TOSHIBA
Carrier

HFC
R410A

1131601101

AIR CONDITIONER (SPLIT TYPE)
Installation Manual

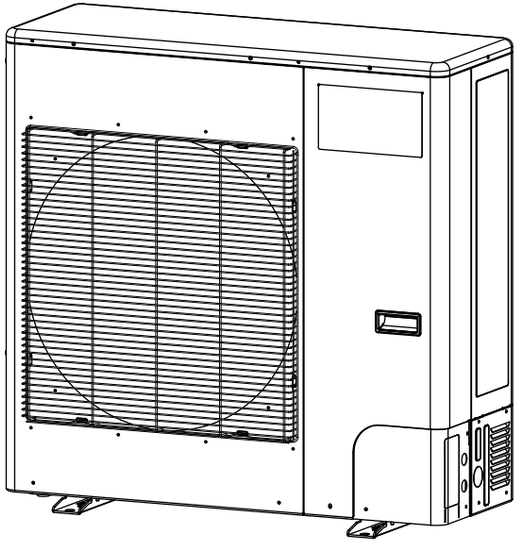
For commercial use
Pour usage commercial
Para uso comercial

Outdoor Unit

Model name:

<Heat Pump Model>

RAV-SP242AT2P-UL



Original instruction

Please read this Installation Manual carefully before installing the Air Conditioner.
- This Manual describes the installation method of the outdoor unit.
- For installation of the indoor unit, refer the Installation Manual attached to the indoor unit.

ADOPTION OF NEW REFRIGERANT

This Air Conditioner uses R410A an environmentally friendly refrigerant.

Contents

1 Precautions for safety 3
2 Accessory parts 5
3 Installation of R410A refrigerant air conditioner 6
4 Installation conditions 6
5 Refrigerant piping 9
6 Vacuum 10
7 Electrical work 12
8 Grounding 13
9 Finishing 13
10 Test run 13
11 Annual maintenance 13
12 Functions to be implemented locally 14
13 Troubleshooting 16
14 Appendix 17
15 Specifications 18

Thank you for purchasing this Toshiba Carrier air conditioner.
Please read carefully through these instructions that contain important information and ensure that you understand them.
After reading these instructions, be sure to keep them in a safe place together with the Owner's Manual and Installation Manual supplied with your product.

Generic Denomination: Air Conditioner

Definition of Qualified Installer or Qualified Service Person
The air conditioner must be installed, maintained, repaired and removed by a qualified installer or qualified service person. When any of these jobs is to be done, ask a qualified installer or qualified service person to do them for you.
A qualified installer or qualified service person is an agent who has the qualifications and knowledge described in the table below.

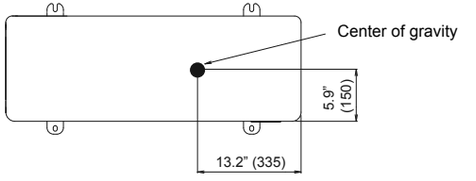
Agent	Qualifications and knowledge which the agent must have
Qualified installer	• The qualified installer is a person who installs, maintains, relocates and removes the air conditioners made by Manufacturer. He or she has been trained to install, maintain, relocate and remove the air conditioners made by Manufacturer or, alternatively, he or she has been instructed in such operations by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to these operations. • The qualified installer who is allowed to do the electrical work involved in installation, relocation and removal has the qualifications pertaining to this electrical work as stipulated by the local laws and regulations, and he or she is a person who has been trained in matters relating to electrical work on the air conditioners made by Manufacturer or, alternatively, he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work. • The qualified installer who is allowed to do the refrigerant handling and piping work involved in installation, relocation and removal has the qualifications pertaining to this refrigerant handling and piping work as stipulated by the local laws and regulations, and he or she is a person who has been trained in matters relating to refrigerant handling and piping work on the air conditioners made by Manufacturer or, alternatively, he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work. • The qualified installer who is allowed to work at heights has been trained in matters relating to working at heights with the air conditioners made by Manufacturer or, alternatively, he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work.
Qualified service person	• The qualified service person is a person who installs, repairs, maintains, relocates and removes the air conditioners made by Manufacturer. He or she has been trained to install, repair, maintain, relocate and remove the air conditioners made by Manufacturer or, alternatively, he or she has been instructed in such operations by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to these operations. • The qualified service person who is allowed to do the electrical work involved in installation, repair, relocation and removal has the qualifications pertaining to this electrical work as stipulated by the local laws and regulations, and he or she is a person who has been trained in matters relating to electrical work on the air conditioners made by Manufacturer or, alternatively, he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work. • The qualified service person who is allowed to do the refrigerant handling and piping work involved in installation, repair, relocation and removal has the qualifications pertaining to this refrigerant handling and piping work as stipulated by the local laws and regulations, and he or she is a person who has been trained in matters relating to refrigerant handling and piping work on the air conditioners made by Manufacturer or, alternatively, he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work. • The qualified service person who is allowed to work at heights has been trained in matters relating to working at heights with the air conditioners made by Manufacturer or, alternatively, he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work.

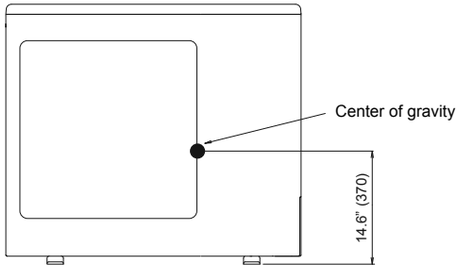
Definition of Protective Gear
When the air conditioner is to be transported, installed, maintained, repaired or removed, wear protective gloves and "Safety" work clothing.
In addition to such normal protective gear, wear the protective gear described below when undertaking the special work detailed in the table below.
Failure to wear the proper protective gear is dangerous because you will be more susceptible to injury, burns, electric shocks and other injuries.

Work undertaken	Protective gear worn
All types of work	Protective gloves "Safety" working clothing
Electrical-related work	Gloves to provide protection for electricians and from heat Insulating shoes Clothing to provide protection from electric shock
Work done at heights (50 cm or more)	Helmets for use in industry
Transportation of heavy objects	Shoes with additional protective toe cap
Repair of outdoor unit	Gloves to provide protection for electricians and from heat

■ Center of gravity

(Unit: in (mm))





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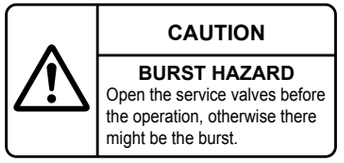
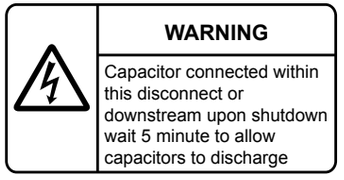
■ Warning indications on the air conditioner unit

Warning indication	Description
	**CAUTION** **BURST HAZARD** Open the service valves before the operation, otherwise there might be the burst.
	**WARNING** Capacitor connected within this disconnect or downstream upon shutdown wait 5 minute to allow capacitors to discharge.

1 Precautions for safety

Installing, starting up, and servicing air--conditioning equipment can be hazardous due to system pressures, electrical components, and equipment location (roofs, elevated structures, etc.).
Only trained, qualified installers and service mechanics should install, start--up, and service this equipment.
Untrained personnel can perform basic maintenance functions such as cleaning coils. All other operations should be performed by trained service personnel.
When working on the equipment, observe precautions in the literature and on tags, stickers, and labels attached to the equipment.
Follow all safety codes. Wear safety glasses and work gloves.
Keep quenching cloth and fire extinguisher nearby when brazing.
Use care in handling, rigging, and setting bulky equipment.
Read these instructions thoroughly and follow all warnings or cautions included in literature and attached to the unit. Consult local building codes and National Electrical Code (NEC) for special requirements. Recognize safety information. This is the safety--alert symbol ⚠. When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand these signal words: DANGER, WARNING, and CAUTION. These words are used with the safety--alert symbol. DANGER identifies the most serious hazards which will result in severe personal injury or death. WARNING signifies hazards which could result in personal injury or death. CAUTION is used to identify unsafe practices which may result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which will result in enhanced installation, reliability, or operation.

