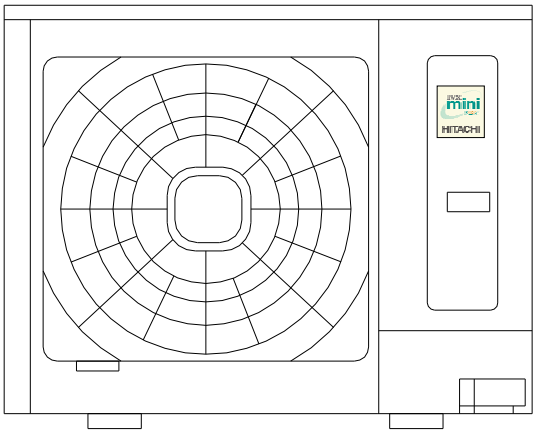
HITACHI

Inspire the Next

Installation & Maintenance Manual

INVERTER-DRIVEN
MULTI-SPLIT SYSTEM
HEAT PUMP
AIR CONDITIONERS
- IVX -mini(R410A) -



Outdoor Unit

Model
RAS– 3HRNM1Q
RAS– 4HRNM1Q
RAS– 5HRNM1Q
RAS– 5HYNM1Q

IMPORTANT:

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

P 0 0 6 9 1 Q

ORIGINAL INSTRUCTIONS

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 purposes such as drying clothes, refrigerating foods or for any other cooling or heating process.
- The installer and system specialist shall secure safety against leakage according to local regulations or standards. The following standards may be applicable if local regulations are not available. British Standard, BS4434 or Japan Standard, KHKS0010.
- No part of this manual may be reproduced without written permission.
- Signal words (DANGER, WARNING and CAUTION) are used to identify levels of hazard seriousness. Definitions for identifying hazard levels are provided below with their respective signal words.

⚠DANGER	:	Immediate hazards which WILL result in severe personal injury or death.
⚠WARNING	:	Hazards or unsafe practices which COULD result in severe personal injury or death.
⚠CAUTION	:	Hazards or unsafe practices which COULD result in minor personal injury or product or property damage.
NOTE	:	Useful information for operation and/or maintenance.

- 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 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 as 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	23WB	15WB
	Outdoor	43 DB	-5 DB
Heating Operation	Indoor	30 DB	15 DB
	Outdoor	17 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.

SAFETY SUMMARY

⚠ DANGER

- **Use refrigerant R410A in the refrigerant cycle. Do not charge oxygen, acetylene or other flammable and poisonous gases into the refrigerant cycle when performing a leakage test or an air-tight test. These types of gases are extremely dangerous and can cause an explosion. It is recommended that compressed air, nitrogen or refrigerant be used for these types of tests.**
- **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 touch or adjust safety devices inside the indoor or outdoor units. If these devices are touched or readjusted, it may cause a serious accident.**
- **Do not open the service cover or access panel for the indoor or outdoor units without turning OFF the main power supply.**
- **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.**
- **The installer and system specialist shall secure safety against refrigerant leakage according to local regulations or standards.**
- **Use an ELB (Electric Leakage Breaker). In the event of a fault, there is danger of an electric shock or a fire if it is not used.**
- **Do not install the outdoor unit where there is a high level of oil mist, flammable gases, salty air or harmful gases such as sulphur.**

⚠ WARNING

- **Do not use any sprays such as insecticide, lacquer, hair spray or other flammable gases within approximately one (1) meter from the system.**
- **If circuit breaker or fuse is often activated, stop the system and contact your service contractor.**
- **Do not perform installation work, refrigerant piping work, 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 a fire.**
- **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 gas piping, water piping, lightning conductor or ground wiring for telephone.**
- **Connect a fuse of specified capacity.**
- **Do not put any foreign material on the unit or inside the unit.**
- **Make sure that the outdoor unit is not covered with snow or ice, before operation.**
- **Before performing any brazing work, check to ensure that there is no flammable material around.**
  When using 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 a fire.
- **Fix the cables securely. External forces on the terminals could lead to a fire.**

SAFETY SUMMARY

⚠CAUTION

- **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 equipment.**
- **Supply electrical power to the system to energize the oil heater for 12 hours before start-up after a long shutdown.**
- **Do not step or put any material on the product.**
- **Provide a strong and correct foundation so that;**
  a. The outdoor unit is not on an incline.
  b. Abnormal sound does not occur.
  c. The outdoor unit will not fall down due to a strong wind or earthquake.
- **The appliance is not to be used by children or person with reduced physical, sensory or mental capabilities,or lack of experience and knowledge,unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.**
- **Children should be supervised they do not play with the appliance.**

NOTE:

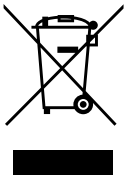
- **It is recommended that the room be ventilated every 3 to 4 hours.**
- **The heating capacity of the heat pump unit is decreased according to the outdoor air temperature. Therefore, it is recommended that auxiliary heating equipment be used in the field when the unit is installed in a low temperature region.**
- **Operate the heat pump air conditioner within this range.**
  Regarding installation altitude below 1000 meters;
  Regarding frequency of supply power within ±1% Hz of rated frequency.
  Regarding transport storage temperature within -25～55℃.

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.

⚠ ATTENTION :



This product shall not be mixed with general household waste at the end of its life and it shall be retired according to the appropriated local or national regulations in an environmentally correct way. Due to refrigerant, oil and other components contained in the Air Conditioner, its dismantling must be done by a professional installer accordingly to the applicable regulations.

Contact the HITACHI Customer Care for more information.

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1. Safety Summary

⚠WARNING

- **Do not perform installation work, refrigerant piping work, drain piping and electrical wiring connection without referring to the installation manual.**
- **Check that the ground wire is securely connected.**
- **Connect a fuse of specified capacity.**

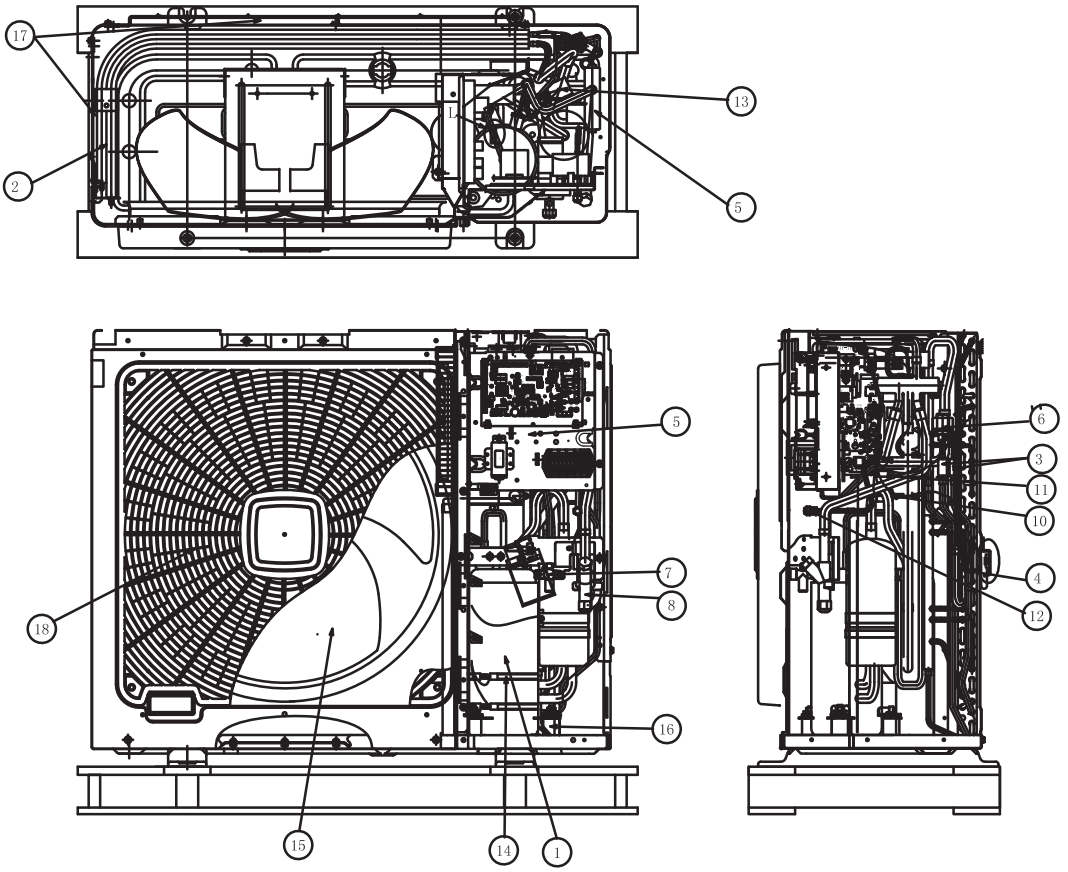
⚠CAUTION

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 equipment.

2. Structure

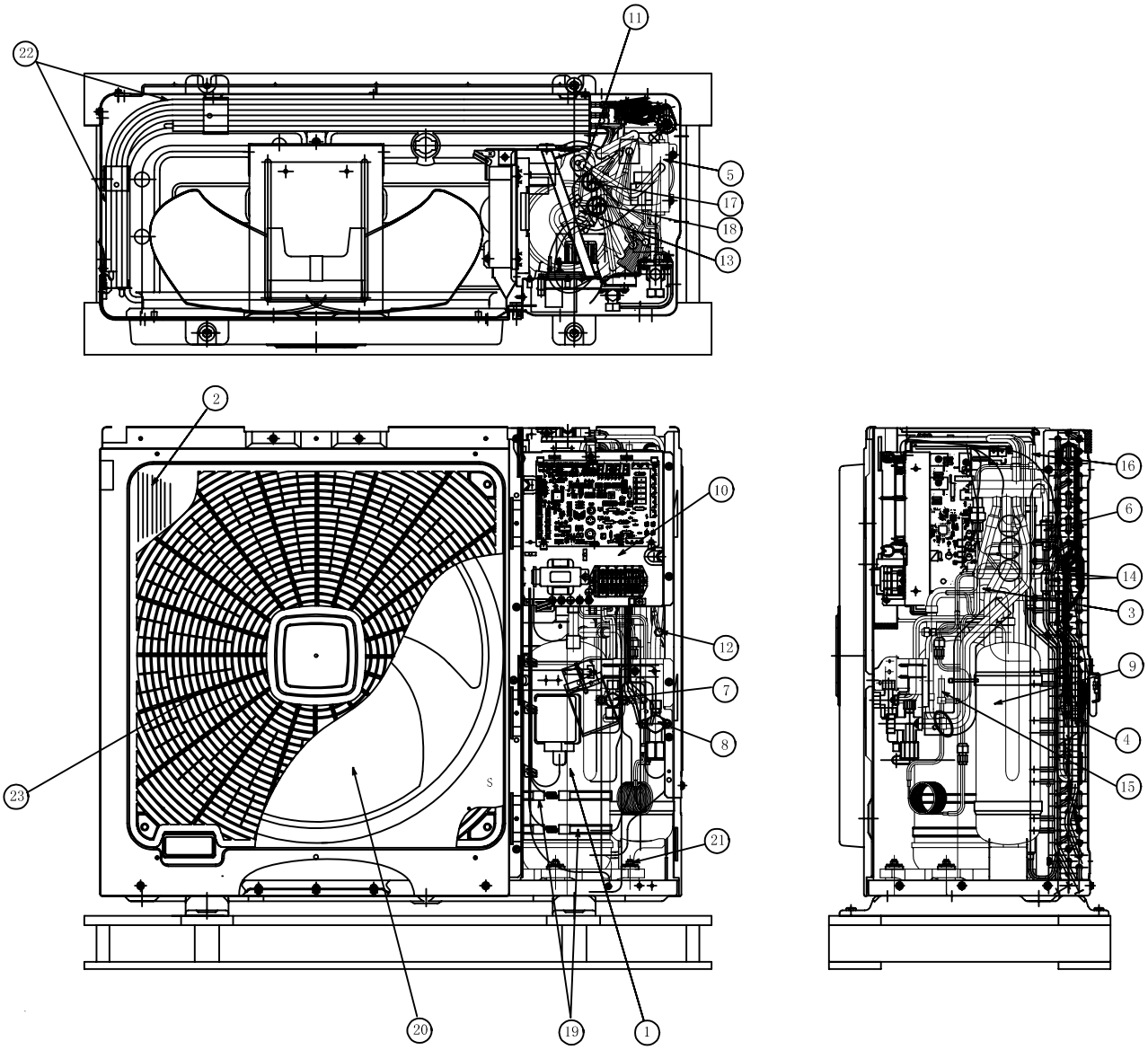
2.1 Outdoor Unit & Refrigerant Cycle

<Outdoor Unit> RAS-3HRNM1Q



No	Part Name	No	Part Name
1	Compressor	12	Check Joint for High Pressure
2	Heat Exchanger	13	Solenoid Valve
3	Strainer	14	Crankcase Heater
4	Distributor	15	Propeller Fan
5	Four-way Valve	16	Vibration Absorbing Rubber
6	Electronic Valve	17	Air Inlet
7	Stop Valve for Liquid Line	18	Air Outlet
8	Stop Valve for Gas Line		
9	Electrical Box		
10	Pressure Switch for Control		
11	High Pressure Switch for Protection		

