

Original Instruction & Maintenance Manual

*HITACHI AIR
CONDITIONER
OUTDOOR UNIT*

Models:

Outdoor Units :

RAS-080HNBSTQ

RAS-090HNBSTQ

RAS-100HNBSTQ

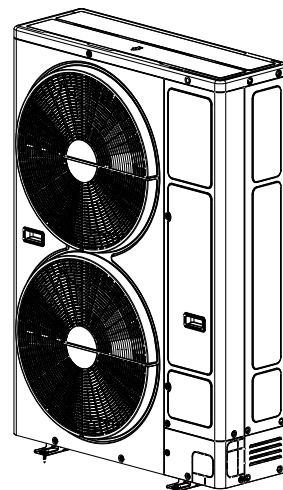
RAS-110HNBSTQ

RAS-120HNBSTQ

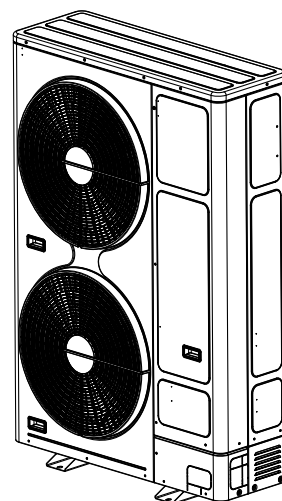
IMPORTANT:

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

HITACHI



080~090



100~120

P02092Q

Original Instructions



Declaration of Conformity (Manufacturer's Declaration)



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

Add.: No. 218, Qianwangang Road, Economic and Technological Development Zone, Qingdao, China
declares under its sole responsibility that the air conditioning models to which this declaration relates:

RAS-080HNBSTQ RAS-090HNBSTQ RAS-100HNBSTQ RAS-110HNBSTQ RAS120HNBSTQ

are in conformity with the following standard(s) or other normative document(s), provided that these are used in accordance with our instructions:

EN IEC 55014-1:2021
EN IEC 55014-2:2021
EN 61000-3-12:2011
EN IEC 61000-3-11:2019
EN 60335-1
EN 60335-2-40
EN 62233

following the provisions of:

2006/42/EC
2014/30/EU
2012/19/EU
2011/65/EU
(EU) No 517/2014
1907/2006/EC

Directives, as amended.

Manufacturing number and manufacturing year: refer to model Nameplate.

Notes:

This declaration becomes invalid, if technical or operational modifications are introduced without the manufacturer's consent.

Johnson Controls Hitachi Air Conditioning Europe SAS is authorized to compile technical file or relevant technical documentation.

Address : Rue de Lombardie, Parc Aktiland II – 69800 Saint Priest, France

HITACHI

Name, Surname : *Song Zhenxing*

Position/ Title : Director

Date : Sep. 30, 2022

IMPORTANT NOTICE

- ◆ Our Company pursues a policy of continuing improvement in design and performance of products. The right is therefore reserved to vary any specifications without prior notice.
 - ◆ Our Company cannot anticipate every possible circumstance that might involve a potential hazard.
 - ◆ This heat pump air conditioning is designed for standard air conditioning only. Do not use this heat pump air conditioning 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) splashes.
 - *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 such as coast regions.
 - *Places with an atmosphere of acidity or alkalinity.
 - ◆ Do not install the unit in the place where silicon gas drifts. If the silicon gas attaches to the surface of heat exchanger, the fin surface repels water. As a result, drain water splashes outside of the drain pan and splashed water runs inside of electrical box. In the end, water leakage or electrical devices failure may occur.
 - ◆ Pay attention to the following points when the unit is installed in a hospital or other facilities where 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, remote control cable or remote control 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 catches the animals and plants. It could adversely affect the animals and plants.
 - ◆ The installation should be in accordance with the local laws and regulations. The following standards may be applicable, if the local regulations are not available. International Organization for Standardization, ISO5149 or European Standard, EN 378 or Japan Standard, KHKS0010.
 - ◆ No part of this manual may be reproduced without written permission.
 - ◆ It is assumed that this heat pump air conditioner will be operated and serviced by English speaking people. If this is not the case, the distributor should add safety, caution and operating signs in the native language. This
 - ◆ heat pump air conditioning unit comes with a full complement of the appropriate Safety, Danger, and Caution, Warnings.
 - ◆ The air conditioning cannot work in the cooling and heating operation simultaneously. Otherwise, the indoor unit which its operation is conflicted with the operation of the outdoor unit would not work.
 - ◆ If you have any questions, please contact your distributor or dealer of our company.
 - ◆ This manual could be obtained at <https://productlibrary-hitachiaircon.com>.
 - ◆ This manual provides common descriptions, basic and advanced information to maintain and service this heat pump air conditioning unit which you operate as well for other models.
- This heat pump air conditioning has been designed for the following temperatures range. Operate the heat pump air conditioning within this range according to the table below.

		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	52°C DB*	-5°C DB
Heating Operation	Indoor	30°C DB	15°C DB
	Outdoor	23°C DB/17°C WB	-20°C DB/-21°C WB

NOTE:

* 48°C DB ~ 52°C DB, operation control range.

CHECKING PRODUCT RECEIVED

- ◆ Upon receiving this product, inspect it for any shipping damages in transit. 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 rating) and accessories to determine if they are in accordance with the purchase order.
- ◆ The standard utilization of the unit shall be explained in the instructions. Therefore, the utilization of the unit other than those indicated in the instructions is not recommended.
- ◆ In case of any problem, please contact the local dealer as any issues involving installation, performance, or maintenance arise. The company's liability shall not cover defects arising from the alteration performed by a customer without the company's consent in a written form.

IMPORTANT NOTICE



Correct Disposal of this product

This marking indicates that this product should not be disposed with other household wastes. To prevent possible harms to the environment or human health from uncontrolled waste disposal, recycle it responsibly to promote the sustainable reuse of material resources. Please return your used device through the return and collection systems or to contact your retailers, they can take this product for environmentally safe recycling.

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1. SAFETY SUMMARY

<Signal Words>

- ◆ Signal words are used to identify levels of hazard seriousness.
- ◆ Definitions for identifying hazard levels are provided below with their respective signal words.



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



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



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



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

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

 DANGER

- ◆ Do not perform installation work, refrigerant piping work, drain pump, drain piping and electrical wiring connection without referring to our installation manual. If the instructions are not followed, it may result in a water leakage, electric shock or a fire.
- ◆ Use the specified non-flammable refrigerant (R410A) to the outdoor unit in the refrigerant cycle. Do not charge material other than R410A into the unit such as hydrocarbon refrigerants (propane or etc.), oxygen, flammable gases (acetylene or etc.) or poisonous gases when installing, maintaining and moving. These flammable gases are extremely dangerous and may cause an explosion, a fire and injury.
- ◆ Do not pour water into the indoor or outdoor unit. These products are equipped with electrical parts. If poured, it will cause a serious electrical shock.
- ◆ Do not open the service cover or access panel for the indoor or outdoor units without turning OFF the main power supply.
- ◆ Do not touch or adjust safety devices inside the indoor unit or outdoor units. If these devices are touched or readjusted, it may cause a serious accident.
- ◆ Refrigerant leakage can cause difficulty with breathing due to insufficient air. Turn OFF the main switch, extinguish any naked flame and contact your service contractor, if refrigerant leakage occurs.
- ◆ Make sure that the refrigerant leakage test should be performed. Refrigerant (Fluorocarbon) for this unit is incombustible, non-toxic and odorless. However if the refrigerant is leaked and is contacted with fire, toxic gas will generate. Also because the fluorocarbon is heavier than air, the floor surface will be filled with it, which could cause suffocation.
- ◆ The installer and system specialist shall secure safety against refrigerant leakage according to local regulations or standards.
- ◆ Use an ELB (Earth Leakage Breaker). In the event of fault, there is danger of an electric shock or a fire if it is not used.
- ◆ Do not install the outdoor unit where there is high level of oil mist, flammable gases, salty air or harmful gases such as sulfur.
- ◆ For installation, firmly connect the refrigerant pipe before the compressor starts operating. For maintenance, relocation and disposal, remove the refrigerant pipe after the compressor stops.
- ◆ Do not perform a short-circuit of the protection device such as a pressure switch when operating. It may cause a fire and explosion.
- ◆ The A-weighted emission sound pressure level do not exceed 70 dB(A).

 WARNING

- ◆ Do not use any sprays such as insecticide, lacquer, hair spray or other flammable gases within approximately one meter from the system.
- ◆ If circuit breaker or fuse is often activated, stop the system and contact your service contractor.
- ◆ Check that the ground wire is securely connected. If the unit is not correctly grounded, it may lead to 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.
- ◆ 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.
- ◆ Provide a sufficiently strong foundation. If not, the unit may fall down and it may lead to injuries.

- ◆ Do not install the unit in a place where oil, vapor, organic solvent and corrosive gas (ammonia, sulfur compound and acid) may be present in quantities. It may cause refrigerant leakage due to corrosion, electrical shock, deteriorated performance and breakage.
- ◆ Perform electrical work according to Installation Manual and all the relevant regulation and standards. If the instructions are not followed, an electrical shock and fire may occur due to insufficient capacity and inadequate performance.
- ◆ Use specified cables between units and choose the cables correctly. If not, an electrical shock or fire may occur.
- ◆ Ensure that the wiring terminals are tightened securely with the specified torques. If not, generating fire or electrical shock at the terminal connection part may occur.
- ◆ 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.
- ◆ This appliance is not intended for use by persons (including children) 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 to ensure that they do not play with the appliance.
- ◆ 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.
- ◆ The appliances are not intended to be operated by means of an external timer or separate remote-control system.
- ◆ Keep the appliance and its cord out of reach of children under the age of 8.



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

NOTICE

- ◆ Do not install the indoor unit, outdoor unit, remote control switch and cable within approximately 3 meters from strong electromagnetic wave radiators such as medical equipment.
 - ◆ Supply electrical power to the system to energize the oil heater for 12 hours before startup after a long shutdown.
 - ◆ Make sure that the outdoor unit is not covered with snow or ice, before operation.
 - ◆ In some cases, the packaged air conditioner may not be operated normally under the following cases.
 - *In case that electrical power for the packaged air conditioner is supplied from the same power transformer as the device*.
 - *In case that the power source wires for the device* and the packaged air conditioner are located close to each other.
- Device*: (Ex) Lift, container crane, rectifier for electric railway, inverter power device, arc furnace, electric furnace, large-sized induction motor and large-sized switch. It consumes a large quantity of electrical power.
- Regarding the cases mentioned above, surge voltage may be inducted into the power supply cables for the packaged air conditioning due to a rapid change in power consumption of the device and an activation of a switch.
- Check field regulations and standards before performing electrical work in order to protect the power supply for the new air conditioning unit.

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 units are installed in a low temperature region.

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

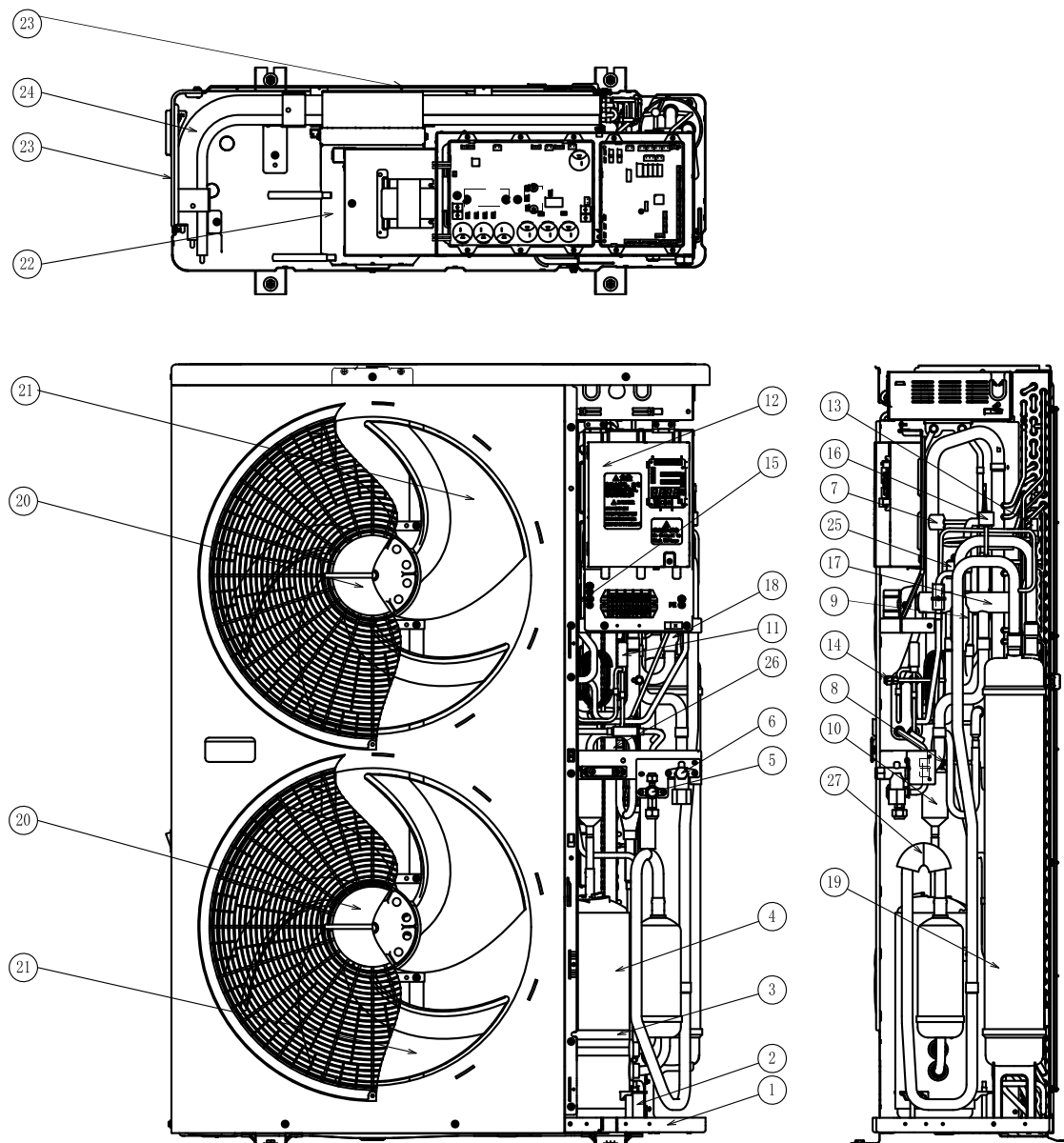
★: Only for Refrigerant R407C (No Interchangeability with R22)

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 R407C 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 up 2mm.	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
Vacuum Drying , Refrigerant Charge	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
	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 type of refrigerant oil. (If use, 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.