⚠ WARNING

- **Ask an authorized dealer or qualified installation professional to install/maintain the air conditioner. Perform installation work properly according to the Installation Manual.**
  Inappropriate installation may result in water leakage, electric shock or fire.
- **Be sure to ground the equipment**
  Improper grounding may cause an electric shock.
  Do not connect ground wires to gas pipes, water pipes, lightning rods or ground wires for telephone wires.
- **Turn off the main power supply switch or breaker before attempting any electrical work and maintenance.**
  Make sure all power switches are off. Failure to do so may cause electric shock.
  Use an exclusive power circuit for the air conditioner. Use the rated voltage.
- **When moving the air conditioner for installation to another place, be very careful not to allow the specified refrigerant (R410A) to become mixed with any other gaseous body into the refrigeration cycle.**
  If air or any other gas mixes with the refrigerant, the gas pressure in the refrigeration cycle will become abnormally high and it may result in the pipe bursting or personal injuries.
- **Do not modify this unit by removing any of the safety guards or by by-passing any of the safety interlock switches.**
- **Do not touch the intake or aluminium fins of the outdoor unit.**
  Doing so may result in injury.
- **Tighten the flare nut with a torque wrench in the specified manner.**
  Excessive tightening of the flare nut may cause a crack in the flare nut after a long period, which may result in refrigerant leakage.
- **Install the air conditioner securely in a location where the base can sustain the weight of the unit adequately.**

- **If refrigerant gas has leaked during the installation work, ventilate the room immediately.**
  If the leaked refrigerant gas comes in contact with fire, noxious gas may be generated.
- **After the installation work, confirm that refrigerant gas does not leak.**
  If refrigerant gas leaks into the room and flows near a fire source, such as a cooking range, noxious gas may be generated.
- **Electrical work must be performed by a qualified electrician in accordance with the NEC or local code. Make sure the air conditioner uses an exclusive power supply.**
  An insufficient power supply capacity or inappropriate installation may cause fire.
- **Use only the specified wiring during the unit installation. Ensure that all terminals are securely fixed, so preventing any external forces having a negative effect on the terminals.**

⚠ WARNING

- **When the air conditioner cannot cool or heat a room well, contact the dealer from whom you purchased the air conditioner as refrigerant leakage is considered as the cause.**
  In the case of repair that requires refill of refrigerant, ask service personnel about details of the repair.
  The refrigerant used in the air conditioner is harmless. Generally, the refrigerant does not leak. However, if the refrigerant leaks in a room and a heater or stove burner in the room catches fire, it may generate toxic gas.
  When you ask service personnel for repairing refrigerant leakage, confirm that the leakage portion has been completely repaired.
- **Do not install the air conditioner in a location that may be subjected to a risk of exposure to a combustible gas.**
  If a combustible gas leaks and becomes concentrated around the unit, a fire may occur.
- **Install the refrigerant pipe securely during the installation work before operating the air conditioner.**

If the compressor is operated with the valve open and without the refrigerant pipe, the compressor sucks air and the refrigeration cycle is over pressurized, which may cause a burst or injury.

- **When carrying out the pump-down work, shut down the compressor before disconnecting the refrigerant pipe.**
  Disconnecting the refrigerant pipe with the service valve left open and with the compressor still operating will cause air, etc. to be sucked in, raising the pressure inside the refrigeration cycle to an abnormally high level, and possibly resulting in rupturing, injury, etc.

⚠ WARNING

- **After installation work, make sure below before operation.**
  - **Connection pipes are connected properly and no leakage.**
  - **Packed valves are fully open.**

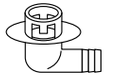
  Running compressor without open packed valves may cause abnormal high pressure and parts failure.
  Leakage at connection piping may suck air and make further high pressure cause burst and injure.

⚠ CAUTION

- **Do not climb onto or place objects on top of the outdoor unit.**
  You may fall or the objects may fall off of the outdoor unit and result in injury.
- **Wear heavy gloves during the installation work to avoid injury.**

EQUIPMENT DAMAGE HAZARD
Failure to follow this caution may result in equipment damage or improper operation.
Do not bury more than 36 in. (914 mm) of refrigerant pipe in the ground. If any section of pipe is buried, there must be a 6 in. (152 mm) vertical rise to the valve connections on the outdoor units. If more than the recommended length is buried, refrigerant may migrate to the cooler buried section during extended periods of system shutdown. This causes refrigerant slugging and could possibly damage the compressor at start-up.

2 Accessory parts

Part name	Q'ty	Shape	Usage
Installation Manual	1	Booklet	Hand this directly to the customer.
Drain connector	1		
Waterproof rubber cap	5		
Guard material for passage part	1		For protecting passage part (pipe cover)

3 Installation of R410A refrigerant air conditioner

⚠ CAUTION

New refrigerant air conditioner installation

- **This air conditioner adopts the new HFC refrigerant (R410A) which does not destroy ozone layer.**

R410A refrigerant is apt to be affected by impurities such as water, oxidizing membrane, and oils because the working pressure of R410A refrigerant is approx. 1.6 times as that of refrigerant R22. Accompanied with the adoption of the new refrigerant, the refrigerant oil has also been changed. Therefore, during installation work, be sure that water, dust, former refrigerant, or refrigerant oil does not enter the new type refrigerant R410A air conditioner cycle.

To prevent mixing of refrigerant or refrigerant oil, the sizes of connecting sections of charging port on main unit and installation tools are different from those of the conventional refrigerant units. Accordingly, special tools are required for the new refrigerant (R410A) units. For connecting pipes, use new and clean piping materials with high pressure fittings made for R410A only, so that water and/or dust does not enter.

■ Required tools / Equipment and precautions for use

Prepare the tools and equipment listed in the following table before starting the installation work.

△ : R410A exclusive

◎ : Generic

Tools/equipment	Use	
Manifold gauge*	Vacuuming/charging refrigerant and operation check	△
Charging hose		△
Gas leak detector	Gas leak check	△
Vacuum pump with backflow prevention function	Vacuum drying	◎
Flare tool	Flare machining of pipes	◎ Usable if dimensions are adjusted.
Bender	Bending pipes	◎
Refrigerant recovery equipment	Refrigerant recovery	△
Torque wrench	Tightening flare nuts	△ Ø1/2” (12.7 mm) and Ø5/8” (15.9 mm)
Pipe cutter	Cutting pipes	◎
Brazing torch and nitrogen cylinder	Braze pipes	◎
Refrigerant charging scales	Charging refrigerant	◎
4 mm hexagon wrench	Opening liquid valve	

4 Installation conditions

■ Before installation

Be sure to prepare to the following items before installation.

Length of refrigerant pipe

Model	Length of refrigerant pipe connected to indoor / outdoor unit	Item
RAV-SP242AT2P-UL	16'5" to 164'1" (5 to 50 m)	Addition of refrigerant at the local site in unnecessary for refrigerant pipe lengths up to 98'5" (30 m). If the reftigerant pipe length exceeds 98'5" (30 m). Add refrigerant in the amount given in “Charging additional refrigerant”.

* Caution during addition of refrigerant.
Charge the refrigerant accurately. Overcharging may cause serious trouble with the compressor.

- Do not connect a refrigerant pipe that is shorter than **16'5" (5 m)**.
  This may cause a malfunction of the compressor or other devices.

Leakage test

1. Before starting a leakage test, further tighten the spindle valves on the gas and liquid sides.
2. Pressurize the pipe with nitrogen gas charged from the service port to the design pressure (4.15 MPa) to conduct a leakage test.
3. After the leakage test is completed, evacuate the nitrogen gas.

Evacuation

- To evacuate system, use a vacuum pump.
- Do not use refrigerant charged in the outdoor unit for evacuation.

Electrical wiring

- Be sure to fix the power wires and system interconnection wires with clamps so that they do not come into contact with the cabinet, etc.

Grounding

⚠ WARNING

Make sure that proper grounding is provided.
Improper grounding may cause an electric shock. For details on how to check grounding, contact the dealer who installed the air conditioner or a professional installation company.

- Proper grounding can prevent charging of electricity on the outdoor unit surface due to the presence of a high frequency in the frequency converter (inverter) of the outdoor unit, as well as prevent electric shock. If the outdoor unit is not properly earthed, you may be exposed to an electric shock.
- **Be sure to connect the earth wire. (grounding work)**
  Incomplete grounding can cause an electric shock. Do not connect ground wires to gas pipes, water pipes, lightning rods or ground wires for telephone wires.

Test run

Turn on the leakage breaker at least 12 hours before starting a test run to protect the compressor during startup.

⚠ CAUTION

Incorrect installation work may result in a malfunction or complaints from customers.

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■ Installation Location

⚠ WARNING

Install the outdoor unit in a location that can support the weight of the outdoor unit.
Insufficient durability may cause the outdoor unit to fall, which may result in injury.

⚠ CAUTION

Do not install the outdoor unit in a location that is subject to combustible gas leaks.
Accumulation of combustible gas around the outdoor unit may cause a fire.

Install the outdoor unit in a location that meets the following conditions.

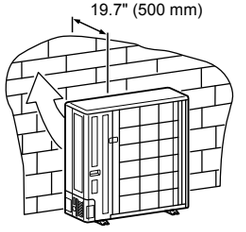
- A well-ventilated location free from obstacles near the air inlets and air outlet
- A location that does not increase the operating noise or vibration of the outdoor unit
- A location that does not produce any drainage problems from discharged water
- Location with easy access to power.