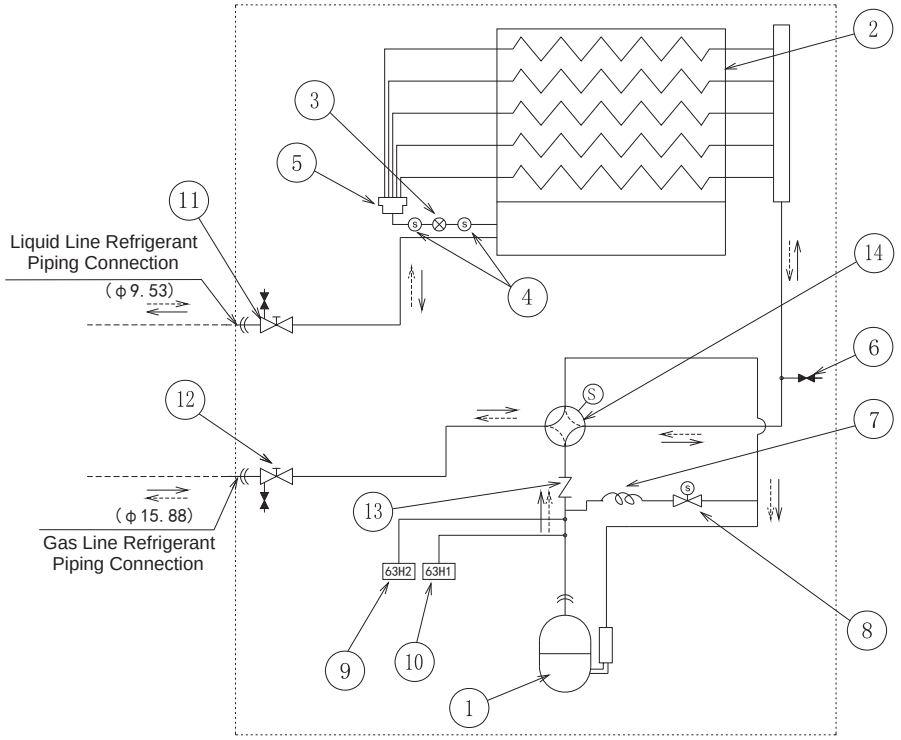
<Outdoor Unit> RAS-4~5HRNM1Q and RAS-5HYNM1Q



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

<Refrigerant Cycle>

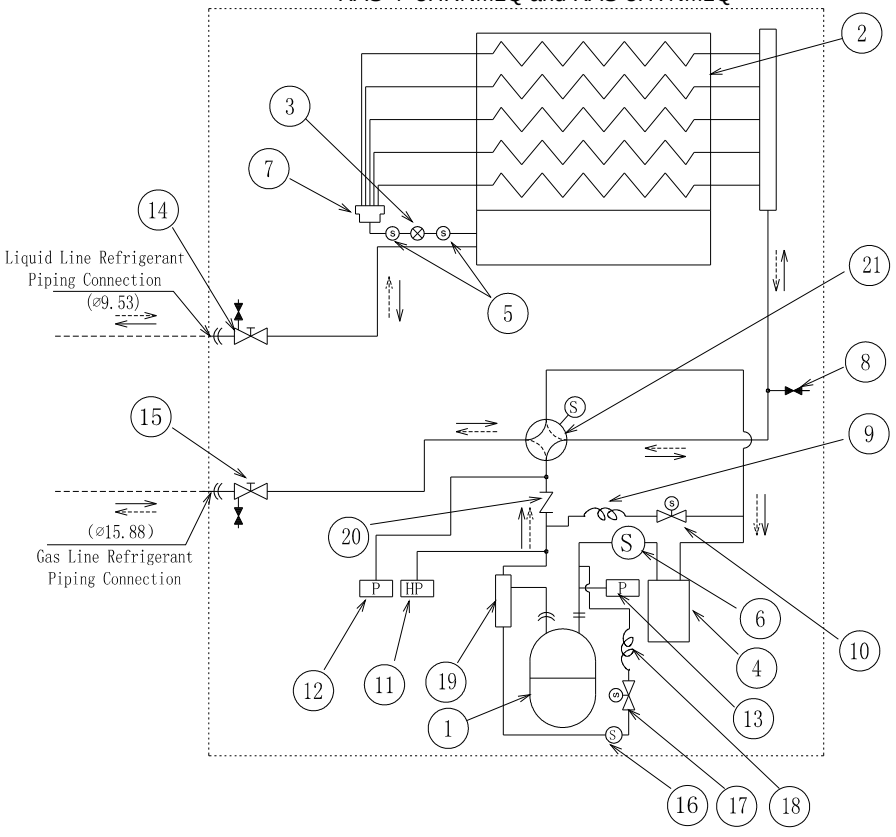
Outdoor Unit RAS-3HRNM1Q



Mark	Part Name
①	Compressor
②	Heat Exchanger
③	Electronic Expansion Valve
④	Strainer
⑤	Distributor
⑥	Check Joint
⑦	SVA Capilary Tube
⑧	Solenoid Valve
⑨	Pressure Switch for Control
⑩	High Pressure Switch for Protection
⑪	Stop Valve for Liquid Line
⑫	Stop Valve for Gas Line
⑬	Check Valve
⑭	Four-Way Valve

Refrigerant Flow Direction (Cooling Operation)
Refrigerant Flow Direction (Heating Operation)
Field Refrigerant Piping
Flare Connection

Outdoor Unit RAS-4~5HRNM1Q and RAS-5HYNM1Q



Mark	Part Name
①	Compressor
②	Heat Exchanger
③	Electronic Expansion Valve
④	Accumulator
⑤	Strainer
⑥	Strainer
⑦	Distributor
⑧	Check Joint
⑨	Capillary Tube
⑩	Bypass Solenoid Valve
⑪	Pressure Switch for Protection
⑫	High Pressure Sensor
⑬	Low Pressure Sensor
⑭	Stop Valve for Liquid Line
⑮	Stop Valve for Liquid Line
⑯	Strainer
⑰	Return Oil Solenoid Valve
⑱	Return Oil Capillary Tube
⑲	Oil Separator
⑳	Check Valve
㉑	Reversing Valve

Refrigerant Flow Direction(Cooling Operation)
Refrigerant Flow Direction(Heating Operation)
Field Refrigerant Piping
Flare Connection

2.2 Necessary Tools and Instrument List for Installation

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

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

✧: Interchangeability is available with current R22
×: 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.	Flaring for Tubes
	Extrusion Adjustment Gauge	●	-	* If using flaring tube, make dimension of tube larger for R410A. * 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, ϕ9.53, 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 zeotoropic 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. Transportation and Handling

3.1 Transportation

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.

● Lifting Method
When lifting the unit, ensure a balance of the unit, check safety and lift up smoothly.

(1) Do not remove any packing materials.
(2) Lift the unit under packing condition with two (2) ropes, as shown in Fig. 3.1.

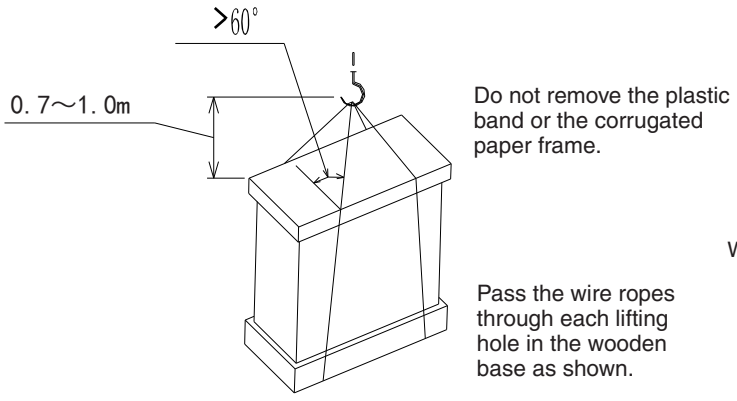


Fig. 3.1 Lifting Work for Transportation

⚠CAUTION

- **Lift the outdoor unit in its factory packaging with 2 wire ropes.**
- **For safety reasons ensure that the outdoor unit is lifted smoothly and does not lean.**
- **Do not attach lifting equipment to the plastic band or the corrugated paper frame.**
- **Ensure the exterior of the unit is adequately protected with cloth or paper.**

3.2 Handling of Outdoor Unit

⚠WARNING

Do not put any foreign material into the outdoor unit and check to ensure that none exists in the outdoor unit before the installation and test run. Otherwise, a fire or failure, etc. may occur.

● When Using Handles
When manually lifting the unit using the handles, pay attention to the following points.

(1) Do not remove the wooden base from outdoor unit.
(2) To prevent the unit from overturning, pay attention to the center of gravity as shown in the below figure.
(3) Two or more personnel should be used to move the unit.

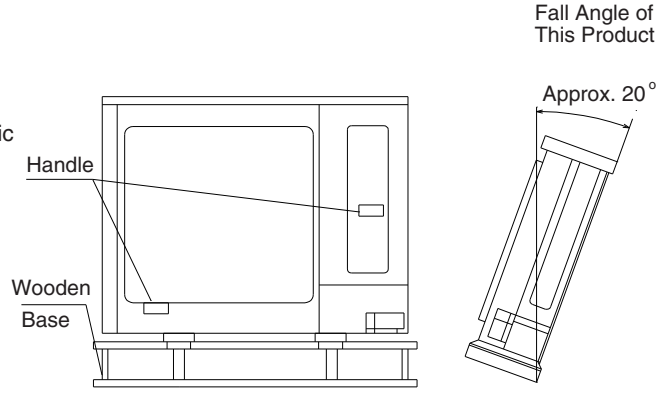


Fig. 3.2 Handling of Outdoor Unit

(kg)

Model	Unit Gross Weight
RAS– 3HRNM1Q	77
RAS– 4HRNM1Q	90
RAS– 5HR(Y)NM1Q	90

4. Outdoor Unit Installation

4.1 Factory-Supplied Accessories

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

Table 4.1 Factory-Supplied Accessories

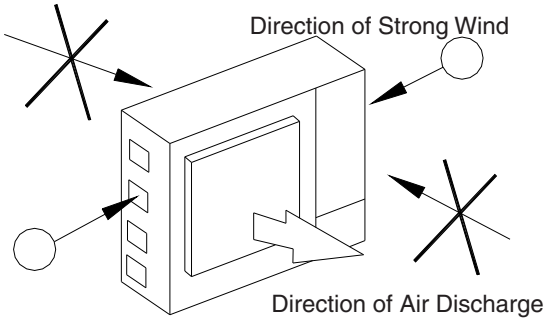
Accessory	Q'ty
Washer	4

NOTE

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

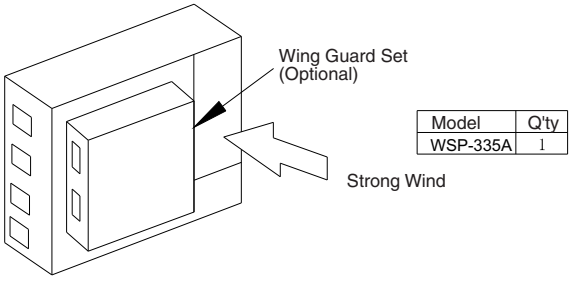
4.2 Initial Check

- 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.



