

HITACHI

INSTALLATION & MAINTENANCE MANUAL

INVERTER-DRIVEN

AIR CONDITIONERS

air365 Max SERIES

OUTDOOR UNITS

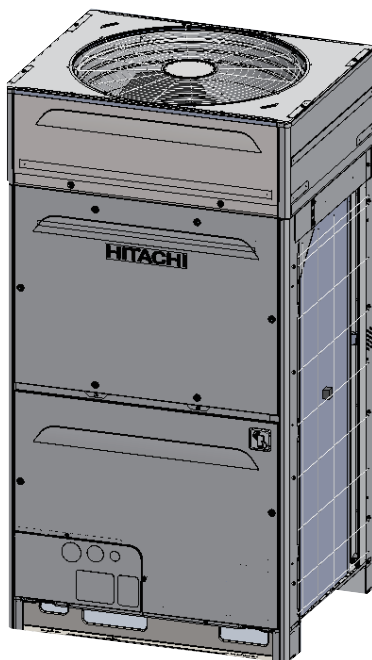
MODELS

<BASE UNITS>

COOLING ONLY

(Standard Type)

RAS-080CNCCLI TO RAS-300CNCCLI



EN INSTALLATION & MAINTENANCE MANUAL
Original Instructions

Scan the code to get the electronic manual.

Cooling & Heating

A1638IN3TM

air

Models

Applicable Models

HP	Cooling Only	HP	Cooling Only
8HP	RAS-080CNCCLI	20HP	RAS-200CNCCLI
10HP	RAS-100CNCCLI	22HP	RAS-220CNCCLI
12HP	RAS-120CNCCLI	24HP	RAS-240CNCCLI
14HP	RAS-140CNCCLI	26HP	RAS-260CNCCLI
16HP	RAS-160CNCCLI	28HP	RAS-280CNCCLI
18HP	RAS-180CNCCLI	30HP	RAS-300CNCCLI

Unit Nomenclature

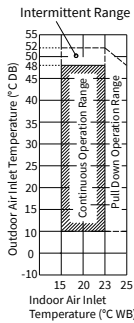
RAS - 080 C N C C L I

	Nomenclature Description
I	Production Location: Ahmedabad, India
L	L: 3N~ 380-415 V 50 Hz / 4 Wires 3N~ 380 V 60 Hz / 4 Wires
C	C: "C" Series (Standard Type)
C	3 rd Generation
N	Refrigerant Type: R410A
C	C: Cooling Only System (2 Pipes System)
080	System Capacity (e.g., 080 = 8 HP, H20 ≈120 HP)
RAS	Unit Type RAS: Outdoor Unit

Working Range

This air conditioner has been designed for a specific temperature range. For optimum performance and a long life, operate this unit within the range limits listed in the table.

< Cooling Operation >



Temperature	DB: Dry Bulb WB: Wet Bulb
	Cooling Operation
Indoor Air Inlet Temperature	15 to 23°C WB
Outdoor Air Inlet Temperature	10 to 48 (52 ⁻¹) °C DB

- The maximum operating temperature for cooling operation of the Cooling Only type is 48 °C (52 °C). The temperatures in parenthesis indicate the temporary maximum operating temperatures.
 - Temporary high ambient operation is allowed depending on the installation condition.
 - Do not install the unit where the ambient temperature is always high.
 - If an air outlet duct is attached and set in high static mode, or an optional hood such as a snow protection hood is attached, the outdoor unit operational temperature should not exceed 48 °C.
 - When the outdoor air inlet temperature is more than 48 °C during cooling operation, "intermittent operation" may be activated to prevent the unit from overloading. If the outdoor unit operates for a long time at a temperature higher than 52 °C protection control may be activated.
 - If installing units in a place where the ambient temperature continuously exceeds 48 °C, the combination ratio must be lower than 130%.
 - The cooling capacity deteriorates at a high ambient temperature. Select a larger capacity outdoor unit than an outdoor unit which capacity is larger than the compatible building heat load.
 - When the ambient temperature is more than 48 °C during cooling operation, the noise level to increase from 5dBA to 7dBA, due to an increase in fan rotation speed.

NOTES:

- The appropriate amount (100%) of refrigerant must be charged. Excessive charging of refrigerant is forbidden.
- Units should not be installed in areas where they will be affected by direct sunlight or where a short circuit of the discharged air may occur. Installing the units in an inappropriate place may activate the protection control and the alarm system. The life span of the products and part may be considerably shortened.
- Periodic maintenance (1/certain month) must be applied to the heat exchanger fin to avoid adhesion of dirt and clogging of sand to the outdoor unit heat exchanger.
- When the cooling load is low and the outdoor air inlet temperature is 10 °C DB or lower, "thermo-OFF" may be activated to prevent frost formation on the indoor unit heat exchanger. Depending on the operating condition, the outlet air temperature of the indoor unit

IMPORTANT NOTICE

may be excessively low. Pay attention to the direction of the outlet air. Do not place objects near the air outlet and under the indoor unit as they may be damaged by condensates that may form if the humidity or the latent heat load is continuously high.

- The operational range differs when connected to All Fresh Air Unit, Econofresh and other special indoor units. Refer to the Technical Catalog for more details.

IMPORTANT NOTICE

- Hitachi-Johnson Controls Air Conditioning pursues a policy of continuing improvement in design and performance in its products. As such, Hitachi-Johnson Controls Air Conditioning reserves the right to make changes at any time without prior notice.
- Hitachi-Johnson Controls Air Conditioning cannot anticipate every possible circumstance that might involve a potential hazard.
- This manual provides common descriptions, basic and advanced information to maintain and service this air conditioner which you operate as well for other models.
- The installer and system specialist must safeguard against refrigerant leakage in accordance with local codes. The following standards may be applicable, if local regulations are not available. International Organization for Standardization: (ISO 5149 or European Standard, EN 378). No part of this manual may be reproduced in any way without the expressed written consent of Hitachi-Johnson Controls Air Conditioning.
- This air conditioner is designed for standard air conditioning applications only. Do NOT use this unit for anything other than the purposes for which it was intended.
- The unit is a partial unit air conditioner, complying with partial unit requirements of the International Standard, and must only be connected to other units that have been confirmed as complying with corresponding partial unit requirements of the International Standard.
- This manual is essential for product operation and should remain with the air conditioning equipment.
- If you have questions, please contact your distributor or contractor.

Introduction

This manual focuses on the outdoor/indoor unit. Read this manual carefully before installation. Also, refer to other manuals where necessary. Forward this manual and the warranty to the next team of installers and then users. Ask them to keep this manual with the air conditioner for future reference.

(Refrigerant Piping Work) → (Electrical Wiring Work) → (Ref. Charge Work) → (Test Run) → (User)

- With regard to the installation (including the mechanical installation, refrigerant system installation and electrical wiring connection), please read the following pages carefully.
 - Installation Work ...Chapter 4
 - Refrigerant Piping Work...Chapter 5
 - Electrical Wiring... Chapter 6
- For wiring between the indoor unit and the outdoor unit, refer to the Installation and Maintenance Manual for the outdoor unit.
- For the optional decorative panel, refer to the Installation and Maintenance Manual for the optional decorative panel.(Only for 1-Way, 2-Way, and 4-Way Cassette Types)
- For each optional controller, refer to the Installation and Maintenance Manual and the Operation Manual.
- For each optional part, refer to the Installation and Maintenance Manual.
- For the central controller, refer to the Installation and Maintenance Manual and the Operation Manual.






Product Inspection upon Arrival

1. Upon receiving this product, inspect it for any damages incurred in transit. Claims for damage, either apparent or concealed, should be filed immediately with the shipping company.
2. Check the model number, electrical characteristics (power supply, voltage, and frequency rating), and accessories to determine if they are correct with the purchase order.
3. Please contact your local agent or contractor if any issues involving installation, performance, or maintenance arise. Liability does not cover defects originating from unauthorized modifications performed by a customer without the written consent of Hitachi-Johnson Controls Air Conditioning. Performing any mechanical alterations on this product without the consent of the manufacturer will render your warranty null and void.

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1. Safety Summary

	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	Is used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
	Is used to address practices not related to personal injury.
	Indicates useful information for operation and/or maintenance.

General Precautions



To reduce the risk of serious injury or death, read these instructions thoroughly and follow all warnings or cautions included in all manuals that accompany the product. Incorrect installation could cause leaks, electric shock, fire or explosion.

- Hitachi-Johnson Controls Air Conditioning will not assume any liability for injuries or damage caused by not following steps outlined or described in this manual. Unauthorized modifications to Hitachi-Johnson Controls Air Conditioning products are prohibited as they:
 - May create hazards that could result in death, serious injury or equipment damage;
 - Will void product warranties;
 - May invalidate product regulatory certifications.
- This system should be installed by personnel certified by Hitachi-Johnson Controls Air Conditioning. Professional personnel must follow all local and national codes. Where Seismic Performance requirements are specified, take appropriate measures during installation to guard against possible damage or injury that might occur in an earthquake due to incorrect installation or a unit falling.
- This air conditioning system is intended to be used by expert or trained users in shops, in light industry and on farms, or for commercial

use by lay persons.

- Use appropriate Personal Protective Equipment (PPE), such as gloves and protective goggles and, where appropriate, have a gas mask nearby. Also use electrical protection equipment and tools suited for electrical operation purposes. Keep a quenching cloth and a fire extinguisher nearby during brazing. Use care in handling, rigging, and setting bulky equipment.
- Before servicing, turn off the power supply and use accepted lockout and tag out procedures at all main switches. Failure to do so can result in damage to internal components with severe or fatal electrical shock.
- This unit is a pressurized system. Never loosen threaded joints while the system is under pressure and never open pressurized system parts.
- When the air conditioner needs repair or is transported to a new location, contact your distributor or contractor. If the repair and the installation are not completed, electric shock or fire can result.
- When transporting, be careful when picking up, moving and mounting these units. Although the unit may be packed using plastic straps, do NOT use them for transporting the unit from one location to another. Do NOT stand on or put any material on the unit. Get a partner to help, and bend with your knees when lifting to reduce strain on your back. Sharp edges or thin aluminum fins on the air conditioner can cut fingers, so wear protective gloves.
- Use only recommended/standardized replacement parts provided by Hitachi-Johnson Controls Air Conditioning.
- This air conditioning system 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 air conditioning system 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.
- Do NOT attempt to "clean" indoor unit components with liquid or powdered cleaning agents during maintenance. Electric shock, sparks, flame, and serious or fatal injury can occur.
- When the flat panel is opened (closed) or the

1. Safety Summary

air filter is attached (removed), hold them firmly. If not, it may cause falling or injury. (only for wall mounted type)

- Do NOT insert fingers or objects into air inlet/outlet. Injury can result from rotating fan blades or energized electrical components.
- Do NOT touch the main circuit board or electronic components in the controller or remote devices. Make sure that dust and/or moisture does not accumulate on the circuit board.
- Do NOT touch the wired controller with wet hands to prevent damage to the wired controller or an electrical shock.
- If you smell anything burning, shut down the unit and turn off the power at the main power supply. Contact the fire department and your installer or electrical contractor.
- Do not apply hair spray, insecticides, lacquers, or other pressurized substances within 1 m of any air conditioner. The substances can react with energized electrical contractor.
- For safe operation, the air conditioning system shall be inspected and maintained every 6 months.

CAUTION

To reduce the risk of minor or moderate injury, the following general precautions must be followed.

- About Wireless Controller
 - Pay attention to the following to use the batteries correctly. If not, it may cause liquid spill or burst.
 - Never use new and used batteries together.
 - Never use the different types of batteries (for example manganese battery and alkaline battery) together.
 - When the wireless controller is not used over a prolonged period of time (more than 2 or 3 months), remove the batteries from the wireless controller.
 - After removing the old batteries, wait five or more seconds before inserting the new ones

NOTICE

Take the following precautions to reduce the risk of property damage.

- Each model number and all matching model

numbers within a system must have the same version of software.

Follow these steps to verify that your product model numbers have the same version of software.

- Access the main printed circuit board in each product.
- Locate a white sticker with a P-XXXX number or
- Connect a service checker and locate the ROM number.
- In a hospital or facility, install the unit at least 3 m away from medical or electronic devices. Operation of the unit may adversely affect the devices. The devices generate electromagnetic interference (EMI) waves that can directly radiate into the unit and cause malfunction.
- If there is a source of electrical interference near the power source, install noise suppression equipment (filter).
- If the wired controller is installed in a location where electromagnetic radiation is generated, make sure that the wired controller is shielded and cables are sleeved inside conduit tubing.
- Be careful that moisture, dust, or variant refrigerant compounds not enter the refrigerant cycle during installation work. Foreign matter could damage internal components or cause blockages.
- If air filters are required on this unit, do NOT operate the unit without the air filter set in place. If the air filter is not installed, dust may accumulate and breakdown may result.
- Do NOT install the unit in a location where animals and plants can come in direct contact with the outlet air and become adversely affected.
- Be sure the condensate hose discharges water properly. If connected incorrectly, leaks can occur.
- Do NOT install the unit with any downward slope to the side of the condensate pipe. If you do, you may have drain water flowing back which may cause leaks.
- Do NOT install the unit in any place where oil can seep into the units, such as a kitchen in restaurants, and so forth. For these locations or social venues, use specialized units with oil-resistant features built into them. In addition, use a specialized ceiling fan designed for restaurant use. These specialized oil-resistant units can be ordered for such applications. However, in places where large quantities of oil can splash onto the unit, such as a factory,

even the specialized units cannot be used. These products should not be installed in such locations.

- Do NOT install this unit in any place where silicon gases can coalesce. If the silicon gas comes into contact with the surface of the heat exchanger, the finned surfaces repel water. As a result, moisture can enter from the condensate pan into the electrical box, possibly causing electrical failures.
- Do not place any flammable items or anything that can cause a fire on or around the outdoor unit. It may cause a fire.
- During the test run, check the unit's operation temperature. If the unit is used in an environment where the temperature exceeds the operation boundary, it may cause severe damage. Check the working range in the manual.
- The A-weighted emission sound pressure level does not exceed 70 dB (A).

Installation Precautions



To reduce the risk of serious injury or death, the following installation precautions must be followed.

- When installing the unit into:
 - A wall: Make sure the wall is strong enough to hold the unit's weight. It may be necessary to construct a strong wood or metal frame to provide added support.
 - A room: Properly insulate any refrigerant piping run inside a room to prevent "condensation" 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, 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 air baffle.
- Do NOT install the unit in the following places. Doing so 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 nearby or

above a kitchen stove.

- Where oil (including machinery oil) may be present.
- Where corrosive gases such as chlorine, bromine, or sulfide can accumulate, such as near a hot tub or a 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 position the condensate pipe for the indoor unit near any sanitary sewers where corrosive gases may be present. If you do, toxic gases can seep into breathable air spaces and can cause respiratory injuries. If the condensate pipe is installed incorrectly, water leakage and damage to the ceiling, floor, furniture, or other possessions may result. If the condensate pipe becomes clogged, water may drip from the indoor unit. Do NOT install the indoor unit where such dripping can cause moisture damage or at uneven locations.
- During transportation, do NOT allow the backrest of the forklift make contact with the unit, otherwise, it may cause damage to the heat exchanger and also may cause injury when stopped or started suddenly.
- Before performing any brazing work, be sure that there are no flammable materials or open flames nearby.
- Remove gas inside the closing pipe when the brazing work is performed. If the brazing filler metal is melted with remaining gas inside, the pipes will be blown off and it may cause injury.
- Be sure to use nitrogen gas for the airtight test. If other gases such as oxygen gas, acetylene gas or fluorocarbon gas are accidentally used, it may cause an explosion or gas intoxication.
- 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.
- Do NOT install the indoor unit anywhere discharge airflow can pass directly toward nearby heating equipment (space heaters). It may interfere with the combustion process in these units.
- When the indoor unit is operating with heating equipment, ventilate the room sufficiently. Any leaked refrigerant gas that happens to come into contact with any heat source can become

1. Safety Summary

toxic on contact and can cause suffocation in the immediate area.

- Do NOT install this system in close proximity to septic sewer lines where flammable and toxic gases can coalesce.

CAUTION

To reduce the risk of minor or moderate injury, the following installation precautions must be followed.

- Proper handling of this unit requires two people. Safe handling and installation of the indoor unit requires the strength of two people. Mounting the unit alone may cause injury due to a fall of the unit. Although the unit may be girded with plastic bands, do NOT use it for transportation. Avoid contact with finned surfaces of the heat exchanger as sharp edges can cause severe injury to hands and fingers. Use appropriate work gloves for the job.

NOTICE

Take the following precautions to reduce the risk of property damage.

- The optional decorative panel can become deformed if the positioning of the indoor unit's suspension brackets is not stable or level. Condensation can accumulate in low spots as a result due to escaping air through any resulting gaps between the indoor unit and the decorative panel.
- Check to ensure that the condensate hose discharges moisture properly. If connected incorrectly, it can result in leakage and cause damage to furniture.
- Make sure to use the factory-supplied condensate hose and hose clamp. Non-factory supplied condensate hose and hose clamp can cause water leakage.
- Do NOT bend or twist the factory-supplied condensate hose. This could compromise the seal and result in water leakage.
- Do NOT apply excessive force to the condensate pipe connection. This can also compromise the seal properties of the connection.
- Verify that the installed unit is level with floor and ceiling surfaces. Any variance or inclination can cause moisture to back up into the condensate pan, overflow, and seepage onto ceiling or wall surfaces, and cause damage to carpeted surfaces or furniture below.

- Air circulation should be optimized to achieve the best distribution pattern and not settled into isolated pockets that can make people uncomfortable.
- Inspect the condensate pan before the onset of winter to drain away all accumulated water in the pan.
- The heat exchanger of indoor unit overheats whenever there is a slight amount of refrigerant circulating during slowdown or stoppage. As a result, water in the condensate pan evaporates and can condense on ceiling or wall surfaces.
- After the drain check is completed, insert the rubber plug again and seal the gap with a silicon sealant.
- Clean up the site when finished, remembering to check that no metal scraps or bits of wiring have been left inside the unit being installed.
- Do NOT install the decorative panel with motion sensor and radiation sensor or motion sensor kit in the following places. It may cause failure or deterioration of the sensor.
 - Ambient temperature changes drastically.
 - Where excessive force or vibration is applied to the sensor.
 - Where static electricity or electromagnetic waves may generate.
 - Where interference of infrared light such as glasses or mist are in the detecting area.
 - Where the lens for sensor is exposed to high temperature and humidity for a long time.
 - Where fluid and corrosive gas exist.
 - Where direct lights such as sunlight or headlights affect the sensor.
 - Where hot air from a heater, etc. affects directly to the sensor.
 - Where the air flow returns to the sensor by hitting obstacles such as a shelf, locker, etc.
 - Where the blower devices such as ceiling fan, ventilating fan, etc. affect the air flow from the indoor unit.
 - Where weather affects directly the surface of the sensor.
 - Where the lens surface may smudge or be damaged such as a dusty environment. Detecting function will decrease if the lens for sensor smudges.

In this case, wipe off smudges using a cotton swab soaked with alcohol (Isopropyl alcohol is recommended.) or a soft cloth. (When wiping off smudges on the lens for sensor, do NOT apply excessive force. If excessive force is applied, the resin lens may be damaged and this may cause

malfunctions such as misdetection or undetectable motion.)

- When using the remote control thermo function, consider the following points when selecting the installation location.
 - Where the average temperature of the room can be detected
 - Where there is no direct sunlight
 - Where there is no heat source nearby
 - Where hot/cold air from the outdoors, or a draft from elsewhere (such as air vents, diffusers or grilles) can affect air circulation.
- When installing the wired controller in the following locations with poor temperature distribution, install remote sensors.
 - Where the unit is exposed to direct sunshine or direct light.
 - Where the unit is in close proximity to a heat source.
 - Where hot/cold air from the outdoors, or a draft from elsewhere (such as air vents, diffusers or grilles) can affect air circulation.
 - In areas with poor air circulation and ventilation.
- When a wireless controller is used, locate at a distance of at least 3 m between the indoor unit and electric lighting. If not, the receiver part of the unit may have difficulty receiving operation commands.

Refrigerant Precautions

WARNING

To reduce the risk of serious injury or death, the following refrigerant precautions must be followed.

- As originally manufactured, this unit contains refrigerant charged by Hitachi-Johnson Controls Air Conditioning. Hitachi-Johnson Controls Air Conditioning uses only refrigerants that have been approved for use in the unit's intended home country or market. Hitachi-Johnson Controls Air Conditioning distributors similarly are only authorized to provide refrigerants that have been approved for use in the countries or markets they serve. The refrigerant used in this unit is identified on the unit's faceplate and/or in the associated manuals. Any additions of refrigerant into this unit must comply with the country's requirements with regard to refrigerant use and should be obtained from Hitachi-Johnson Controls Air Conditioning distributors. Use
- of any non-approved refrigerant substitutes will void the warranty and will increase the potential risk of injury or death.
- To avoid the possibility of different refrigerant or refrigerant oil being introduced into the cycle, the sizes of the charging connections have been changed from R407C type and R22 type. It is necessary to prepare the following tools listed in "Necessary Tools and Instruments List for Installation" in the Installation and Maintenance Manual before performing the installation work. Use refrigerant pipes and joints which are approved for use with R410A.
- The refrigerant R410A is adopted. The refrigerant oil tends to be affected by foreign matters such as moisture, oxide film, (or fat). Perform the installation work with care to prevent moisture, dust, or different refrigerant from entering the refrigerant cycle. Foreign matter can be introduced into the cycle from such parts as expansion valve and the operation may be unavailable.
- The outdoor unit shall only be connected to indoor units suitable for the same refrigerant (R410A).
- The design pressure for this product is 4.15 MPa. The pressure of the refrigerant R410A is 1.4 times higher than that of the refrigerant R22. Therefore, the refrigerant piping for R410A must be thicker than that for R22. Make sure to use the specified refrigerant piping. If not, the refrigerant piping may rupture due to an excessive refrigerant pressure. Besides, pay attention to the piping thickness when using copper refrigerant piping. The thickness of copper refrigerant piping differs depending on its material.
- The maximum operating pressure is 4.15 MPa. This maximum operating pressure shall be considered when connecting the outdoor unit to correlated indoor units.
- When installing the unit, and connecting refrigerant piping, keep all piping runs as short as possible, and make sure to securely connect the refrigerant piping before the compressor starts operating. If the refrigerant piping is not connected and the compressor activates with the stop valve opened, the refrigerant cycle will become subjected to extremely high pressure, which can cause an explosion or fire.
- If installed in a small room, take measures to prevent the refrigerant from exceeding the maximum allowable concentration in the event that refrigerant gases should escape. The

1. Safety Summary

installation should meet the requirements in each regional regulation. If refrigerant gas leaks during the installation work, ventilate the room immediately.

- The refrigerant system may be damaged if the slope of the piping connection kit exceeds +15°.
- Tighten the flare nut with a torque wrench in the specified manner. Do NOT apply excessive force to the flare nut when tightening. If you do, the flare nut can crack and refrigerant leakage may occur.
- When maintaining, relocating, and disposing of the unit, dismantle the refrigerant piping after the compressor stops.
- When pipes are removed from under the piping cover, after the insulation work is completed, cover the gap between the piping cover and pipes using a packing material (field-supplied). If the gap is not covered, the unit may be damaged if snow, rain water or small animals enter the unit.
- Do NOT apply excessive force to the spindle valve at the end of opening. Otherwise, the spindle valve flies out due to refrigerant pressure. At the test run, fully open the gas and liquid valves. Otherwise, these devices will be damaged. (It is closed before shipment.)
- Before installation is complete, make sure that the refrigerant leak test has been performed. If refrigerant gases escape into the air, turn off the main switch, extinguish any open flames and contact your service contractor. Refrigerant (Fluorocarbon) for this unit is odorless. If the refrigerant should leak and come into contact with open flames, toxic gas could be generated. Also, because the fluorocarbons are heavier than air, they settle to the floor, which could cause asphyxiation.
- If refrigerant gas should leak, turn off all heating equipment and ventilate the room immediately. Mop down or vacuum floor areas of residual toxic particulate.
- This product contains fluorinated greenhouse gases that its functioning relies upon. Do NOT vent into the atmosphere.
Refrigerant type: R410A
For mass of charged refrigerant, refer to chapter 7.

GWP^{*1}: 2090

*1. GWP=global warming potential

Electrical Precautions



To reduce the risk of serious injury or death, the following refrigerant precautions must be followed.

- This air conditioning system shall be installed in accordance with national wiring regulations.
- Highly dangerous electrical voltages are used in this system. Carefully refer to the wiring diagram and these instructions when wiring. Improper connections and inadequate grounding can cause serious injury or death.
- Means for disconnection from the supply mains, which have a contact separation in all poles that provide full disconnection under over voltage category III conditions, must be incorporated in the fixed wiring in accordance with the wiring rules.
- Be sure to use the dedicated circuit and perform all electrical work in strict accordance with this manual and all relevant regulatory standards.
- This air conditioning system 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 air conditioning system by a person responsible for their safety.
 - Supervise children to ensure they do not play with the unit.
 - If the power supply wiring is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.
- Do NOT open the service cover or access panel to indoor or outdoor units without turning off the main power supply. Before servicing, open and tag all disconnect switches. Never assume electrical power is disconnected. Check with a multimeter.
- Turn off all power at the main power source before performing maintenance work. Failure to do so can result in damage to internal components with severe or fatal electrical shock.
- Do NOT operate indoor units with the electrical box and switch panel open and exposed. Incidental contact with energized components can prove fatal.

- Insulate all electrical components and connections from exposure to moisture. Failure to do so can result in an electrical short circuit and fire.
- Do NOT tamper with or attempt to "repair" electrical wiring or connections. Call your installer or electrical contractor. Serious or fatal injury can occur.
- Only use electrical protection equipment and tools suited for this installation.
- The Main Fuse shall be replaced by the professional person.
- Use an exclusive power supply for the air conditioner at the unit's rated voltage.
- Use the specified cables between units.
- Be sure to install circuit breakers such as an earth leakage circuit breaker (ELB)/ground fault interrupter (GFCI), isolating switch, molded case circuit breaker and so on), with the specified capacity. Ensure that the wiring terminals are tightened securely to recommended torque specifications. If a circuit breaker or fuse is frequently activated, shut down the system and contact your service contractor.
- Shut down at the main power supply if the ELB (GFCI) activates frequently. Contact your distributor or contractor immediately. Failure to act accordingly can result in serious injury and damage to the unit.
- Clamp electrical wires securely with a cable band after all wiring is connected to the terminal block. In addition, run wires securely through the wiring access channel or the electrical conduit.
- When installing the power lines, do NOT apply tension to the cables. Secure the suspended cables at regular intervals, but not too tightly.
- Make sure that the terminals do NOT come into contact with the surface of electrical box. If the terminals are too close to the surface, it may lead to failures at the terminal connection.
- After stopping operation, be sure to wait at least five minutes before turning off the main power switch. Otherwise, water leakage or electrical breakdown may result. Disconnect the power supply completely before attempting any maintenance for electrical parts. Confirm that no residual voltage is present after disconnecting the power supply.
- Residual voltage can cause electric shock. At all times, check for residual voltage after disconnecting from the power source before starting work on the unit.
- The installation of a residual current device (RCD) having a rated residual operating current not exceeding 30 mA is advisable.
- Do NOT clean with, or pour water onto the controller as it could cause an electric shock and/or damage the unit. Do NOT use strong detergent such as a solvent. Clean with a soft cloth.
- Check that the earth (ground) wiring is securely connected. Do NOT connect ground wiring to gas piping, water piping, lightning conductor, or telephone ground wiring.
- Do NOT run the relay wiring for the motion sensor and power supply wiring in parallel. Electromagnetic Interference (EMI) may cause malfunction of the sensor. (Only for indoor unit with motion sensor)
- The polarity of the input terminals is important, so be sure to match the polarity when using contacts that have polarity.
- Before installing the controller or remote devices, ensure the indoor and outdoor unit operation has been stopped. Further, be sure to wait at least five minutes before turning off the main power switch to the indoor or outdoor units. Otherwise, water leakage or electrical breakdown may result.
- Do NOT install the wired controller in the high-temperature and humidity location.
- When connecting the controller cabling to the units, do NOT touch or adjust any safety devices inside the indoor or outdoor units. All safety features, disengagement, and interlocks must be in place and functioning correctly before the equipment is put into operation. If these devices are improperly adjusted or tampered with in any way, a serious accident can occur. Never bypass any safety device or switch.

