HITACHI

Before installation, please read this manual carefully and keep it properly.

Hitachi
Split Unit Inverter Air Conditioner
Outdoor Unit

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Installation Manual

This unit contains refrigerant inside. The quantity of refrigerant is adequate for pipes up to 30m long. If longer pipes are needed, add refrigerant onsite as necessary. As the quantity of refrigerant varies due to pipe length and model differences, please refer to the piping instructions for details.

Applicable models			
RAM-112FPSQB	**RAM-125FPSQB**	**RAM-140FPSQB**	**RAM-160FPSQB**

■ Make sure to hand over this manual to workers of the next stage and finally to the customer.
(Transportation and Handling) → (Ref. Piping Work) → (Electrical Wiring) → (Test Run) → (Customer)

Introduction

- This product is a general air-conditioner. Do not use for special purposes, such as food, animal and plant, precision machinery, and artwork storage.
- Do not install at the following locations:
  - ○ Locations where there is flammable gas and airborne grease. There is a risk of fire and machine deformation, erosion, and damage.
  - ○ Locations containing airborne grease (including grease from engine oil) and flammable gases.
  - ○ Locations containing sulfur gas, such as hot springs.
- Do not install at the following locations to prevent erosion:
  - ○ Coastal areas and locations with higher salinity.
  - ○ Locations with high acidity or alkalinity.
- When installing at locations where medical instruments may generate electromagnetic wave, avoid causing malfunction of the air-conditioner.
  - ○ To prevent electromagnetic interference (EMI), do not point the electromagnetic wave emitting surface of medical instruments toward the electrical control panel, remote controller, and remote controller cable of the air-conditioner.
  - ○ To avoid EMI in the air, keep machinery generating electromagnetic wave, such as radios, at least 3 meters away from the air-conditioner.
- Do not place plants or animals directly under the airflow, as it is bad for them.
- As light will affect signal receiving of the remote control, keep the signal receiver at least one meter away from lights to ensure signal receiving of the wireless remote control.

Temperature Ranges of Use

Condition / Function	Indoor Unit Air Temperature	Outdoor Unit Air Temperature
Air-conditioning	-5ºC DB to 43ºC DB	21ºC DB /15ºC WB to 32ºC DB /23ºC WB

DB: Dry-bulb temperature/WB: Wet-bulb temperature

—Contents—

66MP1388

1. Safety Precautions

- Before installation, carefully read the "Safety Precautions" for correct installation.
- Pay special attention to "⚠Warning" signs. Failure to follow these warning signs during installation (incorrect installation) may cause severe injury. They are thus extremely important and must be strictly followed.
- When Test run the unit after installation to verify if there is any abnormality, please follow the instructions in the manual and explain to customers the uses and maintenance of the unit. Lastly, hand over both the installation and user manuals to the customer.

[Signs and Meanings]

⚠Warning: Incorrect operation may cause severe injury.

: Items that must be followed. Make sure that both units for models must be earthed.

: Prohibition.

: Attention: Items that must be followed by general users.

Precautions for Installation

⚠ Warning	● Install the unit according to the instructions in the installation manual. Incomplete or incorrect installation or failure to follow these instructions may cause water leakage, electric shock, or fire.	❗
	● Install with the special tools and piping materials for R410A refrigerant and according to the instructions in the installation manual. As the pressure of R410A, an HFC refrigerant, is 1.4 times higher than the previous R22 refrigerant, use of incorrect piping materials or incorrect installation may cause an explosion, which leads to water leakage, electric shock or fire.	❗
	● Do not install in a location where flammable gas may be produced or flow in. This may cause fire.	⃠
	● Make sure to install the units in locations that can provide full support of the unit's weight. Otherwise, the unit may fall and cause injury.	❗
	● Do not climb on the air-conditioner or put objects on it to prevent collapse or overturning, which may cause injury.	⃠
	● Make sure that no refrigerant leaks. Although Hitachi uses non-flammable, non-toxic, and odorless safety refrigerant (HFC), when HFC leaks and comes in contact with sparks, toxic gas produces. Also, as HFC has a higher mass than air, it will cause oxygen insufficiency near the floor.	❗
	● This model uses the non-flammable refrigerant R410A and non-flammable refrigeration oil Ze-GLES RB74 (JX Nippon Oil & Energy Corporation). Filling other types of refrigerants, gases, oxygen, propane, alcohol, or refrigeration oil with the special filling machine for R410A and Ze-GLES RB74 may cause machine failure and even explosion or fire. Make sure to use qualified refrigerant and refrigeration oil only.	⃠
	● The machine maintains a high pressure at all times. Do not heat the machine or any parts in any situation. This may cause machine failure and even explosion or fire.	⃠
	● Make sure to remove all flammable objects on-site before a welding operation. Otherwise, this may cause fire. Also, always wear leather gloves before handling refrigerant to prevent frostbite of the hand or the body.	❗
	● Clean up refrigerant with non-flammable, non-toxic cleaning agents only. Use of flammable cleaning agents may cause explosion or fire.	❗
	● Ensure adequate ventilation when working in confined spaces to prevent oxygen insufficiency. When cleaning agents are exposed to sparks at a high temperature, toxic gases may be produced.	❗
	● Make sure to recover the cleaning agent after use. Do not freely dilute CFCs in the atmosphere.	❗

Precautions for Electrical Works

⚠ Warning	● Always ask a qualified electrician to carry out electrical work with reference to the national regulations and the instructions in this manual. Make sure to use an individual circuit for the air-conditioner. Failure to follow instructions in this manual, insufficient circuit capacity or improper construction may cause electric shock or fire.	❗
	● Connect units with wires of the correct types and gauges. Use of incorrect wires may cause electric shock or fire.	❗
	● Wires should be securely locked on terminals. Loosened connection of wires will cause overheating of terminals and fire.	❗
	● When securing wires on a terminal, make sure wires are unaffected by external influence. Improper connection may cause overheating of wires and fire.	❗
	● Make sure to earth the indoor and outdoor units according to relevant electrical requirements. Unearthed indoor and outdoor units may cause electric shock. Do not earth indoor and outdoor units a gas pipe, water pipe, arrester, or phone line. Incomplete earth may cause electric shock.	❗ ⏚
	● It is necessary to install an earth leakage circuit breaker (ELCB). The absence of an ELCB may cause electric shock or fire.	❗
	● Make sure to disconnect power supply before wiring and electrical inspections to prevent electric shock.	❗
	● Keep wires away from places where rats or other animals may bite the wires to prevent fire.	❗
	● When installing the panel cover, avoid jamming wires together to prevent electric shock and fire.	❗

An item preceded by a box ☐ is a check item. After examining the item, check it ☑.

2. Handling

☐ When handling an outdoor unit, carry it to the installation location in its original packing, if possible.

(1) Before Installation

This unit uses HFC refrigerant (R410A) that does not damage the ozone layer.

☐1)As the pressure of new refrigerant R410A is 1.4 times higher than ordinary refrigerants, it is more easily affected by water, oxides, grease, and other impurities. As new refrigeration oil Ze-GLES RB74 is also used, make sure that no water, impurity, non-R410A refrigerant, and non-Ze-GLES RB74 refrigeration oil enter the system.

☐2) To prevent mixing R410A refrigerant and Ze-GLES RB74 refrigeration oil with other refrigerants and refrigeration oil, both the connector and cap nut for filling of the R410A refrigerant and Ze-GLES RB74 refrigeration oil are different from that of other refrigerants and refrigeration oil. Make sure to use specific tools for filling the R410A refrigerant and Ze-GLES RB74 refrigeration oil.

O: For both new and old types of refrigerants ■: Exclusive for R410A (R22 not supported) ●: Exclusive for R407C(R22 not supported)

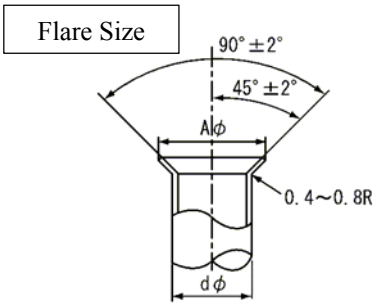
	Gauges and Tools	Interchangeability with R22		Causes and Precautions for Non-interchangeability (new refrigerants only) (◎: must follow items)	Application
		R407C	R410A		
Refrigerant Piping	Copper pipe cutter	O	O		Pipe cutting and deburring
	Pipe expander	O	O■	• Expand the flare of pipes to support the pressure resistance of R410A. Expand the pipe with a 1mm pipe expander pad when using existing pipes. (The pipe flare expander for R410A can also be used for R407C refrigerant piping).	For expanding the flare of refrigerant pipes.
	Expander Spacer	— (N/A)	■		For processing the flare mouth.
	Pipe bender	O	O		For bending the refrigerant pipe.
	Pipe expanding machine	O	O		For expanding the refrigerant pipe.
	Torque wrench	O	■	• 2mm larger than the Φ12.7 or Φ15.88 wrenches for use on R410A pipes. Not suitable for use on the pipes of currently used refrigerants.	For locking cap nuts.
			O	• Φ6.35 and Φ9.53 wrenches can also be used.	
	Welder	O	O	• Weld pipes as instructed (flame adjustment, welding temperature, and choice of welding materials).	For welding refrigerant pipes.
	Nitrogen	O	O	• Strictly prevent dust from entry. (Following the nitrogen use instructions)	For preventing oxidation and the air-tightness test
	Pipe flare coating	●	■	• JX Nippon Oil & Energy Corporation synthetic oil: Ze-GLES RB74。 • Do not use mineral oil for R22, use only synthetic oil of the equivalent level. • Synthetic oil has high moisture absorbency. Do not store synthetic oil in a humid place.	For coating and repairing pipe flares.
Vacuum Dry and Refrigerant Filing	Refrigerant cylinder	● (brown)	■ (pink)	• Refrigerant cylinders are identified by color (cylinders for different types of refrigerants are in different colors) (R410A: Pink) (R407C: Brown) ◎ (Do not use gas refrigerants) non-azeotrope refrigerants. Use liquid refrigerants only.	For filling refrigerants
	Vacuum pump	O	O	◎ Current vacuum pumps can be used. To prevent pump stop, oil inside will flow back to the refrigerant pipe. Install a "ball valve" on the pump	For vacuum drying.
	Ball valve (prevent reflux)	※●	■		
	Manifold gauge set	●	■	• Compared to R22 refrigerant, new refrigerants have higher pressure and thus are not interchangeable. R410A fitting spec: 1/2 UNF | R407C fitting spec: 7/16 UNF	For confirming vacuum status and refrigerant filling pressure.
	Filling hose	●	■	◎ "Do not use fittings for R22 refrigerant". The mineral oil on the fittings may contaminate new refrigerants and clog the circulation system to cause compressor failure.	
	Filling bottle	Prohibited			For filling refrigerants
	Refrigerant filling scale	O	O		For measuring refrigerant filling level.
	Refrigerant leak detector	※●	■	• The leakage testing methods of new and old (R22) refrigerants are different.	For testing refrigerant leakage.