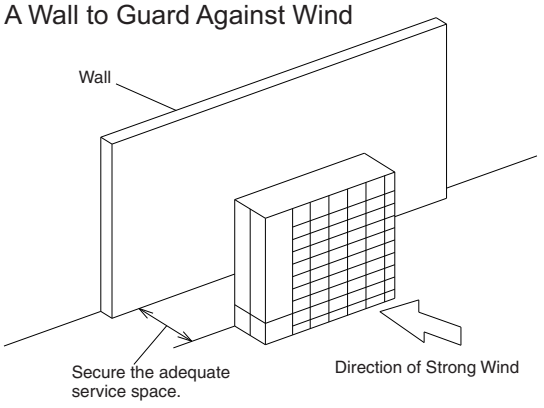
- In case of installation in the open spaces unavoidably where there is no buildings or surrounding structures, adopt the wind guard set or install near the wall to avoid facing the wind directly. Ensure that the service space should be secured.

(1) Using Wind Guard



Model	Q'ty
WSP-335A	1

(2) A Wall to Guard Against Wind



NOTE:
If the extreme strong wind blows directly against the air discharge portion, the fan may rotate reversely and be damaged.

⚠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.

4.3 Service Space

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

(1) Upper Side is Open.

(unit:mm)

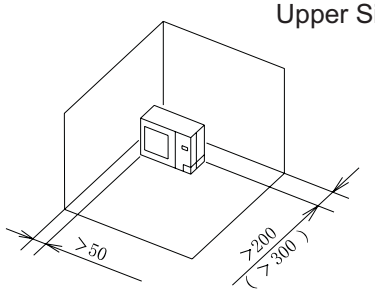
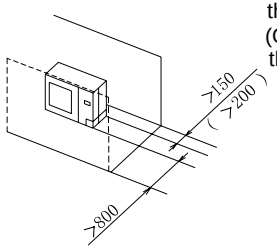
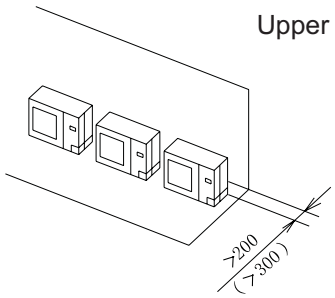
Single Installation	Upper Side is Open  Keep a distance of 100mm between service cover and wall. The dimension in "( )" is for the model of 4HP and 5HP.
Single Installation	Above of two sides of the unit is open. (Occasion of obstacles in the obverse side of the units)  The dimension in "( )" is for the model of 4HP and 5HP.
Multiple Installation	Upper Side is Open  Keep a distance of more than 100mm between other units. The dimension in "( )" is for the model of 4HP and 5HP.

Fig. 4.1 Installation Space

(2) Obstacles in Above

When obstacles is in above ,it is should be ensured that the distance between the top of units and obstacles is more than 500mm, besides the space for installation and maintenance is satisfied.

4.4 Installation Work

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

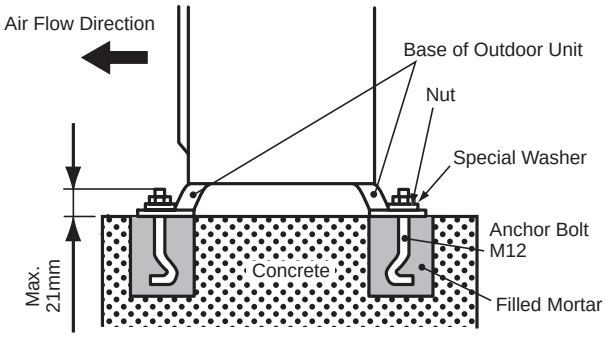


Fig. 4.2 Installation of Anchor Bolts

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

(2) When installing the outdoor unit, fix the unit by anchor bolts. Refer to Fig. 4.3 regarding the location of fixing holes.

(unit:mm)

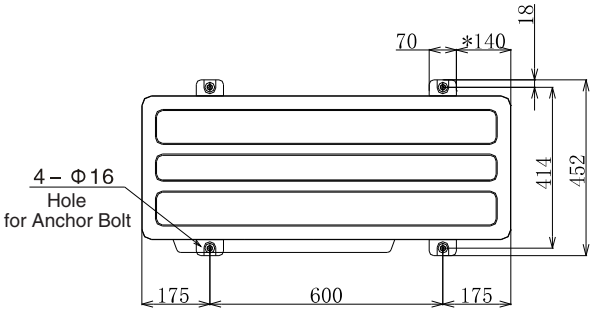


Fig. 4.3 Position of Anchor Bolts

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

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

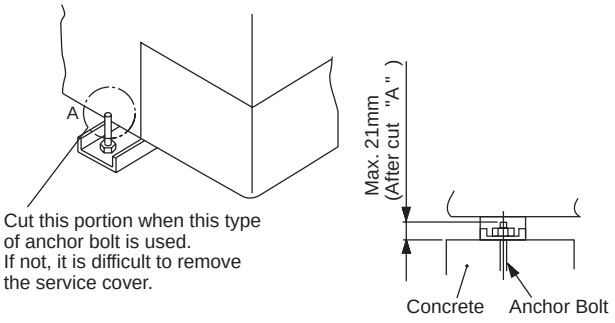


Fig. 4.4 Fixing Example

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

(unit:mm)

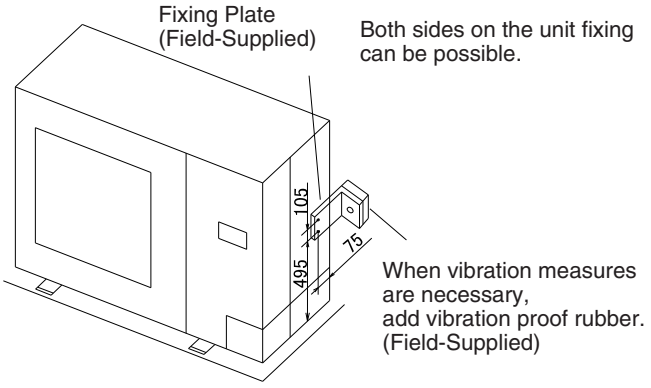
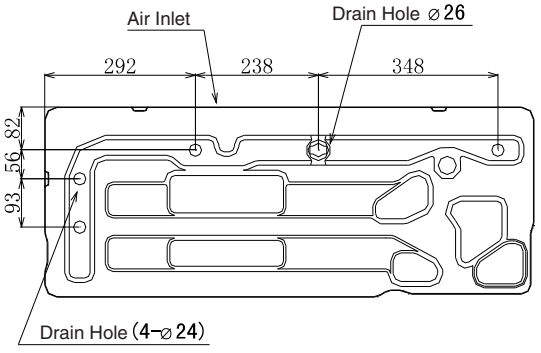


Fig. 4.5 Additional Fixing Arrangement

(5) When installing the unit on a roof or a veranda, drain water sometimes turns to ice in a cold morning. Therefore, avoid draining in an area where people often use because it is slippery.

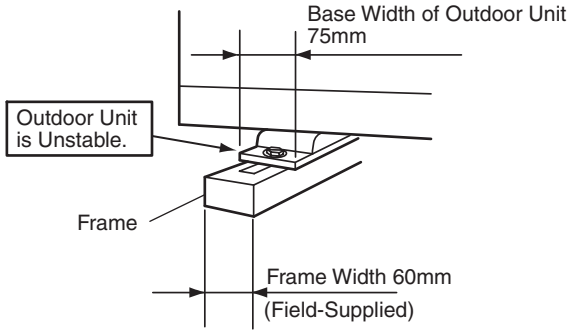
(6) In case of the drain piping is necessary for the outdoor unit, use the drain-kit (DBS-26 or DBS-26L:Optional Parts) .

(unit:mm)

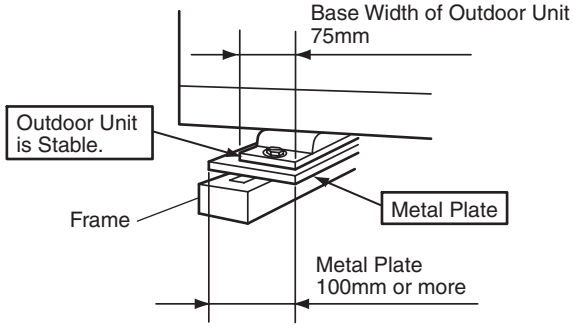


(7) The whole of the base of the outdoor unit should be installed on a foundation. When using vibration-proof mat, it should also be positioned the same way.
When installing the outdoor unit on a field-supplied frame, use metal plates to adjust the frame width for stable installation as shown in Fig. 4.6.

Incorrect



Correct



Recommended Metal Plate Size (Field-Supplied)

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

(unit:mm)

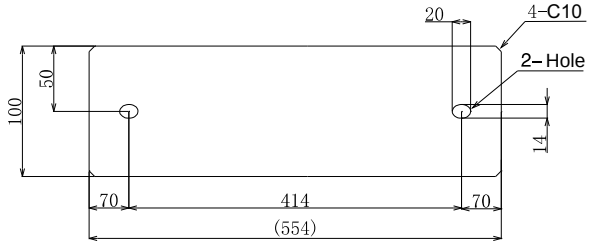


Fig. 4.6 Frame and Base Installation

5. Refrigerant Piping Work

⚠DANGER

Use refrigerant R410A in the refrigerant cycle. Do not charge oxygen, acetylene or other flammable and poisonous gases into the refrigerant cycle when performing a leakage test or an air-tight test. These types of gases are extremely dangerous and can cause an explosion. It is recommended that compressed air, nitrogen or refrigerant be used for these types of tests.

5.1 Piping Materials

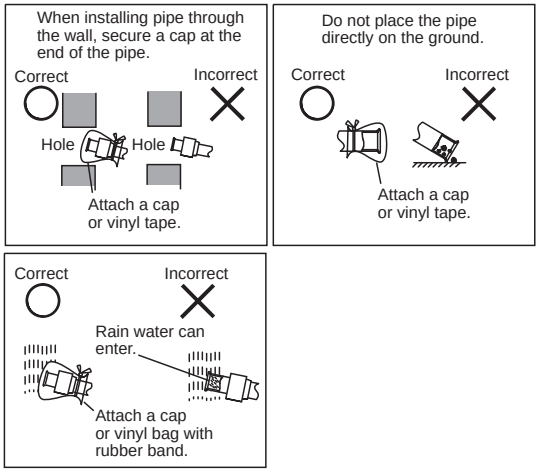
(1) Prepare locally-supplied copper pipes.

(2) Select the piping size from the Table 5.1.

(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.

NOTE

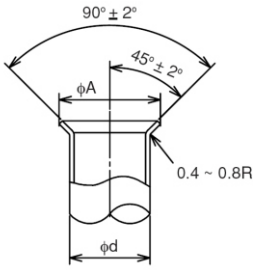
● Cautions for Refrigerant Pipe Ends



⚠CAUTION

- **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.**

● Flaring Dimension
Perform the flaring work as shown below.