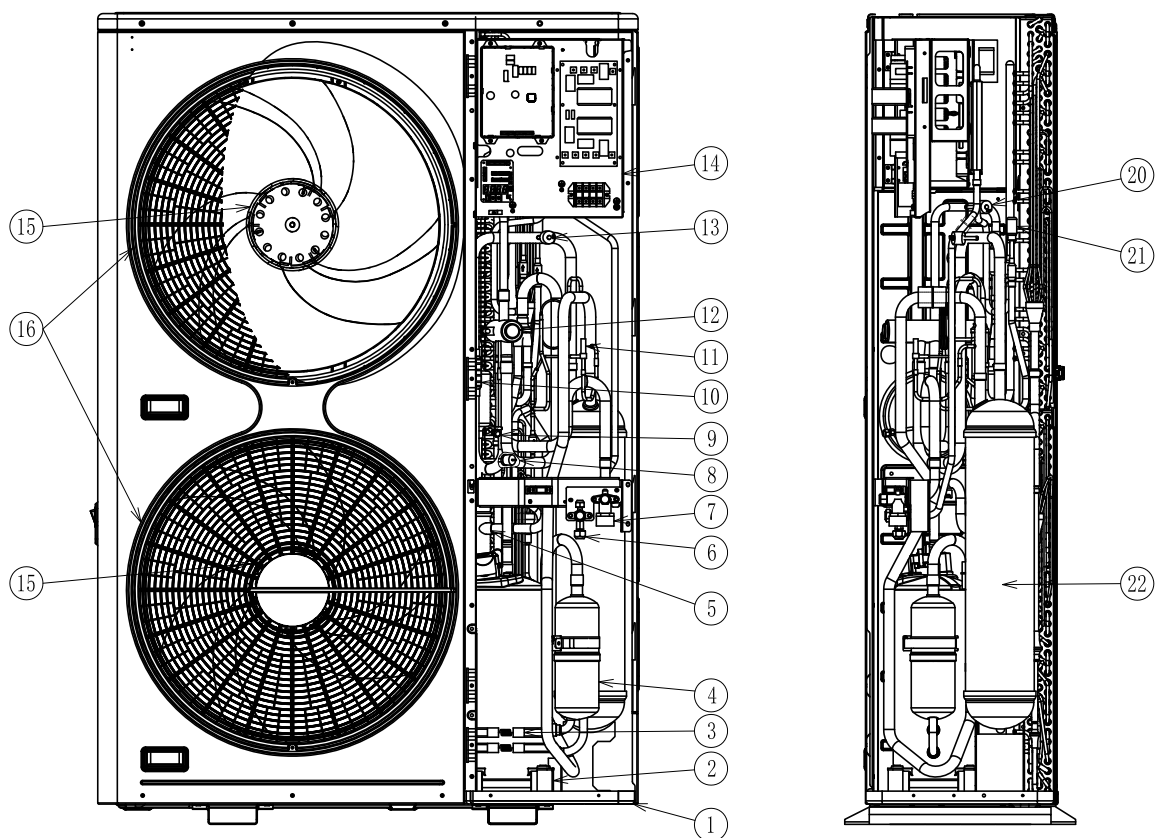
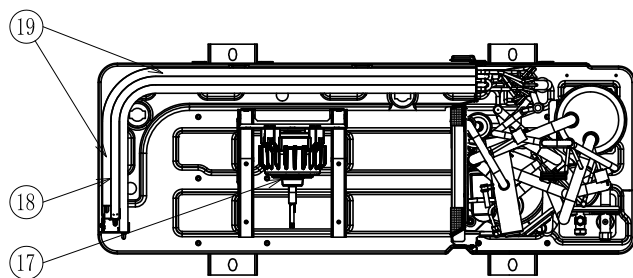
2.2 Structure

Model: 080~090



NO.	Part Name	NO.	Part Name	NO.	Part Name
1	Baseplate	10	Oil separator	19	Accumulator
2	Damping Rubber	11	Electronic Expansion Valve	20	Air Outlet
3	Crankcase Heater	12	Electrical Box	21	Fan
4	Compressor	13	Solenoid Valve	22	Fan Motor
5	Liquid Stop Valve	14	Service Valve	23	Air Inlet
6	Gas Stop Valve	15	Check Valve	24	Heat Exchanger
7	High Pressure Sensor	16	Low Pressure Sensor	25	Electronic Expansion Valve
8	High Pressure Switch	17	4-Way Reversing Valve	26	Damping Rubber
9	Filter	18	Filter	27	Damping Rubber

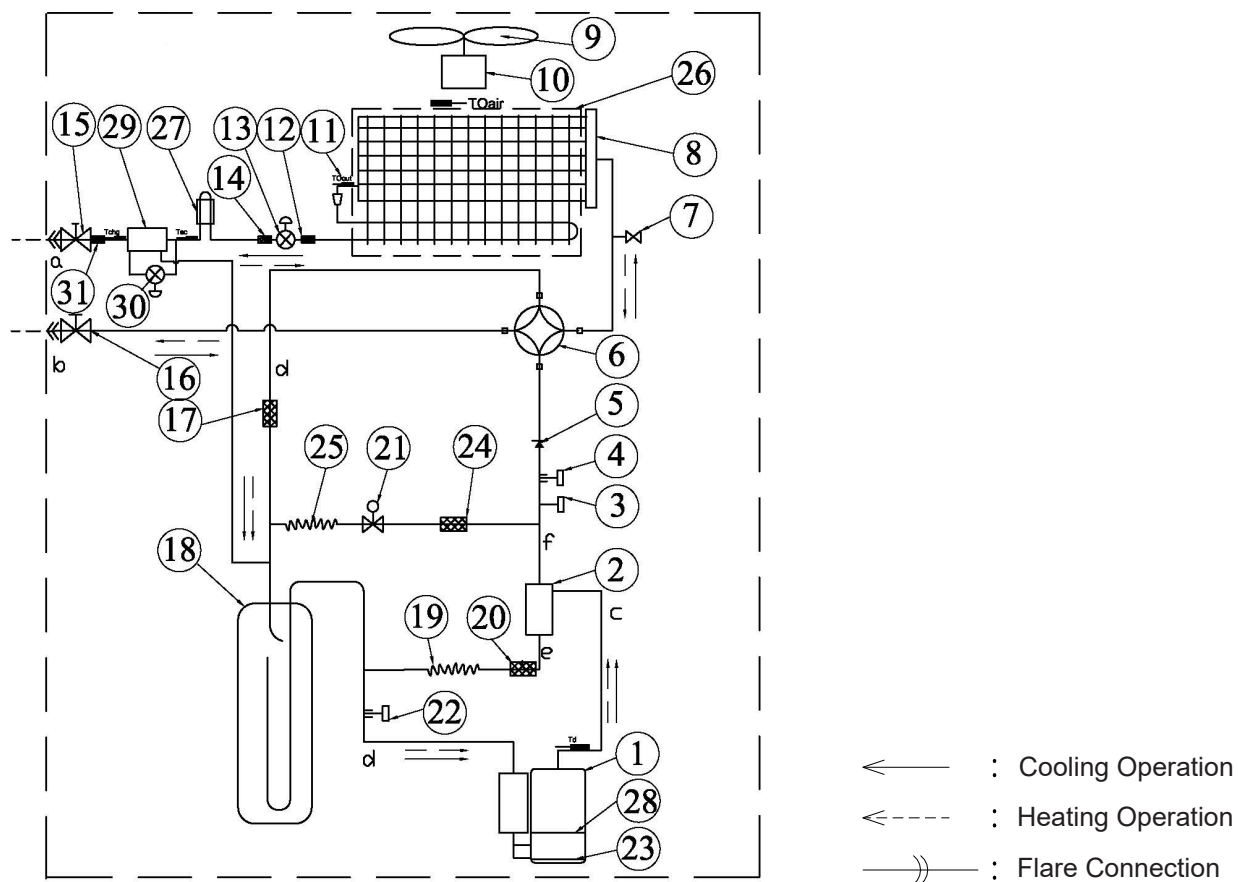
Model: 100~120



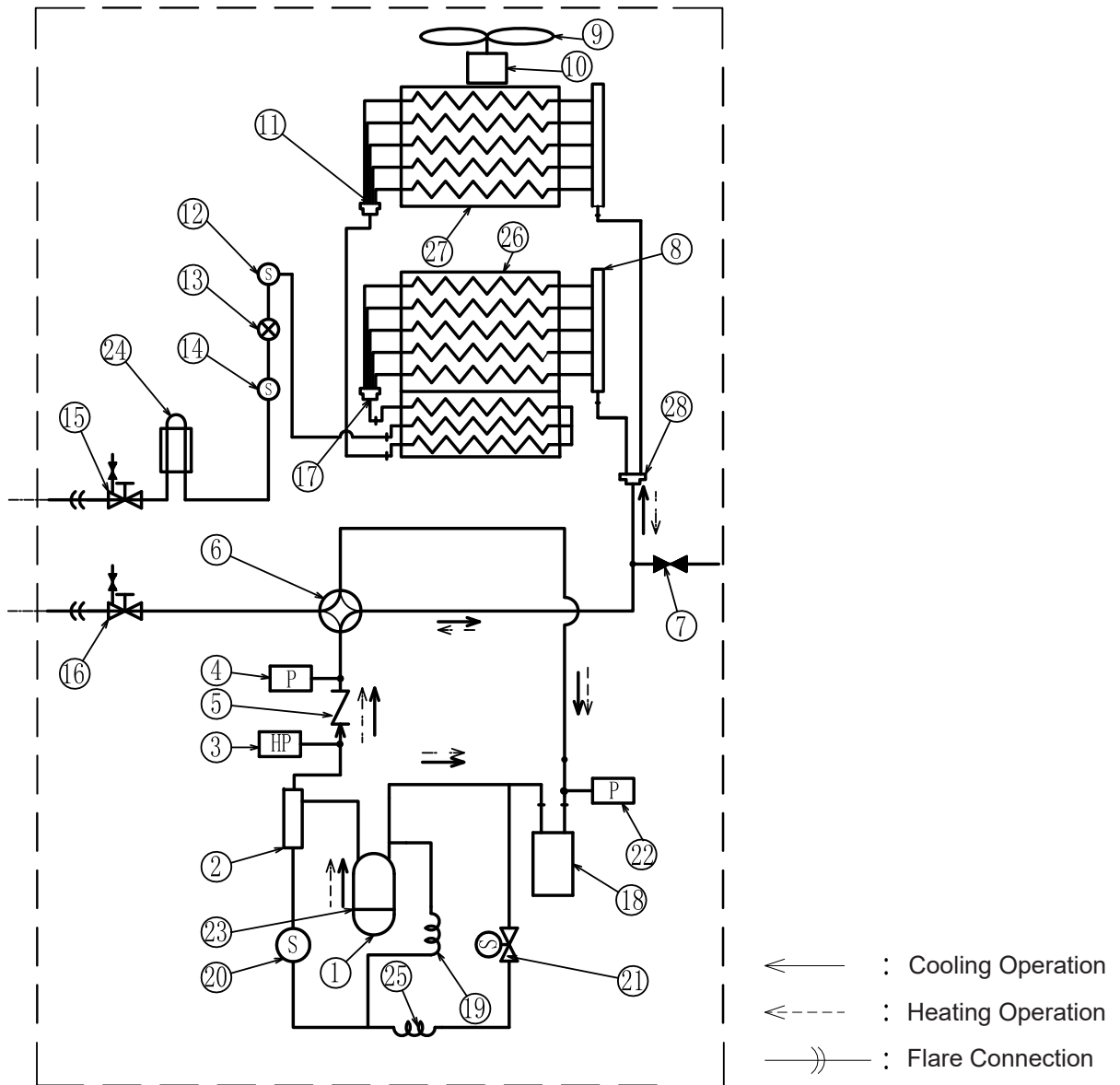
NO.	Part Name	NO.	Part Name
1	Baseplate	12	4-Way Reversing Valve
2	Damping Rubber	13	Low Pressure Sensor
3	Crankcase Heater	14	Electrical Box
4	Compressor	15	Fan
5	Oil Separator	16	Air Outlet
6	Liquid Stop Valve	17	Fan Motor
7	Gas Stop Valve	18	Heat Exchanger
8	High Pressure Switch	19	Air Inlet
9	Service Valve	20	High Pressure Sensor
10	Filter	21	Electronic Expansion Valve
11	Solenoid Valve	22	Accumulator

2.3 Refrigerant Cycle Diagram

Model: 080~090



NO.	Part Name	NO.	Part Name	NO.	Part Name
1	Compressor	12	Filter	23	Crankcase Heater
2	Oil Separator	13	Electronic Expansion Valve	24	Filter
3	High Pressure Switch	14	Filter	25	Capillary Tube
4	High Pressure Sensor	15	Liquid Stop Valve	26	Heat Exchanger
5	Check Valve	16	Gas Stop Valve	27	Refrigerant Cooler
6	4-Way Reversing Valve	17	Filter	28	Crankcase Heater
7	Service Valve	18	Accumulator	29	Plate Heat Exchanger
8	Distributor	19	Capillary Tube	30	Electronic Expansion Valve
9	Fan	20	Filter	31	Filter
10	Fan Motor	21	Solenoid Valve		
11	Distributor	22	Low Pressure Sensor		



NO.	Part Name	NO.	Part Name	NO.	Part Name
1	Compressor	11	Distributor	21	Solenoid Valve
2	Oil Separator	12	Filter	22	Low Pressure Sensor
3	High Pressure Switch	13	Electronic Expansion Valve	23	Heat Exchanger
4	High Pressure Sensor	14	Filter	24	Refrigerant Cooler
5	Check Valve	15	Liquid Stop Valve	25	Capillary Tube
6	4-Way Reversing Valve	16	Gas Stop Valve	26	Heat Exchanger
7	Service Valve	17	Distributor	27	Heat Exchanger
8	Distributor	18	Accumulator	28	Distributor
9	Fan	19	Capillary Tube		
10	Fan Motor	20	Filter		

2.4 Combination of Indoor Unit and Outdoor Unit

The range of the connectable indoor unit capacity ratio is 50%~130%.

*The connectable indoor unit capacity ratio can be calculated as follows:

Connectable Indoor Unit Capacity Ratio = Total Indoor Unit Capacity / Total Outdoor Unit Capacity.

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

Outdoor Unit Model	Rated Capacity (kW)	Min. Total Capacity of the connectable indoor units (kW)	Max. Total Capacity of the connectable indoor units (kW)	Numbers of the connectable indoor units (Q'ty)	Min. Capacity at Individual Operation (kW)
080	22.4	11.2	29.1	1(*1)~12	1.8
090	24.1	12.1	31.3	1(*1)~12	1.8
100	28.0	14.0	36.4	1(*1)~13	1.8
110	30.0	15.5	40.3	1(*1)~16(*2)	1.8
120	33.5	16.8	43.5	1(*1)~19(*2)	1.8

* 1 When only one indoor unit is connected, the connectable indoor unit capacity ratio must be 100%.

* 2 To ensure the heating performance in winter, the recommended number of the connectable indoor units should not exceed 13. If it exceeds, please contact your distributor or dealer.

NOTE:

(1) It is suggested that the total capacity of indoor units which are operated simultaneously should not exceed the capacity of outdoor units under the following conditions. Otherwise, there is a decrease in operating performance.

- ◆ When there are some round-way cassette indoor units and wall-mounted indoor units in the system;
- ◆ When the outdoor air temperature is 43°C or more during the outdoor unit cooling operation;
- ◆ When the outdoor air temperature is lower than -10°C during the outdoor unit heating operation.

(2) For the same system, if the connectable indoor unit capacity ratio is over than 100%, and which all the indoor units operate simultaneously, capacity of every indoor unit should be less than its rated capacity.

2.5 Factory supplied Accessories

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

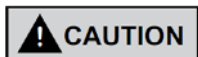
Accessory	Quantity
Installation Manual	 ×1
Plastic Bag	 ×1
Cord Clamp (Big)	 ×1
Cord Clamp (Small)	 ×2
Washer	 ×4
Accessory Pipe Pouch	 ×1
	 ×1
Magnetic Ring (Big)	 ×1
Magnetic Ring (Small)	 ×1

NOTE:

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

2.6 Transportation

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



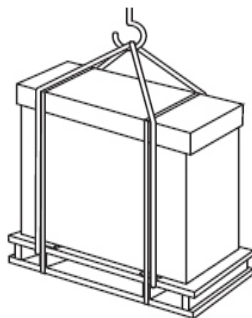
Do not put any material or stand on the product. Apply two lifting wires onto the outdoor unit, when lifting it by crane.

◆ 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 unless the hanging work is finished.

(b) The hanging work can be conducted according to the figure below.

