

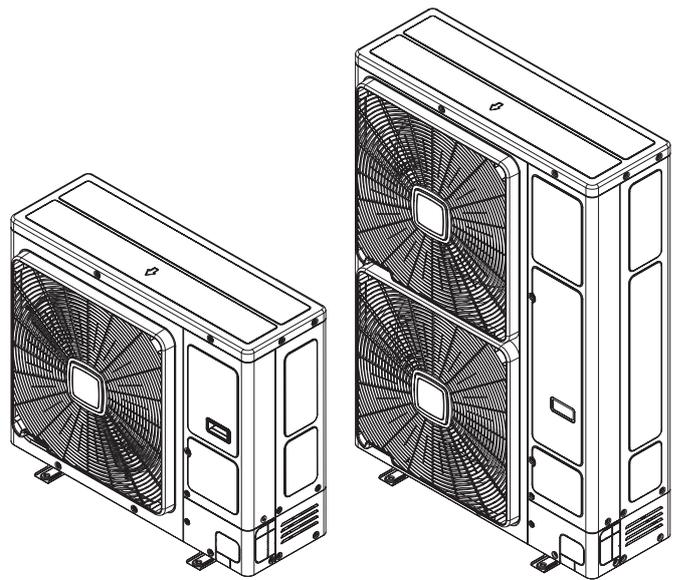
Installation & Maintenance Manual

*INVERTER-DRIVEN
MULTI-SPLIT SYSTEM
HEAT PUMP
AIR CONDITIONERS
- Set Free mini-HNRQ1 Series -*

Models:

Outdoor Units:

RAS-3.0HNBRKQ1	RAS-3.5HNBRKQ1
RAS-4.0HNBRKQ1	RAS-4.5HNBRKQ1
RAS-5.0HNBRKQ1	RAS-6.0HNBRKQ1
RAS-6.5HNBRKQ1	RAS-7.0HNBRMQ1
RAS-8.0HNBRMQ1	RAS-10HNBRMQ1
RAS-11HNBRMQ1	RAS-12HNBRMQ1



IMPORTANT:

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

P01627Q

Original Instructions

IMPORTANT NOTICE

- The company pursues a policy of continuous improvement in design and performance of products. The right is therefore reserved to vary specifications without notice.
- The company 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.
- Do not install the unit in the following places. It may cause a fire, deformation, corrosion or failure:
 - * Places where oil (including machinery oil).
 - * Places where a lot of sulfide gas drifts such as in hot spring.
 - * Places where inflammable gas may generate or flow.
 - * Places where strong salty wind blows or with an atmosphere of acidity or alkalinity such as coastal regions.
- Do not install the unit in the place where silicon gas drifts. If the silicon gas attaches to the surface of heat exchanger, the fin surface repels water. As a result, drain water splashes outside the drain pan and splashed water runs into electrical box. In the end, water leakage or electrical devices failure may occur.
- Pay attention to the following points when the unit is installed in a hospital or other facilities where electromagnetic wave generates from medical equipment.
 - * Do not install the unit in the place where the electromagnetic wave is directly radiated to the electrical box, wired controller cable or switch.
 - * Install the unit at least 3 meters away from electromagnetic wave such as a radio.
- Do not install the unit in the place where the breeze directly blows to the animals and plants. It could adversely affect the animals and plants.
- The installation and service engineering should be in accordance with the local laws and regulations.
- If you have any questions, contact your distributor or dealer.
- The installation of this air conditioner can only be carried out by dealers or specialists. If the user installs the air conditioner by himself, it may cause leakage, electric shock or fire.
- This manual gives a common description and information for this heat pump air conditioner and also for other models.
- To protect the environment, do not discard the product at will, the company can provide recycling services as per the relevant provisions of the country, and provide replaceable components as per national standards.
- This manual should be considered as a permanent part of the unit and should remain with it.
- No part of this manual may be reproduced without written permission.
- It is assumed that this heat pump air conditioner will be operated and serviced by English speaking people. If this is not the case, the customer should be added safety, caution and operating signs in the native language.
- This heat pump air conditioner has been designed for the following temperatures. Operate the heat pump air conditioner within this range.

		Temperature	DB: Dry Bulb, WB: Wet Bulb
		Maximum	Minimum
Cooling Operation	Indoor	32°C DB/23°C WB	21°C DB/15°C WB
	Outdoor	Stable 48°C DB Interval 48~52°C DB	-5°C DB*
Heating Operation	Indoor	27°C DB	15°C DB
	Outdoor	24°C DB/15°C WB	Stable -15°C WB Interval -20°C~-15°C WB

NOTE:

When RAS-7.0~12HNBRMQ1 outdoor units are connected with the RCIM-0.8FSN4 or RCD-0.8~1.0FSN3 or RCS-0.8~1.0FSN, if only one of these indoor unit is operating in cooling mode, the minimum outdoor temperature is limited to 5°C DB.

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.

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

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1. Safety Instructions

<Signal Words>

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

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

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

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

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

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



- Do not perform installation work, refrigerant piping work, drain pump, drain piping and electrical wiring connection without referring to our installation manual. If performed without following the instructions, it may result in a system leakage, electric shock or a fire.
- Do not pour water into the indoor or outdoor unit. These products are equipped with electrical parts. If poured, it will cause a serious electrical shock.
- Do not open the service cover and the PCB for the indoor and outdoor unit without turning OFF the main power supply, this may lead to serious safety accidents.
- Do not touch or adjust safety devices inside the indoor or outdoor units. If these devices are touched or readjusted, serious accidents may occur.
- Refrigerant leakage can cause difficulty with breathing due to insufficient air. If a refrigerant leakage is found, immediately turn OFF the main power supply, extinguish any open flame, and then contact the service dealer.
- Make sure to perform air-tight testing.
- The refrigerant R410A used in this product (fluorocarbon) is not flammable, non-toxic, and odourless. If there is refrigerant leakage, exposure to open flame produces toxic gases. Also, the refrigerant gas is heavier than air, if the area is filled with refrigerant gas, it may cause suffocation to the people in the vicinity. When conducting leak detection and air-tight testing, filling with oxygen, acetylene or flammable and toxic gas may cause explosion. Nitrogen is recommended for this test.
- The refrigerant safety leakage standard for construction and operation systems are determined as per local regulations or standards.
- Use a medium induction speed above ELB (Earth Leakage Breaker with action time of 0.1 seconds or less). Otherwise, this may cause electric shock or fire.
- Do not install the product in places where there is high density of oil mist, flammable gas, salt spray, or toxic gases (such as sulphide), and so on.
- During installation, connect the refrigerant pipe firmly before the compressor starts running. For maintenance, stop the compressor before moving, handling and removing the refrigerant pipe.
- Do not short-circuit the protective devices (such as pressure switches and so on) during operation. Otherwise it may cause a fire or explosion.
- The A-weighted emission sound pressure level do not exceeds 70 dB(A).

 **WARNING**

- Please do not use sprays such as pesticide, oil paint, hair spray or other flammable gases within 1 meter of the unit.
- If the circuit breaker acts or fuse acts frequently, please stop the system operation immediately and contact your local dealer or customer service.
- Ensure that the grounding wire is securely connected. If not, it may cause an electrical failure. Do not connect the grounding wire to the gas pipe, tap water pipe, lightning rod or telephone grounding wire.
- Use fuse of specified capacity.
- While you perform brazing, ensure that there are no combustibles around it. Please wear leather gloves while using refrigerant to prevent freezing.
- Prevent mice and other small animals from damaging the wiring and the electrical components. If unprotected parts are bitten, it may lead to fire.
- Securely connect and fix the wiring, do not apply external force on terminal blocks, this may cause the terminal to loosen and can cause a fire.
- Ensure that the foundation is robust enough to install the unit. If not, the appliance can fall and break.
- Do not install the unit in the presence of large amounts of oil, steam, organic solvents and corrosive gases (ammonia, sulphide and acid, etc.). Because corrosion may cause refrigerant leakage, electrical failure, performance degradation and unit damage.
- Please follow the installation manual and all the relevant provisions, standards for electrical construction. Otherwise, electric failure or fire may occur due to insufficient capacity or mismatch of specifications.
- Use specified wiring between the units and select the correct wiring between the appliances. Otherwise, it will cause an electrical malfunction or fire.
- Make sure that the terminals are tightened with the specified torque. Otherwise it will cause a fire or electrical fault at the terminal block.
- If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.
- If there is fire, please cut-off the power supply immediately.
- This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.
- Means for disconnection from the supply mains, which have a contact separation in all poles that provide full disconnection under overvoltage category III conditions, must be incorporated in the fixed wiring in accordance with the wiring rules.
- The appliance shall be installed in accordance with national wiring regulations.
- The maximum working pressure is 4.15MPa. This maximum working pressure shall be considered when connecting the outdoor unit to indoor units.
- The refrigerant used in the outdoor unit is R410A. Please refer to “Additional Refrigerant Charge” of this manual for the refrigerant charging.
- The outdoor unit shall only be connected to indoor units suitable for the same refrigerant (R410A).
- The unit is a partial unit air conditioner, complying with partial unit requirements of the International Standard, and must only be connected to other units that have been confirmed as complying with corresponding partial unit requirements of the International Standard.

NOTICE

- Do not tread on the product or place sundries on the product.
- Do not place or put any material on the product or inside 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.

NOTE:

- Please do not install indoor unit, outdoor unit, wired controller and wiring within 3m of strong electromagnetic radiation appliance (For example: medical device).
 - After a long time shut down, if you want to restart the appliance, please power the crankcase heating band to work 12 hours prior to operation.
 - Before switching on the outdoor unit, make sure that it is not covered by snow and ice.
 - The heat pump air conditioner may not work properly if:
 - * The power of the transformer which supplies power is equal or less than the electric power of the air conditioner.
 - * Power supply for high-power equipment is too close to the power wire of the air conditioner.
- Device*: (Ex) Lift, container crane, rectifier for electric railway, inverter power device, arc furnace, electric furnace, large-sized induction motor and large-sized switch. It consumes a large quantity of electrical power.
- In the case mentioned above, the power wire of the air conditioner generates a large induced surge voltage due to the abrupt change in the power consumption of the power equipment and the switch action.
- Therefore, to protect the power supply to the system, before performing electric construction, please carefully check the field installation specifications and standards.
 - It is recommended to ventilate the room every 3 to 4 hours.
 - Reduction in heat pump air conditioner heating capacity is observed due to the degradation of outdoor environmental temperature. Therefore, in some low temperature areas, it is recommended to use auxiliary heating device while installing heat pump air conditioner.
 - Only a professional maintenance personnel can perform maintenance work for this air conditioner.

2. Before Installation

2.1 Necessary Tools and Instrument List for Installation

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

It is recommended to use specially designated tools for handling R410A refrigerant.

■: Interchangeability is available with current R22

●: Only for Refrigerant R410A (No Interchangeability with R22)

⊙: Prohibited

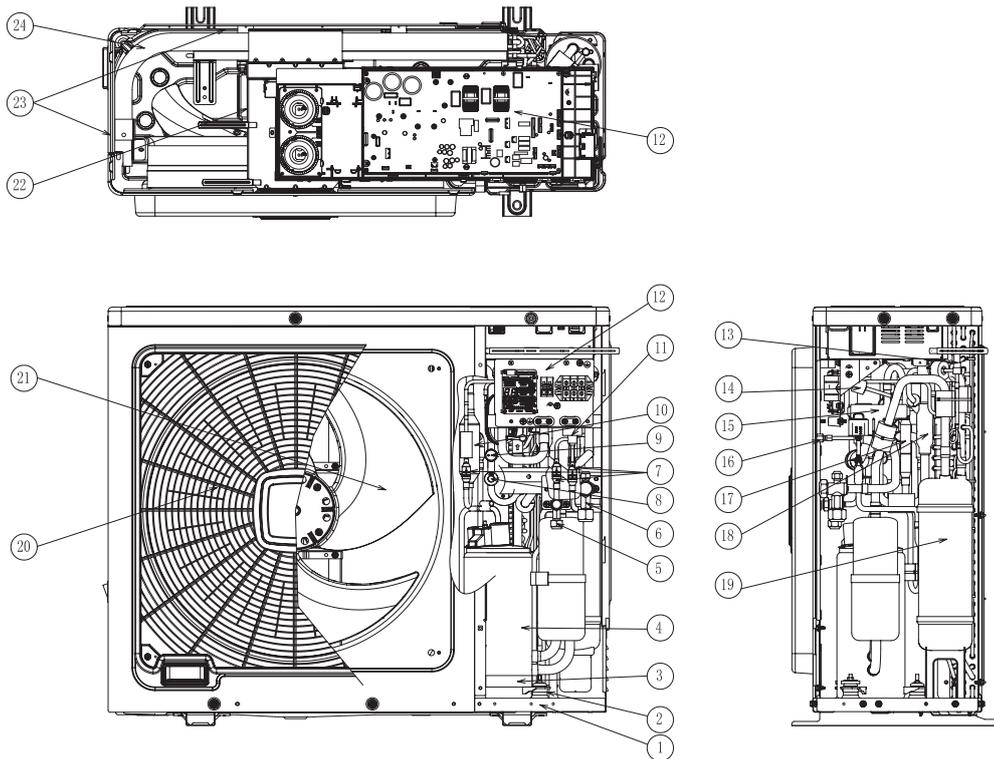
★: Only for Refrigerant R407C (No Interchangeability with R22)

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 R107C are applicable to R22. *If using flaring tube, make dimension of tube larger for R410A. *In case of hard temper pipe, flaring is not available.	Flaring for Tubes
	Extrusion Adjustment Gauge	●	-		Dimensional Control for Extruded Portion of Tube after Flaring
	Pipe Bender	■	■	*In case of hard temper pipe, bending is not available. Use elbow for bend and braze.	Bending
	Expanding Tool	■	■	*In case of hard temper pipe, expanding of tube is not available. Use socket for connecting tube.	Expanding Tubes
	Torque Wrench	●	■	*For 12.7mm D., 15.88mm D., wrench size is the same.	Connection of Flare Nut
		■	■	*For 6.35mm D., 9.52mm D., 19.05mm D., wrench size is the same.	
	Brazing Tool	■	■	*Perform correct brazing work.	Brazing for Tubes
	Nitrogen Gas	■	■	*Strict control against pollution (Blow nitrogen during brazing)	Prevention from Oxidation during Brazing
	Lubricating Oil (For Flare Surface)	●	★	Use a synthetic oil which is equivalent to the oil used in the refrigeration cycle. Synthetic oil absorbs moisture quickly.	Applying Oil to the Flared Surface
Vacuum Drying Refrigerant Charge	Refrigerant Cylinder	●	★	*Check refrigerant cylinder color. ○Liquid refrigerant charging is required regarding zeotropic refrigerant.	Refrigerant Charging
	Vacuum Pump	■	■	○It is required to mount a vacuum pump adapter (check valve) to prevent oil of the vacuum pump from being pulled when the vacuum pump stops.	Vacuum Pumping
	Adapter for Vacuum Pump (Check Valve)	※ ●	★		
	Manifold Valve	●	★	○Use manifold and charging hoses designed for each refrigerant as design pressure is different. Do not share manifold and charging hoses with other refrigerant type to prevent mixing of different types of refrigerant oil. (If used, it may cause cycle choking or compressor failure.) Standard of Connection Diameter; 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	※ ●	★	*Use a detector designed for each refrigerant as detecting method is different.	Gas Leakage Check	

※Interchangeability with R407C.