(unit:mm)

Diameter Φd	$A^{+0}_{-0.4}$ R410A
6.35	9.1
9.53	13.2
12.7	16.6
15.88	19.7

● Piping Thickness and Material
Use the pipe as below.

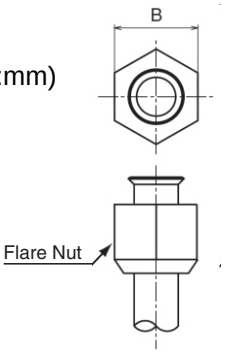
(unit:mm)

Diameter	R410A	
	Thickness	Material
ϕ6.35	0.8	0
ϕ9.53	0.8	0
ϕ12.7	0.8	0
ϕ15.88	1.0	0

● Flare Nut Dimension
Use the flare nut as below.

<Flare Nut Dimension B (unit:mm)

Diameter	R410A
ϕ6.35	17
ϕ9.53	22
ϕ12.7	26
ϕ15.88	29



5.2 Refrigerant Piping Work

(1) Ensure that the directions for refrigerant piping work according to the tables.

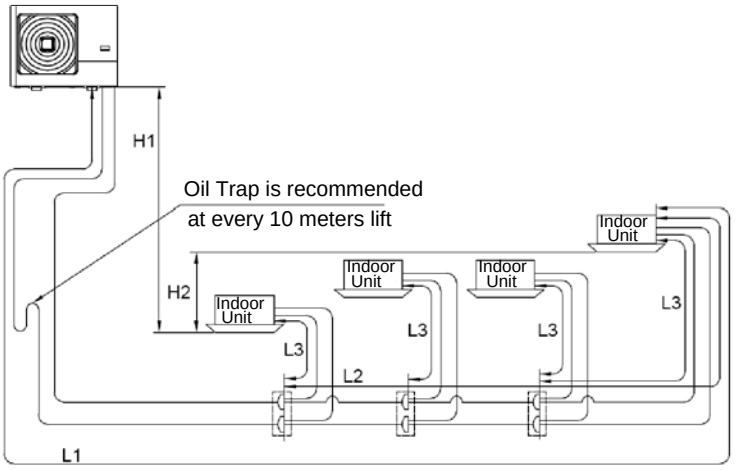
Table 5.1 Limitation of Outdoor Unit

Length / Model	Outer Diameter and Piping Size (mm)		Maximum Piping Length	Multi–Kit Model
	Gas	Liquid		
RAS– 3HRNM1Q	ϕ15.88	ϕ9.53	Actual Length≤40m	E–102SN
RAS– 4HRNM1Q			Actual Length≤60m	
RAS– 5HR(Y)NM1Q				

(2) Piping System

<Multi–kit to Indoor Unit>

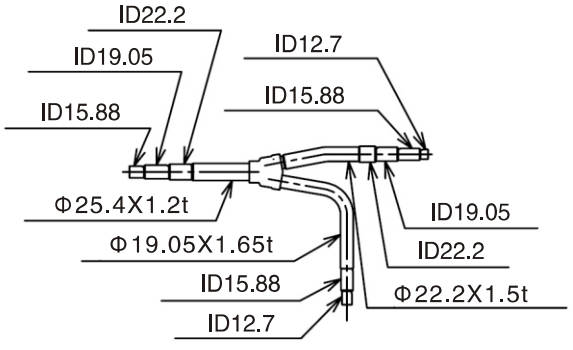
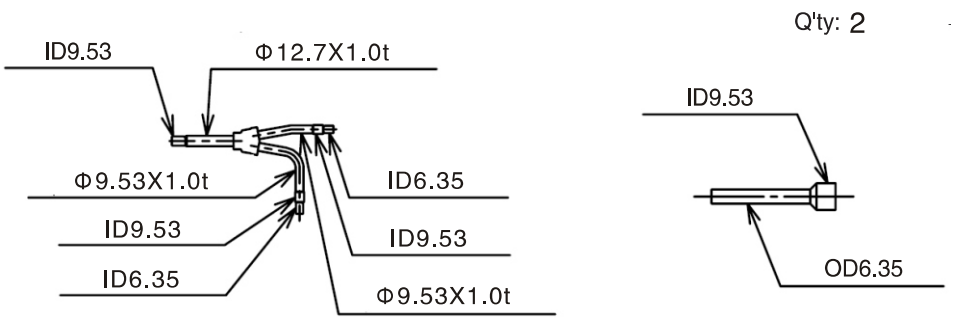
Indoor Unit Capacity(HP) / Piping Size	Gas/Liquid (Φmm)
0.8~1.5	12.7/6.35
1.8~2.0	15.88/6.35
2.3~6.0	15.88/9.53



Item		Applicable Range
Ref.Pipe Length：L1	RAS–3HRNM1Q	Within 30 m
	RAS–4HRNM1Q	Within 50m
	RAS–5HR(Y)NM1Q	Within 50m
Piping Length from 1st Branch to each I.U.：L2	RAS–3HRNM1Q	Within 10m
	RAS–4HRNM1Q	Within 20m
	RAS–5HR(Y)NM1Q	Within 20m
Piping Length from each Branch to I.U.：L3	RAS–3HRNM1Q	Within 5 m
	RAS–4HRNM1Q	Within 10m
	RAS–5HR(Y)NM1Q	Within 10m
Lift between I.U.and O.U.：H1	O.U.is Higher	Within 30m
	O.U.is Lower	Within 20m
Total Length of I.U.Piping		Within 3.5m

Table 5.2 Multi–Kit for Line Branch

Unit: mm， ID: Inner Diameter OD:Outer Diameter

Multi–Kit	E–102SN
Gas Line	
Liquid Line	

5.3 Piping Connection

Pipes can be connected from 4 directions.

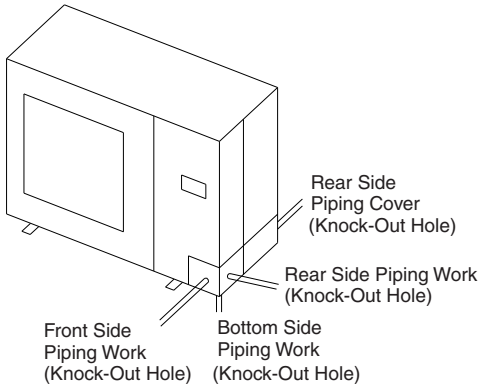
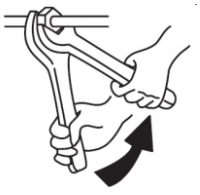


Fig. 5.1 Piping Direction

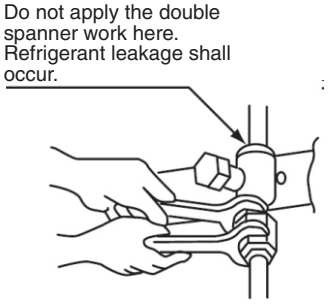
(1) Confirm that the valve is closed.

(2) Prepare a field-supplied bend pipe for liquid line. Connect it to the liquid valve by flare nut through the square hole of bottom base.

(3) For Gas Piping Connection
Prepare a field-supplied bend pipe for gas line. Braze it and the factory-supplied pipe flange at the outside of the unit.



Double Spanner Work

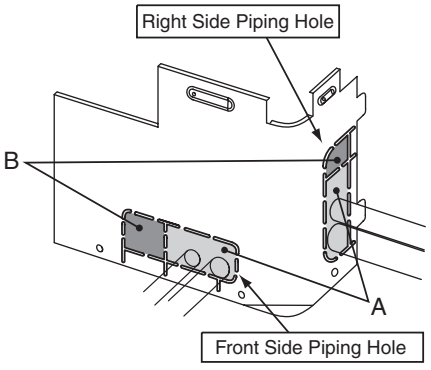


Tightening Work for Stop Valve

Pipe Size	Tightening Torque for Flare Nut
Φ6.35(1/4)	20N・m (2kgf・m)
Φ9.53(3/8)	40N・m (4kgf・m)
Φ12.7(1/2)	60N・m (6kgf・m)
Φ15.88(5/8)	80N・m (8kgf・m)

(5) Pipes can be connected from 4 directions as shown Fig. 5.1. 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 screwdriver and a hammer.
Then, cut the edge of the holes and attach insulation (Field-Supplied) for cables and pipes protection.

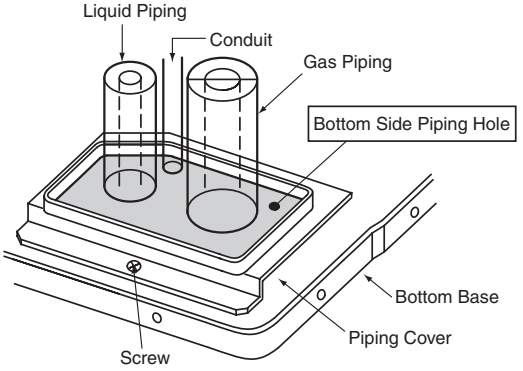
(a) Front and Right Side Piping Work
Select the correct knock-out size depending on whether it is for power wiring or transition wiring.



It is available to correct the liquid or gas piping, power wiring less than 14mm^2 and transition wiring from “A” part.

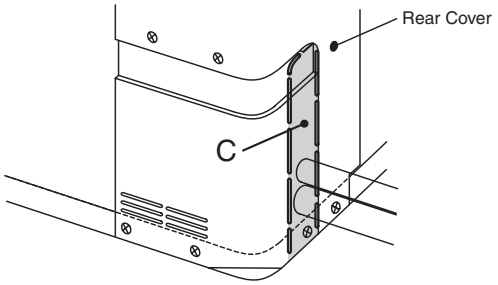
NOTE:
When using conduit, check to the tube size before removing “B” part.

(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 Piping Work
After removing rear piping cover, punch out the “C” holes along the guide line.



NOTE:
To avoid damage protect cables and pipes with adequate insulation (Field-Supplied).

(6) To prevent gaps use a rubber bush and insulation (Factory-Supplied) adequately when installing the piping cover. Cut the lower side guide line of the piping cover when attaching work is difficult. If not, it will be included water in the unit and electrical parts will be damaged.

(7) Use a pipe bender or elbow (Field-Supplied) for bending work when connecting pipe.

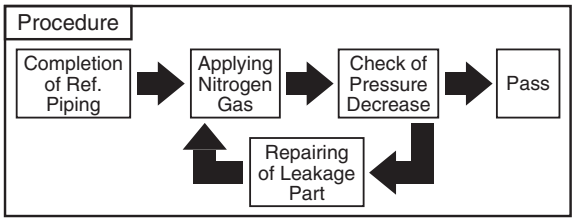
5.4 Air Tight Test

(1) The stop valve has been closed before shipment, however, make sure that the stop valves are closed completely.

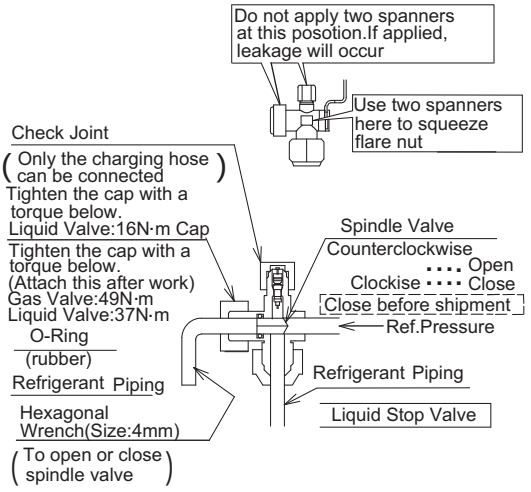
(2) Connect the indoor unit and the outdoor unit with field-supplied refrigerant piping.
Suspend the refrigerant piping at certain points and prevent the refrigerant piping from touching the weak part of the building such as wall, ceiling, etc.
(If touched, abnormal sound may occur due to the vibration 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.
Lubrication Oil is field-supply.

Model: FVB68D (Ether Oil)
Manufacturer: IDEMITSU KOSAN Co., Ltd.