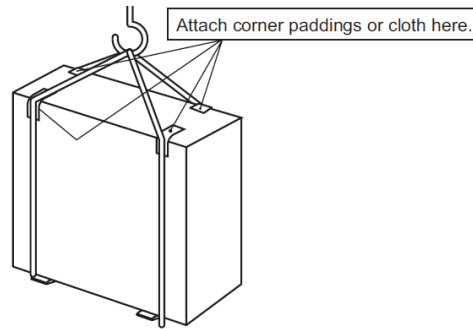


NOTE:

◆ Make sure the unit is 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.

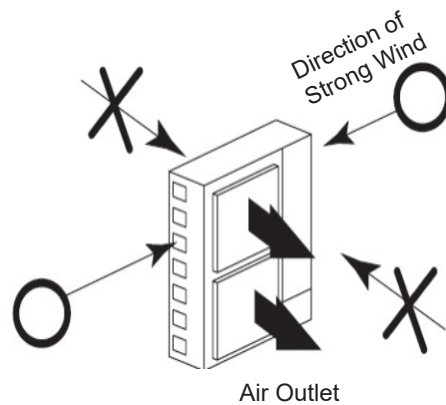


Do not put any foreign material into the outdoor unit and check to ensure that none exists in the outdoor unit before the installation and test run. Otherwise, a fire or failure, etc. may occur.

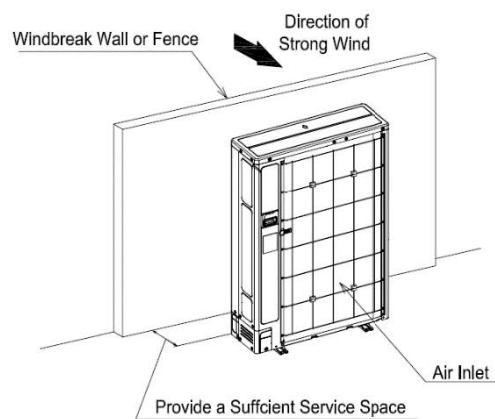
3. Outdoor Unit Installation

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, remembering 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 installed to prevent a strong wind from blowing to air inlet or outlet of the outdoor unit. And make sure to provide sufficient space around the outdoor unit for operation and maintenance.



NOTE:

- ◆ If strong wind blows direct to the air outlet, 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.
- ◆ If the local altitude exceeds 2000m, indicate the actual installation altitude in the following formula.

Altitude	() m
----------	------------



Pay attention to the sharp edges of the fins to avoid any injury.

3.2 Service Space

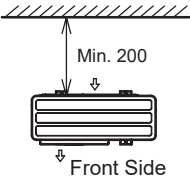
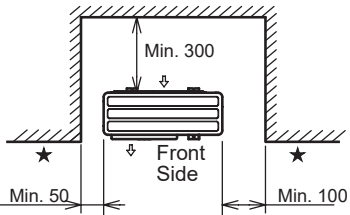
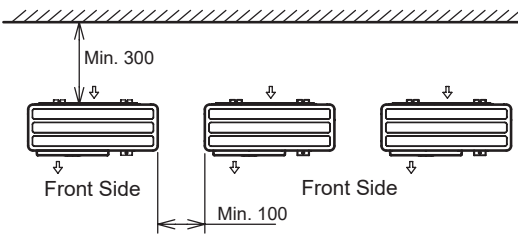
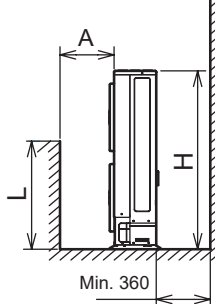
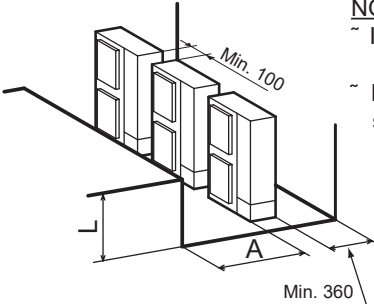
When the outdoor unit is installed, the allowed service space is as follows:

- ◆ 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

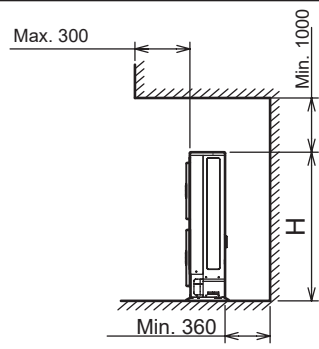
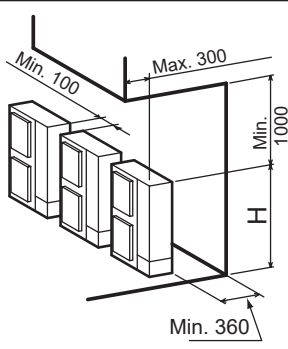
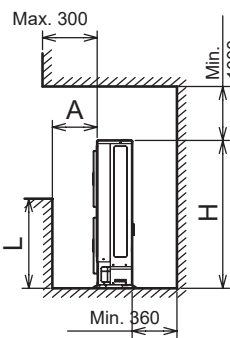
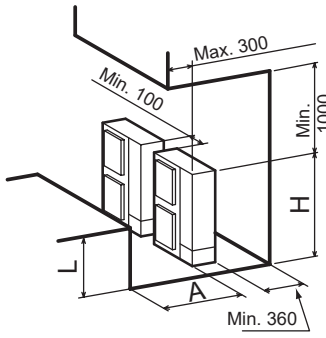
(a) There is no obstacle in the upper side.

Unit: mm

Single Installation	Multiple Installation
* Around sides are open.  Min. 200 Front Side * Around sides are closed.  Min. 300 Front Side Min. 50 Min. 100 Fit positions "★" with unit front side.	 Min. 300 Front Side Min. 100 Front Side NOTE: Both right and left sides are open.
 Min. 360 NOTES: ~ Install Airflow Guide (optional) ~ Both right and left sides are open.	 Min. 100 Min. 360 NOTES: ~ Install Airflow Guide (optional) ~ Both right and left sides are open.

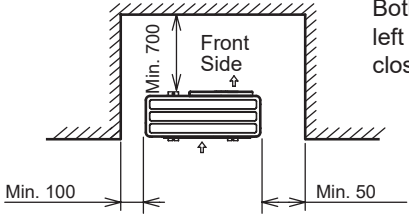
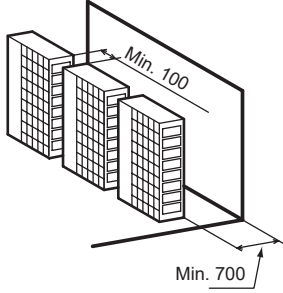
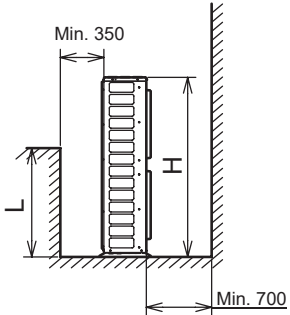
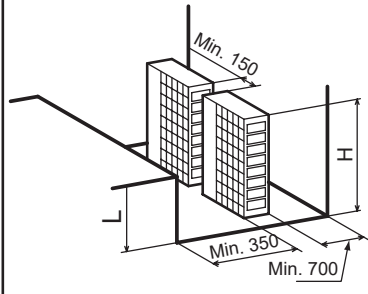
(b) There are obstacles in the upper side.

Unit: mm

Single Installation	Multiple Installation
 Max. 300 Min. 1000 Min. 360	 Max. 300 Min. 1000 Min. 360 NOTE: Both right and left sides are open.
 Max. 300 Min. 1000 Min. 360 NOTES: ~ Install Airflow Guide (optional) ~ Both right and left sides are open.	 Max. 300 Min. 1000 Min. 360 NOTES: ~ Install Airflow Guide (optional) ~ Both right and left sides are open. ~ No more than 2 units for multiple installation

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

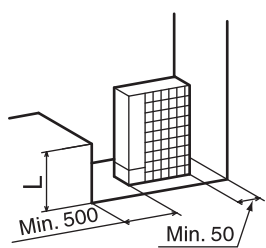
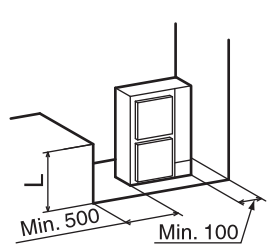
Unit: mm

Single Installation	Multiple Installation
 NOTE: Both right and left sides are closed.	 NOTE: Both right and left sides are open.
 NOTES: ~ Install Airflow Guide (optional) ~ Both right and left sides are open.	 NOTES: ~ Install Airflow Guide (optional) ~ Both right and left sides are open. ~ No more than 2 units for multiple installation

(3)Obstacles on the right and left sides of single installation

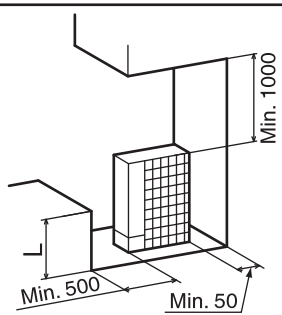
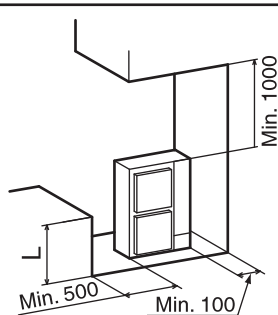
(a)There is no obstacle in the upper side.

Unit: mm

Single Installation
 

(b)There are obstacles in the upper side.

Unit: mm

Single Installation
 

NOTE:

If L is greater than H, install the outdoor unit on the foundation so that H is greater than or equal to L.

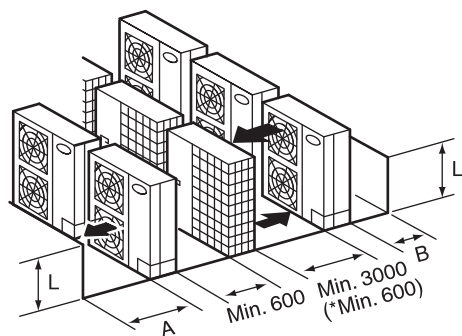
H: Outdoor unit height + foundation height

In this case, ensure that the foundation is firm, and do not allow short circuit of air flow. In all cases, short circuit of air flow is not allowed when installing outdoor unit.

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

(4) Multi-row and multiple installations.

Unit: mm



Keep a distance of more than 150mm between other units and do not put obstacles on the right and left sides.

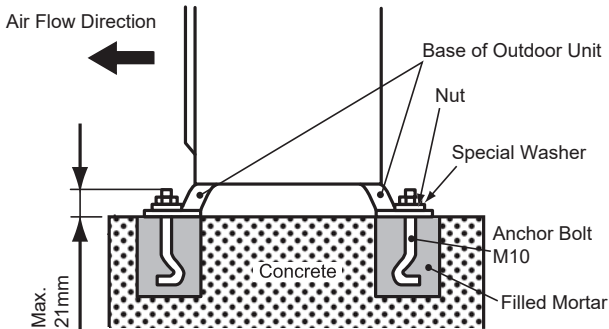
L	A	B
$0 < L \leq 1/2 H$	600 or more	300 or more
$1/2 H < L \leq H$	1400 or more	350 or more

NOTE:

- ◆ If L is greater than H, install the outdoor unit on the foundation so that H is greater than or equal to L.
In this case, ensure that the foundation is firm, and do not allow short circuit of air flow.
When the mark * dimension is secured, be sure to mount the airflow guide.

3.3 Installation Work

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

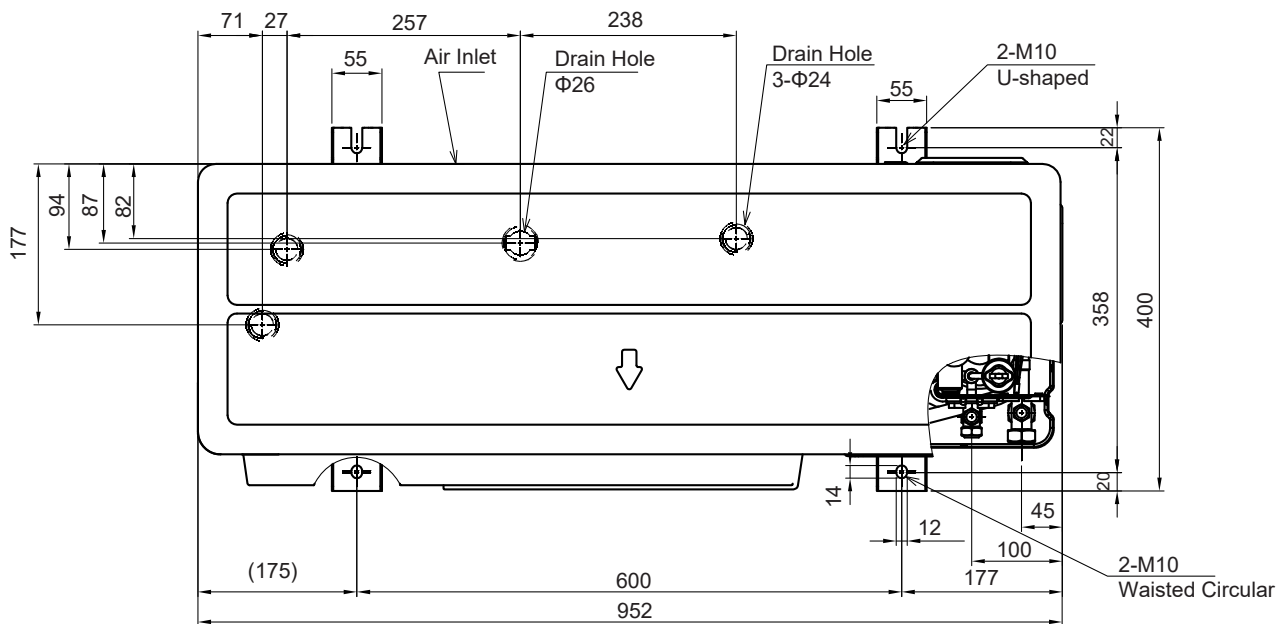


Fix the outdoor unit to the anchor bolts by special washer of field-supplied accessory.

(2) When installing the outdoor unit, fix the unit by anchor bolts.