※: Interchangeable for R410A and R407C refrigerants.

☐3) Use special parts for R410A in piping and connection. Both the cap nut and pipe flare are different, choose the correct type according to the specifications below.

Unit: mm

Flare Size



Pipe Diameter dΦ	Size $^{+0}_{-0.4}$	
	R407C/R22	R410A
6.35	9.0	9.1
9.53	13.0	13.2
12.7	16.2	16.6
15.88	19.4	19.7
19.05	23.3	※Cannot be processed (1/2H material)

※ Connect with the flare that comes with the product.

- Selection of pipe wall thickness

The wall thickness of pipes must be changed according to the design pressure change.

Wall thickness of copper piping for the new refrigerant (mm)

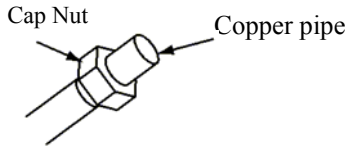
Pipe Diameter	Current Refrigerant		New Refrigerant			
	R22		R407C		R410A	
	Wall Thickness	Piping Material	Wall Thickness	Piping Material	Wall Thickness	Piping Material
Φ6.35	0.6	O	0.8	O	0.8	O
Φ9.53	0.8	O	0.8	O	0.8	O
Φ12.7	0.8	O	0.8	O	0.8	O
Φ15.88	1.0	O	1.0	O	1.0	O
Φ19.05	1.0	O	1.0	O	1.0	1/2H
Φ22.2	1.2	O	1.15	O	1.0	1/2H
Φ25.4	1.2	O	1.0	1/2H	1.0	1/2H
Φ28.6	1.4	O	1.0	1/2H	1.0	1/2H
Φ31.75	1.4	O	1.1	1/2H	1.1	1/2H
Φ38.1	1.65	O	1.15	1/2H	1.35	1/2H

- Connector Selection

The wall thickness of connectors (elbows and tubing) must be changed according to the design pressure change. As 1/2H parts cannot be bend or expanded, select the appropriate tubing according to the minimum wall thickness below. Please note that the sizes of some cap nuts also change.

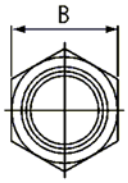
Minimum wall thickness of connector (mm)

Pipe Diameter	R407C/R22	R410A	Pipe Diameter	R407C/R22	R410A
Φ6.35	0.5	0.5	Φ22.2	0.9	0.9
Φ9.53	0.6	0.6	Φ25.4	0.95	0.95
Φ12.7	0.7	0.7	Φ28.6	1.0	1.0
Φ15.88	0.8	0.8	Φ31.75	1.05	1.1
Φ19.05	0.8	0.8	Φ38.1	1.25	1.35



Cap Nut Size B (mm)

Pipe Diameter	Cap Nut Size B (mm)		Pipe Diameter	Cap Nut Size B (mm)	
	R407C/R22	R410A		R407C/R22	R410A
Φ6.35	17	17	Φ15.88	27	29
Φ9.53	22	22	Φ19.05	36	36
Φ12.7	24	26			



2-1 Outdoor unit accessories

Verify the following outdoor unit accessories before installation.

Name	Q'ty	Application	Method
Special Washers 	4	Securing the mounting board	See installation instructions in p.7
Drain pipe 	1	For draining condensate at the bottom	For use on Φ20 drain (See installation instructions in p.7)

2-2 Verification of the combined capacity of indoor and outdoor units

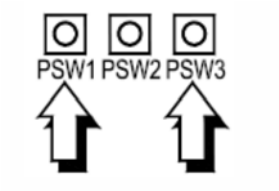
☐1) Select the quantity and capacity of indoor units for outdoor units as shown below.

Outdoor Unit	Indoor Unit	
	Combined Capacity	Maximum Number of Indoor Units
RAM-112FPSQB	100-110%	2
RAM-125FPSQB		
RAM-140FPSQB		
RAM-160FPSQB		

☐2) Attention

This unit will not operate in the first four hours after power connection. The error code will be "d1-22". Follow the steps below to deactivate protection if you need to operate the unit within four hours after power connection.

1) Connect the power of both the indoor and outdoor units.
2) Wait for 30 seconds.
3) At the same time, press the PSW1 and PSW3 switches on the mainboard of outdoor unit for three seconds.



2-3 Outdoor unit installation

Cautions

☐1) Do not install at locations containing flammable gases, salt (seaside) and sulfur (hot springs) or environments containing acid and alkaline.
(Fault may occur more easily when installing in such locations/environments. Apply special protection if it is necessary to install the air-conditioner in these locations/environments.)

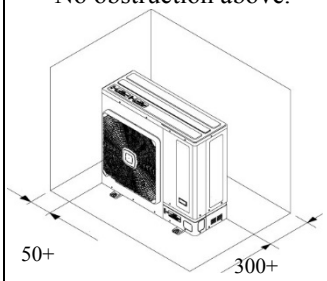
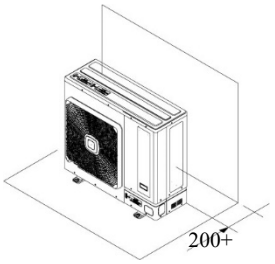
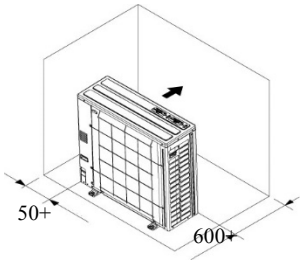
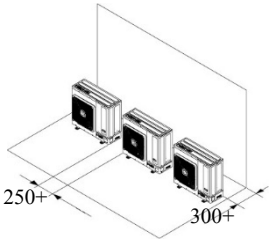
☐2) Do not install at locations with instruments producing electromagnetic wave. Do not point the electromagnet wave emitting surface toward the electrical control panel of the air-conditioner.

☐3) To avoid EMI in the air, keep machinery generating electromagnetic wave, such as radios, at least 3 meters away from the air-conditioner.

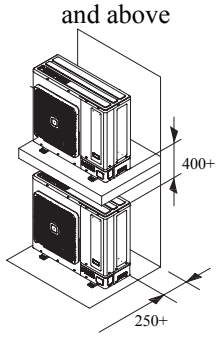
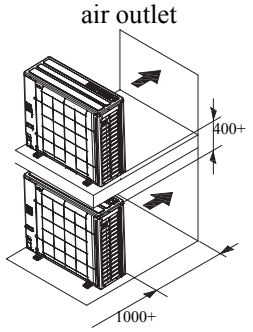
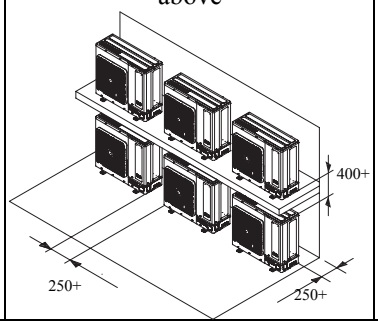
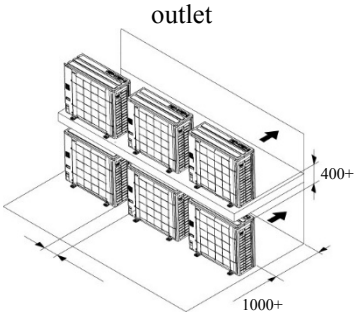
☐4) Do not install the outdoor unit in the indoor.

(1) Installation space

Retain maintenance space for the outdoor unit as shown below (unit: mm)

Standalone	Standalone	Standalone	Two or More Units (side by side)
No obstruction above. 	No obstruction on sides and above 	Obstruction in front of the air outlet 	Even both sides are clear of obstruction, maintain at least 100mm between units. 

(Unit: mm)

Two or More Units (over and under)	Two or More Units (over and under)	Two or More Units (side by side and over and under)	Two or More Units (side by side and over and under)
No obstruction on sides and above	Obstruction in front of the air outlet	No obstruction on sides and above	Obstruction in front of the air outlet
			

(2) Installation locations

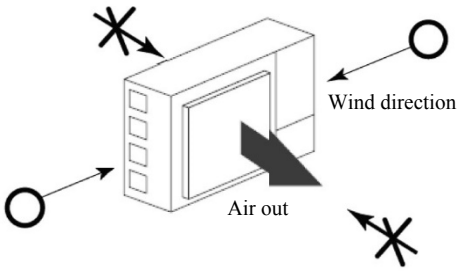
☐1) Dry and well-ventilated locations.
☐2) Do not expose the unit under direct sunlight and to heat sources. Use a shade when direct sunlight is unavoidable.
☐3) Make sure the noise from unit operation does not disturb neighbors (noise at the back (air inlet) is about 3dB higher).
☐4) Do not directly ventilate air from the unit to ornamental plants or the window of neighbors.
☐5) Do not install the heat exchanger in places where dust or scrap paper can enter easily. Add a wind guard (see below) as necessary to deflect wind.
☐6) Avoid installing the unit in places with headwind. Add a wind guard when installing in places with strong wind.
☐7) Pay attention to the following items during installation:

1. To prevent the outdoor unit from falling, shaking, and producing noise in a strong wind or an earthquake, install the unit using appropriate methods. Determine the required installation strength by calculating the seismic strength. Do not install the unit at locations where strong wind may blow off the roof or wall. Secure the unit with steel wire if necessary.
2. Add rubber cushions to the four legs of the unit stand.
3. The location should be convenient for draining rainwater and condensate from defrosting. For good drainage, the outdoor unit should be installed in places with draining facilities. (When installing under roofs where condensate drips, this may wet the floor to cause fall in winter.) Also, using central draining pipes is easier. (In frigid zones, condensate from defrosting may freeze easily in winter, do not use central draining pipes.)
4. Legs of the unit must be installed on a robust stand of about 100-300mm tall.