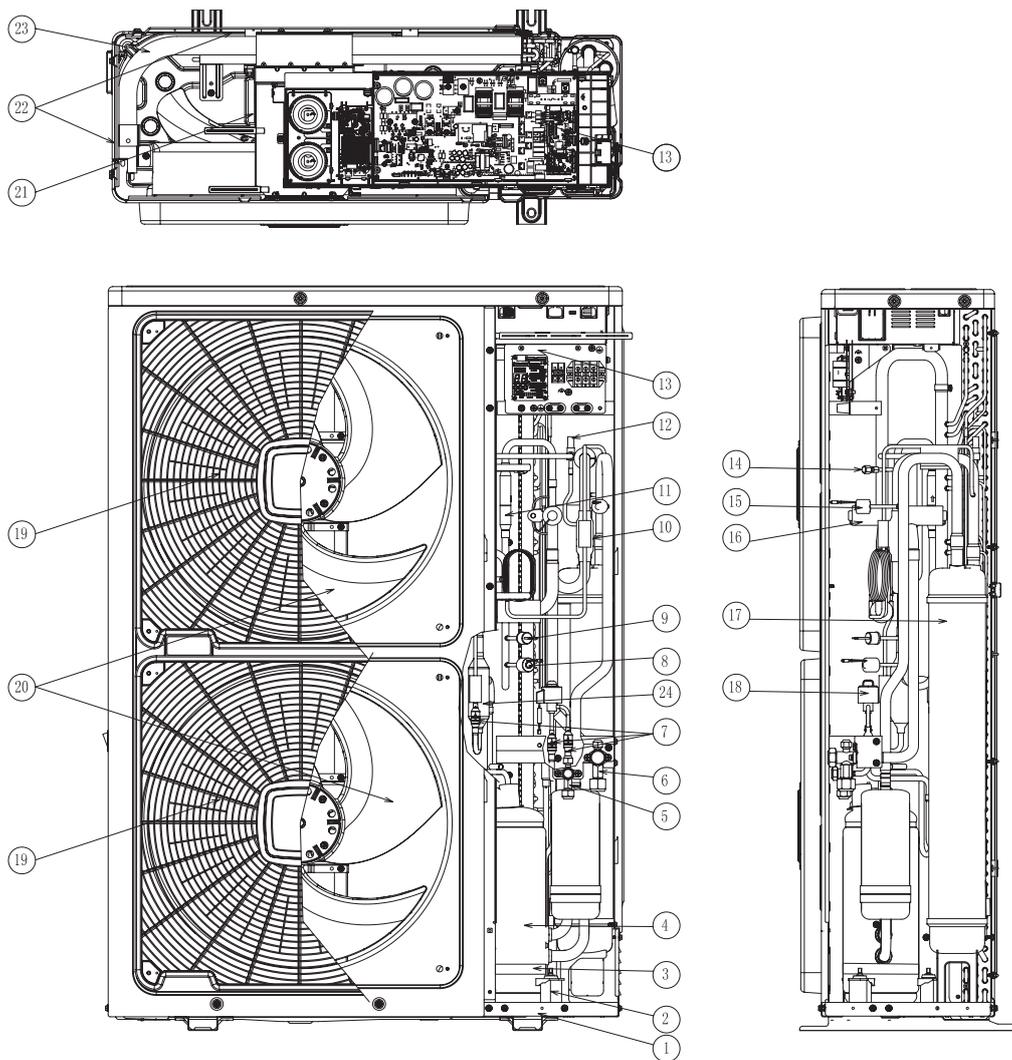
2.2 Structure

Model: RAS-3.0~3.5HNBRKQ1



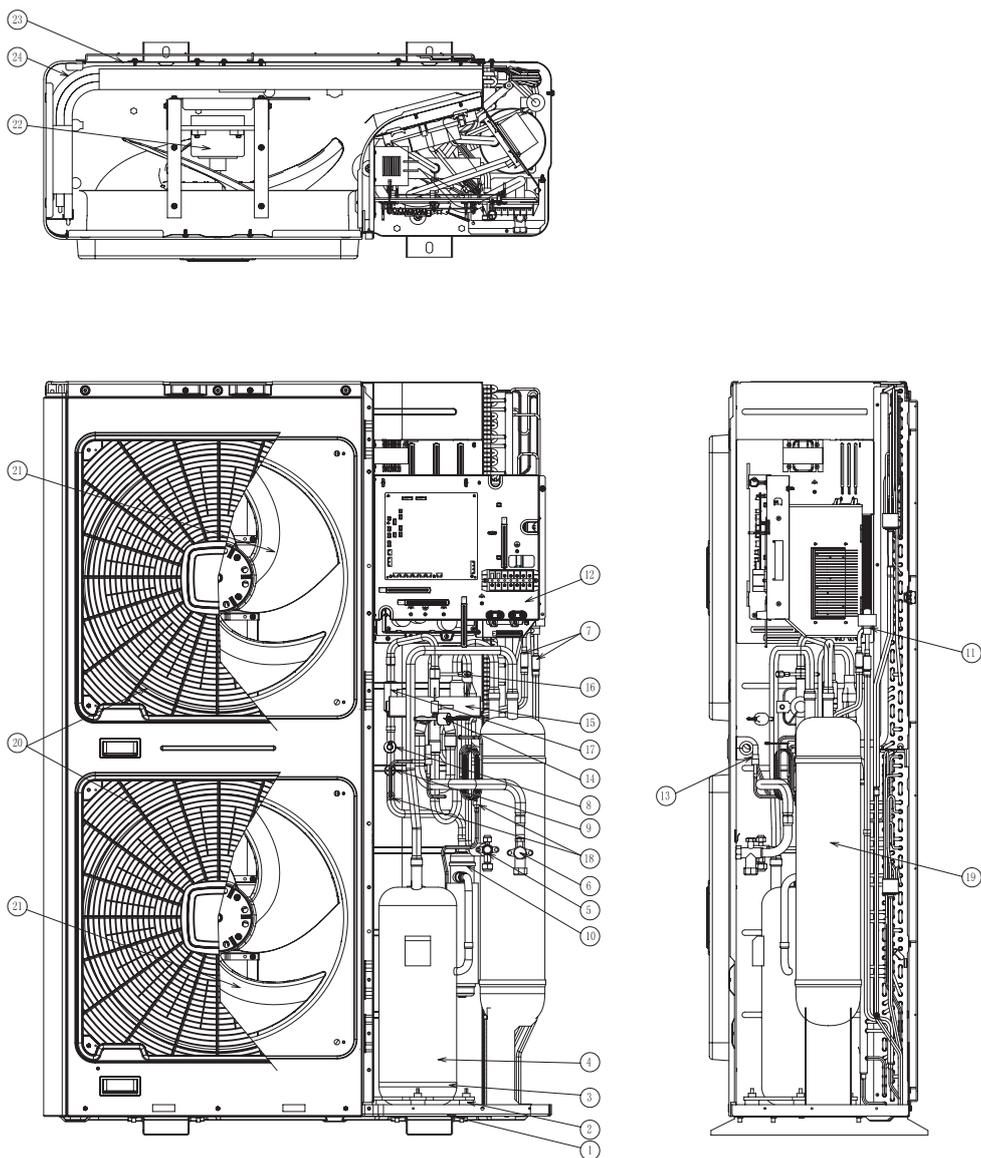
No.	Part Name	No.	Part Name	No.	Part Name	No.	Part Name
1	Chassis	7	Filter	13	Solenoid Valve	19	Accumulator
2	Vibration Absorber	8	High Pressure Sensor	14	Low Pressure Sensor	20	Air Outlet
3	Crankcase Heater	9	High Pressure Switch	15	4-Way Valve	21	Propeller Fan
4	Compressor	10	Oil Separator	16	Check Joint	22	Fan Motor
5	Liquid Stop Valve	11	Electronic Expansion Valve	17	Check Valve	23	Air Inlet
6	Gas Stop Valve	12	Electrical Box	18	Filter	24	Heat Exchanger

Model: RAS-4.0HNBRKQ1~RAS-6.5HNBRKQ1



No.	Part Name	No.	Part Name	No.	Part Name	No.	Part Name
1	Chassis	7	Filter	13	Electrical Box	19	Air Outlet
2	Vibration Absorber	8	High Pressure Sensor	14	Check Joint	20	Propeller Fan
3	Crankcase Heater	9	High Pressure Switch	15	Low Pressure Sensor	21	Fan Motor
4	Compressor	10	Filter	16	4-Way Valve	22	Air Inlet
5	Liquid Stop Valve	11	Check Valve	17	Accumulator	23	Heat Exchanger
6	Gas Stop Valve	12	Solenoid Valve	18	Electronic Expansion Valve	24	Oil Separator

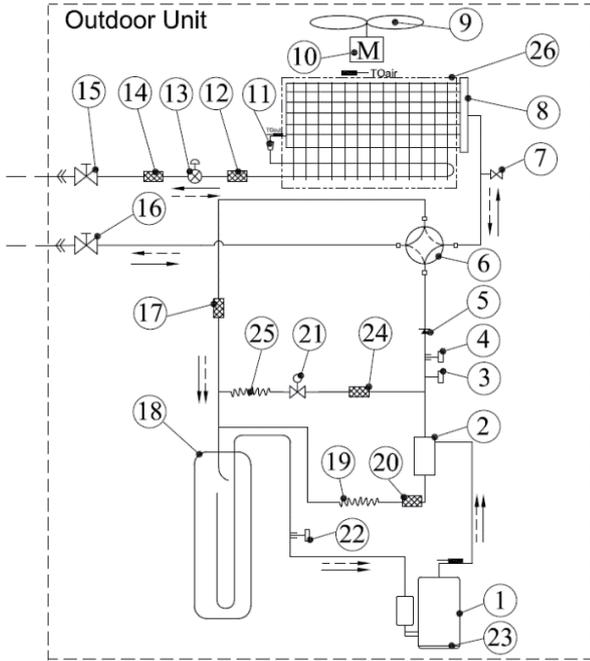
Model: RAS-7.0HNBRMQ1~RAS-12HNBRMQ1



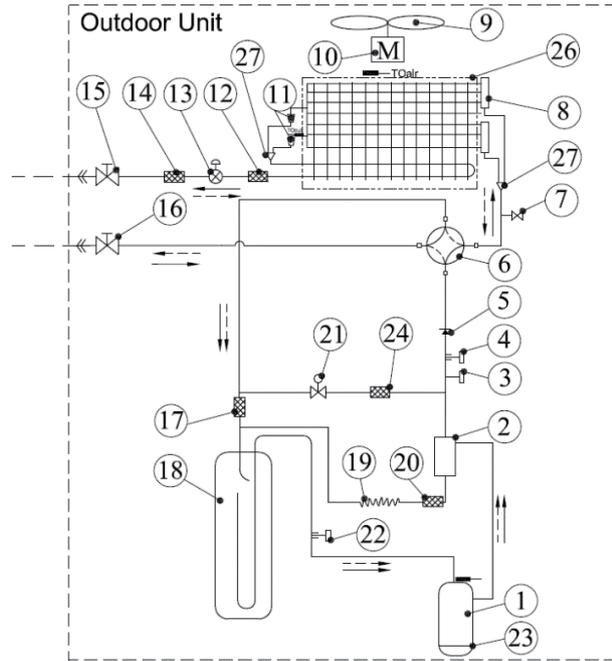
No.	Part Name	No.	Part Name	No.	Part Name	No.	Part Name
1	Chassis	7	Filter	13	Solenoid Valve	19	Accumulator
2	Vibration Absorber	8	High Pressure Sensor	14	Low Pressure Sensor	20	Air Outlet
3	Crankcase Heater	9	High Pressure Switch	15	4-Way Valve	21	Propeller Fan
4	Compressor	10	Oil Separator	16	Check Joint	22	Fan Motor
5	Liquid Stop Valve	11	Electronic Expansion Valve	17	Check Valve	23	Air Inlet
6	Gas Stop Valve	12	Electrical Box	18	Filter	24	Heat Exchanger

2.3 Refrigerant Cycle Diagram

Model:RAS-3.0~6.5HNBRKQ1



Model:RAS-7.0~12HNBRMQ1



— Cooling — Refrigerant Piping
 - - - Heating ← Flare Connection

No.	Part Name	No.	Part Name	No.	Part Name
1	Compressor	10	Fan Motor	19	Oil Capillary Tube
2	Oil Separator	11	Distributor	20	Filter 4
3	High Pressure Switch	12	Filter 1	21	Solenoid Valve
4	High Pressure Sensor	13	Electronic Expansion Valve	22	Low Pressure Sensor
5	Check Valve	14	Filter 2	23	Crankcase Heater
6	4-Way Valve	15	Liquid Stop Valve	24	Filter 5
7	Check Joint	16	Gas Stop Valve	25	Bypass Capillary Tube
8	Gas Collector	17	Filter 3	26	Heat Exchanger
9	Propeller Fan	18	Accumulator	27	Y-shaped Joint

2.4 Model of Outdoor Unit

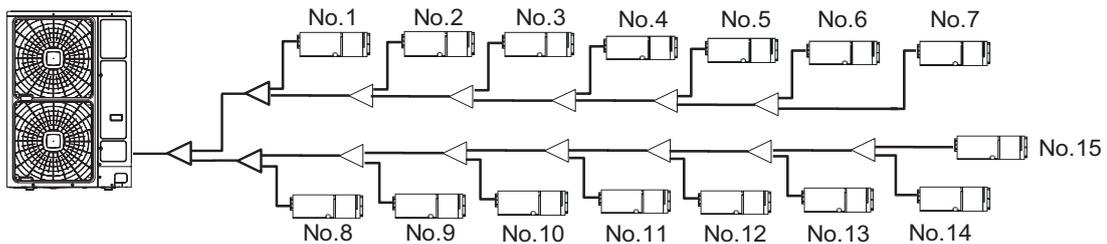
The number of indoor units that can be connected to an outdoor unit is defined in the following table :

Table 2.1 System Combination

Outdoor Unit Type	Rated Capacity (kW)	Min. Total Capacity of the indoor units can be connected (kW)	Max. Total Capacity of the indoor units can be connected (kW)	Numbers of the indoor units can be connected (Q'ty)	Min. Capacity at Individual Operation (kW)
RAS-3.0HNBRKQ1	8.0	4.0	10.4	2~4	2.2
RAS-3.5HNBRKQ1	10.0	5.0	13.0	2~5	2.2
RAS-4.0HNBRKQ1	11.2	5.6	14.6	2~6	2.2
RAS-4.5HNBRKQ1	12.0	6.0	15.6	2~6	2.2
RAS-5.0HNBRKQ1	14.0	7.0	18.2	2~7	2.2
RAS-6.0HNBRKQ1	16.0	8.0	20.8	2~8	2.2
RAS-6.5HNBRKQ1	18.0	9.0	23.4	2~9	2.2
RAS-7.0HNBRMQ1	20.0	10.0	26.0	2~10	2.2
RAS-8.0HNBRMQ1	22.4	11.2	29.1	2~10	2.2
RAS-10HNBRMQ1	28.1	14.1	36.5	2~10(13) [△]	2.2
RAS-11HNBRMQ1	31.0	15.5	40.3	2~10(14) [△]	2.2
RAS-12HNBRMQ1	33.5	16.8	43.6	2~10(15) [△]	2.2

NOTES:

- The connectable indoor unit capacity ratio can be calculated as follows:
Connectable Indoor Unit Capacity Ratio = Total Indoor Unit Capacity / Total Outdoor Unit Capacity.
- For the same system, if the connectable indoor unit capacity ratio is over than 100%, and which all the indoor units operate simultaneously, the capacity of every indoor unit should be less than its rated capacity.
- Combination capacity is 50-130%.
- △:When the number of indoor units which are connected to the model of RAS-10~12HNBRMQ1 outdoor unit is over than 10 units, the following restrictions are also required to meet.
 - (a) The piping system must be divided into two main pipes, the total capacity and the number of the units connected to each main pipe should be as equal as possible.
 - (b) The maximum height difference between outdoor and indoor units is 30 meters and the maximum height difference between indoor units is 10 meters, the longest piping length between the branch pipe to the connected indoor unit is 10m.
 - (c) The connectable indoor unit capacity ratio should not be more than 105%.
 - (d) Only 0.8~4.0HP of ducted indoor units can be selected.



2.5 Transportation

Transport the product as near to the installation location before unwrapping the package.

NOTICE

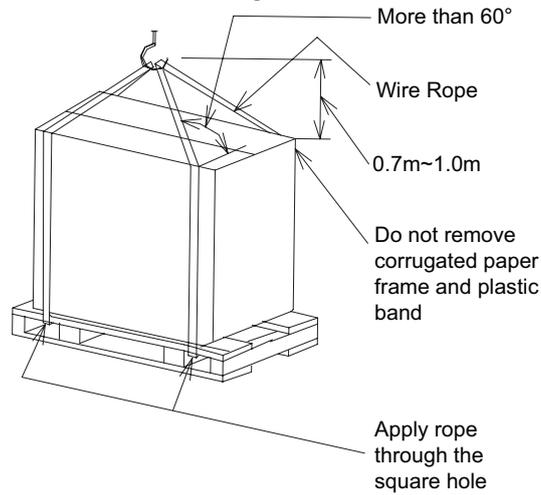
- Do not put any material or stand on the product.
- Apply two lifting wires onto the outdoor unit, when lifting it by crane.

● The Method of Hanging

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

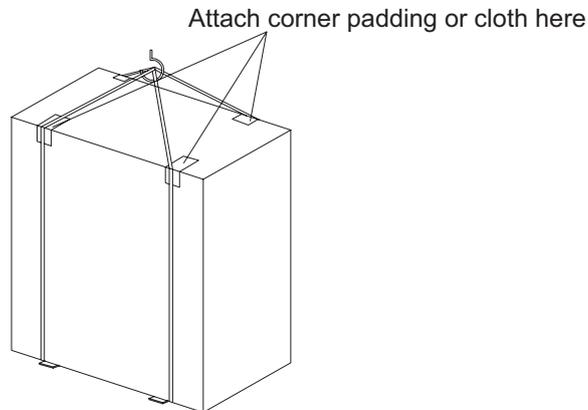
(a) Do not unwrap the package until the hanging work is finished.

(b) The hanging work can be followed the next figure:



NOTES:

- Make sure the unit is in horizontal while lifting.
- Do not hook with the plastic bands.
- If the unit is lifted after unwrapping the package, protect the unit with the corner paddings or cloth.



- The weight of outdoor units is shown in the following table.

Model	Net Weight (kg)	Gross Weight (kg)
RAS-3.0HNBRKQ1 RAS-3.5HNBRKQ1	75	85
RAS-4.0HNBRKQ1 RAS-4.5HNBRKQ1 RAS-5.0HNBRKQ1	114	124
RAS-6.0HNBRKQ1 RAS-6.5HNBRKQ1	118	128
RAS-7.0HNBRMQ1 RAS-8.0HNBRMQ1	154	168

Model	Net Weight (kg)	Gross Weight (kg)
RAS-10HNBRMQ1 RAS-11HNBRMQ1 RAS-12HNBRMQ1	172	187



Do not place or leave any other objects (cables, tools) inside the outdoor unit or control board and verify that nothing remains there prior to installation and test run. Ignoring the instructions can lead to damage and fire incidents.

2.6 Factory Supplied Accessories

The accessories are packed with the outdoor unit, please check that in the package.

Accessory	Quantity	Remarks
Wire Clamp (big)	1	Only for RAS-3.0~6.5HNBRKQ1
Wire Clamp (small)	3	
Magnetic Ring (big)	2	
Magnetic Ring (small)	1	
Washer	4	
Wire Clamp (big)	2	Only for RAS-7.0~12HNBRMQ1
Pipe Adapter 1	1	
Pipe Adapter 2	1	

NOTE:

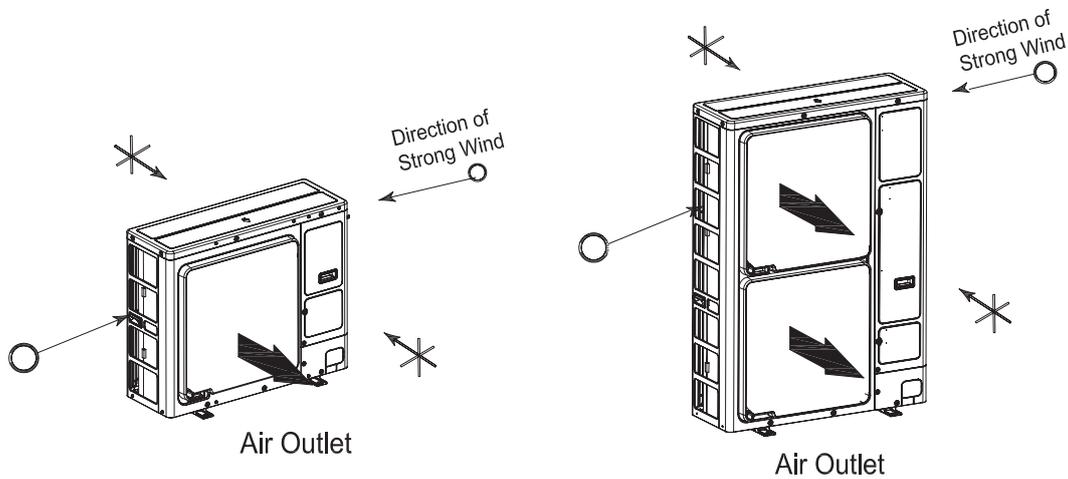
If any of these accessories are not packed in the unit, please contact your distributor.