Do not install the outdoor unit in the following location.

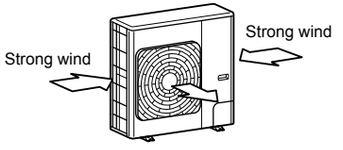
- A location with a saline atmosphere (coastal area) or one that is full of sulfide gas (hot-spring area) (Special maintenance is required.)
- A location subject to oil, vapor, oily smoke, or corrosive gases
- A location in which organic solvent is used
- A location where high-frequency equipment (including inverter equipment, private power generator, medical equipment, and communication equipment) is used (Installation in such a location may cause malfunction of the air conditioner, abnormal control or problems due to noise from such equipment.)
- A location in which the discharged air of the outdoor unit blows against the window of a neighboring house
- A location where the operating noise of the outdoor unit is transmitted.
- When the outdoor unit is installed in an elevated position, be sure to secure its feet.
- A location in which drain water poses any problems.

When an outdoor unit is installed in a location that is always exposed to strong winds like a coast or on the high stories of a building, one of the following is recommended.

- Install the unit so that its discharge faces the wall of the structure.
  Keep a distance 19.7” (500 mm) or more between the unit and wall.

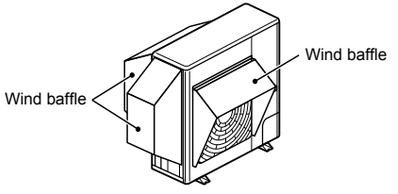


- Install the unit so that the discharge is at a right angle relative to the wind direction.



- Use wind baffle. Produce those parts in the field.
- When outside temperature conditions are 23°F (-5°C) or lower and unit is running in cooling mode.

<Example>

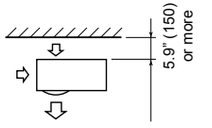


■ Necessary space for installation Unit: in (mm)

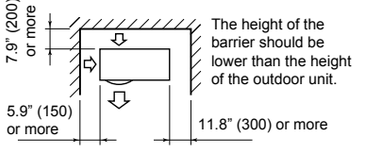
Barrier at rear side

▼ Upper side is free

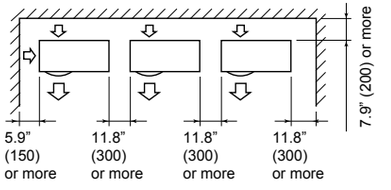
1. Single unit installation



2. Barrier on right, left and rear.

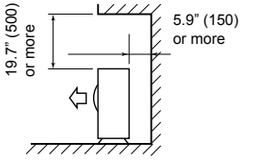


3. Multiple units installation



The height of the obstacle should be lower than the height of the outdoor unit.

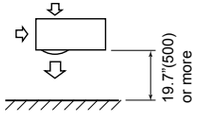
▼ Barrier also above unit



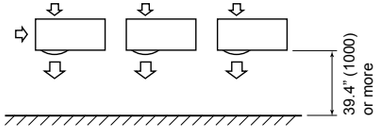
Barrier in front

▼ Above unit is free

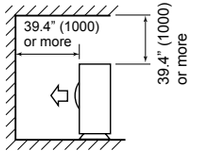
1. Single unit installation



2. Multiple units installation



▼ Barrier also above unit

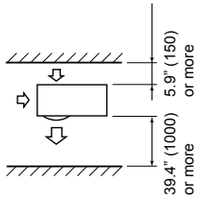


Barriers in front and back of unit

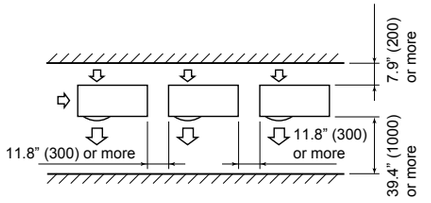
Open above and to the right and left of the unit.
The height of an barrier in both the front and rear of the unit, should be lower than the height of the outdoor unit.

▼ Standard installation

1. Single unit installation

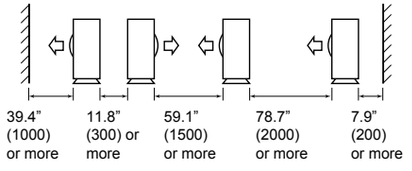


2. Multiple unit installation
   a. Intake and supply parallel



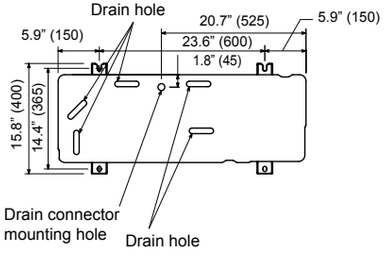
   b. Intake and supply in line
   Open above and to the right and left of the unit. The height of an obstacle in both the front and rear of the unit should be lower than the height of the outdoor unit.

▼ Standard installation



■ Installation of Outdoor Unit

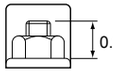
- Before installation, check the strength and horizontal of the base so that abnormal sounds do not emanate.
- According to the following base diagram, fix the base firmly with the anchor bolts.
  (Anchor bolt, nut: 3/8" (M10) x 4 pairs)



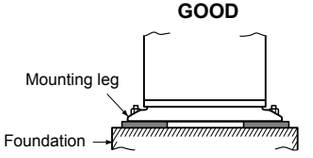
1) Field fabricate a snow or an ice stand for the unit using the above dimension.
2) Place snow or ice stand on a foundation/pad and secure it to the foundation/pad and secure it to the foundation/pad by anchor bolts.

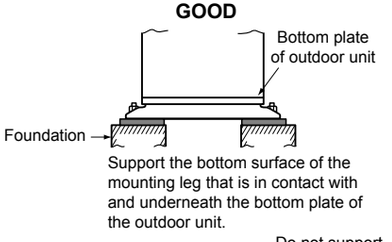
NOTE

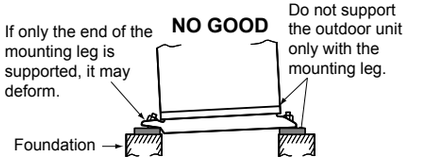
When the outdoor unit is anchored directly on the foundation/pad (cooling only protrude a minimum of 0.6" (15 mm)).



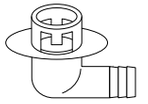
3) Place unit on stand. Make sure it is level and fasten securely to the stand.
   - As shown in the figure below, install the foundation and vibration-proof rubber pads to directly support the bottom surface of the fixing leg that is in contact with the bottom plate of the outdoor unit.
   - When installing the foundation for an outdoor unit with downward piping, consider the piping work.

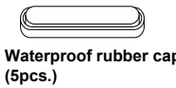


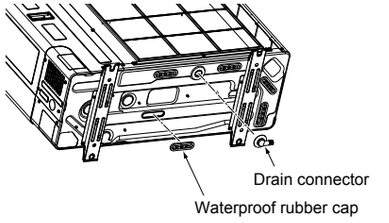




- When water is to be drained through the drain hose, attach the following drain connector and waterproof rubber cap, and use the drain hose (Inner diameter: 0.6" (16 mm)) field supplied drain hose. Also seal the screws securely with silicone material, etc., to prevent water from leaking.
  Some conditions may cause condensation or dripping of water.
- When collectively draining discharged water completely, use a drain pan.







■ For Reference

If a heating operation is to be continuously performed for a long time under the condition that the outdoor temperature is 32 °F (0 °C) or lower, draining defrosted water may be difficult due to the bottom plate freezing, resulting in trouble with the cabinet or fan.

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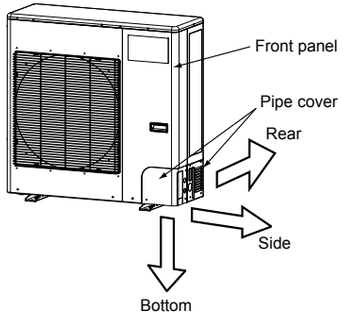
5 Refrigerant piping

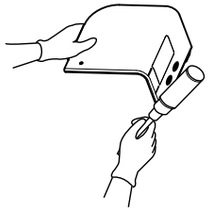
Piping connections are inside the front panel of the unit and the front panel and pipe cover needs to be removed before piping and wiring connections are made.

Piping can enter the outdoor unit from the back, from the side or from the bottom as shown



1. Remove the front panel of the unit.
2. Remove the pipe cover.
3. Remove the appropriate knockout depending on the orientation of the piping.

   The pipe cover is easily mounted by cutting off the slit at the lower part of the pipe cover.



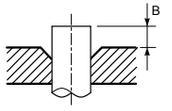
* Be sure to wear heavy work gloves while working.

4. Remove the burrs from the knockout opening and use the factory supplied protective edge guard material around the opening to protect the piping and the wiring.
5. Remove the flare nut from the service valve on outdoor unit. Insert the flare nut into the field piping, and flare the pipe.
   Bend the pipe approx. 90 degree with a pipe bender for side and rear piping.
6. When the piping connections are complete re-install the pipe cover.