NOTICE

Take the following precautions to reduce the risk of property damage.

- Use an exclusive power supply with the rated voltage for the controller that requires an external power supply.
- Communication cable must be shielded twist pair cable (0.75 mm²). 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 cable is

2. Before Installation

applied, proper bonding and termination of the cable shield is required as per Hitachi-Johnson Controls Air Conditioning guidelines. Plenum and riser ratings for communication cables must be considered per application and local code requirements.

- The air conditioner may not function normally in the following instances:
 - If electrical power for the air conditioner is supplied from the same transformer as a device^{*1} referred to below.
 - If the power source cables for this device^{*1} and the air conditioner are located in close proximity to each other.
- ^{*1} A device can include a lift, container crane, rectifier for electric railway, inverter power device, arc furnace, electric furnace, large-sized induction motor and large-sized switch.

Regarding the cases mentioned above, surge voltage may be induced into the power supply cables for the air conditioner 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 air conditioner.

- Turn off and disconnect the unit from the power source when handling the service connector. Do NOT open the service cover or access panel to the indoor or outdoor units without turning off the main power supply.

2. Before Installation

2.1 About This Product

Hitachi proudly introduces the New "air365 Max" series, the highly-efficient and reliable air-conditioning system. Recently, increased numbers of buildings are requiring "Intelligent" facilities - communication networks, office automation, and a comfortable environment. Particularly, comfortable space is required all the day through the year in office buildings.

This multi-split system air conditioner, "air365 Max" series can meet these requirements. The proven combination of the scroll compressor and the inverter provides the best air conditioning for small/medium office buildings.

- **SYSTEM FREE System**
Hitachi has developed the SYSTEM FREE system with its customers always in mind.
This system, which is unique in the world,

allows the interconnection of the same indoor units for all the Hitachi systems.

This system provides the end user with greater flexibility for installation, which means that the air-conditioning systems will integrate better with the whole of the installations that make up the building.

- **Wide Product Range of Outdoor Units**
Space, structure and necessary functions, in line with evolution in building design, the requirements for air conditioning have also diversified.
- **About Refrigerant**

WARNING

- **The design pressure for this product is 4.15 MPa. The pressure of the refrigerant R410A is 1.4 times higher than that of the refrigerant R22. Therefore, the refrigerant piping for R410A must be thicker than that for R22. Make sure to use the specified refrigerant piping. If not, the refrigerant piping may rupture due to an excessive refrigerant pressure. Besides, pay attention to the piping thickness when using copper refrigerant piping. The thickness of copper refrigerant piping differs depending on its material.**

NOTICE

- The refrigerant R410A is adopted. The refrigerant oil tends to be affected by foreign matters such as moisture, oxide film, (or fat). Perform the installation work with care to prevent moisture, dust, or different refrigerant from entering the refrigerant cycle. Foreign matter can be introduced into the cycle from such parts as expansion valve and the operation may be unavailable.
- To prevent the different refrigerant or refrigerant oil from being mixed into the cycle, the sizes of the charging connections have been changed from R407C type and R22 type.
It is necessary to prepare the following tools before performing the installation work.
- Use refrigerant pipes and joints which can be used for R410A.

• Necessary Tools and Instruments List for Installation

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

Use tools and measuring instruments only for the new refrigerant R410A as they come into direct contact with the 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 (O: Strictly Required)	Use
		R410A	R407C		
Refrigerant Pipe	Pipe Cutter Chamfering Reamer	◇	◇	-	Cutting Pipe Removing Burrs
	Flaring Tool	◇●	◇	<ul style="list-style-type: none"> The flaring tools for R407C are applicable to R22. If using flaring tube, make dimension of tube larger for R410A. In case of material 1/2H, flaring is not available. 	Flaring for Tubes
	Extrusion Adjustment Gauge	●	-		Dimensional Control for Extruded Portion of Tube after Flaring
	Pipe Bender	◇	◇	<ul style="list-style-type: none"> In case of material 1/2H, bending is not available. Use elbow for bend and braze. 	Bending
	Expanding Tool	◇	◇	<ul style="list-style-type: none"> In case of material 1/2H, expanding of tube is not available. Use socket for connecting tube. 	Expanding Tubes
	Torque Wrench	●	◇	<ul style="list-style-type: none"> For φ12.7, φ15.88, spanner size is increased by 2mm. 	Connection of Flare Nut
		◇	◇	<ul style="list-style-type: none"> For φ6.35, φ9.52, φ19.05, spanner size is the same. 	
	Brazing Tool	◇	◇	<ul style="list-style-type: none"> Perform correct brazing work. 	Brazing for Tubes
	Nitrogen Gas	◇	◇	<ul style="list-style-type: none"> Strict Control against Contamination (Blow nitrogen during brazing.) 	Prevention from Oxidation during Brazing
	Lubrication Oil (for Flare Surface)	●	◆	<ul style="list-style-type: none"> 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

2. Before Installation

Measuring Instrument and Tool		Interchangeability with R22		Reason of Non-Interchangeability and Attention (O: Strictly Required)	Use
		R410A	R407C		
Vacuum Drying/ Refrigerant Charge	Refrigerant Cylinder	●	✦	<ul style="list-style-type: none"> Check refrigerant cylinder color. ○ Liquid refrigerant charging is required regarding zeotropic refrigerant. 	Refrigerant Charging
	Vacuum Pump	◇	◇	<ul style="list-style-type: none"> ○ The current ones are applicable. However, it is required to mount a vacuum pump adapter which can prevent reverse oil flow when a vacuum pump stops. 	Vacuum Pumping
	Adapter for Vacuum Pump	● ^{*1}	✦		
	Manifold Valve	●	✦	<ul style="list-style-type: none"> No interchangeability is available due to higher pressures when compared with R22. ○ Do not use current ones to the different refrigerant. If used, mineral oil will flow into the cycle and cause sludges, resulting in clogging or compressor failure. Connection diameter is different; R410A: UNF1/2, R407C: UNF7/16. 	Vacuum Pumping, Vacuum Holding, Refrigerant Charging and Check of Pressures
	Charging Hose	●	✦		
	Charging Cylinder	×	×	<ul style="list-style-type: none"> Use the weight scale. 	-
	Weight Scale	◇	◇	-	Measuring Instrument for Refrigerant Charging
	Refrigerant Gas Leakage Detector	● ^{*1}	✦	<ul style="list-style-type: none"> The current gas leakage detector (R22) is not applicable due to different detecting method. 	Gas Leakage Check

*1. Interchangeability with R407C.

2.2 Line-Up of Outdoor Units

Standard Type: CNCCLI

- This outdoor unit series “CNCCLI” can build the capacity of 8 to 120 HP by combining the outdoor units of 8 to 30 HP.
- The combinations not indicated in the table below are unavailable.

<Base Unit>

HP	8	10	12	14	16	18
Model	RAS-080CNCCLI	RAS-100CNCCLI	RAS-120CNCCLI	RAS-140CNCCLI	RAS-160CNCCLI	RAS-180CNCCLI

HP	20	22	24	26	28	30
Model	RAS-200CNCCLI	RAS-220CNCCLI	RAS-240CNCCLI	RAS-260CNCCLI	RAS-280CNCCLI	RAS-300CNCCLI

<Combination of Base Units>

HP	32	34	36	38	40	42
Model	RAS-320CNCCLI	RAS-340CNCCLI	RAS-360CNCCLI	RAS-380CNCCLI	RAS-400CNCCLI	RAS-420CNCCLI
Combination	RAS-180CNCCLI	RAS-180CNCCLI	RAS-180CNCCLI	RAS-220CNCCLI	RAS-220CNCCLI	RAS-240CNCCLI
	RAS-140CNCCLI	RAS-160CNCCLI	RAS-180CNCCLI	RAS-160CNCCLI	RAS-180CNCCLI	RAS-180CNCCLI

HP	44	46	48	50	52	54
Model	RAS-440CNCCLI	RAS-460CNCCLI	RAS-480CNCCLI	RAS-500CNCCLI	RAS-520CNCCLI	RAS-540CNCCLI
Combination	RAS-220CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI	RAS-280CNCCLI
	RAS-220CNCCLI	RAS-220CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI

2. Before Installation

HP	56	58	60	62	64	66
Model	RAS-560CNCCLI	RAS-580CNCCLI	RAS-600CNCCLI	RAS-620CNCCLI	RAS-640CNCCLI	RAS-660CNCCLI
Combination	RAS-280CNCCLI	RAS-300CNCCLI	RAS-300CNCCLI	RAS-220CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI
	RAS-280CNCCLI	RAS-280CNCCLI	RAS-300CNCCLI	RAS-220CNCCLI	RAS-220CNCCLI	RAS-240CNCCLI
	-	-	-	RAS-180CNCCLI	RAS-180CNCCLI	RAS-180CNCCLI
HP	68	70	72	74	76	78
Model	RAS-680CNCCLI	RAS-700CNCCLI	RAS-720CNCCLI	RAS-740CNCCLI	RAS-760CNCCLI	RAS-780CNCCLI
Combination	RAS-240CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI
	RAS-220CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI
	RAS-220CNCCLI	RAS-220CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-260CNCCLI
HP	80	82	84	86	88	90
Model	RAS-800CNCCLI	RAS-820CNCCLI	RAS-840CNCCLI	RAS-860CNCCLI	RAS-880CNCCLI	RAS-900CNCCLI
Combination	RAS-280CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-300CNCCLI	RAS-300CNCCLI	RAS-300CNCCLI
	RAS-260CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-300CNCCLI	RAS-300CNCCLI
	RAS-260CNCCLI	RAS-260CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-300CNCCLI
HP	92	94	96	98	100	102
Model	RAS-920CNCCLI	RAS-940CNCCLI	RAS-960CNCCLI	RAS-980CNCCLI	RAS-H00CNCCLI	RAS-H02CNCCLI
Combination	RAS-240CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI
	RAS-240CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI
	RAS-220CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-260CNCCLI
	RAS-220CNCCLI	RAS-220CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI
HP	104	106	108	110	112	114
Model	RAS-H04CNCCLI	RAS-H06CNCCLI	RAS-H08CNCCLI	RAS-H10CNCCLI	RAS-H12CNCCLI	RAS-H14CNCCLI
Combination	RAS-260CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-300CNCCLI
	RAS-260CNCCLI	RAS-260CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI
	RAS-260CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI
	RAS-260CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI
HP	116	118	120			
Model	RAS-H16CNCCLI	RAS-H18CNCCLI	RAS-H20CNCCLI			
Combination	RAS-300CNCCLI	RAS-300CNCCLI	RAS-300CNCCLI			
	RAS-300CNCCLI	RAS-300CNCCLI	RAS-300CNCCLI			
	RAS-280CNCCLI	RAS-300CNCCLI	RAS-300CNCCLI			
	RAS-280CNCCLI	RAS-280CNCCLI	RAS-300CNCCLI			

2. Before Installation

2.3 Combination of Indoor Unit and Outdoor Unit

The following indoor units can be combined with the Hitachi "air365 Max" series outdoor unit.

Table 2.1 Indoor Unit Type List

Indoor Unit Type	Nominal Capacity																			
	0.4	0.6	0.7	0.8	0.9	1	1.1	1.3	1.5	1.6	1.8	2	2.3	2.5	3	3.3	3.6	4	4.5	5
1-Way Cassette				○		○			○			○		○	○					
2-Way Cassette				○		○			○			○		○	○			○	○	○
4(R)-Way Cassette						○			○			○		○	○			○	○	○
AC Compact Ducted				○		○		○	○		○	○	○	○						
AC Low Static Ducted				○		○		○	○		○	○	○	○	○	○		○	○	○
AC M/H Static Ducted				○		○		○	○		○	○	○	○	○	○		○	○	○
AC Slim/Mini Ducted				○		○		○	○											
All Fresh Air																			○	○
Convertible																				
DC Low Static Ducted				○		○		○	○		○	○	○	○	○			○	○	○
DC M/H Static Ducted				○		○		○			○		○	○				○	○	○
DX-AHU kit												○						○		○
Floor Ceiling											○	○	○	○	○	○		○	○	○
Floor Concealed						○			○			○		○						
Floor Exposed						○			○			○		○						
Mini 4-Way Cassette		○		○		○			○			○		○						
Total Heat Exchanger			○	○	○		○	○	○	○	○	○	○	○	○	○	○	○		
Wall Mounted		○		○		○		○	○	○	○	○	○	○	○			○		

○: Available, { } : India only

NOTE:

The number of indoor units connectable to "air365 Max" series outdoor unit is listed in Tables 2.2 System Combination. Comply with the following conditions when installing the unit.

Table 2.2 System Combination - CNCCLI

Outdoor Unit	Min. Capacity at Individual Operation	Max. Number of Connectable IDU	Recommended Number of Connectable IDU	Range of Combination Capacity	Total Length between Each IDU and Expansion Valve Kit(*)
RAS-080CNCCLI	0.6HP (1.6kW)	20	8	50 to 200%	40m
RAS-100CNCCLI		25	10		
RAS-120CNCCLI		30			60m
RAS-140CNCCLI		36	70m		
RAS-160CNCCLI		40	16		80m
RAS-180CNCCLI		45			
RAS-200CNCCLI		50	18		120m
RAS-220CNCCLI		55	20		
RAS-240CNCCLI		60	26		
RAS-260CNCCLI		64	32		150m
RAS-280CNCCLI					
RAS-300CNCCLI					
RAS-320CNCCLI			180m		
RAS-340CNCCLI					
RAS-360CNCCLI			38		200m
RAS-380CNCCLI to RAS-540CNCCLI					
RAS-560CNCCLI		50 to 180%			
RAS-580CNCCLI to RAS-H20CNCCLI		50 to 150%			

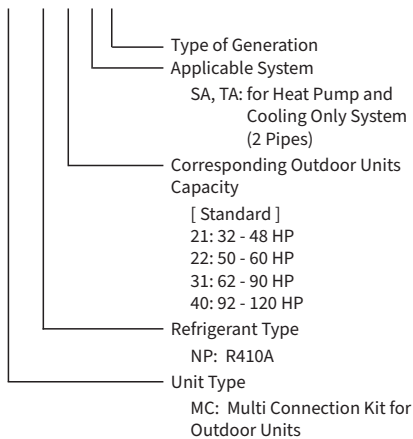
NOTES:

- The connectable indoor unit capacity ratio can be calculated as follows.
Connectable Indoor Unit Capacity Ratio = Total Indoor Unit Capacity / Total Outdoor Unit Capacity
- For the system under which all the indoor units are supposed to operate simultaneously, the total indoor unit capacity should be less than outdoor unit capacity. Otherwise, it may cause a decrease of operating performance and operating limit in overload operation.
- For the system under which all the indoor units are not supposed to operate simultaneously, the total indoor unit capacity is available up to 130%, 150%, 180% or 200% depending on the indoor unit type and capacity.
- Maximum number of connectable indoor units differs depending on the model, capacity, environment and installation place of connected indoor units. Refer to the Technical Catalog for the selection.
- The air flow volume for indoor units of 0.6 to 1.3HP is set higher than that for indoor units of 1.5HP or more.
- Total Length between Each I.U. and Expansion Valve Kit (*): This is the summation of the piping length between each wall mounted type without expansion valve and expansion valve kit in the refrigerant system.

The load capacity per hour or the possibility of all indoor units simultaneous operation is unknown at the design stage, the total capacity of combined indoor units should be not over 100% against the outdoor unit capacity.

2.4 Piping Connection Kit (Optional) between Outdoor Units

MC - NP 21 SA 1

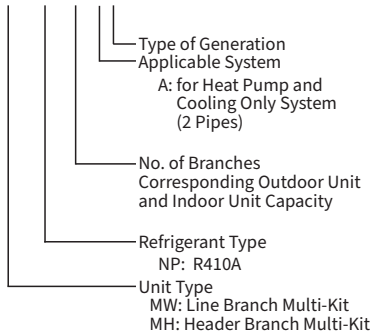


Item	Applicable Outdoor Unit		Model	Remarks
	Cooling Only	No. of ODU		
Piping Connection Kit	32 - 48	2	MC-NP21SA1	for Gas: 1 for Liquid: 1
	50 - 60	2	MC-NP22TA	
	62 - 90	3	MC-NP31TA	for Gas: 2 for Liquid: 2
	92 - 120	4	MC-NP40TA	for Gas: 3 for Liquid: 3

2. Before Installation

2.5 Multi-Kit (Optional) between Indoor Unit and Outdoor Unit

MW - NP 282 A 3



1. Line Branch
First Branch

(Standard Type)

Outdoor Unit HP	Model
8, 10	MW-NP282A3
12 - 16	MW-NP452A3
18 - 24	MW-NP692A3
26 - 54	MW-NP902A3
56 - 120	MW-NP2682A3

2. Multi-Kit after First Branch

(Standard Type)

Total Indoor Unit HP	Model
<12	MW-NP282A3
12 - 17.99	MW-NP452A3
18 - 25.99	MW-NP692A3
26 - 55.99	MW-NP902A3
≥56	MW-NP2682A3

3. Header Branch











































































(Standard Type)











































































Total Indoor Unit HP	No. of Header Branches	Model
Max. 8	4	MH-NP224A
Max. 10	8	MH-NP288A

2.6 Factory-Supplied Accessories

Check to ensure that the following accessories are packed with the outdoor unit. (Refer to page 15 for NOTE.)

Table 2.3 Factory-Supplied Accessories (CNCCLI)

Accessory		8HP	10HP	12HP	14HP	16HP	18HP	Remarks
Accessory Pipe	Connection for Refrigerant Gas Pipe	 ID ϕ 22.4 → OD ϕ 19.05	-	 ID ϕ 22.4 → OD ϕ 25.4	 ID ϕ 22.4 → OD ϕ 25.4	 ID ϕ 25.6 → OD ϕ 28.58	 ID ϕ 25.6 → OD ϕ 28.58	
	Connection for Refrigerant Liquid Pipe	-	-	 OD ϕ 9.52 → OD ϕ 12.7	 OD ϕ 9.52 → OD ϕ 12.7	-	 OD ϕ 12.7 → OD ϕ 15.88	
Cord Clamp	For Fixing Power Source Wire							
Cable Clamp	For Fixing Power Source Wire	 ×2	 ×2	 ×2	 ×2	 ×2	 ×2	
Rubber Bush	For Power Source Wire Outlet (Bottom Base, Piping Cover)	 ×2	 ×2	 ×2	 ×2	 ×2	 ×2	φ70 mm
	For Communication Wire Outlet (Bottom Base, Piping Cover)	 ×2	 ×2	 ×2	 ×2	 ×2	 ×2	φ62 mm
	For Comm. Wire Outlet (Bottom Base, Piping Cover)	 ×2	 ×2	 ×2	 ×2	 ×2	 ×2	φ38 mm
Rubber cap ³	Attach to the bottom base.	 ×2	 ×2	 ×2	 ×2	 ×2	 ×2	*1
Packing ³	Attach to the bottom base.	 ×1	 ×1	 ×1	 ×1	 ×1	 ×1	*2
Screw		 ×3	 ×3	 ×3	 ×3	 ×3	 ×3	For fixing Cord Clamp and Spare
Combination Unit Model Label	For Indication of Combination Unit Model	 ×3	 ×3	 ×3	 ×3	 ×3	 ×3	Attach to Outdoor Unit A (Main Unit)
Open/Close Indication for Stop Valve	For Indication of "Open"	 ×2	 ×2	 ×2	 ×2	 ×2	 ×2	With Fixing Band
Ferrite Core	White	 ×1	 ×1	 ×1	 ×1	 ×1	 ×1	

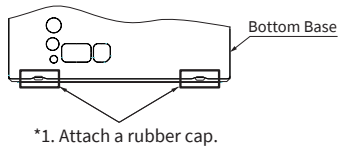
Accessory		20HP	22HP	24HP	26HP	28HP	30HP	Remarks
Accessory Pipe	Connection for Refrigerant Gas Pipe	 ID φ25.6 → OD φ28.58	-	-	 ID φ28.8 → OD φ31.75	 ID φ28.8 → OD φ31.75	 ID φ28.8 → OD φ31.75	
	Connection for Refrigerant Liquid Pipe	 OD φ12.7 → OD φ15.88	-	-	 ID φ15.88 → OD φ19.05	 ID φ15.88 → OD φ19.05	 ID φ15.88 → OD φ19.05	
Cord Clamp	For Fixing Power Source Wire							
Cable Clamp	For Fixing Power Source Wire	 ×2	 ×2	 ×2	 ×2	 ×2	 ×2	
Rubber Bush	For Power Source Wire Outlet (Bottom Base, Piping Cover)	 ×2	 ×2	 ×2	 ×2	 ×2	 ×2	φ70 mm
	For Communication Wire Outlet (Bottom Base, Piping Cover)	 ×2	 ×2	 ×2	 ×2	 ×2	 ×2	φ62 mm
	For Comm. Wire Outlet (Bottom Base, Piping Cover)	 ×2	 ×2	 ×2	 ×2	 ×2	 ×2	φ38 mm
Rubber cap ^{*3}	Attach to the bottom base.	 ×2	 ×2	 ×2	 ×2	 ×2	 ×2	*1
Packing ^{*3}	Attach to the bottom base.	 ×1	 ×1	 ×1	 ×1	 ×1	 ×1	*2
Screw		 ×3	 ×3	 ×3	 ×3	 ×3	 ×3	For fixing Cord Clamp and Spare
Combination Unit Model Label	For Indication of Combination Unit Model	 ×3	 ×3	 ×3	 ×3	 ×3	 ×3	Attach to Outdoor Unit A (Main Unit)
Open/Close Indication for Stop Valve	For Indication of "Open"	 ×2	 ×2	 ×2	 ×2	 ×2	 ×2	With Fixing Band
Ferrite Core	White	 ×1	 ×1	 ×1	 ×1	 ×1	 ×1	

NOTE:

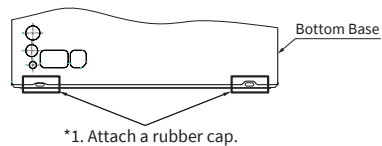
- If any of these accessories is not packed with the unit, please contact your contractor.

*3. Attach the rubber cap and packing as shown in the figure below.

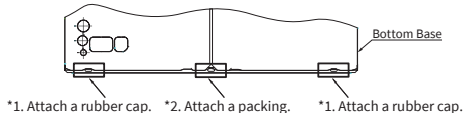
RAS-080 to 140CNCCLI



RAS-160 to 200CNCCLI



RAS-220 to 300CNCCLI



3. Selection of Installation Location

⚠ WARNING

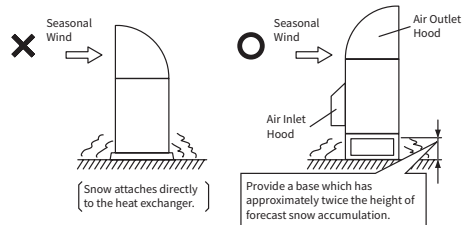
- Provide a sufficiently strong foundation. If not, the unit may fall down and it may lead to injuries.
- Do not install the outdoor unit where the flammable gases may occur or leak. Otherwise, it may cause a fire.
- If the indoor unit is installed in a small room and the refrigerant gas leakage occurs, the leaked refrigerant gas fills the room and it may cause suffocation. Do not exceed the maximum permissible concentration of the refrigerant gas in the room. Consult with distributor for countermeasure such as ventilation system, etc.

3.1 Installation Location

1. Install the outdoor unit in a well dried, ventilated environment.
2. Install the outdoor unit where it is in the shade or it will not be exposed to direct sunshine or direct radiation from high temperature heat source.
3. Install the outdoor unit where the sound or the discharge air from the outdoor unit does not affect neighbors or surrounding ventilation. The operating sound at the rear or right/left sides is 3 to 6dB(A) higher than the sound at the front side indicated in the technical catalog.
4. Install the outdoor unit in a space with limited access to general public.
5. Check to ensure that the foundation is flat, level and sufficiently strong.
(Perform the foundation work in order to fix firmly the outdoor unit to avoid inclining, abnormal sound or falling down due to a strong wind or earthquake.)
6. Do not install the outdoor unit where dust or other contaminations could block the outdoor heat exchanger.
7. Provide adequate drainage around the foundation. If installing the unit on a roof or a balcony, provide the additional drainage around the foundation to prevent water dripping on a person or forming ice in winter.
8. Do not install the outdoor unit where a seasonal wind directly blows to the outdoor heat exchanger or where strong winds through the tall buildings directly blows to the outdoor fan.

NOTES:

- Do not install the outdoor unit where there is a high level of oil mist, flammable gases, salty air or harmful gases such as sulfur and an acid or alkaline environment.
- Do not install the outdoor unit where the electromagnetic wave is radiated directly to the electrical box.
- Install the outdoor unit as far from the electromagnetic wave radiator as possible, at least 3 meters away from it.

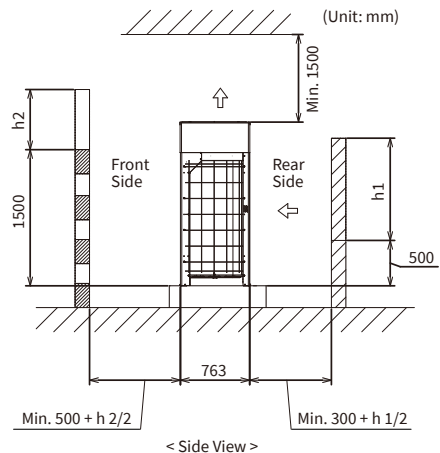


3.2 Service Space and Installation Area

Make the service space when outdoor unit is installed as follows.

If the service spaces for air inlet and outlet are insufficient, it may cause a performance degradation and some abnormalities due to insufficient air intake.

Additionally, the service space is required for facilitating the maintenance.



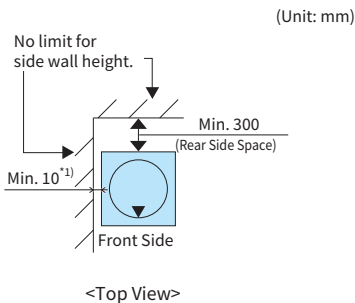
3. Selection of Installation Location

- In the case of no walls on the front side and the rear side, the service space is required as follows.
 - Front Side: Min. 500mm
 - Rear Side: Min. 300mm
 - Right and Left Sides: Min. 10mm (In the case that the field-supplied snow protection food or the air outlet duct is amounted to the unit, the spaces of min. 50mm are required.)
- If the wall on the front side is over 1,500mm high, the space of $(500 + h_2/2)$ mm for the front side is required.
- If the wall on the rear side is over 500mm high, the space of $(300 + h_1/2)$ mm for the rear side is required.
- When the units are surrounded by walls on more than 2 sides, the space indicated on the previous page is required.
- For walls on more than 2 sides, secure the service space as shown in the following figures.
- If the space between the unit and an obstacle above the unit is less than 1,500mm or the space above the unit is closed, set up the duct at the air outlet side in order to prevent short circuit.
- When there are obstacles above the unit, the four (front, rear, right and left) sides of the unit shall be open in principle.

1. Walls on 2 Sides

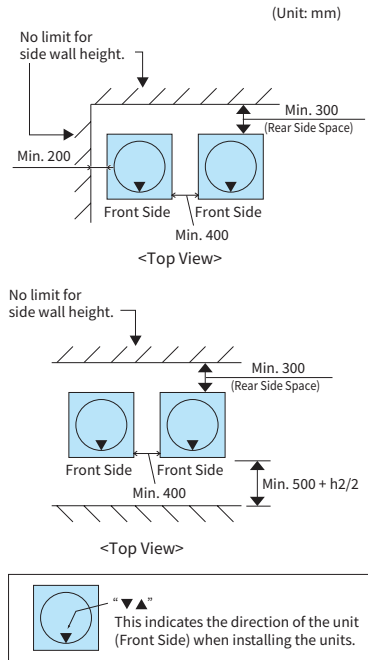
In case that the units are installed adjacent to tall buildings and there are no walls on 2 sides, the minimum rear side space must be 300mm.

- Single Installation



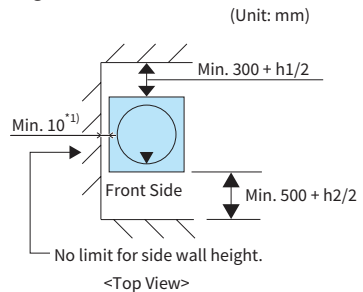
*1): In the case that the field-supplied snow protection hood or the air outlet duct is adopted, the space of minimum 50mm is required.