3. Outdoor Unit Installation

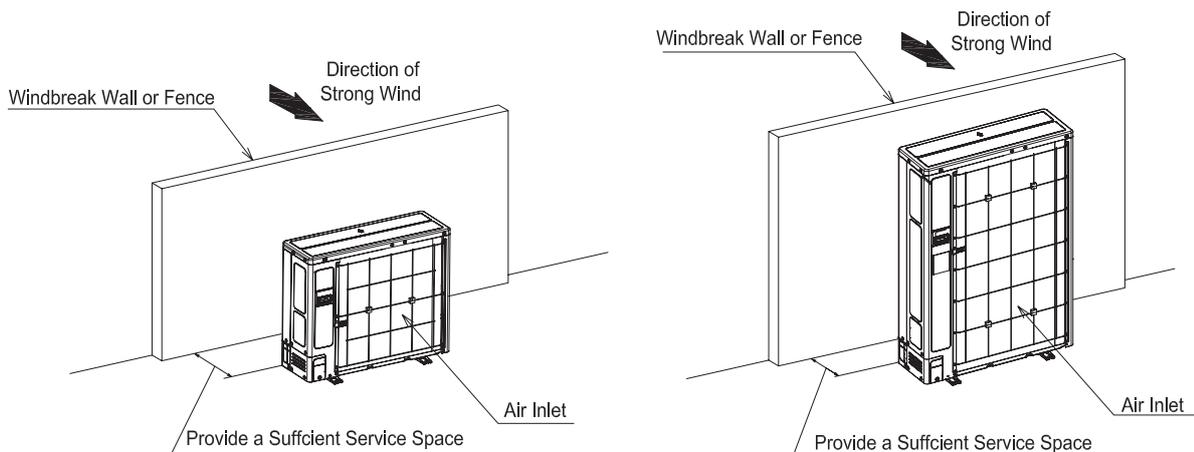
3.1 Installation Location and Precautions

- When installing the unit into:
 - A wall: Make sure the wall is strong enough to hold the weight of the unit. It may be necessary to construct a strong wood or metal frame to provide added support.
 - A room: Properly insulate any refrigerant tubing run inside a room to prevent “sweating” that can cause dripping and water damage to wall and floors.
 - Damp or uneven areas: Use a raised concrete pad or concrete blocks to provide a solid and level foundation for the unit to prevent water damage and abnormal vibration.
 - An area with high winds: Securely anchor the outdoor unit down with bolts and a metal frame. Provide a suitable wall for wind prevention (field-supplied).
 - A snowy area: Install the outdoor unit on a raised platform that is higher than drifting snow. Provide snow roof for snow prevention (field-supplied).
- Do not install the unit in the following places. Otherwise, it can result in an explosion, fire, deformation, corrosion, or product failure.
 - Explosive or flammable atmosphere.
 - Where a fire, oil, steam, or powder can directly enter the unit, such as in close proximity or directly above a kitchen stove.
 - Where oil (including machinery oil) may be present.
 - Where corrosive gases such as chlorine, bromine, or sulphide can accumulate, such as near a hot tub or hot spring.
 - Where dense, salt-laden airflow is heavy, such as in coastal regions.

- Where the air quality is of high acidity.
- Where harmful gases can be generated from decomposition.
- Do not install the indoor unit where such dripping can cause moisture damage or uneven locations: Use a raised concrete pad or concrete blocks to provide a solid and level foundation for the unit to prevent water damage and abnormal vibration. Do not position the drain pipe for the indoor unit near any sanitary sewers where corrosive gases may be present.
- Before performing any brazing work, be sure that there are no flammable materials or open flames nearby.
- Perform a test run to ensure normal operation. Safety guards, shields, barriers, covers, and protective devices must be in place while the compressor/unit is operating. During the test run, keep fingers and clothing away from any moving parts.
- Clean up the site when finished, remember to check that no metal scraps or bits of wiring have been left behind inside the unit being installed.
- After installation work for the system has been completed, explain the “Safety Precautions”, the proper use and maintenance of the unit to the customer according to the information in all manuals that came with the system. All manuals and warranty information must be given to the user or be left near the Indoor Unit.
- Select a direction where a strong wind does not blow to the air outlet surface or the air inlet surface.



- If a suitable location cannot be found, the windbreak wall or fence should be installation to prevent a strong wind blows to air inlet or outlet of the outdoor unit. Make sure to provide sufficient space around the outdoor unit for operation and maintenance.



NOTES:

- If strong wind blows to the air outlet directly, the needed airflow volume cannot be maintained and the outdoor unit may be difficult to operate normally.
- If excessively strong wind blows to the air outlet consecutively, it may cause the propeller fan or the fan motor breakage by high speed rotation or overload.

3.2 Service Space

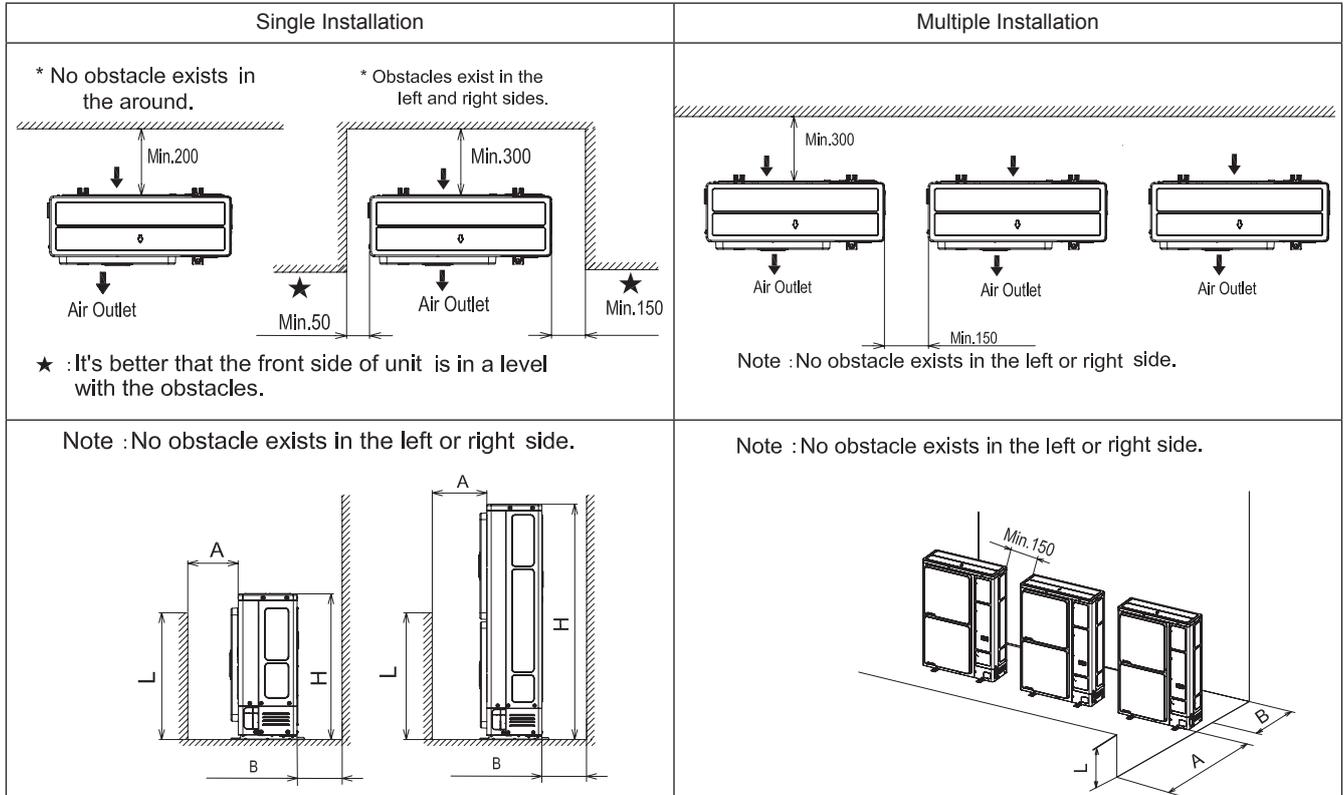
When the outdoor unit is installed, the allowed service space is as follows:

- If there is not enough service space for air inlets and outlets, it may result in a performance drop-off and mechanical issues due to insufficient air intake.
- Additionally, adequate service space is required for service maintenance access.

(1) Obstacles on the inlet side

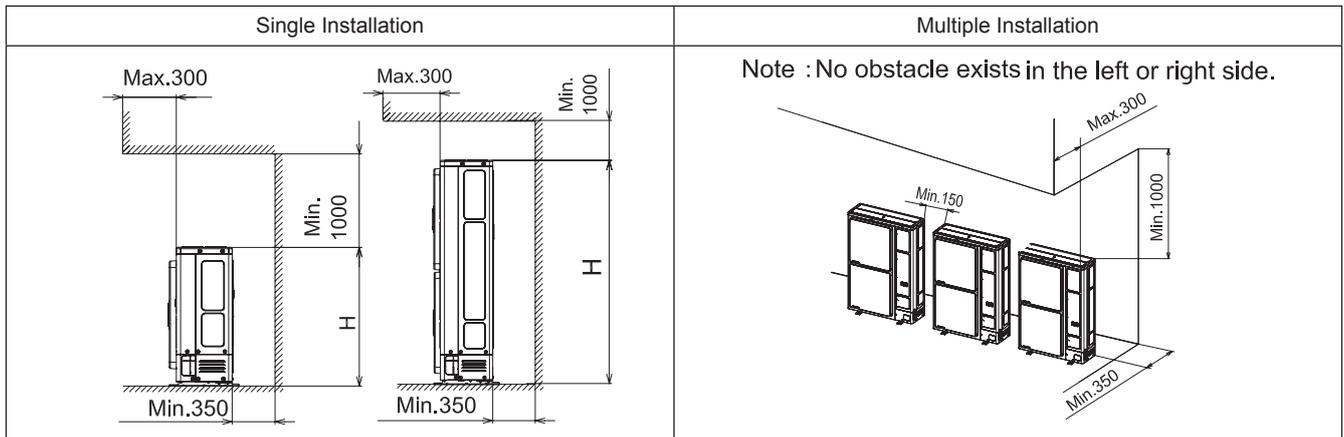
(a) There is no obstacle in the upper side.

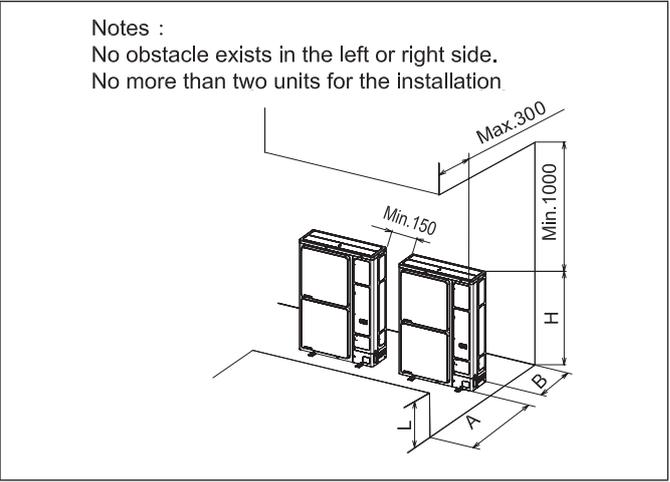
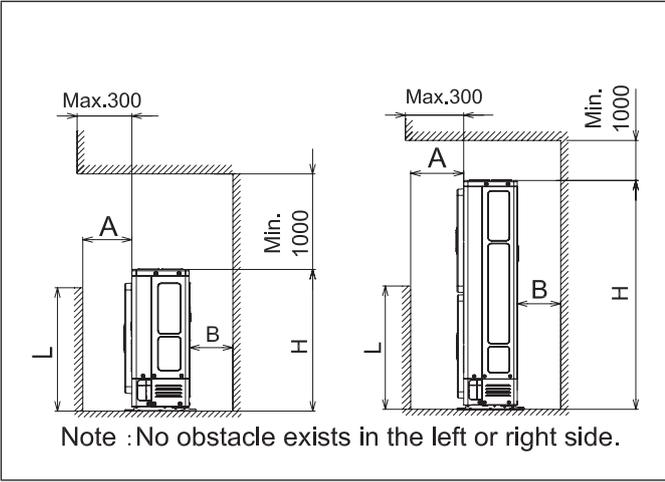
Unit: mm



(b) There are obstacles in the upper side.

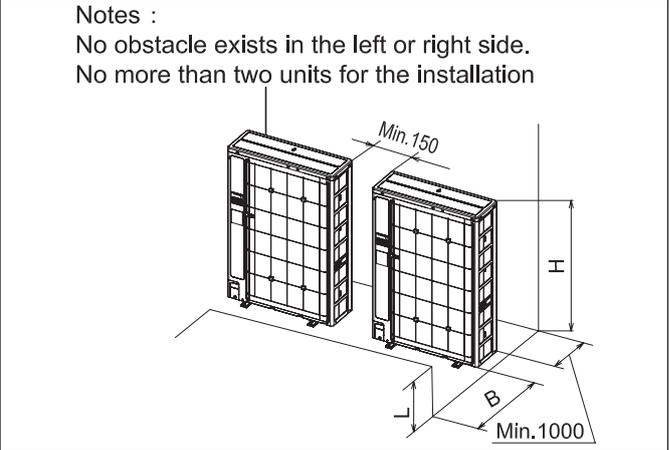
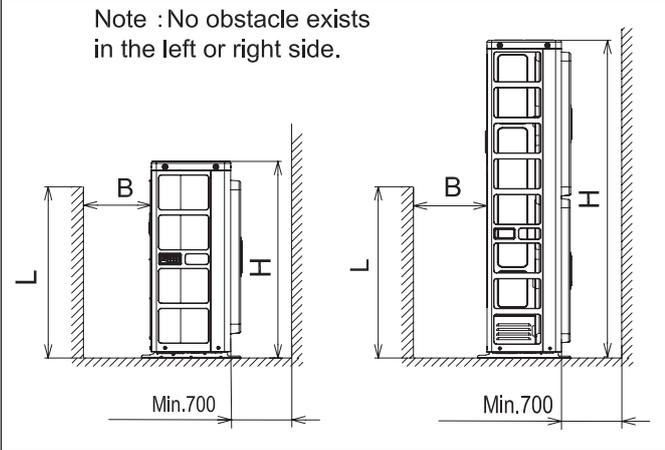
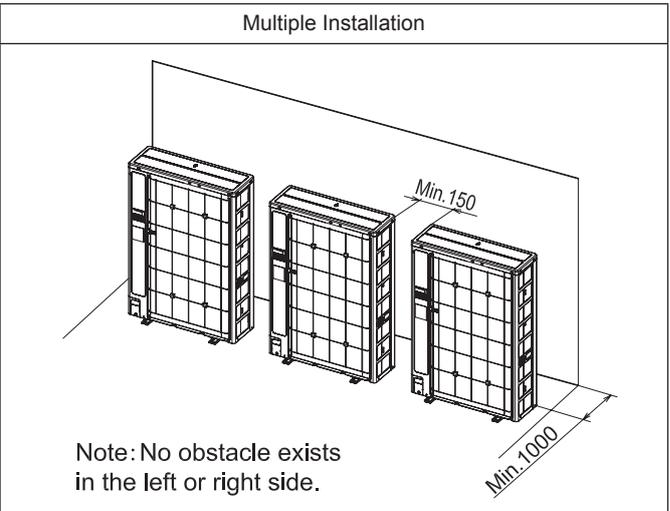
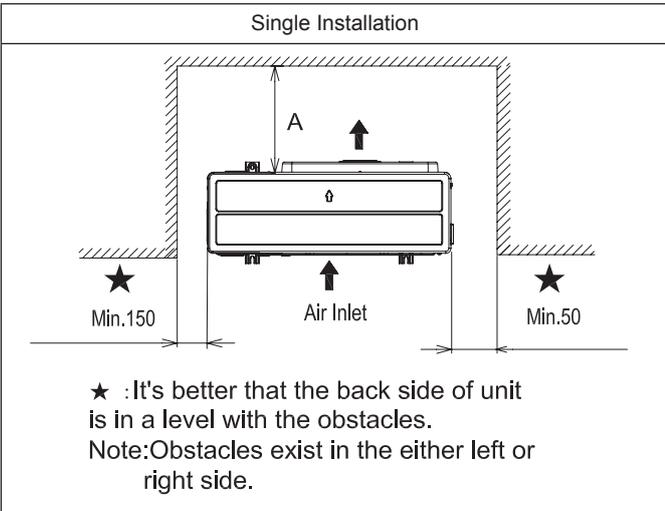
Unit: mm





(2) Obstacles on the outlet side and no obstacle in the upper side.

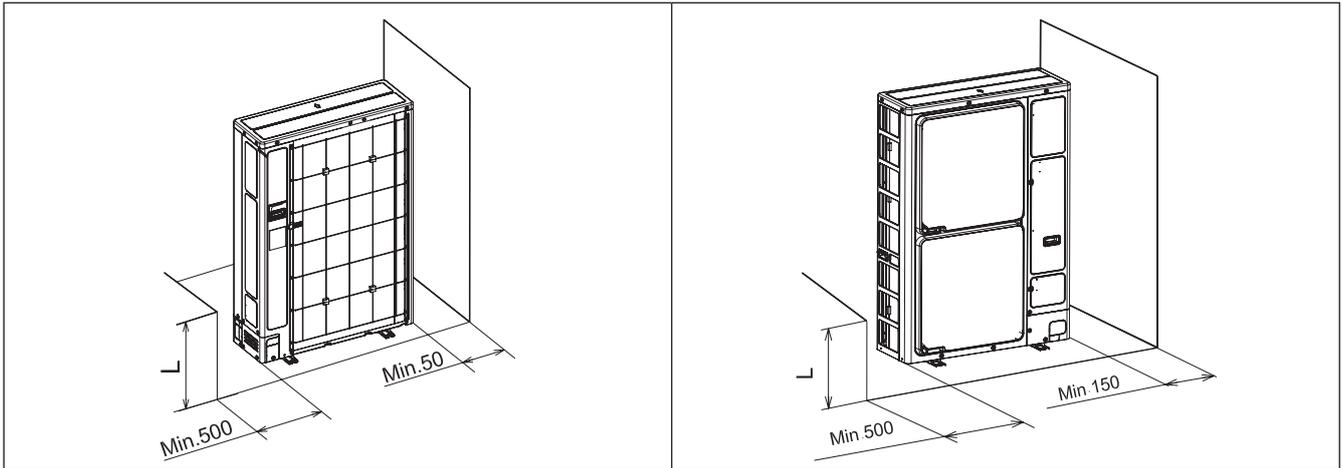
Unit: mm



(3) Obstacles on right and left side of single installation.

