

TOSHIBA

Carrier

AIR CONDITIONER (SPLIT TYPE) Installation Manual



1115652713-1

Indoor Unit

Model name:

For commercial use
Pour usage commercial
Para uso comercial

Ceiling Type

RAV-SM182CTP-UL

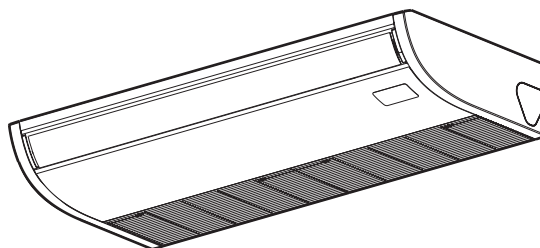
RAV-SM242CTP-UL

RAV-SM302CTP-UL

RAV-SM362CTP-UL

RAV-SM422CTP-UL

RAV-SM482CTP-UL



Original instruction

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

ADOPTION OF NEW REFRIGERANT

This Air Conditioner uses R410A an environmentally friendly refrigerant.

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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	<ul style="list-style-type: none"> The qualified installer is a person who installs, maintains, relocates and removes the air conditioners made by Toshiba Carrier Corporation. He or she has been trained to install, maintain, relocate and remove the air conditioners made by Toshiba Carrier Corporation. 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 Toshiba Carrier Corporation. 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 Toshiba Carrier Corporation. 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 Toshiba Carrier Corporation. 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	<ul style="list-style-type: none"> The qualified service person is a person who installs, repairs, maintains, relocates and removes the air conditioners made by Toshiba Carrier Corporation. He or she has been trained to install, repair, maintain, relocate and remove the air conditioners made by Toshiba Carrier Corporation. 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 Toshiba Carrier Corporation. 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 Toshiba Carrier Corporation. 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 Toshiba Carrier Corporation. 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 could lead to injury, burns, electric shocks and other injuries.






Work undertaken	Protective gear wear
All types of work	Protective gloves 'Safety' working clothing
Electrical-related work	Gloves to provide protection for electricians Insulating shoes Clothing to provide protection from electric shock
Work done at heights (19.7" (50 cm) or more)	Helmets for use in industry
Transportation of heavy objects	Shoes with additional protective toe cap

These safety cautions describe important matters concerning safety to prevent injury to users or other people and damages to property. Please read through this manual after understanding the contents below (meanings of indications), and be sure to follow the description.

Indication	Meaning of Indication
 WARNING	Text set off in this manner indicates that failure to adhere to the directions in the warning could result in serious bodily harm (*1) or loss of life if the product is handled improperly.
 CAUTION	Text set off in this manner indicates that failure to adhere to the directions in the caution could result in slight injury (*2) or damage (*3) to property if the product is handled improperly.

- *1: Serious bodily harm indicates loss of eyesight, injury, burns, electric shock, bone fracture, poisoning, and other injuries which leave aftereffect and require hospitalization or long-term treatment as an outpatient.
 *2: Slight injury indicates injury, burns, electric shock, and other injuries which do not require hospitalization or long-term treatment as an outpatient.
 *3: Damage to property indicates damage extending to buildings, household effects, domestic livestock, and pets.

■ Warning indications on the air conditioner unit

Warning indication	Description
 WARNING ELECTRICAL SHOCK HAZARD Disconnect all remote electric power supplies before servicing.	WARNING ELECTRICAL SHOCK HAZARD Disconnect all remote electric power supplies before servicing.
 WARNING Moving parts. Do not operate unit with grille removed. Stop the unit before the servicing.	WARNING Moving parts. Do not operate unit with grille removed. Stop the unit before the servicing.
 CAUTION High temperature parts. You might get burned when removing this panel.	CAUTION High temperature parts. You might get burned when removing this panel.
 CAUTION Do not touch the aluminum fins of the unit. Doing so may result in injury.	CAUTION Do not touch the aluminium fins of the unit. Doing so may result in injury.
 CAUTION BURST HAZARD Open the service valves before the operation, otherwise there might be the burst.	CAUTION BURST HAZARD Open the service valves before the operation, to avoid unnecessary pressure built up which could lead to explosion.