Flaring

1. **Cut the pipe with a pipe cutter.**
   Be sure to remove burrs that may cause a gas leak.
2. Insert the supplied flare nut into the pipe, and then flare the pipe.
   As the flaring sizes of R410A differ from those of refrigerant R22, the flare tools newly manufactured for R410A are recommended.

However, the conventional tools can be used by adjusting the projection margin of the copper pipe.



▼ Projection margin in flaring : B (Unit : in (mm))

Rigid (Clutch type)

Outer diameter of copper pipe	R410A tool used	Conventional tool used
	R410A	
3/8” (9.5)	0 - 0.02” (0 - 0.5)	0.04” - 0.06” (1.0 - 1.5)
5/8” (15.9)		

▼ Flaring diameter size : A (Unit : in (mm))

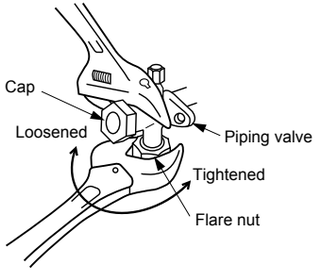
Outer diameter of copper pipe	$A^{+0}_{-0.02"(-0.4)}$
3/8” (9.5)	0.52” (13.2)
5/8” (15.9)	0.78” (19.7)

* In case of flaring for R410A with the conventional flare tool, pull the tool out approx. 0.02” (0.5 mm) more than that for R22 to adjust it to the specified flare size. The copper pipe gauge is useful for adjusting the projection margin size.

■ Tightening of Flare Connections

1. Align the centers of the flare connections and fully tighten the flare nuts with your fingers.

Valve at liquid side

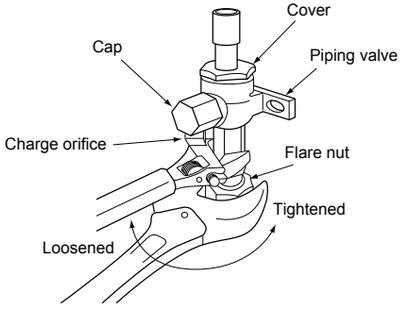


2. Use two wrenches to loosen or tighten the flare nut on the gas service valve as shown in the figure.
   Use only one wrench to loosen or tighten the flare not on the liquid service valve.
   The final tightening with a torque wrench should be to the specifications shown in table below.

Unit : ft•lbs (N•m)

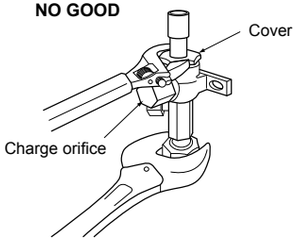
Outer diameter of copper pipe	Tightening torque
3/8” (9.5 mm)	24 - 31 (33 - 42)
5/8” (15.9 mm)	50 - 60 (68 - 82)

Valve at gas side



- After the installation work, be sure to check for gas leaks of the pipe connections with nitrogen.

NO GOOD



⚠ CAUTION

1. Do not put the crescent wrench on the charge orifice or cover.
   The valve may be broken.
2. If applying excessive torque, the nut may break according to some installation conditions.

- Pressure of R410A is higher than that of R22 (Approx. 1.6 times).
  Therefore, using a torque wrench, tighten the flare pipe connecting sections that connect the indoor/outdoor units at the specified tightening torque. Incomplete connections may cause not only a gas leak, but also trouble with the refrigeration cycle.

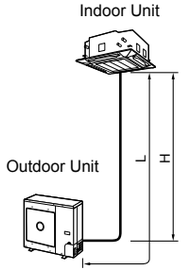
Do not apply refrigerant oil to the flared surface.

■ System Requirements

- Minimum refrigerant line length between the outdoor unit and indoor unit is 16'5" (5 m)
- Maximum pipe lengths

Allowable pipe length (ft (m))	Height difference (Indoor-outdoor H) (ft (m))		Number of bent portions
Total length L	Indoor unit: Upper	Outdoor unit: Lower	10 or less
164'1" (50)	98'5" (30)	98'5" (30)	

Figure of Single



Refrigerant sizes

Liquid side		Gas side	
Outer diameter	Thickness	Outer diameter	Thickness
Ø3/8" (9.5 mm)	0.03" (0.8 mm)	Ø5/8" (15.9 mm)	0.04" (1.0 mm)

Flare nuts and flaring

- The flare nuts and flaring are different from those for the conventional refrigerant.
  Use the flare nuts supplied with the air conditioner or those for R410A.
- Before performing flaring, carefully read "REFRIGERANT PIPING"

Insulation (Local supplied)

Both lines need to be insulated. Use a minimum 0.4" (10 mm) wall thickness.

Refrigerant charge

Length of refrigerant pipe connected to indoor/outdoor unit	Additional refrigerant
16'5" - 98'5" (5 - 30 m)	None
*98'5" - 246'1" (30 - 75 m)	Add 0.43 oz/ft (40 g/m) of refrigerant for piping that exceeds 98'5" (30 m) up to 246'1" (75 m).

* Caution during addition of refrigerant
Max. amount of additional refrigerant is 1.8 lbs (800 g).
Charge the refrigerant accurately. Overcharging may cause serious trouble with the compressor.

* Minimum refrigerant pipe is 16'5" (5 m).
This may cause a malfunction of the compressor or other devices.

Metering Device is an electronic EXV (PMV) in outdoor unit.

■ Connecting power and control cables (Field supplied)

- The main power is supplied to the outdoor unit. The field supplied connecting cables from the outdoor unit to the indoor unit consist for 4 wires and provides the power for the indoor unit as well as the communication signal between the outdoor and indoor unit.
- System interconnection wire size must be AWG16.
- Breaker must have a capacity specified in the following table.
- All wiring must comply with local electric codes and NEC (National Electric Code) or CEC (Canadian Electric Code).

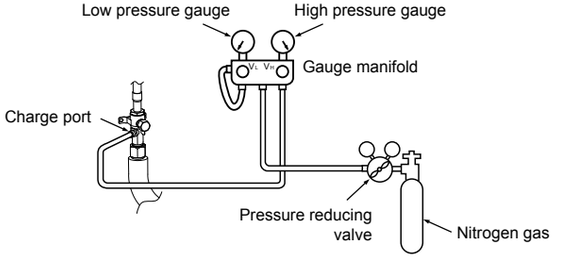
Model RAV-	SP242
Power supply	208/230 V, 60 Hz
MCA	17 A
MOCP (MAX Fuse/CB)	25 A
Breaker	20 A
System interconnection wires	AWG16
Field power supply wire	AWG12

MCA = Minimum Circuit Amps
MOCP = Maximum Over Protection Device Amps.

6 Vacuum

■ Vacuum test

After completing the refrigerant piping work, perform a vacuum test. Connect a nitrogen gas cylinder and pressurize the pipes with nitrogen gas as follows to conduct the vacuum test.



⚠ CAUTION

Never use oxygen, flammable gas, or noxious gas for the airtight test.

Gas leak check

Step 1....Pressurize to **0.5 MPa** (5 kg/cm²G) for 5 minutes or longer.
Step 2....Pressurize to **1.5 MPa** (15 kg/cm²G) for 5 minutes or longer. 〉Major leaks can be discovered.
Step 3....Pressurize to **4.15 MPa** (42 kg/cm²G) for 24 hours. ..... Micro leaks can be discovered.
(However, note that when the ambient temperature differs during pressurization and after 24 hours, the pressure will change by approximately 0.01 MPa (0.1 kg/cm²G) per 1°C, so this should be compensated.)

If the pressure drops in steps 1 through 3, check the connections for leakage.
Check for leaks with foaming liquid, etc., take steps to fix the leaks such as brazing the pipes again and tightening the flare nuts, and then perform the airtight test again.

* After the vacuum test is completed, evacuate the nitrogen gas.

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■ Evacuation

⚠ CAUTION

UNIT DAMAGE HAZARD
Failure to follow this caution may result in equipment damage or improper operation.
Never use the system compressor as a vacuum pump.

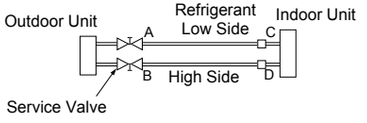
Refrigerant tubes and indoor heat exchanger should be evacuated using the recommended deep vacuum method of 500 microns. The alternate triple evacuation method may be used if the procedure outlined below is followed. Always break a vacuum with dry nitrogen.