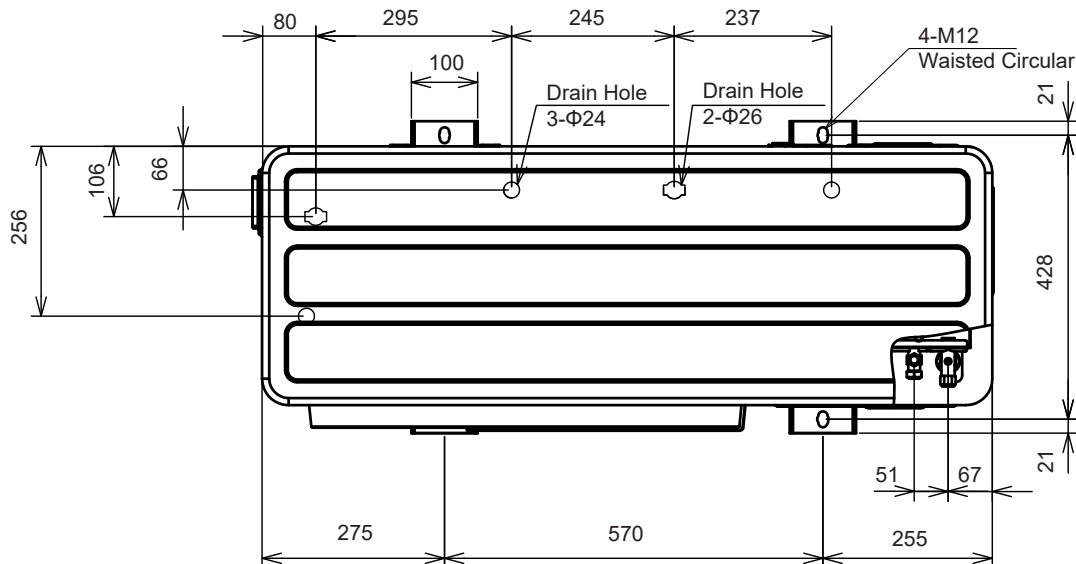
Model: 080~090

Unit: mm

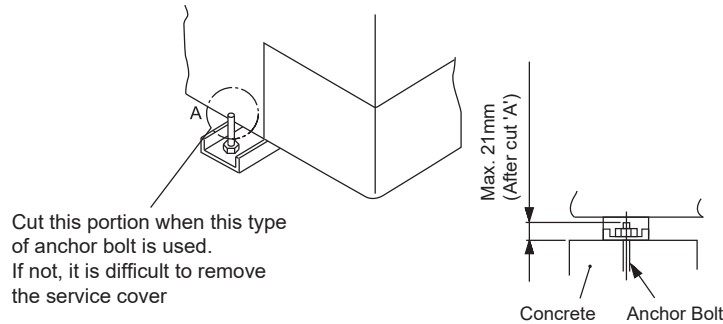


Model: 100~120

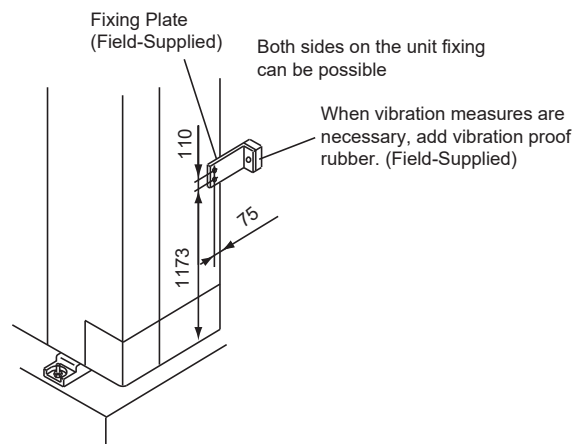
Unit: mm



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



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

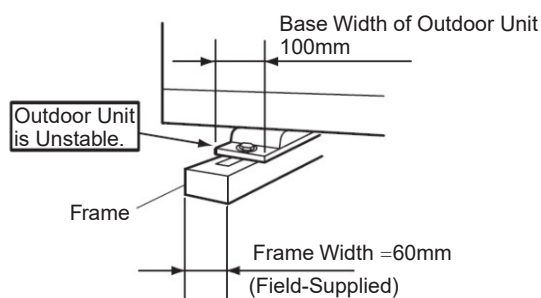


(5) The unit will condensate in heating mode. And the condensate will freeze in colder climates, which may cause the road slippery if not properly managed.

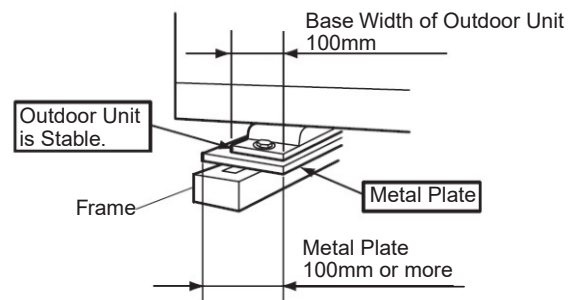
(6) The drain holes are working during the heating and defrosting operation. Choose a place where well drainage is available, or provide a groove for draining.

(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 in 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. 3.1.

Incorrect



Correct



Recommended Metal Plate Size (Field-Supplied)

Material: Hot-Rolled Mild Steel Plate (SPHC)

Plate Thickness: 4.5T

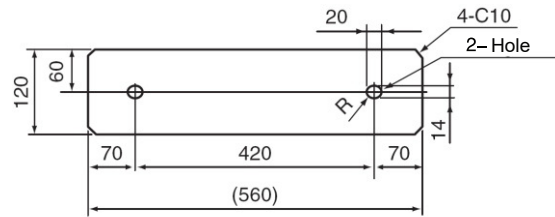


Fig. 3.1 Frame and Base Installation

4. Refrigerant Piping Work

⚠ WARNING

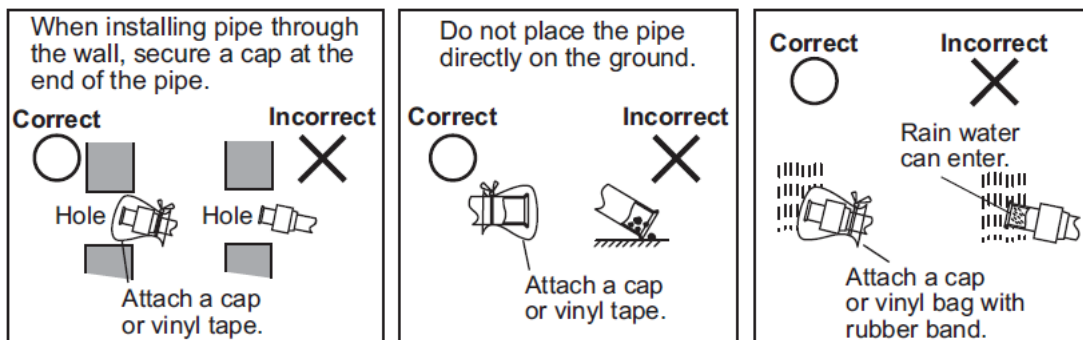
- ◆ The design pressure for this product is 601 psi (4.15MPa). The pressure required for refrigerant R410A is 1.4 times higher than that of the refrigerant R22. That means that the refrigerant piping for R410A must be thicker than that for R22. Make sure to use specified refrigerant piping. Otherwise, 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.

⚠ CAUTION

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
9.53 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

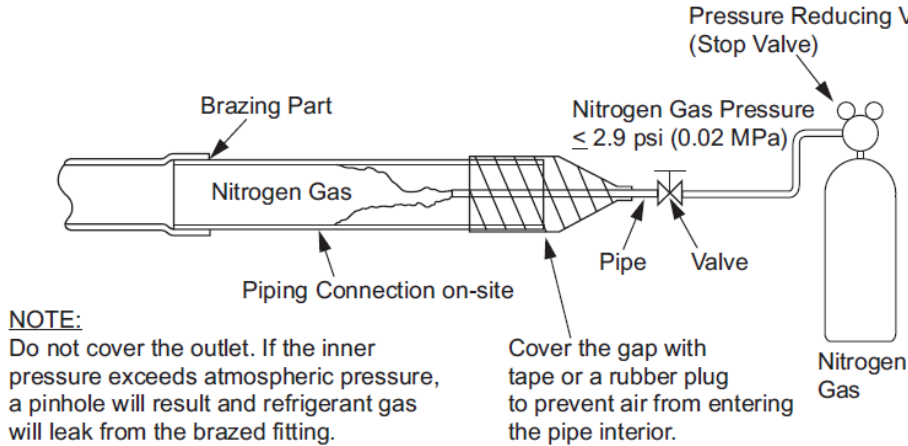
NOTE:

- ◆ Do not use the pipe whose 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:

- ◆ 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) Wash the weld joints to remove all flux completely after completing brazing work.

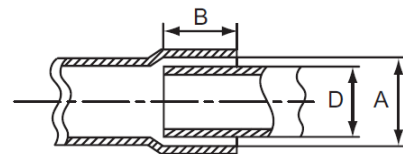
NOTE:

- ◆ 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 ≤ D < 8	6	0.05 - 0.35
8 ≤ D < 12	7	
12 ≤ D < 16	8	0.05 - 0.45
16 ≤ D < 25	10	

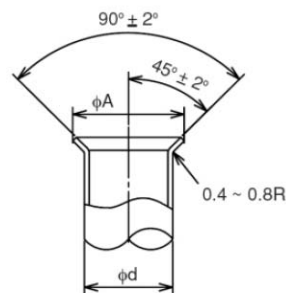


(8) Cautions for Flaring Work

(A) Perform the flaring work as shown below:

Unit: mm

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



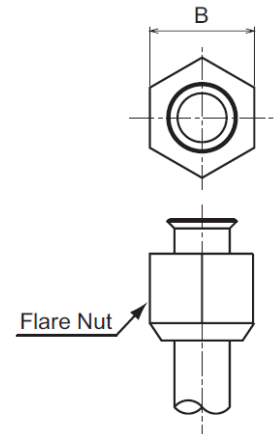
(*): It is impossible to perform flaring work with hard temper pipe. Use an accessory pipe with a flare.

(B) Flare Nut Dimension

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



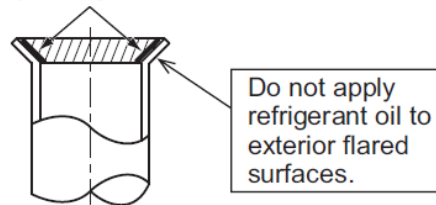
NOTE:

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

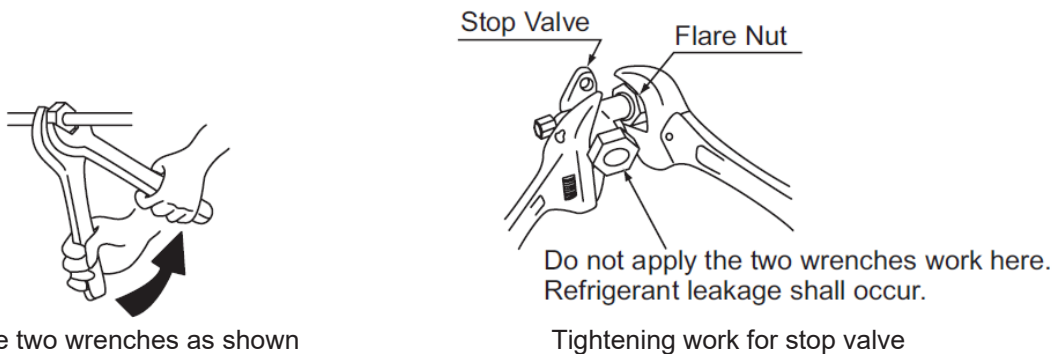
(C) Verify that there are no scratches, metal particles, gaps, or deformations at the flared end before making connections to the system.

(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.



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



Required Tightening Torque for Flare Nut

Pipe Diameter (mm)	Tightening Torque
$\Phi 6.35$	14~18 N • m
$\Phi 9.52$	34~42 N • m
$\Phi 12.7$	50~62 N • m
$\Phi 15.88$	63~77 N • m
$\Phi 19.05$	90~110 N • m

4.2 Model of Branch Pipe

Unit: mm

Branch Pipe	E-102SN
Gas Pipe	
Liquid Pipe	

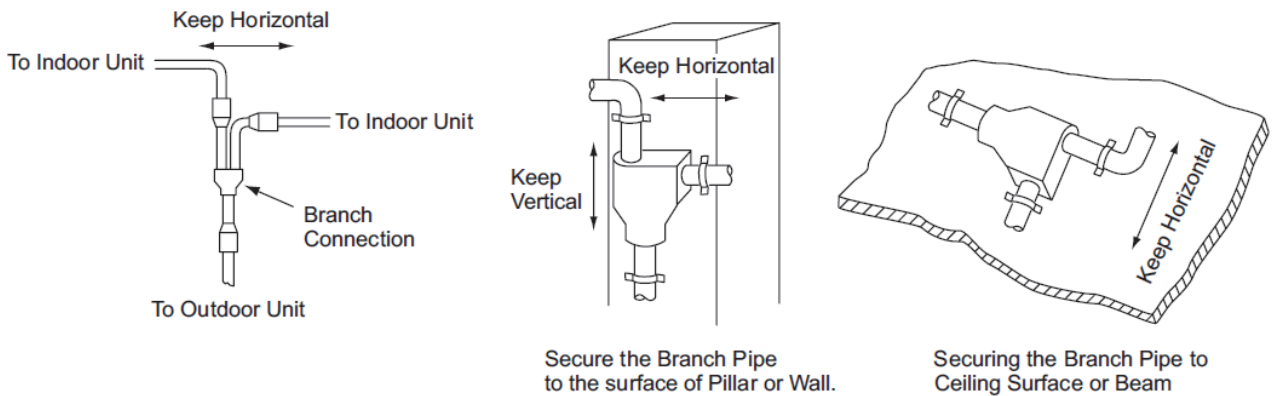
Unit: mm

Branch Pipe	E-162SN
Gas Pipe	
Liquid Pipe	

Precaution for branch pipe connection

Use the branch pipe to connect the outdoor/indoor units. Mount 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.



Upper Side	Upper Side	Upper Side	Upper Side
CORRECT	CORRECT	CORRECT	INCORRECT

4.3 Refrigerant Piping Size

Example of connection: connection of 4 indoor units.

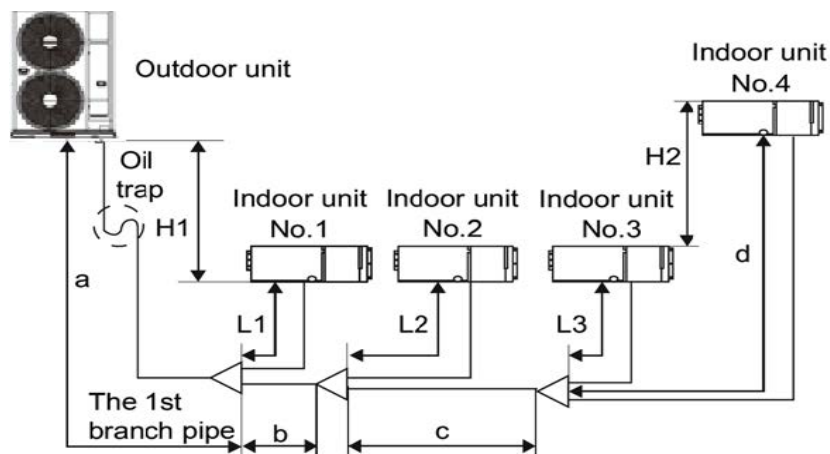


Table 4.1 Piping Size of Main Pipe

Model	Stop Valve(mm)		Pipe between the outdoor unit and the 1st branch pipe(a); The pipes between the branch pipes(b,c).		
	Gas	Liquid	Gas	Liquid	Marks
080~090	Φ19.05	Φ9.53	Φ19.05▲	Φ9.52▲	a; b; c
100	Φ19.05	Φ12.7	Φ22.2*	Φ12.7	a; b; c
110~120	Φ19.05	Φ12.7	Φ25.4*	Φ12.7	a; b; c

NOTE:

- ◆ Mark “▲” represent that if the liquid pipe length between the outdoor unit and the 1st branch pipe(a) is over 70 meters, the diameter of pipe(a) should be up size. The Φ9.52/Φ19.05 diameter pipe is converted to Φ12.7/Φ22.2 diameter pipe.
- ◆ Mark “*” represent that there is a pipe adapter in the outdoor unit, which is used to adjust the gas pipe between the outdoor unit and the 1st branch pipe. Thus the Φ19.05 diameter pipe is converted to Φ22.2 diameter pipe in the model of RAS-100HNBSTQ, and the Φ19.05 diameter pipe is converted to Φ25.4 diameter pipe in the model of RAS-110~120HNBSTQ.
- ◆ The piping connection between the branch pipe and the indoor unit shall be selected according to the piping size of the indoor unit.