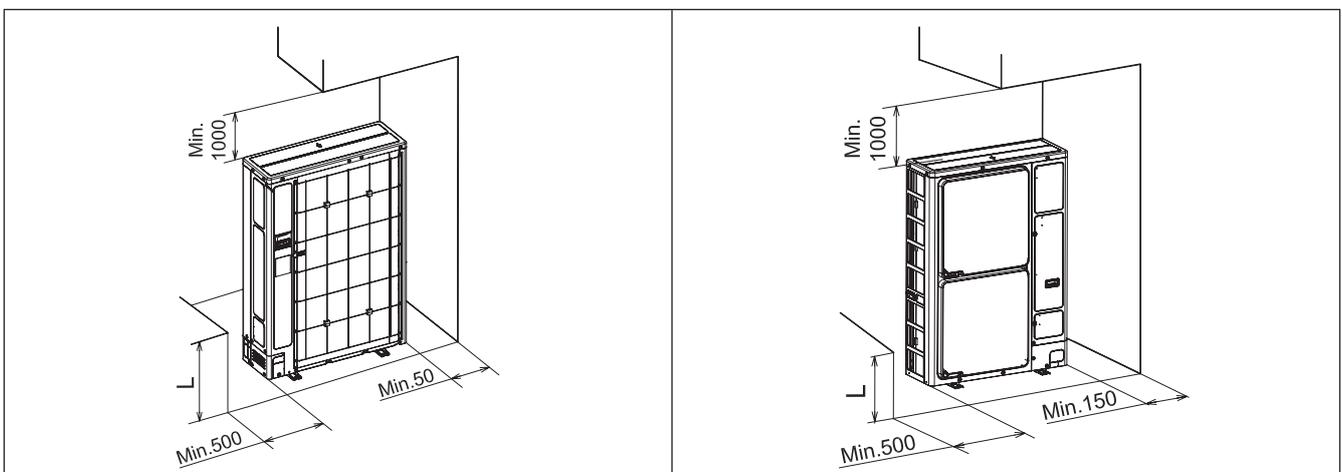
(a) There is no obstacle in the upper side.

Unit: mm



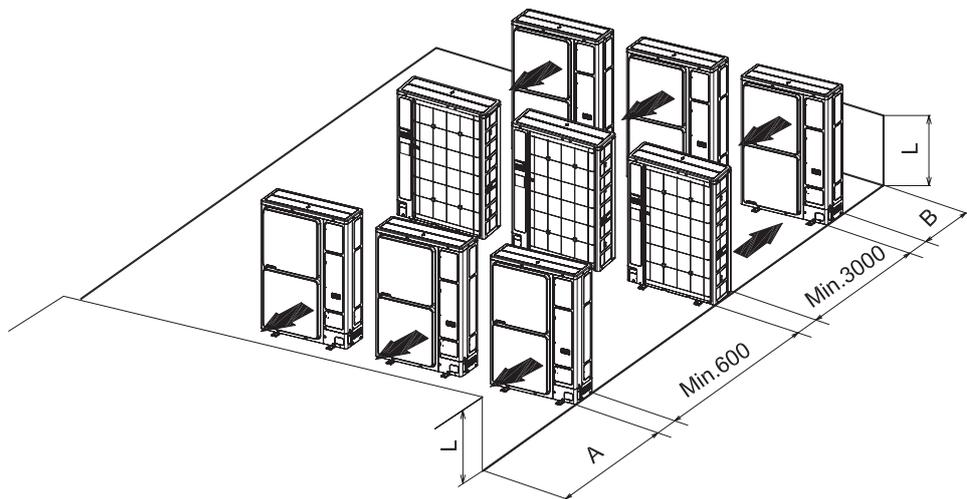
(b) There are obstacles in the upper side.

Unit: mm



(4) Multi-row and multiple installations.

Unit: mm



NOTE:

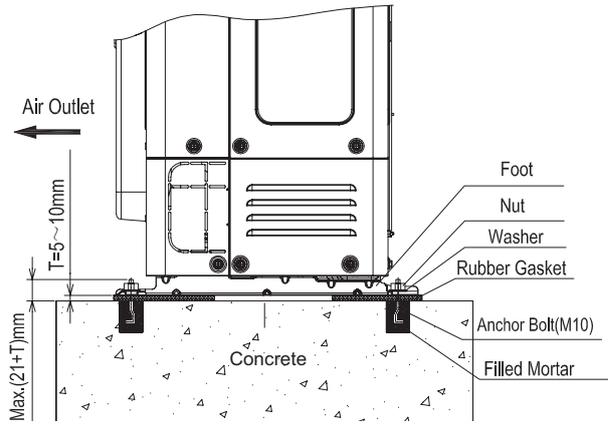
If L is larger than H, mount the units on a base so that H is greater or equal to L. Be sure to seal up every surface of the base. If the base allows the airflow to go, it may cause a short-circuit.

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

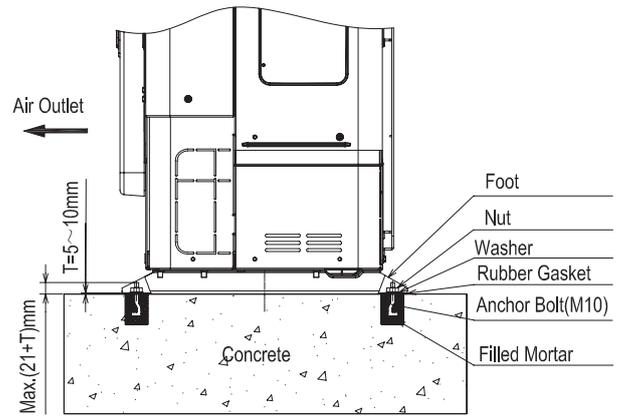
3.3 Installation Work

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

In order to avoid the vibration from transmitting to the indoor by the base of the unit, the 5 ~ 10mm thickness of rubber gaskets (field supplied) should be placed under the feet of the outdoor unit, which could decrease the vibration into the room.



a) Model:RAS-3.0~6.5HNBRKQ1

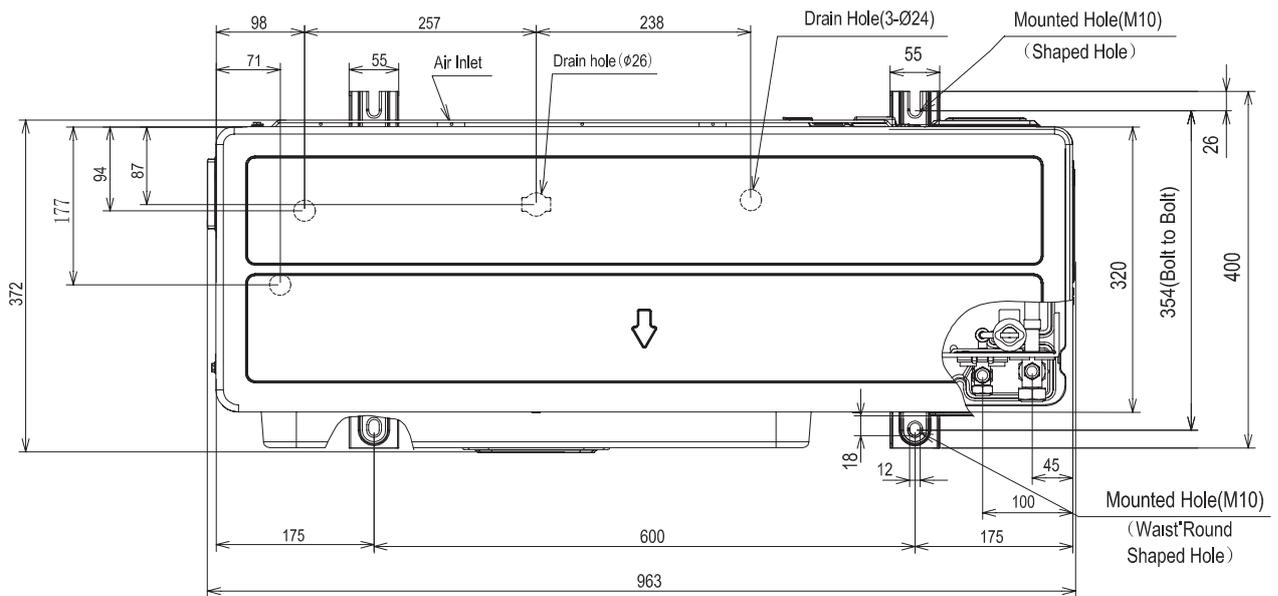


b) Model: RAS-7.0~12HNBRMQ1

(2) Installation positions of feet, air inlet and drain holes are shown in the following figures:

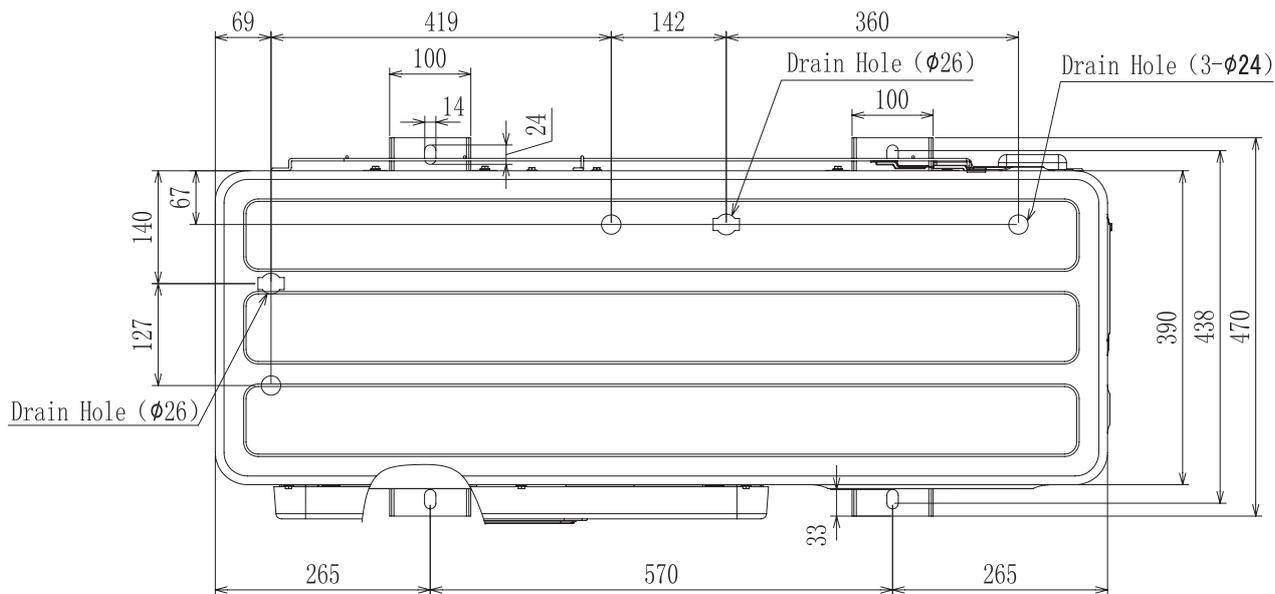
Model: RAS-3.0~6.5HNBRKQ1

Unit: mm



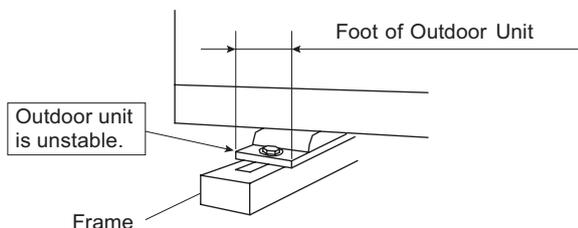
Model: RAS-7.0~12HNBRMQ1

Unit: mm

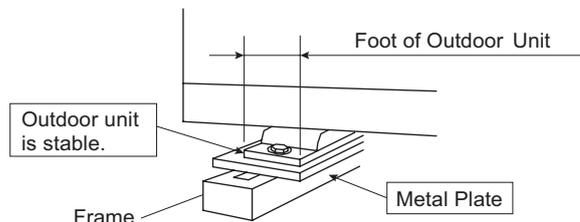


- (3) The drain holes are working during the heating and defrosting operation. Choose a place where well drainage is available or provide a groove for draining.
- (4) The unit will condensate in heating mode, and the condensate will freeze in colder climates, which may cause the road slippery, if not properly managed.
- (5) The base of the outdoor unit should be installed on a foundation, which is made up of concrete or metal frame. When the rubber gaskets have been adopted, they should also be positioned under the feet of the outdoor unit.
- (6) When the outdoor unit is installed on a metal frame, the metal plates should be used to adjust the frame width for stable installation.

Incorrect



Correct



Recommended Metal Plate Size (Field-Supplied):

Material: Hot-Rolled Mild Steel Plate (SPHC);

Plate Thickness: 4.5mm.

NOTICE

Aluminum fins have very sharp edges, handle them carefully to avoid injuries.

NOTE:

Install the outdoor unit on a roof or in an area where only service engineers come in contact with the outdoor unit.

4. Refrigerant Piping Work

WARNING

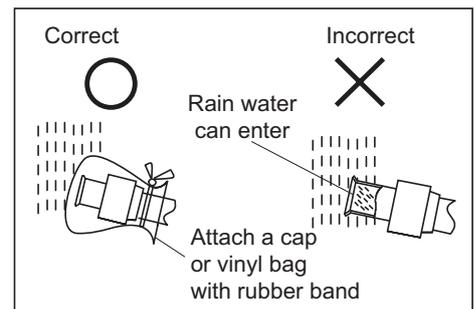
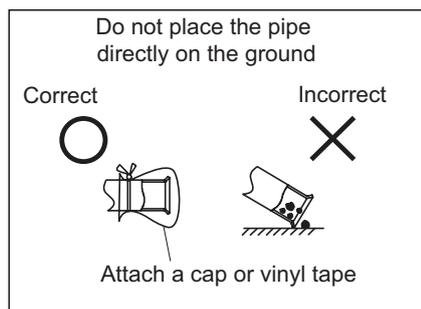
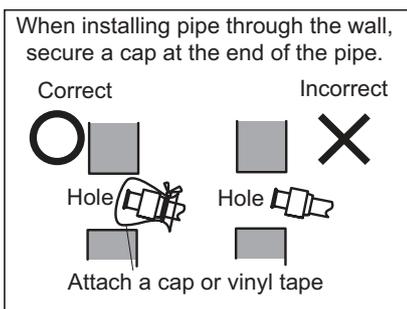
- The design pressure for this product is 601 psi (4.15MPa). The pressure required for refrigerant R410A is 1.4 times higher than that of the refrigerant R22. That means that the refrigerant piping for R410A must be thicker than that for R22. Make sure to use specified refrigerant piping. Otherwise, the refrigerant piping may rupture due to an excessive refrigerant pressure. Pay close attention to the piping thickness when using copper refrigerant piping.
- Ensure that the stop valves are closed before removing the flare nut of the stop valves.

NOTICE

- When handling the refrigerant, be sure to wear leather gloves to prevent injuries.

4.1 Precaution for Refrigerant Piping

- (1) Use the copper pipe for refrigerant piping.
- (2) Keep the copper pipes clean. Make sure there is no dust or moisture inside the pipes. Blow nitrogen or dry, compressed air into the pipes to remove any dust or foreign materials before connecting them. Do not use any cutting tools such as a grinder or saw which could produce metal particles.
- (3) Take special care to prevent pollution or moisture settling from going into the interior pipe during piping work.
- (4) Avoid performing the piping connection work for outdoor unit in the rain.
- (5) Refrigerant pipe ends.



(6) Piping Thickness and Material

The thickness of refrigerant pipe differs depending on design pressure. For copper tube, pay attention to pipe selection, because the piping thickness differs depending on its material.

Diameter (Φd)	R410A	
	Thickness	Temper
6.35 mm	0.8 mm	O
9.52 mm	0.8 mm	O
12.7 mm	0.8 mm	O
15.88 mm	1.0 mm	O
19.05 mm	1.0 mm	1/2H
22.2 mm	1.2 mm	1/2H
25.4 mm	1.2 mm	1/2H

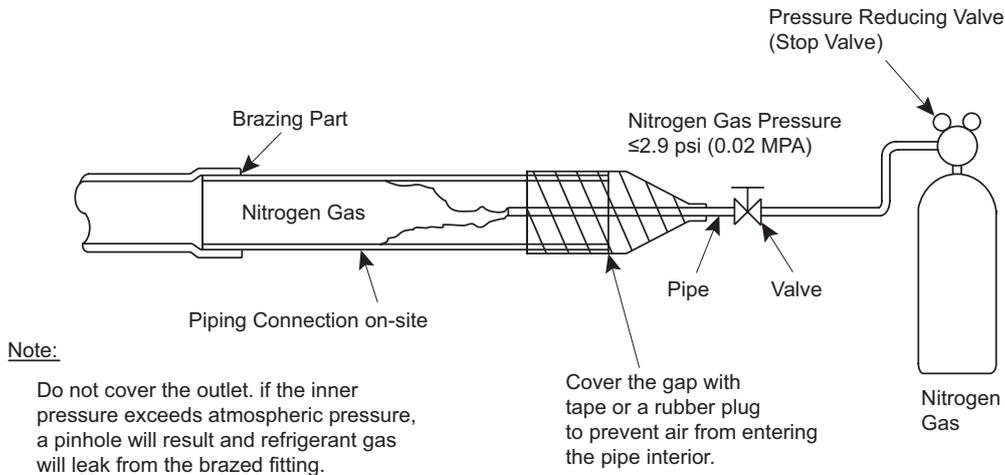
NOTES:

- Do not use the pipe that allowable pressure is less than 4.15MPa.
- The reference value of the refrigerant piping thickness is indicated in the table above.
- Do not use the pipe which is considerably different from the reference value.

(7) Cautions for Brazing Work

(A) For piping connections, complete non-oxidation brazing with a nitrogen charge. If brazing the pipes without the nitrogen substitution, a large amount of oxidized scaling will be generated in the piping. This oxidized scaling can cause clogging inside the expansion valve, solenoid valve, accumulator, and compressor, which can damage the unit.

Do not use field-supplied antioxidant which can corrode pipes and degrade the refrigerant oil.



Note:

Do not cover the outlet. If the inner pressure exceeds atmospheric pressure, a pinhole will result and refrigerant gas will leak from the brazed fitting.

NOTES:

- Make sure to use nitrogen. Nitrogen gas pressure shall be 0.02 MPa or less.
- Make sure to use the pressure-reducing valve.
- Do not use field-supplied antioxidant.

(B) Use a type of flux with a low chlorine concentration.

(C) Washing the weld joints to remove all flux completely after completing brazing work.

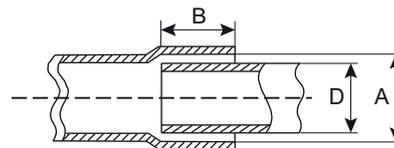
NOTE:

To avoid oxidation and scaling, perform brazing at the appropriate temperature.

(D) To prevent gas leakage at the brazing connection, refer to the table for the insertion depth and the gap for joint pipe.

Unit: mm

Diameter(ΦD)	Min. Insertion Depth (B)	Gap (A - D)
$5 \leq D < 8$	6	0.05 - 0.35
$8 \leq D < 12$	7	
$12 \leq D < 16$	8	0.05 - 0.45
$16 \leq D < 25$	10	

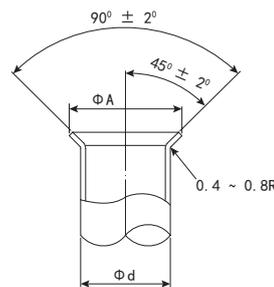


(8) Cautions for Flaring Work

(A) Perform the flaring work as shown below:

Unit: mm

Diameter (Φd)	$A^{+0}_{-0.4}$
	R410A
6.35	9.1
9.52	13.2
12.7	16.6
15.88	19.7
19.05	(*)



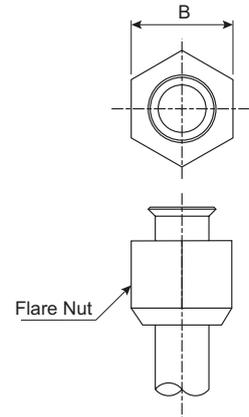
(*): It is impossible to perform flaring work with hard temper pipe. Use an accessory pipe with a flare.