■ System Vacuum and Charge

Using Vacuum Pump

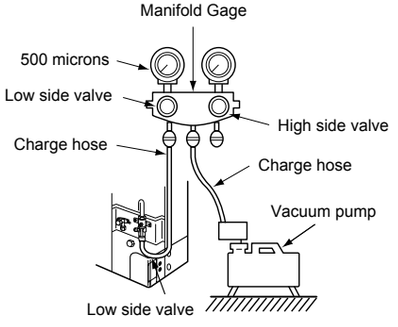
1. Completely tighten flare nuts A, B, C, D, connect manifold gage charge hose to a charge port of the low side service valve.

Service Valve



2. Connect charge hose to vacuum pump.
3. Fully open the low side of manifold gage.

Manifold

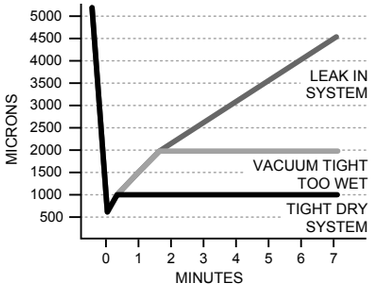


4. Start vacuum pump.
5. Evacuate using either deep vacuum or triple evacuation method.
6. After evacuation is complete, fully close the low side of manifold gage and stop operation of vacuum pump.

Deep Vacuum Method

The deep vacuum method requires a vacuum pump capable of pulling a vacuum of 500 microns and a vacuum gage capable of accurately measuring this vacuum depth. The deep vacuum method is the most positive way of assuring a system is free of air and liquid water.

Deep Vacuum Graph



Triple Evacuation Method

The triple evacuation method should only be used when vacuum pump is only capable of pumping down to 28 in. of mercury vacuum and system does not contain any liquid water.
Refer to “Triple Evacuation Method chart” and proceed as follows:

1. Pump system down to 28 in. of mercury and allow pump to continue operating for an additional 15 minutes.
2. Close service valves and shut off vacuum pump.
3. Connect a nitrogen cylinder and regulator to system and open until system pressure is 2 psig.
4. Close service valve and allow system to stand for 1 hr. During this time, dry nitrogen will be able to diffuse throughout the system absorbing moisture.
5. Repeat this procedure as indicated in the chart. System will then be free of any cotaminants and water vapor.

Triple Evacuation Method chart

EVACUATE
▼
BREAK VACUUM WITH DRY NITROGEN
▼
WAIT
▼
EVACUATE
▼
BREAK VACUUM WITH DRY NITROGEN
▼
WAIT
▼
EVACUATE
▼
CHECK FOR TIGHT, DRY SYSTEM
(IF IT HOLDS DEEP VACCUM)
▼
RELEASE CHARGE INTO SYSTEM

■ Final Tubing Check

IMPORTANT:
Check to be certain factory tubing on both indoor and outdoor unit has not shifted during shipment. Ensure tubes are not rubbing against each other or any sheet metal. Pay close attention to feeder rubes, making sure wire ties on feeder tubes are secure and tight.

■ Pump down process

1. Turn off the Air Conditioner system.
2. Connect the charge hose from the manifold valve to the service port of the packed valve at gas side.
3. Turn on the Air Conditioner system in cooling operation more than 10 minutes.
4. Check the operating pressure of the system should be normal value.
   (Ref. with product specification)
5. Release the valve rod cap of both service valves.
6. Use the Hexagon wrench to turning the valve rod of Liquid side fully close.
   (*Make sure no entering air into the system)
7. Continue operate Air Conditioner system until and the gauge of manifold dropped into the range of 0.5 - 0 kgf/cm^2
8. Use the Hexagon wrench to turning the valve rod of Gas side fully close.
   And turn off the Air Conditioner system immediately thereafter.
9. Remove the gauge manifold from the service port of the packed valve.
10. Securely tighten the valve rod cap to the both service valves.

⚠ CAUTION

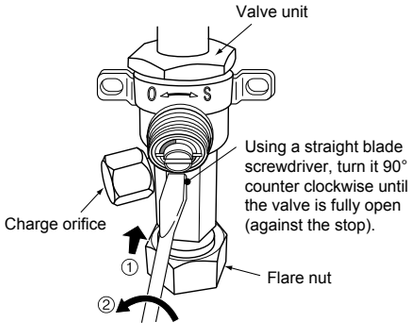
Should be check the compressor operating condition while pumping down process. It must not any abnormal sound, more vibration. It is abnormal condition appears and must turn off the Air Conditioner immediately.

Open service valves

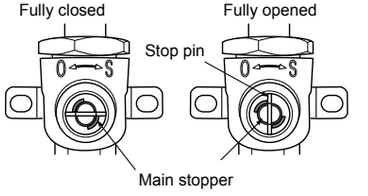
Open or close the valve.

▼ Liquid side
Open the valve with a **0.16” (4 mm)** hexagon wrench.

▼ Gas side



Handle position



- While the valve is fully opened, after the screwdriver has reached the stopper, do not apply torque exceeding 4 ft•lbs (5 N•m). Applying excessive torque may damage the valve.

Valve handling precautions
- Open the valve stem until it reaches the stop. It is unnecessary to apply further force.
- Securely tighten the cap with a torque wrench.
- Cap tightening torque

Valve size	Ø3/8” (9.5 mm)	24 - 31 ft•lbs (33 - 42 N•m)
	Ø5/8” (15.9 mm)	15 - 18 ft•lbs (20 - 25 N•m)
Charge port		10 - 13 ft•lbs (14 - 18 N•m)

7 Electrical work

⚠ WARNING

ELECTRICAL SHOCK HAZARD
Failure to follow this warning could result in personal injury or death.

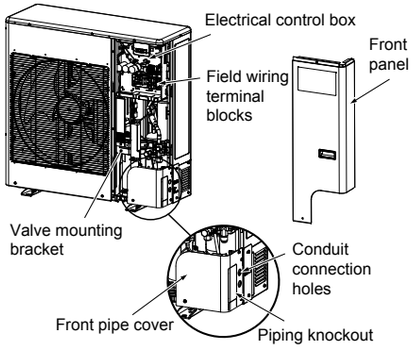
- The unit cabinet must have an uninterrupted or unbroken ground to minimize personal injury if an electrical fault should occur. The ground may consist of electrical wire or metal conduit when installed in accordance with existing electrical codes.
- The appliance shall be installed in accordance with national wiring regulations.
- Before performing service or maintenance, be sure main power switch is turned OFF.

⚠ CAUTION

All wiring and connections must comply with NEC, CEC, local codes.

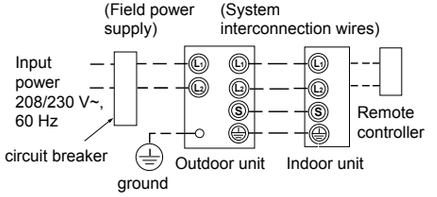
UNIT DAMAGE HAZARD
Failure to follow this caution may result in damage or improper operation.

- Unit failure as a result of operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components.
- Wrong wiring may cause a burn-out of some electrical parts.
- Do not damage or scratch the conductive core or inner insulator of the power and inter-connecting wires when peeling them.



■ Field wiring

The dashed lines show field wiring.



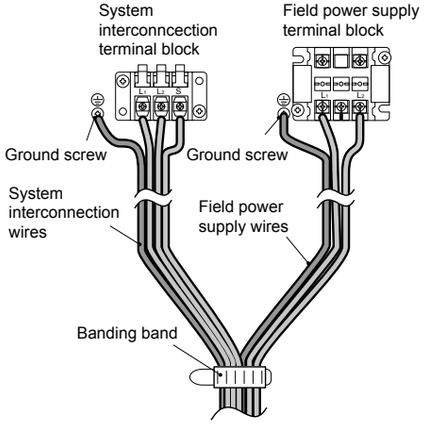
- System interconnection wire size must be AWG16.
- Breaker must have a capacity specified in the following table.
- All wiring must comply with local electric codes and NEC (National Electric Code) or CEC (Canadian Electric Code).

Model RAV-	SP242
Power supply	208/230 V, 60 Hz
MCA	17 A
MOCP (MAX Fuse/CB)	25 A
Breaker	20 A
System interconnection wires	AWG16
Field power supply wire	AWG12

MCA = Minimum Circuit Amps
MOCP = Maximum Over Protection Device Amps.

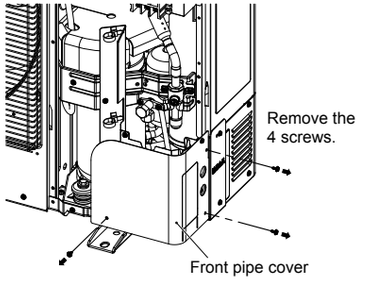
- Connect the system interconnection (indoor to outdoor) wires to the identical terminal numbers on the terminal block of each unit.
  Incorrect connection may cause a failure.