1 Precautions for safety

The manufacturer shall not assume any liability for the damage caused by not observing the description of this manual.

WARNING

General

- Before starting to install the air conditioner, read through the Installation Manual carefully, and follow its instructions to install the air conditioner.
- Only a qualified installer or qualified service person is allowed to do installation work. Inappropriate installation may result in water or refrigerant leakage, electric shock or fire.
- Do not use any refrigerant different from the one specified for complement or replacement. Otherwise, abnormally high pressure may be generated in the refrigeration cycle, which may result in a failure or explosion of the product or an injury to your body.
- Before opening the intake grille of the indoor unit, set the circuit breaker to the OFF position. Failure to set the circuit breaker to the OFF position may result in electric shocks through contact with the interior parts. Only a qualified installer or qualified service person is allowed to remove the intake grille of the indoor unit and do the work required.
- Before carrying out the installation, maintenance, repair or removal work, set the circuit breaker to the OFF position. Otherwise, may result in electric shocks.
- Place a "Work in progress" sign near the circuit breaker while the installation, maintenance, repair or removal work is being carried out. There is a danger of electric shocks if the circuit breaker is set to ON by mistake.
- Only a qualified installer or qualified service person is allowed to undertake work at heights using a stand of 19.7" (50 cm) or more or to remove the intake grille of the indoor unit to undertake work.
- Wear protective gloves and safety work clothing during installation, servicing and removal.

- Do not touch the aluminium fin of the unit. You may injure yourself if you do so. If the fin must be touched for some reason, first put on protective gloves and safety work clothing, and then proceed.
- Before opening the intake grille, set the circuit breaker to the OFF position. Failure to set the circuit breaker to the OFF position may result in injury through contact with the rotation parts. Only a qualified installer or qualified service person is allowed to remove the intake grille and do the work required.
- When work is performed at heights, use a ladder which complies with the ISO 14122 standard, and follow the procedure in the ladder's instructions. Also wear a helmet for use in industry as protective gear to undertake the work.
- Before cleaning the filter or other parts of the outdoor unit, set the circuit breaker to OFF without fail, and place a "Work in progress" sign near the circuit breaker before proceeding with the work.
- Before working at heights, put a sign in place so that no-one will approach the work location, before proceeding with the work. Parts and other objects may fall from above, possibly injuring a person below. While carrying out the work, wear a helmet for protection from falling objects.
- The refrigerant used by this air conditioner is the R410A.
- The air conditioner must be transported in stable condition. If any part of the product is broken, contact the dealer.
- When the air conditioner must be transported by hand, carry it by two or more people.
- Do not move or repair any unit by yourself. Must be done by qualified installer or qualified service person. Special precaution should be taken when removing the cover for the unit to avoid electric shock from high voltage lines.
- To transport the air conditioner, wear shoes with additional protective toe caps.
- To transport the air conditioner, do not take hold of the bands around the packing carton. You may injure yourself if the bands should break.
- This appliance is intended to be used by expert or trained users in shops, in light industry, or for commercial use by lay persons.

Selection of installation location

- When the air conditioner is installed in a small room, provide appropriate measures to ensure that the concentration of refrigerant leakage occur in the room does not exceed the critical level.
- Do not install in a location where flammable gas leaks are possible. Flammable gas accumulation may ignite and cause a fire.
- Install the indoor unit at least 8'2" (2.5 m) above the floor level since otherwise the users may injure themselves or receive electric shocks if they poke their fingers or other objects into the indoor unit while the air conditioner is running.
- Do not place any combustion appliance in a place where it is directly exposed to the wind of air conditioner, otherwise it may cause imperfect combustion

Installation

- When the indoor unit is to be suspended, the designated hanging bolts (M10 or W3/8) and nuts (M10 or W3/8) must be used.
- Install the air conditioner securely in a location where the base can sustain the weight adequately. If the strength is not enough, the unit may fall down resulting in injury.
- Follow the instructions in the Installation Manual to install the air conditioner. Failure to follow these instructions may cause the product to fall down or topple over or give rise to noise, vibration, water leakage or other trouble.
- 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 generate.
- Use forklift to carry in the air conditioner units and use winch or hoist at installation of them.