Installation in Places with Strong Winds

Follow the instructions below when installing the unit on the roof with strong winds in the absence of obstruction.

- Do not face the air outlet toward headwinds. This will interfere with air ventilation from the unit and damage the unit.

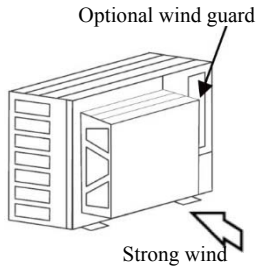


Attention

When strong winds continuously blow toward the air outlet, the ventilation fan will rotate in reverse and become damaged.

- When installing the unit with the air outlet facing headwinds.

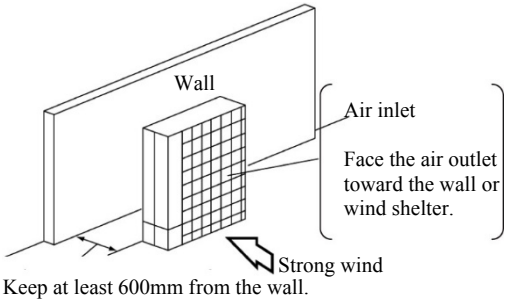
1. When add a wind guard



Optional wind guard

Model	Q'ty
WSP-160A	2

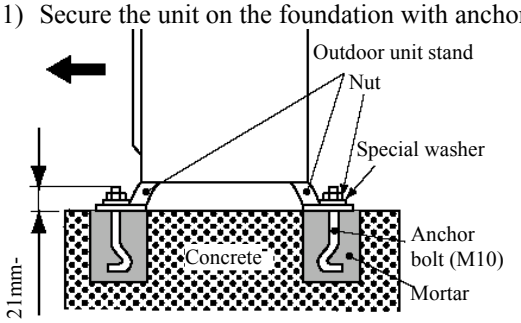
2. When there is a wall



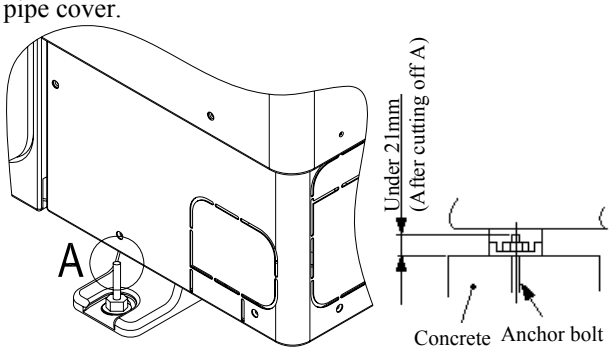
(3) Installation

Securely fix the outdoor unit on the foundation to prevent collapse in a strong wind or an earthquake or noise due to loss of level (leaning aside).

1) Secure the unit on the foundation with anchor bolts.



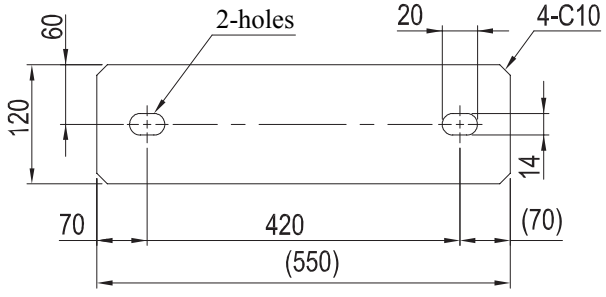
4) Example of fixing the stand with anchor bolts:
Make sure to cut off section A when using this type of anchor bolts. Otherwise, it will be difficult to remove the pipe cover.



5) Securely fix the outdoor unit on the foundation to prevent collapse in a strong wind or an earthquake or noise due to loss of level (leaning aside).

6) When using ordinary frames whose legs are narrower than the legs of the outdoor unit, add a board under the legs of the outdoor unit as shown in the figure before installation to ensure all legs of the outdoor unit are adequately supported on the frame.

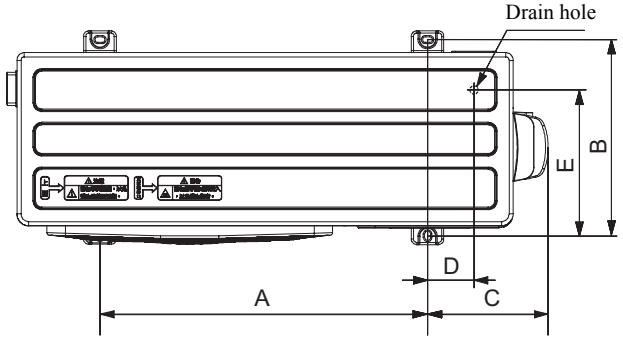
Recommended board size: SPHC material (prepared onsite)
Unit: mm
Board thickness: 4.5mm



2) Anchor bolt size.

3) Verify drainage and drain pipe installation.

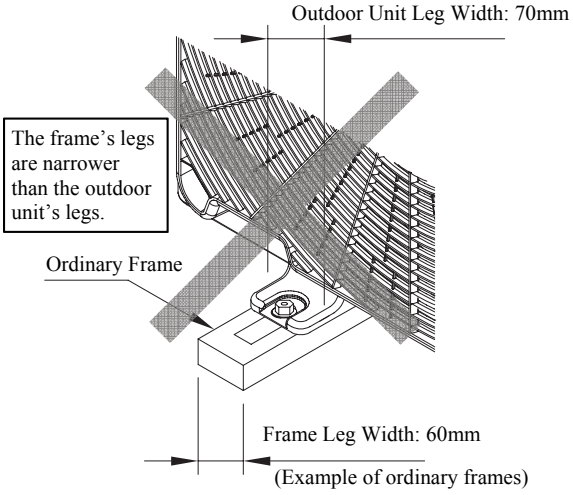
- Water will drain from the unit when it rains. Install the unit at locations with good drainage and drain water to the ditch. Also, avoid install the unit overhead as water will drip from the unit. Plan drainage for the secondary condensate tray if overhead installation is necessary.

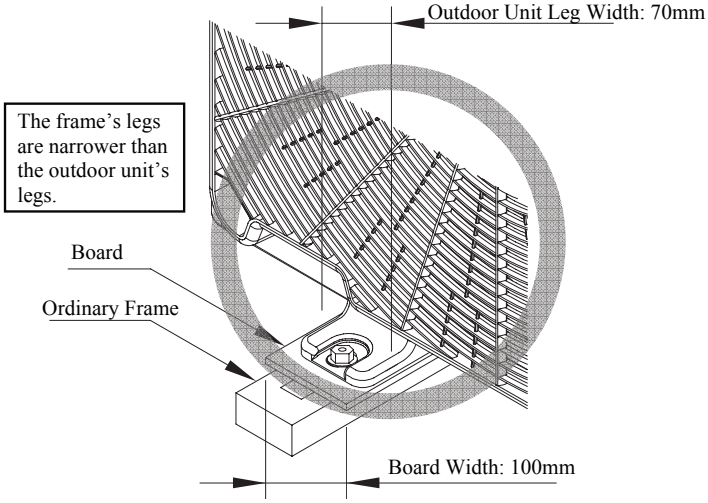


Unit: mm

Model	A	B	C	D	E
RAM-112FPSQB	700	420	255	106	307
RAM-125FPSQB					
RAM-140FPSQB					
RAM-160FPSQB					

※ Maintain this distance at much as possible to install there is adequate space for piping.

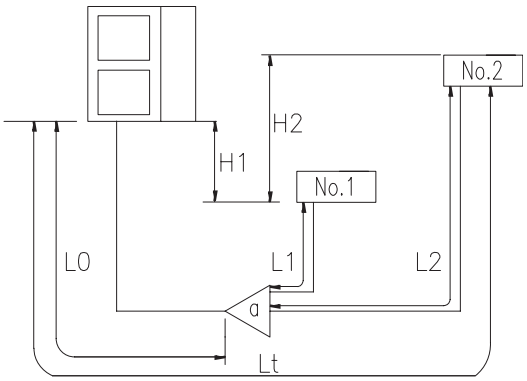




3. Piping

3-1 Refrigerant pipe installation

□(1) The requirements for pipe diameter, pipe length, and lapse height between the indoor and outdoor units are shown in the table below.