1. With the front panel removed the electrical control box is exposed at the top right corner of the unit.
2. Terminate the field wiring conduit (if used) at the conduit connection holes provided.
3. Route the field power wires and the system interconnection wires as shown on the following pages. Terminate the wires at field wiring terminal blocks located immediately below the electrical control box.

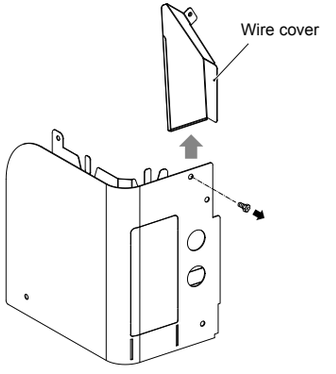


■ Wiring

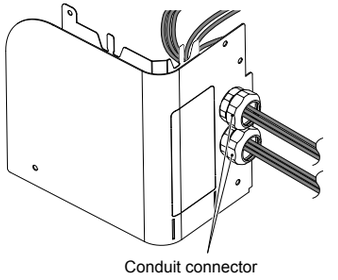
1. Remove front panel and remove the front pipe cover.



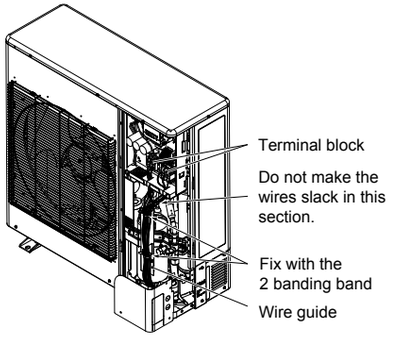
2. Remove the wire cover from back of the front pipe cover.



3. Pass the wires through the conduit connection holes and attach the conduit connecters.



4. Connect the wires to the terminal blocks and fix the wires to the wiring guide with the 3 included banding band.



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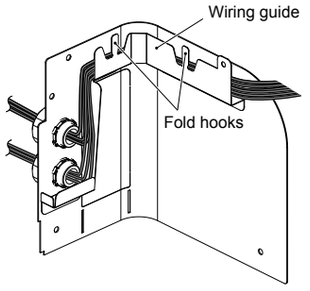
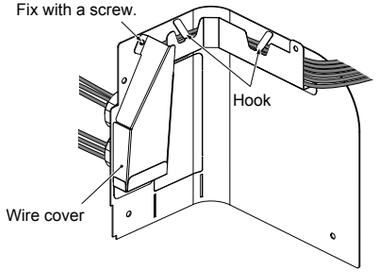
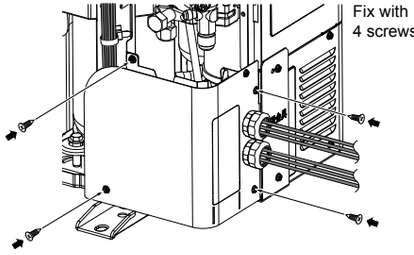
5. Pass the wires through the wiring guide of the front pipe cover, adjust the wire lengths and fold the wiring guide hooks.



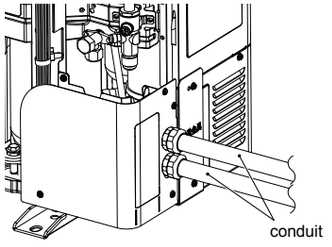
6. Attach the wire cover and hold the wires with the wiring guide hooks.
   Do not clip or damage the wires with the cover.



7. Attach the front pipe cover with 4 screws.



8. Connect 2 conduits.



8 Grounding

⚠ WARNING

Be sure to connect the ground wire. (grounding work)
Incomplete grounding may cause an electric shock.

Connect the ground wire properly following applicable technical standards.
Connecting the ground wire is essential to preventing electric shock and to reducing noise and electrical charges on the outdoor unit surface due to the high-frequency wave generated by the frequency converter (inverter) in the outdoor unit.
If you touch the charged outdoor unit without a ground wire, you may experience an electric shock.

9 Finishing

After the refrigerant pipe, inter-unit wires, and drain pipe have been connected, make sure they are supported and fixed in place for the entire length.
Keep the power wires and system interconnection wires away from all factory wiring and piping.

10 Test run

- **Turn on the leakage breaker at least 12 hours before starting a test run to protect the compressor during startup.**
  To protect the compressor, power is supplied from the 208-230 VAC input to the unit to preheat the compressor.
- **Check the following before starting a test run:**
  - **That all pipes are connected securely without leaks.**
  - **That the valve is open.**

  If the compressor is operated with the valve closed, the outdoor unit will become overpressurized, which may damage the compressor or other components.
  If there is a leak at a connection, air can be sucked in and the internal pressure further increases, which may cause a burst or injury.
- Operate the air conditioner in the correct procedure as specified in the Owner's Manual.

11 Annual maintenance

For an air conditioning system that is operated on a regular basis, cleaning and maintenance of the indoor / outdoor units are strongly recommended.
As a general rule, if an indoor unit is operated for about 8 hours daily, the indoor / outdoor units will need to be cleaned at least once every 3 months. This cleaning and maintenance should be carried out by a qualified service person.
Failure to clean the indoor / outdoor units regularly will result in poor performance, icing, water leaking and even compressor failure.

12 Functions to be implemented locally

■ Handling existing pipe

When using the existing pipe, carefully check for the following:
- Wall thickness (within the specified range)
- Scratches and dents
- Water, oil, dirt, or dust in the pipe
- Flare looseness and leakage from welds
- Deterioration of copper pipe and heat insulator

Cautions for using existing pipe

- Do not reuse a flare nut to prevent gas leaks.
  Replace it with the supplied flare nut and then process it to a flare.
- Blow nitrogen gas or use an appropriate means to keep the inside of the pipe clean. If discolored oil or much residue is discharged, wash the pipe.
- Check welds, if any, on the pipe for gas leaks.

When the pipe corresponds to any of the following, do not use it. Install a new pipe instead.
- The pipe has been opened (disconnected from indoor unit or outdoor unit) for a long period.
- The pipe has been connected to an outdoor unit that does not use refrigerant R32, R410A.
- The existing pipe must have a wall thickness equal to or larger than the following thicknesses.

Reference outside diameter (in (mm))	Wall thickness (in (mm))
3/8" (9.5)	0.03" (0.8)
5/8" (15.9)	0.04" (1.0)

- Do not use any pipe with a wall thickness less than these thicknesses due to insufficient pressure capacity.

■ Refrigerant recovery

When recovering the refrigerant in situations such as when relocating an indoor unit or outdoor unit, the recovery operation can be performed by operating the SW01 and SW02 switches on the P.C. board of the outdoor unit.
A cover for the electric parts has been installed in order to provide protection from electric shocks while work is being performed. Operate the service switches and check the LED displays with this electric parts cover in place.
Do not remove this cover while the power is still on.

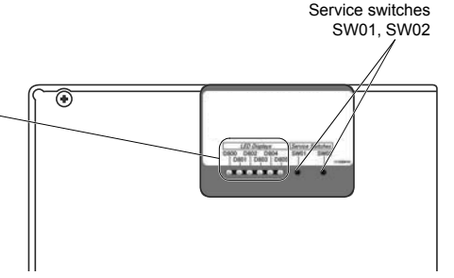
⚠ DANGER

The entire P.C. board of this air conditioner system is a high-voltage area.
When operating the service switches with the power of the system left on, wear electrically insulated gloves.

LED displays

○ D800 (Yellow)	○ D801 (Yellow)	○ D802 (Yellow)	○ D803 (Yellow)	○ D804 (Yellow)	○ D805 (Green)

- There are four LEDs display patterns.
  ○ : ON
  ● : OFF
  ◎ : Rapid flashing (5 times/sec.)
  ◇ : Slow flashing (1 time/sec.)



- In the initial LED display status, D805 is lighted as shown on the right. If the initial status is not established (if D805 is flashing), hold down the SW01 and SW02 service switches simultaneously for at least 5 seconds to return the LED displays to the initial status.