(B) Joint Selection

The minimum thickness of joint and flare nut dimension are selected from the table below:

Minimum Thickness of Joint Unit: mm	
Diameter(Φd)	R410A
6.35	0.5
9.52	0.6
12.7	0.7
15.88	0.8
19.05	0.8

Flare Nut Dimension B Unit: mm	
Diameter(Φd)	R410A
6.35	17
9.52	22
12.7	26
15.88	29
19.05	36

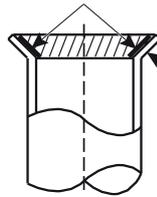


NOTE:

Do not use a thin joint other than the ones shown in the table above.

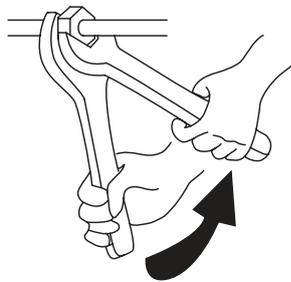
- (C) Verify that there are no scratches, metal particles, gaps, or deformations at the flared end before making connections to the system.
- (D) Apply refrigerant oil (field-supplied) slightly on the flare surface of the pipe and flare nut before performing flaring work. Tighten the flare nut with the specified torque settings using two wrenches. Perform flaring work to the liquid piping side before treating the gas piping side. Verify that no gas leakage has occurred after completing flaring work.

Apply Refrigerant Oil

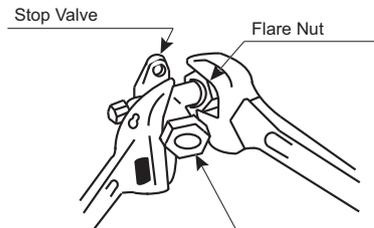


Do not apply refrigerant oil to exterior flared surfaces.

- (E) Be sure to use two wrenches as shown.



Use two wrenches as shown



Do not apply the two wrenches work here. Refrigerant leakage shall occur

Tightening Work for Stop Valve

Required Tightening Torque for Flare Nut

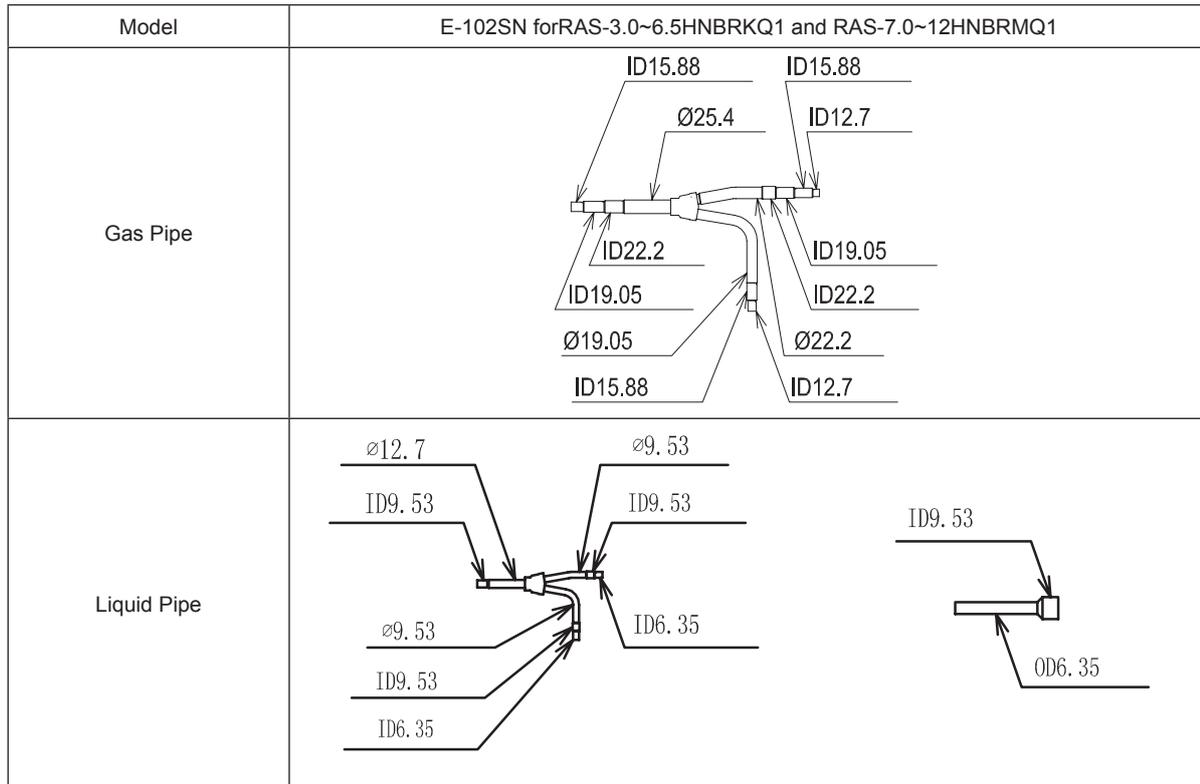
Nominal outside diameter (according to EN 12735-1 and EN 12735-2)			Minimum wall Thickness (mm)	Tightening torque (N·m)
Metric series (mm)	Imperial series			
		(mm)	(in)	
6			0,80	14 -- 18
	6,35	1/4	0,80	14 -- 18
	7,94	5/16	0,80	33 -- 42
8			0,80	33 -- 42
	9,52	3/8	0,80	33 -- 42
10			0,80	33 -- 42
12			0,80	50 -- 62
	12,7	1/2	0,80	50 -- 62
15			0,80	63 -- 77
	15,88	5/8	0,95	63 -- 77
18			1,00	90 -- 110
	19,06	3/4	1,00	90 -- 110

4.2 Model of Branch Pipe

(1) E-102SN

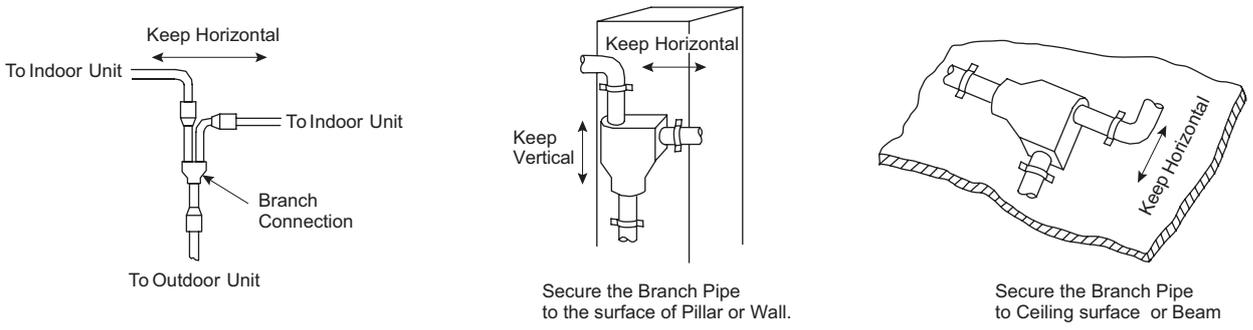
The model of E-102SN branch pipe is used for the model of RAS-3.0~6.5HNBRKQ1 and RAS-7.0~12HNBRMQ1 outdoor unit.

Unit: mm



(2) Precaution for branch pipe connection

Use the branch pipe to connect the outdoor/indoor units. Mounted the branch pipes to a pillar, a wall, or a ceiling.
 Keep the inlet pipe of the branch pipe straight, and the length of the straight pipe is no less than 0.5 meter.



<p>Upper side</p>	<p>Upper side</p>	<p>Upper side</p>	<p>Upper side</p>
<p>CORRECT</p>	<p>CORRECT</p>	<p>CORRECT</p>	<p>INCORRECT</p>

4.3 Refrigerant Piping Size

Example of connection: connection of 4 indoor units.

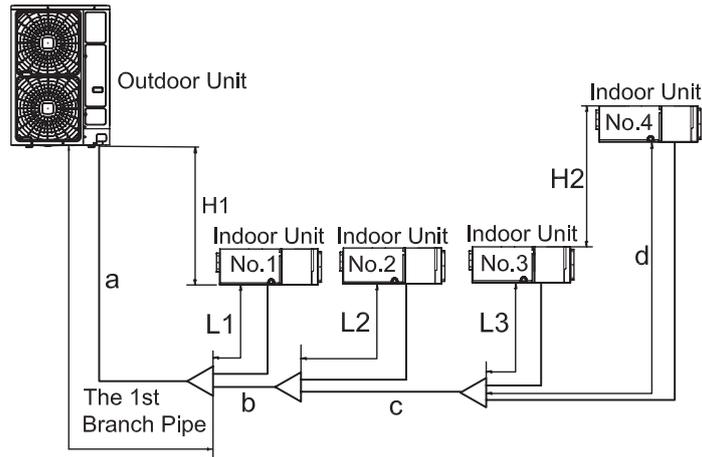


Table 4.1 Piping Size of Main Pipe

Model	Stop Valve(mm)		Pipe between the outdoor unit and the first branch pipe; The pipes between the branch pipes		
	Gas	Liquid	Gas	Liquid	Marks
RAS-3.0~6.5HNBRKQ1	Φ15.88	Φ9.52	Φ15.88	Φ9.52▲	a; b; c
RAS-7.0~8.0HNBRMQ1	Φ19.05	Φ9.52	Φ19.05	Φ9.52▲	a; b; c
RAS-10HNBRMQ1	Φ19.05	Φ12.7	Φ22.2*	Φ12.7	a; b; c
RAS-11~12HNBRMQ1	Φ19.05	Φ12.7	Φ25.4*	Φ12.7	a; b; c

NOTES:

- Mark “▲” represent that if the liquid pipe which between the outdoor unit and the first branch is over than 70 meters, its diameter should be up size. Thus the Φ9.52 diameter pipe is converted to Φ12.7 diameter pipe.
- Mark “*” represent that there are pipe adapters in the outdoor unit, which is used to adjust the gas pipe between the outdoor unit and the first branch. Thus the Φ19.05 diameter pipe is converted to Φ22.2 diameter pipe in the model of RAS-10HNBRMQ1, and the Φ19.05 diameter pipe is converted to Φ25.4 diameter pipe in the model of RAS-11~12HNBRMQ1.
- The piping size (L1, L2, L3, d) of indoor units differ with indoor unit model, please refer to Installation and Maintenance Manual attached to each indoor unit.

Table 4.2 Piping Work Conditions

Item		Marks	Allowable Piping Length	
Maximum Piping Length (Liquid Pipe)	Between the outdoor unit and the farthest indoor unit	a+b+c+d	RAS-3.0~3.5HNBRKQ1	≤65 meters
			RAS-4.0~5.0HNBRKQ1	≤70 meters
			RAS-6.0~6.5HNBRKQ1	≤85 meters
			RAS-7.0~12HNBRMQ1	≤100 meters
	Total liquid pipe length	a+b+c+d+ L1+L2+L3	RAS-3.0~3.5HNBRKQ1	≤100 meters
			RAS-4.0~5.0HNBRKQ1	≤120 meters
			RAS-6.0~6.5HNBRKQ1	≤150 meters
			RAS-7.0~12HNBRMQ1	≤180 meters
	Between the first branch pipe and the farthest indoor unit		b+c+d	≤40 meters
	Between branch pipes and connected indoor units		L1,L2,L3,d	≤15 meters
Allowable Height Difference	Outdoor unit is higher than indoor unit	H1	RAS-3.0~6.5HNBRKQ1	≤30 meters
			RAS-7.0~12HNBRMQ1	≤50 meters
	Outdoor unit is lower than indoor unit	H1	RAS-3.0~6.5HNBRKQ1	≤30 meters
			RAS-7.0~12HNBRMQ1	≤40 meters
	Height difference between indoor units	H2		≤15 meters
Others	The model of branch pipe ▲		RAS-3.0~6.5HNBRKQ1 RAS-7.0~12HNBRMQ1	E-102SN

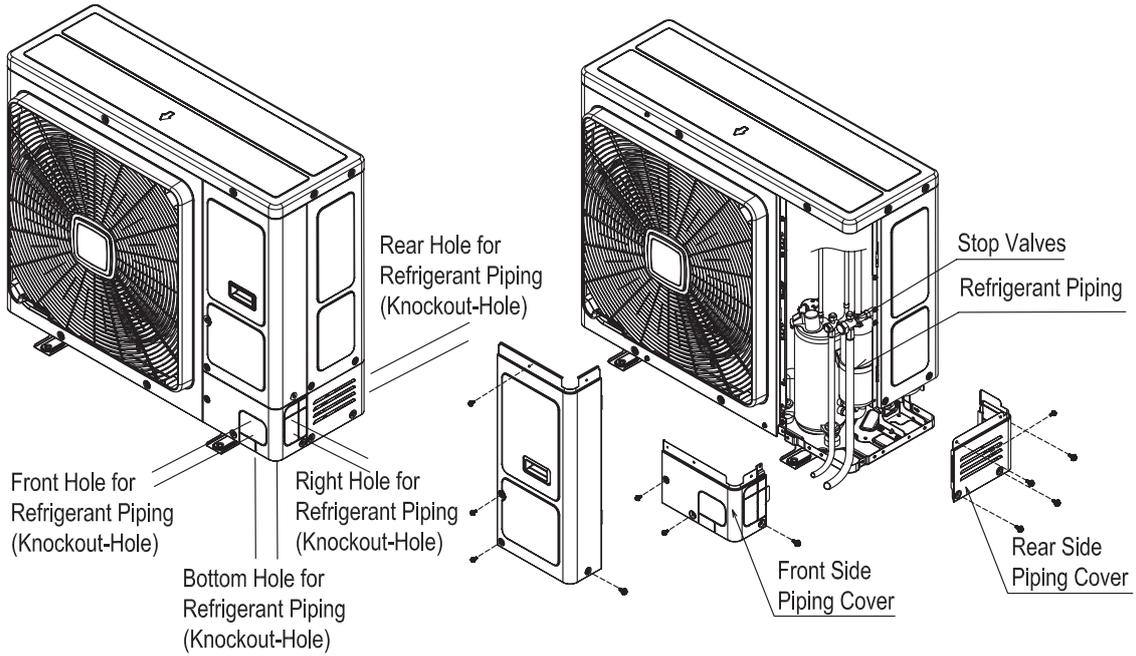
NOTE:

Mark “▲” represent that the model of branch pipe should be same as the requirement of the table above.

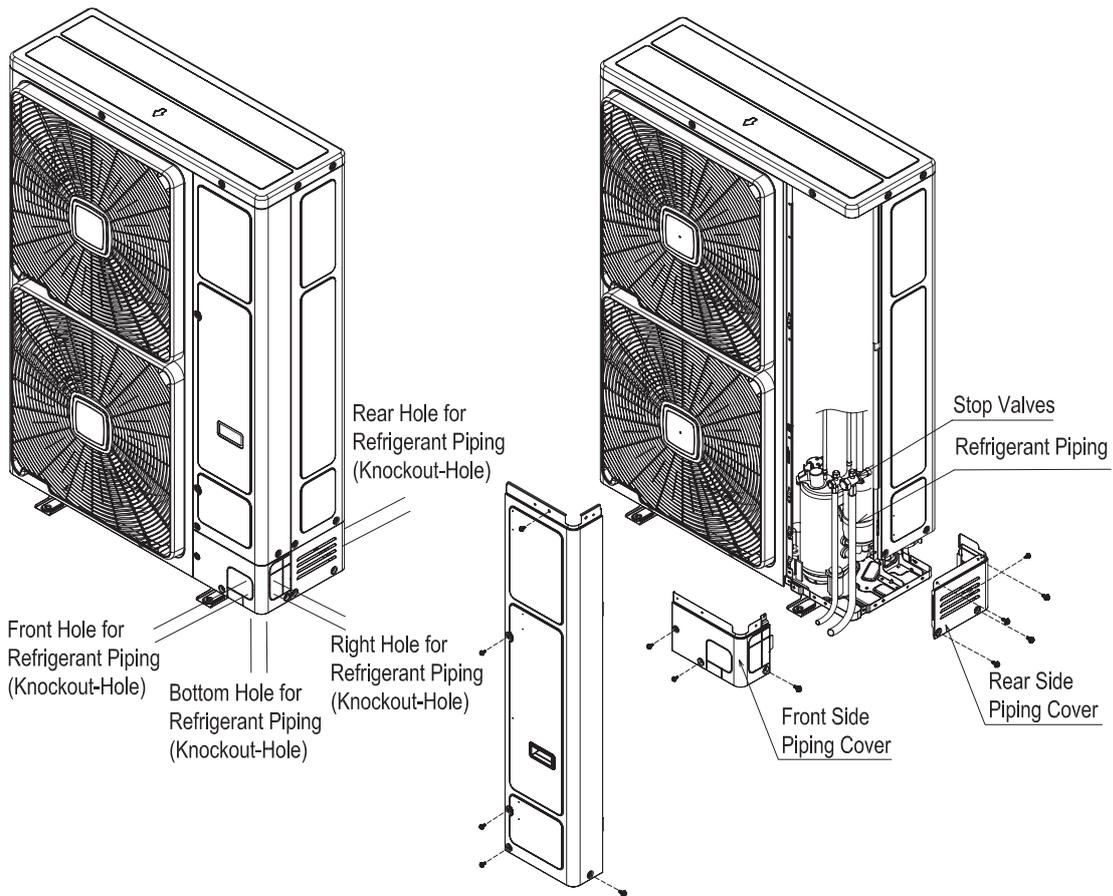
4.4 Refrigerant Piping Work for Outdoor Unit

(1) The refrigerant piping can be installed in four directions (front, right, bottom or rear side) as shown in the following figures.

Model: RAS-3.0~3.5HNBRKQ1



Model: RAS-4.0~6.5HNBRKQ1; RAS-7.0~12HNBRMQ1



Attention for Removing Service Cover

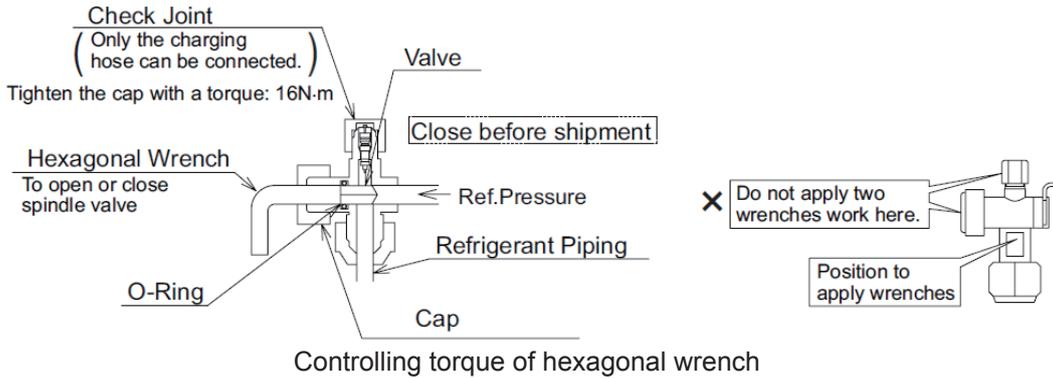
– Procedures of Removing Cover –

- Remove the screws according to the figure above.