Table 4.2 Piping Work Conditions

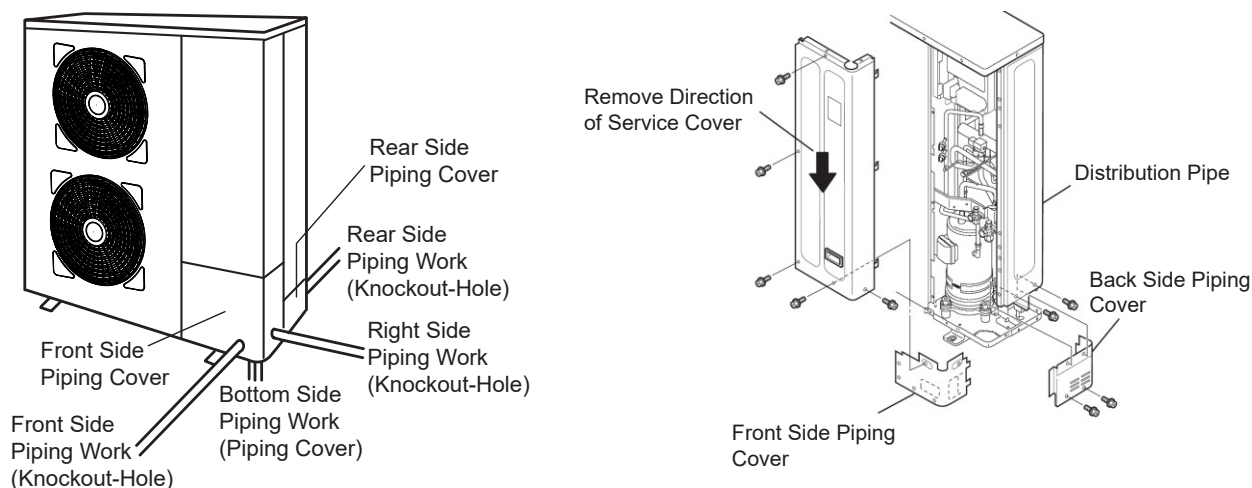
Item		Marks	Allowable Piping Length
Maximum Piping Length (Liquid Pipe)	Between the outdoor unit and the farthest indoor unit	a+b+c+d	≤80 meters (Model: 080~090) ≤100 meters (Model: 100~120)
	Total liquid pipe length	a+b+c+d+L1+ L2+L3	≤300 meters (Model: 080~090) ≤250 meters (Model: 100~120)
	Between the 1st 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	≤50 meters
	Outdoor unit is lower than indoor unit	H1	≤40 meters
	Height difference between indoor units	H2	≤15 meters
Others	Setting requirement for oil trap	When the gas pipe is lifted over 10 meters interval, one oil trap should be set.	

Table 4.3 Model of Branch Pipe

Model	Liquid pipe length between the outdoor unit and the 1st branch pipe(a)	
	≤70 meters	>70 meters
080~090	E-102SN	E-162SN
100~120	E-162SN	

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.



Attention for Removing Service Cover

– Procedures of Removing Cover –

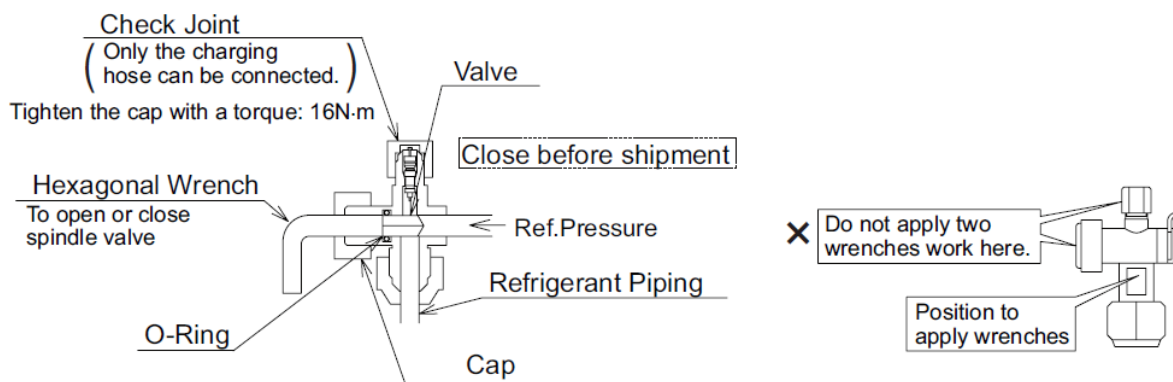
- 1) Remove the screws according to the figure above.

NOTE:

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

- 2) Slowly push the service cover downward.

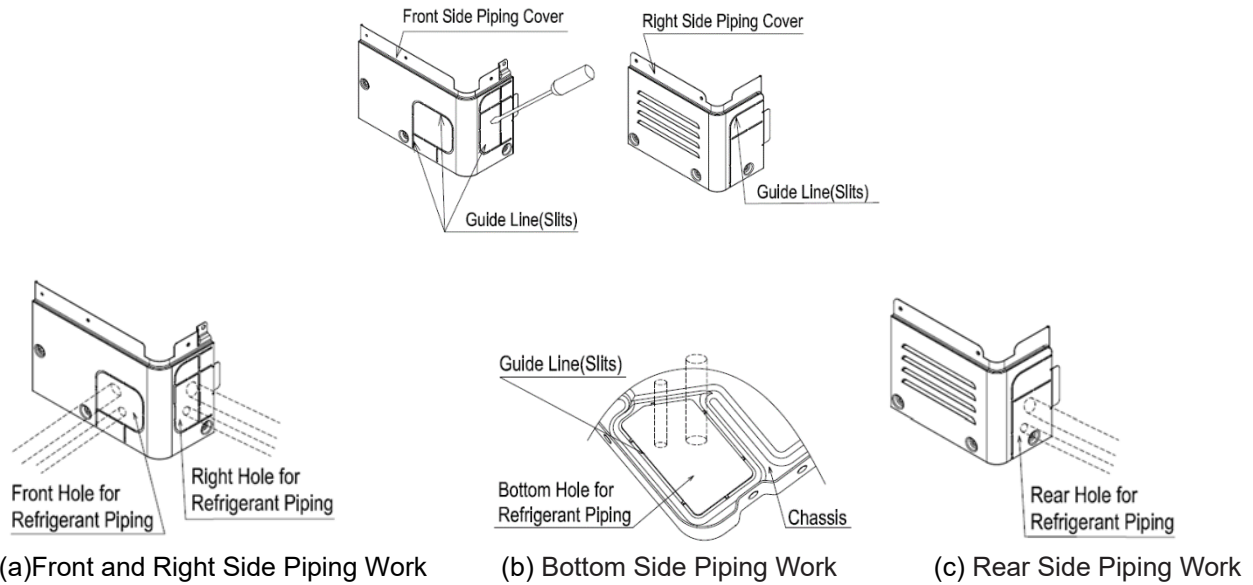
(2) Use securely two wrenches at the following position when removing or installing the pipe. (If not, refrigerant leakage may occur.)



Controlling torque of hexagonal wrench

Model	Gas side stop valve	Liquid side stop valve
080~120	15 N·m	7~9 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.



NOTICE

- ◆ Protect cables and refrigerant pipes from the edges of the holes with insulations, etc. (Field- supplied).
- ◆ Prevent the cables from contacting with 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.

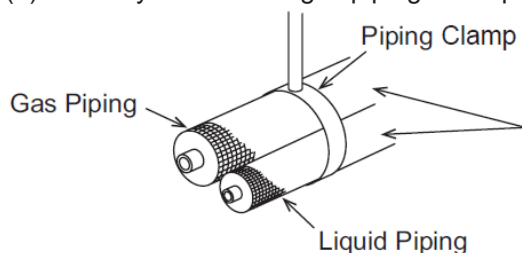
4.5 Air-Tightness Test

(1) The stop valves should be closed completely (factory-setting). Do not open the stop valves until all the refrigerant piping connections, air-tightness test, and vacuum have been completed.

(2) The refrigerant used for the outdoor unit is R410A. Use the manifold gauge and the charging hose for exclusive use of R410A.

(3) Connect the indoor/outdoor units with refrigerant piping. Mount 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 and liquid piping separately.



NOTE:

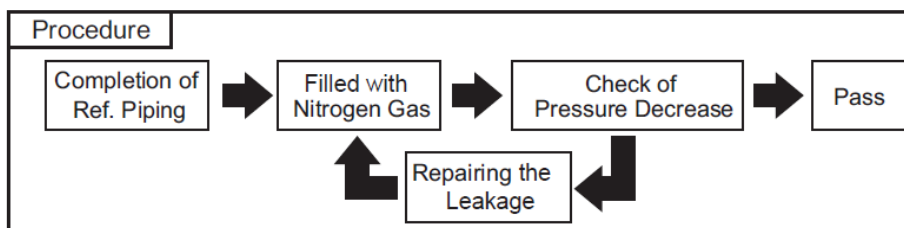
Due to gas and liquid piping will stretch or contract at different rates due to changing refrigerant temperatures. Do not fasten gas and liquid piping together. Distortion and deformation of the piping can occur.

(5) Connect the manifold gauge and the charging hoses to the check joints of the stop valves with a nitrogen tank. Perform the air-tightness test at 4.15 MPa for the test pressure.

(6) For the air-tightness test, please use a leak detector or forming agent to detect the joints and stop valves for the piping connection. If there is a leakage, please repair it and repeat the air-tightness test operation.

(7) If there is no leakage, the nitrogen gas should be discharged from the refrigerant pipes and the air-tightness 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.



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

4.6 Vacuuming

(1) Connect the manifold 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.

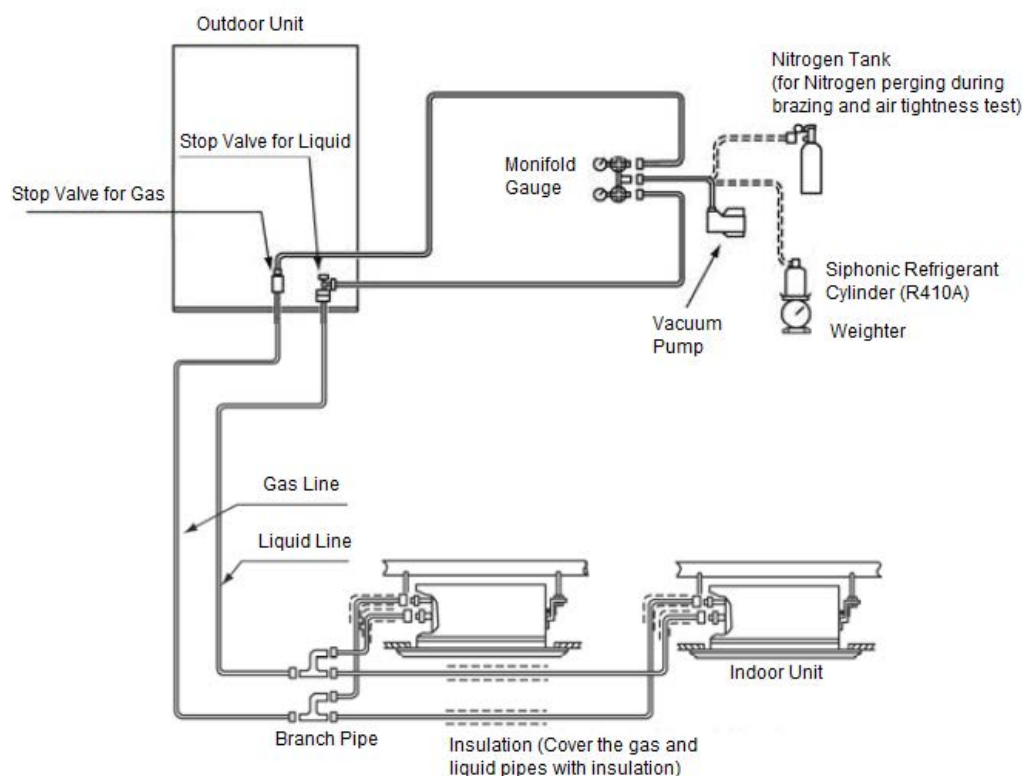
(3) After that, turn off the vacuum pump and then observe the pressure for more than two hours.

(4) If the pressure is higher than -0.1MPa obviously, the gas leak is suspected. Please check the leak position and eliminate it. Then repeat the vacuuming work again.

CAUTION

- ◆ 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.

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



Insulate the liquid pipe for prevention of the capacity decrease according to the ambient air conditions and the dewing on the pipe surface by the low pressure.

Check to ensure that there is no gas leakage. When large amount of the refrigerant leaks, the troubles as follows may occur;
1. Oxygen Deficiency
2. Generation of Harmful Gas Due to Chemical Reaction with Fire.

CAUTION

- At the test run, fully open the spindle. If not, 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 carefully. If a severe refrigerant leakage occurs, it will cause difficulty with breathing, or harmful gases would generate when there is open fire in the room.

4.7 Additional Refrigerant Charge Calculation

Although this unit has been charged the 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

Item	Contents						Total Additional Charge
For the refrigerant pipes	Pipe diameter	Symbol	Total length of liquid piping (meter)	Refrigerant charge per meter	Additional charge (kg)	Model	W=W11+W12 +W13
	Φ6.35	W11=		×0.02kg/m=		080~090	
				×0.03kg/m=		100~120	
	Φ9.52	W12=		×0.05kg/m=		080~090	
				×0.07kg/m=		100~120	
	Φ12.7	W13=		×0.085kg/m=		080~090	
				×0.12kg/m=		100~120	
For the Indoor units	0						

NOTE:

◆ Ensure the total additional charge should not exceed the max. additional refrigerant charge quantity.

(2) Max. Additional Refrigerant Charge Quantity

Outdoor Unit	080~090	100~120
Max. Additional Refrigerant Charge Quantity (kg)	8.2	13.5

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

Outdoor Unit	W ₀ (kg)
080~090	5.9
100	5.5
110~120	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 in the following formula.

Total of Refrigerant Charge	=	W	+	W ₀				Total Additional Charge: W kg Total Ref. Charge: kg Date of Ref. Charge Work: / /
The system	=		+		=		kg	

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.

NOTICE

Fill in the label attached to the unit with the amount of refrigerant charged and Tonnes of CO₂ equivalent of fluorinated greenhouse gases contained on the installation.

NOTE

- This equipment Contains fluorinated greenhouse gases.
- Refrigerant: R410A , global warming potential (GWP) value : 2088.
- Weight (kg) of Refrigerant charged before shipment:
Reference to the nameplate [] ① kg.
- Weight (kg) of Refrigerant charged additionally on site:
Reference to the manual [] ② kg.
- Weight (kg) of Refrigerant charged totally:
③=(①+②), [] kg.
- Tonnes of CO₂ equivalent of fluorinated greenhouse gases contained :③×2088/1000, [] tCO₂eq. H7D09278A

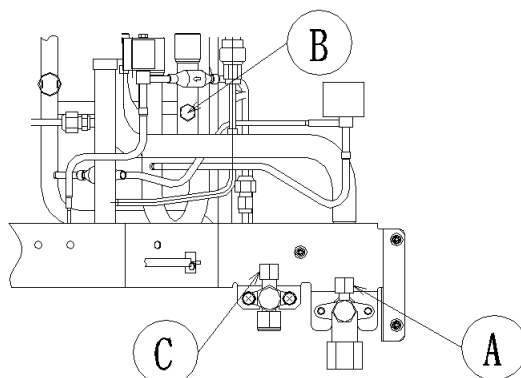
WARNING

- Only use R410A as refrigerant. Other substances may cause explosions and accidents.
- R410A is fluorinated greenhouse gases. Its global warming potential (GWP) value is 2088. Do NOT vent these gases into the atmosphere.
- Tonnes of CO₂ equivalent of fluorinated greenhouse gases contained is calculated by GWP value of the refrigerant × Total refrigerant charge [kg] / 1000 on the label.