- Multiple / Serial Installation



2. Walls on 3 Sides

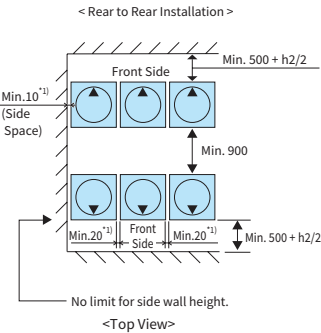
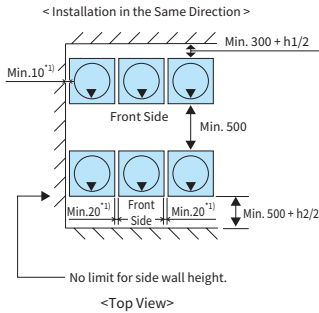
- Single Installation



3. Selection of Installation Location

- Multiple / Serial Installation

(Unit: mm)

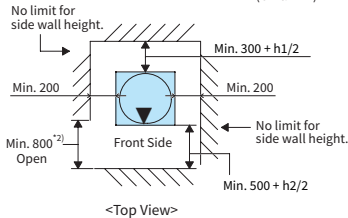


*1): In the case that the field-supplied snow protection hood or the air outlet duct is adopted, the space of minimum 50mm is required.

3. Walls on 4 Sides

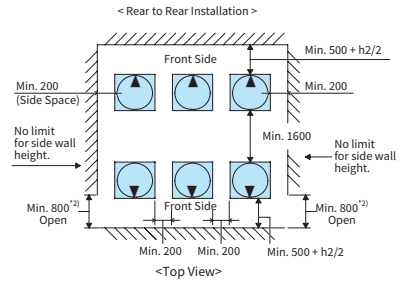
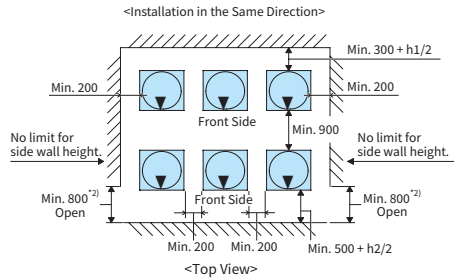
- Single Installation

(Unit: mm)



- Multiple / Serial Installation

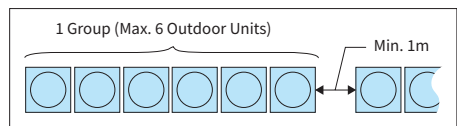
(Unit: mm)



*2): Partly open a wall if the unit is surrounded by walls on four sides.

NOTES:

- Keep the upper side open to prevent mutual interference of inlet and outlet air of each outdoor unit.
- The figure dimensions indicate sufficient spaces around outdoor units for operation and maintenance at typical installation conditions as follows. [Operation Mode: Cooling Operation, Outside Temp.: 35 °C] In case that the outdoor unit ambient temperature is higher and also the short circuit is likely to occur compared to the installation condition, find an appropriate dimension by calculating air flow current.
- For the multiple installation, 1 group shall consist of 6 outdoor units (max.). Keep 1-meter interval between each unit group.



4. Installation Work

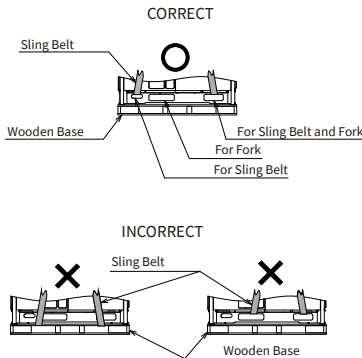
4.1 Transportation and Handling

4.1.1 Transportation

Transport the product as close to the installation location as practical before unpacking. When using a crane, hang the unit according to the description of the label attached to the outdoor unit.

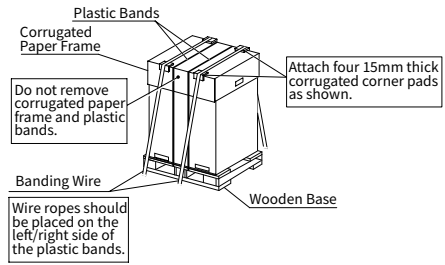
⚠ WARNING

- Do not hang the unit with the sling belts at the wooden base.



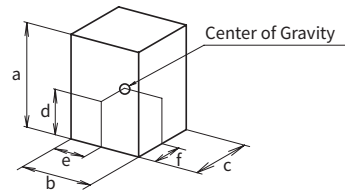
⚠ CAUTION

- The unit shall not be handled by one person. Do not use the PP band to move the unit although the unit is packed by PP band. Additionally, do not touch the heat exchanger with bare hands. The fin of heat exchanger may cause injuries.
- Transportation and Storage
The corrugated paper frame is not sufficiently strong. Therefore, follow the instructions below in order to prevent the unit deformation.
 - Do not step or put any material on the product. It may cause injury.
 - Apply two sling belts onto the outdoor unit, when lifting it with a crane.
- Transportation and Wire Rope
 - To protect the unit, do not remove any packing.
 - Do not stack or put any material on the product.
 - Apply wire ropes on both sides of the unit as shown in the figure.



Take special care when hanging or moving the outdoor unit because its center of mass is eccentric as shown in the figure below.

- Center of Gravity



Front Side of Unit

< CNCCLI >

(mm)

Model	380 - 415V/50Hz 380V/60Hz					
	a	b	c	d	e	f
RAS-080CNCCLI	1805	960	775	745	530	335
RAS-100CNCCLI	1805	960	775	745	530	335
RAS-120CNCCLI	1805	960	775	745	530	335
RAS-140CNCCLI	1805	960	775	745	530	335
RAS-160CNCCLI	1805	1220	775	790	635	350
RAS-180CNCCLI	1805	1220	775	790	635	350
RAS-200CNCCLI	1805	1220	775	790	635	350
RAS-220CNCCLI	1805	1610	775	755	825	325
RAS-240CNCCLI	1805	1610	775	755	825	325
RAS-260CNCCLI	1805	1610	775	755	825	325
RAS-280CNCCLI	1805	1610	775	755	825	325
RAS-300CNCCLI	1805	1610	775	755	825	325

4. Installation Work

4.1.2 Handling of Outdoor Unit

- Hanging Method
 - Hang the unit under packing condition with 2 sling belts as shown in Fig. 4.1.
 - Do not use a wire rope.
 - Ensure a balance of unit.
 - Check the safety and lift up the unit gently in order not to incline the unit.

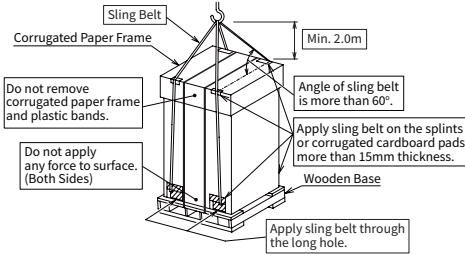


Fig. 4.1 Hanging Work for Transportation

<CNCCLI>

(kg)

HP	380 - 415V/50Hz, 380V/60Hz											
	8	10	12	14	16	18	20	22	24	26	28	30
Net Weight	202	207	223	227	271	277	277	360	360	379	379	379
Gross Weight	218	223	239	243	291	297	297	383	383	402	402	402

- Hang the unit without wooden base with 2 sling belts as shown in Fig. 4.2.

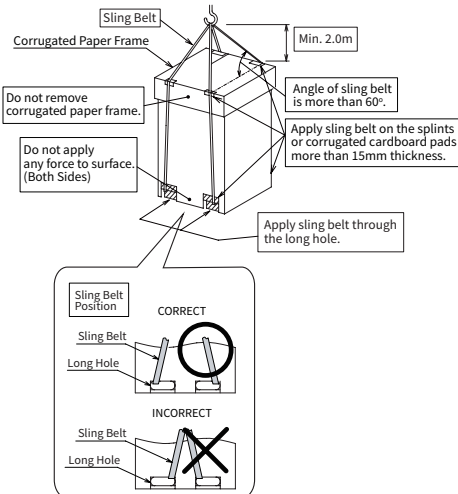
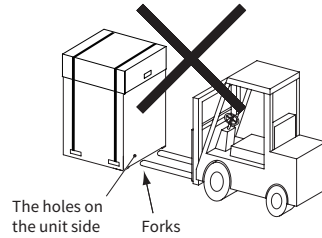


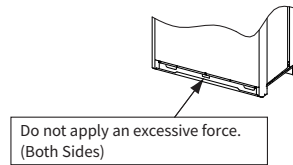
Fig. 4.2 Hanging Work without Wooden Base

When using forklift, do not insert forks into the holes on the unit side. The unit may be damaged.



Do not apply excessive force to the square holes with forks or other materials. The bottom of the unit may be deformed.

- Do not push the bottom base by a fork.
- Do not use a roller.



- Wooden Base Removal Method
 - Remove the hexagon head bolt using the ratchet wrench.
 - Suspend the unit from the wooden base in its packing with two sling belts.
 - Ensure safety while hoisting the unit gently to prevent the unit from tipping over as shown in Fig. 4.3.

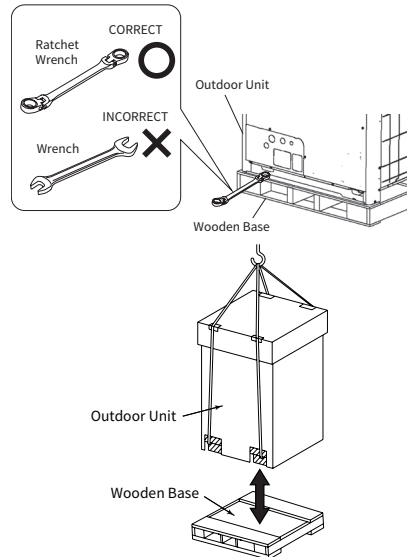
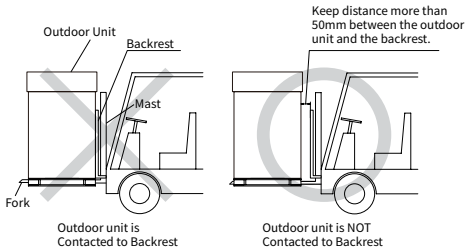


Fig. 4.3 Wooden Base Removal Method

NOTE:

- In case of transportation after unpacking, protect the unit with corrugated paper boards or cloths.



CAUTION

- Prevent the outdoor unit from contacting to the backrest of forklift during transportation. If not, the heat exchanger fin may be broken due to sudden starting or stopping.

WARNING

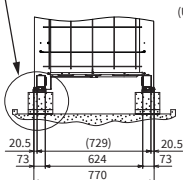
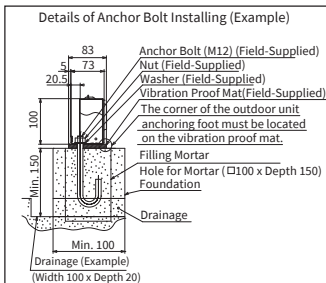
- Do not put any foreign material into the outdoor unit and check to ensure that nothing exists in the outdoor unit before the installation and test run. Otherwise, a fire or failure, etc. may occur.

4.2 Outdoor Unit Installation

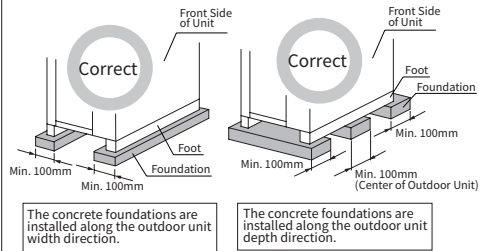
4.2.1 Foundation

- Concrete Foundations

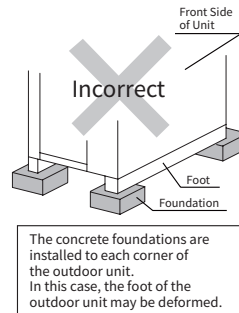
- The height of the foundation should be over 150mm above the ground.
- Provide a drainage around the foundation for smooth drainage.



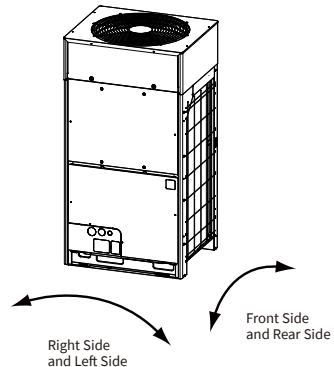
Provide concrete foundation as shown in the figure.



Do not provide concrete foundation as shown below. The foot of the outdoor unit may be deformed.



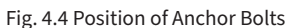
- Install the outdoor unit in the front-rear and right-left direction horizontally. (Use a level gauge.) Check to ensure that the gradient in four directions (front, rear, right and left) is within 10mm.



- Provide a strong and correct foundation so that:
 - The outdoor unit does not incline.
 - Abnormal sound does not occur.
 - The outdoor unit will not fall down due to a strong wind or earthquake.

5. When installing the outdoor unit, fix the unit with anchor bolts and vibration proof mat (field-supplied).
Refer to Fig. 4.4 regarding the location of fixing holes.

- (Unit: mm)



(Unit: mm)



- Standard Type (22 to 30 HP)

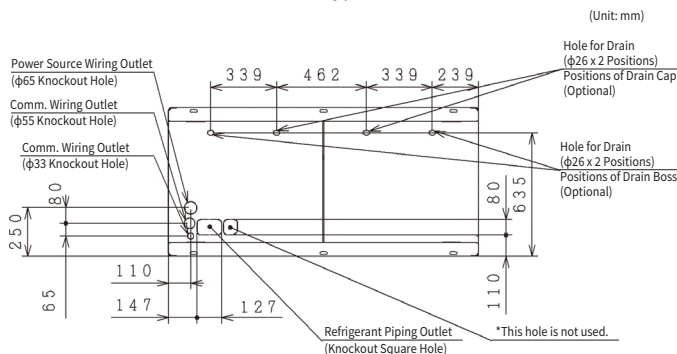


Fig. 4.5 Position of Drain Water Treatment

- Drain adapter (Optional Parts)

The drain adapter is for the drain pipe connection in order to use outdoor unit bottom base as a drain pan.

Name	Model
Drain adapter	DBS-TP10A

Model	Parts Name	Material / Color	Q'ty	Application
DBS-TP10A	Drain adapter	PP / Black	2	Connecting for Drain Piping
	Drain Cap	PP / Black	2	Embolization for Drain Hole
	Rubber Cap	CR / Black	4	Sealing for Boss and Cap

NOTE:

When installing the unit above a passage way, drain water sometimes turns to ice on a cold morning. Therefore, avoid discharging the water into places which people often pass through, because it is slippery.

When drain piping is necessary for the outdoor unit, use the drain adapter set (Optional, DBS-TP10A). Do not use drain adapter and drain pan kit in the cold area. The drain water in the drain pipe may be frozen and then the drain pipe may crack.

5. Refrigerant Piping Work

WARNING

- 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 the unit. These flammables are extremely dangerous and may cause an explosion, fire, and injury.
- Check to ensure that no pressure exists inside the stop valve before removing the flange.
- Make sure that the refrigerant leakage test is performed. The refrigerant (Fluorocarbon R410A) for this unit is nonflammable, non-toxic and odorless. However, if the refrigerant leaks and contacts 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.
- 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.
If the compressor is operated under the condition that the stop valves are opened without refrigerant pipe, it may cause abnormal high pressure in refrigerant cycle and may cause an explosion, fire or injury.
- Before performing any brazing work, check to ensure that there is no flammable material around.
If not, it may cause a fire.
- If the indoor unit is installed in a small room and the refrigerant gas leakage occurs, the leaked refrigerant gas fills the room and it may cause suffocation. Do not exceed the maximum permissible concentration of the refrigerant gas in the room. Consult with your distributor for an appropriate ventilation system, etc.
- The design pressure for this product is 4.15MPa.
The pressure of refrigerant R410A is 1.4 times higher than that of refrigerant R407C. The thickness of copper pipe differs

depending on its materials, so use the specified piping.

If the specified materials are not used, it may cause explosion, injury, leakage, or fire.

CAUTION

- Ensure to connect the piping among the units in the same refrigerant cycle.
- Wear leather gloves when handling the refrigerant. If the refrigerant splashes directly to hands, it may be the cause of frostbite.
- Do not apply excessive force to the flare nut when tightening it. Otherwise, the flare nut may crack due to aged degradation and refrigerant leakage may occur. Use the specified tightening torque.

NOTICE

- The refrigerant R410A is adopted. The refrigerant R410A and the refrigerant oil tend to be affected by foreign matters such as moisture, oxide film, or fat. Perform the installation work with care to prevent moisture, dust or different refrigerant from entering the refrigerant cycle. Otherwise, foreign materials may get mixed into the cycle from such parts as expansion valve and the operation may be unavailable.
- Perform the drain piping work in order to drain water securely. If not, the drain water can flow back to the unit and it may cause leakage to the room.

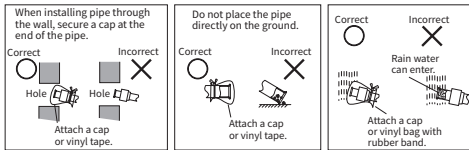
5.1 Piping Materials

1. Prepare locally-supplied copper pipes.
2. Use the phosphorus-deoxidized copper pipe for refrigerant piping, which is based on the JIS H3300 "Copper and copper alloy seamless pipes and tubes."
3. Select the piping size from Tables 5.1 and 5.2.
Pay attention to pipe selection, because the thickness of copper pipe differs depending on its material.
4. Use clean copper pipes. Make sure there is no dust and moisture inside the pipes. Blow nitrogen or dry air into the pipes to remove any dust or foreign materials before connecting pipes. Do not use any tools which produce a lot of swarf such as a saw or a grinder.
5. Take special care to prevent contaminations and

moisture from entering the pipe interior during the piping work.

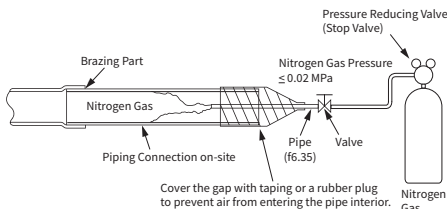
- Avoid performing the piping connection work for outdoor unit in the rain.

• Cautions for Refrigerant Pipe Ends



• Brazing Work

- The brazing work must be performed by an authorized installer in order to prevent any trouble.
- For piping connection, perform securely non-oxidation brazing with nitrogen substitution. If brazing the pipes without the nitrogen substitution, a large amount of oxidized scale will be generated in the pipes. This oxidized scale may cause clogging in the expansion valve, solenoid valve, accumulator and compressor, which can prevent the unit from operating properly.
Do not use field-supplied antioxidant, etc., which may corrode pipes and deteriorate the refrigerant oil.



NOTE:

Do not cover the outlet. If the inner pressure exceeds atmospheric pressure, a pinhole may generate and the refrigerant gas will leak from the brazing part.

NOTES:

- Make sure to use nitrogen. Nitrogen gas pressure shall be 0.02 MPa or less.
DO NOT use the following gases.
 - Oxygen: flammable and causes oxidation degradation of the refrigerant oil.
 - Carbon Dioxide: may cause decrease in drier performance.
 - Freon Gas: emits harmful gases if exposed to fire.
- Make sure to use the pressure reducing valve.
- Do not use field-supplied antioxidant.

- Use a quality brazing filler metal specified in JIS. Select a flux whose chlorine concentration is low.
- Remove the flux completely after the brazing work.

NOTE:

When the brazing work is performed, perform brazing to minimum portion by appropriate temperature to suppress generating oxidized scale.

• Cautions for Piping Connection Work

- Connect the indoor and the outdoor units with refrigerant pipes. Fix the pipes and prevent the pipes from contacting weak portions such as wall, ceiling, etc. (Otherwise, abnormal sound may be heard due to vibration of the piping.)

NOTE:

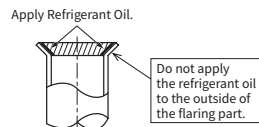
When on-site piping with joint such as elbow or socket is buried, provide a service access door to facilitate the check for connecting part.

- Check that there are no scratch, swarf, deformation, gap, etc. at the flaring part, before the connecting work.
- Apply refrigerant oil slightly on the sheet surface of the pipe and flare nut before the flaring work. And then tighten the flare nut with the specified tightening torque using two spanners. Perform the flaring work on the liquid piping side before the gas piping side. Check that no gas leakage occurred after the flaring work.

NOTE:

Refrigerant oil is field-supplied.

[Ethereal Oil: FVC68D (Idemitsu Kousan Co. Ltd.)]



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

5. Refrigerant Piping Work

- When tightening the flare nut, use two spanners.

Required Tightening Torque (JIS B8607)

Pipe Size (Φmm)	Tightening Torque (N·m)
6.35 (1/4)	14 to 18
9.52 (3/8)	34 to 42
12.7 (1/2)	49 to 61
15.88 (5/8)	68 to 82
19.05 (3/4)	100 to 120

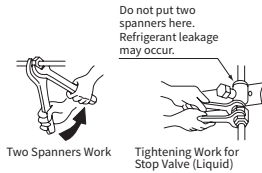


Table 5.1 Piping Size of Outdoor Unit

<2 Pipes System>

(Standard Type)	(Φmm)	
Outdoor Unit HP	Gas	Liquid
8	19.05	9.52
10	22.2	9.52
12, 14	25.4	12.7
16	28.58	12.7
18 - 24	28.58	15.88
26 - 34	31.75	19.05
36 - 54	38.1	19.05
56 - 66	44.45	19.05
68 - 72	44.45	22.2
74 - 88	50.8	22.2
90 - 96	50.8	25.4
98 - 112	54.0	25.4
114 - 120	54.0	28.58

Table 5.2 Piping Size of Indoor Unit

Indoor Unit HP	Diameter (Φmm)	
	Gas Pipe	Liquid Pipe
1.5 or less	12.7	6.35 ^{*1}
2.0, 2.3	12.7 ^{*2}	6.35 ^{*1}
2.5 to 6.0	15.88	9.52
8.0	19.05	9.52
10.0	22.2	9.52
16.0	28.58	12.7
20.0	28.58	15.88

- *1. When the liquid piping length is longer than 15m, use Φ9.52 pipe and a reducer (field-supplied).
- *2. As for some of the indoor unit types, if Φ12.7 pipe is not available, Φ15.88 pipe should be used. Make sure to check the indoor unit specifications.

- Piping Thickness and Material

Use the pipe as below.

The thickness of refrigerant pipe differs depending on design pressure.

For copper pipe, pay attention to pipe selection, because the piping thickness differs depending on its material.

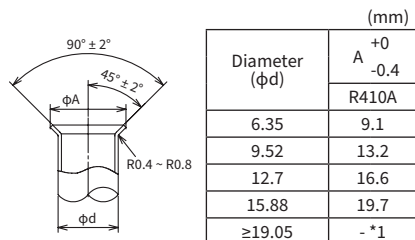
(Φmm)

Outer Diameter	R410A	
	Thickness	Material
6.35	0.8	O material
9.52	0.8	O material
12.7	0.8	O material
15.88	1.0	O material
19.05	1.2	O material
	1.0	1/2H material
22.2	1.0	1/2H material
25.4	1.0	1/2H material
28.58	1.0	1/2H material
31.75	1.1	1/2H material
34.92	1.2	1/2H material
38.1	1.35	1/2H material
41.28	1.4	1/2H material
44.45	1.55	1/2H material
50.8	1.5	1/2H material
54.0	1.5	H material

5.2 Flaring and Joint

- Flaring Dimension

Perform the flaring work as shown below.



- *1. It is impossible to perform the flaring work with 1/2H material. In this case, use an accessory pipe (with a flare).

Joint Selection

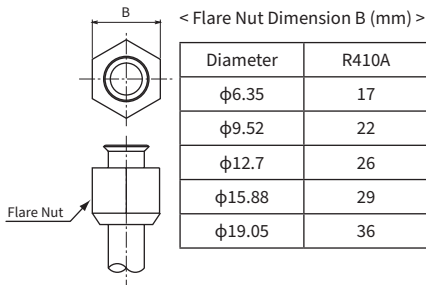
If 1/2H material is used, the flaring work cannot be performed. In this case, use a joint selected from the table below.

< Minimum Thickness of Joint (mm) >

Diameter	R410A
φ6.35	0.5
φ9.52	0.6
φ12.7	0.7
φ15.88	0.8
φ19.05	0.8
φ22.2	0.9
φ25.4	0.95
φ28.58	1.0
φ31.75	1.1
φ34.92	1.2
φ38.1	1.35
φ41.28	1.45
φ44.5	1.55
φ50.8	1.65
φ54.0	1.75

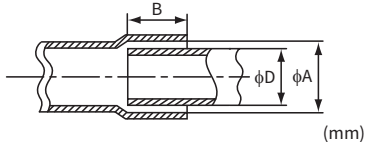
NOTE:

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



Processing at Brazing Connection

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



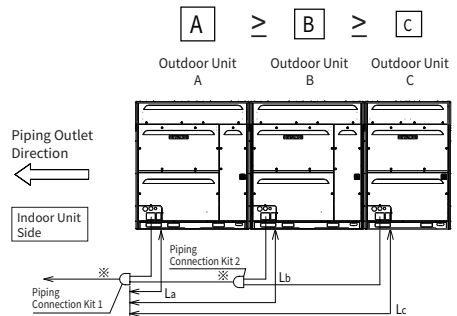
Diameter (D)	Min. Insertion Depth (B)	Gap (A - D)
5 ≤ D < 8	6	0.05 - 0.35
8 ≤ D < 12	7	
12 ≤ D < 16	8	0.05 - 0.45
16 ≤ D < 25	10	
25 ≤ D < 35	12	0.05 - 0.55
35 ≤ D < 45	14	
45 ≤ D	16	0.05 - 0.6

5.3 Caution about Outdoor Unit Installation

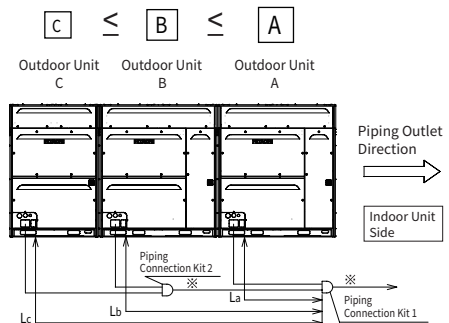
When the installation and piping work for the multiple outdoor units are performed, it is required that the arrangement for outdoor units and piping length be determined. Perform securely the installation work according to the following restrictions. If the arrangement for outdoor units is incorrect, it may cause flow back of the refrigerant and result in failure of outdoor unit.

<Restrictions for 2 and 3 Unit Combination>

- For 2 and 3 outdoor units combination, align the outdoor units from largest capacity to smallest as A > B > C and outdoor unit "A" should be connected to the piping connection kit 1.
- The piping length between the piping connection kit 1 and the outdoor unit should be $L_a < L_b < L_c < 25m$.
- For maintenance, attach "Main unit label" to the service cover (back side surface) of the outdoor unit "A".



※ : Keep the straight-line distance of 500mm or more for piping after the piping connection kit.

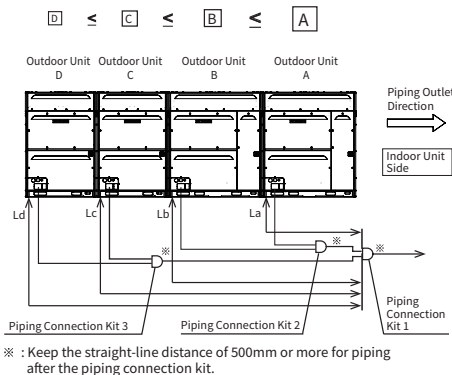
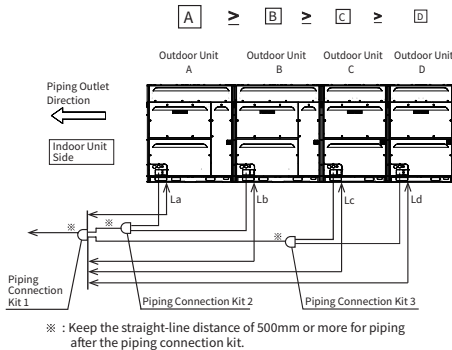


※ : Keep the straight-line distance of 500mm or more for piping after the piping connection kit.