NOTE:
Remove the screws and hold the service cover with your hands. If not, the service cover may fall down.

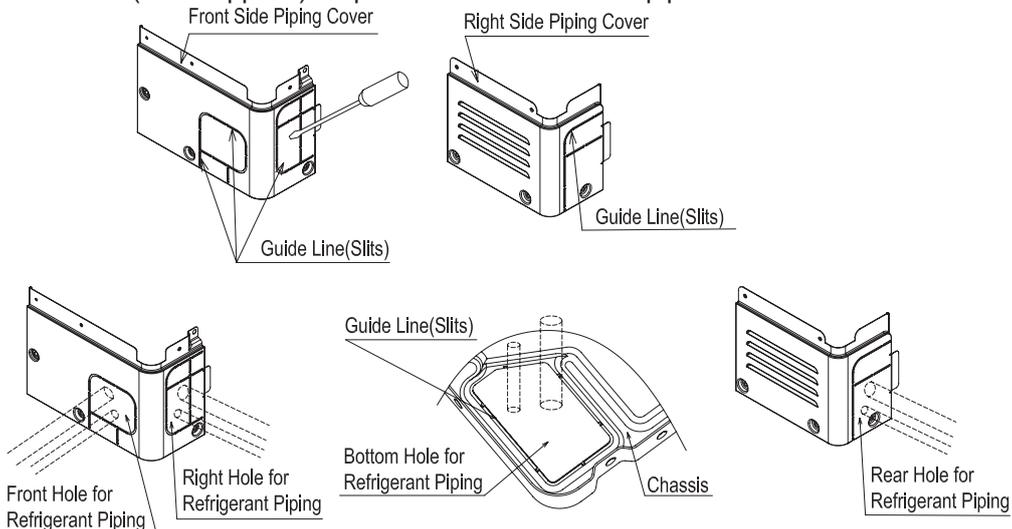
- Slowly push the service cover downward.

(2) Securely use two wrenches at the following position when removing or installing the pipe. (If not, refrigerant leakage may occur.)



Model	Gas side stop valve	Liquid side stop valve
RAS-3.0~6.5HNBRKQ1	11~14 N·m	7~9 N·m
RAS-7.0~8.0HNBRMQ1	12~15 N·m	7~9 N·m
RAS-10~12HNBRMQ1	12~15 N·m	8~12 N·m

(3) If the direction of the refrigerant piping has been chosen, please remove the piping cover from the unit, punch out the holes following the guide line with a screwdriver and a hammer. Then, deburr the holes and attach insulation (field-supplied) for protection of cables and pipes.



(a) Front and Right Side Piping Work (b) Bottom Side Piping Work (c) Rear Side Piping Work

NOTICE

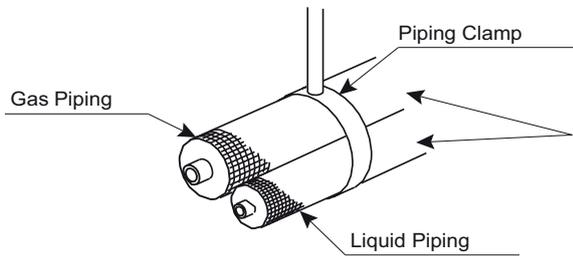
- Protect cables and refrigerant pipes from the edges of the holes with insulations etc. (Field supplied).
- Prevent the cables from contacting the refrigerant piping and the hot components of the unit directly.
- For the right side and rear side piping work, secure enough space for the piping.

(4) Be sure to attach the piping cover to prevent rain water from going into the unit. Completely seal the penetration parts of the pipes with field-supplied insulation in order to prevent rain water from going into the unit.

(5) Use a pipe bender or an elbow (field-supplied) for bending work while connecting pipes.

4.5 Air Tight Test

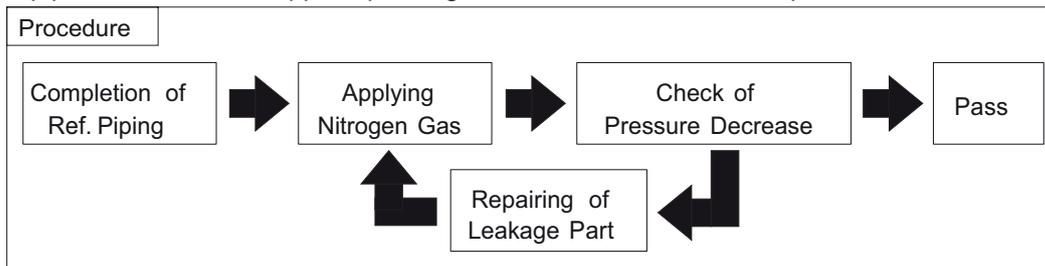
- (1) The stop valves should be closed completely (factory-setting). Do not open the stop valves until all the refrigerant piping connections, air tight test, and vacuum have been completed.
- (2) The refrigerant used for the outdoor unit is R410A. Use the pressure gauge and the charging hose for exclusive use of R410A.
- (3) Connect the indoor/outdoor units with refrigerant piping. Mounted the piping to a stable wall or ceiling with the piping clamp at interval 1.5 meters. Otherwise, the piping may be damaged.
- (4) Securely insulate the gas piping side and liquid piping side individually.



Note:

Due to gas and liquid piping will stretch or contact at different rates due to changing refrigerant temperatures. Do not fasten gas and liquid piping together. Distortion and deformation of the piping can occur.

- (5) Connect the manifold gauge and the charging hoses to the check joints of the stop valves with a nitrogen tank. Perform the air tight test at 4.15 MPa for the test pressure.
- (6) For the air tight test, please use a leak detector or forming agent to detect the joints and stop valves for the piping connection. If there is leakage, please repair it and repeat the air tight test operation.
- (7) If there is no leakage, the nitrogen gas should be discharged from the refrigerant pipes and the air tight test is finished.
- (8) Make sure to insulate the joints for the piping connection as well. Seal the gap between the piping cover and pipes with the field-supplied packing after insulation work is completed.



NOTICE

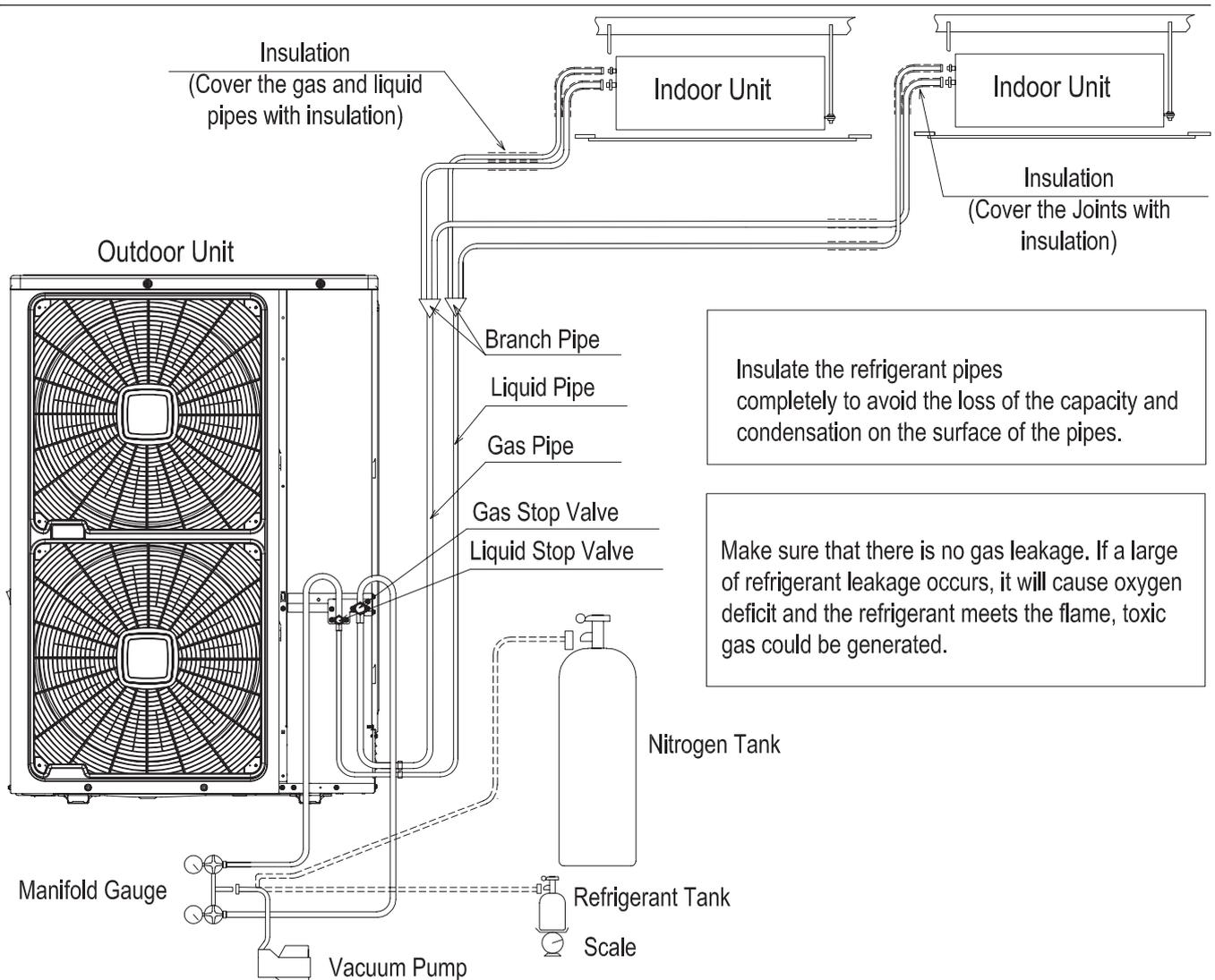
- The air tight test should be performed on the gas stop valve and the liquid stop valve simultaneously. Otherwise, the air tight test is invalid.
- Use the pressure gauge and the charging hose for exclusive use of R410A.

4.6 Vacuuming

- (1) Connect the main fold gauge and the charging hoses to the check joints of the stop valves with a vacuum pump.
- (2) Vacuum the refrigerant piping of the system with the vacuum pump until the pressure reaches -0.1MPa or lower. And then, continue the vacuum pumping work for more than one hour.
- (3) After that, turn off the vacuum pump and then observe the pressure for more than two hours.
- (4) If the pressure is over than -0.1MPa obviously, a gas leak is suspected. Please check the leak position and eliminate it. Then repeat the vacuuming work again.

NOTICE

- The vacuuming should be performed on the gas stop valve and the liquid stop valve simultaneously. Otherwise, air may be left in the system and lead the system to be damaged.
- The tools are used for exclusive use of R410A.



4.7 Additional Refrigerant Charge Calculation

Although this unit has been charged with refrigerant, additional refrigerant charge is required on the site. Determine additional quantity of refrigerant required according to the following table, and charge it into the system.

(1) Calculating the method of Additional Refrigerant Charge

Model	Item	Contents					Total Additional Charge
RAS-3.0~6.5 HNBRKQ1	For the refrigerant pipes	Liquid pipe diameter	Symbol	Total length of liquid piping (m)	Refrigerant charge per meter	Additional charge (kg)	W=W11+W12+W13
		Φ6.35	W11=		×0.020kg/m=		
		Φ9.52	W12=		×0.050kg/m=		
	Φ12.7	W13=		×0.085kg/m=			
	For the Indoor units	0					
RAS-7.0~12 HNBRMQ1	For the refrigerant pipes	Liquid pipe diameter	Symbol	Total length of liquid piping (m)	Refrigerant charge per meter	Additional charge (kg)	W=W11+W12+W13+W21+W22+W23
		Φ6.35	W11=		×0.020kg/m=		
		Φ9.52	W12=		×0.059kg/m=		
	Φ12.7	W13=		×0.120kg/m=			
	For the 4-Way cassette indoor units	Model	Symbol	Numbers (Q'ty)	Refrigerant charge per unit	Additional charge (kg)	
		RCI-1.0~1.5	W21=		×0.23kg/pcs=		
		RCI-2.0~2.5	W22=		×0.29kg/pcs=		
	For the other indoor units	0					

NOTE:

Ensure the total additional charge should not be exceeded the max. additional refrigerant charge quantity.

(2) Max. Additional Refrigerant Charge Quantity

Outdoor Unit	RAS-3.0~3.5HNBRKQ1	RAS-4.0~5.0HNBRKQ1	RAS-6.0~6.5HNBRKQ1	RAS-7.0~8.0HNBRMQ1	RAS-10~12HNBRMQ1
Max. Additional Refrigerant Charge Quantity (kg)	3.9	7.9	8.6	12.9	12.9

(3) Refrigerant Charge Amount of Outdoor Unit before Shipment.

Outdoor Unit	W ₀ (kg)
RAS-3.0~3.5HNBRKQ1	3.0
RAS-4.0~5.0HNBRKQ1	4.1
RAS-6.0~6.5HNBRKQ1	4.4
RAS-7.0~8.0HNBRMQ1	5.5
RAS-10~12HNBRMQ1	6.5

NOTE:

W₀ is outdoor unit refrigerant charge before shipment.

(4) Record of Additional Charge

The total refrigerant charge of the system should be calculated by the following formula:

Total of Refrigerant Charge	=	W	+	W ₀						
The system	=		+		=				kg	

Total Additional Charge: W kg
 Total Ref. Charge: kg
 Date of Ref. Charge Work: / /

4.8 Additional Refrigerant Charge Work

- (1) The additional refrigerant charge is required according to the calculation.
- (2) Before charge work, make sure that the stop valves are fully closed.
- (3) Charge the additional refrigerant from the check joint of liquid stop valve.
- (4) After refrigerant has been charged, fully open the liquid stop valve and gas stop valve.
- (5) If it is impossible to charge the required quantity of refrigerant, follow the procedure below:
 - (A) Fully open the gas stop valve.
 - (B) Operate the compressor in the cooling mode and charge the additional refrigerant from the check joint of the liquid stop valve. At this time, keep the liquid stop valve slightly open.
 - (C) After the refrigerant is charged, fully open the liquid stop valve and the gas stop valve.
 - (D) Carefully calculate any additional refrigerant quantity for charging. If the quantity of additional refrigerant is not correct, it might cause the system in an abnormal condition. The additional refrigerant must be charged as liquid.

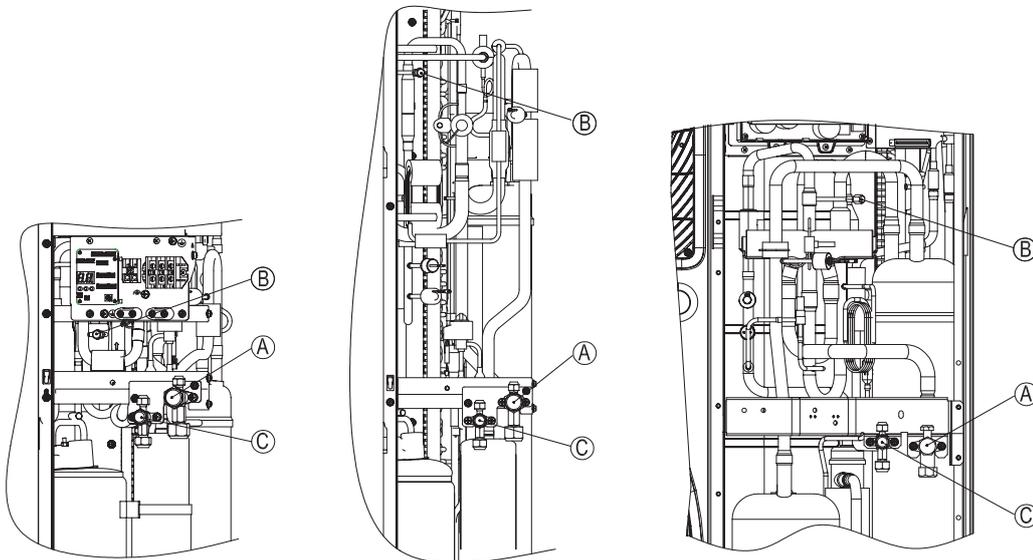
NOTICE

- Do not apply excessive force to the stop valves after fully opening the valves.
- At the test run, fully open the gas and liquid stop valves.

4.9 Pressure Measurement

When the pressure is measured, it can be applied by the check joints as the following figures. Connect the pressure gauge according to the table below, because of high pressure side and low pressure side change by operation mode.

Item	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"	High Pressure	High Pressure



a) RAS-3.0~3.5HNBRKQ1

b) RAS-4.0~6.5HNBRKQ1

c) RAS-7.0~12HNBRMQ1

5. Electrical Wiring

WARNING

- Turn off the main power switch of the indoor unit and the outdoor unit, then wait for more than 10 minutes before electrical wiring work or a periodical check is performed.
 - Ensure that the indoor fan and the outdoor fan have been stopped before electrical wiring work or a periodical check is performed.
 - Protect the wirings, electrical parts, and so on. from rats or other small animals. If not, rats may gnaw at unprotected parts which may lead to a fire.
 - Avoid the wirings touching the refrigerant pipes, plate edges and electrical parts inside the unit. If not, the wirings will be damaged and a fire may be happened.
 - Secure the cables. External forces on the terminals can lead to a fire.
-

NOTICE

- The indoor unit fan may continue to operate for up to five minutes following the heating cycle to dissipate residual heat from the indoor unit.
-

5.1 General Check

- (1) Make sure that the field-supplied electrical components (main power switches, circuit breakers, wires, conduit connectors and wire terminals) have been properly selected according to the electrical characteristics indicated in the table 5.1. Make sure that the components comply with the local national standards and rules.
 - Supply electrical power to each outdoor unit. An ELB (Earth Leakage Breaker), fuse and main switch should be used for each outdoor unit. If not, it will be cause of fire or electrical shock.
- (2) Ensure that the power supply voltage is within $\pm 10\%$ of the rated voltage. If the power supply voltage is too low, the system cannot start due to the voltage drop.
- (3) Check the size of the electrical wires.
- (4) Ensure that the ground wiring for the outdoor unit and indoor unit are connected. If not, it will be cause of fire or an electrical shock.
- (5) Communication cabling shall be a minimum of 0.75mm², 2-Conductor, Stranded Copper. Shielded cable must be considered for applications and routing in areas of high EMI and other sources of potentially excessive electrical noise to reduce the potential for communication errors. When shielded cabling is applied, proper bonding and termination of the cable shield is required as per guidelines. Plenum and riser ratings for transmission cables must be considered per application and local code requirements.
 - In case of where the power source for the air conditioning is supplied from the same power transformer as the device with high electricity consumption*.
 - In case of where the power supply wiring for the device* and for the air conditioning are located close to each other.