Refrigerant piping

- 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 refrigerant pipe, the compressor sucks air and the refrigeration cycles is over pressurized, which may cause a injury.
- Tighten the flare nut with a torque wrench in the specified manner. Over tightening the flare nut may cause a crack in the flare nut after a long period, which may result in refrigerant leakage.
- 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.
- When the air conditioner has been installed or relocated, follow the instructions in the Installation Manual and purge the air completely so that no gases other than the refrigerant will be mixed in the refrigerating cycle. Failure to purge the air completely may cause the air conditioner to malfunction.
- Nitrogen gas must be used for the airtight test.
- The charge hose must be connected in such a way that it is not slack.

Electrical wiring

- Only a qualified installer or qualified service person is allowed to carry out the electrical work of the air conditioner. Under no circumstances must this work be done by an unqualified individual since failure to carry out the work properly may result in electric shocks and/or electrical leaks.
- To connect the electrical wires, repair the electrical parts or undertake other electrical jobs, wear gloves to provide protection for electricians, insulating shoes and clothing to provide protection from electric shocks. Failure to wear this protective gear may result in electric shocks.
- Use wiring that meets the specifications in the Installation Manual and the stipulations in the local regulations and laws. Use of wiring which does not meet the specifications may give rise to electric shocks, electrical leakage, smoking and/or a fire.
- Connect earth wire. (grounding wire)

- Incomplete grounding causes an electric shock.
- Do not connect grounding wires to gas pipes, water pipes, and lightning conductor or telephone earth wires.
- After completing the repair or relocation work, check that the grounding wires are connected properly.
- Install a circuit breaker that meets the specifications in the installation manual and the stipulations in the local regulations and laws.
- Install the circuit breaker where it can be easily accessed by the agent.
- When installing the circuit breaker outdoors, install one which is designed to be used outdoors.
- Under no circumstances the power wire must not be extended. Connection trouble in the places where the wire is extended may give rise to smoking and/or a fire.
- Electrical wiring work shall be conducted according to law and regulation in the community and installation manual. Failure to do so may result in electrocution or short circuit.

Test run

- Before operating the air conditioner after having completed the work, check that the electrical control box cover of the indoor unit and service panel of the outdoor unit are closed, and set the circuit breaker to the ON position. You may receive an electric shock if the power is turned on without first conducting these checks.
- If there is any kind of trouble (such as an error display has appeared, smell of burning, abnormal sounds, the air conditioner fails to cool or heat or water is leaking) has occurred in the air conditioner, do not touch the air conditioner but set the circuit breaker to the OFF position, and contact a qualified service person. Take steps to ensure that the power will not be turned on (by marking "out of service" near the circuit breaker, for instance) until qualified service person arrives. Continuing to use the air conditioner in the trouble status may cause mechanical problems to escalate or result in electric shocks or other trouble.

- After the work has finished, use an insulation tester set (500V Megger) to check the resistance is 1MΩ or more between the charge section and the non-charge metal section (Earth/Ground section).
If the resistance value is low, a disaster such as a leak or electric shock is caused at user's side.
- Upon completion of the installation work, check for refrigerant leaks and check the insulation resistance and water drainage. Then conduct a test run to check that the air conditioner is operating properly.

Explanations given to user

- Upon completion of the installation work, tell the user where the circuit breaker is located. If the user does not know where the circuit breaker is, he or she will not be able to turn it off in the event that trouble has occurred in the air conditioner.
- If the fan grille is damaged, do not approach the outdoor unit but set the circuit breaker to the OFF position, and contact a qualified service person to have the repairs done. Do not set the circuit breaker to the ON position until the repairs are completed.
- After the installation work, follow the Owner's Manual to explain to the customer how to use and maintain the unit.