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 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



NOTE:

- Special Attention Regarding Refrigerant Gas Leakage

Pay attention to the critical gas concentration to avoid accidental refrigerant gas leakage before installing air conditioning systems.

$$\frac{R: \text{Total Quantity of Charged Refrigerant (kg)}}{V: \text{Room Volume (m}^3\text{)}} \leq C: \text{Critical Concentration (0.42kg/m}^3\text{)}$$

* This value should be decided according to the each country's regulation such as ISO5149, EN378 and ASHRAE Standard 15. In the case that the calculated critical concentration is higher than this value, take the following actions:

- 1) Provide a gas leakage detector and exhaust fan controlled by its gas leakage detector.
- 2) Provide effective opening in the wall or door for ventilation to next door so that the critical gas concentration can be maintained lower than the above value. (Provide an opening with area greater than 0.15% of the floor surface at the lower part of a door.)

CAUTION

1. Maximum Permissible Concentration of HFC GAS R410A

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

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

Once leakage occurs, it is a must to take effective actions to make the concentration of R410A lower than 0.42 kg/m³.

2. Calculation of Refrigerant Concentration

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

(2) Calculate the volume of the room installing this unit V (m³).

3. Calculate the refrigerant concentration C (kg/m³) of the room according to the above equation.

Please follow local codes or regulations, if any.

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 and 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 occur.
- ◆ 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 cause a 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.

5.2 Electrical Wiring Connection

Connect the electrical wiring according to the following figures:

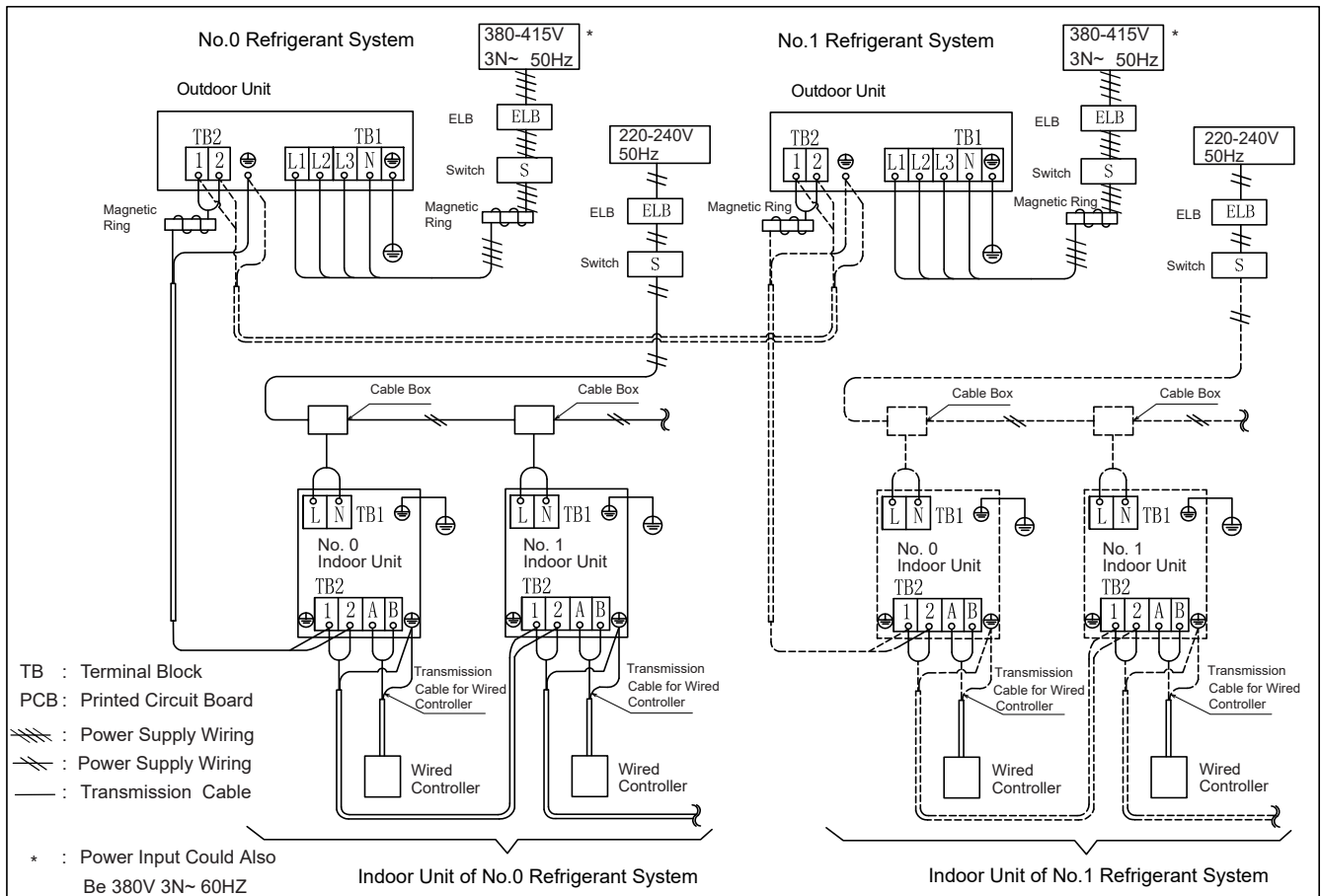


Table 5.1 Electrical Data and Recommended Characteristics

Model	Power Source	Maximum Running Ampacity (A)	Power Supply Wiring (Cores×mm ²)	Transmission cable (Cores×mm ²)	ELB	
					Rated Ampacity (A)	Rated Sensitive Ampacity (mA)
080	380~415V 3N~ 50Hz	21.0	5×4.0	2×0.75	25	30
090		24.0	5×4.0	2×0.75	32	30
100~120	380V 3N~ 60Hz	26.0	5×6.0	2×0.75	32	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 shielded twisted pair transmission cables between the outdoor unit and indoor units to the terminals 1 and 2 on the terminal block. The installation must consider the application and local code requirements.

(3) Connect the transmission cables between the indoor unit and wired controller to the terminals A and B on the terminal block.

(4) The transmission cable should be separated from the power supply wiring.

Keep at least 5cm distance between the transmission cable and the power supply wiring, and also at least 1.5m distance between the transmission cable and power supply wiring for other electrical devices. If it is not secured, put the power supply wiring into the metal conduit tube to separate from other wirings.

(5) 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.

(6) 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.

(7) Tighten screws for the terminal block according to the following table:

Size	Tightening Torque
M4	1.0~1.3 N·m
M5	2.0~2.4 N·m
M6	4.0~5.0 N·m
M8	9.0~11.0 N·m
M10	18.0~23.0 N·m

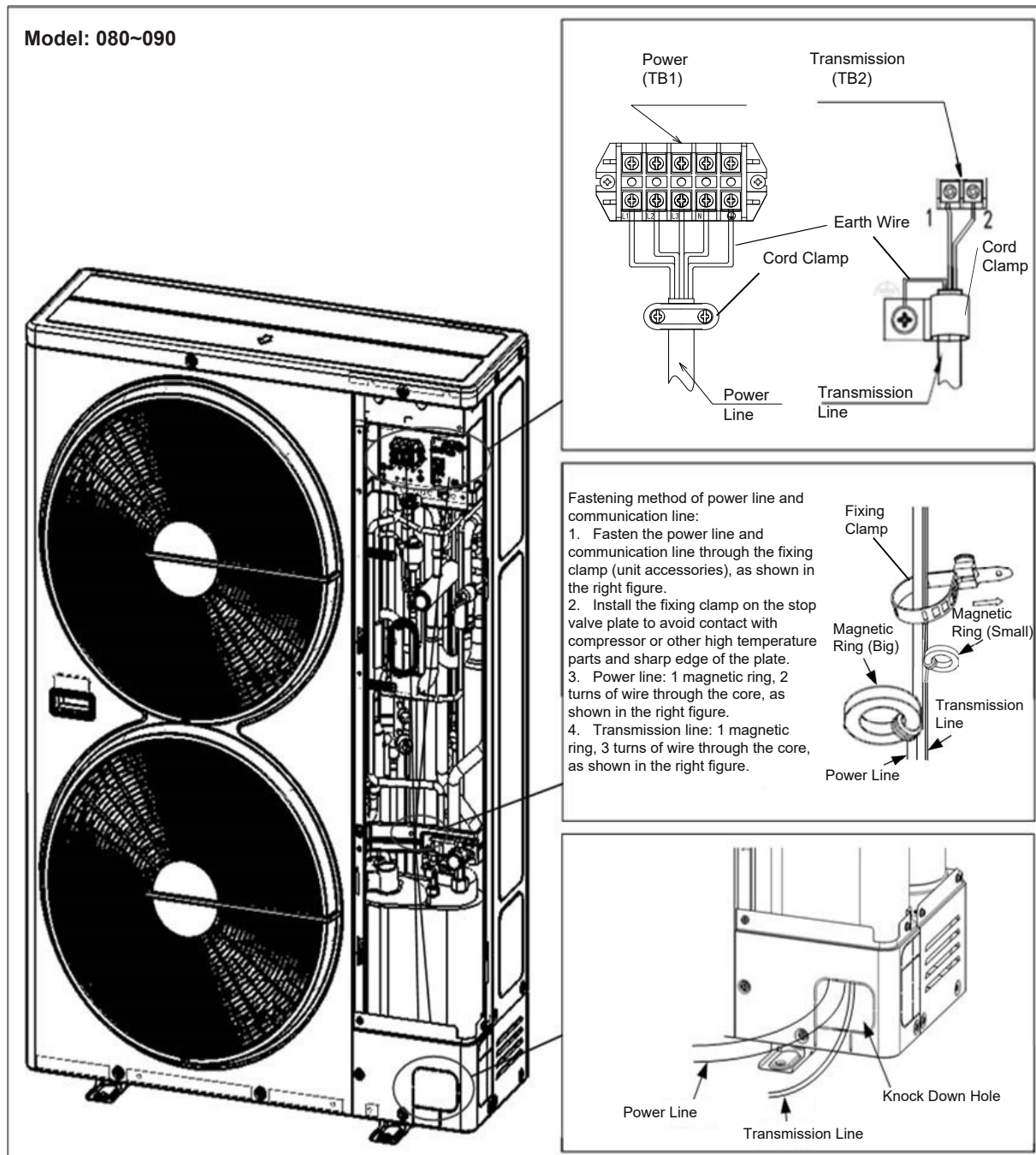
WARNING

- ◆ 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-080~120HNBSTQ, 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.

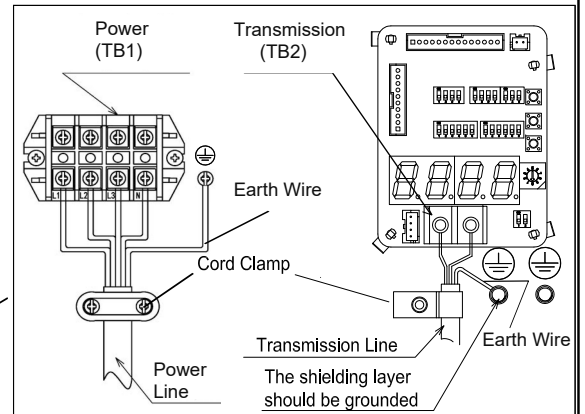
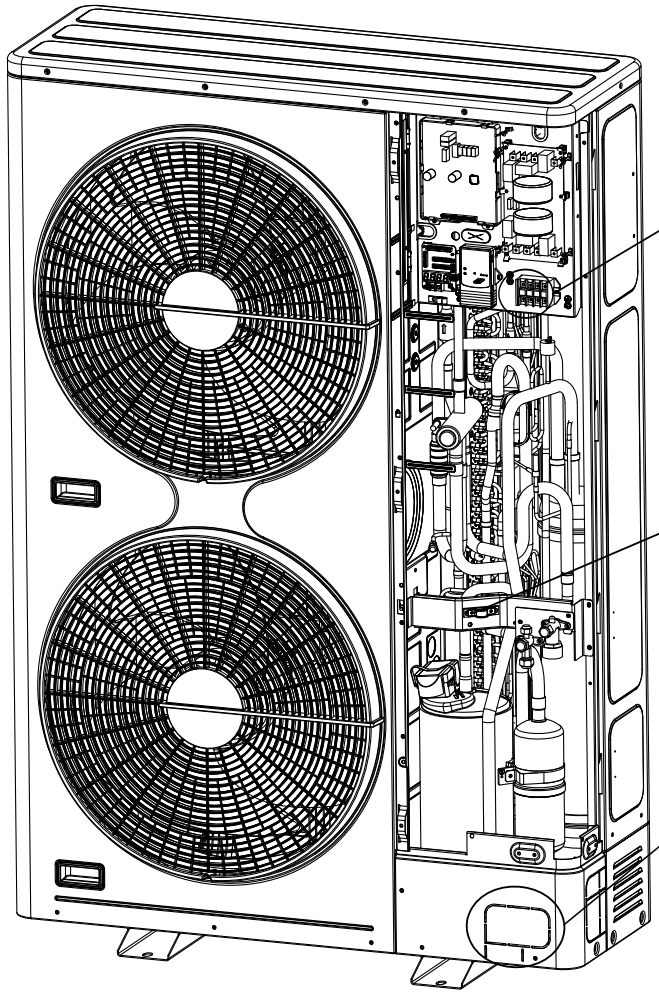
5.3 Electrical Wiring for Outdoor Unit

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

Terminal block for power source and control circuit

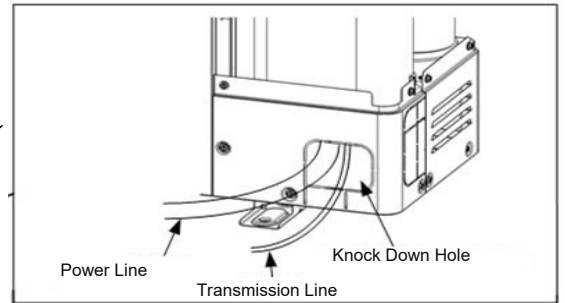
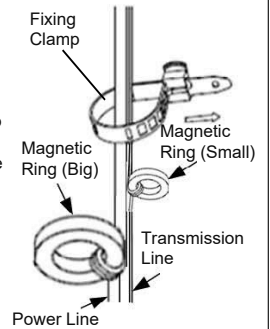


Model: 100~120

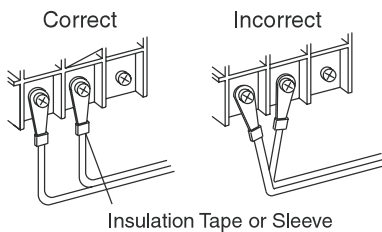


Fastening method of power line and communication line:

1. Fasten the power line and communication line through the fixing clamp (unit accessories), as shown in the right figure.
2. Install the fixing clamp on the stop valve plate to avoid contact with compressor or other high temperature parts and sharp edge of the plate.
3. Power line: 1 magnetic ring, 2 turns of wire through the core, as shown in the right figure.
4. Transmission line: 1 magnetic ring, 3 turns of wire through the core, as shown in the right figure.



Keep a distance between each wiring terminal and attach insulation tape or sleeve as shown in the figure.



Do not use a solderless terminal when a single wire is used. If used, it causes abnormal heating at the caulking portion of the terminal. If a single wire is used connect the wire directly as shown in the figure.



NOTES

- (1) Field wiring shall be in conformity to local laws and regulations, and all wiring operations must be performed by qualified professionals.
- (2) Refer to relevant standards for above-noted power cord size.
- (3) Where power cord is connected through junction box in series, be sure to determine the total current and choose wires based on the table below.
- (4) As a minimum, the chosen power cord shall be compliant with requirements on neoprene sheathed wire #57 as stated in IEC60245-1, while the power cord shall be made from copper conductor.
- (5) The wiring specifications for transmission cable shall not be lower than that for RVV(S)P shielded wires or equivalent, and the shielding layer shall be grounded.
- (6) A switch that can ensure all-pole disconnection shall be installed between power supply and air conditioning unit in such a manner that the contact spacing shall not be less than 3mm.
- (7) Once the power cord is damaged, the dealer or the professionals from designated maintenance department must be contacted in a timely manner for repair and replacement.
- (8) For the installation of power cord, the ground wire must be longer than the current-carrying conductor.