* Example: Lift, container crane, rectifier for electric railway, inverter power device, arc furnace, electric furnace, large-sized induction motor, and large-sized switch.

In the instances mentioned above, an induction surge of the power supply wiring for the air conditioning could occur due to a rapid change in electricity consumption of the device and activation of the switch. Therefore, check the field regulations and standards before performing electrical work in order to protect the power supply wiring for the air conditioning.

Table 5.1 Electrical Data and Recommended Characteristics

Model	Power Supply	Maximum Running Ampacity (A)	Power Supply Wiring (Cores×mm ²)	Transmission cable (Cores×mm ²)	ELB	
					Rated Ampacity (A)	Rated Sensitive Ampacity (mA)
RAS-3.0~3.5HNBRKQ1	220-240V/1Ph/50Hz	21	3×4.0	2×0.75	32	30
RAS-4.0~6.5HNBRKQ1	220-240V/1Ph/50Hz	31	3×6.0	2×0.75	40	30
RAS-7.0~8.0HNBRMQ1	380-415V/3Ph/50Hz	20	5×6.0	2×0.75	25	30
RAS-10~12HNBRMQ1	380-415V/3Ph/50Hz	28	5×6.0	2×0.75	40	30

- (1) Connect the power supply wirings to the terminal block TB1 and ground wiring to the terminal in the electrical control box. The ELB (Earth leakage breaker), FUSE and S (Main switch) must be installed to each power source of outdoor unit.
- (2) Connect the transmission cables between the outdoor unit and indoor units to the terminals 1 and 2 on the terminal block. The transmission cables must be made from the shielded twist pair cabling. Proper bonding and termination of the cable shield is required as per guidelines. The installation must be considered per application and local code requirements. Transmission cable shall be a minimum of 0.75mm², 2-Conductor, Stranded Copper.
- (3) For the model of RAS-3.0~6.5HNBRKQ1 outdoor units, the magnetic rings in the package of the outdoor unit should be used on the power supply wire and transmission cable. For the power supply wire, two magnetic rings should be paralleled and the wire should through them by one cycle. For the transmission cable between the outdoor unit and indoor units, the cable should be through the magnetic ring by 3 cycles.
- (4) Connect the transmission cables between the indoor unit and wireless controller to the terminals A and B on the terminal block.
- (5) The transmission cable is required to be separated from the power supply wiring.
Keep at least 5cm distance between the transmission cable and the power supply wiring, and also min. 1.5m distance between the transmission cable and power supply wiring for other electrical device. If the above is not secured, put the power supply wiring into the metal conduit tube to separate from other wirings.
- (6) Do not connect the power supply wiring to the terminals 1 and 2 on the terminal block for transmission wiring. Otherwise, printed circuit board may be damaged.
- (7) Connect the ground wire for the outdoor/indoor units. The ground wiring work under the condition of 100Ω (Max.) ground resistance should be performed by the qualified person.
- (8) Tighten screws for the terminal block according to the following table:

Size	Tightening Torque
M4	1.0~1.3 N·m
M5	2.0~2.5 N·m
M6	4.0~5.0 N·m
M8	9.0~11.0 N·m
M10	18.0~23.0 N·m



- The ELB (Earth leakage breaker), FUSE and S (Main switch) must be installed to each power source of outdoor unit and indoor units. If not, it may cause an electrical shock or fire.
- Perform the electrical work according to the regulations of each region and this installation and maintenance manual. A separate, dedicated electrical circuit must be used. If the electrical wiring work is performed incorrectly or there is a capacity shortage of the power circuit, it will cause an electric shock or fire.
- Check that the ground wire is securely connected. Otherwise, it may lead to an electrical shock. Do not connect the ground wiring to gas piping, water piping, lightning conductor, or telephone ground wirings.
- In the electrical wiring connection for RAS-7.0~12HNBRMQ1, do not connect the live wires (L1/L2/L3) to the terminals N of the terminal block TB1. Otherwise, printed circuit board may be damaged.

5.3 Electrical Wiring for Outdoor Unit

Avoid the wirings touching the refrigerant pipes, plate edges and electrical parts inside the unit. If not, the wires will be damaged and at the worst, a fire will occur.

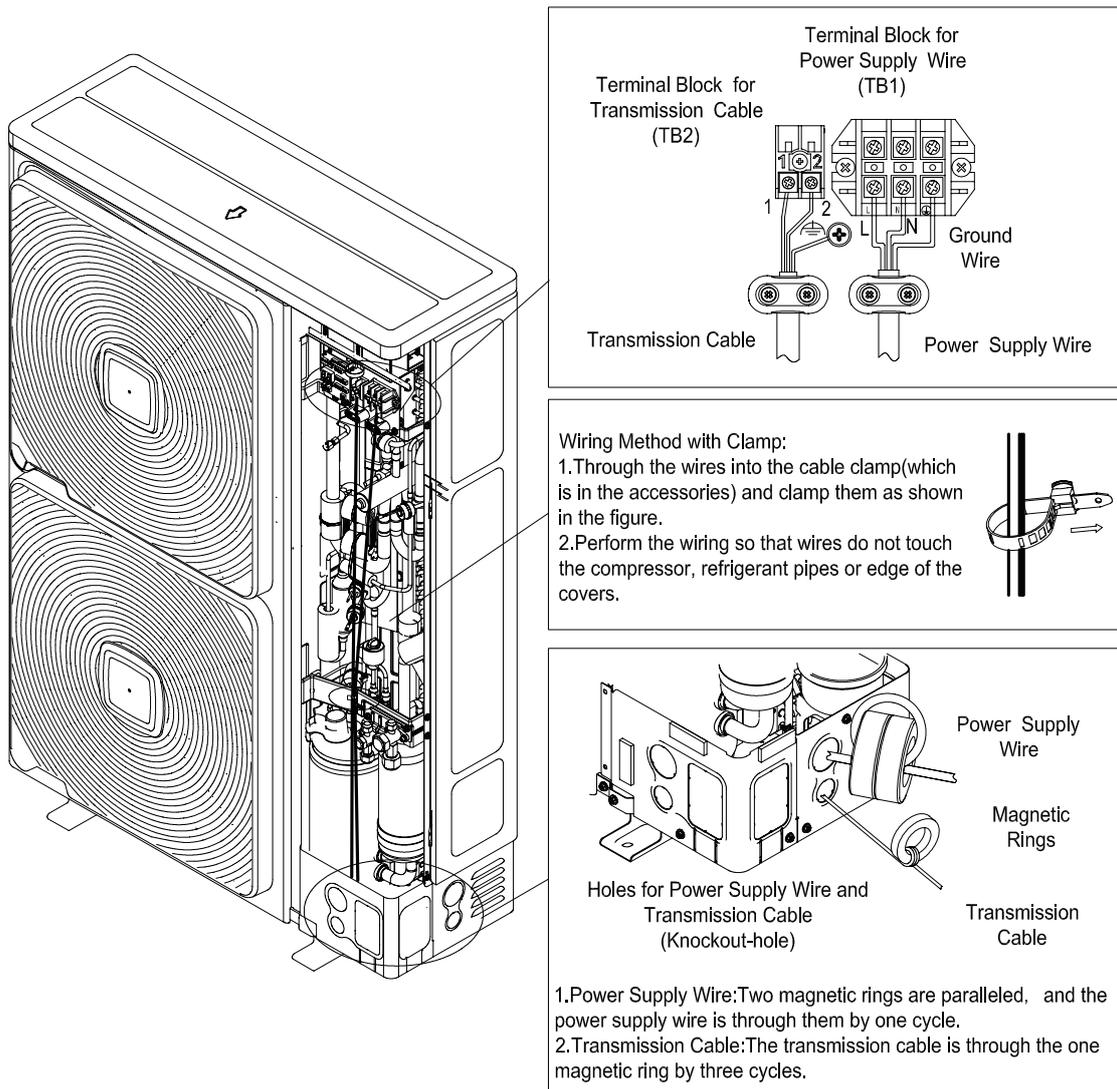


Figure 5.3 Electrical Wiring for RAS-3.0~6.5HNBRKQ1

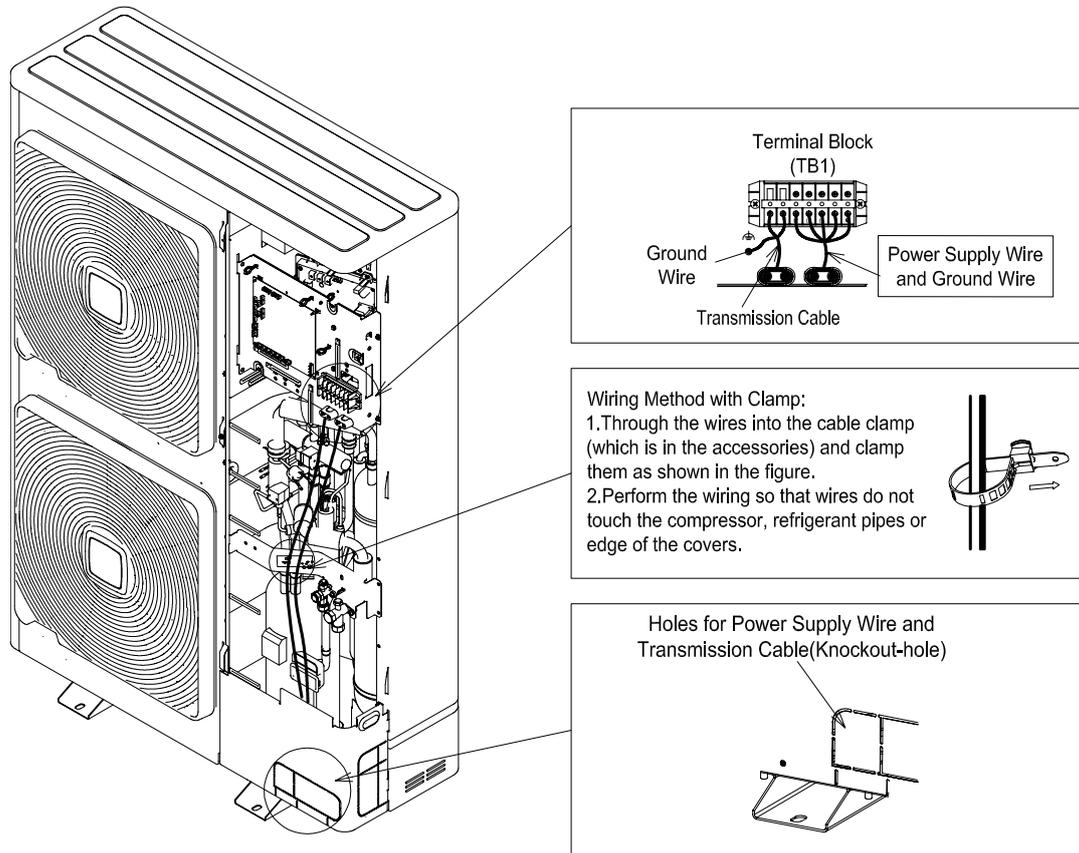


Figure 5.4 Electrical Wiring for RAS-7.0~12HNBRM Q1

NOTES:

- Perform all the electrical work in accordance with the manual and in compliance with the local regulations and safety standards. The electrical wiring should be applied by the qualified person.
- The recommended electrical characteristics are calculated by the related safety standards. The environment temperature is less than 40°C, the length of the power supply wire is no more than 15 meters. If the air conditioning is in an extreme environment, please calculate the electrical characteristics again.
- If the distribution box or pull box is adopted to the power supply for air conditioning, the size of the power supply wire should be chosen according to the following table.

Total Ampacity (A)	Power Supply Wiring (mm ²)	
I≤6	2.5	※ 1: If the total ampacity is over than 63A, the power supply wires must not be connected in series.
6<I≤10	2.5	
10<I≤16	2.5	
16<I≤25	4	
25<I≤32	6	
32<I≤40	10	
40<I≤63	16	
63<I	※ 1	

- The power supply wire should be stranded copper with shielding by neoprene.
- The transmission cables must be made up of the shielded twist pair cabling, and the shielded should be connected to the ground.
- If the power supply wiring or the transmission cable is damaged, please turn off the power supply and contact the service dealer.
- The ELB (Earth leakage breaker) must be installed to each power source of outdoor unit and indoor units. The distance between the terminals of the ELB should be more than 3 mm.
- When connect the power supply wirings, it is better that the ground wire should be longer than the live and neutral wires.

6. DIP Switch Setting of Outdoor Unit

There are several DIP Switches in the front of the outdoor unit, which is designed for test and diagnostic conveniently. It has the advantages that it can monitor the real-time status of the outdoor unit, display the alarm codes, view the historical alarm codes, and so on.

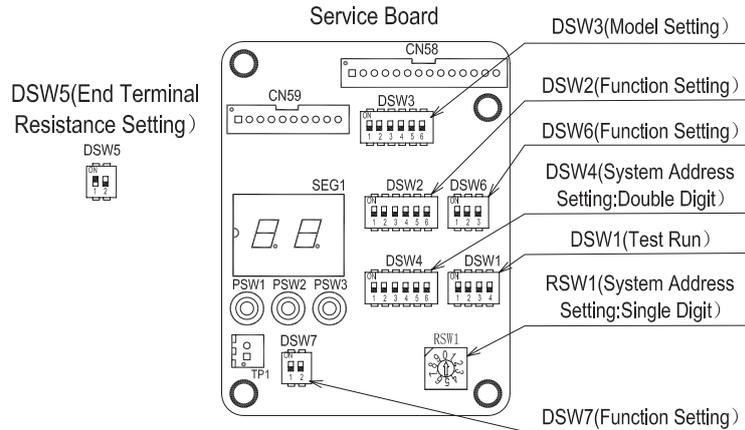


Figure 6.1 DIP Switches of RAS-3.0~6.5HNBKQ1

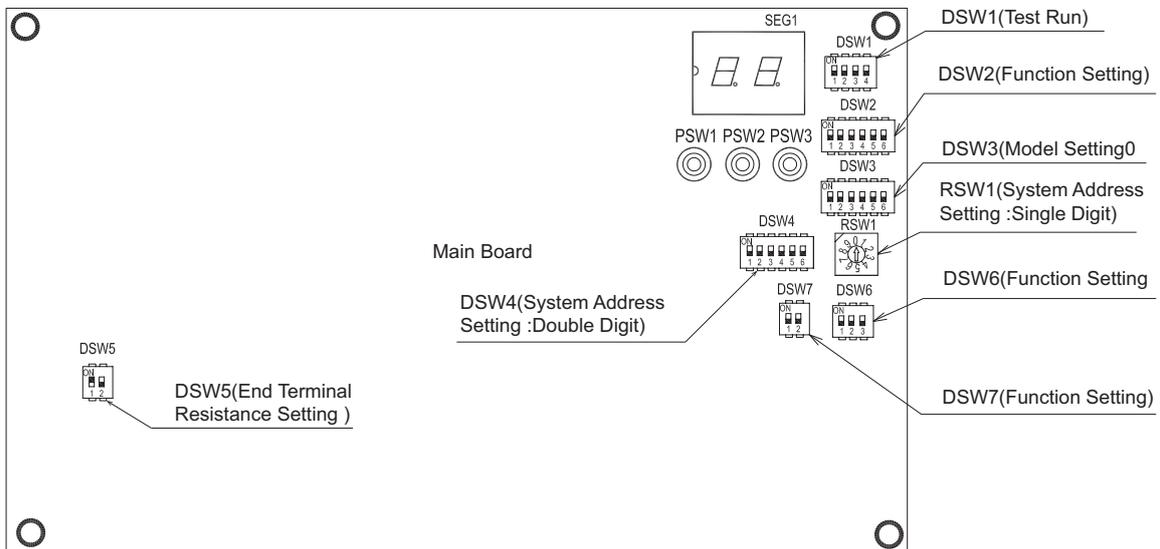
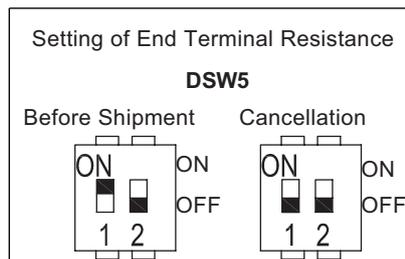


Figure 6.2 DIP Switches of RAS-7.0~12HNBRMQ1

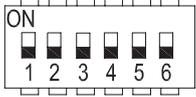
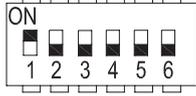
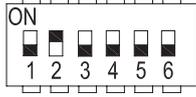
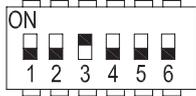
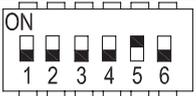
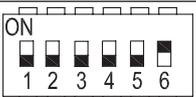
- (1) The mark of “■” indicates the position of DIP switches. Set the DIP switches according to the introduction of DIP switches inside the outdoor unit.
- (2) Setting for Transmitting
It is required to set the refrigerant cycle No. of outdoor unit.
- (3) Setting End Terminal Resistance
Before shipment, No. 1 pin of DSW5 is set at the “ON” side. If there are 2 or more units in the same communication system, set No. 1 pin of DSW5 at the “OFF” side from the 2nd refrigerant group outdoor unit. If only one outdoor unit is used, no setting is required.



(4) Setting Refrigerant Cycle No.

In the same refrigerant cycle, set the same refrigerant cycle No. for the outdoor unit and the indoor units as shown below. The range of refrigerant cycle No. is between 0 and 63.

Refrigerant Cycle No. = The value of the DSW4 (System Address Setting: Double Digit) + The value of the RSW1 (System Address Setting: Single Digit).

DSW4 (System Address Setting: Double Digit)		RSW1 (System Address Setting: Single Digit)	
DIP Switch Setting	Value	DIP Switch Setting	Value
	0		0
	10		1
	20		2
	30		3
	40		4
	50		5
	60		6
			7
			8
			9

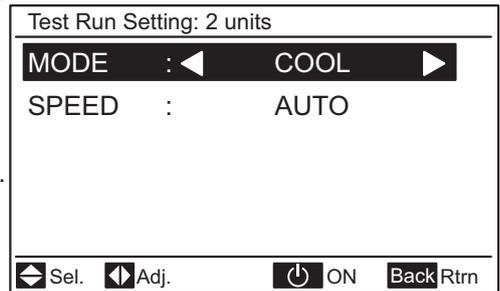
7. Test Run

Test run of outdoor units and indoor units should be performed one by one sequentially. And record the results in the table 7.1.