Relocation










- Only a qualified installer or qualified service person is allowed to relocate the air conditioner. It is dangerous for the air conditioner to be relocated by an unqualified individual since a fire, electric shocks, injury, water leakage, noise and/or vibration may result.
- 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 the compressor still operating will cause air or other gas to be sucked in, raising the pressure inside the refrigeration cycle to an abnormally high level, and possibly resulting in rupture, injury or other trouble.

CAUTION

New refrigerant air conditioner installation

- **This air conditioner adopts the new HFC refrigerant (R410A) which does not destroy ozone layer.**
- The characteristics of R410A refrigerant are easy to absorb water, oxidizing membrane or oil, and its pressure is approx. 1.6 times higher than that of refrigerant R22. Accompanied with the new refrigerant, refrigerating oil has also been changed. Therefore, do not let water, dust, former refrigerant, or refrigerating oil enter the refrigerating cycle during installation work.
- To prevent charging an incorrect refrigerant and refrigerating oil, the sizes of connecting sections of charging port of the main unit and installation tools are changed from those for the conventional refrigerant.
- Accordingly the exclusive tools are required for the new refrigerant (R410A).
- For connecting pipes, use new and clean piping designed for R410A, and please care so that water or dust does not enter.

2 Accessory parts

Part name	Q'ty	Shape	Usage
Installation Manual	1	This manual	(Hand over to customers)
Owner's Manual	1		(Hand over to customers)
Insulation pipe	2		For heat insulation of pipe connecting section
Washer	4	W3/8 (M10) × 63/64" (Ø25)	For holding down unit
Hose band	2		For connecting drain pipe
Drain hose	1		For connecting drain pipe
Bushing	1		For protection of edge at power taking-in port
Insulation	1		For heat insulation of drain hose 0.4"t × 7.5" × 7.5" (10t × 190 × 190)
Heat insulator of top plate	1		For upper pipe hole of indoor unit 0.3"t × 4.7" × 6.3" (6t × 120 × 160)
Banding band	6		For heat insulation of pipe connecting section (n=4) and drain hose heat insulator (n=2).
Electrical cover 2 holes	1		For connecting 2 power supply.

3 Selection of installation place

Avoid installing in the following places.

Select a location for the indoor unit where the cool or warm air will circulate evenly.

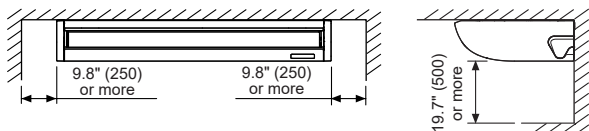
Avoid installation in the following kinds of locations.

- Saline area (coastal area).
- Locations with acidic or alkaline atmospheres (such as areas with hot springs, factories where chemicals or pharmaceuticals are made and places where the exhaust air from combustion appliances will be sucked into the unit).
Doing so may cause the heat exchanger (its aluminum fins and copper pipes) and other parts to become corroded.
- Places where iron or other metal dust is present. If iron or other metal dust adheres to or collects on the interior of the air conditioner, it may spontaneously combust and start a fire.
- Locations with atmospheres with mist of cutting oil or other types of machine oil.
Doing so may cause the heat exchanger to become corroded, mists caused by the blockage of the heat exchanger to be generated, the plastic parts to be damaged, the heat insulators to peel off, and other such problems to result.
- Locations where vapors from food oils are formed (such as kitchens where food oils are used).
Blocked filters may cause the air conditioner's performance to deteriorate, condensation to form, the plastic parts to be damaged, and other such problems to result.
- Locations near obstructions such as ventilation openings or lighting fixtures where the flow of the blown air will be disrupted (a disruption of the air flow may cause the air conditioner's performance to deteriorate or the unit to shut down).
- Locations where an in-house power generator is used for the power supply.
The power line frequency and voltage may fluctuate, and the air conditioner may not work properly as a result.
- On truck cranes, ships or other moving conveyances.
- The air conditioner must not be used for special applications (such as for storing food, plants, precision instruments or art works).
(The quality of the items stored may be degraded.)
- Locations where high frequencies are generated (by inverter equipment, in-house power generators, medical equipment or communication equipment).
(Malfunctioning or control trouble in the air conditioner or noise may adversely affect the equipment's operation.)
- Locations where there is anything under the unit installed that would be compromised by wetness.
(If the drain has become blocked or when the humidity is over 80%, condensation from the indoor unit will drip, possibly causing damage to anything underneath.)
- In the case of the wireless type of system, rooms with the inverter type of fluorescent lighting or locations exposed to direct sunlight.
(The signals from the wireless remote controller may not be sensed.)
- Locations where organic solvents are being used.
- The air conditioner cannot be used for liquefied carbonic acid cooling or in chemical plants.
- Location near doors or windows where the air conditioner may come into contact with high-temperature, high-humidity outdoor air.
(Condensation may occur as a result.)
- Locations where special sprays are used frequently.