(4) Stop Valve
Operation of the stop valve should be performed according to the below.



Spindle Valve Torque (N-m)

Gas	Liquid
9～11	7～9

Hexagonal Wrench Size (mm)

Gas	Liquid
5	4

⚠CAUTION

- **Do not apply an abnormal big force to the spindle valve at the end of opening (5.0N-m or smaller).**
  The back seat construction is not provided.
- **Do not loosen the stop ring. If the stop ring is loosened, it is dangerous, since the spindle will hop out.**
- **At the test run, fully open the spindle.**
  If not fully opened, the devices will be damaged.

(5) Connect the gauge mani-fold using charging hoses with 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.

(6) Check for any gas leakage at the flare nut connections, or brazed parts by gas leak detector or foaming agent.

(7) After the air tight test, release nitorogen gas.

5.5 Vacuum Pumping

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

Continue vacuum pumping work until the pressure reaches 760mmHg or lower for one to two hours.

(2) After vacuum pumping work, stop the mani-fold valve's valve, stop the vacuum pump and leave it for one hour. Check to ensure that the pressure in the mani-fold gauge does not increase.

(3) Fully open the gas valve and liquid valve.

(4) Add refrigerant according to the piping diameter and piping length in the field connecting.

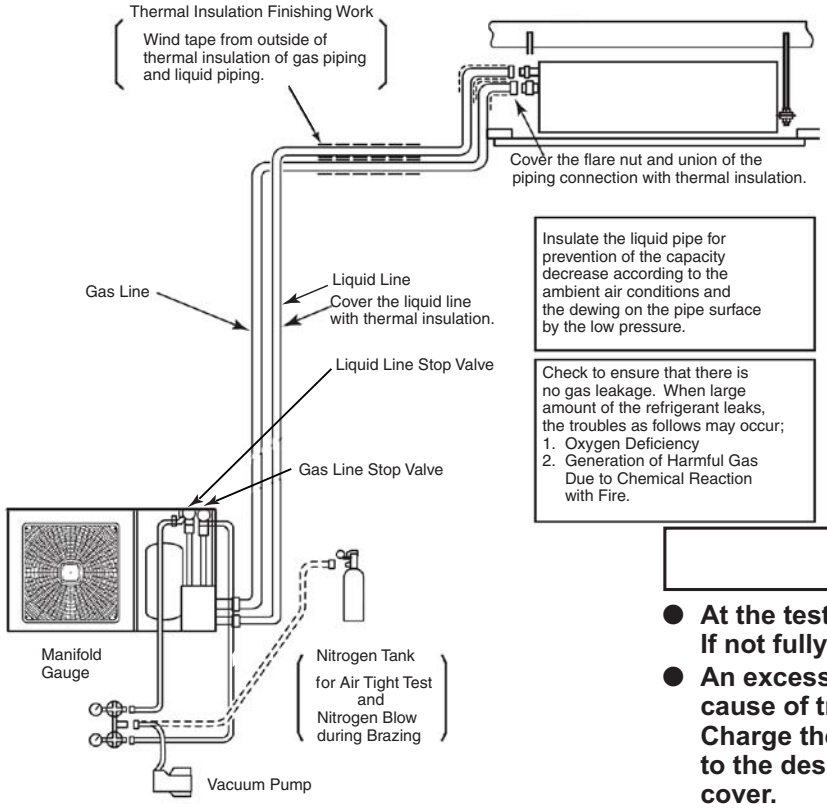
(5) Check for any gas leakage by gas leak detector or forming agent. Use the foaming agent which does not generate the ammonia (NH_3) by chemical reaction. The recommended forming agent are as shown below. Do not use general household detergent for checking.

Foaming Agent	Manufacturer
SNOOP	NUPRO (U.S.A.)
Gupoflex	YOKOGAWA & CO., LTD

NOTES:

1. When the spindle cap for stop valve is removed, the gas accumulated at O-ring or screws is released and may make sound. This phenomenon is NOT a gas leakage.
2. This unit is only for the refrigerant R410A. The manifold gauge and the charging hose should be exclusive use for R410A.
3. If vacuum degree of -0.1MPa (760mmHg) is not available, it is considered of gas leakage or entering moisture. Check for any gas leakage once again. If no leakage exists, operate the vacuum pump for more than one to two hours.

Never use the refrigerant charged in the outdoor unit for air purging. Insufficient refrigerant will lead to failure.



⚠CAUTION

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

(6) Additional Refrigerant Charge

It is necessary additional refrigerant charge as follows.

Additional Refrigerant Charge Calculation

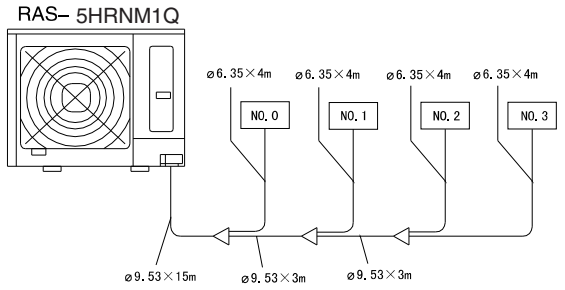
Although refrigerant has been charged into this unit, it is required that additional refrigerant be charged according to piping length.

A. Determine an additional refrigerant quantity according to the following procedure, and charge it into the system.

B. Record the additional refrigerant quantity to facilitate service activities thereafter.

1. Calculating Method of Additional Refrigerant Charge (W kg)

<Example>



<Table 1>

(kg)

Outdoor Unit	W0: Outdoor Unit Ref. Charge
RAS– 3HRNM1Q	2.50
RAS– 4HRNM1Q	3.00
RAS– 5HR(Y)NM1Q	3.00

NOTE:
W0 is outdoor unit ref. charge before shipment.

See Example for Model RAS-5HRNMQ, and fill in the following table.

Pipe Diameter (mm)	Total Piping Length (m)	Additional Charge (kg)
Φ9.53....	(15+3+3)	×0.04 = 0.84
Φ6.35....	(4+4+4+4)	×0.02 = 0.32

Total Piping Length 37m Additional Charge W1 = 1.16 (kg)

Total Ref.Charge W=W1+W0

=3.00+1.16=4.16 (kg)

Pipe Diameter (mm)	Total Piping Length (m)	Additional Charge (kg)
Φ9.53....	____	×0.04 = ____
Φ6.35....	____	×0.02 = ____

Total Piping Length ____ m Additional Charge W1 = ____ (kg)

Total Ref.Charge W=W1____+W0____ =____(kg)

NOTE:
Additional refrigerant charge of the pipe diameter Φ9.53 are 0.03kg/m for model RAS-3HR(Y)NM1(Q) and 0.04kg/m for model RAS-4~5HR(Y)NM1(Q).
It is 0.02kg/m for the pipe diameter Φ6.35 of all units

2. Charging Work

Charge refrigerant (R410A) into the system as follows.

(1) For charging refrigerant, connect the gauge mani-fold using charging hoses with a refrigerant cylinder to the check joint of the liquid line stop valve.

(2) Fully open the gas line stop valve and slightly open the liquid line stop valve. Charge refrigerant by opening the gauge mani-fold valve.

(3) Charge the required refrigerant by operating the system in cooling. Ensure to charge correct volume by utilizing a weight scale. An excess or shortage of refrigerant is the main cause of trouble to the units. Fully open the liquid line stop valve after completing refrigerant charge.

3. Record of Additional Charge

Record the refrigerant charging quantity in order to facilitate maintenance and servicing activities.

Total refrigerant charge of this system is calculated in the following formula.

Total Ref. Charge of This System = W1 + W0

This System = ____ + ____ = ____ kg

Total Additional Charge	____ kg
Total Ref. Charge of This System	____ kg
Date of Ref. Charge Work	
Day ____ Month ____ Year ____	

⚠CAUTION

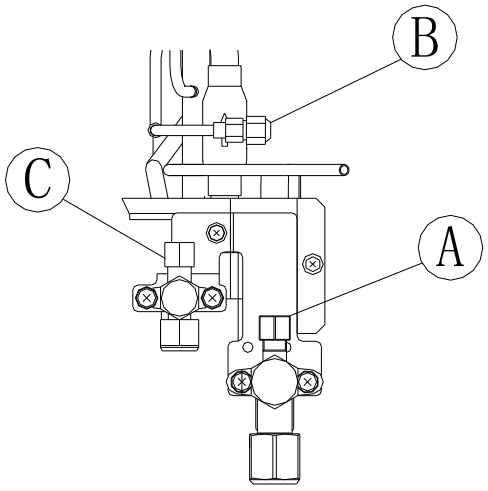
Slim celing ducted type indoor unit 1.3/1.5HP, because the capacity of the indoor unit is small,additional one of the indoor unit, the additional refrigerant need to reduce 150g.(If the calculation of the additional charge of less than 150g, then don't need to add refrigerant, also don't need to release from the outdoor unit .)

5.6 Caution of the Pressure by Check Joint

When the pressure is measured, use the check joint of gas stop valve ((A) in the figure below) and use the check joint of liquid piping ((B) in the figure below).
At that time, connect the pressure gauge according to the following table because of high pressure side and low pressure side changes by operation mode.

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

NOTE:
Be careful that refrigerant and oil do not splash to the electrical parts when removing the charge hoses.



1. Maximum Permissible Concentration of HFC GAS R410A ,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 HCFC gas, R410A in air is 0.3kg/m^3, 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 0.3kg/m^3, in case of leakage.

2. Calculation of Refrigerant Concentration
   (1) Calculate the total quantity of refrigerant R (kg) charged in the system connecting all the indoor units of objective rooms.
   (2) Calculate the room volume V (m^3) of each objective room.
   (3) Calculate the refrigerant concentration C (kg/m^3) of the room according to the following equation.

$$\frac{\text{R: Total Quantity of Charged Refrigerant (kg)}}{\text{V: Room Volume (m}^3\text{)}} = \text{C: Refrigerant Concentration} \leq 0.3\ (\text{kg/m}^3)$$

   If local codes or regulations are specified, follow them.

5.7 Collecting Refrigerant

When the refrigerant should be collected into the outdoor unit due to indoor/outdoor unit relocation, collect the refrigerant as follows.

(1) Attach the manifold gauge to the gas stop valve and the liquid stop valve.

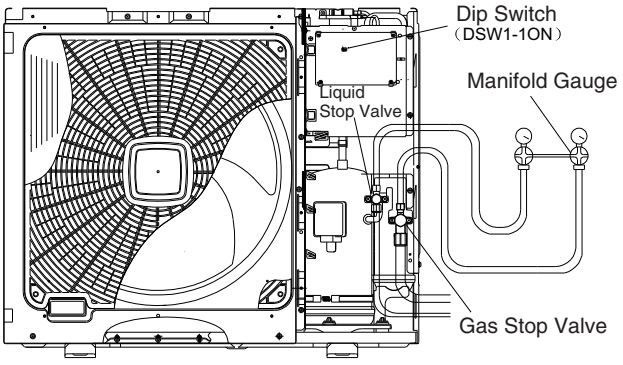
(2) Turn ON the power source.

(3) Set the DSW1-1 pin of the outdoor unit PCB at the “ON” side for cooling operation. Close the liquid stop valve and collect the refrigerant.

(4) When the pressure at lower pressure side (gas stop valve) indicates -0.01MPa (684mmHg), perform the following procedures immediately.

* Close the gas stop valve.
* Set the DSW1-1 pin at the “OFF” side. (To stop the unit operation.)

(5) Turn OFF the power source.



⚠CAUTION

Measure the low pressure by the pressure gauge and keep it not to decrease than -0.01MPa.If the pressure is lower than -0.01MPa,the compressor may be faulty.

6. Electrical Wiring

⚠WARNING

- **Turn OFF the main power switch to the indoor unit and the outdoor unit and wait for more than 1 minute 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 at the worst, a fire will occur.
- **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, a fire will occur.