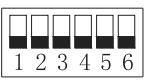
Current (A)	Wire Size (mm ²)	※1: DO NOT connect wires in series when the current exceeds 63A.
$i \leq 6$	2.5	
$6 < i \leq 10$	2.5	
$10 < i \leq 16$	2.5	
$16 < i \leq 25$	4	
$25 < i \leq 32$	6	
$32 < i \leq 40$	10	
$40 < i \leq 63$	16	
$63 < i$	※1	

- (9) This equipment complies with IEC 61000-3-12 provided that the short-circuit power S_{sc} is greater than or equal to the following table.

MODELS SITUATION REGARDING IEC 61000-3-12 S_{sc} "xx" (kVA)	Model	S_{sc} "xx" (kVA)
This equipment complies with IEC 61000-3-12 provided that the short-circuit power S_{sc} is greater than or equal to xx(see S_{sc} column) at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with a short-circuit power S_{sc} greater than or equal to xx(see S_{sc} column).	RAS-080HNBSTQ	1659
	RAS-090HNBSTQ	1896
	RAS-100HNBSTQ	2054
	RAS-110HNBSTQ	2054
	RAS-120HNBSTQ	2054

6. DIP Switch Setting of Outdoor Unit

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

DSW1	DSW2	DSW4	DSW5
Test Run  All OFF: Factory Setting 1 ON : Test Run for Cooling 1 and 2 ON :Test Run for Heating	Function Setting  All OFF: Factory Setting 5 ON : Function Setting Mode 6 ON :External Input/Output Setting Model	Refrigerant Cycle No. Setting  ON OFF	End Terminal Resistance Setting  ON OFF
	DSW3	DSW6	
	Model Setting Check the Label of Electrical Wiring Diagram	Piping Length Setting Factory Setting ON  OFF Height Difference≥20m Indoor Unit is above ON  OFF Height Difference≥25m Outdoor Unit is above ON  OFF	

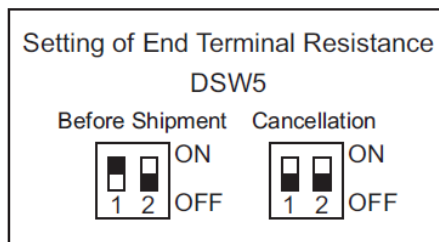
(1) The mark of “■” indicates the position of DIP switches. Set the DIP switches according to the introduction of DIP switches inside of the outdoor unit.

(2) Setting for Transmitting

It is required to set the refrigerant cycle No. of outdoor unit with H-LINK system.

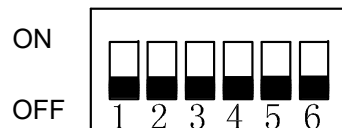
(3) Setting End Terminal Resistance

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.



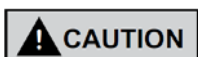
(4) Setting Refrigerant Cycle No.

In the same refrigerant cycle, set the same refrigerant cycle No. for the outdoor unit and the indoor units as shown below with DSW4. The range of refrigerant cycle No. is between 0 and 63.



NOTE: The mark of “●” indicates the ON position of DIP switches;
The mark of “○” indicates the OFF position of DIP switches.

Refrigerant Cycle NO.	DSW4						Refrigerant Cycle NO.	DSW4					
	1	2	3	4	5	6		1	2	3	4	5	6
0	○	○	○	○	○	○	32	○	○	○	○	○	●
1	●	○	○	○	○	○	33	●	○	○	○	○	●
2	○	●	○	○	○	○	34	○	●	○	○	○	●
3	●	●	○	○	○	○	35	●	●	○	○	○	●
4	○	○	●	○	○	○	36	○	○	●	○	○	●
5	●	○	●	○	○	○	37	●	○	●	○	○	●
6	○	●	●	○	○	○	38	○	●	●	○	○	●
7	●	●	●	○	○	○	39	●	●	●	○	○	●
8	○	○	○	●	○	○	40	○	○	○	●	○	●
9	●	○	○	●	○	○	41	●	○	○	●	○	●
10	○	●	○	●	○	○	42	○	●	○	●	○	●
11	●	●	○	●	○	○	43	●	●	○	●	○	●
12	○	○	●	●	○	○	44	○	○	●	●	○	●
13	●	○	●	●	○	○	45	●	○	●	●	○	●
14	○	●	●	●	○	○	46	○	●	●	●	○	●
15	●	●	●	●	○	○	47	●	●	●	●	○	●
16	○	○	○	○	●	○	48	○	○	○	○	●	●
17	●	○	○	○	●	○	49	●	○	○	○	●	●
18	○	●	○	○	●	○	50	○	●	○	○	●	●
19	●	●	○	○	●	○	51	●	●	○	○	●	●
20	○	○	●	○	●	○	52	○	○	●	○	●	●
21	●	○	●	○	●	○	53	●	○	●	○	●	●
22	○	●	●	○	●	○	54	○	●	●	○	●	●
23	●	●	●	○	●	○	55	●	●	●	○	●	●
24	○	○	○	●	●	○	56	○	○	○	●	●	●
25	●	○	○	●	●	○	57	●	○	○	●	●	●
26	○	●	○	●	●	○	58	○	●	○	●	●	●
27	●	●	○	●	●	○	59	●	●	○	●	●	●
28	○	○	●	●	●	○	60	○	○	●	●	●	●
29	●	○	●	●	●	○	61	●	○	●	●	●	●
30	○	●	●	●	●	○	62	○	●	●	●	●	●
31	●	●	●	●	●	○	63	●	●	●	●	●	●



Turn off all power switch before setting Dip-Switch.

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 connect the power supply wiring to 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 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.

7.2 Test Run by DIP Switch of Outdoor Unit

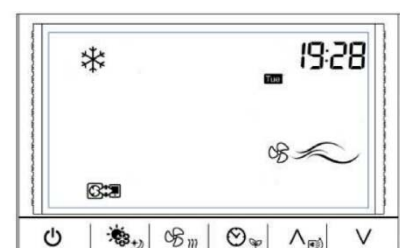
- (1) Turn on the power supply of the outdoor units and indoor units for more than 12 hours, the 7-segment display is lighting.
- (2) Check the 7-segment display of the outdoor unit. If there is any alarm code blinking, please examine and clear it by referring to the table of alarm codes.
- (3) Operate 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 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.

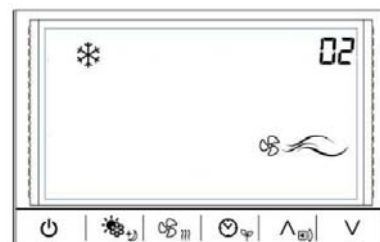
7.3 Test Run by Wired Controller

- (1) Turn on the power supply of the outdoor and indoor units for more than 12 hours.
- (2) The Liquid Crystal Display (LCD) of the wired controller is shown as below:



(3) Press and hold the MODE “❄️” and INCREASE “⬆️” simultaneously for at least 5 seconds, the test run menu will be displayed.

- ◆ The total numbers of indoor units connected to the same wired controller is displayed on the LCD. A twin combination (one set with two indoor units) is identified as “02”.
- ◆ The icon of operation mode “❄️” and the icon of fan “🌀” are blinking.
- ◆ Press the FAN “🌀” to set the fan speed of the indoor units.
- ◆ Press the ON/OFF “🔌” to turn on the air conditioning.
- ◆ The default setting for the test run time is a 120-minutes OFF timer. It can be adjusted by pressing the INCREASE “⬆️” and DECREASE “⬇️”. The range of the timer is between 30 minutes and 600 minutes, with an interval of 30 minutes.



(4) After setting the test run menu, the LCD will be displayed as follow:



NOTE:

- ◆ Louver angle switch is in auto swing mode.
- ◆ If the multiple indoor units are operated simultaneously and controlled by one wired controller, the all setting in the wired controller is applied to every indoor unit which is connected to the same wired controller.

(5) Set the other wired controllers to test the other indoor units.

(6) To finish the test run, wait two hours (as a default setting), or press ON/OFF “🔌”, or press the MODE “❄️” and INCREASE “⬆️” simultaneously for at least 5 seconds.

(7) During the test run, if any malfunction happens, please examine and clear it by referring to the table of alarm codes.

(8) If the indicated number of the wired controller is different with the actual connected indoor units, the auto-address function is not performed correctly due to incorrect wiring, turn off the power supply and correct the wiring after checking the following points:

Indicated Number	Malfunction	Turn off the power supply to check
None	◆ Power supply for indoor unit is not turned on or incorrect wiring; ◆ Power supply for outdoor unit is not turned on or incorrect wiring; ◆ Incorrect wiring of wired controller.	◆ The terminal block for transmission wiring in the indoor unit; ◆ The terminal block for transmission wiring in the wired controller; ◆ The wiring is connected to the wrong terminals; ◆ The screws for the terminal block are loosen.
Less than the actual connected	◆ Power supply for indoor unit is not turned on; ◆ Disconnect the transmission cables between outdoor unit and indoor units.	

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 unit fan correct?
2. Is the rotation direction of the outdoor unit fans correct?
3. Are there any abnormal compressor sounds?
4. Has the unit been in operation 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
Inlet:	No.5 DB	/WB	°C	No.6 DB	/WB	°C	No.7 DB	/WB	°C	No.8 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 Temperature: _____ °C
8. Check Pressure:

Discharge Pressure: _____ MPa
Suction Pressure : _____ MPa
9. Check Voltage:

Rated Voltage: _____ V
Operating Voltage: L-N _____ V
Starting Voltage: _____ V
10. Check the Input Running Current of the Compressor:

Running Current: _____ A

11. Is the refrigerant charge correct?
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 mounted?
17. Are all cabinet panels free from rattles?
18. Is the indoor unit filter clean?
19. Are the indoor unit heat exchanger and outdoor unit heat exchanger clean?
20. Are the stop valves open?
21. Does the drain water flow smoothly from the drain pipe?

Table 7.2 Alarm Code

Alarm Code	Malfunction	Reason
01	Activation of Protection Device (Float Switch)	Activation of Float Switch , High Water Level in Drain Pan
02	Activation of Protection Device (High Pressure Cut)	Activation of PSH (Pipe 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
05	Abnormality of Power Supply Phases	Incorrect Power Source, Connection to Reversed Phase, Open-Phase
06	Abnormal Inverter Voltage	Outdoor Voltage Drop, Insuff icient 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	
21	Abnormality of High Pressure Sensor	Incorrect Wiring, Severed or Disconnecting Wiring, Short Circuit
22	Abnormality of Outdoor Air Thermistor	
23	Abnormality of Discharge Gas 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
36	Incorrect of Indoor Unit Combination	Outdoor unit, indoor unit 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)
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 Circuit), 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
b1	Incorrect Outdoor Unit Address No. or Unit Number Setting	Over 64 Number is Set for Address or Refrigerant Cycle.
b5	Incorrect Indoor Unit Connection No. Setting	More than 18, Non-Corresponding to H-LINK II Units are Connected to One System.
EE	Compressor Protection Alarm (It 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.

◆When the alarm codes in the brackets have appeared, it means 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		080~090	100~120
High Pressure Switch Cut-Out Cut-In		Automatic Reset, Non-Adjustable	
	MPa	4.15	
	MPa	3.2	
Fuse Capacity	A	40	
Crankcase Heater	W	88	80
CCP Timer Setting Time	Min	Non-Adjustable 3	
Fuse Capacity for Control Circuit PCB	A	5	

9. Technical Parameters

Technical parameters							
Model(s):RAS-080HNBSTQ							
Outdoor side heat exchanger of air conditioner/heat pump:air							
Indoor side heat exchanger of air conditioner/heat pump:air							
Type: compressor driven vapour compression							
Driver of compressor:electric motor							
Indication if the heater is equipped with a supplementary heater:no							
Parameters shall be declared for the average heating season							
Item	Symbol	Value	Unit	Item	Symbol	Value	unit
cooling							
Rated cooling capacity	$P_{rated,c}$	22.4	kW	Seasonal space cooling energy efficiency	$\eta_{s,c}$	258.9	%
Declared capacity (*) for cooling, at indoor temperature 27(19) °C and outdoor temperature T_j				Declared energy efficiency ratio (*), at indoor temperature 27(19) °C and outdoor temperature T_j			
$T_j = 35\text{ °C}$	P_{dc}	22.4	kW	$T_j = 35\text{ °C}$	EER_d	3.52	—
$T_j = 30\text{ °C}$	P_{dc}	16.8	kW	$T_j = 30\text{ °C}$	EER_d	4.52	—
$T_j = 25\text{ °C}$	P_{dc}	10.6	kW	$T_j = 25\text{ °C}$	EER_d	7.71	—
$T_j = 20\text{ °C}$	P_{dc}	5.6	kW	$T_j = 20\text{ °C}$	EER_d	11.18	—
co-efficient for air conditioners(*)	C_{dc}	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.02	kW	crankcase heater mode	P_{CK}	0	kW
thermostat-off mode(cooling)	P_{TO}	0	kW	standby mode	P_{SB}	0.02	kW
heating							
Rated heating capacity	$P_{rated,h}$	25.0	kW	Seasonal space heating energy efficiency	$\eta_{s,h}$	148.5	%
Declared heating capacity for part load at indoor temperature 20 °C and outdoor temperature T_j				Declared coefficient of performance (*)/Average season, at indoor temperature 20 °C and outdoor temperature T_j			
$T_j = -7\text{ °C}$	P_{dh}	15.1	kW	$T_j = -7\text{ °C}$	COP_d	2.34	—
$T_j = 2\text{ °C}$	P_{dh}	9.4	kW	$T_j = 2\text{ °C}$	COP_d	3.47	—
$T_j = 7\text{ °C}$	P_{dh}	5.9	kW	$T_j = 7\text{ °C}$	COP_d	5.71	—
$T_j = 12\text{ °C}$	P_{dh}	4.3	kW	$T_j = 12\text{ °C}$	COP_d	7.04	—
$T_j = \text{bivalent temperature}$	P_{dh}	15.1	kW	$T_j = \text{bivalent temperature}$	COP_d	2.34	—
$T_j = \text{operating limit}$	P_{dh}	13.3	kW	$T_j = \text{operating limit}$	COP_d	2.15	—
Bivalent temperature				Operating limit temperature			
heating/Average	T_{biv}	-7	°C	heating/Average	T_{ol}	-10	°C
heating/Warmer	T_{biv}	—	°C	heating/Warmer	T_{ol}	—	°C
heating/Colder	T_{biv}	—	°C	heating/Colder	T_{ol}	—	°C
Degradation co-efficient heat pumps(**)	C_{dh}	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.02	kW	Back-up heating capacity (*)	$elbu$	0	kW
thermostat-off mode(heating)	P_{TO}	0.02	kW	Type of energy input			
crankcase heater mode	P_{CK}	0.01	kW	standby mode	P_{SB}	0.02	kW
Other items							
Capacity control	variable			air flow rate, outdoor measured		7320	m3/h
Sound power level , indoor/outdoor measured	LWA	-77	dB(A)				
Global warming potential	GWP	2088	kgCO ₂ eq.				
Note	The above performance data is obtained on the basis of the performance of this outdoor unit, with a 100%-combination of 4-way cassette type indoor units.						
Contact details	Qingdao Hisense Hitachi Air-conditioning Systems Co., Ltd. NO. 218, Qianwangang Road, Economic and Technological Development Zone, Qingdao,China						