5. Refrigerant Piping Work

<Restrictions for 4 Unit Combination>

- For 4 outdoor unit combination, align the outdoor units from largest capacity to smallest as $A > B > C > D$.
The outdoor units "A" and "B" should be connected to the piping connection kit 2 and the outdoor units "C" and "D" should be connected to the piping connection kit 3.
- The piping length between the piping connection kit 1 and each outdoor unit should be $L_a < L_b < L_c < L_d < 25\text{m}$.
- For maintenance, attach the main unit label to the service cover (back side surface) of the outdoor unit "A".



5.4 Piping Connection Work

Comply with the restrictions for refrigerant piping (permissible length, height difference) in item 5.4.2 Piping Connection Method.

If not, the outdoor unit may be damaged or fail. The stop valves shall be closed completely (factory setting) when the refrigerant piping connection is performed. Do not open the stop valves until all the refrigerant piping connections, air-tight test and vacuuming have been completed.

5.4.1 Removing of Closing Pipes

- Step1. Make sure that all the valve stems are closed completely.
- Step2. Connect the charging hose to the service port and release the gas inside the piping from the gas pipe.
- Step3. Cut the end of the closing pipe and check that no gas exists inside the gas pipe.
- Step4. Remove the stop valve cover.
- Step5. Remove the closing pipe from the brazing portion with a burner.
Pay attention to the flame from the burner not to burn the stop valve body.

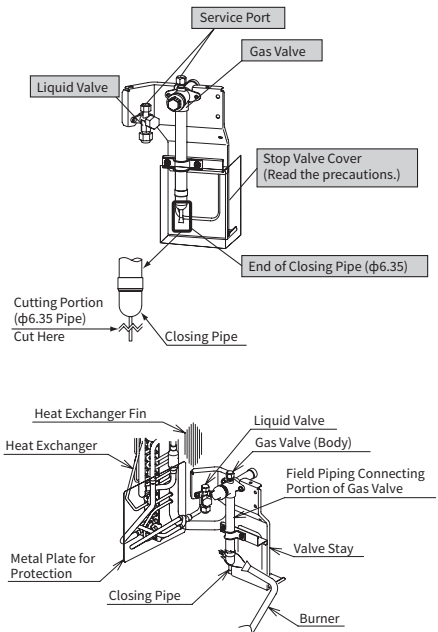


Fig. 5.1 Brazing of Closing Pipe

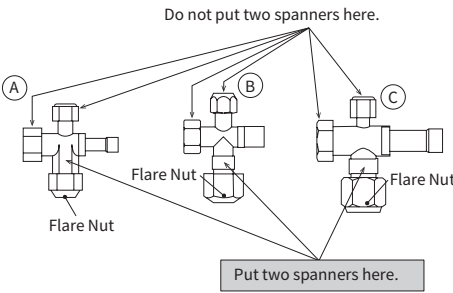
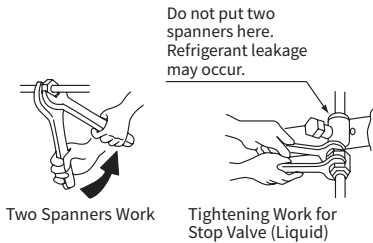
CAUTION

- Ensure that there is no gas inside the pipe when removing the closing pipe. Otherwise, the pipe may be blown out and it may lead to injury.
- Do not expose surrounding parts and the oil return pipe of the compressor to flames when torch is used. If the oil return piping is exposed to the fire, high temperature oil will spurt and cause a fire or injury.

<Liquid Valve>

Tighten the flare nut for liquid stop valve according to the following torque. If an excessive force is applied to the flare nut, the refrigerant leakage may occur from the spindle part. (Put two spanners at the positions indicated in the figure when removing and connecting the piping. If not, the refrigerant leakage may occur.)

Type	HP	Tightening Torque (N-m)	Valve Type
Standard	8 - 14	33 - 42	(A)
	16 - 20	50 - 62	(B)
	22 - 30	68 - 84	(C)

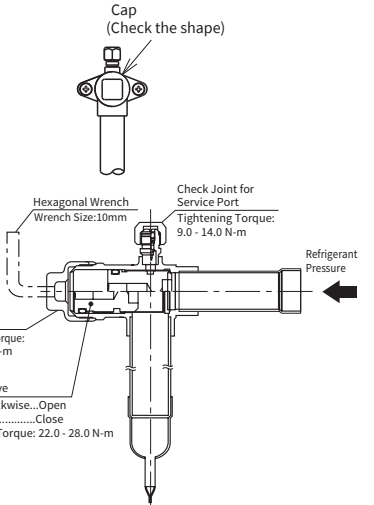


CAUTION

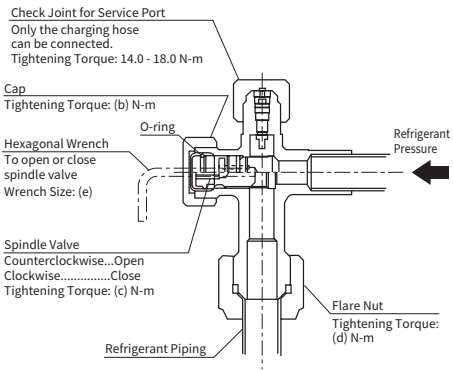
- Do not apply an excessive force to the spindle valve after fully opening the spindle. The back seat construction is not provided.
- At the test run, fully open the spindle. If it is not fully opened, the devices will be damaged.

- The details of stop valves is as follows.

<Gas Valve>



<Liquid Valve>



Outdoor Unit (Base Unit)		Tightening Torque (N-m)			Wrench Size (e) (mm)
		Cap (b)	Spindle Valve (c)	Flare Nut (d)	
Standard Type	8 - 14	33.0 - 42.0	7.0 - 9.0	33.0 - 42.0	4
	16 - 20	33.0 - 42.0	7.0 - 9.0	50.0 - 62.0	4
	22 - 30	50.0 - 62.0	9.0 - 11.0	68.0 - 84.0	5

CAUTION

- Do not apply excessive force to the spindle valve after fully opening the spindle. The back seat construction is not provided.
- At the test run, fully open the spindle. If it is not fully opened, the devices will be damaged.

5. Refrigerant Piping Work

5.4.2 Piping Connection Method

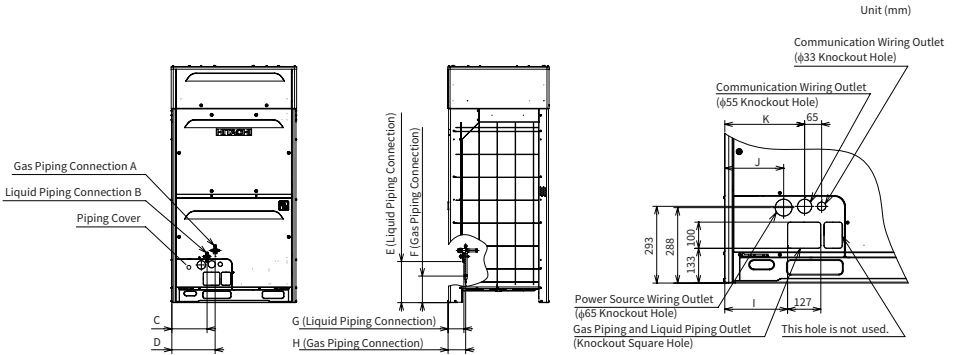
Perform the piping connection work for each outdoor unit.

NOTE:

- Ensure that the refrigerant pipe should be connected to the same refrigerant cycle unit.

Prepare the refrigerant pipe in the field for the piping work.

Refer to Fig. 5.2 for the position of piping connection.



The figures illustrate the examples of a small cabinet.

< CNCCLI >

Model	Piping Diameter		Dimension (mm)										
	Gas	Liquid	A	B	C	D	E	F	G	H	I	J	K
RAS-080CNCCLI	φ19.05	φ9.52	φ22.2	φ9.52	269	331	268	163	117	131	240	225	305
RAS-100CNCCLI	φ22.2	φ9.52											
RAS-120CNCCLI	φ25.4 ^{*1}	φ12.7											
RAS-140CNCCLI	φ25.4 ^{*1}	φ12.7											
RAS-160CNCCLI	φ28.58	φ12.7	φ25.4	φ12.7	178	239	263	160	112	130	147	132	212
RAS-180CNCCLI	φ28.58	φ15.88											
RAS-200CNCCLI	φ28.58	φ15.88											
RAS-220CNCCLI	φ28.58	φ15.88	φ28.58	φ15.88	177	239	259	160	132	152	147	132	212
RAS-240CNCCLI	φ28.58	φ15.88											
RAS-260CNCCLI	φ31.75 ^{*2}	φ19.05											
RAS-280CNCCLI	φ31.75 ^{*2}	φ19.05											
RAS-300CNCCLI	φ31.75 ^{*2}	φ19.05											

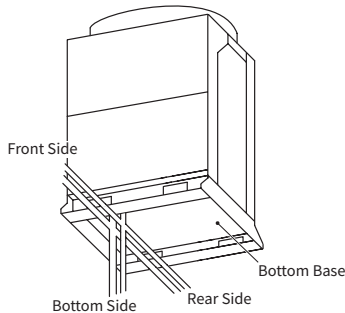
*1. If φ25.4 piping is not available, use φ28.58 piping and a reducer (field-supplied).

*2. If φ31.75 piping is not available, use φ34.93 piping and a reducer (field-supplied).

Fig. 5.2 Position of Piping Connection

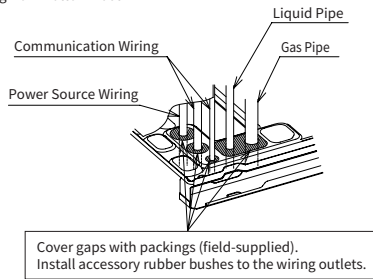
- Piping Direction
Fix the pipes adequately in order to avoid vibration and excessive force to the valve.

Step1. The pipes can be installed in four directions (front, rear, right or bottom side).
For vibration protection, properly fix the piping connection and check that no excessive force is applied to the stop valve.

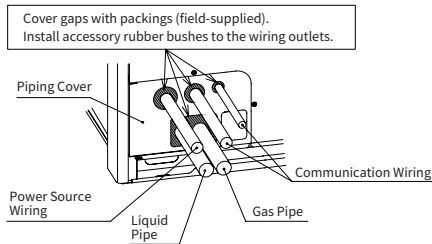


- Step2. Operation of the stop valve should be performed according to item 5.4.1.
Step3. Connect the pipes according to Fig. 5.2.
Step4. Completely seal the penetration part at the bottom of the pipes with insulation in order to prevent rain water from entering the conduit.

- For Piping from Bottom Base



- For Piping from Front or Rear Side Piping Cover



NOTICE

- After removing the pipes and completing insulation work, cover the gap between the pipe cover and the pipes with packing (field-supplied). If the gap is not covered, the unit may be damaged if snow, rain water or animals enter the unit.

5.4.3 Piping Connection

After connecting the pipes, remove the caps of stop valves for gas and liquid.
Tighten the open-close spindle in the closing direction according to the following tightening torque.

- Step1. Make sure that the stop valves are closed completely.
Step2. Protect the compressor and sound-proof cover with a metal plate when brazing the gas pipe as shown in Fig. 5.1.
Pay attention to the flame from the burner not to burn the stop valve body.
Step3. Connect the indoor unit and outdoor units with refrigerant piping. Fix the pipes and take special care not to contact with weak portions such as wall, ceiling, etc. (Otherwise, abnormal sound may be heard due to vibration of the piping.)

NOTE:

- When on-site piping with joint such as elbow or socket is buried, provide a service access door to facilitate the check for connecting part.
- Step4. As for the flaring work of the field pipe, use the specified tightening torque in Table 5.3. Put nitrogen gas into the pipe when brazing the piping.
Step5. Insulate the gas pipe and liquid pipe completely.
Step6. Mount the piping cover equipped with the outdoor unit after the piping connection. If not, the unit may be damaged due to snow or rain water entering the piping.

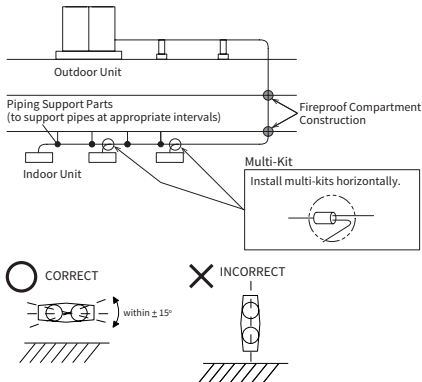
Table 5.3 Tightening Work of Flare Nut

Required Tightening Torque (JIS B8607)		
Pipe Size φmm (in)		Tightening Torque (N·m)
6.35	(1/4)	14 to 18
9.52	(3/8)	34 to 42
12.7	(1/2)	49 to 61
15.88	(5/8)	68 to 82
19.05	(3/4)	100 to 120

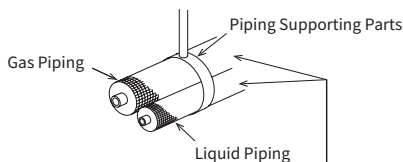
5. Refrigerant Piping Work

- When connecting the indoor unit and outdoor unit refrigerant pipes, the refrigerant pipes must be supported appropriately. Do not let them come into contact with the weak strength portion of a wall or a ceiling. If not, it may cause abnormal sound due to piping vibration.
- Precautions during installing and fixing the pipes.

< Example of Support Direction >



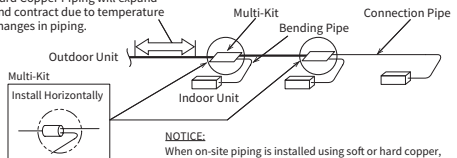
< Supporting Liquid Piping and Gas Piping >



NOTE:
Temperature changes in refrigerant during operation of the unit can cause pipes to expand or contract. Tying the gas piping and liquid piping together with taping may cause piping deformation.

Example: Recommended From each Indoor Unit to Multi-Kit, use hard copper pipes that bend to prevent kinking.

Hard Copper Piping will expand and contract due to temperature changes in piping.



NOTE:

- When on-site piping with joint such as elbow or socket is buried, provide a service access door to facilitate a check of connecting parts.

CAUTION

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

- Details of Stop Valve Piping Connection

< CNCCLI >

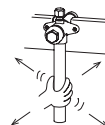
RAS-080CNCCLI	RAS-100CNCCLI
RAS-120CNCCLI	RAS-140CNCCLI
RAS-160CNCCLI	RAS-180, 200CNCCLI
RAS-220, 240CNCCLI	RAS-260, 280, 300CNCCLI

NOTES:

- Ensure that the closing pipe of the gas stop valve is removed firstly.
- Refer to item 5.2 for the flaring work.

NOTICE

- When connecting the outdoor unit gas stop valve and the field-supplied refrigerant pipe, do not apply excessive force to the stop valve pipe as illustrated below. This may loosen the stop valve spindle.



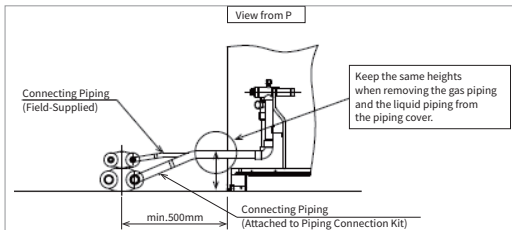
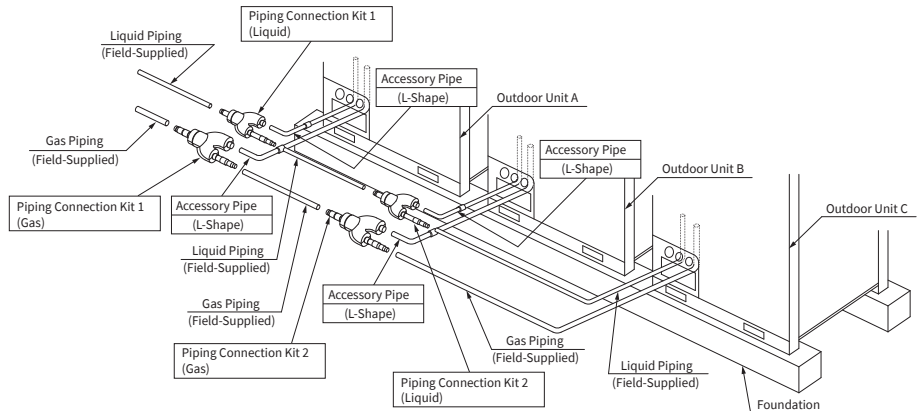
Construction Example

The following figures show the examples of 3 unit combination.

Regarding the piping work for Combination Unit, refer to Installation and Maintenance Manual attached to the piping connection kit.

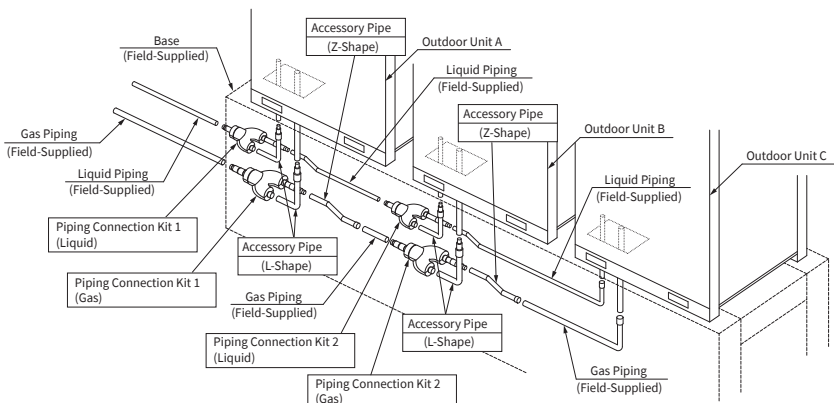
Front Side Piping Connection

Perform the piping connection between outdoor units according to this figure.



Downward Piping Connection

Perform the piping connection between outdoor units according to this figure.



NOTE:

- The figure shows the case that the refrigerant pipes are pulled out from the front side piping cover. They can be also pulled out from the bottom base hole.

5. Refrigerant Piping Work

5.5 Piping Work between Outdoor Units

The optional piping connection kit is required to combine base units.

It is NOT required for the base units.

< Standard Type: RAS-080 to H20CNCCLI >

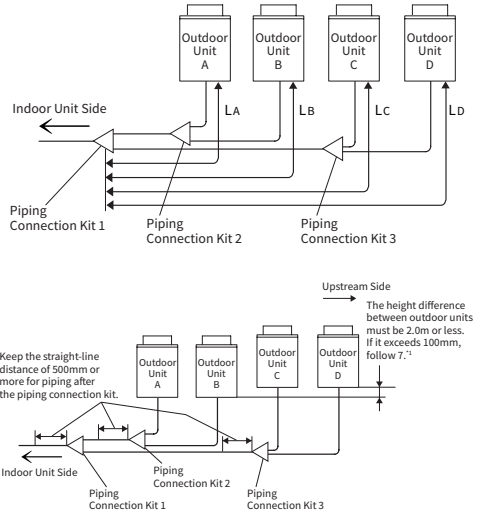
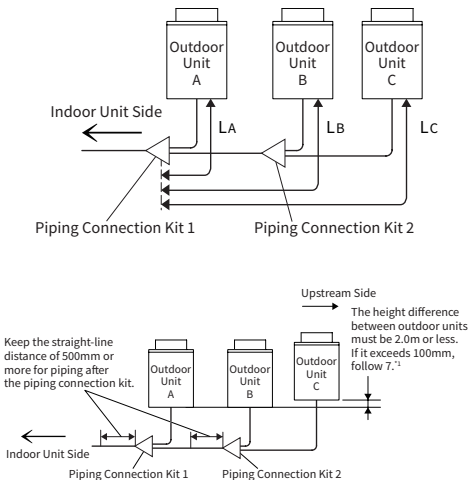
Applicable Outdoor Unit		Model	Piping Set	Remarks
Outdoor Unit	Outdoor Unit			
HP	Number			
32 - 48	2	MC-NP21SA1	1	for Gas: 1 for Liquid: 1
50 - 60	2	MC-NP22TA	1	for Gas: 1 for Liquid: 1
62 - 90	3	MC-NP31TA	1	for Gas: 2 for Liquid: 2
92 - 120	4	MC-NP40TA	1	for Gas: 3 for Liquid: 3

Select the pipe size according to items 5.5.1 to 5.5.4 "Piping Size between Outdoor Units".

For refrigerant piping work, the optional piping connection kit is required to branch the pipe between outdoor units.

The arrangement for outdoor units should be determined depending on the piping direction when the refrigerant piping work and installation work are planned. When the outdoor unit is installed, perform the installation work according to the following restrictions.

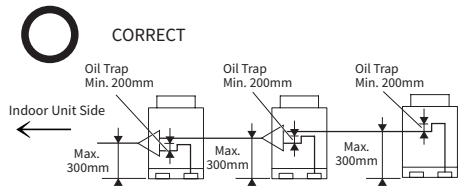
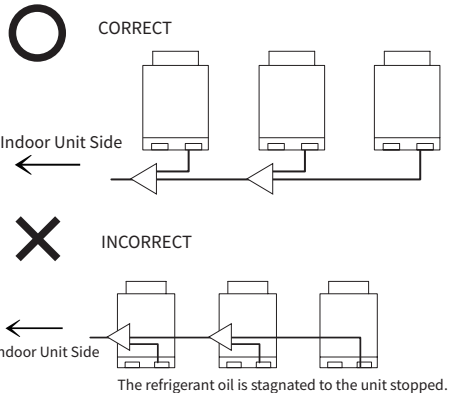
1. Piping length between piping connection kit 1 and each outdoor unit should be $LA < LB < LC < 25m$, $LD - LA \leq 10m$, $LC - LA \leq 10m$, $LB - LA \leq 10m$. Keep the straight-line distance of 500mm or more after the piping connection kit 1.



*1. Refer to 7. on page page 36.

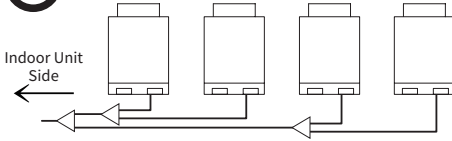
2. Place the piping connection kit lower than the outdoor unit piping connection.

In case that the piping connection kit is placed higher than the outdoor unit piping connection, keep 300mm (max.) between the piping connection kit and the bottom of the outdoor unit. Also, provide the oil trap (min. 200mm) for the gas piping between the piping connection kit and the outdoor unit.

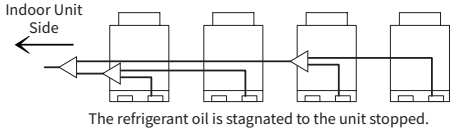




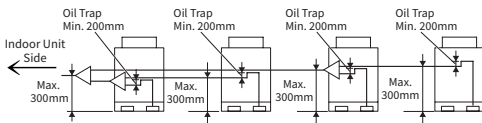
CORRECT



INCORRECT



CORRECT



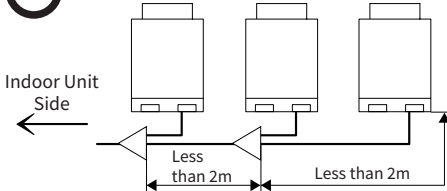
The refrigerant oil stagnates in the stopped outdoor unit during system operation.

3. Install an oil trap for the gas piping when the piping length between the piping connection kits, or the outdoor unit and the piping connection kit is 2m or more to prevent any accumulation of refrigerant oil.

- Less than 2m



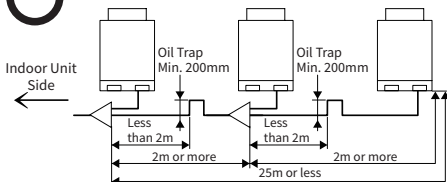
CORRECT



- 2m or more



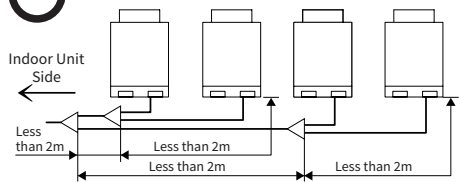
CORRECT



- Less than 2m



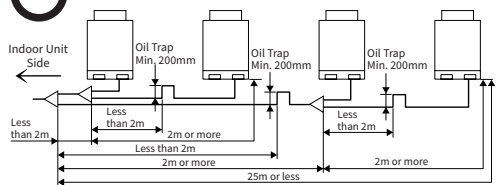
CORRECT



- 2m or more



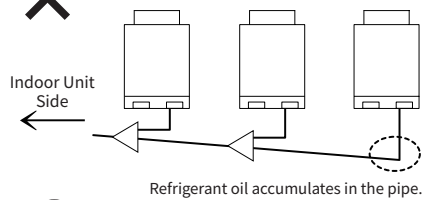
CORRECT



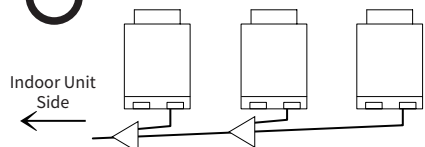
4. Place the outdoor unit pipe horizontally or with the pipe slanted downward towards the indoor unit side so that accumulation of refrigerant oil may not occur in the pipe.



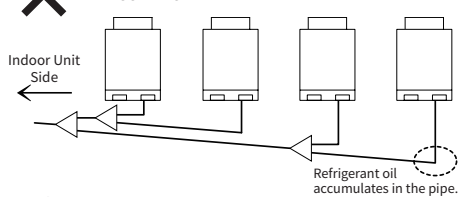
INCORRECT



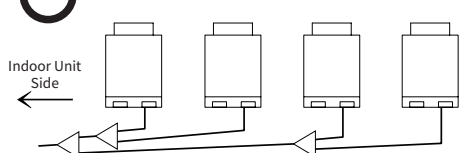
CORRECT



INCORRECT

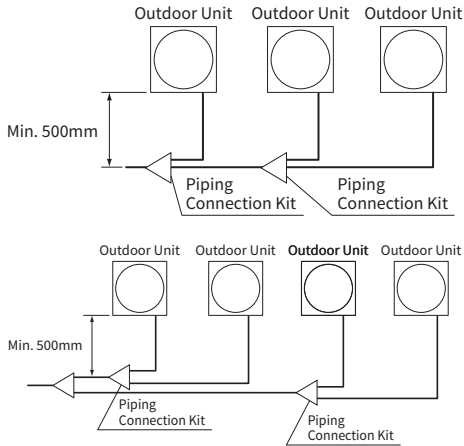


CORRECT



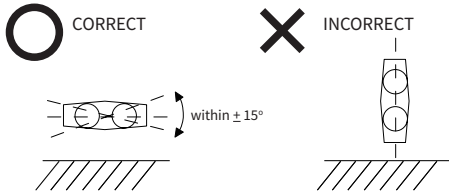
5. Refrigerant Piping Work

5. For servicing, in case that the pipe is placed frontward of the outdoor unit, secure min. 500mm between the outdoor unit and piping connection kits. (When the compressor is replaced, a space of min. 500mm is required.)



6. Direction of Piping Connection Kit

Place the piping connection kit parallel to the ground (the slope must be within $\pm 15^\circ$) as shown in the figure.

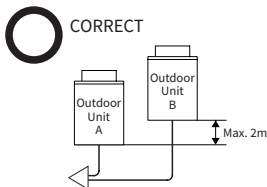


NOTICE

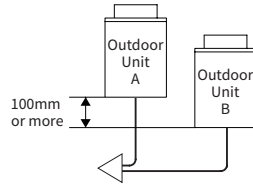
- The refrigerant system may be damaged if the slope of the piping connection kit exceeds $\pm 15^\circ$.
7. When the height difference between the outdoor units exceeds 100mm, there are restrictions depending on the number of connected outdoor units. Incorrect positioning of the outdoor units may cause failure of outdoor units due to flowing back of the refrigerant.

a. Two Outdoor Unit Combination

Outdoor Unit A must be lower than Outdoor Unit B.



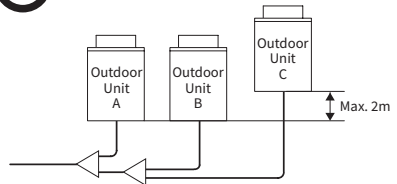
✗ INCORRECT



b. Three Outdoor Unit Combination

Two outdoor units must be lower than the third outdoor unit.

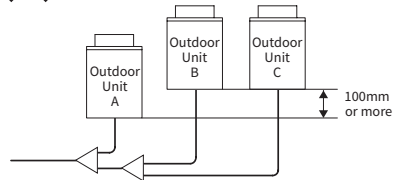
○ CORRECT



NOTE:

- The example shows Outdoor Units A and B are lower than Outdoor Unit C.