⚠CAUTION

- **Tightly secure the power source wiring using the cord clamp inside the unit.**

NOTE

Fix the rubber bushes with adhesive when conduit tubes to the outdoor unit are not used.

6.1 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. Make sure that the components comply with National Electrical Code (NEC).

(2) Check to ensure that the voltage of power supply is within ±6% of nominal voltage and earth phase is contained in the power supply wires. If not, electrical parts will be damaged.

(3) Check to ensure that the capacity of power supply is enough.
If not, the compressor will be not able to operate because of abnormal voltage drop at starting.

(4) Check to ensure that the earth wire is connected.

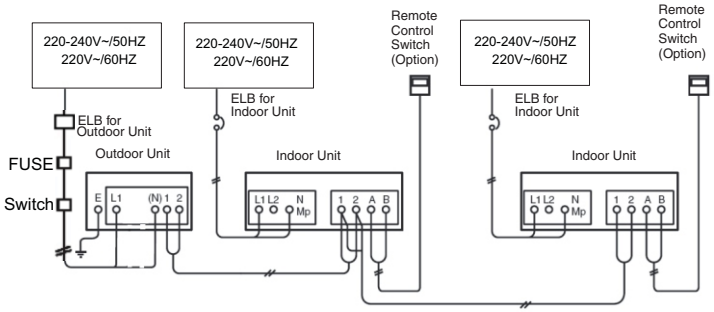
(5) Check to ensure that the electrical resistance is more than 1 megohm, by measuring the resistance between ground and the terminal of the electrical parts.
If not, do not operate the system until the electrical leakage is found and repaired.

6.2 Electrical Wiring Connection

(1) Connect the power supply wires to the terminal board in the electrical control box of both outdoor unit and indoor unit. And connect the earth wire to the electrical control box of outdoor unit.
In addition, connect the earth wire to earth screw in the electrical control box of indoor unit. Refer to Fig. 6.2-Fig.6.5

(2) Connect the wires between the outdoor and indoor units to terminals 1 and 2 on the terminal board.
If power supply wiring is connected to 1 and 2 of terminal board (TB1), printed circuit board will be damaged.

CORRECT(1N~)



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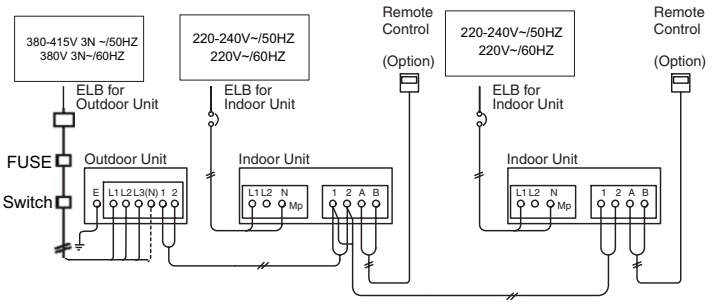
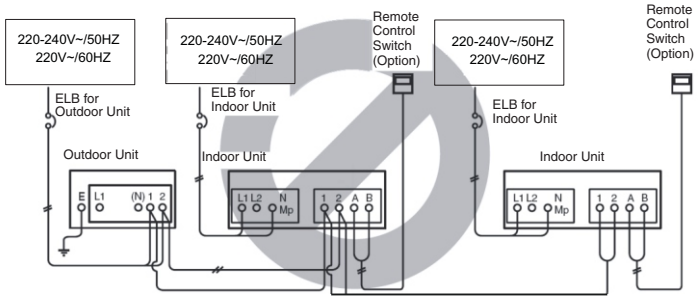
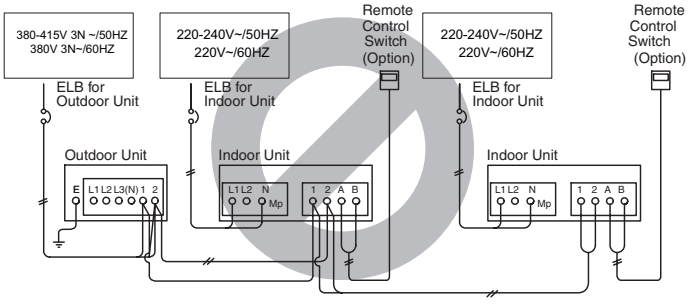


INCORRECT



INCORRECT



Do not connect the Power Source Line to the terminal 1 and 2.
These terminals are for the Control Line.
If connected, the printed circuit board will be damaged.

(3) Do not wire in front of the fixing screw of the service panel. Otherwise, the screw can not be removed.

(4) In case that the power source is 240V, change CN1 (connector) to CN2 of transformer in the electrical control box as shown in Fig. 6.1.

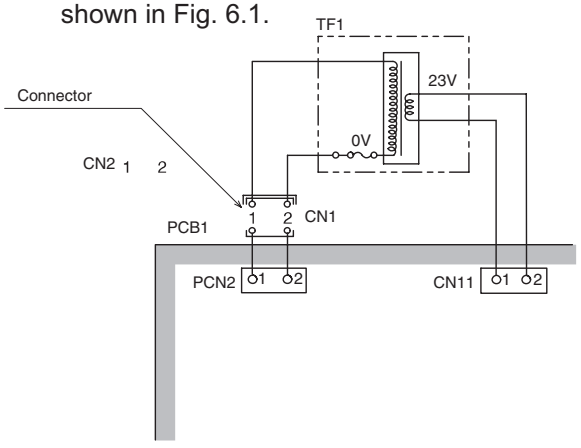


Fig. 6.1 Connector of Transformer of Outdoor Unit

(5) Connect the electrical wires between the indoor unit and the outdoor unit, as shown in Fig. 6.2, Fig. 6.3,Fig. 6.4 and Fig.6.5. Check to ensure that the terminal for power source wiring of each terminal board: AC220-240V between the indoor unit and the outdoor unit coincide correctly. If not, some component will be damaged.

(6) Use shielded twist pair for control between outdoor unit and indoor unit, control wiring between indoor units, Connect the wires between the outdoor and indoor units to terminals 1 and 2 on the terminal board.

NOTES:

1. In case of total wiring length at intermediate wiring between outdoor unit and indoor unit and between indoor units is less than 100m, it is possible to use the normal wiring (more than 0.75mm^2) except shielded twist pair.
2. Total wiring length for remote control switch can be extended up to 500m.
If total wiring length less than 30m, it is possible to use the normal wiring (0.3mm^2) except shielded twist pair.

⚠CAUTION

In Case of 3 Phases 4 Wires Type
The power source has to be applied from L1 line and N line. If applied from L1-L2, L1-L3, the electrical parts will be damaged to outdoor unit and indoor unit.

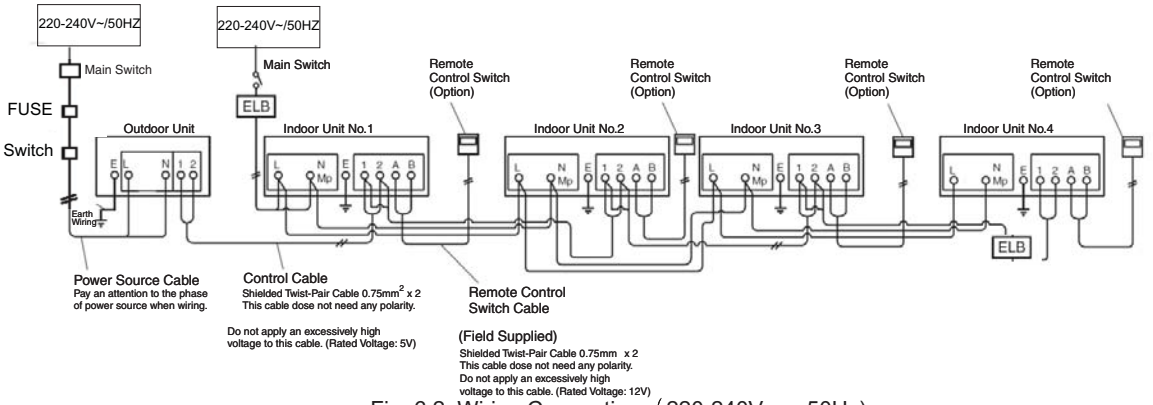


Fig. 6.2 Wiring Connection (220-240V ~ 50Hz)

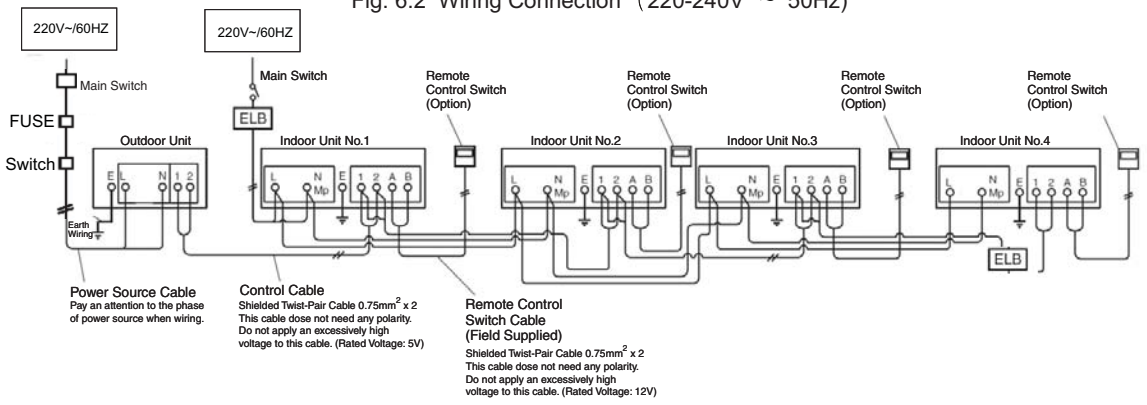


Fig. 6.3 Wiring Connection (220V~ 60Hz)

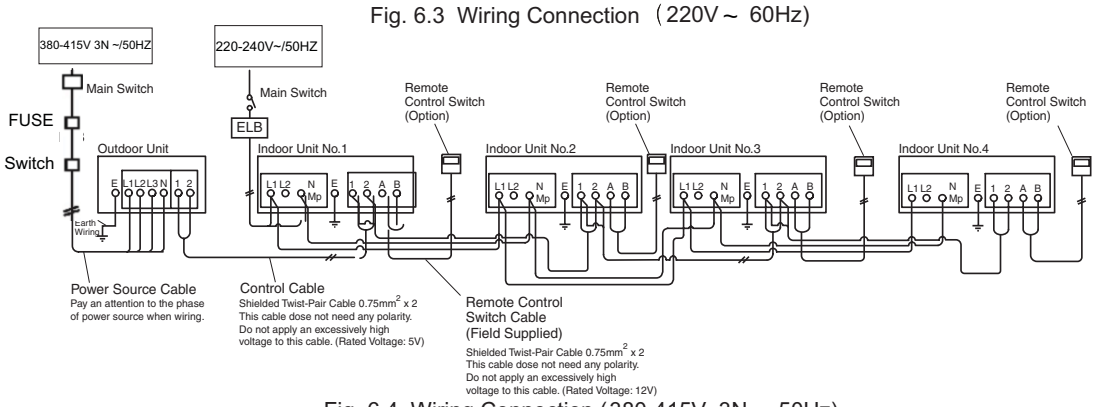


Fig. 6.4 Wiring Connection (380-415V 3N~ 50Hz)

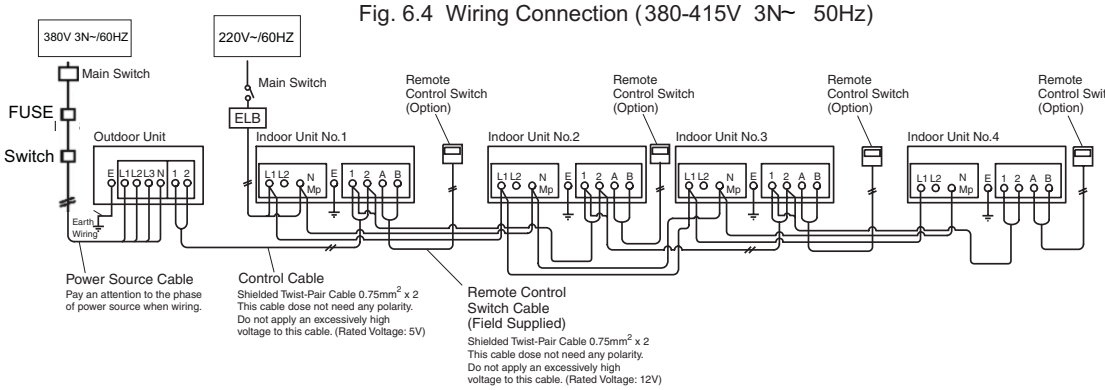


Fig. 6.5 Wiring Connection (380V 3N~ 60Hz)

⚠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.**
  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
  Keep the above tightening torque when wiring work.