■ Installation space

(Unit: in (mm))

Reserve sufficient space required for installation or service work.



■ Ceiling height

Model RAV-	Possible installed ceiling height
SM182, SM242, SM302	Up to 13'1" (4.0 m)
SM362, SM422, SM482	Up to 14'1" (4.3 m)

If height of ceiling exceeds 11'5" (3.5 m), hot air becomes difficult to reach the floor surface, and then the change of setup of high ceiling is necessary.

For the change method of high ceiling, refer to the application control, "Installing indoor unit on high ceiling" in this Manual.

▼ Maximum installation height

Model RAV-	SM182, SM242, SM302	SM362, SM422, SM482	SET DATA
Standard (Factory default)	Up to 11'5" (3.5 m)	Up to 11'5" (3.5 m)	0000
High ceiling (1)	Up to 13'1" (4.0 m)	Up to 14'1" (4.3 m)	0003

The lighting time of the filter sign (notification of filter cleaning) on the remote controller can be changed according to installation conditions.

When it is difficult to obtain satisfactory heating due to location place of the indoor unit or the structure of the room, the detection temperature of heating can be raised.

For change the setup time, refer to the application control, "Filter sign setting" and "To secure better effect of heating" in this Manual.

■ In case of wireless type

Decide the position which remote controller is operated and the installation place.

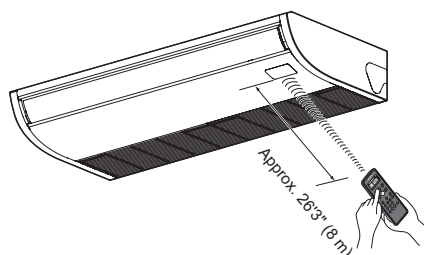
And then refer to the Installation Manual of the wireless remote controller kit sold separately.

(The signal of the wireless type remote controller can be received within approx. 26'3" (8 m).

This distance is a criterion and varies a little according to capacity of the battery)

• To prevent malfunction, select a place where is not affected by a fluorescent lamp or direct sunlight.

• Two wireless-type indoor units can be set in a room.