Technical parameters

Model(s):RAS-090HNBSTQ

Outdoor side heat exchanger of air conditioner/heat pump:air

Indoor side heat exchanger of air conditioner/heat pump:air

Type: compressor driven vapour compression

Driver of compressor:electric motor

Indication if the heater is equipped with a supplementary heater:no

Parameters shall be declared for the average heating season

Item	Symbol	Value	Unit	Item	Symbol	Value	unit
cooling							
Rated cooling capacity	$P_{rated,c}$	24.1	kW	Seasonal space cooling energy efficiency	$\eta_{s,c}$	250.2	%
Declared capacity (*) for cooling, at indoor temperature 27(19) °C and outdoor temperature T_j				Declared energy efficiency ratio (*), at indoor temperature 27(19) °C and outdoor temperature T_j			
$T_j = 35\text{ °C}$	P_{dc}	24.1	kW	$T_j = 35\text{ °C}$	EER_d	3.35	—
$T_j = 30\text{ °C}$	P_{dc}	17.8	kW	$T_j = 30\text{ °C}$	EER_d	4.34	—
$T_j = 25\text{ °C}$	P_{dc}	11.3	kW	$T_j = 25\text{ °C}$	EER_d	7.40	—
$T_j = 20\text{ °C}$	P_{dc}	5.6	kW	$T_j = 20\text{ °C}$	EER_d	10.96	—
co-efficient for air conditioners(*)	C_{dc}	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.02	kW	crankcase heater mode	P_{CK}	0	kW
thermostat-off mode(cooling)	P_{TO}	0	kW	standby mode	P_{SB}	0.02	kW
heating							
Rated heating capacity	$P_{rated,h}$	26.0	kW	Seasonal space heating energy efficiency	$\eta_{s,h}$	140.3	%
Declared heating capacity for part load at indoor temperature 20 °C and outdoor temperature T_j				Declared coefficient of performance (*)/Average season, at indoor temperature 20 °C and outdoor temperature T_j			
$T_j = -7\text{ °C}$	P_{dh}	15.7	kW	$T_j = -7\text{ °C}$	COP_d	2.20	—
$T_j = 2\text{ °C}$	P_{dh}	9.5	kW	$T_j = 2\text{ °C}$	COP_d	3.26	—
$T_j = 7\text{ °C}$	P_{dh}	6.3	kW	$T_j = 7\text{ °C}$	COP_d	5.48	—
$T_j = 12\text{ °C}$	P_{dh}	4.4	kW	$T_j = 12\text{ °C}$	COP_d	6.62	—
$T_j = \text{bivalent temperature}$	P_{dh}	15.7	kW	$T_j = \text{bivalent temperature}$	COP_d	2.20	—
$T_j = \text{operating limit}$	P_{dh}	14.3	kW	$T_j = \text{operating limit}$	COP_d	2.06	—
Bivalent temperature				Operating limit temperature			
heating/Average	T_{biv}	-7	°C	heating/Average	T_{ol}	-10	°C
heating/Warmer	T_{biv}	—	°C	heating/Warmer	T_{ol}	—	°C
heating/Colder	T_{biv}	—	°C	heating/Colder	T_{ol}	—	°C
Degradation co-efficient heat pumps(**)	C_{dh}	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.02	kW	Back-up heating capacity (*)	$elbu$	0	kW
thermostat-off mode(heating)	P_{TO}	0.02	kW	Type of energy input			
crankcase heater mode	P_{CK}	0.01	kW	standby mode	P_{SB}	0.02	kW
Other items							
Capacity control	variable			air flow rate, outdoor measured		7320	m3/h
Sound power level , indoor/outdoor measured	LWA	-78	dB(A)				
Global warming potential	GWP	2088	kgCO ₂ eq.				
Note	The above performance data is obtained on the basis of the performance of this outdoor unit, with a 100%-combination of 4-way cassette type indoor units.						
Contact details	Qingdao Hisense Hitachi Air-conditioning Systems Co., Ltd. NO. 218, Qianwangang Road, Economic and Technological Development Zone, Qingdao,China						

Technical parameters

Model(s):RAS-100HNBSTQ

Outdoor side heat exchanger of air conditioner/heat pump:air

Indoor side heat exchanger of air conditioner/heat pump:air

Type: compressor driven vapour compression

Driver of compressor:electric motor

Indication if the heater is equipped with a supplementary heater:no

Parameters shall be declared for the average heating season

Item	Symbol	Value	Unit	Item	Symbol	Value	unit
cooling							
Rated cooling capacity	$P_{rated,c}$	28.0	kW	Seasonal space cooling energy efficiency	$\eta_{s,c}$	252.2	%
Declared capacity (*) for cooling, at indoor temperature 27(19) °C and outdoor temperature T_j				Declared energy efficiency ratio (*), at indoor temperature 27(19) °C and outdoor temperature T_j			
$T_j = 35\text{ °C}$	P_{dc}	28.0	kW	$T_j = 35\text{ °C}$	EER_d	3.41	—
$T_j = 30\text{ °C}$	P_{dc}	20.6	kW	$T_j = 30\text{ °C}$	EER_d	4.42	—
$T_j = 25\text{ °C}$	P_{dc}	13.2	kW	$T_j = 25\text{ °C}$	EER_d	7.38	—
$T_j = 20\text{ °C}$	P_{dc}	7.1	kW	$T_j = 20\text{ °C}$	EER_d	11.13	—
co-efficient for air conditioners(*)	C_{dc}	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.02	kW	crankcase heater mode	P_{CK}	0	kW
thermostat-off mode(cooling)	P_{TO}	0	kW	standby mode	P_{SB}	0.02	kW
heating							
Rated heating capacity	$P_{rated,h}$	31.5	kW	Seasonal space heating energy efficiency	$\eta_{s,h}$	130.6	%
Declared heating capacity for part load at indoor temperature 20 °C and outdoor temperature T_j				Declared coefficient of performance (*)/Average season, at indoor temperature 20 °C and outdoor temperature T_j			
$T_j = -7\text{ °C}$	P_{dh}	18.9	kW	$T_j = -7\text{ °C}$	COP_d	2.04	—
$T_j = 2\text{ °C}$	P_{dh}	11.4	kW	$T_j = 2\text{ °C}$	COP_d	3.07	—
$T_j = 7\text{ °C}$	P_{dh}	7.5	kW	$T_j = 7\text{ °C}$	COP_d	4.94	—
$T_j = 12\text{ °C}$	P_{dh}	4.4	kW	$T_j = 12\text{ °C}$	COP_d	6.15	—
$T_j = \text{bivalent temperature}$	P_{dh}	18.9	kW	$T_j = \text{bivalent temperature}$	COP_d	2.04	—
$T_j = \text{operating limit}$	P_{dh}	17.1	kW	$T_j = \text{operating limit}$	COP_d	2.00	—
Bivalent temperature				Operating limit temperature			
heating/Average	T_{biv}	-7	°C	heating/Average	T_{ol}	-10	°C
heating/Warmer	T_{biv}	—	°C	heating/Warmer	T_{ol}	—	°C
heating/Colder	T_{biv}	—	°C	heating/Colder	T_{ol}	—	°C
Degradation co-efficient heat pumps(**)	C_{dh}	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.02	kW	Back-up heating capacity (*)	$elbu$	0	kW
thermostat-off mode(heating)	P_{TO}	0.02	kW	Type of energy input			
crankcase heater mode	P_{CK}	0.01	kW	standby mode	P_{SB}	0.02	kW
Other items							
Capacity control	variable			air flow rate, outdoor measured		9780	m3/h
Sound power level , indoor/outdoor measured	LWA	-/80	dB(A)				
Global warming potential	GWP	2088	kgCO ₂ eq.				
Note	The above performance data is obtained on the basis of the performance of this outdoor unit, with a 100%-combination of 4-way cassette type indoor units.						
Contact details	Qingdao Hisense Hitachi Air-conditioning Systems Co., Ltd. NO. 218, Qianwangang Road, Economic and Technological Development Zone, Qingdao,China						

Technical parameters

Model(s):RAS-110HNBSTQ

Outdoor side heat exchanger of air conditioner/heat pump:air

Indoor side heat exchanger of air conditioner/heat pump:air

Type: compressor driven vapour compression

Driver of compressor:electric motor

Indication if the heater is equipped with a supplementary heater:no

Parameters shall be declared for the average heating season

Item	Symbol	Value	Unit	Item	Symbol	Value	unit
cooling							
Rated cooling capacity	$P_{rated,c}$	30.0	kW	Seasonal space cooling energy efficiency	$\eta_{s,c}$	241.3	%
Declared capacity (*) for cooling, at indoor temperature 27(19) °C and outdoor temperature T_j				Declared energy efficiency ratio (*), at indoor temperature 27(19) °C and outdoor temperature T_j			
$T_j = 35\text{ °C}$	P_{dc}	30.0	kW	$T_j = 35\text{ °C}$	EER_d	3.30	—
$T_j = 30\text{ °C}$	P_{dc}	22.1	kW	$T_j = 30\text{ °C}$	EER_d	4.11	—
$T_j = 25\text{ °C}$	P_{dc}	14.3	kW	$T_j = 25\text{ °C}$	EER_d	7.11	—
$T_j = 20\text{ °C}$	P_{dc}	7.8	kW	$T_j = 20\text{ °C}$	EER_d	10.93	—
co-efficient for air conditioners(*)	C_{dc}	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.02	kW	crankcase heater mode	P_{CK}	0	kW
thermostat-off mode(cooling)	P_{TO}	0	kW	standby mode	P_{SB}	0.02	kW
heating							
Rated heating capacity	$P_{rated,h}$	33.0	kW	Seasonal space heating energy efficiency	$\eta_{s,h}$	140.3	%
Declared heating capacity for part load at indoor temperature 20 °C and outdoor temperature T_j				Declared coefficient of performance (*)/Average season, at indoor temperature 20 °C and outdoor temperature T_j			
$T_j = -7\text{ °C}$	P_{dh}	19.7	kW	$T_j = -7\text{ °C}$	COP_d	2.21	—
$T_j = 2\text{ °C}$	P_{dh}	12.1	kW	$T_j = 2\text{ °C}$	COP_d	3.24	—
$T_j = 7\text{ °C}$	P_{dh}	8.0	kW	$T_j = 7\text{ °C}$	COP_d	5.43	—
$T_j = 12\text{ °C}$	P_{dh}	4.5	kW	$T_j = 12\text{ °C}$	COP_d	6.83	—
$T_j = \text{bivalent temperature}$	P_{dh}	19.7	kW	$T_j = \text{bivalent temperature}$	COP_d	2.21	—
$T_j = \text{operating limit}$	P_{dh}	18.0	kW	$T_j = \text{operating limit}$	COP_d	2.04	—
Bivalent temperature				Operating limit temperature			
heating/Average	T_{biv}	-7	°C	heating/Average	T_{ol}	-10	°C
heating/Warmer	T_{biv}	—	°C	heating/Warmer	T_{ol}	—	°C
heating/Colder	T_{biv}	—	°C	heating/Colder	T_{ol}	—	°C
Degradation co-efficient heat pumps(**)	C_{dh}	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.02	kW	Back-up heating capacity (*)	$elbu$	0	kW
thermostat-off mode(heating)	P_{TO}	0.02	kW	Type of energy input			
crankcase heater mode	P_{CK}	0.01	kW	standby mode	P_{SB}	0.02	kW
Other items							
Capacity control	variable			air flow rate, outdoor measured		9780	m3/h
Sound power level , indoor/outdoor measured	LWA	-81	dB(A)				
Global warming potential	GWP	2088	kgCO ₂ eq.				
Note	The above performance data is obtained on the basis of the performance of this outdoor unit, with a 100%-combination of 4-way cassette type indoor units.						
Contact details	Qingdao Hisense Hitachi Air-conditioning Systems Co., Ltd. NO. 218, Qianwangang Road, Economic and Technological Development Zone, Qingdao,China						

Technical parameters

Model(s):RAS-120HNBSTQ

Outdoor side heat exchanger of air conditioner/heat pump:air

Indoor side heat exchanger of air conditioner/heat pump:air

Type: compressor driven vapour compression

Driver of compressor:electric motor

Indication if the heater is equipped with a supplementary heater:no

Parameters shall be declared for the average heating season

Item	Symbol	Value	Unit	Item	Symbol	Value	unit
cooling							
Rated cooling capacity	$P_{rated,c}$	33.5	kW	Seasonal space cooling energy efficiency	$\eta_{s,c}$	233.0	%
Declared capacity (*) for cooling, at indoor temperature 27(19) °C and outdoor temperature T_j				Declared energy efficiency ratio (*), at indoor temperature 27(19) °C and outdoor temperature T_j			
$T_j = 35\text{ °C}$	P_{dc}	33.5	kW	$T_j = 35\text{ °C}$	EER_d	3.16	—
$T_j = 30\text{ °C}$	P_{dc}	24.8	kW	$T_j = 30\text{ °C}$	EER_d	3.95	—
$T_j = 25\text{ °C}$	P_{dc}	15.6	kW	$T_j = 25\text{ °C}$	EER_d	6.83	—
$T_j = 20\text{ °C}$	P_{dc}	8.5	kW	$T_j = 20\text{ °C}$	EER_d	10.71	—
co-efficient for air conditioners(*)	C_{dc}	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.02	kW	crankcase heater mode	P_{CK}	0	kW
thermostat-off mode(cooling)	P_{TO}	0	kW	standby mode	P_{SB}	0.02	kW
heating							
Rated heating capacity	$P_{rated,h}$	37.5	kW	Seasonal space heating energy efficiency	$\eta_{s,h}$	148.8	%
Declared heating capacity for part load at indoor temperature 20 °C and outdoor temperature T_j				Declared coefficient of performance (*)/Average season, at indoor temperature 20 °C and outdoor temperature T_j			
$T_j = -7\text{ °C}$	P_{dh}	22.4	kW	$T_j = -7\text{ °C}$	COP_d	2.35	—
$T_j = 2\text{ °C}$	P_{dh}	13.7	kW	$T_j = 2\text{ °C}$	COP_d	3.45	—
$T_j = 7\text{ °C}$	P_{dh}	8.9	kW	$T_j = 7\text{ °C}$	COP_d	5.66	—
$T_j = 12\text{ °C}$	P_{dh}	4.9	kW	$T_j = 12\text{ °C}$	COP_d	7.27	—
$T_j = \text{bivalent temperature}$	P_{dh}	22.4	kW	$T_j = \text{bivalent temperature}$	COP_d	2.35	—
$T_j = \text{operating limit}$	P_{dh}	20.3	kW	$T_j = \text{operating limit}$	COP_d	2.17	—
Bivalent temperature				Operating limit temperature			
heating/Average	T_{biv}	-7	°C	heating/Average	T_{ol}	-10	°C
heating/Warmer	T_{biv}	—	°C	heating/Warmer	T_{ol}	—	°C
heating/Colder	T_{biv}	—	°C	heating/Colder	T_{ol}	—	°C
Degradation co-efficient heat pumps(**)	C_{dh}	0.25					
Power consumption in modes other than 'active mode'							
off mode	P_{OFF}	0.02	kW	Back-up heating capacity (*)	$elbu$	0	kW
thermostat-off mode(heating)	P_{TO}	0.02	kW	Type of energy input			
crankcase heater mode	P_{CK}	0.01	kW	standby mode	P_{SB}	0.02	kW
Other items							
Capacity control	variable			air flow rate, outdoor measured		9780	m3/h
Sound power level , indoor/outdoor measured	LWA	-82	dB(A)				
Global warming potential	GWP	2088	kgCO ₂ eq.				
Note	The above performance data is obtained on the basis of the performance of this outdoor unit, with a 100%-combination of 4-way cassette type indoor units.						
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The Company is committed to continuous product improvement. We reserve the right, therefore, to alter the product information at any time and without prior announcement.

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