(7) The recommended breaker sizes etc. are shown in Table 6.1.

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

Table 6.1 Electrical Data and Recommended Wiring, Breaker Size/1 Outdoor Unit

Model	Power Supply	Maximum Running Current (A)	Power Source Cable Size EN60335-1 *1 (mm^2)	ELB		Fuse (A)
				Nominal Current (A)	Nominal Sensitive Current /(mA)	
RAS-3HRNM1Q	220-240V~/50HZ 220V~/60HZ	19.5	4.0	30	30	30
RAS-4HRNM1Q		26.0	4.0	40	30	40
RAS-5HRNM1Q		26.0	4.0	40	30	40
RAS-5HYNM1Q	380-415V 3N ~/50HZ 380V 3N~/60HZ	16.2	2.5	25	30	25

ELB: Earthleakage Breaker

■Field Minimum Wire Size for Power Source

Model	Power Supply	Maximum Running Current (A)	Power Source Cable Size	Transmitting Cable Size
			EN 60335-1	EN 60335-1
RAS-3HRNM1Q	220-240V~/50HZ 220V~/60HZ	19.5	4.0mm^2	0.75mm^2
RAS-4HRNM1Q		26.0	4.0mm^2	
RAS-5HRNM1Q		26.0	4.0mm^2	
RAS-5HYNM1Q	380-415V 3N ~/50HZ 380V 3N~/60HZ	16.2	2.5mm^2	0.75mm^2

NOTES:

(1) Follow local codes and regulations when selecting field wires.

(2) The wire sizes marked with *1 in the table are selected at the rated current of the unit according to the European Standard ,EN60 335-1,Use the wires which are not lighter than the ordinary tough rubber sheathed fixible cord (cord designation H05RN-F)or ordinary polychloroplene sheathed flexible cord. (cord designation H05RN-F)

(3) Use a shielded cable for the transmitting circuit and connect it to ground.

(4) In the case that power cables are connected in series add each unit rated current and select wires below.

Table 6.2 Wire Selection Criterion

According to EN60335-1	
Current(A)	Wire Size(mm^2)
i≤3	1~2.5
3<i≤6	1~2.5
6<i≤10	1~2.5
10<i≤16	1.5~4
16<i≤25	2.5~6
25<i≤32	4~10
32<i≤50	6~16
50<i≤63	10~25

*: In the case that current exceeds 63A,Don't series connection

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

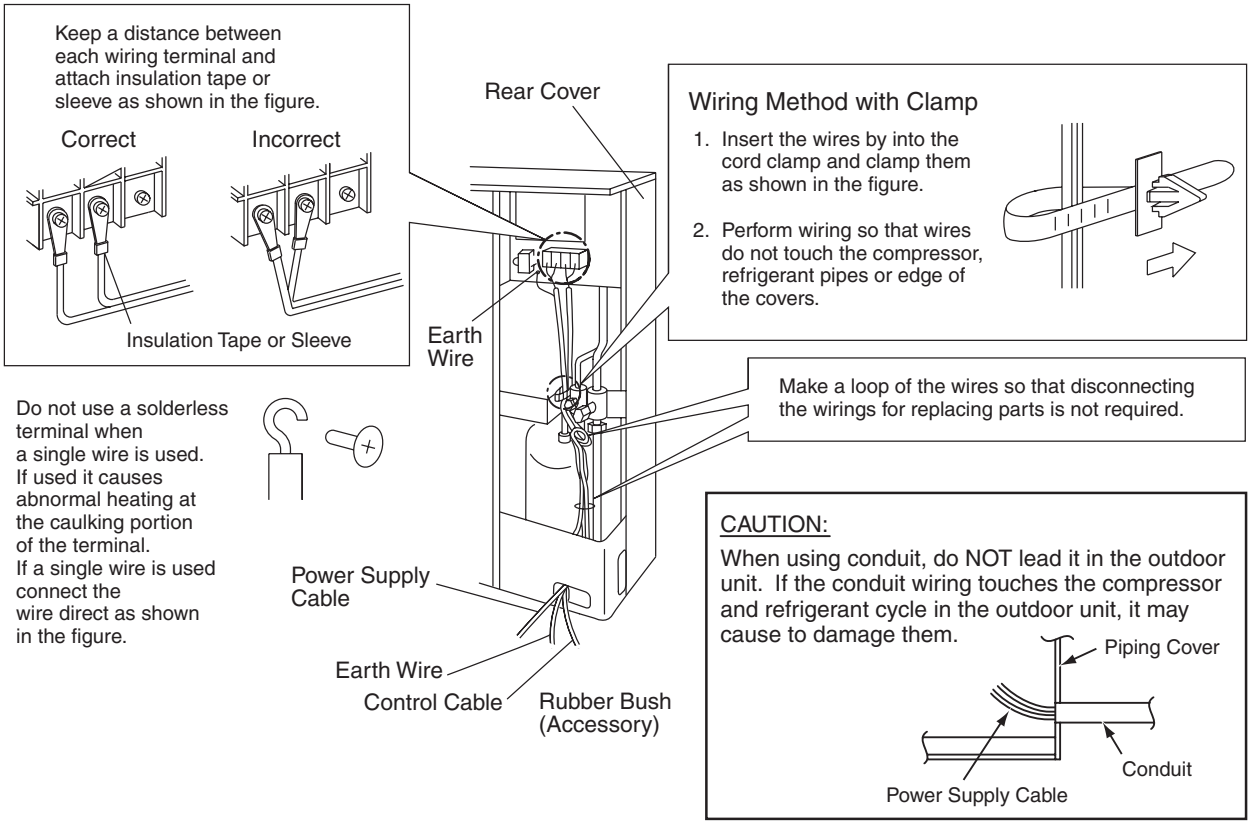


Fig. 6.6 Wiring Connection of Outdoor Unit

■ Field Minimum Wire Sizes for Power Source of Indoor Unit

- Connect S/I series indoor unit.
- Use an ELB (Electric Leakage Breaker). If not used, it will cause an electric shock or a fire.
- Do not operate the system until all the check points have been cleared.

NOTES:

1) Follow local codes and regulations when selecting field wires.
2) The power cable *1 stated above is chosen according to the maximum current value stipulated in GB4706.1-1998. The size of the power cable over 63A is referred to other standards.
3) Use a shielded cable for the transmitting circuit and connect it to ground.
4)In the case that power cables are connected in series, add each unit maximum current and select wires by Table6.2 .

⚠CAUTION

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

7. Test Run

Test run should be performed according to the Table 7.2 on page 24. And use the Table 7.1 on page 23 for recording test run.

⚠WARNING

- **Do not operate the system until all the check points have been cleared.**
  - **(A) 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.**
  - **(B) Check to ensure that the stop valves of the outdoor unit are fully opened, and then start the system.**
  - **(C) Check to ensure that the switch on the main power source has been ON for more than 12 hours, to warm the compressor oil by the oil heater.**
- **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.**

Table 7.1 Test Run and Maintenance Record

MODEL:	SERIAL. No.	COMPRESSOR MFG. No.
CUSTOMER'S NAME AND ADDRESS:		DATE:

1. Is the rotation direction of the indoor coil fan correct? ☐
2. Is the rotation direction of the outdoor coil fan correct? ☐
3. Are there any abnormal compressor sounds? ☐
4. Has the unit been operated at least twenty (20) minutes? ☐
5. Check Room Temperature

Inlet:	No. 1	DB	/WB	°C,	No. 2	DB	/WB	°C,	No.3	DB	/WB	°C,	No.4	DB	/WB	°C
Outlet:		DB	/WB	°C,		DB	/WB	°C,		DB	/WB	°C,		DB	/WB	°C

6. Check Outdoor Ambient Temperature

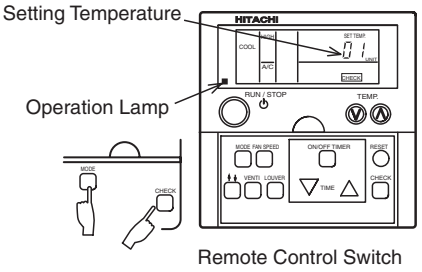
Inlet:	DB	°C,	WB	°C
Outlet:	DB	°C,	WB	°C

7. Check Refrigerant Temperature
   - Liquid Temperature: ____ °C
   - Discharge Gas Temperature: ____ °C
8. Check Pressure
   - Discharge Pressure: ____ MPa
   - Suction Pressure: ____ MPa
9. Check Voltage
   - Rated Voltage: ____ V
   - Operating Voltage: ____ V,
   - Starting Voltage: ____ V
10. Check Compressor Input Running Current
    - Input: ____ kW
    - Running Current: ____ A
11. Is the refrigerant charge adequate? ☐
12. Do the operation control devices operate correctly? ☐
13. Do the safety devices operate correctly? ☐
14. Has the unit been checked for refrigerant leakage? ☐
15. Is the unit clean inside and outside? ☐
16. Are all cabinet panels fixed? ☐
17. Are all cabinet panels free from rattles? ☐
18. Is the filter clean? ☐
19. Is the heat exchanger clean? ☐
20. Are the stop valves open? ☐
21. Does the drain water flow smoothly from the drain pipe? ☐

Table 7.2 Checking of Wire Connection by Test Run

NOTE: "TEST RUN" shall be performed with each refrigerant cycle (each outdoor unit).

(1) Turn ON the power source of the units.
(2) Procedure for "TEST RUN" mode of remote control switch.
Depress the "MODE" and the "CHECK" switches together for more than 3 seconds.



→ If "TEST RUN" and the counting number of the connected units with the remote control switch (for example "05") are indicated on the remote control switch, the connection of remote control cable is correct.

→ If no indication appears or the number of the units indicated is smaller than the actual number of the units, some abnormalities exist.

(3)

Remote Control Switch Indication	Wrong Portions	Inspection Points after the Power Source OFF
No Indication	* The power source of outdoor unit is not turned ON. * The connection of the remote control cable is incorrect. * The connecting wires of power supply line are incorrect or loosed.	1. Connecting Points of Remote Control Cable Terminal Board of Remote Control Switch and Indoor Unit 2. Contact of Terminals of Remote Control Cable 3. Connecting Order of each Terminal Boards 4. Screw Fastening of each Terminal Boards
Counting number of connected units is incorrect.	* The power source of outdoor unit is not turned ON. * The operating line wiring between indoor unit and outdoor unit is not connected.	

Back to (1) after checking

(4) Select TEST RUNNING MODE by depressing "MODE" switch. (COOL or HEAT)
(5) Depress "RUN/STOP" switch.

→ The "TEST RUN" operation will be started. (The 2 hours OFF-TIMER will be set and the "TEST RUN" operation will be finished after 2 hours unit operation or by depressing the "RUN/STOP" switch again.)
NOTE:
The "TEST RUN" operation ignores the temperature limitation and ambient temperature during heating operation to have a continuous operation, but the protections are alive.
Therefore, the protection may activate when the heating "TEST RUN" operation is performed in high ambient temperature.