<table>
<tr><td colspan="2">System example:
(The diagram shows one outdoor unit with four indoor units.
In this example, only one refrigerant pipe is used. In actual installation, however, separate pipes should be used for refrigerant and refrigeration oil.)</td><td colspan="2"> 
</td></tr>
<tr><td colspan="2">Outdoor unit model</td><td>RAM-112FPSQB</td><td>RAM-125/140/160FPSQB</td></tr>
<tr><td colspan="2">Total pipe length: L0 + L1+ L2</td><td>70</td><td>75</td></tr>
<tr><td>Max. pipe length (actual): Lt</td><td>Pipe length from the outdoor unit to each indoor unit.</td><td>90(70)</td><td>95(75)</td></tr>
<tr><td rowspan="2">Max. lapse height between the outdoor unit and indoor units: H1</td><td>When the outdoor unit is higher than the indoor units.</td><td>30</td><td>30</td></tr>
<tr><td>When the outdoor unit is lower than the indoor units.</td><td>20</td><td>20</td></tr>
<tr><td colspan="2">Max. lapse height between indoor units: H2</td><td>3</td><td>3</td></tr>
<tr><td colspan="2">Max. pipe length between branch pipes and indoor units: L1, L2</td><td>10</td><td>10</td></tr>
<tr><td colspan="2">Branch pipe selection</td><td colspan="2">MW-NP282A at a</td></tr>
<tr><td colspan="2">Cautions</td><td colspan="2">1. The length and route of both the refrigerant and refrigeration oil pipes must be the same.
2. Branch pipes should be near the indoor unit.</td></tr>
</table>

(2) Refrigerant pipe size

●Indoor unit

Capacity Level	Refrigerant Pipe Size (mm)	
	Gas Side	Liquid Side
112, 125, 140,160	Φ15.88	Φ6.35
		Φ9.53

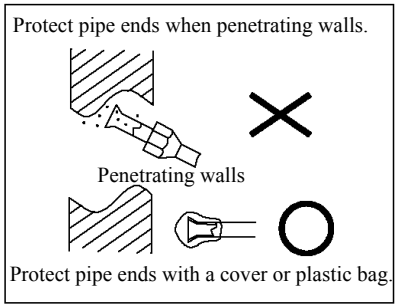
●Outdoor unit

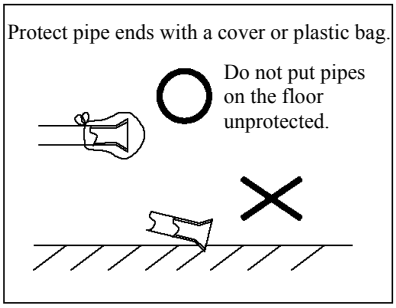
Refrigerant Pipe Size (mm)	
Gas Side	Liquid Side
Φ15.88	Φ9.53

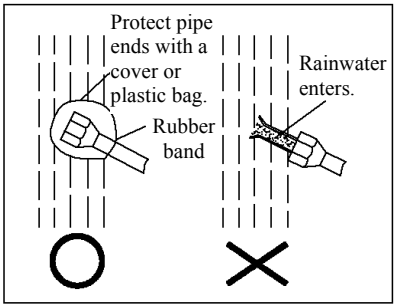
(2) Precautions for installing refrigerant pipes (example)

Make sure the pipe is free of water and dust inside. Cut the pipe with a copper pipe cutter. Remove dust and impurities inside the pipe with nitrogen or compression air before installation. (Do not use a saw or whetstone that may cause powder.)

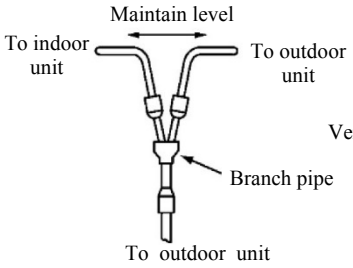
□1) Prepare suitable refrigerant pipes onsite.

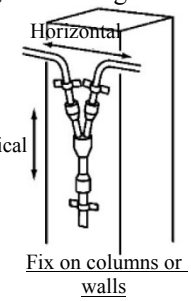


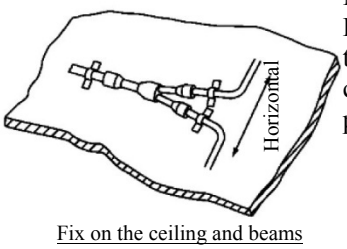




□2) Connect the indoor unit only with the optional branch pipe kit. Do not use connectors.
Maintain level with the column, wall, and ceiling when fixing branch pipes.

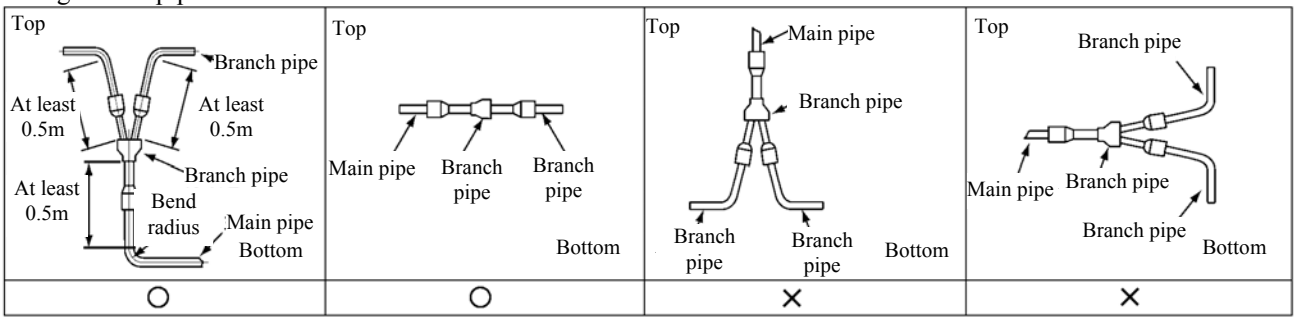






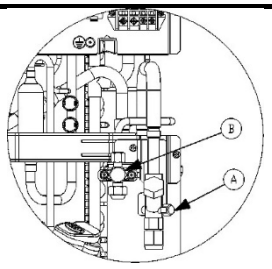
Note:
Fix pipes with clamps outside the insulation layer or add cushions between clamps and pipes.

- Fixing branch pipes



＜Precautions for releasing pressure from the pipe union＞

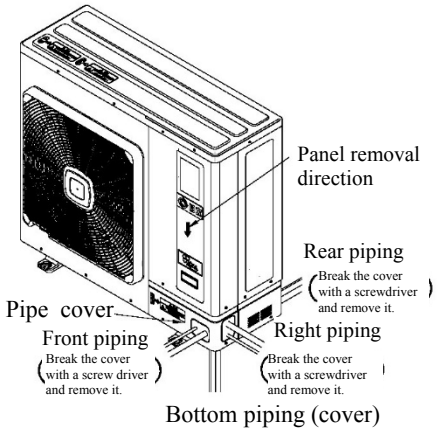
Release pressure from the pipe union (Ⓑ in the right diagram) on the fluid interceptor valve on the pipe union (Ⓐ in the right diagram) of the gas interceptor valve. Follow the instructions below.



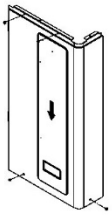
	Operation Air Conditioner
Pipe union Ⓐ on the gas interceptor valve.	Low pressure
Pipe union Ⓑ on the liquid interceptor valve.	Filling refrigerant after evacuation or repair.

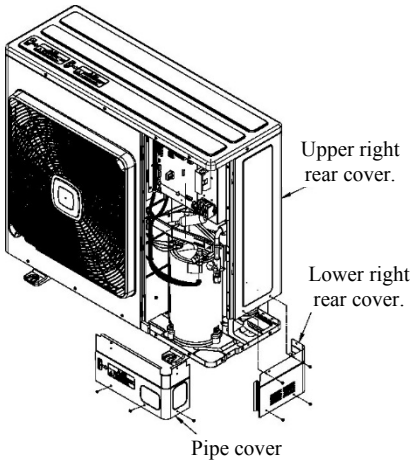
Note: After removing the filling hose, prevent refrigerant and refrigeration oil from contaminating the electrical panel.

(3) Pipe removal direction



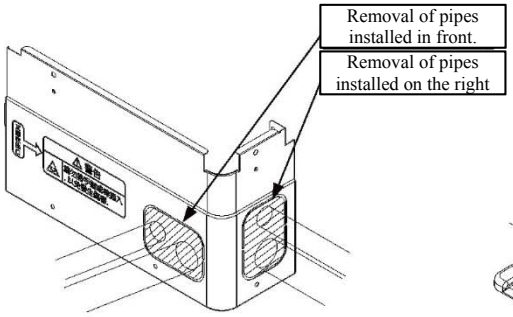
- As shown in the left diagram, pipes can be installed in four locations. Remove the cover where the pipe is installed and install the pipe through the hole. Break the cover with a screwdriver and remove it. Break the bottom cover with a small hammer.

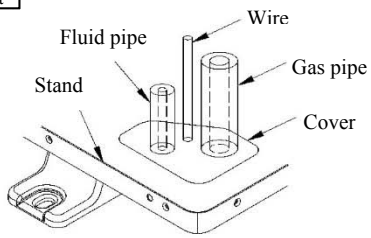


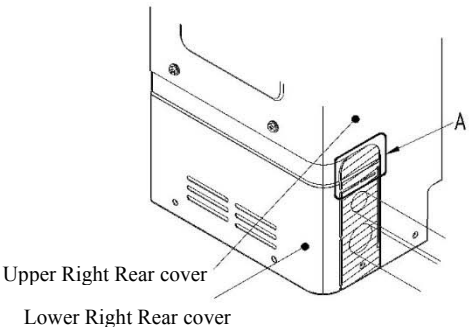


※Size cover flash after removing it. Wrap wires and pipes with the insulation sheet (prepare on-site).

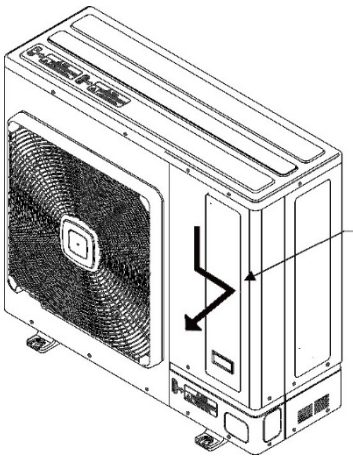
- Front and right piping
- Bottom piping
- Rear piping
  Remove the rear piping cap next to the bottom cover and remove the cover as shown in the shaded part ▨ in the diagram below.