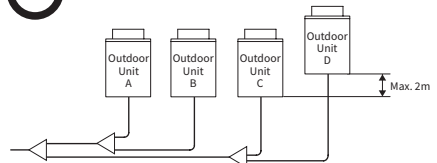
✗ INCORRECT



c. Four Outdoor Unit Combination

Three outdoor units must be lower than the fourth outdoor unit.

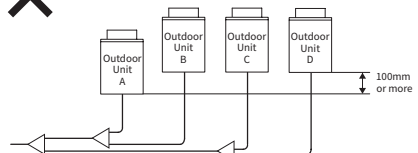
○ CORRECT



NOTE:

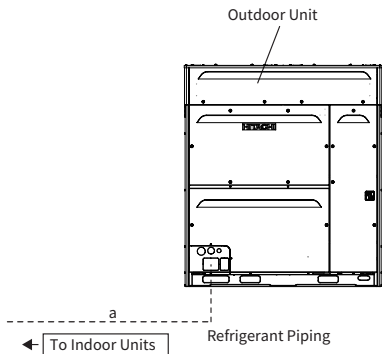
- The example shows Outdoor Units A, B and C are lower than Outdoor Unit D.

✗ INCORRECT



5.5.1 Piping Size between Outdoor Units (Base Unit)

- Standard Type: RAS-080 to 300CNCCLI



Standard Type: RAS-080 to 300CNCCLI

(φmm)

Model			RAS-080CNCCLI	RAS-100CNCCLI	RAS-120CNCCLI	RAS-140CNCCLI	RAS-160CNCCLI	RAS-180CNCCLI	RAS-200CNCCLI
Piping Size	a	Gas	19.05	22.2	25.4 ^{*1}	25.4 ^{*1}	28.58	28.58	28.58
		Liquid	9.52	9.52	12.7	12.7	12.7	15.88	15.88

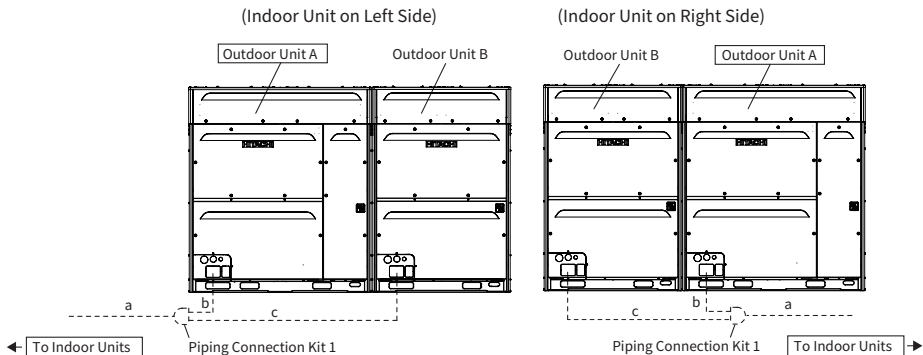
Model		RAS-220CNCCLI	RAS-240CNCCLI	RAS-260CNCCLI	RAS-280CNCCLI	RAS-300CNCCLI
Piping Size	a	Gas	28.58	28.58	31.75 ^{*2}	31.75 ^{*2}
		Liquid	15.88	15.88	19.05	19.05

*1. If φ25.4 piping is not available, use φ28.58 piping and a reducer (field-supplied).

*2. If φ31.75 piping is not available, use φ34.93 piping and a reducer (field-supplied).

5.5.2 Piping Size between Outdoor Units (2 Unit Combination)

- Standard Type: RAS-320 to 600CNCCLI



5. Refrigerant Piping Work

Standard Type: RAS-320 to 600CNCCLI

(φmm)

Model		RAS-320CNCCLI	RAS-340CNCCLI	RAS-360CNCCLI	RAS-380CNCCLI	RAS-400CNCCLI	RAS-420CNCCLI	RAS-440CNCCLI
Comb. Unit	Outdoor Unit A	RAS-180CNCCLI	RAS-180CNCCLI	RAS-180CNCCLI	RAS-220CNCCLI	RAS-220CNCCLI	RAS-240CNCCLI	RAS-220CNCCLI
	Outdoor Unit B	RAS-140CNCCLI	RAS-160CNCCLI	RAS-180CNCCLI	RAS-160CNCCLI	RAS-180CNCCLI	RAS-180CNCCLI	RAS-220CNCCLI
Piping Connection Kit		MC-NP21SA1						
Piping Size	a	Gas	31.75 ^{*1}	31.75 ^{*1}	38.1 ^{*2}	38.1 ^{*2}	38.1 ^{*2}	38.1 ^{*2}
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	b	Gas	Refer to item 5.5.1 for the piping size for the base units to be combined.					
		Liquid						
	c	Gas						
		Liquid						

Model		RAS-460CNCCLI	RAS-480CNCCLI	RAS-500CNCCLI	RAS-520CNCCLI	RAS-540CNCCLI	RAS-560CNCCLI	RAS-580CNCCLI	RAS-600CNCCLI
Comb. Unit	Outdoor Unit A	RAS-240CNCCLI	RAS-240CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-300CNCCLI	RAS-300CNCCLI
	Outdoor Unit B	RAS-220CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-300CNCCLI
Piping Connection Kit		MC-NP21SA1			MC-NP22TA				
Piping Size	a	Gas	38.1 ^{*2}	38.1 ^{*2}	38.1 ^{*2}	38.1 ^{*2}	38.1 ^{*2}	44.45 ^{*3}	44.45 ^{*3}
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05	19.05
	b	Gas	Refer to item 5.5.1 for the piping size for the base units to be combined.						
		Liquid							
	c	Gas							
		Liquid							

*1. If φ31.75 piping is not available, use φ34.93 piping and a reducer (field-supplied).

*2. If φ38.1 piping is not available, use φ41.28 piping and a reducer (field-supplied).

*3. If φ44.45 piping is not available, use φ41.28 piping and a reducer (field-supplied).

NOTE:

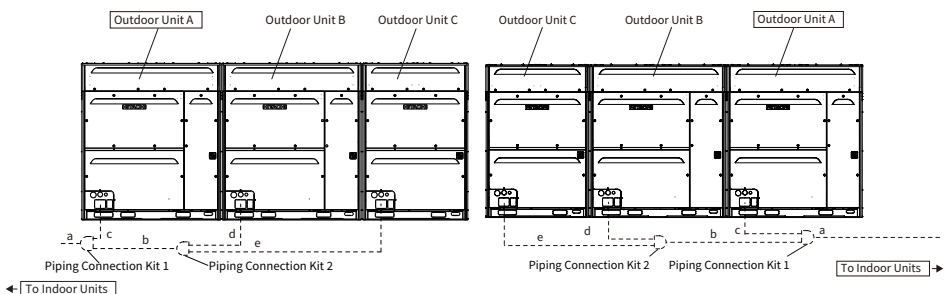
- Perform the installation of the outdoor unit and piping connection according to the figure.
Refer to the table for the outdoor unit model, the piping connection kit model and the piping diameter.

5.5.3 Piping Size between Outdoor Units (3 Unit Combination)

- Standard Type: RAS-620 to 900CNCCLI

(Indoor Unit on Left Side)

(Indoor Unit on Right Side)



5. Refrigerant Piping Work

Standard Type: RAS-620 to 900CNCCLI

(φmm)

Model		RAS-620CNCCLI	RAS-640CNCCLI	RAS-660CNCCLI	RAS-680CNCCLI	RAS-700CNCCLI	RAS-720CNCCLI	RAS-740CNCCLI
Combination Unit	Outdoor Unit A	RAS-220CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-260CNCCLI
	Outdoor Unit B	RAS-220CNCCLI	RAS-220CNCCLI	RAS-240CNCCLI	RAS-220CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI
	Outdoor Unit C	RAS-180CNCCLI	RAS-180CNCCLI	RAS-180CNCCLI	RAS-220CNCCLI	RAS-220CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI
Piping Connection Kit		MC-NP31TA						
Piping Size	a	Gas	44.45 ⁻²	44.45 ⁻²	44.45 ⁻²	44.45 ⁻²	44.45 ⁻²	50.8 ⁻³
		Liquid	19.05	19.05	19.05	22.2	22.2	22.2
	b	Gas	38.1 ⁻¹	38.1 ⁻¹	38.1 ⁻¹	38.1 ⁻¹	38.1 ⁻¹	38.1 ⁻¹
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	c	Gas	Refer to item 5.5.1 for the piping size for the base units to be combined.					
		Liquid						
	d	Gas						
		Liquid						
	e	Gas						
		Liquid						

(φmm)

Model		RAS-760CNCCLI	RAS-780CNCCLI	RAS-800CNCCLI	RAS-820CNCCLI	RAS-840CNCCLI	RAS-860CNCCLI	RAS-880CNCCLI	RAS-900CNCCLI
Combination Unit	Outdoor Unit A	RAS-260CNCCLI	RAS-260CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-300CNCCLI	RAS-300CNCCLI	RAS-300CNCCLI
	Outdoor Unit B	RAS-260CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-300CNCCLI	RAS-300CNCCLI
	Outdoor Unit C	RAS-240CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-300CNCCLI
Piping Connection Kit		MC-NP31TA							
Piping Size	a	Gas	50.8 ⁻³	50.8 ⁻³	50.8 ⁻³	50.8 ⁻³	50.8 ⁻³	50.8 ⁻³	50.8 ⁻³
		Liquid	22.2	22.2	22.2	22.2	22.2	22.2	25.4 ⁻⁴
	b	Gas	38.1 ⁻¹	38.1 ⁻¹	38.1 ⁻¹	38.1 ⁻¹	44.45 ⁻²	44.45 ⁻²	44.45 ⁻²
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05	19.05
	c	Gas	Refer to item 5.5.1 for the piping size for the base units to be combined.						
		Liquid							
	d	Gas							
		Liquid							
	e	Gas							
		Liquid							

*1. If Φ38.1 piping is not available, use Φ41.28 piping and a reducer (field-supplied).

*2. If Φ44.45 piping is not available, use Φ41.28 piping and a reducer (field-supplied).

*3. If Φ50.8 piping is not available, use Φ54.0 piping and a reducer (field-supplied).

*4. If Φ25.4 piping is not available, use Φ28.58 piping and a reducer (field-supplied).

NOTE:

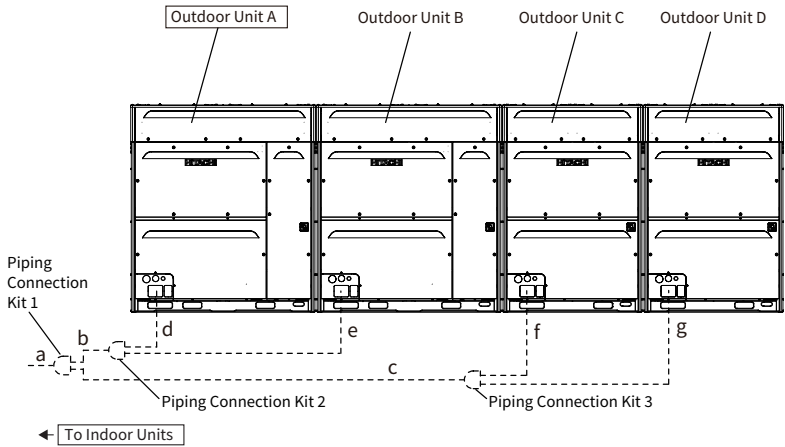
- Perform the installation of the outdoor unit and piping connection according to the figure.
Refer to the table for the outdoor unit model, the piping connection kit model and the piping diameter.

5. Refrigerant Piping Work

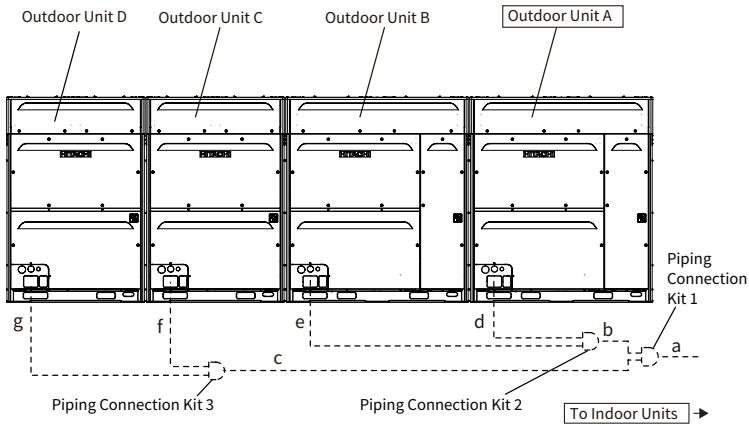
5.5.4 Piping Size between Outdoor Units (4 Unit Combination)

- Standard Type: RAS-920 to H20CNCCLI

(Indoor Unit on Left Side)



(Indoor Unit on Right Side)



Standard Type: RAS-920 to H20CNCCLI

(φmm)

Model		RAS-920CNCCLI	RAS-940CNCCLI	RAS-960CNCCLI	RAS-980CNCCLI	RAS-H00CNCCLI	RAS-H02CNCCLI	RAS-H04CNCCLI
Combination Unit	Outdoor Unit A	RAS-240CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI
	Outdoor Unit B	RAS-240CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI
	Outdoor Unit C	RAS-220CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI
	Outdoor Unit D	RAS-220CNCCLI	RAS-220CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-240CNCCLI	RAS-260CNCCLI
Piping Connection Kit		MC-NP40TA						
Piping Size	a	Gas	50.8 ³	50.8 ³	50.8 ³	54.0	54.0	54.0
		Liquid	25.4 ⁴	25.4 ⁴	25.4 ⁴	25.4 ⁴	25.4 ⁴	25.4 ⁴
	b	Gas	38.1 ¹	38.1 ¹	38.1 ¹	38.1 ¹	38.1 ¹	38.1 ¹
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	c	Gas	38.1 ¹	38.1 ¹	38.1 ¹	38.1 ¹	38.1 ¹	38.1 ¹
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05
	d	Gas	Refer to item 5.5.1 for the piping size for the base units to be combined.					
		Liquid						
	e	Gas						
		Liquid						
	f	Gas						
		Liquid						
	g	Gas						
		Liquid						

(φmm)

Model		RAS-H06CNCCLI	RAS-H08CNCCLI	RAS-H10CNCCLI	RAS-H12CNCCLI	RAS-H14CNCCLI	RAS-H16CNCCLI	RAS-H18CNCCLI	RAS-H20CNCCLI
Combination Unit	Outdoor Unit A	RAS-280CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-300CNCCLI	RAS-300CNCCLI	RAS-300CNCCLI	RAS-300CNCCLI
	Outdoor Unit B	RAS-260CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-300CNCCLI	RAS-300CNCCLI	RAS-300CNCCLI
	Outdoor Unit C	RAS-260CNCCLI	RAS-260CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-300CNCCLI	RAS-300CNCCLI
	Outdoor Unit D	RAS-260CNCCLI	RAS-260CNCCLI	RAS-260CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-280CNCCLI	RAS-300CNCCLI
Piping Connection Kit		MC-NP40TA							
Piping Size	a	Gas	54.0	54.0	54.0	54.0	54.0	54.0	54.0
		Liquid	25.4 ⁴	25.4 ⁴	25.4 ⁴	25.4 ⁴	28.58	28.58	28.58
	b	Gas	38.1 ¹	44.45 ²	44.45 ²	44.45 ²	44.45 ²	44.45 ²	44.45 ²
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05	19.05
	c	Gas	38.1 ¹	38.1 ¹	38.1 ¹	44.45 ²	44.45 ²	44.45 ²	44.45 ²
		Liquid	19.05	19.05	19.05	19.05	19.05	19.05	19.05
	d	Gas	Refer to item 5.5.1 for the piping size for the base units to be combined.						
		Liquid							
	e	Gas							
		Liquid							
	f	Gas							
		Liquid							
	g	Gas							
		Liquid							

*1. If Φ38.1 piping is not available, use Φ41.28 piping and a reducer (field-supplied).

*2. If Φ44.45 piping is not available, use Φ41.28 piping and a reducer (field-supplied).

*3. If Φ50.8 piping is not available, use Φ54.0 piping and a reducer (field-supplied).

*4. If Φ25.4 piping is not available, use Φ28.58 piping and a reducer (field-supplied).

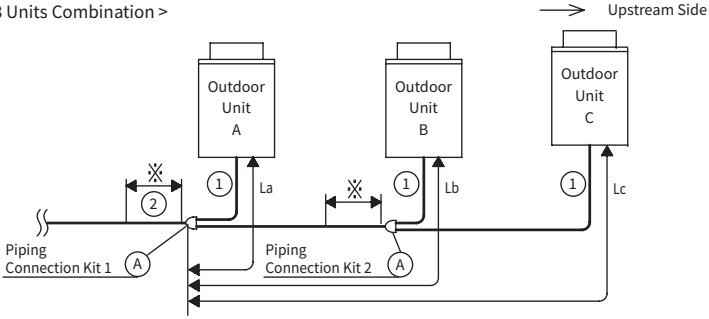
NOTE:

- Perform the installation of the outdoor unit and piping connection according to the figure.
Refer to the table for the outdoor unit model, the piping connection kit model and the piping diameter.

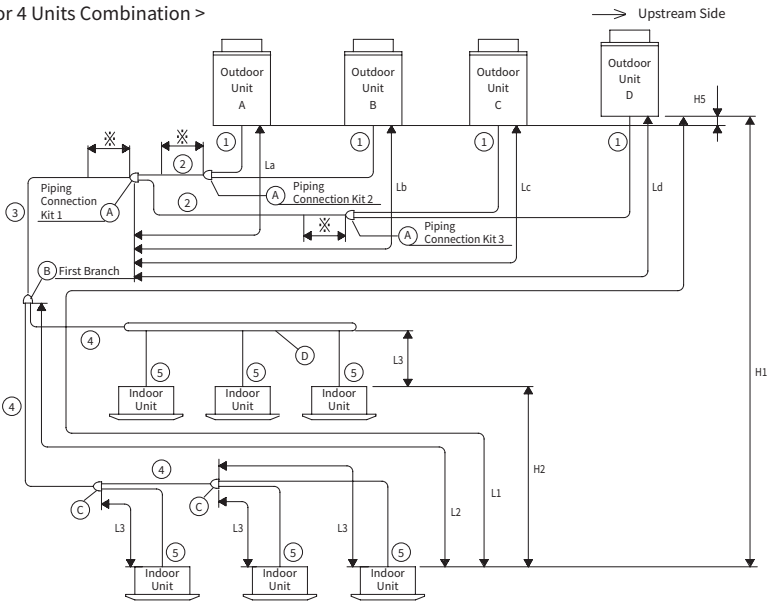
5.6 Piping Size, Piping Connection and Multi-Kit Selection

For selecting the pipe sizes between the outdoor unit and the piping connection kit ①, between the piping connection kits ② and for piping connection kit (A), refer to items from 5.5.1 to 5.5.4 “Piping Size between Outdoor Units”.

< For 2 and 3 Units Combination >



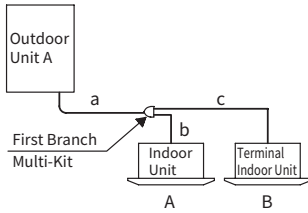
< For 4 Units Combination >



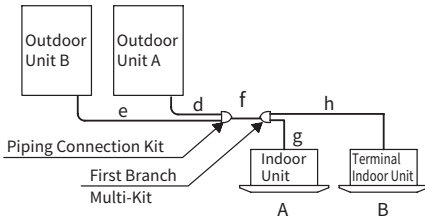
※ Keep the straight line distance of 500mm or more after the piping connection kit.

Term	Symbol		Description
Total Piping Length	Example 1	a+b+c	Total length of all liquid pipes (sum)
	Example 2	d+e+f+g+h	
Maximum Piping Length	Example 1	a+c	Actual length of the liquid pipe from outdoor unit stop valve or piping connecting kit to the terminal unit.
	Example 2	f+h	
Piping Length	-		Actual length of liquid pipe out of consideration of local resistance, such as bent or elbow.
Equivalent Length	-		This length is obtained by converting local resistance, such as bent or elbow, to straight pipe length.

< Example 1 > Line Branch (Including Main Pipe Branch)

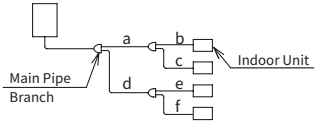


< Example 2 > Using Piping Connection Kit



NOTE:

The main pipe branch is the piping branch method where Multi-Kits are connected to the pipes both after the first branch.



5.6.1 Connection between Outdoor Units and Connection Kit

Multi-Kit (Optional Parts)

< Line Branch >

(Standard Type)

Ⓑ First Branch

Outdoor Unit HP	Model
8, 10	MW-NP282A3
12 - 16	MW-NP452A3
18 - 24	MW-NP692A3
26 - 54	MW-NP902A3
56 - 120	MW-NP2682A3

Ⓒ Multi-Kit after First Branch

Total Indoor Unit HP	Model
<12	MW-NP282A3
12 - 17.99	MW-NP452A3
18 - 25.99	MW-NP692A3
26 - 55.99	MW-NP902A3
≥56	MW-NP2682A3

< Ⓓ Header Branch >

Total Indoor Unit HP	No. of Header Branches	Model
Max. 8	4	MH-NP224A
Max. 10	8	MH-NP288A

Piping Size (φmm)

③ Main Pipe Diameter

(Base Unit or Piping Connection Kit 1 to First Branch)

[Multi-Kit of First Branch]

< 2 Pipes System >

(Standard Type)

(φmm)

Outdoor Unit HP	Gas Pipe	Liquid Pipe
8	19.05	9.52
10	22.2	9.52
12, 14	25.4 ^{*1}	12.7
16	28.58	12.7
18 - 24	28.58	15.88
26 - 34	31.75 ^{*2}	19.05
36 - 54	38.1 ^{*3}	19.05
56 - 66	44.5 ^{*4}	19.05
68 - 72	44.5 ^{*4}	22.2
74 - 88	50.8 ^{*5}	22.2
90 - 96	50.8 ^{*5}	25.4 ^{*1}
98 - 120	54.0	25.4 ^{*1}

*1. If φ25.4 piping is not available, use φ28.58 piping and a reducer (field-supplied).

*2. If φ31.75 piping is not available, use φ34.93 piping and a reducer (field-supplied).

*3. If φ38.1 piping is not available, use φ41.28 piping and a reducer (field-supplied).

*4. If φ44.45 piping is not available, use φ41.28 piping and a reducer (field-supplied).

*5. If φ50.8 piping is not available, use φ54.0 piping and a reducer (field-supplied).

NOTE:

- When the maximum length of the equivalent refrigerant pipe (L1) from the piping connection kit 1 to the indoor unit is over 100m, the pipe size of gas and liquid lines from the piping connection kit 1 to first branch should be increased by one size (with limitation of Max. φ54.0mm) with reducers (field-supplied).

④ [Pipe Diameter after First Branch]

(Standard Type)

Total Indoor Unit HP	Diameter (φmm)	
	Gas Pipe	Liquid Pipe
< 6	15.88	9.52
6 - 8.99	19.05	9.52
9 - 11.99	22.2	9.52
12 - 15.99	25.4 ^{*1}	12.7
16 - 17.99	28.58	12.7
18 - 25.99	28.58	15.88
26 - 35.99	31.75 ^{*2}	19.05

5. Refrigerant Piping Work

36 - 55.99	38.1 ^{*3}	19.05
56 - 67.99	44.45 ^{*4}	19.05
68 - 73.99	44.45 ^{*4}	22.2
74 - 89.99	50.8 ^{*5}	22.2
90 - 97.99	50.8 ^{*5}	25.4 ^{*1}
≥ 98	54.0	25.4 ^{*1}

- *1. If Φ25.4 piping is not available, use Φ28.58 piping and a reducer (field-supplied).
- *2. If Φ31.75 piping is not available, use Φ34.93 piping and a reducer (field-supplied).
- *3. If Φ38.1 piping is not available, use Φ41.28 piping and a reducer (field-supplied).
- *4. If Φ44.45 piping is not available, use Φ41.28 piping and a reducer (field-supplied).
- *5. If Φ50.8 piping is not available, use Φ54.0 piping and a reducer (field-supplied).

NOTES:

- In the case that the piping length from the Multi-Kit at the first branch to the terminal indoor unit is over 40m, the size of the piping between Multi-Kits should be increased by one size with reducers (field-supplied). Refer to item 5.7 Piping Branch Restrictions for details.
- Even if the equivalent refrigerant piping length is more than 100m, there is no need to increase the pipe size after first branch. If the multi-kit size is larger than the first branch, adjust the multi-kit size to the first branch. In case that the selected pipe size after the first branch is larger than the pipe size before the first branch, use the same pipe size as before the first branch.

⑤ [Pipe Diameter between Multi-Kit and Indoor Unit]

Indoor Unit HP	Diameter (φmm)	
	Gas Pipe	Liquid Pipe
1.5 or less	12.7	6.35 ^{*1}
2.0, 2.3	12.7 ^{*2}	6.35 ^{*1}
2.5 to 6.0	15.88	9.52
8.0	19.05	9.52
10.0	22.2	9.52
16.0	28.58	12.7
20.0	28.58	15.88

- *1. When the liquid piping length is longer than 15m, use Φ9.52 pipe and a reducer (field-supplied).
- *2. As for some of the indoor unit types, if Φ12.7 pipe is not available, Φ15.88 pipe should be used. Make sure to check the indoor unit specifications.

NOTE:

- The pipe diameter should be the same as the indoor unit piping connection size.

5.6.2 Connection between Outdoor Units, Multi-Kits and Indoor Units

Piping Work Conditions

Item		Mark	Allowable Piping Length (m)
Total Piping Length		Total Liquid Piping Actual Length	≤ 1000
Maximum Piping Length	Actual Length	L1	≤ 200
	Equiv. Length		≤ 225
Maximum Piping Length between Multi-kit of 1st Branch and Each Indoor Unit		L2	≤ 100
Maximum Piping Length between Each Multi-kit and Each Indoor Unit		L3	≤ 40
Piping Length between Piping Connection Kit 1 and Each Outdoor Unit		La, Lb, Lc, Ld	≤ 25 ^{*6}
Height Difference between Outdoor Units and Indoor Units	O.U. is Higher	H1 *4	≤ 50 *1
	O.U. is Lower		≤ 40 *2
Height Difference between Indoor Units		H2 *3, *5	≤ 40
Height Difference between Outdoor Units		H5	≤ 2.0

- *1. The maximum piping length of 110m is available on request. The following restrictions apply when the height difference between the outdoor units and the indoor units (the outdoor unit is higher) are 50m or more.

- The maximum outdoor temperature during cooling operation is 43°C.
- The connectable indoor unit capacity ratio is ≤ 100%.
- To protect the system, the thermo OFF may be activated to turn the system off when the outside temperature is 38°C or more.
- Performance priority mode is disabled.

- *2. The maximum piping length of 110m is available on request. The following restrictions apply when the height difference between the outdoor units and the indoor units (the outdoor unit is lower) are 40m or more.

- The maximum outdoor temperature during cooling operation is 43°C.

- The minimum outdoor temperature during cooling operation is 10°C.
 - The connectable indoor unit capacity ratio is $\leq 130\%$.
- *3. The piping length must be 15m or less when even one dedicated outside air system (DOAS) is connected to the system.
- *4. When there are height differences between outdoor units, use the outdoor unit that has the largest height difference from the indoor unit as the height reference.
- *5. When H2 is 30m or more, the connectable indoor unit capacity ratio is $\leq 100\%$.
- *6. The piping length between outdoor units should be $L_a \leq L_b \leq L_c \leq L_d \leq 25m$.
 $L_b - L_a \leq 10m$, $L_c - L_a \leq 10m$, $L_d - L_a \leq 10m$.
(If the piping length is incorrect, it may cause failure of outdoor unit due to flowing back of the refrigerant.)

NOTES:

- For 2, 3 and 4 outdoor unit combination, the outdoor unit “A” should be connected to the piping connection kit 1.
(Refer to items 5.6.1 and 5.6.2 for the outdoor unit models.)
For the details of piping connection, refer to the Installation Manual for Piping Connection Kit.
- Keep the straight line distance of 500mm or more after the piping connection kit.
- Allowable total piping length may become shorter than 1000m due to the limitation of maximum additional refrigerant amount as following table.