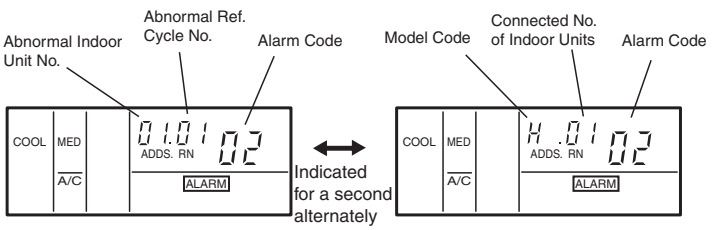
→ If the units do not start or the operation lamp on the remote control switch is flashed, some abnormalities exist.

(6)

Remote Control Switch Indication	Unit Condition	Wrong Portions	Inspection Points after the Power Source OFF
The operation lamp flashes. (1 time/1 sec.) And the Unit No. and Alarm Code "03" flash.	The unit does not start.	The power source of outdoor unit is not turned ON. The connecting wires of operating line are incorrect or loosed.	1. Connecting Order of each Terminal Boards 2. Screw Fastening of each Terminal Boards NOTE: Recovering method of FUSE for operating circuit. There is a fuse ("FUSE4" on Indoor Unit PCB1, "EF1" on Outdoor Unit PCB1) to protect operating circuit on the PCB, when the power lines are connected to operating lines. If fuse is melted, operating circuit can be recovered once by setting the dip switch on the PCB, as below. Indoor Unit PCB1 DSW7 ON OFF 1 2 * Set the switch #1 to ON position to recover the operation circuit.
The operation lamp flashes. (1 time/2 sec.)	The unit does not start.	Remote control cable is broken. Contact of connectors is not good. The connection of remote control cable is incorrect.	This is the same as items (3)-1 and 2.
Indication or flash except above.	The unit does not start, or starts once and then stops.	The connection of the thermistors or other connectors are incorrect. Tripping of protector exists, or elses.	Check by the abnormality mode table 7.3 and table 7.4. (Do it by service people.)
The operation lamp flashes. (1 time/1 sec.) And the Unit No. ***00***. Alarm Code ***dd*** and Unit Code ***E.00*** flash.	The unit does not start.	The connection of the remote control cable between indoor units is incorrect.	Check by the abnormality mode table 7.3 and table 7.4. (Do it by service people.)

Back to (1) after checking

● Alarm Code Indication of Remote Control Switch



Model Code

Indication	Model
H	Heat-pump
P	Inverter
F	Multi
C	Cooling Only
E	Others

Table 7.3 Alarm Code (RAS-3HRNM1(Q))

Code No.	Category	Content of Abnormality	Leading Cause
01	Indoor Unit	Activating of Protection Device	High Water Level in Drain Pan, Activated Float Switch.
02	Outdoor Unit	Activating of Protection Device (Except Alarm Code 41 and 42)	Activated High Pressure Switch. Locked Motor in Cooling Operation. Abnormality of Power Supply Phase
03	Transmission	Abnormality between Indoor and Outdoor	Incorrect Wiring. Loose Terminals, Disconnected wire, Tripping of Fuse.
04		Abnormality between Inverter and Control PCB	Failure in Transmission of PCB for Inverter.
05	Supply Phases	Abnormality of Power Supply Phases (for 220V/60Hz Unit Only)	Abnormal Waveform of one or more the Supply Phases (Ex. Distortion of the Voltage Signal).
06	Voltage Drop	Voltage Drop by Excessively Low or High Voltage to Outdoor Unit	Voltage Drop of Power Supply Insufficient Capacity of Power Supply Wiring.
07	Cycle	Decrease of Discharge Gas Superheat	Discharge Gas SUPERHEAT less than 10 deg. is maintained for one hour.
08		Increase of Discharge Gas Temperature	Temperature of the top of Compressor: Td Td $\geq$ 127°C(Cooling), Td $\geq$ 120°C(Heating) over 10 minutes, or Td $\geq$ 140°C over 5 seconds.
11	Sensor on Indoor Unit	Inlet Air Thermistor	Failure of Thermistor, Loose Terminal, Disconnected Wire.
12		Outlet Air Thermistor	
13		Freeze Protection Thermistor	
14		Gas Piping Thermistor	
19		Tripping of Protection Device	Activated Internal Thermo of Fan Motor.
20	Sensor on Outdoor Unit	Compressor Thermistor	Failure of Thermistor, Loose Terminal, Disconnected Wire. Locked Motor in Heating Operation.
22		Outdoor Air Thermistor	
24		Evaporating Thermistor	
31	System	Incorrect Capacity of Outdoor and Indoor Unit	Incorrect Setting of Capacity Combination or Incorrect O.U. Capacity Setting.
35		Incorrect Indoor Unit No. Setting	Duplication of Indoor Unit No.
38		Abnormality of Protective Circuit in outdoor Unit	Failure of Protection detecting Circuit
41	Pressure	Overload cooling (Possibility of high pressure device activation.)	O.U. Pipe Thermistor Temp. is Higher than 55°C and the Comp. Top Temp. is Higher than 95°C when O.U. Protection Device is activated.
42		Overload heating (Possibility of high pressure device activation.)	I.U. Freeze Protection Thermistor Temp. is Higher than 55°C and the Comp. Top Temp. is Higher than 95°C when O.U. Protection Device is activated.
47		Activation of Low Pressure Decrease Protection Device	Stoppage by Excessively Decrease of evaporating Temperature (Te $\leq$ -35°C) is activated 3 times in one hour, Locked Motor in Heating Operation.
51	Inverter	Abnormality of Current Sensor for Inverter	Failure of Control PCB1, IPM or PCB2
52		Overcurrent Protection Activation	Failure of IPM or PCB2, Clogging of Heat Exchanger.
53		Protection Activation of IPM or PCB2	IPM or PCB2 Abnormality Failure of Compressor, clogging of Heat Exchanger.
54		Inverter Fin Temperature Increase	Abnormal Inverter Fin Thermistor, Clogging of Heat Exchanger Abnormal Outdoor Fan
55		IPM or PCB2 Abnormality	Failure of IPM or PCB2
57	Outdoor Fan	Fan Motor Abnormality	Disconnected wire or Incorrect wiring between Control PCB and Inverter PCB. Incorrect Wiring or Fan Motor Abnormality
59	Inverter	Thermistor of Inverter Fin Abnormality (for Inverter Fin Temp.)	Loose Connector, Disconnected Wire, Short Circuit
b1	Indoor Unit No. Setting	Incorrect Unit No. Setting	Over 64 I.U. Setting by Ref. No. or I.U. Address.
EE	Compressor	Compressor Protection Alarm	Failure of Compressor.

Table 7.4 Alarm Code (RAS-4/5HRNM1(Q) and RAS-5HYNM1(Q))

Code No.	Category	Content of Abnormality	Leading Cause
01	Indoor Unit	Activating of Protection Device	Activation of Float Switch, High Water Level in Drain Pan.
02	Outdoor Unit	Activating of Protection Device	Activation of PSH, Pipe Clogging. Excessive Ref., Inert Gas Mixing.
03	Transmission	Abnormality between I.U. and O.U./O.U. and O.U	Incorrect Wiring. Loose Terminals, Disconnected wire, Tripping of Fuse.
04		Abnormality between Inverter PCB and O.U.PCB	Transmission Failure (Loose Connector).
05	Supply Phases	Abnormal Power Source Phase	Incorrect Power Source Connection to Reversed-Phase, Open Phase
06	Voltage Drop	Abnormal Inverter Voltage	O.U.Voltage Drop Insufficient Power Capacity
07	Cycle	Decrease of Discharge Gas Temperature	Excessive Ref.Charge, Failure of Thermistor, Incorrect Wiring
08		Increase of Discharge Gas Temperature	Insufficient Ref.Charge, Pipe Clogging, Failure of Thermistor, Incorrect Wiring
09	Outdoor Unit	Activation of Protection Device for Indoor Unit Fan	Fan Motor Overheat, Locking.
11	Sensor on Indoor Unit	Inlet Air Thermistor	Incorrect Wiring, Disconnected Wiring
12		Outlet Air Thermistor	
13		Freeze Protection Thermistor	
14		Gas Piping Thermistor	
16		Remote Contorl Thermistor	
17		Remote Contorl Switch Thermistor	
21	Sensor on Outdoor Unit	High Pressure Sensor	Incorrect Wiring, Disconnected Wiring
22		Outlet Air Thermistor	
23		Discharge Gas Thermistor	
24		Evaporating Piping Thermistor	
29		Low Pressure Sensor	
31	System	Incorrect Capacity of O.U.and I.U.	Incorrect Setting of Capacity Combination
35		Incorrect Setting of I.U.No.	Duplication of Indoor Unit No.
36		Incorrect Combination of I.U.No.	Refrigerant of Indoor Unit No.
38		Abnormality of Protective Circuit in O.U.	Failure of Protection Detecting Circuit
43	Pressure	Activation of Low-Pressure Decrease Protection Device	Detective Compression(Failure of Compressor of Inverter,Loose Power Supply Connection)
44		Activation of Low-Pressure Increase Protection Device	Overload at Cooling High Temp.at Heating Locking (Loose Connector)
45		Activation of High-Pressure Increase Protection Device	Overload Operation(Clogging,Short-Pass), Pipe Clogging, insufficient Ref.Inert Gas Mixing
47		Activation of Low-Pressure Decrease Protection Device(Vacuum Operation)	Insufficient Ref.,Ref.Pipe Clogging, Locking(Loose Connector)
48	Inverter	Activation of Inverter Overvurrent Protection Device	Overload Operation, Comp.Failure
51		Abnormal Current Sensor	Current Sensor Failure
53		Inverter Error Signal Detection	Driver IC Error Signal Detection,(Protection for Overcurrent,Low Voltage, Short-Circuit)
54		Increase of Inverter Fin Temperature	Abnormal Inverter Fin Thermistor, Heat Exchanger Clogging,Abnormal Fan
55		Inverter Failure	Inverter PCB Failure
57	Outdoor Fan	Fan Motor Abnormality	Disconnected Wiring/Incorrect Wiring between Control PCB(PCB1) and Fan Relay PCB(PCB3,PCB5), Fan Motor Failure
EE	Compressor	Compressor Protection Alarm	Failure of Compressor
b1	Indoor Unit No. Setting	Incorrect of Address or Ref.Cycle setting	Over 64 NO.is set for Address or Ref.Cycle
b5	Indoor Unit No.Connected	Incorrect I.U.No. Connected	More than 17 Non-Corresponding to H-LINK 2 Units are Connected to One System

8. Safety and Contorl 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-3HRNM1Q	RAS-4HRNM1Q	RAS-5HRNM1Q	RAS-5HYNM1Q
For Compressor Pressure Switch			Automatic Reset,Non-Adjustable			
	Cut-Out	MPa	$4.15^{-0.05}_{-0.20}$	$4.15^{-0.05}_{-0.20}$	$4.15^{-0.05}_{-0.20}$	$4.15^{-0.05}_{-0.20}$
	Cut-In	MPa	$3.2^{+0.15}_{-0.20}$	$3.2^{+0.15}_{-0.20}$	$3.2^{+0.15}_{-0.20}$	$3.2^{+0.15}_{-0.20}$
For Control Pressure Switch	Cut-Out	MPa	2.85 ± 0.1	–	–	–
	Cut-In	MPa	$3.6^{0}_{-0.15}$	–	–	–
Fuse 220-240V ~/50HZ 220V ~/60HZ		A	32	50	50	–
Fuse 380-415V 3N ~/50HZ 380V 3N~/60HZ			–	–	–	25
CCP Timer Setting Time		min.	3	3	3	3
For Control Circuit Fuse Capacity on PCB1		A	5	5	5	5