04		Abnormality between Inverter PCB and Outdoor PCB	Inverter PCB - Outdoor PCB Transmission Failure (Loose Connector, Wire Breaking, Blowout of Fuse)
05	Supply Phase	Abnormality of Power Source Phases	Reverse Phase due to Incorrect Wiring
06	Voltage	Abnormal Inverter Voltage	Outdoor Voltage Drop, Insufficient Power Capacity
07	Cycle	Decrease in Discharge Gas Superheat	Excessive Refrigerant Charge, Failure of Thermistor, Incorrect Wiring, Incorrect Piping Connection, Expansion Valve Locking at Opened Position (Disconnect Connector)
08		Excessively High Discharge Gas Temperature at Top of Compressor Chamber	Shortage of Refrigerant, Leaking, Pipe Clogging
11	Sensor on Indoor Unit	Inlet Air Thermistor	Incorrect Wiring, Disconnecting Wiring, Breaking Wire, Short Circuit
12		Outlet Air Thermistor	
13		Freeze Protection Thermistor	
14		Gas Piping Thermistor	
19	Fan Motor	Activation of Protection Device for Indoor Fan Motor	Fan Motor Overheat, Locking (49FE) (130°C OFF)
20	Sensor on Outdoor Unit	Compressor Thermistor	Incorrect Wiring, Disconnecting Wiring, Breaking Wire, Short Circuit
21		High Pressure Sensor	
22		Outdoor Air Thermistor	
24		Piping Thermistor	Incorrect Wiring, Disconnecting Wiring, Breaking Wire, Short Circuit, Fan Motor Locking at Heating Operation
31	System	Incorrect Capacity Setting of Outdoor Unit and Indoor Unit	Incorrect Capacity Code Setting of Combination Excessive or Insufficient Indoor Unit Total Capacity Code
35		Incorrect Setting of Indoor Unit No.	Duplication of Indoor Unit No. in same Ref. Group, The number of the indoor unit is out of range.
38		Abnormality of Picking up Circuit for Protection in Outdoor Unit	Failure of Protection Detecting Device (Incorrect Wiring of Outdoor PCB)
45	Protection Device	Activation of High Pressure Increase Protection Device	Overload Operation (Clogging, Short-Pass), Pipe Clogging, Excessive Refrigerant, Inert Gas Mixing
47		Activation of Low Pressure Decrease Protection Device (Vacuum Operation Protection)	Insufficient Refrigerant, Refrigerant Piping, Clogging, Expansion Valve Locking at Open Position (Loose Connector), O.U. Fan Motor Locking at Heating Operation
48		Activation of Overcurrent Protection	Excessive Refrigerant, Heat Exchanger Clogging, Increasing Pressure by Abnormality of Cycle Portions, Abnormality of Compressor (Overload, Locking, Overcurrent)
51	Inverter	Abnormality of Current Sensor for Inverter	Overload Operation (Heat Exchanger Clogging)
53		Activation of Transistor Module Protection Device	Abnormality of Inverter (Overload, Overcurrent, Abnormality of Rotation, Activation Failure), Compressor Failure
54		Abnormality of Inverter Fin Temperature	Abnormal Fin Thermistor Failure, Heat Exchanger Clogging, Fan Motor Failure
55		Inverter Failure	Inverter PCB Failure
57	Outdoor Fan	Abnormality of Fan Motor	Disconnecting Transition Wiring for Fan Motor, Abnormality of Fan Motor or Terminal for Inverter, Incorrect Wiring
b1	Outdoor Unit No. Setting	Incorrect Setting of Unit and Refrigerant Cycle No.	Over 64 number is set for address or refrigerant Cycle.
EE	Compressor	Compressor Protection Alarm	This alarm code appears when the following alarms* occurs three times within 6 hours. *02, 07, 08, 47



## 11. Safety and Control Device Setting

● Compressor Protection

High Pressure Switch: This switch cuts out the operation of the compressor when the discharge pressure exceeds the setting.

● Fan Motor Protection

When the thermistor temperature is reached to the setting, motor output is decreased. The other way, when the temperature becomes lower, limitation is cancelled.

Model			RAS-3HVRNM2	RAS-4HVRNM2	RAS-5HVRNM2	RAS-6HVRNM2	RAS-7HVRNM2
For Compressor			Automatic Reset, Non-Adjustable				
Pressure Switch			(each one for each compressor)				
High	Cut-Out	MPa	4.15 <sup>-0.05</sup> <sub>-0.15</sub>	4.15 <sup>-0.05</sup> <sub>-0.15</sub>	4.15 <sup>-0.05</sup> <sub>-0.15</sub>	4.15 <sup>-0.05</sup> <sub>-0.15</sub>	4.15 <sup>-0.05</sup> <sub>-0.15</sub>
	Cut-In	MPa	3.20±0.15	3.20±0.15	3.20±0.15	3.20±0.15	3.20±0.15
Low	Cut-Out	MPa	0.30±0.05	0.30±0.05	0.30±0.05	0.30±0.05	0.30±0.05
	Cut-In	MPa	0.20±0.03	0.20±0.03	0.20±0.03	0.20±0.03	0.20±0.03
Fuse							
1φ, 220/240V, 50Hz							
1φ, 220V, 60Hz	A		40	50	50	50	50
CCP Timer			Non-Adjustable				
Setting Time	min.		3	3	3	3	3
For Condenser Fan Motor			Automatic Reset, Non-Adjustable				
Internal Thermostat			(each one for each motor)				
For Control Circuit							
Fuse Capacity on PCB	A		5	5	5	5	5

All the installation work of the air conditioning is completed.  
 Deliver and describe to keep this "Installation & Maintenance Manual" to a user.