1) When using rubber stoppers and electrical hoses, check the size of the above mentioned seams before removing the cover in the shaded part ▨.
2) Before removing pipes installed in the front and on the right, leave adequate space for removing wires. For example, when removing pipes installed in the rear and on the right, remove pipes from the upper part of the seams (A). Make sure pipes and wires inside the unit do not interfere with each other.
3) Bend the pipe for the turns with a pipe bender.
4) To prevent burrs from damaging pipes and wires, wrap pipes and wires with insulation sheets (prepare on-site).
5) To prevent rainwater from entering the unit, put back the pipe cover afterwards. Wrap pipes with insulation sheets (prepare on-site) before penetrating pipes through the cap hole to ensure it is seamless. Make sure that there is adequate space for putting back the pipe cover.



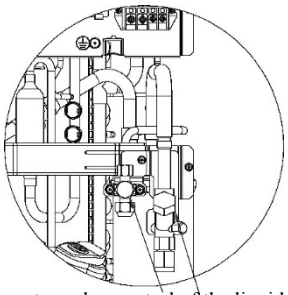
Guidelines for Opening Panel Cover

① Press the panel cover with one hand and remove the screw on the left.
② Push the cover downward and move to the right to remove it.

□(4) Pipe connection and insulation

1) Make sure the interceptor valve of the outdoor unit is completely shut.
2) Connect the pipes between the indoor unit and the outdoor unit. When locking pipefittings, coat refrigeration oil on the interior and exterior edges of the flare and lock the fitting with two wrenches at the specified torque. Check leakage after locking. Fill pipes up with nitrogen before welding.
3) Fix the pipes between the indoor unit and outdoor unit appropriate. Avoid fixing pipes on weak wall surface and ceilings. This may cause vibration and noise, particularly for short pipe length.
4) Re-confirm there is no leakage after piping.
5) Wrap pipefittings with insulation sheets and pack with plastic tape for insulation. Also, wrap the gas inlet and liquid inlet of the refrigerant pipe with insulation sheets to ensure insulation.

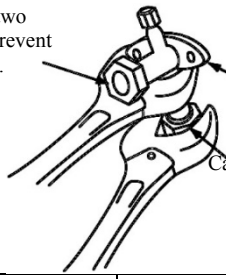
Remark: Prepare refrigeration oil on-site.
Supplier: JX Nippon Oil & Energy Corporation
Type: Synthetic Ze-GLES RB74



Interceptor valve control of the liquid inlet.
Interceptor valve control of the gas inlet.

●Interceptor valve on the outdoor unit

Do not work with two wrenches here to prevent refrigerant leakage.



Model	RAM-112/125/140/160FPSQB	
	Gas Inlet	Liquid Inlet
Hex key (mm)	5	4
Spool locking torque (N•m)	11~14	7~9

●Interceptor valve on the indoor unit

Work with two wrenches.

Locking torque table:

Pipe size	Torque
Φ 6.35 (1/4 ")	20 N•m
Φ 9.53 (3/8 ")	40 N.m
Φ 12.7 (1/2 ")	60 N.m
Φ 15.8 8 (5/8 ")	80 N.m

□ (5) Air-tightness test

1) Shut the interceptor valve spool of the gas and liquid inlets before running the air-tightness test.
2) Fill in air or non-flammable gas (except for oxygen and toxic gases) from the pipe union of the fluid inlet and the pipe union of the gas inlet to run the air-tightness test. The pressure is 4.15MPaG. Release gas after the test.

□ 3-2 Evacuation and Refrigerant Filling

(1) Evacuation

1) Please refer to the instructions on the attention plate inside the panel cover for details of interceptor valve operation.
2) Evacuate from both the gas and liquid interceptor valves until pressure is below -0.1MPaG (-750mmHg).
3) After evacuation, shut the valve on the manifold gauge set, stop evacuation, and settle for one hour to **see if meeting reading rises.**
4) As the pipe union does not fit in the cap nut, use a filling hose. Also, lock the cap nut at 15-16N•m afterwards.
5) Make sure to check leakage with a leakage detector and bubbles. Do not use bubble liquids containing NH_3. Recommended bubble liquids for the leakage test tabulated below. Do not use general household detergents in the bubble test.

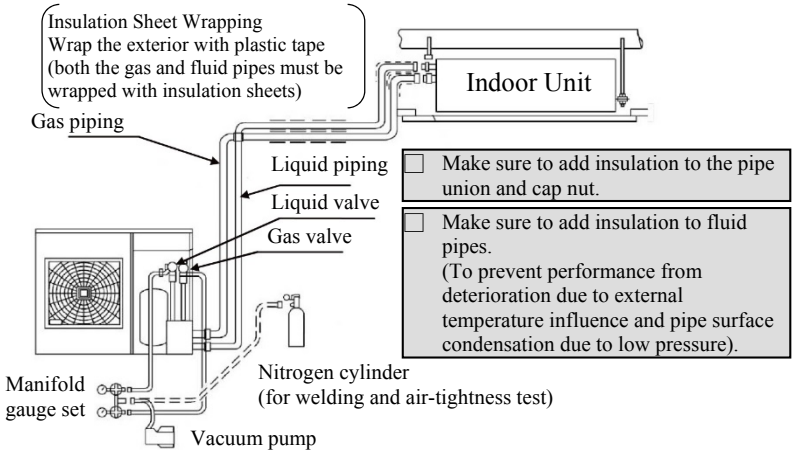
(2) Refrigeration filling

1) The unit has been equipped with refrigerant before shipping. If pipes are longer than the design range, add suitable amount of refrigerant on-site (p. 12).
2) Fully open the gas interceptor valve.
3) The compressor operates when the air-conditioner is in operation. Add refrigerant from the pipe union of the fluid interceptor valve. At the same time, the fluid interceptor valve opens slightly.
4) Fully open the fluid interceptor valve after filling refrigerant.
5) Make sure to check leakage afterwards.

※Note

1. When removing the cap of the interceptor valve spool, gas will pop from the O-ring inside and thread, which is irrelevant to a gas leak.
2. As the outdoor unit uses R401A refrigerant, use the manifold gauge set and filling hose for R401A refrigerant.
3. When pressure does not drop below -0.1MPaG (-750mmHg) after evacuating for one hours, there may be leakage or water inside the pipe. First, check if there is leakage. Next, evacuate for one hour again. Lastly, check pressure again.

Do not purge air inside the unit with refrigerant. This will result in refrigerant insufficiency and cause machine damage.



□ Make sure to add insulation to the pipe union and cap nut.

□ Make sure to add insulation to fluid pipes. (To prevent performance from deterioration due to external temperature influence and pipe surface condensation due to low pressure).

Recommended bubble liquids

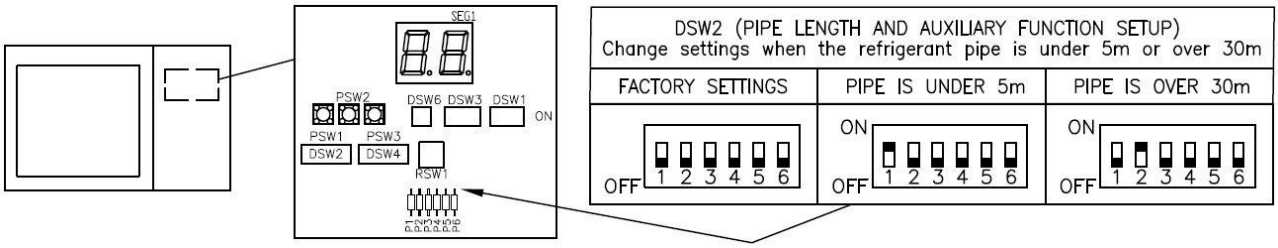
Bubble Liquid	Manufacturer
SNOOP	NUPRO (USA)
ギュポフレックス	Yokogawa & Co., Ltd. (Japan).

Make sure to check refrigerant leakage. Mass refrigerant leakage will cause:
1. Oxygen insufficiency.
2. Toxic gas production in contact with heat.

Guidelines for Refrigerant Pipe Installation

☐3-3 Pipe Length DIP Switch (DSW) Settings

Adjust DSW2 settings as shown below when the refrigerant pipe is under 5m or over 30m.



☐3-4 Refrigerant Filling Level

(1) Refrigerant filling level and standard pipe length at shipping by model

Refrigerant filling level (kg)		Standard pipe length (m): l
112FPSQB	3.2	30
125/140/160FPSQB	3.4	

Calculate the additional pipe length before filling in additional refrigerant to ensure the required quantity of refrigerant. Calculate the required quantity of refrigerant as shown below and 3-2 Guidelines for Additional Refrigerant Filling.

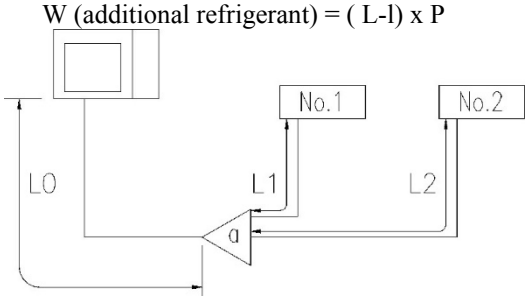
- Tolerance of refrigerant filling level: ±0.1kg.
- Over- or under-filling of refrigerant will cause anomalies or compressor fault. Fill in exact level of refrigerant only.
- **Make sure R410A refrigerant is in liquid form before filling.**

(2) Calculation of additional refrigerant filling

Pipe length L(m) calculation

a) L(m)<30m: No need of additional refrigerant.
b) L(m)>30m: Add refrigerant.
Calculate the required quantity of refrigerant as shown below:
W (additional refrigerant) = (L-l) x P

L: Pipe length
l: Standard pipe length (30m)
P: Compensational value (60g/m).



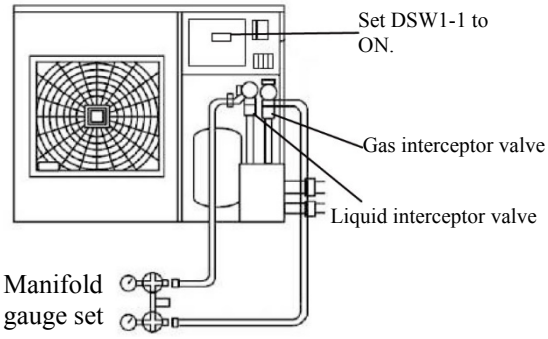
(Example)
L=L0+L1+L2=25+6+3=34m
L-l =34-30=4m
Additional quantity of refrigerant
W=(L-l) x P=4m x 60 g/m =240g

(3) Fill in the additional quantity of refrigerant (W) calculated in (2).