LED display initial status

D800 (Yellow)	D801 (Yellow)	D802 (Yellow)	D803 (Yellow)	D804 (Yellow)	D805 (Green)
● or ◎	● or ◎	● or ◎	● or ◎	● or ◎	○
OFF or Rapid flashing	OFF or Rapid flashing	OFF or Rapid flashing	OFF or Rapid flashing	OFF or Rapid flashing	ON

EN

Steps taken to recover the refrigerant

1. Operate the indoor unit in the fan mode.
2. Check that the LED displays are placed in their initial status. If not, place them in the initial status.
3. Hold down SW01 for at least 5 seconds, and check that D804 flashes slowly. (Fig. 1)
4. Press SW01 once to set the LED displays (D800 to D805) to the “refrigerant recovery LED display” shown below. (Fig. 2)

(Fig. 1)

LED displays indicated when step 3 is taken					
D800	D801	D802	D803	D804	D805
○	●	●	●	◇	●

○: ON, ●: OFF, ◇: Slow flashing

(Fig. 2)

Refrigerant recovery LED display					
D800	D801	D802	D803	D804	D805
○	●	●	●	◎	●

○: ON, ●: OFF, ◎: Rapid flashing

5. Press SW02 to set D805 to rapid flashing. (Each time SW02 is pressed, D805 is switched between rapid flashing and OFF.) (Fig. 3)
6. Hold down SW02 for at least 5 seconds, and when D804 flashes slowly and D805 lights, the forced cooling operation is started. (Max. 10 minutes) (Fig. 4)

(Fig. 3)

LED displays indicated when step 5 is taken					
D800	D801	D802	D803	D804	D805
○	●	●	●	◎	◎

○: ON, ●: OFF, ◎: Rapid flashing

(Fig. 4)

LED displays indicated when step 6 is taken					
D800	D801	D802	D803	D804	D805
○	●	●	●	◇	○

○: ON, ●: OFF, ◇: Slow flashing

7. After operating the system for at least 3 minutes, close the valve on the liquid side.
8. After the refrigerant has been recovered, close the valve on the gas side.
9. Hold down SW01 and SW02 simultaneously for at least 5 seconds. The LED displays are returned to the initial status, and the cooling operation and indoor fan operation stop.
10. Turn off the power.

* If there is any reason to doubt whether the recovery was successful in the course of this operation, hold down SW01 and SW02 simultaneously for at least 5 seconds to return to the initial status, and then repeat the steps for recovering the refrigerant.

■ Existing piping

The following settings are required when using a pipe Ø3/4” (19.1 mm) as the existing piping at the gas pipe side.

Steps taken to support existing piping

1. Set the circuit breaker to the ON position to turn on the power.
2. Check that the LED displays are placed in their initial status. If not, place them in the initial status.
3. Hold down SW01 for at least 5 seconds, and check that D804 flashes slowly. (Fig. 5)
4. Press SW01 four times to set the LED displays (D800 to D805) to the “LED displays for existing piping settings” shown below. (Fig. 6)

(Fig. 5)

LED displays indicated when step 3 is taken					
D800	D801	D802	D803	D804	D805
○	●	●	●	◇	●

○: ON, ●: OFF, ◇: Slow flashing

(Fig. 6)

LED displays for existing piping settings					
D800	D801	D802	D803	D804	D805
●	●	○	●	◎	●

○: ON, ●: OFF, ◎: Rapid flashing

5. Press SW02 to set D805 to rapid flashing. (Each time SW02 is pressed, D805 is switched between rapid flashing and OFF.) (Fig. 7)
6. Hold down SW02 for at least 5 seconds, and check that D804 flashes slowly and that D805 lights. (Fig. 8)

(Fig. 7)

LED displays indicated when step 5 is taken					
D800	D801	D802	D803	D804	D805
●	●	○	●	◎	◎

○: ON, ●: OFF, ◎: Rapid flashing

(Fig. 8)

LED displays indicated when step 6 is taken					
D800	D801	D802	D803	D804	D805
●	●	○	●	◇	○

○: ON, ●: OFF, ◇: Slow flashing

7. Hold down SW01 and SW02 simultaneously for at least 5 seconds to return the LED displays to the initial status. The existing piping is now supported by taking the above steps. In this status, the heating capacity may decrease during heating depending on the outside air temperature and indoor temperature.

* If there is any reason to doubt whether establishing support was successful in the course of this operation, hold down SW01 and SW02 simultaneously for at least 5 seconds to return to the initial status, and then repeat the setting steps.

How to check the existing piping settings

You can check whether the existing piping settings are enabled.
1. Check that the LED displays are placed in their initial status. If not, place them in the initial status.
2. Hold down SW01 for at least 5 seconds, and check that D804 flashes slowly. (Fig. 9)
3. Press SW01 four times to set the LED displays (D800 to D805) to the “LED displays for existing piping settings” shown below. If the setting is enabled, D802 lights and D804 and D805 flash rapidly. (Fig. 10)
4. Hold down SW01 and SW02 simultaneously for at least 5 seconds to return the LED displays to the initial status.

(Fig. 9)

LED displays indicated when step 3 is taken					
D800	D801	D802	D803	D804	D805
○	●	●	●	◇	●

○: ON, ●: OFF, ◇: Slow flashing

(Fig. 10)

LED displays for existing piping settings					
D800	D801	D802	D803	D804	D805
●	●	○	●	◎	◎

○: ON, ●: OFF, ◎: Rapid flashing

When restoring the factory defaults

To restore the factory defaults in situations such as when relocating the units, follow the steps below.
1. Check that the LED displays are placed in their initial status. If not, place them in the initial status.
2. Hold down SW01 for at least 5 seconds, and check that D804 flashes slowly. (Fig. 11)
3. Press SW01 14 times to set the LED displays (D800 to D805) to the “LED displays restored to factory defaults” shown below. (Fig. 12)

(Fig. 11)

LED displays indicated when step 2 is taken					
D800	D801	D802	D803	D804	D805
○	●	●	●	◇	●

○: ON, ●: OFF, ◇: Slow flashing

(Fig. 12)

LED displays restored to factory defaults					
D800	D801	D802	D803	D804	D805
●	●	●	●	◎	●

○: ON, ●: OFF, ◎: Rapid flashing

4. Hold down SW02 for at least 5 seconds, and check that D804 flashes slowly. (Fig. 13)
5. Hold down SW01 and SW02 simultaneously for at least 5 seconds to return the LED displays to the initial status.

(Fig. 13)

LED displays indicated when step 4 is taken					
D800	D801	D802	D803	D804	D805
●	●	●	●	◇	●

○: ON, ●: OFF, ◇: Slow flashing

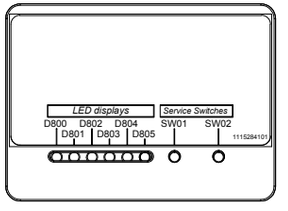
13 Troubleshooting

You can perform fault diagnosis of the outdoor unit with the LEDs on the P.C. board of the outdoor unit in addition to using the check codes displayed on the wired remote controller of the indoor unit.
Use the LEDs and check codes for various checks. Details of the check codes displayed on the wired remote controller of the indoor unit are described in the Installation Manual of the indoor unit.

■ LED displays and check codes

No.	Error	Display					
		D800	D801	D802	D803	D804	D805
1	Normal	●	●	●	●	●	○
2	Discharge temperature sensor (TD) error	◎	●	●	●	●	○
3	Heat exchanger temperature sensor (TE) error	●	◎	●	●	●	○
4	Heat exchanger temperature sensor (TL) error	◎	◎	●	●	●	○
5	Outside air temperature sensor (TO) error	●	●	◎	●	●	○
6	Suction temperature sensor (TS) error	◎	●	◎	●	●	○
7	Heat sink temperature sensor (TH) error	●	◎	◎	●	●	○
8	Miss-mounting of sensor (TE, TS)	◎	◎	◎	●	●	○
9	EEPROM error	●	◎	●	◎	●	○
10	Compressor breakdown	◎	◎	●	◎	●	○
11	Compressor lock	●	●	◎	◎	●	○
12	Current detection circuit error	◎	●	◎	◎	●	○
13	Case thermostat activated	●	◎	◎	◎	●	○
14	Unset model type	●	●	●	●	◎	○
15	Communication error between MCUs	◎	●	●	●	◎	○
16	Discharge temperature sensor error	●	◎	●	●	◎	○
17	High pressure SW error	◎	◎	●	●	◎	○
18	Power supply voltage error	●	●	◎	●	◎	○
19	Heatsink overheating error	●	◎	◎	●	◎	○
20	Gas leak detected	◎	◎	◎	●	◎	○
21	4-way valve reversal error	●	●	●	◎	◎	○
22	High pressure protective activated	◎	●	●	◎	◎	○
23	Fan system error	●	◎	●	◎	◎	○
24	Compressor driver device short circuit	◎	◎	●	◎	◎	○
25	Position detection circuit error	●	●	◎	◎	◎	○

○: ON, ●: OFF, ◎: Rapid flashing (5 times/sec.)



* The LEDs and switches are located at the Sub P.C. board of the outdoor unit as shown in the figure on the left.

LED displays					
○ D800 (Yellow)	○ D801 (Yellow)	○ D802 (Yellow)	○ D803 (Yellow)	○ D804 (Yellow)	○ D805 (Green)

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14 Appendix

[1] Existing piping

Work instructions

The existing R22 and R410A piping can be reused for our digital inverter product installations.

⚠ WARNING

Confirming the existence of scratches or dents on the existing pipes and confirming the reliability of the pipe strength are conventionally referred to the local site.
If the specified conditions can be cleared, it is possible to update existing R22 and R410A.