(Standard Type)

HP	8, 10	12, 14	16 - 20	22 - 24	26 - 30	32 - 66
Max. Additional Refrigerant Charge (kg)	28.0	36.0	40.0	46.0	56.0	63.0

HP	68 - 88	90 - 120
Max. Additional Refrigerant Charge (kg)	73.0	93.0

- If the piping length (L3) between each multi-kit and indoor unit is considerably longer than that of other indoor units, refrigerant may not flow well and also performance may be deteriorated compared to other models.
(Recommended Piping Length: within 15m)

- The piping connection kit is counted from the indoor unit side (as Piping Connection Kit 1).
- Check the gas pipe and liquid pipe are equivalent in terms of the piping length and piping system.
- Use a multi-kit (system components) for the branch pipe of indoor unit.
- Install the indoor unit and multi-kit according to each Installation and Maintenance Manual.
- When connecting units in the field, use bent pipes or (horizontal) elbow pipes to absorb the expansion and contraction of pipes caused by pipe temperature change.

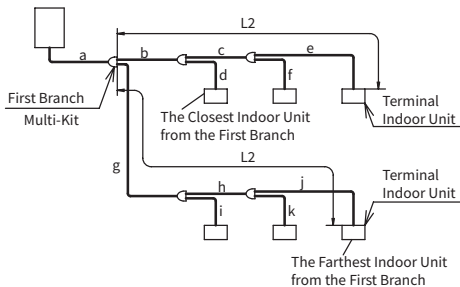
5.7 Piping Branch Restrictions

The number of the main piping branches is not limited under the following restrictions.

In the case that the piping length L2 from the Multi-Kit at the first branch to the farthest indoor unit is over 40m.

(Example 1): Installation with Main Piping Branch (T)
Piping length from the Multi-Kit at the first branch to the terminal indoor unit is within 40~100m.

1. In the case that the piping length L2 is over 40m, the size of gas and liquid lines “b and c” or “g and h” should be increased by one size with reducers (field-supplied).
If (a) is smaller than (b, g) after increasing the size, increase the size of (a) to the same size as (b, g).
2. The difference between the piping length from the first branch to the farthest indoor unit and the piping length from the first branch to the closest indoor unit must be within 60m.
 $(g+h+j) - (b+d) \leq 60m$



(Example 2): Installation without Main Piping Branch (T)
Piping length from the Multi-Kit at the first branch to the terminal indoor unit is within 40~100m.

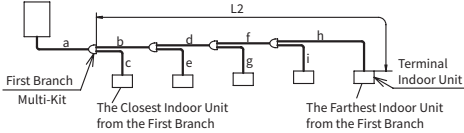
1. In the case that L2 is over 40m, the size of gas and liquid lines “b, d and f” should be increased

5. Refrigerant Piping Work

by one size with reducers (field-supplied).

If (a) is smaller than (b) after increasing the size, increase the size of (a) to the same size as (b).

- The difference between the piping length from the first branch to the farthest indoor unit and the piping length from the first branch to the closest indoor unit must be within 60m.
 $(b+d+f+h) - (c) \leq 60m$



Main Piping Branch: Both of the pipes branched from a Multi-Kit are connected to the next Multi-Kits.

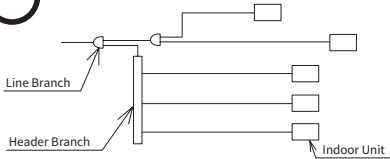
Header branch can be used with line branch.

Header branch can also be used after the second branch.

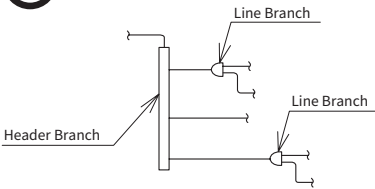
Do not connect a line branch to a header branch.



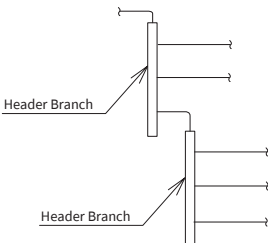
CORRECT



CORRECT



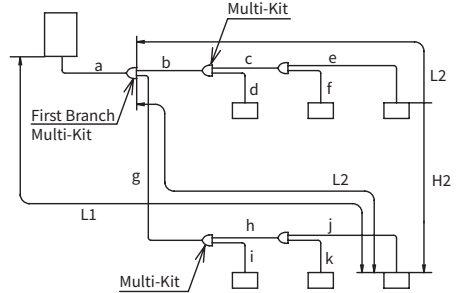
INCORRECT



5.8 Restrictions on Height Difference between Indoor Units

If all of the following conditions apply, increase the size of liquid lines (b to k) after the first branch by one size.

- H2 is over 30m.
- Neither the size of the liquid line nor that of the gas line need to be increased by one size according to 5.7 Piping Branch Restrictions.
- The liquid pipe diameter is $a > b \cdot g$.



6. Electrical Wiring

WARNING

- Turn OFF the main power switch of the indoor unit and the outdoor unit and wait for more than 3 minutes before electrical wiring work or a periodic check is performed.
- Check to ensure that the indoor fan and the outdoor fan have stopped before electrical wiring work or a periodic check is performed.
- Protect the wires, electrical parts, etc. from rats or other small animals.
If not, rats may gnaw at unprotected parts, which may lead to a fire.
- Avoid the wirings from touching the refrigerant pipes, plate edges and electrical parts inside the unit.
If not, the wires will be damaged and at the worst, a fire will occur.
- Use a medium sensing speed type ELB (Earth Leakage Breaker, activation speed of 0.1 sec. or less).
If not, it will cause an electric shock or a fire.
- Fix the cables securely. External forces on the terminals could lead to a fire.
- Tighten screws according to the following torque.
 - M4: 1.0 to 1.3 N·m
 - M5: 2.1 to 2.4 N·m
 - M6: 4.0 to 5.0 N·m
 - M8: 9.0 to 11.0 N·m
 - M10: 18.0 to 23.0 N·m
- The electrical wiring work must be performed by authorized installers in order to prevent an electric shock or a fire.
- Perform the electrical work according to the regulation of each region and Installation and Maintenance Manual, and the 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 a fire.
- Use the specified cables for wiring between the outdoor unit and indoor units. Selecting incorrect cables will cause an electric shock or a fire.
- Tightly secure the wirings to the terminal block according to the specified torque. If tightening the terminals is not completed, heat generation, an electric shock or a fire

will occur at the terminal connections.

- Tightly clamp the wires with a cord clamp after the wiring to the terminal block has been completed. In addition, run securely the wires through the wiring hole. If not, the wires will be pinched and it may cause a fire.
- Turn OFF the power source when handling the service connector. Otherwise, it may cause an electric shock.

6.1 General Check

1. Make sure that the field-selected electrical components (main power switches, circuit breakers, wires, conduit connectors and wire terminals) have been properly selected according to the electrical data indicated in Table 6.1. Make sure that the components comply with National Electrical Code (NEC).
 - a. Supply electrical power to each outdoor unit.
ELB, fuse and main switch should be installed for each outdoor unit. If not, it will cause a fire or an electrical shock.
 - b. The power sources for the indoor unit and outdoor unit should be supplied respectively. Connect the power supply wiring to each indoor unit group connected to the same outdoor unit.
(Max. capacity of one indoor unit group is 15A.) ELB, fuse and main switch should be installed for each indoor unit group. Refer to Installation and Maintenance Manual attached to the indoor unit.
2. Check to ensure that the power supply voltage is within $\pm 10\%$ of the rated voltage.
If the power supply voltage is too low, the system cannot start due to the voltage drop.
3. Check the size of the electrical wires.
4. The packaged air conditioner may not operate normally in the following cases.
 - a. In case that the power source for the packaged air conditioner is supplied from the same power transformer as the device with high electricity consumption^{*1}

In case that the power supply wiring for the device^{*1} and for the packaged air conditioner are located close to each other.

^{*1}1. Lift, container crane, rectifier for electric railway, inverter power device, arc furnace, electric furnace, large-sized induction motor and large-sized switch.
In the cases mentioned above, induction surge of the power supply wiring for the packaged air conditioner could occur

6. Electrical Wiring

due to a rapid change in electricity consumption of the device and activation of switch. Therefore, check the field regulations and standards before performing electrical work in order to protect the power supply wiring for the packaged air conditioner.

- Check to ensure that the earth wire of the outdoor unit, indoor unit are connected.

6. Special Attention UAE

UAE.S 5010-5:2019 stipulates to lower the set temperature of the air conditioner (thermostat 20°C set value evaluation) and must be complied with. "All appliances subject for certification (except chiller) shall comply with the thermostat temperature setting limit that limiting the lowest allowable cooling temperature setpoint to 20°C." For the wired controller used in UAE, use PC-ARFG1-U (602992344), which has a minimum cooling temperature setting of 20°C.

6.2 Electrical Wiring for Outdoor Unit

Connect the electrical wirings according to the figures on the right.

- Connect the power supply wires to L1, L2, L3, and N (for 400V, 380-415V) for the three phase power source on the terminal block TB1 and earth wire to the terminal in the electrical box.
- Connect the communication wires between the outdoor and indoor units to the TB2 terminals 1 and 2 on the PCB1. As for the communication wires between outdoor units in the same refrigerant cycle, connect them to the TB2 terminals 3 and 4 on the PCB1.
- Tighten screws for the terminal block according to the following table.

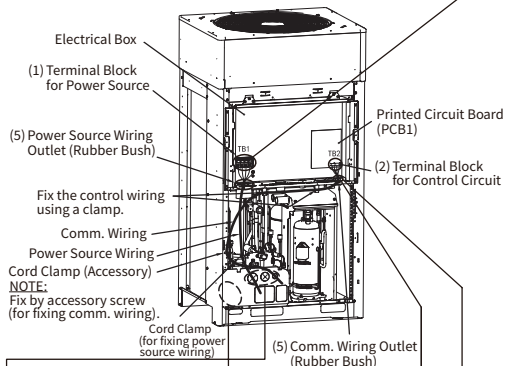
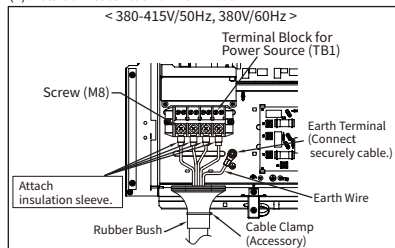
< Required Tightening Torque >

Size	Tightening Torque
M3.5	0.7 to 1.1 N·m
M4	1.0 to 1.3 N·m
M5	2.1 to 2.4 N·m
M6	4.0 to 5.0 N·m
M8	9.0 to 11.0 N·m
M10	18.0 to 23.0 N·m

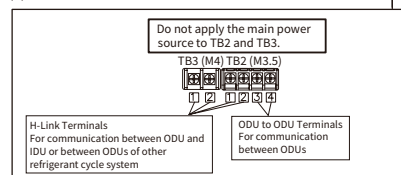
4. Main Fuse Capacity (Standard Type)

	8, 10 HP	12, 14 HP	16, 20 HP	22 HP	24 to 28 HP	30 HP
3N~, 380 - 415 V/50 Hz	20A	30A	40A	50A	60A	80A
3N~, 380V/60 Hz						

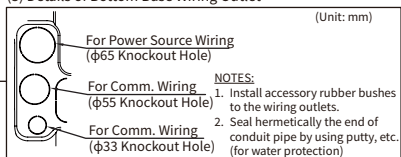
(1) Detail of Electrical Box Terminal



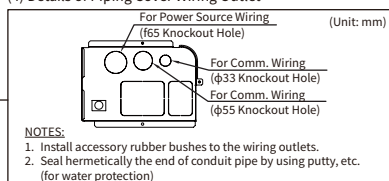
(2) Detail of Terminal Block for Control Circuit



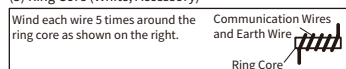
(3) Details of Bottom Base Wiring Outlet



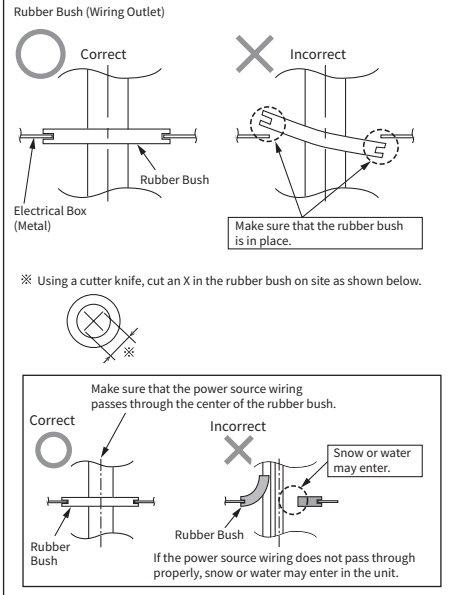
(4) Details of Piping Cover Wiring Outlet



(5) Ring Core (White, Accessory)



(5) Details of Wiring Outlets inside the Electrical Box (Rubber Bush Section)



CAUTION

- **Be sure to note the following points to run the cables under the unit using conduit tube. (The pipe cover needs to be removed before performing piping and wiring works.)**

NOTES:

- Do not run the power supply wiring and communication wiring through the same conduit tube. Moreover, keep at least 5cm between the power supply wiring and communication wiring.
- Pull out each wire from each corresponding knockout hole. Cut an "X" in rubber bush (accessory) and securely attach it to the knockout hole for cable protection. Check that the rubber bush is surely attached.
- Attach the pipe cover to prevent rats or other small animals from entering the unit.
- Prevent the wirings from touching or rubbing against the refrigerant pipes, plate edges and electrical parts inside the unit.
- When the power source cable (cabtyre cable) whose size exceeds 38mm² is used, peel the sheath part of the cable, put into the unit and run it. At this time, do not damage the coated insulating part.
- Completely seal the end of conduit tube with sealing materials to prevent the rain from

entering the conduit tube.

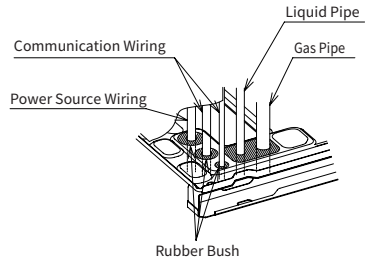
- Make a drain hole at the lowest part of the conduit tube.

CAUTION

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

NOTE:

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



6.3 Electrical Wiring Connection

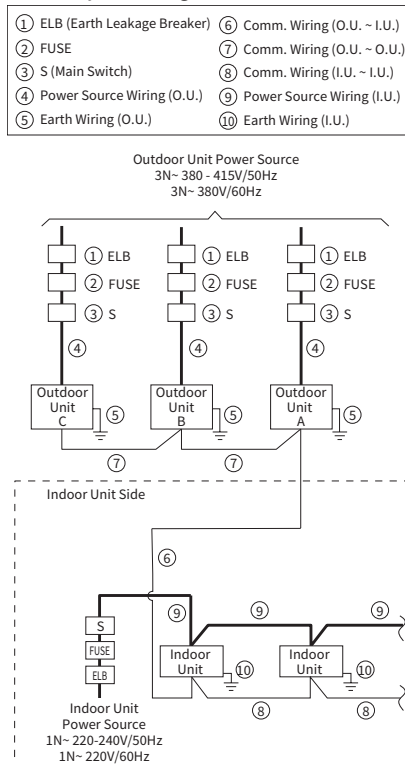
WARNING

- The ELB (earth leakage breaker), FUSE and S (main switch) must be installed for each outdoor unit and also for each indoor unit group. If not, it may cause an electrical shock or fire.
- Perform the electrical work according to the regulation of each region and the Installation and Maintenance Manual, and the 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 damage electrical parts and cause an electric shock or a fire.
- Check that the ground wire is securely connected. If the unit is not correctly grounded, it may lead to an electrical shock. Do not connect the ground wiring to a gas piping, water piping, lighting conductor or ground wiring for telephone.
- The power sources for the indoor unit and outdoor unit should be supplied respectively.
- The power source for each indoor unit group should be supplied respectively.

6. Electrical Wiring

1. Power Source Wiring

Supply the power sources to each outdoor unit and indoor unit group respectively.
Power source wiring is fundamentally according to this method.



2. The recommended wire size and main switch(① ~ ⑦) are shown in Table 6.1.

Please refer to the indoor units installation manual for other cables (⑧ ~ ⑩).

- Select the capacity of power transformer according to the maximum running current.
- When the power supply wiring is too long, select the minimum wiring size whose voltage drop is within 2%.
- Power supply voltage should comply with the following requirements.
Supply Voltage: Rated Voltage within $\pm 10\%$
Starting Voltage: Rated Voltage within -15%
Operating Voltage: Rated Voltage within $\pm 10\%$
Imbalance between Phases: within 3%
- Calculate short-circuit current from the power transformer and electrical wiring length and size, and select the appropriate rated capacity for ELB (earth leakage breaker).
- Select ELB which can be used for the high harmonic wave.

⚠ WARNING

- **Do not connect the earth wire to the gas pipe, water pipe or lightning conductor.**
 - **Gas Pipe:** An explosion and ignition may occur when gas leaks.
 - **Water Pipe:** Earth wire becomes ineffective when a hard vinyl pipe is used.
 - **Lightning Conductor:** The earth electric potential abnormally increases when a lightning conductor is used.

3. The recommended wiring, ELB and breaker sizes are shown in Table 6.1.

- Standard Type

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

Model	Power Supply	Maximum Running Current	Power Supply Line	① ELB		③ Main Switch	② Fuse
				Nominal Current	Nominal Sensitive Current	Nominal Current	
		(A)	(φmm)	(A)	(mA)	(A)	(A)
RAS-080CNCCLI	3N~ 380-415V/50Hz 3N~ 380V/60Hz	16.1	MLFC2.0SQ	20	30	20	20
RAS-100CNCCLI		20.0	MLFC3.5SQ	20	30	20	20
RAS-120CNCCLI		23.3	MLFC3.5SQ	30	30	30	30
RAS-140CNCCLI		27.7	MLFC3.5SQ	30	30	30	30
RAS-160CNCCLI		32.7	MLFC5.5SQ	40	30	40	40
RAS-180CNCCLI		39.7	MLFC8.0SQ	40	30	40	40
RAS-200CNCCLI		40.0	MLFC8.0SQ	40	30	40	40
RAS-220CNCCLI		42.7	MLFC8.0SQ	50	30	50	50
RAS-240CNCCLI		53.0	MLFC14.0SQ	60	30	60	60
RAS-260CNCCLI		58.3	MLFC14.0SQ	60	30	60	60
RAS-280CNCCLI		59.4	MLFC14.0SQ	60	30	60	60
RAS-300CNCCLI		65.6	MLFC14.0SQ	80	30	80	80

ELB: Earth Leakage Breaker, MLFC: Flame Retardant Polyflex Wire

Install main switch and ELB for each system separately. Select the high response type of ELB that acts within 0.1 second.

Field Minimum Wire Sizes for Power Source and Communication

Model	Power Supply	Maximum Running Current	④ Power Source Cable Size		⑥⑦⑧ Communication Wire Size		⑤ Earth Wire Size
			EN60 335-1 *1	MLFC *2	EN60 335-1 *1	MLFC *2	
			(mm ²)	(mm ²)	(mm ²)	(mm ²)	
RAS-080CNCCLI	3N~ 380-415V/50Hz 3N~ 380V/60Hz	16.1	2.5	2	0.75	0.75	2.5
RAS-100CNCCLI		20.0	2.5	3.5	0.75	0.75	2.5
RAS-120CNCCLI		23.3	2.5	3.5	0.75	0.75	2.5
RAS-140CNCCLI		27.7	4	3.5	0.75	0.75	4
RAS-160CNCCLI		32.7	4	5.5	0.75	0.75	4
RAS-180CNCCLI		39.7	10	8	0.75	0.75	10
RAS-200CNCCLI		40.0	10	8	0.75	0.75	10
RAS-220CNCCLI		42.7	10	8	0.75	0.75	10
RAS-240CNCCLI		53.0	10	14	0.75	0.75	10
RAS-260CNCCLI		58.3	10	14	0.75	0.75	10
RAS-280CNCCLI		59.4	10	14	0.75	0.75	10
RAS-300CNCCLI		65.6	14	14	0.75	0.75	14

NOTE:

- Refer to the NOTES on page page 52 for selection of the power source cable size.

6. Electrical Wiring

NOTES:

- Follow the local codes and regulations when selecting field wires.
- The wire sizes marked with ¹ in the table of the previous page are selected at the maximum current of the unit according to the European Standard, EN60 335-1. Use the wires which are not lighter than the ordinary tough rubber sheathed flexible cord (code designation H05RN-F) or ordinary polychloroprene sheathed flexible cord (code designation H05RN-F).
- The wire sizes marked with ² in the table of the previous page are selected at the maximum current of the unit according to the wire, MLFC (Flame Retardant Polyflex Wire) manufactured by Hitachi Cable Ltd., Japan.
- Use a shielded cable for the transmitting circuit and connect it to the ground.
- In the case that power cables are connected in series, add apply maximum current to each unit and select appropriate wires in the table below.

Selection According to EN60 335-1		Selection According to MLFC (at Cable Temperature of 90 °C, Field Ambient Temperature 52°C and Cables are Tied Together)	
Current i (A)	Wire Size (mm ²)	Current i (A)	Wire Size (mm ²)
i ≤ 6	0.75	i ≤ 12	0.75
6 < i ≤ 10	1	12 < i ≤ 15	1.25
10 < i ≤ 16	1.5	15 < i ≤ 22	2
16 < i ≤ 25	2.5	22 < i ≤ 30	3.5
25 < i ≤ 32	4	30 < i ≤ 40	5.5
32 < i ≤ 40	6	40 < i ≤ 50	8
40 < i ≤ 63	10	50 < i ≤ 72	14
63 < i	3 ^{*3}	72 < i ≤ 95	22
		95 < i ≤ 115	30
		115 < i ≤ 133	38

^{*3}. In the case that the current exceeds 63 A, use MLFC cables.
When the field ambient is around 30 °C.

NOTE:
When the field ambient is high, for example 48 °C.

NOTE:

- Use 2-core cable (equivalent to following cables: VCTF, VCT, CVV, MWVS, VVR or VVF, size: 0.75 mm² to 1.25 mm² (manufactured by Hitachi Cable Co. Ltd.)) or 2-core twist pair cable (equivalent to following cables: KPEV or KPEV-S (manufactured by Hitachi Cable Co. Ltd.)) for the control cable between the outdoor unit and the indoor unit.
The total communication wiring length between the indoor unit and the outdoor unit should be less than 1000 m and the total communication wiring length between outdoor units should be less than 30m.

CAUTION

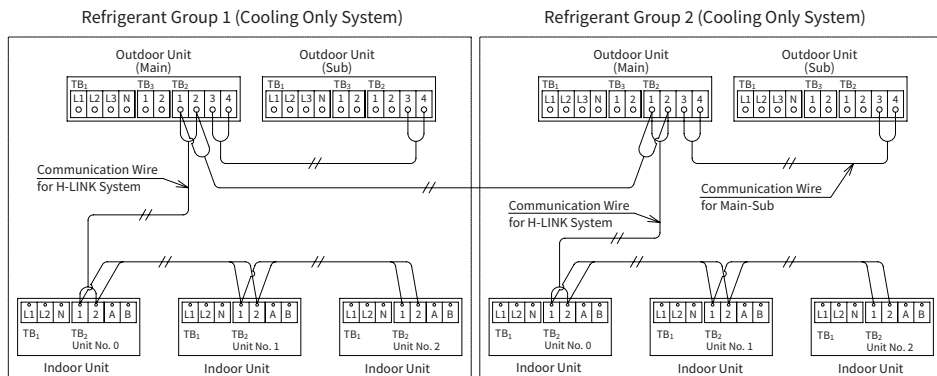
- Install a multi-pole main switch with a space of 3.5 mm or more between each phase.

6.4 Electrical Wiring Connection of Indoor Unit and Outdoor Unit

1. Connect a power supply wiring to each outdoor unit. Connect an ELB, fuse and main switch (S) to each outdoor unit.
2. Connect a power supply wiring to each indoor unit group connected to the same outdoor unit. (Max. capacity of one indoor unit group is 15A.)
Connect an ELB, fuse and main switch (S) to each indoor unit group.
3. Connect the communication wiring between indoor units and outdoor units, as shown in Fig. 6.1.
4. Connect the communication wiring in the same refrigerant cycle unit. (In the case that the refrigerant piping of indoor unit is connected to the outdoor unit, also connect the communication wiring to the same indoor unit.) Connecting the refrigerant piping and communication wiring to the different refrigerant cycle systems may lead to malfunction.
5. Use 2-Core lead wires such as shielded twist pair cable for the communication wiring.
(Do not use 3-Core or over.)

6. Use the same kind of cables in the same H-LINK system.
7. The communication wiring is required to be separated from the power supply wiring when installed parallel to the power supply wiring.
Keep at least 5cm between the communication wiring and the power supply wiring, and also min. 1.5m between the communication wiring and power supply wiring for other electrical device. If the above is not secured, put the power supply wiring into the metal conduit tube to separate it from other wirings. Make sure to ground the end of the power supply wiring.
8. Connect the following communication wiring to the terminals 1 and 2 of TB2 in the outdoor unit A (main unit).
 - a. between outdoor unit and indoor unit
 - b. between outdoor unit and outdoor unit in other refrigerant cycles
9. Do not connect the power supply wiring to the terminal block for communication wiring (TB2).
All the printed circuit boards in the same refrigerant cycle will be damaged.
10. Connect the earth wire to the outdoor/indoor units. The earth wiring work under the condition of 100W (max.) ground resistance must be performed by a qualified person.
11. Connect the communication wiring between outdoor units in the same refrigerant cycle to the terminals 3 and 4 on the terminal block (TB2).

• Communication Wiring



NOTES:

- For the combination units, DSW settings of Main and Sub are required.
- Alarm occurs if the communication wires between main outdoor unit and sub outdoor units are connected to the terminals 1 and 2 for H-LINK system.
- In case that alarm is indicated on the LCD of Main outdoor unit, follow the "7-segment" indication of the Main outdoor unit for checking.
- Perform function setting at Main outdoor unit.
- Maximum number of refrigerant groups with one central controller is 64 (for H-LINK II).
Maximum number of indoor units to be connected is 160 (for H-LINK II).

6. Electrical Wiring

< 380-415V/50Hz, 380V/60Hz >

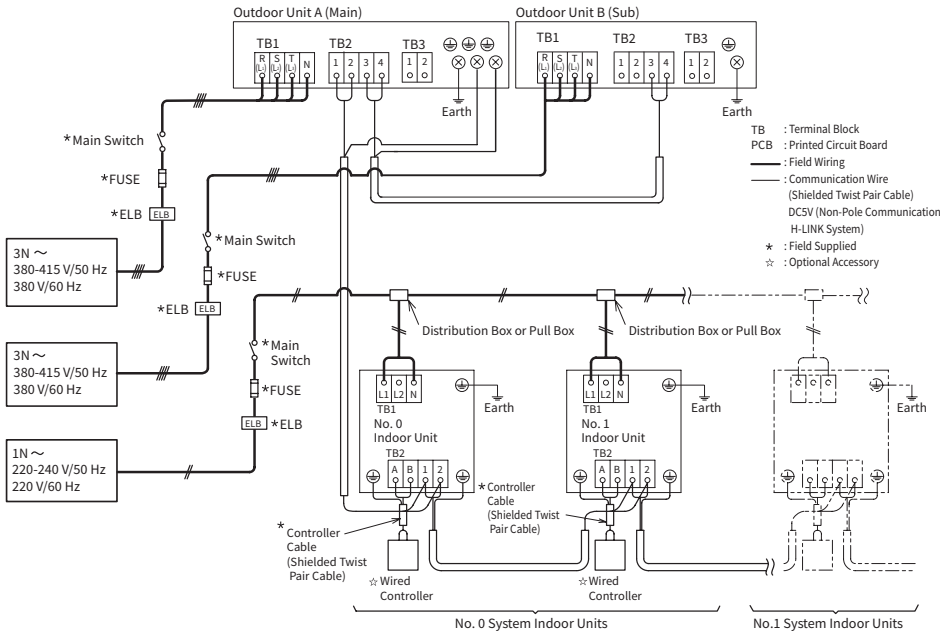


Fig. 6.1 Instruction for Electrical Wiring Connection

6.5 PSW and DIP Switch Setting for Outdoor Unit

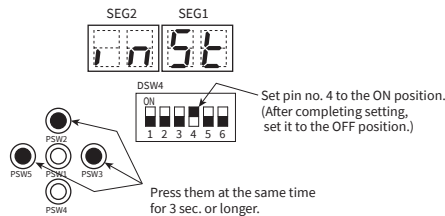
NOTE:

- airCloud Tap application can be used to make installation settings except end terminal resistance. For details, refer to "Outdoor Unit Installation Setting" in the airCloud Tap application manual.