☐3-5 Recovering Refrigerant

Follow the steps below to recover refrigerant from the outdoor unit before relocating the indoor and/or outdoor unit(s).

1) Connect the manifold gauge set with the gas interceptor valve and liquid interceptor valve.
2) Turn on the A/C power.
3) Set DSW1-1 on the outdoor unit to ON (unit operation starts). Close the liquid interceptor valve. Start refrigerant recovery.
4) When the low pressure (gas interceptor valve) is -0.01MPaG (-75mmHg), quickly run the following actions:
   1. Close the gas interceptor valve.
   2. Set DSW1-1 to OFF (unit operation stops).
5) Shut down the power.



⚠ **Caution: Make sure pressure is not below -0.01MPaG.**
Pressure below -0.01MPaG will cause compressor damage.

4. Wiring

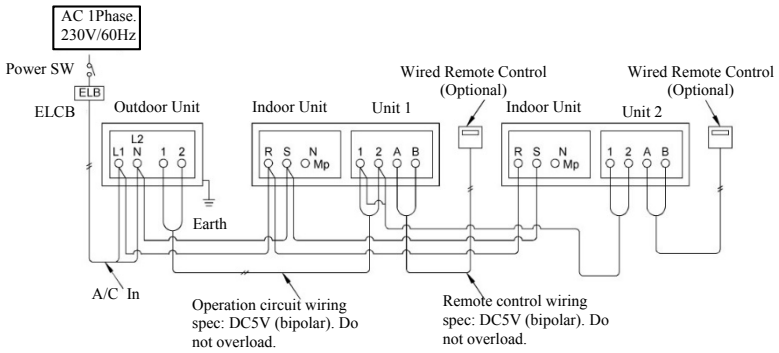
(1) Electrical work

Ask a qualified agent (electrician) to carry out electrical work with reference to national electrical regulations.

□1) Wiring with 1Φ230VAC. Select wire gauge according to the following guidelines. There are two ways of wiring:

1. From the outdoor unit (Method B).
2. Individual power supply for the indoor and outdoor units (Method C).

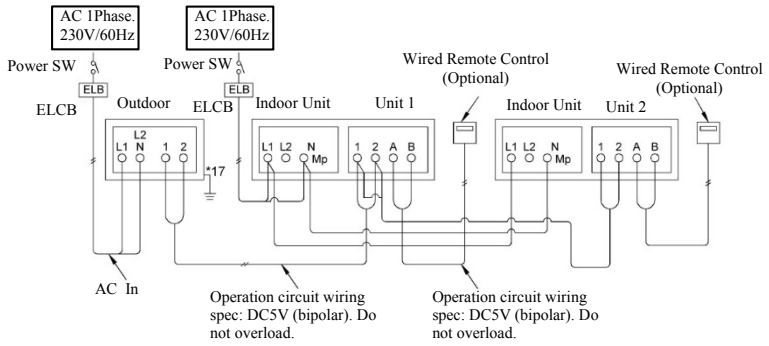
From the outdoor unit (Method B)



In a multi-split combination, each indoor unit can operate individually.
To synchronize the operation of all indoor units, set DSW6-1 on the outdoor unit to OFF.

Individual power supply for the indoor and outdoor units (Method C)

Singe phase:

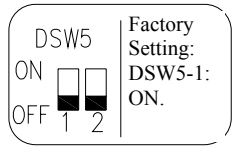


Precautions

- Follow the instructions in the installation manual of the indoor unit when wiring is different.
- Connect the operation circuit of the outdoor unit and indoor unit with 0.75-1.25mm^2, 2C (type: VCTF, VCT, CVV, MVVS, CVVS, VVR, VVF) or 2C stranded (type: KPEV, KPEV-S equivalent). Also, wire length must be under 1,000m.
- Wires other than the 2C and 2C stranded wires mentioned above can be used in H-LINK systems and wiring under 100m.
- Connect the wired remote control and the operation circuit of the indoor unit with 2C stranded wires (type: KPEV, KPEV-S equivalent). Also, wire length must be under 500m. Wires (0.3mm^2) other than double stranded wires can also be used for wire length under 30m.
- When shielded wires (type: MVVS, CVVS, KPEV-S) are used for connecting the operation circuit of the indoor and outdoor units, earth with shielded wires.

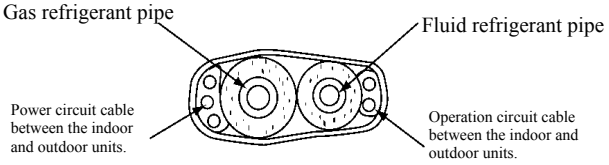
Precautions for H-LINK system connection

- The factory setting of unit terminal impedance (DSW5-1: ON) is shown on the right diagram. **When more than two outdoor units are connected to the H-LINK, disabled the terminal impedance (DSW5-1: OFF) from the second outdoor unit onward**. Make sure that the terminal impedance of only one outdoor unit in the H-LINK is ON. When there is only one outdoor unit, do not change the factory setting.
- Use the same type of cables for all units on the H-LINK.



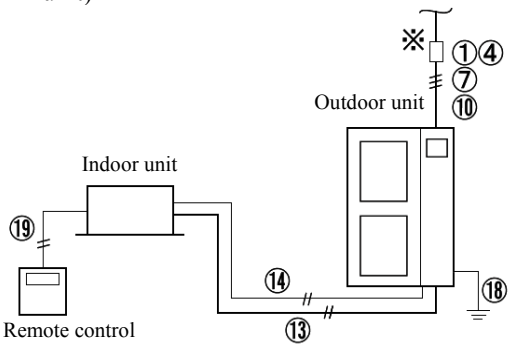
Located on the mainboard of the outdoor unit.

- Precautions for Indoor and Outdoor Units Wiring (Methods B and C)
  When connecting the outdoor unit and the indoor unit, the distance between the operation circuit of the outdoor unit and the 230V power line should at least be 5-6cm. Therefore, do not use co-axil cables. Also, when the power source of the A/C and other machines is in parallel, keep at distance of at least 1m. When it is unable to separate them, wire the power line wire inside a metal conduit (earthed on one end) to separate them.

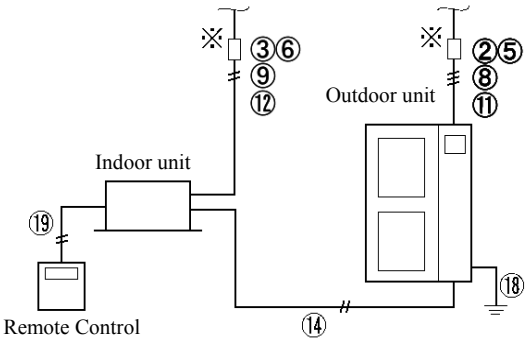


※Insulation materials for pipe should resist the heat from the pipe.

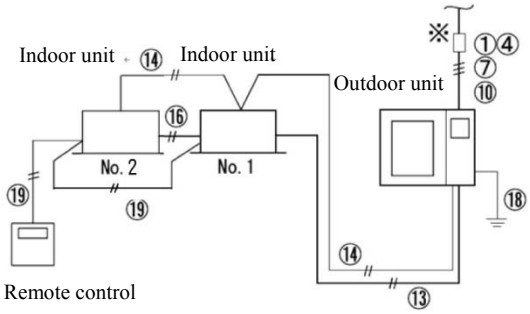
- One to One (Method B: Power supply from the outdoor unit)



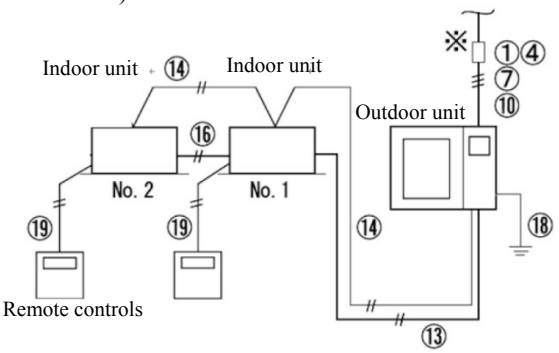
- One to One (Method C: Individual power supply for indoor and outdoor unit)



- One to Two/Four(Method B: Power supply from the outdoor unit)



- One to Two/Four(Method B: Power supply from the outdoor unit)



Precautions

Install an ELCB at the No Fuse Breaker (NFB) or manual switch of the branch circuit marketed "※" near the packaged A/C.

Use a high-sensitivity, high-speed (trip time < 0.1 second) ELCB of the required capacity for high frequency operation (for inverter use).

"B" and "C" in the table below refer to "Method B" and "Method C".

Mode/Shape		ELCB Rated Current (A)			Power SW						Wire Gauge (mm^2)											
					Rated Current (A)			Fuse Size (A)			Power Cable				Indoor/Outdoor Connection Wiring					B, C Operation Circuit ⑭	Indoor Connection Power Cable ⑯	Earth ⑱	Remote Control Cable ⑲
											B ⑩		C Outdoor ⑪	C Indoor ⑫	B Power ⑬								
Outdoor Unit RAC-	Voltage	B ①	C Outdoor ②	C Indoor ③	B ④	C Outdoor ⑤	C Indoor ⑥	B ⑦	C Outdoor ⑧	C Indoor ⑨	<10 m	<20m			<20m	<35m	<50m	<70m	<75m				
112/125/140/160FPSQB	AC 1Φ 230 V 60 Hz	50	50	5	60	60	30	35	35	5	8.0	8.0	8.0	2.0	2.0	2.0	2.0	2.0	3.5	Above 0.75	2.0	2.0	Above 0.75

- ELCB Selection

  Determine the rated current of the ELCB based on the total wiring capacity shown in the right table.