7.1 Before Test Run

- (1) Do not operate the system until all the points have been examined and cleared.
 - Check to ensure that the refrigerant piping and transmission between outdoor unit and indoor units are connected to the same refrigerant cycle. If not, it will cause an abnormal operation and a serious accident.
 - Check to ensure that the resistance to ground 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. Do not impress the power supply wiring on the terminals for transmission.
 - Check to ensure that the liquid stop valve and the gas stop valves are fully open.
 - Check to ensure that the power supply of air conditioning has been turn on for more than 12 hours, in order to warm the compressor oil by the crankcase heater.
- (2) Pay attention to the following items while the system is running.
 - Do not touch the compressor and the discharge gas pipes by hand, because their surface is very hot, it may be lead to be scalded.
 - Do not touch any electrical components, otherwise, it may cause an electrical shock.
- (3) Turn off the main power switch to the indoor unit and the outdoor unit and wait for more than 10 minutes before electrical wiring work or a periodical check is performed.

Test Run Screen



7.2 Test Run by DIP Switch of Outdoor Unit

- (1) Turn on the power supply of the outdoor and indoor units for more than 12 hours, the 7-segment display is lighting.
- (2) Check the 7-segment display of the outdoor unit. If there is any alarm code blinking, please examine and clear it by referring to the table of alarm codes.
- (3) Operate the air conditioning in the cooling or heating operation according to the ambient temperature. The DIP Switch setting is shown as below. The operation will start in 1 minute after the DIP Switch setting is done.

DIP Switch	Original State	Cooling Operation	Heating Operation
DSW1			

- (4) The indoor unit automatically starts operating when the test run of the outdoor unit is set. The operation continues for 2 hours without thermo-off, switch the DSW1 to the original state, defrosting or a malfunction will happen.
- (5) During the test run, if any malfunction happens, please examine and clear it according to the table of alarm codes.
- (6) If the test run has been finished, please switch the DSW1 to the original state. Otherwise, the air conditioning will not work normally.

7.3 Test Run by Wired Controller

This test run method is for the wired controller (Model: PC-ARF1). As for other remote controllers, refer to Installation and Maintenance Manual attached to each wired controller

(1) Check to ensure that stop valves for gas and liquid of the outdoor unit are fully opened.

(In the case of combined outdoor units, check to ensure that all stop valves of the outdoor units are fully opened.)

(2) Perform the test run of indoor units one by one sequentially, and then check the accordance of the refrigerant piping system and the electrical wiring system. (If the multiple indoor units are operated simultaneously, the system accordance cannot be inspected.)

(3) Perform the test run according to the following procedure. Ensure that the unit operates without any problem.

NOTE:

In the case that 2 wired controllers (main and sub) are installed to the system, perform the test run from the main wired controller.

< For PC-ARF1 >

(a) Press and hold "Menu" and "Back/Help" simultaneously for at least 3 seconds. The test run menu will be displayed.

(b) Select "Test Run" by pressing "▲▼" and press "OK".

The test run screen will be displayed.

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

NOTE:

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

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

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

* The power supply for the indoor unit is NOT turned ON or the incorrect wiring.

* Loose Connection between Indoor Units or Wired Controller

* Incorrect Setting of Indoor Unit Address (The indoor unit address is overlapped.)

(c) Start Test Run.

- Press "⏻ On/Off". The test run operation will start. The operation mode, the air flow volume, the air flow direction and the test run time can be set on the test run screen. Select the item by pressing "▲▼" and set the detail by pressing "◀▶".

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

- Check the temperature conditions.

The unit operation cannot be performed if the conditions are out of range.

Refer to the table below for working range.

< Example >

The cooling operation is not performed if the outdoor temperature is below -5°C DB.

		Temperature	DB: Dry Bulb, WB: Wet Bulb
		Maximum	Minimum
Cooling Operation	Indoor	32°C DB/23°C WB	21°C DB/15°C WB
	Outdoor	Stable 48°C DB Interval 48~52°C DB	-5°C DB*
Heating Operation	Indoor	27°C DB	15°C DB
	Outdoor	24°C DB/15°C WB	Stable -15°C WB Interval -20°C~-15°C WB

NOTE:

When RAS-7.0~12HNBRMQ1 outdoor units are connected with the RCIM-0.8FSN4 or RCD-0.8~1.0FSN3 or RCS-0.8~1.0FSN, if only one of these indoor unit is operating in cooling mode, the minimum outdoor temperature is limited to 5°C DB.

(d) Press “▲” or “▼”, select “LOUV.” and select “” (auto swing) by pressing “◀” or “▶”.

The auto swing operation will start. Check the operating sound at the louvers.

If abnormal sound is generated from louvers, it may be caused by deformation of the air panel due to incorrect installation. In this case, install the air panel again without deformation. If abnormal sound is not generated, press “◀” or “▶” again to stop the auto swing operation.

(e) Though the temperature detections by the thermistors are invalid, the protection devices are valid during the test run. If an alarm occurs, refer to Table 7.2, Alarm Code and perform troubleshooting. Then perform the test run again.

(f) To finish the test run, wait for 2 hours (as default setting) or press “ On/Off” switch again.

- Flashing the operation lamp for 2 seconds ON and 2 seconds OFF is for abnormality of the transmitting between the indoor unit and the wired controller (loosened or disconnected connector, disconnected wires, or incorrect wiring etc.)
- Small sound may be heard from the outdoor unit after turning ON the power source because the electrical expansion valve is activated to adjust the opening. Therefore, there is no abnormality of the unit.
- Sound may be heard from the outdoor unit for seconds after running or stopping the compressor, starting or finishing the defrosting, etc. It generates because of the pressure difference inside the piping from the compressor. Therefore, there is no abnormality of the unit.



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

Table 7.1 Test Run and Maintenance Record

Model:	SERIAL No.:	COMPRESSOR MFG. No.																																												
CUSTOMER'S NAME AND ADDRESS:		DATE:																																												
<p>1. Is the rotation direction of the indoor unit fan correct? <input style="float:right;" type="checkbox"/></p> <p>2. Is the rotation direction of the outdoor unit fans correct? <input style="float:right;" type="checkbox"/></p> <p>3. Are there any abnormal compressor sounds? <input style="float:right;" type="checkbox"/></p> <p>4. Has the unit been in operation at least twenty (20) minutes? <input style="float:right;" type="checkbox"/></p> <p>5. Check Room Temperature:</p> <table style="width:100%; border:none;"> <tr> <td style="width:25%;">Inlet:</td> <td style="width:25%;"><u>No.1 DB /WB</u> °C</td> <td style="width:25%;"><u>No.2 DB /WB</u> °C</td> <td style="width:25%;"><u>No.3 DB /WB</u> °C</td> <td style="width:25%;"><u>No. 4 DB /WB</u> °C</td> </tr> <tr> <td>Outlet:</td> <td><u>DB /WB</u> °C</td> <td><u>DB /WB</u> °C</td> <td><u>DB /WB</u> °C</td> <td><u>DB /WB</u> °C</td> </tr> <tr> <td>Inlet:</td> <td><u>No.5 DB /WB</u> °C</td> <td><u>No.6 DB /WB</u> °C</td> <td><u>No.7 DB /WB</u> °C</td> <td><u>No. 8 DB /WB</u> °C</td> </tr> <tr> <td>Outlet:</td> <td><u>DB /WB</u> °C</td> <td><u>DB /WB</u> °C</td> <td><u>DB /WB</u> °C</td> <td><u>DB /WB</u> °C</td> </tr> </table> <p>6. Check Outdoor Ambient Temperature:</p> <table style="width:100%; border:none;"> <tr> <td style="width:25%;">Inlet:</td> <td style="width:25%;"><u>DB</u> °C</td> <td style="width:25%;"><u>WB</u> °C</td> <td style="width:25%;"></td> </tr> <tr> <td>Outlet:</td> <td><u>DB</u> °C</td> <td><u>WB</u> °C</td> <td></td> </tr> </table> <p>7. Check Refrigerant Temperature:</p> <table style="width:100%; border:none;"> <tr> <td style="width:60%;">Liquid Temperature:</td> <td style="width:40%;">_____ °C</td> </tr> <tr> <td>Discharge Temperature:</td> <td>_____ °C</td> </tr> </table> <p>8. Check Pressure:</p> <table style="width:100%; border:none;"> <tr> <td style="width:60%;">Discharge Pressure:</td> <td style="width:40%;">_____ MPa</td> </tr> <tr> <td>Suction Pressure:</td> <td>_____ MPa</td> </tr> </table> <p>9. Check Voltage:</p> <table style="width:100%; border:none;"> <tr> <td style="width:60%;">Rated Voltage:</td> <td style="width:40%;">_____ V</td> </tr> <tr> <td>Operating Voltage:</td> <td><u>L-N</u> _____ V</td> </tr> <tr> <td>Starting Voltage</td> <td>_____ V</td> </tr> </table> <p>10. Check the Input Running Current of the Compressor:</p> <table style="width:100%; border:none;"> <tr> <td style="width:60%;">Running Current:</td> <td style="width:40%;">_____ A</td> </tr> </table> <p>11. Is the refrigerant charge correct? <input style="float:right;" type="checkbox"/></p> <p>12. Do the operation control devices operate correctly? <input style="float:right;" type="checkbox"/></p> <p>13. Do the safety devices operate correctly? <input style="float:right;" type="checkbox"/></p> <p>14. Has the unit been checked for refrigerant leakage? <input style="float:right;" type="checkbox"/></p> <p>15. If the unit clean inside and outside? <input style="float:right;" type="checkbox"/></p> <p>16. Are all cabinet panels mounted? <input style="float:right;" type="checkbox"/></p> <p>17. Are all cabinet panels free from rattles? <input style="float:right;" type="checkbox"/></p> <p>18. Is the indoor unit filter clean? <input style="float:right;" type="checkbox"/></p> <p>19. Are the indoor unit heat exchanger and outdoor unit heat exchanger clean? <input style="float:right;" type="checkbox"/></p> <p>20. Are the stop valves open? <input style="float:right;" type="checkbox"/></p> <p>21. Does the drain water flow smoothly from the drain pipe? <input style="float:right;" type="checkbox"/></p>			Inlet:	<u>No.1 DB /WB</u> °C	<u>No.2 DB /WB</u> °C	<u>No.3 DB /WB</u> °C	<u>No. 4 DB /WB</u> °C	Outlet:	<u>DB /WB</u> °C	<u>DB /WB</u> °C	<u>DB /WB</u> °C	<u>DB /WB</u> °C	Inlet:	<u>No.5 DB /WB</u> °C	<u>No.6 DB /WB</u> °C	<u>No.7 DB /WB</u> °C	<u>No. 8 DB /WB</u> °C	Outlet:	<u>DB /WB</u> °C	<u>DB /WB</u> °C	<u>DB /WB</u> °C	<u>DB /WB</u> °C	Inlet:	<u>DB</u> °C	<u>WB</u> °C		Outlet:	<u>DB</u> °C	<u>WB</u> °C		Liquid Temperature:	_____ °C	Discharge Temperature:	_____ °C	Discharge Pressure:	_____ MPa	Suction Pressure:	_____ MPa	Rated Voltage:	_____ V	Operating Voltage:	<u>L-N</u> _____ V	Starting Voltage	_____ V	Running Current:	_____ A
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Table 7.2 Alarm Code

Alarm Code	Malfunction	Reason
(01)	Activation of Protection Device (Float Switch)	Activation of Float Switch (High Water Level in Condensation Drainage Pan, Problem with Drain Piping, Float Switch, or Condensation Drainage Pan)
02	Activation of Protection Device (High Pressure Cut)	Activation of PSH (Piping Clogging, Excessive Refrigerant, Inert Gas Mixing)
03	Abnormal Communication between Indoor and Outdoor Units	Incorrect Wiring, Loose Terminals, Disconnect Wire, Blowout of Fuse, Outdoor Unit Power OFF
04	Abnormal Communication between Inverter PCB and Outdoor PCB	Inverter PCB-Outdoor Unit PCB Communication Failure (Loose Connector, Wire Breaking, Blown of Fuse)
05	Abnormality of Power Supply Phases	Incorrect Power Source, Connection to Reversed Phase, Open-Phase
06	Abnormal Inverter Voltage	Outdoor Voltage Drop, Insufficient Power Capacity
07	Decrease in Discharge Gas Superheat	Excessive Refrigerant Charge, Failure of Thermistor, Incorrect Wiring, Incorrect Piping Connection, Expansion Valve Locking at Opened Position (Disconnect Connector)
08	Increase in Discharge Gas Temperature	Insufficient Refrigerant Charge, Pipe Clogging, Failure of Thermistor, Incorrect Wiring, Incorrect Piping Connection, Expansion Valve Locking at Closed Position (Disconnect Connector)
(11)	Abnormality of Inlet Air Thermistor	Incorrect Wiring, Disconnecting Wiring Breaking Wire, Short Circuit
(12)	Abnormality of Outlet Air Thermistor	
(13)	Freeze Protection Thermistor	
(14)	Abnormality of Gas Piping Thermistor	
(16)	Abnormality of Remote Sensor (DOAS)	
(17)	Abnormality of Thermistor Built-in Wired Controller	
18	Activation of Protection Device for Inverter PCB of Indoor Fan	
19	Activation of Protection Device for Indoor Fan	Fan Motor Overheat, Lockup
(1A)	Abnormality of Fin Temperature of Indoor Fan Controller	
(1b)	Overcurrent of Indoor Fan Controller	
(1C)	Abnormality of Current Sensor of Indoor Fan Controller	
(1d)	Indoor Fan Controller Protection Action	
(1E)	Abnormality of Voltage of Indoor Fan Controller	
20	Abnormality of Discharge Gas Thermistor	Incorrect Wiring, Severed or Disconnecting Wiring, Short Circuit
21	Abnormality of High Pressure Sensor	
22	Abnormality of Outdoor Air Thermistor	
24	Abnormality of Heat Exchanger Liquid Pipe Thermistor	
29	Abnormality of Low Pressure Sensor	
31	Incorrect Capacity Setting of Outdoor Unit and Indoor Unit	Incorrect Capacity Code Setting of Combination Excessive or Insufficient Indoor Unit Total Capacity Code
35	Incorrect Setting of Indoor Unit No.	Duplication of Indoor Unit No. in same Refrigerant Group

Alarm Code	Malfunction	Reason
36	Incorrect of Indoor Unit Combination	Outdoor Unit, Indoor Machine Different Tier, Brand Exception Combination
38	Abnormality of Picking up Circuit for Protection in Outdoor Unit	Failure of Protection Detecting Device (Incorrect Wiring of Outdoor PCB)
3E	Combination Problem between Inverter PCB and Outdoor PCB	Incorrect Combination between Inverter PCB and Outdoor PCB
43	Activation of Pressure Ratio Decrease Protection Device	Defective Compression (Failure of Compressor of Inverter, Loose Power Supply Connection)
44	Activation of Low Pressure Increase Protection Device	Overload at Cooling, High Temperature at Heating, Expansion Valve Locking (Loose Connector)
45	Activation of High Pressure Increase Protection Device	Overload Operation (Clogging, Short-Pass), Pipe Clogging, Excessive Refrigerant, Inert Gas Mixing
47	Activation of Low Pressure Decrease Protection Device (Vacuum Operation Protection)	Insufficient Refrigerant, Refrigerant Piping, Clogging, Expansion Valve Locking at Open Position (Loose Connector)
48	Activation of Inverter Overcurrent Protection Device	Overload Operation, Compressor Failure
51	Problem with Inverter Current Sensor	Current Sensor Failure.
53	Inverter Error Signal Detection	Driver IC Error Signal Detection (Protection for Overcurrent, Low Voltage, Short Circuit)
54	Abnormality of Inverter Fin Temperature	Abnormal Inverter Fin Thermistor, Heat Exchanger Clogging, Fan Motor Failure
55	Inverter Failure	Inverter PCB Failure
57	Activation of Fan Controller Protection	Driver IC Error Signal Detection (Protection for Overcurrent, Low Voltage, Short Circuit), Instantaneous Overcurrent
5A	Abnormality of Fan Controller Fin Temperature	Fin Thermistor Failure, Heat Exchanger Clogging, Fan Motor Failure
5b	Activation of Fan Controller Overcurrent Protection	Fan Motor Failure.
5C	Problem with Fan Controller Sensor	Failure of Current Sensor (Instantaneous Overcurrent, Increase of Fin Temperature, Low Voltage, Ground Fault, Step-Out)
(b0)	Indoor Models and Capacity is Set Incorrectly	Compressor damage alarm occurred three times within 6 hours
(b1)	Incorrect Outdoor Unit Address No. or Unit Number Setting	Over 64 Number is Set for Address or Refrigerant Cycle.
(b2)	Abnormality of EEPROM	
(b3)	Incorrect of Outdoor Unit Combination	Outdoor Unit, Indoor Machine Different Tier, Brand Exception Combination
b5	Incorrect Indoor Unit Connection No. Setting	More than 18, Non-Corresponding to H-LINK II Units are Connected to One System.
(b6)	Indoor Fan Controller Communication Error	
(b7)	Indoor -2 Fan with Controller Communication Error	
(bF)	The Number of Software Control Board Connections is Abnormal	
EE	Compressor Protection Alarm (It is cannot be reset from remote controller)	If the alarms (02; 07; 08; 43; 44; 45; 47) occur three times within 6 hours, the alarm code appears.
A1	Noise Filter Board is Abnormal	Noise Filter Board is Abnormal

- When the alarm codes in the brackets have been appeared, they are presented that the malfunctions are from the indoor unit.

8. Safety and Control Device Setting

The compressor is protected by the following devices and their combinations:

- (1) High Pressure Switch: This switch cuts out the operation of the compressor when the discharge pressure exceeds the setting.
- (2) Crankcase Heater: This band type heater protects against oil foaming during cold starting, as it is energized while the compressor is stopped.

Model		RAS-3.0~ 3.5HNBRKQ1	RAS-4.0~ 6.5HNBRKQ1	RAS-7.0~ 8.0HNBRMQ1	RAS-10~ 12HNBRMQ1
High Pressure Switch		Automatic Reset, Non-Adjustable		Automatic Reset, Non-Adjustable	
Cut-Out	MPa	$4.15_{-0.2}^{-0.05}$	$4.15_{-0.2}^{-0.05}$	$4.15_{-0.2}^{-0.05}$	$4.15_{-0.2}^{-0.05}$
	Cut-In	$3.2_{-0.2}^{+0.15}$	$3.2_{-0.2}^{+0.15}$	$3.2_{-0.2}^{+0.15}$	$3.2_{-0.2}^{+0.15}$
Breaker	A	32	40	25	40
Crankcase Heater	W	24	28	80	80
CCP Timer	Min	Non-Adjustable	Non-Adjustable	Non-Adjustable	Non-Adjustable
Setting Time		3	3	3	3

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DEMO

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Qingdao Hisense Hitachi Air-conditioning Systems Co.,Ltd.

Add: Hisense Information Industry Park 218,Qianwangang Road,
Qingdao Economic Development Zone,China

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