1. H-LINK Connection Setting

When connecting H-LINK or H-LINK II, set the outdoor unit number, the refrigerant cycle number, and the end terminal resistance.

- With the power ON, set pin no. 4 of the DIP switch (DSW4) to the ON position, and press push switches (PSW) 2, 3, and 5 at the same time for 3 seconds. The 7-segment LED will display the following and the system will enter the installation setting mode.



3. Refrigerant Cycle Number and Indoor Unit Number Setting

Step1. Set the same refrigerant cycle number for the outdoor and indoor units of the same refrigerant system.

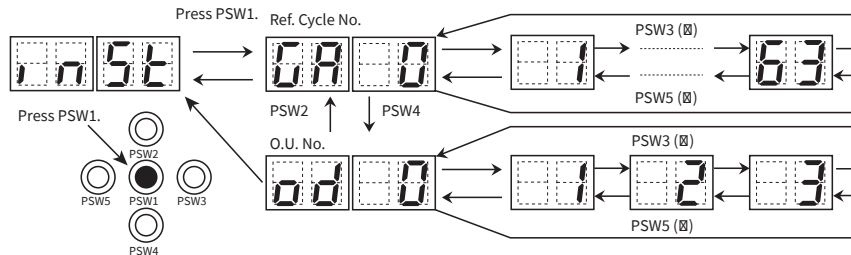
Step2. Set the outdoor unit number of the system combination.

Step3. Press the push switch (PSW1) while in installation setting mode.

Step3-1 The 7-segment LED will display the following and the number will change by pressing PSW3 or PSW5.

Step3-2 The change between refrigerant cycle number and outdoor unit number can be made by pressing PSW2 and PSW4.

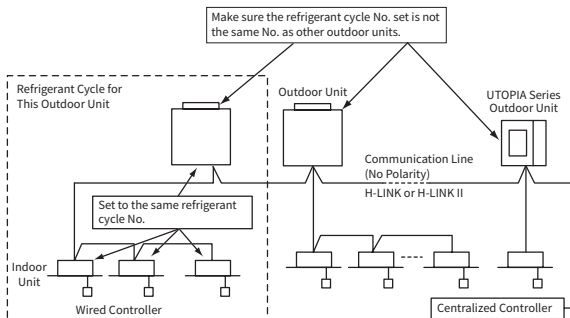
Step4. After completing setting, press push switch (PSW1) and set dipswitch (DSW4) pin to the OFF position.



Base Unit (Before shipment) (No. 0)	Combination of Base Units		
	Outdoor Unit A (No. 0)	Outdoor Unit B (No. 1)	Outdoor Unit C (No. 2)
od 0	od 1	od 2	od 3

NOTE:

- Refer to the Installation and Maintenance Manual attached to the indoor unit for the indoor unit refrigerant cycle number setting.



Maximum Number of Connectable
Outdoor Units and Indoor Units
(for H-LINK II)

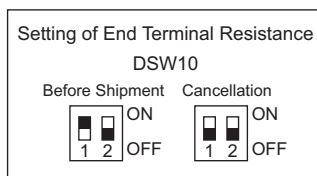
Outdoor Unit	64
Indoor Unit	160

NOTE:

- For installing the outdoor unit and the indoor unit on the same communication wire, which cannot be used for H-LINK II, maximum number of connectable indoor units is 128.

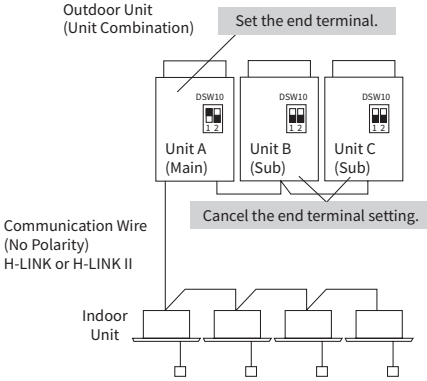
- Setting of End Terminal Resistance

Before shipment, No. 1 pin of DSW10 (for the setting of end terminal resistance) is in the "ON" position.

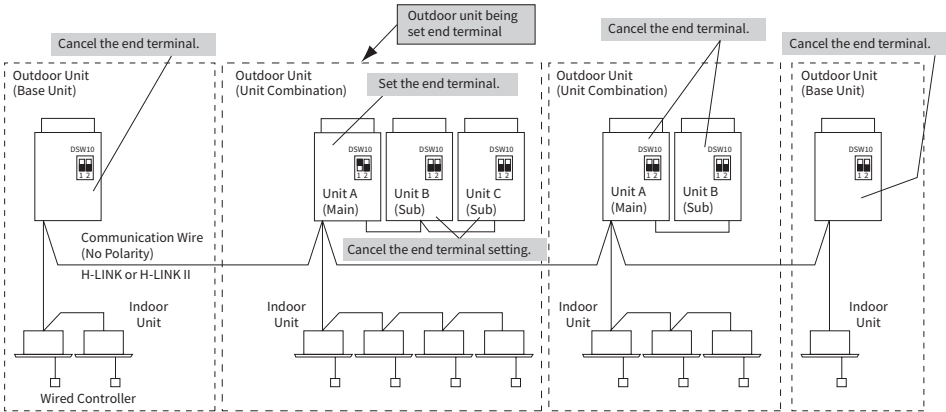


6. Electrical Wiring

- In the case of one refrigerant cycle in the same H-LINK or H-LINK II, set all No. 1 pins of DSW10 in the “OFF” position except the main outdoor unit A.



- In the case of more than one refrigerant cycles in the same H-LINK or H-LINK II, set all No. 1 pins of DSW10 in the “OFF” position except the main outdoor unit A.



• Function Setting

External Input/Output and Function Setting

Make sure to perform external input/output and function setting while the outdoor unit is stopped.
It cannot be set while the outdoor unit is operating or check mode.

[External Input/Output Setting]

■ Start of Setting

Turn ON DSW4-No.4.
Turn ON DSW4-No.6.

[Function Setting]

■ Start of Setting

Turn ON DSW4-No.4.
Turn ON DSW4-No.5.

For the setting mode, refer to ① below. For the setting mode, refer to ② below.

■ Exit Setting Mode

Turn OFF DSW4-No.6 during indicated
External Input/Output Setting Mode.
Turn OFF DSW4-No.4.

■ Exit Setting Mode

Turn OFF DSW4-No.5 during indicated
Function Setting Mode.
Turn OFF DSW4-No.4.

NOTE:

Release "Menu Mode" after
the setting is completed.
Otherwise, the air conditioner
may not operate appropriately.

After setting, confirm DSW4 setting is same as setting before shipment.

② [Function Setting]

By pressing the push-switches PSW3 (▶) and PSW5 (◀),
the setting can be changed.
PSW4 (▼): forward, PSW2 (▲): backward
Refer to the Service Manual for more details.

Fill out the selected function setting No.
in the space of the table as shown.

< Example >
1

① [External Input/Output Setting]

By pressing the push-switches PSW3 (▶) and PSW5 (◀),
the function No. can be selected.
PSW4 (▼): forward, PSW2 (▲): backward

Fill out the selected function setting No.
in the space of the table as shown.

< Example >
1

Item	SEG2	SEG1	SET
1 Input Setting 1 CN17 [1-2 pin]	1	1	
2 Input Setting 2 CN17 [2-3 pin]	1	2	
3 Input Setting 3 CN18 [1-2 pin]	1	3	
4 Output Setting 1 CN16 [1-2 pin]	0	1	
5 Output Setting 2 CN16 [1-3 pin]	0	2	

(Setting Before Shipment)

Before shipping, the input/output function settings are specified
to each input/output terminal according to above table.
The details of function No. and external input/output settings
are as shown below.

Setting of External Input and Output Function

Function No.	Input	Output
1	Fixing Heating Operation Mode **	Operation Signal
2	Fixing Cooling Operation Mode	Alarm Signal
3	Demand Stoppage	Compressor ON Signal
4	Outdoor Fan Motor Start/Stop	Defrost Signal **
5	Forced Stoppage	-
6	Demand Current Control 40%	-
7	Demand Current Control 60%	-
8	Demand Current Control 70%	-
9	Demand Current Control 80%	-
10	Demand Current Control 100%	-
11	Low Noise Setting 1	-
12	Low Noise Setting 2	-
13	Low Noise Setting 3	-
14	External Abnormality Detection Setting	-
0	No Setting	No Setting

*1. Please do not set for Cooling Only.
The same input/output function setting cannot be set to different
input/output terminals.
If set, a setting of larger function number becomes invalid.
Example: When setting of input 1 and input 2 are same,
input 2 will be invalid.

Function No.14 is valid only when applied to Input Setting 3.

Item	SEG2	SEG1	SET
1 Not Prepared	FR	0	
2 Night-Shift (Low Noise)	RI	0	
3 Cancellation of Outdoor Ambient Temperature Limit	GS	0	
4 Not Prepared	JO	0	
5 Not Prepared	BU	0	
6 Cancellation of Outdoor Unit Hot Start	HR	0	
7 Priority Capacity Mode	RU	0	
8 Minimum Evaporating Temperature Setting for Cooling	HC	0	
9 Not Prepared	HH	0	
10 Indoor Expansion Valve Control Target Value for Cooling	SC	0	
11 Not Prepared	SH	0	
12 Not Prepared	SI	0	
13 Not Prepared	SO	0	
14 Not Prepared	CI	0	
15 Indoor Expansion Valve Initial Opening for Cooling	CB	0	
16 Not Prepared	CH	0	
17 Low Noise Setting	DB	0	
18 Demand Function Setting	DE	0	
19 Wave Function Setting	UE	0	
20 Protection of Decrease in Outlet Temperature for Cooling	Fb	0	
21 Outlet Temperature Control (POAS)	Ff	0	
22 Adjustment of Fan Rotation (for multiple installation)	Fo	0	
23 Not Prepared	Lf	0	
24 Not Prepared	dS	0	
Item	SEG2	SEG1	SET
25 Not Prepared	F1	0	
26 Crankcase Heater Control during Stoppage	F2	0	
27 Not Prepared	F3	0	
28 Intermittent Operation of Outdoor Fan Motor	F4	0	
29 Indoor Expansion Valve Control Target Value for Cooling (Only for 4-way Cassette Type)	F5	0	
30 Not Prepared	F6	0	
31 Not Prepared	F7	0	
32 Not Prepared	F8	0	
33 Not Prepared	F9	0	
34 Not Prepared	FC	0	
35 Not Prepared	Fd	0	
36 Permit Indoor Fan Operation during Forced Stoppage	FE	0	
37 Not Prepared	FF	0	
38 Not Prepared	FG	0	
39 Not Prepared	FH	0	
40 Not Prepared	Fi	0	
41 Not Prepared	FJ	0	
42 Not Prepared	FL	0	
43 Not Prepared	Fn	0	
44 Not Prepared	FP	0	
45 Not Prepared	Fr	0	
46 Not Prepared	FU	0	
47 Not Prepared	FY	0	

7. Air-Tight Test and Additional Refrigerant Charge

7.1 Air-Tight Test

1. Check to ensure that spindles of the stop valves for gas and liquid pipes are closed completely before air-tight test.

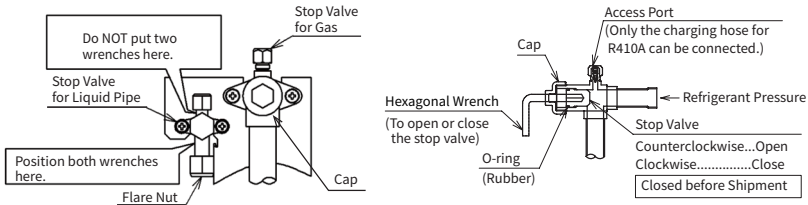
Check the cap shape and tighten according to the torque specification as shown in the table below.

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

< Tightening Check of Stop Valves >

After connecting the pipe, remove the caps of stop valves for gas and liquid. Tighten the open-close spindle in the closing direction according to the following tightening torque.

- Caution for Operation of Stop Valves
 1. Remove the stop valve caps before performing the air-tight test after connecting the refrigerant piping. Tighten the spindle (valve) in clockwise direction according to the following tightening torque.
 2. Perform the work after warming the spindle part with a dryer etc. when controlling the stop valve in a cold area.
(O-ring of the spindle part will harden at the low temperature and the refrigerant leakage may occur.)
 3. Do not apply excessive force after fully opening the spindle. (Tightening Torque: < 5.0N·m)
(The back seat is not provided.)
 4. When each valve is opened, remove tags “Close” (Accessories) and attach tags “Open” instead.



< CNCCLI >

Outdoor Unit (Base Unit)	Tightening Torque (N·m)							Hexagonal Wrench Size (mm)	
	Spindle (Valve)		Flare Nut	Cap		Check Joint		Gas Valve	Liquid Valve
	Gas Valve	Liquid Valve	Liquid	Gas Valve	Liquid Valve	Gas Valve	Liquid Valve		
8 - 14HP	22.0 - 28.0	7.0 - 9.0	33.0 - 42.0	42.0 - 48.0	33.0 - 42.0	9.0 - 14.0	14.0 - 18.0	10	4
16 - 20HP			50.0 - 62.0						5
22 - 30HP		9.0 - 11.0	68.0 - 84.0		50.0 - 62.0				

< Air-Tight Test Method >

1. Connect the manifold gauge to the check joints of the liquid line and the gas line stop valves using charging hoses with a vacuum pump or a nitrogen cylinder.

Perform the air-tight test.

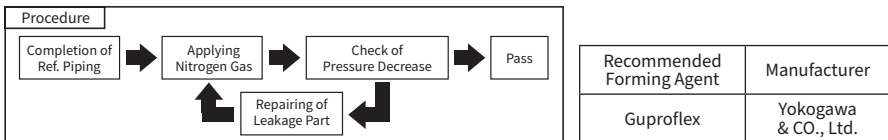
Do not open the stop valves. Apply nitrogen gas pressure of 4.15MPa for "air365 Max" series.

For checking gas leakage, use the leak detector or forming agent. If there is any leakage, fix the leaking part.

2. For checking gas leakage, do not use a forming agent which generates ammonia.

Additionally, do NOT use a household detergent as forming agent whose components are not clear.

The recommended forming agent for checking gas leakage is shown in the table.



⚠ WARNING

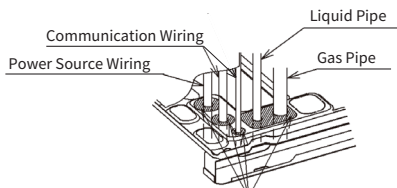
- **Be sure to use Nitrogen Gas for air-tight test. If other gases such as oxygen gas, acetylene gas or fluorocarbon gas are accidentally used, it may cause an explosion or gas intoxication.**

<Insulation Work>

1. Securely insulate gas piping side and liquid piping side individually.
Make sure to insulate the union flare nut for the piping connection as well.
2. Mount the piping cover equipped with the outdoor unit after connecting the pipe.
Completely seal the penetration part at the bottom of the pipes with insulation in order to prevent rain water from entering the conduit.
3. Cover the gap between the piping cover and pipes with a packing (field-supplied) after the insulation work is completed.

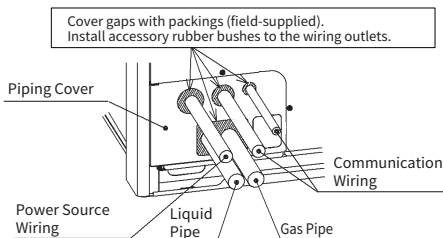
NOTICE

- If the gap is not covered, the unit may be damaged if snow, rain water or animals enter the unit.
- For Piping from Bottom Base



Cover gaps with packings (field-supplied).
Install accessory rubber bushes to the wiring outlets.

- For Piping from Front or Rear Side Piping Cover



Cover gaps with packings (field-supplied).
Install accessory rubber bushes to the wiring outlets.

7.2 Vacuuming

<Connecting >

Connect a manifold gauge, vacuum gauge and vacuum pump to the check joints (Gas Stop Valve and Liquid Stop Valve).

< Basic Method >

If the penetration of moisture is suspected, perform "Triple Evacuation Method" that is described in the next paragraph.

- Step1. Vacuum until the pressure reaches 500 microns (0.5 mmHg) or lower for two hours.
- Step2. After vacuum pumping work, stop the vacuum pumping and leave the gauge for one hour.
- Step3. Check to ensure that the pressure in the vacuum gauge does not increase.
- Step4. Tighten the caps of check joint according to the specified torque after the vacuum drying work.
- Step5. If the pressure inside the gauge does not reach 500 microns, it is considered that there is gas leakage.
- Step6. Check for any gas leakage once again.
- Step7. If no leakage exists, it might be moisture remains inside the pipes.
Perform "Triple Evacuation Method".

< Triple Evacuation Method >

According to the following [Step 1] [Step 2] [Step 3] in order, conduct vacuum drying work.

Step1.

- Step1-1 Vacuum until the pressure reaches 2000 microns (2.0 mmHg).
- Step1-2 Pressurize with nitrogen up to 0.3 MPaG (50 PSIG) for 15 minutes.
- Step1-3 Release pressure to atmosphere level less than 0.03 MPaG (5 PSIG).

Step2.

- Step2-1 Vacuum until the pressure reaches 1000 microns (1.0 mmHg).
- Step2-2 Pressurize with nitrogen up to 0.3 MPaG (50 PSIG) for 15 minutes.
- Step2-3 Release pressure to atmosphere level less than 0.03 MPaG (5 PSIG).

Step3.

- Step3-1 Vacuum until the pressure reaches 500 microns (0.5 mmHg).
- Step3-2 Stop vacuum pump.
- Step3-3 Check that the vacuum 500 microns (0.5 mmHg) can maintain for one hour.

NOTICE

- If tools or measuring instruments come into contact with the refrigerant, use the tools or the measuring instruments exclusively for R410A.
- Do not perform vacuum pumping work with valves of the outdoor units open.
Otherwise, the refrigerant charged before shipment may leak and it may result in failure.
If moisture remains inside the pipes, the compressor may be damaged.

7. Air-Tight Test and Additional Refrigerant Charge

7.3 Additional Refrigerant Charge Calculation

Table 7.1 Additional Refrigerant Charge Calculation

Additional Refrigerant Charge Calculation

Although refrigerant has been charged into this unit in advance, additional refrigerant charge is required according to piping length. Determine the additional refrigerant quantity according to the following procedure, and charge the system with it. Record the additional refrigerant quantity to facilitate maintenance and servicing activities thereafter.

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

No.	Symbol	Contents	Additional Ref. Charge																																								
1	W1	<p>Additional Refrigerant Charge Calculation for Liquid Piping (W1 kg)</p> <table><tr><th>Pipe Diameter (mm)</th><th>Total Piping Length (m)</th><th>Refrigerant Amount for 1m Pipe (kg/m)</th><th>Additional Ref. Charge (kg)</th></tr><tr><td>φ 28.58</td><td></td><td>× 0.67 =</td><td></td></tr><tr><td>φ 25.4</td><td></td><td>× 0.52 =</td><td></td></tr><tr><td>φ 22.2</td><td></td><td>× 0.36 =</td><td></td></tr><tr><td>φ 19.05</td><td></td><td>× 0.26 =</td><td></td></tr><tr><td>φ 15.88</td><td></td><td>× 0.17 =</td><td></td></tr><tr><td>φ 12.7</td><td></td><td>× 0.11 =</td><td></td></tr><tr><td>φ 9.52</td><td></td><td>× 0.056 =</td><td></td></tr><tr><td>φ 6.35</td><td></td><td>× 0.024 =</td><td></td></tr><tr><td colspan="3">Total Additional Ref. Charge For Liquid Piping</td><td></td></tr></table> <p><u>NOTE:</u> Round off the numbers two decimal places.</p>	Pipe Diameter (mm)	Total Piping Length (m)	Refrigerant Amount for 1m Pipe (kg/m)	Additional Ref. Charge (kg)	φ 28.58		× 0.67 =		φ 25.4		× 0.52 =		φ 22.2		× 0.36 =		φ 19.05		× 0.26 =		φ 15.88		× 0.17 =		φ 12.7		× 0.11 =		φ 9.52		× 0.056 =		φ 6.35		× 0.024 =		Total Additional Ref. Charge For Liquid Piping				kg
Pipe Diameter (mm)	Total Piping Length (m)	Refrigerant Amount for 1m Pipe (kg/m)	Additional Ref. Charge (kg)																																								
φ 28.58		× 0.67 =																																									
φ 25.4		× 0.52 =																																									
φ 22.2		× 0.36 =																																									
φ 19.05		× 0.26 =																																									
φ 15.88		× 0.17 =																																									
φ 12.7		× 0.11 =																																									
φ 9.52		× 0.056 =																																									
φ 6.35		× 0.024 =																																									
Total Additional Ref. Charge For Liquid Piping																																											
2	W2	<p>Additional Refrigerant Charge Calculation for Indoor Unit (W2 kg)</p> <p>The additional refrigerant charge is required depending on the number of connected indoor units and ratio of indoor unit connection capacity (Indoor Unit Total Capacity / Outdoor Unit Capacity).</p> <p>Additional Refrigerant Charge Quantity (kg)</p> <table><tr><th rowspan="2">Indoor Unit Capacity (HP)</th><th colspan="2">Additional Charge Ref. (kg)/unit</th></tr><tr><th>I.U. Capacity Ratio is less than 95%</th><th>I.U. Capacity Ratio is 95% or more</th></tr><tr><td>0.4-1.3</td><td>0.0</td><td>0.3</td></tr><tr><td>1.5-2.0</td><td>0.0</td><td>0.5</td></tr><tr><td>2.3-3.3</td><td>0.0</td><td>0.9</td></tr><tr><td>4.0-6.0</td><td>0.0</td><td>1.1</td></tr><tr><td>8.0-12.0</td><td>0.0</td><td>1.4</td></tr><tr><td>16.0</td><td>0.0</td><td>1.5</td></tr><tr><td>20.0</td><td>0.0</td><td>2.0</td></tr></table> <p><u>NOTE:</u> 1. The table above shows the quantity of additional refrigerant charge per indoor unit. e.g. 12 indoor units of 1.5 hp are connected and I.U. Capacity Ratio is 95% or more. 0.5kg/unit × 12 unit = 6.0kg 2. The quantity of additional refrigerant based on the above calculation is must not be exceed the following formula. Maximum additional refrigerant charge = ("Total Indoor Unit Capacity (HP)" × 0.112) kg or 13.2kg whichever is bigger. (Round off the numbers two decimal places.)</p>	Indoor Unit Capacity (HP)	Additional Charge Ref. (kg)/unit		I.U. Capacity Ratio is less than 95%	I.U. Capacity Ratio is 95% or more	0.4-1.3	0.0	0.3	1.5-2.0	0.0	0.5	2.3-3.3	0.0	0.9	4.0-6.0	0.0	1.1	8.0-12.0	0.0	1.4	16.0	0.0	1.5	20.0	0.0	2.0	kg														
Indoor Unit Capacity (HP)	Additional Charge Ref. (kg)/unit																																										
	I.U. Capacity Ratio is less than 95%	I.U. Capacity Ratio is 95% or more																																									
0.4-1.3	0.0	0.3																																									
1.5-2.0	0.0	0.5																																									
2.3-3.3	0.0	0.9																																									
4.0-6.0	0.0	1.1																																									
8.0-12.0	0.0	1.4																																									
16.0	0.0	1.5																																									
20.0	0.0	2.0																																									
3	W3	<p>The additional refrigerant charge is required depending on the number of connected outdoor units. (W3 kg)</p> <p>Select adequate refrigerant charge from the table below.</p> <table><tr><th rowspan="2">Outdoor Unit Capacity (HP)</th><th colspan="3">Additional Charge Ref. (kg)/unit</th></tr><tr><th>24</th><th>26</th><th>28</th></tr><tr><td>RAS-*(H/R)NCCL(L/R)(L/W)</td><td>0.8</td><td>1.8</td><td>1.8</td></tr></table> <p><u>NOTE:</u> The table above shows the quantity of additional refrigerant charge per outdoor unit. e.g. RAS-480HNCCLW is 2 outdoor unit of 24HP connected. 0.8kg/unit × 2 unit = 1.6kg</p> <p>※W3 is not suitable for cooling only, and W3 defaults to 0kg</p>	Outdoor Unit Capacity (HP)	Additional Charge Ref. (kg)/unit			24	26	28	RAS-*(H/R)NCCL(L/R)(L/W)	0.8	1.8	1.8	kg																													
Outdoor Unit Capacity (HP)	Additional Charge Ref. (kg)/unit																																										
	24	26	28																																								
RAS-*(H/R)NCCL(L/R)(L/W)	0.8	1.8	1.8																																								
4	W4	<p>Additional Refrigerant Charge Quantity for Each CH-Box (Multiple Branch Type) Connected (W4 kg)</p> <p>If CH-Boxes (multiple branch type) are connected, additional refrigerant charge is required.</p> <p>Select adequate refrigerant charge from the table below.</p> <table><tr><th>CH-Box Model</th><th>CH-AP04MSSX</th><th>CH-AP08MSSX</th><th>CH-AP12MSSX</th><th>CH-AP16MSSX</th></tr><tr><td>Additional Ref. Charge (kg)</td><td>0.1</td><td>0.2</td><td>0.3</td><td>0.4</td></tr></table> <p>※W4 is not suitable for cooling only, and W4 defaults to 0kg</p>	CH-Box Model	CH-AP04MSSX	CH-AP08MSSX	CH-AP12MSSX	CH-AP16MSSX	Additional Ref. Charge (kg)	0.1	0.2	0.3	0.4	kg																														
CH-Box Model	CH-AP04MSSX	CH-AP08MSSX	CH-AP12MSSX	CH-AP16MSSX																																							
Additional Ref. Charge (kg)	0.1	0.2	0.3	0.4																																							
5	W	Calculation of Additional Ref. Charge (W1 + W2 +W3 + W4) =	kg																																								

NOTES:

1. Some refrigerant charge calculations differ when installing Wall Type (RPK-FSN4M Series) with expansion valve kit.

Refer to "Installation & Maintenance Manual".

2. Ensure that the total additional refrigerant charge quantity (W) should not exceed the max. additional refrigerant charge quantity shown in the table below "Table(※)".

(2) Charging Work

Charge the system with refrigerant R410A according to "Installation & Maintenance Manual".

(3) Recording of Additional Refrigerant Charge

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

$$\text{Total Ref. Charge} = \text{W} + \text{W0} \\ \text{This System} = \text{ } + \text{ } = \text{ } \text{ kg}$$

Total Additional Ref. Charge: W kg

Total Ref. Charge: kg

Date of Ref.Charge Work: / /

※Attach this label on the service cover of the outdoor unit after recording the calculation result in the blank above.

NOTE:

•W0 is outdoor unit Ref. charge before shipment.

•In case of the combination of the base units, calculate the total ref. charge before shipment of the outdoor units to be combined.

Table(※) < Max. Additional Refrigerant Charge Quantity >

Outdoor Unit Capacity (HP)	Max. Additional Ref. Charge (kg)									
	8.10	12.14	16-20	22.24	26-30	32-42	44-66	68-88	90-120	
RAS-*(H/R)NCCL(L/W)	28.0	36.0	40.0	46.0	56.0	63.0	63.0	73.0	93	

< Ref. Charge Amount of O.U Before Shipment (W0) kg >

Outdoor Unit Capacity (HP)	W0 Outdoor Unit Ref. Charge (kg)									
	8	10	12	14	16	18	20	22	24	30
RAS-*(H/R)NCCL(L/W)	5.6	5.6	8.3	8.3	9.5	10.2	10.2	11.2	11.6	11.6

NOTE:

- When the refrigerant is recovered or charged because of repairing, operating or adjusting the unit, record the refrigerant quantity again.