  Determine the ELCB model, sensed current, and trip current based on the information shown in the right table.

  *Use high-sensitivity, high-speed (trip time < 0.1 second) ELCB.

  *Confirm the ELCB rated current, sensitivity, and trip time and protective coordination of the upper part.

Rated Current (A)	ELCB Mode (trip current)	Rated Sensed Current (mA)
15, 20, 30	EX-30(5kA), EX-50B(10kA), EX-50C(35kA)	30
40, 50	EX-50B(10kA), EX-50C(35kA)	30, 100
60, 75, 100	EX-100(10kA), EX-100B(35kA)	100

Note

1. Use high-sensitivity, high-speed ELCB with rated sensed current under 30mA or medium-sensitivity ELCB with rated sensed current over 500mA. The trip time of both types must be within 0.1 second.
2. Use high-frequency ELCBs for inverter use.

- **Select transformers according to the instructions below.**

  Transformer Capacity≧Maximum Wattage ×1.3

  Determine maximum wattage as shown below:

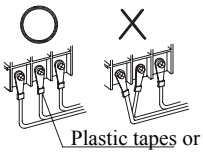
Type	RAM-112FPSQB	RAM-125/140/160FPSQB
Max. Current (A)	27	28

(2) Wiring connection port

□1) The indoor unit wiring connection port, please according to the indoor unit installation manual instruction

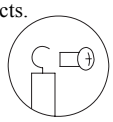
Precautions for Wiring

Keep an appropriate distance among terminals. Insulate terminals with plastic tapes or bushings.

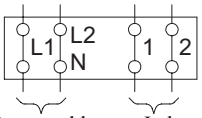


Note: Do not use terminals for single-core cables.

When using single-core cables, do not use spade terminals. Directly connect single-core cables to the terminal block as shown in the diagram below. Overheating may occur at contacts.



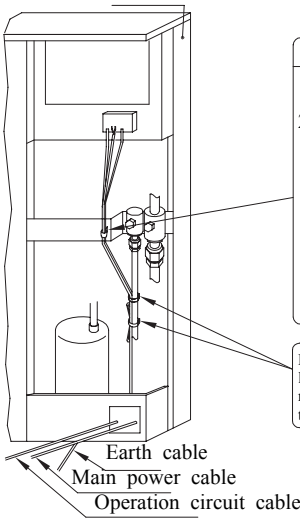
Terminal Block (TB1)



Power cable (AC 1Φ 230V)

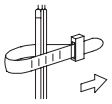
Indoor-outdoor cable (DC 5V).

Upper Right Panel Cover

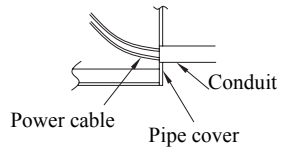


Cable Tie

1. Tie cables together as shown below with cable ties.
2. Tie cables together and separate them from the pipes, compressor, other parts, and metal frame.



Fold up cables and retain adequate length for service to prevent removing cables from the terminal.



* Precautions for Conduits
When using conduits, prevent conduits from entering the outdoor unit. This may risk contacting the compressor or circulation pipes to cause damage.

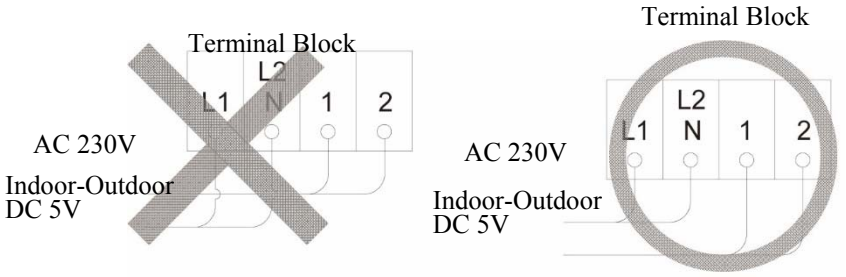
(3) Wiring Indoor and Outdoor Units

□1)Please connect the indoor and outdoor units according to the electrical work instructions in p.13.

1. (No connection for T for single-phase indoor units.) Also, lock the screw of the terminal block with the torque as shown in the right table.
2. Please refer to the Electrical Equipment Standards to implement electrical work.
3. Do not connect a 230VAC source to terminal blocks ① and ② of the outdoor unit. Wrong connections will damage the mainboard. Do not connect a 230VAC source to them.

Locking torque

Screw	Locking torque (N•m)
M4	1.0~1.3
M5	2.0~2.5
M6	4.0~5.0
M8	9.0~11.0
M10	18.0~23.0



(Methods B and C)

□2) Does the voltage of the power source comply with the rated voltage? Over- or under-voltage will damage the unit.

□3) Is the capacity of the power source adequate to support the unit? Inadequate power capacity may cause mass voltage drop and the unit cannot be activated.

□4) Failure to earth the indoor and outdoor units may cause electrical shock. Make sure to earth them according to Type 3 method at impedance under 100Ω. Ask a qualified electrician to implement the work.

□5) Make sure to disconnect power source before opening the electrical panel for wiring or service to prevent electric shock.

⚠Warning	**When installing the panel cover, avoid jamming wires together to prevent electric shock and fire.**

5. Test Run and Handover

5-1 Test Run

Precautions for Test Running

1) Check insulation impedance between electrical terminals and earth with a 500V insulation tester. Impedance must be over 1MΩ. Re-check insulation impedance if it is below 1MΩ.
2) Make sure the interceptor valve of the outdoor unit is fully open before test run.
3) As the main switch is open phase, the alarm code on the remote control is "05" when operating the unit. Check power supply and related equipment.
4) Check if the oil heater is operating.
5) Connect to the power supply for at least 12 hours before test run.
6) When operating the cooling function, room temperature must be over DB21.5ºC and WB16ºC, and outdoor temperature over DB0ºC.
7) Connect the pressure meter according to the piping precautions (p.9) when releasing pressure from the pipe union.

About Insulation Impedance

Impedance measured with the 500V insulation tester must be over 1MΩ. Re-check insulation impedance if it is below 1MΩ.

- During commissioning or after disconnecting from the power supply for a long time, insulation impedance reduces, as refrigerant in the compressor is stagnant. The ELCB will trip when insulation impedance is below 1MΩ. Re-check to verify the following:

  Verification contents

  ① Disconnect the compressor from power supply and measure the insulation impedance of compressor. When impedance is below 1MΩ, other electrical parts may be poorly insulated.

  ② When the insulation impedance of compressor is below 1MΩ, remove wires connecting the compressor and the inverter mainboard before alimentation. Measure insulation impedance again after alimenting the oil heater for three hours. If impedance is normal, there is no problem with the compressor. Otherwise, there may be a compressor problem.
  (Extend alimentation as necessary based on the air condition and refrigerant status in the pipe.)

  Note: When re-connecting the compressor cables, make sure flag terminals are securely locked. Adjust terminal clamping pressure with a pair of clamps before inserting and locking on the terminal block.
- If the ELBC trips, check if the rated capacity of the ELBC meets the requirements as shown in p. 14.
  Use ELCBs for inverters (<30mA) or high-sensitivity ELCBs (trip time<0.1 second).

1) Run commissioning after completing indoor unit installation before handing over to the customer.
   Follow the steps below to run test and verify if there are abnormalities.

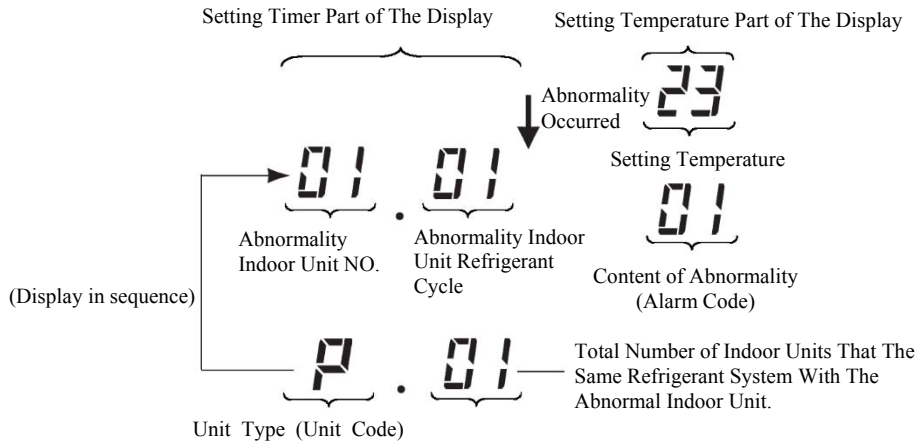
   ① Press the **Run/Stop** and **CHECK** buttons on the remote control at the same time for 3 seconds or longer.
   "Test Run" and "Connected No. of Indoor Units" will be shown on the LCD display. When multiple units are connected, check the total number of connected indoor units. If the number of connected units shown on the LCD display is smaller than the actual number of connected units, check if there is poor wiring. Then, press the **Run/Stop** again to set the desired operation model.

   ② Press the **Run/Stop** button
   The operation indicator illuminates and operation starts. The program will shut down the unit after 2 hours automatically. On the LCD display, the information reads: "TIMER OFF" "2 H". Although temperature adjustment is disabled after test run in "①", the protective device is effective during unit operation.

   ③ Press the **LOUVER** button on indoor units equipped with the auto swing function to verify the deflector response. Press the **LOUVER** button again to stop the deflector.

   ④ Test Run will end in two hours (automatically) or by pressing the **Run/Stop** again. When the protective device activates after an abnormality occurs, the operation light on the remote control will blink to alert an "abnormality" has occurred, and the error code will appear on the temperature display section on the remote control at the same time.

   - Display change on the temperature and timer display sections:



   Please look up the error, its cause, and troubleshooting in p. 19. Contact a service technician for help if the situation persists. When the operation light blinks every 2 seconds repeatedly, this means there is a signal transfer error between the indoor unit and the remote control (wires are loosened or disconnected, broken; incorrect wiring, etc.).