Basic conditions needed to reuse existing pipes

Check and observe the presence of three conditions in the refrigerant piping works.

1. **Dry** (There is no moisture inside of the pipes.)
2. **Clean** (There is no dust inside of the pipes.)
3. **Tight** (There are no refrigerant leaks.)

Restrictions for use of existing pipes

In the following cases, the existing pipes should not be reused as they are. Clean the existing pipes or exchange them with new pipes.

1. When a scratch or dent is heavy, be sure to use new pipes for the refrigerant piping works.
2. When the existing pipe thickness is thinner than the specified “Pipe diameter and thickness,” be sure to use new pipes for the refrigerant piping works.
   - The operating pressure of R410A is high. If there is a scratch or dent on the pipe or a thinner pipe is used, the pressure strength may be inadequate, which may cause the pipe to break in the worst case.

* **Pipe diameter and thickness (in (mm))**

Pipe outer diameter		3/8" (9.5)	5/8" (15.9)
Thickness	R410A	0.03" (0.8)	0.04" (1.0)

3. When the outdoor unit was left with the pipes disconnected, or the gas leaked from the pipes and the pipes were not repaired and refilled.
   - There is the possibility of rain water or air, including moisture, entering the pipe.
4. When refrigerant cannot be recovered using a refrigerant recovery unit.
   - There is the possibility that a large quantity of dirty oil or moisture remains inside the pipes.
5. When a commercially available dryer is attached to the existing pipes.
   - There is the possibility that copper green rust has been generated.
6. When the existing air conditioner is removed after refrigerant has been recovered.
   Check if the oil is judged to be clearly different from normal oil.
   - The refrigerator oil is copper rust green in color: There is the possibility that moisture has mixed with the oil and rust has been generated inside the pipe.
   - There is discolored oil, a large quantity of residue, or a bad smell.
   - A large quantity of shiny metal dust or other wear residue can be seen in the refrigerant oil.
7. When the air conditioner has a history of the compressor failing and being replaced.
   - When discolored oil, a large quantity of residue, shiny metal dust, or other wear residue or mixture of foreign matter is observed, trouble will occur.
8. When temporary installation and removal of the air conditioner are repeated such as when leased etc.
9. If the type of refrigerator oil of the existing air conditioner is other than the following oil (Mineral oil), Suniso, Freol-S, MS (Synthetic oil), alkyl benzene (HAB, Barrel-freeze), ester series, PVE only of ether series.
   - The winding-insulation of the compressor may deteriorate.

NOTE

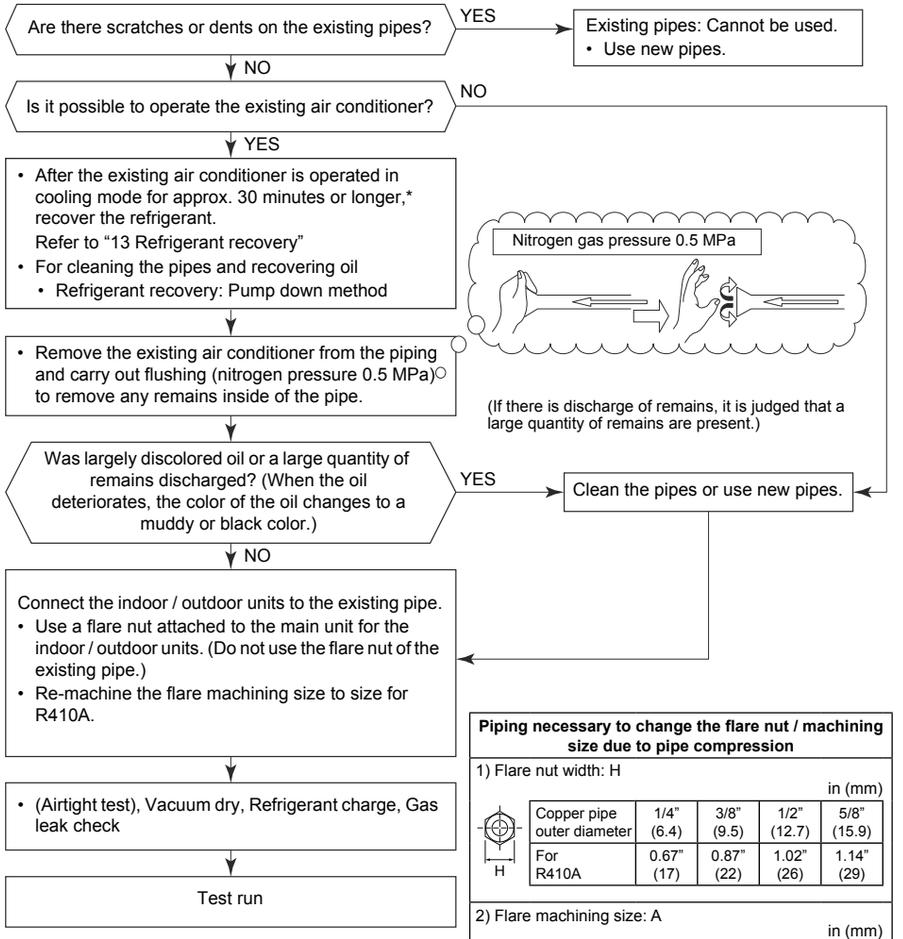
The above descriptions are results have been confirmed by our company and represent our views on our air conditioners, but do not guarantee the use of the existing pipes of air conditioners that have adopted R410A in other companies.

Curing of pipes

When removing and opening the indoor or outdoor unit for a long time, cure the pipes as follows:

- Otherwise rust may be generated when moisture or foreign matter due to condensation enters the pipes.
- The rust cannot be removed by cleaning, and new pipes are necessary.

Placement location	Term	Curing manner
Outdoors	1 month or more	Pinching
	Less than 1 month	Pinching or taping
Indoors	Every time	



Piping necessary to change the flare nut / machining size due to pipe compression

1) Flare nut width: H

in (mm)

Copper pipe outer diameter	1/4” (6.4)	3/8” (9.5)	1/2” (12.7)	5/8” (15.9)
For R410A	0.67” (17)	0.87” (22)	1.02” (26)	1.14” (29)

2) Flare machining size: A

in (mm)

Copper pipe outer diameter	1/4” (6.4)	3/8” (9.5)	1/2” (12.7)	5/8” (15.9)
For R410A	0.36” (9.1)	0.52” (13.2)	0.65” (16.6)	0.78” (19.7)

Becomes a little larger for R410A

Do not apply refrigerator oil to the flare surface.

15 Specifications

This product contains fluorinated greenhouse gases covered by the Kyoto Protocol	
Chemical Name of Gas	**R410A**
Global Warming Potential (GWP) of Gas	**1,975**

⚠ CAUTION

1. Paste the enclosed refrigerant label adjacent to the charging and/or recovering location.
2. Clearly write the charged refrigerant quantity on the refrigerant label using indelible ink. Then, place the included transparent protective sheet over the label to prevent the writing from rubbing off.
3. Prevent emission of the contained fluorinated greenhouse gas. Ensure that the fluorinated greenhouse gas is never vented to the atmosphere during installation, service or disposal. When any leakage of the contained fluorinated greenhouse gas is detected, the leak shall be stopped and repaired as soon as possible.
4. Only qualified service personnel are allowed to access and service this product.
5. Any handling of the fluorinated greenhouse gas in this product, such as when moving the product or recharging the gas, shall comply under (EC) Regulation No. 842/2006 on certain fluorinated greenhouse gases and any relevant local legislation.
6. Periodical inspections for refrigerant leaks may be required depending on European or local legislation.
7. Contact dealers, installers, etc., for any questions.

Warnings on refrigerant leakage

Check of concentration limit

The room in which the air conditioner is to be installed requires a design that in the event of refrigerant gas leaking out, its concentration will not exceed a set limit.

The refrigerant R410A which is used in the air conditioner is safe, without the toxicity or combustibility of ammonia, and is not restricted by laws to be imposed which protect the ozone layer. However, since it contains more than air, it poses the risk of suffocation if its concentration should rise excessively. Suffocation from leakage of R410A is almost non-existent.

If a conditioner system is to be installed in a small room, select a suitable model and installation procedure so that if the refrigerant accidentally leaks out, its concentration does not reach the limit (and in the event of an emergency, measures can be made before injury can occur).

In a room where the concentration may exceed the limit, create an opening with adjacent rooms, or install mechanical ventilation combined with a gas leak detection device.

The concentration is as given below.

$$\frac{\text{Total amount of refrigerant (kg)}}{\text{Min. volume of the indoor unit installed room (m}^3\text{)}} \leq \text{Concentration limit (kg/m}^3\text{)}$$

The concentration limit of R410A which is used in multi air conditioners is 0.3 kg/m^3.

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