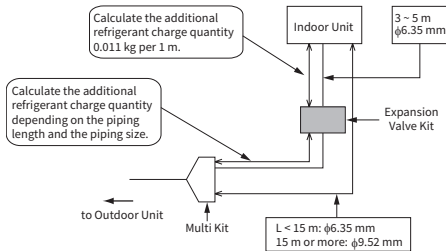
NOTICE

- Emissions of the fluorocarbons without any reason are prohibited.
- For disposal and maintenance of this product, collection of fluorocarbons is required.
- Additional Refrigerant Calculation for an indoor unit with the Expansion Valve Kit
The additional refrigerant calculation for an indoor unit with the Expansion Valve Kit is as follows. Refer to item "Calculating Method of Additional Refrigerant Charge W1".

- Firstly, calculate the additional refrigerant amount for the liquid pipe between Multi-Kit and the Expansion Valve Kit according to the piping length and diameter.
- Then, calculate the additional refrigerant amount for the liquid pipe between indoor unit and the Expansion Valve Kit (Pipe diameter: $\phi 6.35$ Refrigerant Amount for 1m Pipe: 0.011kg/m).

NOTE:

- Refer to Table 2.2 "System Combination" for the number of indoor units and the expansion valve kit connectable to the outdoor unit.



7.4 Charging Work

- The additional refrigerant charge is required according to the total piping length. Refer to Table 7.1.
- After vacuum pumping work, check that the gas stop valve and liquid stop valve are fully closed. Charge the additional refrigerant from the check joint of liquid stop valve (acceptable error must be within 0.5 kg).
- After the refrigerant has been charged, fully open the liquid stop valve and the gas stop valve.

NOTE:

- The gas staying at O-ring or screw part may make sound when removing the cap of the spindle.
- However, it is not gas leakage.

- If it is impossible to charge the specified quantity of refrigerant, follow the procedure below.

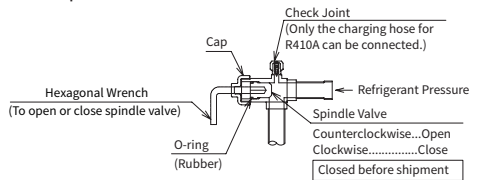
- fully open the stop valve for the gas line.

⚠ CAUTION

- Do not apply excessive force to the spindle valve after fully opening the spindle. Otherwise, the spindle valve flies out due to refrigerant pressure. At the test run, open fully the spindle valve, otherwise, the devices will be damaged. (It is closed before shipment.)**

< Caution for Opening Stop Valve >

- Do not apply excessive force after fully opening the spindle. (Tightening Torque: < 5.0 N·m) (The back seat is not provided.)
- When the valve is opened, remove the tags "Close" (Accessories) and attach the tags "Open" (Accessories) instead.
- Tighten securely the caps according to the tightening torque (Caution for Operation of Stop Valves in Item 7.1) after each spindle valve is opened.



Hexagonal Wrench Size (mm)

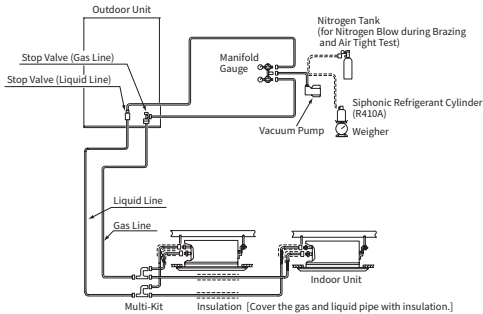
Outdoor Unit (Base Unit)		Gas Valve	Liquid Valve
Standard Type	8 - 14 HP	10	4
	16 - 20 HP		
	22 - 30 HP		5

- Operate the compressor in the cooling mode and charge the additional refrigerant from the check joint of the liquid stop valve (acceptable error must be within 0.5 kg). At this time, keep the liquid stop valve slightly opened.
- After the refrigerant is charged, fully open the liquid stop valve and the gas stop valve.
- Calculate securely the additional refrigerant quantity for charging. If the quantity of additional refrigerant is not correct, it may

7. Air-Tight Test and Additional Refrigerant Charge

cause compressor failure. The additional refrigerant must be charged in a liquid condition.

- e. After the refrigerant is charged, fully open the liquid stop valve and the gas stop valve.



NOTES:

- Charge the correct refrigerant quantity according to Table 7.1. If not, a compressor may be damaged due to an excess or insufficient refrigerant charge.
- Refrigerant charge from check joint of gas stop valve may lead to compressor failure. Be sure to charge refrigerant from the check joint of liquid stop valve.
- Insulate the liquid piping and gas piping completely to avoid decreasing of performance and dewing on the surface of the pipe.
- Insulate the flare nut and union of the piping connection with insulation.
- Check to ensure that there is no gas leakage. If a large refrigerant leakage occurs, it will cause difficulty with breathing or harmful gases would occur if a fire was being used in the room.

< Caution for Refrigerant Leakage>

The room where the packaged air conditioner is installed, the refrigerant gas should be controlled not to exceed the limit concentration in case of the refrigerant leakage.

The refrigerant R410A of incombustible and non-toxic is adopted with this unit. If by any chance the refrigerant gas is leaked and filled in the room, the possibility of suffocation may occur. Especially for the "air365 Max" series, the outdoor unit is multi-type air conditioner by connecting multiple indoor units with long distance piping. Accordingly, the refrigerant charging quantity is larger than general individual unit. Before the indoor unit installation, confirm that the room can keep the lower gas concentration than the limit value in order to take the emergency

countermeasures even if the gas leakage is occurred.

< Calculation of Refrigerant Concentration >

1. Calculate the total quantity of refrigerant R (kg) charged in the system connecting all the indoor units of rooms to be air-conditioned.
2. Calculate the Room Volume V (m^3) of each room.
3. Calculate the refrigerant concentration C (kg/m^3) of the room according to the following equation.

R: Total Quantity of Charged Refrigerant (kg)

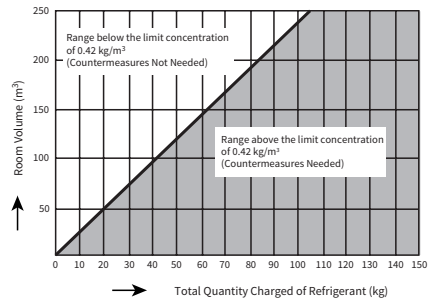
V: Room Volume (m^3)

= C: Refrigerant Concentration

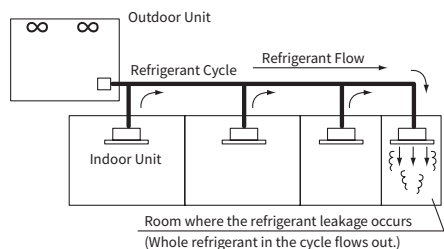
< 0.42 (kg/m^3) for R410A

WARNING

- **The refrigerant R410A is non-toxic and inflammable in its original state. However, in consideration of a state where the refrigerant leaks into the room, measures against refrigerant leaks must be taken in small rooms where the tolerable level could be exceeded. Take countermeasures by installing ventilation devices, etc.**



After calculation, the room to install this unit is proved not to keep the gas concentration lower than the limit value. However, the air conditioner should be installed in this room from unavoidable circumstances, each of the following countermeasures should be taken.



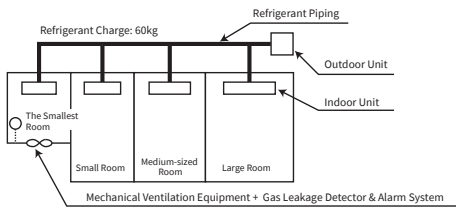
Provide an opening^{*1} for ventilation between rooms in order not to exceed the permissible

concentration.

- *1. It is opening without door or opening at the top or bottom of door with floor space more than 0.15%.

NOTES:

<Example>



- The quantity of refrigerant gas leakage against each room should be calculated as 60kg each.
- The refrigerant concentration must be below 0.42 kg/m^3 for each room.

The installer and system specialist shall secure against leakage according to local regulations or standards.

The following standards may be applicable, if local regulations are not available.

International Organization for Standardization, ISO5149 or European Standard, EN378 or Japan Standard, KHKS0010.

8. Test Run

Test run should be performed according to item 8.2. And use Table 8.1 for recording test run.

⚠ WARNING

- **An electrical shock will occur by residual voltage.**
Turn OFF the power source completely before starting the maintenance for electrical parts.
Check to ensure that no residual voltage exists after turning OFF the power source.
- **Check to ensure that each wire is correctly connected at each phase of power supply. If it is incorrectly connected, electrical parts will be damaged, the unit will not operate and the alarm code will be indicated. In this case, connect each wire correctly.**
- **Do not operate the system until all the check points have been cleared.**
As for the test run of indoor unit, check Installation and Maintenance Manual attached to the indoor unit.

8.1 Before Test Run

1. Check to ensure that the refrigerant piping and communication between outdoor unit and indoor units are connected to the same refrigerant cycle.
If not, it will cause abnormal operation and a serious accident.
Check that the DIP switch settings of the refrigerant cycle No. (DSW1 and RSW1 [O.U.], DSW5 and RSW2 [I.U.]) and the unit number (RSW) for the indoor units apply to the system.
Confirm that the DIP switch settings on the printed circuit board of the indoor units and the outdoor units are correct. Especially, pay attention to the setting of outdoor unit No., the refrigerant cycle No. and the end terminal resistance. Refer to Chapter 6. Electrical Wiring.
2. Check to ensure that the electrical resistance is more than 1 megohm, by measuring the resistance between ground and the terminal of electrical parts. If the electrical resistance is less than 1 megohm, do not operate the system until the electrical leakage is found and repaired (Refer to "Caution for Insulation Resistance" for details.).
Do not impress the voltage on the terminals for communication (Outdoor Unit: TB2 1, 2, 3, 4 / Indoor Unit: TB2 A, B, 1, 2). Otherwise, it may cause failure.
3. Check to ensure that each wire, L1, L2, L3 and N (R, S and T) is correctly connected to the power source.
If it is incorrectly connected, the unit will not operate and the wired controller will indicate the alarm code "05". In this case, check and change the phase of the power source according to the sheet attached to the reverse side of the service cover.
4. **Check to ensure that the switch of the main power source has been ON for more than 12 hours, to warm the compressor oil by the oil heater.**
"air365 Max" series outdoor unit does not operate for at most 4 hours after power supply (Stoppage Code d1-22).
In case of operation within 4 hours, release the protection control as follows:
 - a. Supply power to the outdoor unit.
 - b. Wait for 30 seconds.
 - c. Push PSW5 on the outdoor PCB for more than 3 seconds in order to release the d1-22.
 In case of using the wired controller for release.
NOTE:
 - As for other remote controllers, refer to

8. Test Run

Installation and Maintenance Manual
attached to each wired controller.

5. Be sure to close the service cover at the front lower side when the test run is performed.
6. Combination Unit Model Label
In case of the combination of base units, attach the combination unit model label to a visible spot of the main unit (outdoor unit A) so that the outdoor unit A can be identified easily.
Do not attach it to the sub unit (outdoor unit B and C).

CAUTION

- **Caution for Insulation Resistance**
 - **If total unit insulation resistance is lower than 1 megohm, the compressor insulation resistance may be low due to refrigerant retained in the compressor. This may occur if the unit has not been used for long periods.**
 - **Disconnect the cables to the compressor and measure the insulation resistance of the compressor itself. If the resistance value is over 1 megohm, then insulation failure has occurred at other electrical parts.**
 - **If the insulation resistance is less than 1 megohm, reconnect the compressor cables from the inverter PCB. Then, turn on the main power to apply current to the crankcase heater. After applying current for more than 3 hours, measure insulation resistance again. (Depending on the air conditions, pipe length or refrigerant conditions, it may be necessary to apply the current for a longer period of time.)**
 - **If the leakage breaker is activated, check the recommended size shown in Table 6.1 Electrical Data and Recommended Wiring, Breaker Size / 1 Outdoor Unit.**

NOTICE

- Confirm that field-supplied electrical components (main switch fuse, fuse-free breaker, earth leakage breakers, wires, conduit connectors and wire terminals) have been properly selected according to the electrical data shown in Table 6.1, and ensure that the

components comply with national and local codes.

- Use shielded wires ($\geq 0.75\text{mm}^2$) for field wiring to avoid electrical noise obstacle. (Total length of shielded wire shall be less than 1000m, and size of shielded wire shall comply with local codes.)
- Check the terminal for power source wiring (terminals “L1” to “L1” and “N” to “N” of each terminal block:
AC 400V, 380-415V, terminals “R” to “L1” and “S” to “L2” of each terminal block: AC 220V).
If not, some components will be damaged.

8.2 Test Run

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

- Step1. Check to ensure that the stop valves for gas and liquid of the outdoor unit are fully opened.
(In the case of combined outdoor units, check to ensure that all the stop valves of the outdoor units are fully opened.)
- Step2. Perform the test run of indoor units one by one sequentially, and then check the accordance of the refrigerant piping system and the electrical wiring system. (If the multiple indoor units are operated simultaneously, the system accordance cannot be inspected.)
- Step3. Perform the test run according to the following procedure. Ensure that the unit operates without any problem.

NOTE:

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

< For PC-ARF1 >

- Step1. Press and hold “Menu” and “Back/Help” simultaneously for at least 3 seconds. The test run menu will be displayed.
- Step2. Select “Test Run” by pressing “ $\Delta \nabla$ ” and press “OK”. The test run screen will be displayed.
 - The total number of indoor units connected is shown on the LCD (Liquid crystal display).
The twin combination (one (1) set with two (2) indoor units) is indicated as “2 units”, and the triple combination (one

(1) set with three (3) indoor units) is indicated as “3 units”.

Test Run Setting: 2 units	
MODE	: ◀ COOL ▶
SPEED	: AUTO
Sel. Adj. ON BackRtn	

NOTES:

- When “00 unit” is shown, the auto-address function may be performing. Cancel “Test Run” mode and set it again.
- If the indicated number is not equal to the actual number of connected indoor units, the auto-address function is not performed correctly due to incorrect wiring, the electric noise, etc.
Turn OFF the power supply, and correct the wiring after checking the following points (Do not repeat turning ON and OFF within 10 seconds.)
 - The power supply for the indoor unit is NOT turned ON or the incorrect wiring.
 - Loose Connection between Indoor Units or Wired Controller.
 - Incorrect Setting of Indoor Unit Address. (The indoor unit address overlaps.)

Step3. Start Test Run.

Step3-1 Press “ On/Off”. The test run operation will start. The operation mode, the air flow volume, the air flow direction and the test run time can be set on the test run screen. Select the item by pressing “ ” and set the detail by pressing “ ”.
By default, the automatic “2-hour OFF timer” is set.

Step3-2 Check the temperature conditions.
The unit operation cannot be performed if the conditions are out of range.

NOTE:

- Check the temperature conditions during the test run.
 - Cooling: 21.5°C DB, 15°C WB (minimum), outdoor temperature 10°C DB or more

If the system will not perform a test run, check the indoor and outdoor temperatures and humidity. (The system cannot run in cooling mode at an outdoor temperature of 10°C DB or less.)

Step4. Press “ ” or “ ”, select “LOUV.” and select “ ” (auto swing) by pressing “ ” or “ ”.
The auto swing operation will start. Check the operation sound of the louvers.
If abnormal sound is generated from louvers, it may be caused by deformation of the air panel due to incorrect installation. In this case, install the air panel again without deformation. If abnormal sound is not generated, press “ ” or “ ” again to stop the auto swing operation.

Step5. Though the temperature detections by the thermistors are invalid, the protection devices are valid during the test run. If an alarm occurs, refer to Table 8.2 Alarm Code and perform troubleshooting.
Then perform the test run again.

Step6. Use the label “Checking Method by 7-Segment Display” attached to the back side of the service cover of the outdoor unit to check the temperature, the pressure and the operation frequency of the specified portions, and check the number of the connected indoor units on the 7-segment display.

Step7. To finish the test run, wait for 2 hours (as default setting) or press “ On/Off” switch again.

Step7-1 Flashing of the “ On/Off” switch (2 seconds ON, 2 seconds OFF) indicates an abnormality in the communication between the indoor unit and the wired controller (loosened or disconnected connector, disconnected wires, or incorrect wiring etc.)

Step7-2 A small sound may be heard from the outdoor unit after turning ON the power source because the electrical expansion valve is activated to adjust the opening. Therefore, this is not an abnormality of the unit.

Step7-3 Sound may be heard from the outdoor unit for a few seconds after running or stopping the compressor, starting or finishing defrosting, etc. This sound is due to the pressure difference inside the piping from the compressor. Therefore, this is not an abnormality of the unit.

8. Test Run



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

Table 8.1 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 fan correct?	<input type="checkbox"/>
2. Is the rotation direction of the outdoor fan correct?	<input type="checkbox"/>
3. Are there any abnormal compressor sounds?	<input type="checkbox"/>
4. Has the unit been operated for at least twenty (20) minutes?	<input type="checkbox"/>

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 Gas Temperature:	°C

8. Check Pressure

Discharge Pressure:	MPa
Suction Pressure:	MPa

9. Check Voltage

Rated Voltage:	V
Operating Voltage:	L ₁ -L ₂ V, L ₁ -L ₃ V, L ₂ -L ₃ V
Starting Voltage:	V
Phase Imbalance:	$1 - \frac{V}{V_m} =$

10. Check Compressor Input Running Current

Input:	kW
Running Current:	A

11. Is the refrigerant charge adequate?	<input type="checkbox"/>
12. Do the operation control devices operate correctly?	<input type="checkbox"/>
13. Do the safety devices operate correctly?	<input type="checkbox"/>
14. Has the unit been checked for refrigerant leakage?	<input type="checkbox"/>
15. Is the unit clean inside and outside?	<input type="checkbox"/>
16. Are all cabinet panels fixed?	<input type="checkbox"/>
17. Are all cabinet panels free from rattles?	<input type="checkbox"/>
18. Is the filter clean?	<input type="checkbox"/>
19. Is the heat exchanger clean?	<input type="checkbox"/>
20. Are the stop valves open?	<input type="checkbox"/>
21. Does the drain water flow smoothly from the drain pipe?	<input type="checkbox"/>

Table 8.2 Alarm Code

Code	Category	Content of Abnormality	Leading Cause
01	Indoor Unit	Activation of Protection Device (Float Switch)	Activation of Float Switch (High Water Level in Drain Pan, Abnormality of Drain Pipe, Float Switch, or Drain Pan)
02	Outdoor Unit	Activation of Protection Device (High Pressure Cut)	Activation of PSH (Pipe Clogging, Excessive Refrigerant, Inert Gas Mixing)
03	Communication	Abnormal Communication between Indoor Units and Outdoor Units	Incorrect Wiring, Loose Terminals, Disconnected Communication Cable, Blowout of Fuse, Indoor Unit Power OFF
04		Abnormal Communication between Inverter PCB and Outdoor PCB	Inverter PCB-Outdoor PCB Communication Failure (Loose Connector, Wire Breaking, Blowout of Fuse)
05	Supply Phase	Abnormality of Power Supply Phases	Incorrect Power Supply, Connection to Reversed Phase, Open-Phase
06	Voltage	Abnormal Inverter Voltage	Outdoor Voltage Decrease, Insufficient Power Capacity
07	Cycle	Decrease in Discharge Gas Superheat	Excessive Refrigerant Charge, Failure of Thermistor, Incorrect Wiring, Incorrect Piping Connection, Expansion Valve Locking at Opened Position (Disconnect Connector)
08		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)
0A	Communication	Abnormal Communication between Outdoor Units	Incorrect Wiring, Breaking Wire, Loose Terminals
0b	Outdoor Unit	Incorrect Outdoor Unit Address Setting	Duplication of Address Setting for Outdoor Units (Sub Units) in Same Refrigerant Cycle Number
0C		Incorrect Outdoor Unit Main Unit Setting	Two (or more) Outdoor Units Set as "Main Unit" Exist in Same Refrigerant Cycle Number
11	Sensor on Indoor Unit	Abnormality of Inlet Air Thermistor	Incorrect Wiring, Disconnecting Wiring, Breaking Wire, Short Circuit
12		Abnormality of Outlet Air Thermistor	
13		Abnormality of Freeze Protection Thermistor	
14		Abnormality of Gas Piping Thermistor	
15		Abnormality of Outdoor Air Thermistor (Econo Fresh)	
16		Abnormality of Remote Sensor (DOAS)	
17		Abnormality of Thermistor Built-in Remote Controller (DOAS)	
18	Indoor Fan Motor	Abnormality of Indoor Fan System	Abnormality of Indoor Fan Motor (Step-Out), Indoor Fan Controller Failure
19		Activation of Protection Device for Indoor Fan	Fan Motor Overheat, Lockup
1A	Indoor Fan Controller	Abnormality of Fan Controller Fin Temperature	Abnormality of Fin Thermistor or Fan Controller, Heat Exchanger Clogging, Abnormality of Fan Motor
1b		Activation of Overcurrent Protection	Abnormality of Fan Motor
1C		Problem with Current Sensor	Abnormality of Fan Controller Current Sensor
1d		Activation Fan Controller Protection	Driver IC Error Signal Detection, Instantaneous Overcurrent
1E		Abnormality of Indoor Fan Controller Voltage	Indoor Voltage Decrease, Insufficient Capacity of Power Supply Wiring

8. Test Run

Code	Category	Content of Abnormality	Leading Cause
21	Sensor on Outdoor Unit	Abnormality of High Pressure Sensor	Incorrect Wiring, Disconnecting Wiring, Breaking Wire, Short Circuit
22		Abnormality of Outdoor Air Thermistor	
23		Abnormality of Discharge Gas Thermistor on Top of Compressor	
24		Abnormality of Heat Exchanger Liquid Pipe Thermistor	
29		Abnormality of Low Pressure Sensor	
30	System	Incorrect DSW Settings of Outdoor Unit for CH-Box	Connection of CH-Box to Heat Pump System, Disconnection of CH-Box to Heat Recovery System CH Unit(Generation 1 model) and CH-Box(Generation 2 model) are used in the same system together.
31		Incorrect Capacity Setting of Outdoor Unit and Indoor Unit	Incorrect Capacity Setting of Outdoor Unit and Indoor Unit, Excessive or Insufficient Indoor Unit Total Capacity Code
35		Incorrect Setting of Indoor Unit No.	Duplication of Indoor Unit No. In same Refrigerant Cycle Number
36		Incorrect of Indoor Unit Combination	Indoor Unit is Designed for R22
38		Abnormality of Picking up Circuit for Protection in Outdoor Unit	Failure of Protection Detecting Device (Incorrect Wiring of Outdoor PCB)
3A	Outdoor Unit	Abnormality of Outdoor Unit Capacity	Outdoor Unit Capacity > 120HP
3b		Incorrect Setting of Outdoor Unit Models Combination or Voltage	Incorrect Setting of Main and Sub Units(s) Combination or Voltage
3d		Abnormal Communication between Main Unit and Sub Unit(s)	Incorrect Wiring, Disconnect Wire, Breaking Wire, PCB Failure
3E		Abnormal Combination between Inverter PCB and Outdoor PCB	Incorrect Combination between Inverter PCB and Outdoor PCB
43	Protection Device	Activation of Pressure Ratio Decrease Protection	Defective Compression (Failure of Compressor or Inverter, Loose Power Supply Connection)
44		Activation of Low Pressure Increase Protection	Overload at Cooling, Expansion Valve Locking at Open Position (Loose Connector)
45		Activation of High Pressure Increase Protection	Overload Operation (Heat Exchanger Clogging, Short Circuit of Airflow), Pipe Clogging, Excessive Refrigerant, Inert Gas Mixing
47		Activation of Low Pressure Decrease Protection	Insufficient Refrigerant, Piping Clogging, Expansion Valve Locking at Close Position (Loosen Connector)
48		Activation of Inverter Overcurrent Protection	Overload Operation, Compressor Failure
51	Sensor	Abnormal Inverter Current Sensor	Current Sensor Failure
53	Inverter	Inverter Error Signal Detection	Driver IC Error Signal Detection (Protection for Overcurrent, Voltage Decrease, Short Circuit), Instantaneous Overcurrent
54		Abnormality of Inverter Fin Temperature	Abnormal Inverter Fin Thermistor, Heat Exchanger Clogging, Fan Motor Failure
55		Inverter Failure	Inverter PCB Failure
57	Fan Controller	Activation of Fan Controller Protection	Driver IC Error Signal Detection (Protection for Overcurrent, Voltage Decrease, Short Circuit), Instantaneous Overcurrent
5A		Abnormality of Fan Controller Fin Temperature	Fin Thermistor Failure, Heat Exchanger Clogging, Fan Motor Failure
5b		Activation of Overcurrent Protection	Fan Motor Failure
5C		Abnormality of Fan Controller Sensor	Failure of Current Sensor (Instantaneous Overcurrent, Increase of Fin Temperature, Voltage Decrease, Grand Fault, Step-Out)
A1	External Input	Detection of External Abnormality	Input Signal by External Abnormality Detection Setting

Code	Category	Content of Abnormality	Leading Cause
b0	Indoor Unit	Incorrect Setting of Unit Model Code	Incorrect Setting of Indoor Unit Model
b1		Incorrect Setting of Unit and Refrigerant Cycle Number	64 or More Number is Set for Address or Refrigerant Cycle
b2		Abnormality of EEPROM	EEPROM failure, Incorrect Data of EEPROM
b5		Incorrect Indoor Unit No. Setting	There are 17 or More Non-Corresponding to H-LINK II Units are Connected to One System.
b6		Abnormal Communication between Indoor PCB and Indoor Fan Controller	Communication Failure, Disconnected Communication Cable, Abnormal Connection
EE	Compressor	Compressor Protection Alarm (It cannot be reset from Wired Controller)	This alarm code appears when the following alarms* occurs three times within 6 hours. *02, 07, 08, 39, 43 to 45, 47

9. Safety and Control Device Setting

Compressor Protection

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. Oil Heater: This band type heater protects against oil foaming during cold starting, as it is energized while the compressor is stopped.

(Standard Type)

Model			RAS-080CNCCLI	RAS-100CNCCLI	RAS-120CNCCLI	RAS-140CNCCLI	RAS-160CNCCLI	RAS-180CNCCLI
For Compressor Pressure Switches			Automatic Reset, Non-Adjustable (each one for each compressor)					
High	Cut-Out	MPa	4.15 ^{-0.05} _{-0.15}	4.15 ^{-0.05} _{-0.15}	4.15 ^{-0.05} _{-0.15}	4.15 ^{-0.05} _{-0.15}	4.15 ^{-0.05} _{-0.15}	4.15 ^{-0.05} _{-0.15}
	Cut-In	MPa	3.20 ±0.15	3.20 ±0.15	3.20 ±0.15	3.20 ±0.15	3.20 ±0.15	3.20 ±0.15
Fuse Capacity 3N~, 380-415V, 50Hz 3N~, 380V, 60Hz		A	50	50	50	63	63	63
Oil Heater Capacity (pcs/unit)		W	40.8 x 1	40.8 x 1	40.8 x 1	40.8 x 1	40.8 x 1	40.8 x 1
CCP Timer			Non-Adjustable					
Setting Time		min.	3	3	3	3	3	3
For DC Fan Module Fuse Capacity 3N~, 380-415V, 50Hz 3N~, 380V, 60Hz		A	10	10	10	10	10	10

Model			RAS-200CNCCLI	RAS-220CNCCLI	RAS-240CNCCLI	RAS-260CNCCLI	RAS-280CNCCLI	RAS-300CNCCLI
For Compressor Pressure Switches			Automatic Reset, Non-Adjustable (each one for each compressor)					
High	Cut-Out	MPa	4.15 ^{-0.05} _{-0.15}	4.15 ^{-0.05} _{-0.15}	4.15 ^{-0.05} _{-0.15}	4.15 ^{-0.05} _{-0.15}	4.15 ^{-0.05} _{-0.15}	4.15 ^{-0.05} _{-0.15}
	Cut-In	MPa	3.20 ±0.15	3.20 ±0.15	3.20 ±0.15	3.20 ±0.15	3.20 ±0.15	3.20 ±0.15
Fuse Capacity 3N~, 380-415V, 50Hz 3N~, 380V, 60Hz		A	63	50	50	63	63	63
Oil Heater Capacity (pcs/unit)		W	40.8 x 1	40.8 x 2	40.8 x 2	40.8 x 2	40.8 x 2	40.8 x 2
CCP Timer			Non-Adjustable					
Setting Time		min.	3	3	3	3	3	3
For DC Fan Module Fuse Capacity 3N~, 380-415V, 50Hz 3N~, 380V, 60Hz		A	10	10	10	10	10	10

Memo