   - When there is a giggle sound coming out from the mechanical chamber of the outdoor unit after alimentation, it is the activation sound of the electronic valve. It is normal and not a problem.
   - A giggle sound also comes out from the mechanical chamber of the outdoor unit after compressor start and stop or defrosting start and stop. This is because of the pressure difference inside the pipes. It is normal and not a problem.

Test Run Checklist

Customer Name: Seller: Check Date: dd/MM/YY

Customer Address: Checked by:

Outdoor Unit Type: Outdoor Unit No. (YY/MM) (/) Compressor No.

Indoor Unit Type								
Indoor Unit No.								
Indoor Unit Type								
Indoor Unit No.								

Check items:

1. Indoor unit fan direction — Correct/Incorrect
2. Outdoor unit fan direction — Correct/Incorrect
3. Compressor noise — Yes/No
4. Operating for 20+ minutes — Yes/No
5. Air in and out temperature of each indoor unit
   In: No.1 DB / WB ºC， No.2 DB / WB ºC，
   Out: DB / WB ºC， DB / WB ºC，
6. Air in and out temperature of the outdoor unit
   In: DB / WB ºC
   Out: DB / WB ºC
7. Refrigerant temperature
   Fluid pipe temperature: ºC
   Compressor out temperature: ºC
8. Refrigerant pressure
   Delivery pressure: MPaG
   Intake pressure: MPaG
9. Voltage
   Rated voltage: V
   Operating voltage: L1-N V，L1-L2 V
   Start voltage: V
10. Compressor input power and current
    Power: kW
    Current: A
11. Refrigerant filling level — Correct/Incorrect
12. Remote control functions — Correct/Incorrect
13. Protective device functions — Correct/Incorrect
14. System leakage check — Yes/No
15. Unit interior and exterior cleanliness — Yes/No
16. Unit covers locking status — Yes/No
17. Noise from unit covers — Yes/No
18. Outdoor unit filter cleanliness — Yes/No
19. Heat exchanger cleanliness — Yes/No
20. Outdoor unit interceptor valve status — Open/Close
21. Smooth drainage of condensate from the drain pipe — Yes/No

5-2 Menu setup

Menu setup

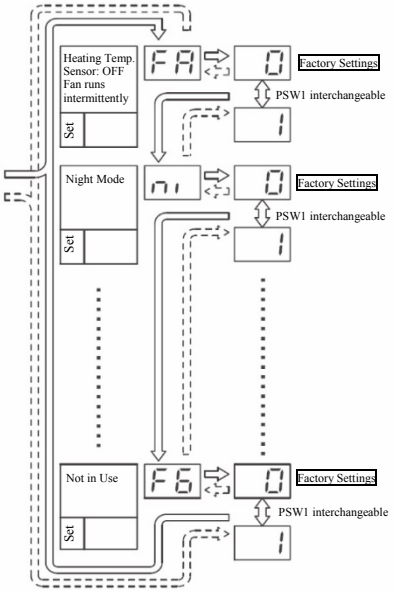
Run menu setup after the outdoor unit stops.
Do not run setup during operation, in the check mode, and external I/O setup.

Start
DSW2-5 is ON
DSW1-4 is ON
Press the CHECK button to show the function selection code. Run setup according to the instructions.
Method (PSW2 solid line / PSW3 dotted line)
End
DSW2-5 is OFF
DSW1-4 is OFF

Note 1: Take down the code of each function you have set when running External I/O setup.
Ex. "1" means set.

Set	1

NO HEATING FUNCTION



External I/O Setup

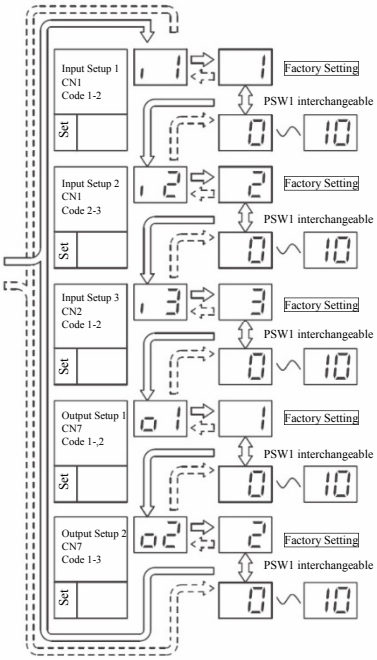
Run external I/O setup after the outdoor unit stops.
Do not run setup during operation, in the check mode, and external I/O setup.

Start
DSW2-6 is ON
DSW1-4 is ON
Press the CHECK button to show the function selection code. Run setup according to the instructions.
Method (PSW2 solid line / PSW3 dotted line)
End
DSW2-6 is OFF
DSW1-4 is OFF

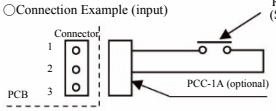
Note 1: Take down the code of each function you have set when running External I/O setup.
Ex. "1" means set.

Set	1

Note 2: Settings of each input terminal should be different.
The value of settings greater than the default value is invalid.



○Connection Example (input)

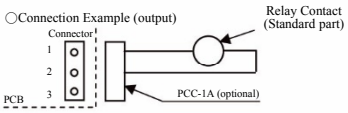


○Relay Contact Spec.

Brand/Model	Remarks
OMROM micro-power relay MY1F (or 2F) equivalent	110V or 220V

Relay

○Connection Example (output)



○Relay Contact Spec.

Brand/Model
OMROM micro-power relay LY2F DC12V

SEG1		
0	Not in use	Not in use
1	Heating Mode	Operation Signal
2	Cooling Mode	Alarm Signal
3	Stop Request	Compressor ON Signal
4		
5	Force Stop	Defrost Signal
6	Current Control 60%	
7	Current Control 70%	
8	Current Control 80%	
9	Current Control 100%	
10		

6. Error Code Table

1) When "EE" appears, this means there is a critical error; the compressor is probably blown.

Code	Error	Cause
01	Indoor unit protective device activation (float switch)	The float switch is activated when (1) abnormal high water level of the condensate tank or (2) there are pipe abnormalities.
02	Outdoor unit protective device (except for codes 41 and 42)	High-pressure switch (4.15MPaG) activation; outdoor fan locked in cooling mode.
03	Signal transfer error (indoor→outdoor)	Loosened or broken wires or incorrect wiring of the operation circuit between the indoor and outdoor units; the fuse of the outdoor unit is blown.
04	Signal transfer error (inverter)	Signal transfer error between the circuit board and the inverter or the power fuse is blown.
05	Phase check error	Open phase of the outdoor unit power supply due to reverse wiring or loosened wires.
06	Outdoor unit voltage error	Outdoor unit is under-voltage, power cable capacity is inadequate.
07	Degree of superheat at compressor outlet drops significantly	The indoor unit electronic valve is locked.
08	Compressor upper temperature is too high.	Refrigerant insufficiency or leakage; refrigerant pipe clogging.
11	Air inlet temperature sensor error (indoor unit) (broken wire, short circuit)	Wires are loosened, disconnected, or broken.
12	Air outlet temperature sensor error (indoor unit) (broken wire, short circuit)	Wires are loosened, disconnected, or broken.
13	Anti-frost temperature sensor error (indoor unit) (broken wire, short circuit)	Wires are loosened, disconnected, or broken.
14	Heat exchanger pipe temperature sensor error (indoor unit) (broken wire, short circuit)	Wires are loosened, disconnected, or broken.
19	Indoor unit fan motor protection activation	Indoor unit fan motor protection activation.
20	Compressor upper temperature sensor error (outdoor unit) (broken wire, short circuit)	Wires are loosened, disconnected, or broken.
22	Open air temperature sensor error (outdoor unit) (broken wire, short circuit)	Wires are loosened, disconnected, or broken.
24	Pipe temperature sensor error (outdoor unit) (broken wire, short circuit)	Wires are loosened, disconnected, or broken. Heating outdoor fan motor is locked.
31	Indoor/outdoor unit capacity mismatch	Indoor unit capacity is 100-130% higher than the outdoor unit capacity.
35	Indoor unit number setup error	Repeated number setting or the number is greater than the connected number of indoor units.
38	Protection check circuit error (outdoor unit)	Error of the outdoor unit protection check circuit.
41	Cooling overload (high pressure switch activated)	When the outdoor unit protection activates, compressor upper temperature is over 95ºC, and the outdoor unit pipe is over 55ºC.
42	Heating overload (No Function) (high pressure switch activated)	When the outdoor unit protection activates, compressor upper temperature is over 95ºC, and the outdoor unit pipe is over 55ºC.
47	Low pressure protection is activated	The unit stops 3 times within one hour, as the evaporation temperature is excessively low. Heating outdoor unit fan motor is locked.
48	Overload protection is activated	Pressure rise due to too much refrigerant, pipe clogged, and circulation error; compressor error (overload, locked, over-current).
51	Current check error	Operation overload (heat exchanger clogged, etc.)
53	Power module protection is activated	Inverter error (overload, over-current, revolution error, start failure); compressor error.
54	Inverter fin temperature sensor error, protection is activated	Fin temperature sensor error, heat exchanger clogged, fan error.
55	Inverter failure	Inverter circuit board error.
57	Outdoor unit fan motor error	Circuit board—fan motor connection: broken wires, incorrect wiring; fan motor fault.
59	Inverter fin temperature sensor error	Wires are loosened, disconnected, broken, and short circuit.
b1	Refrigerant system location error	Set location over 64.
EE	Compressor protection error	Three times within six hours.

Note: When the operation light on the remote control blinks every two seconds repeatedly, this means there is a signal transfer error between the indoor unit and the remote control (wires loosened, disconnected, broken; incorrect wiring, etc.).

□2) Check the outlet temperature of each indoor unit during operation. If the temperature difference of different units exceeds the range (over 10ºC for cooling), this may be a refrigerant piping problem. Check refrigerant piping again.

□3) Lastly, please hand over the warranty card, user's manual, and installation manual to the customer.

⚠ Warning! Do not operate the unit before Test run is completed. Check electrical wiring exactly.