4 Installation

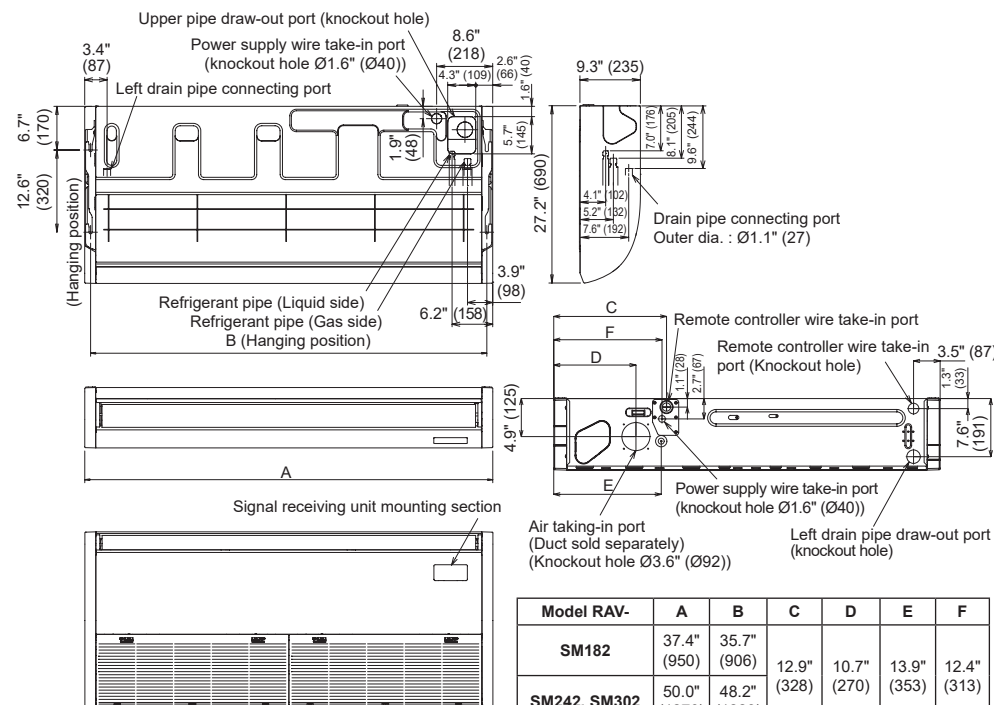
⚠ CAUTION

Strictly comply with the following rules to prevent damage of the indoor units and human injury.

- Do not put a heavy article on the indoor unit or let a person get on it. (Even units are packaged)
- Carrying the indoor unit as it is packaged if possible. If carrying the indoor unit unpacked is necessary, use buffering cloth or other material to not damage the unit.
- Carry the package by two or more persons, and do not bundle it with plastic band at positions other than specified.
- To install vibration isolation material to hanging bolts, confirm that it does not increase the unit vibration.

■ External dimensions

(Unit: in (mm))



EN

■ Installation of hanging bolt

- When determining the location of the indoor unit, consider the piping and wiring connections.
- After the location of the indoor unit installation has been determined, install hanging bolts.
- For the dimensions of the hanging bolt pitches, refer to the external view and installation pattern.

Procure hanging bolts washer and nuts for installing the indoor unit (these are not supplied).

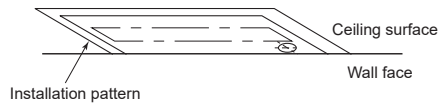
Hanging bolt	M10 or W3/8	4 pieces
Nut	M10 or W3/8	8 pieces

- To fasten the hanging bracket from above and below, twelve pieces of nuts are required.

How to use attached installation pattern

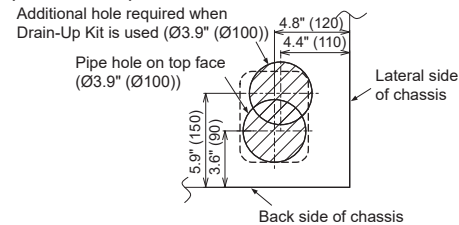
Using the pattern, positioning of the hanging bolt and pipe hole can be performed.
The installation pattern is printed on the packing carton. Cut it off the carton.

* As an error to some degree may generate on the pattern size due to temperature and humidity, be sure to confirm the size.



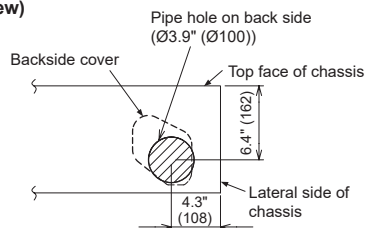
Hole for drawing out pipe from top face

(Bottom View)



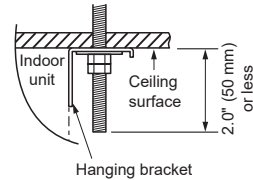
Hole for drawing out pipe from back side

(Front View)



Installation of hanging bolt

Use W3/8 (M10) hanging bolts (4 pcs, locally procured). Matching to the existing structure, set pitch according to size in the "External dimensions".



New concrete slab Install the bolts with insert brackets or anchor bolts. 	
Steel frame structure Use existing angles or install new support angles. 	
Existing concrete slab Use a hole-in anchors, hole-in plugs, or a hole-in bolts. 	

■ Installation of remote controller (Sold separately)

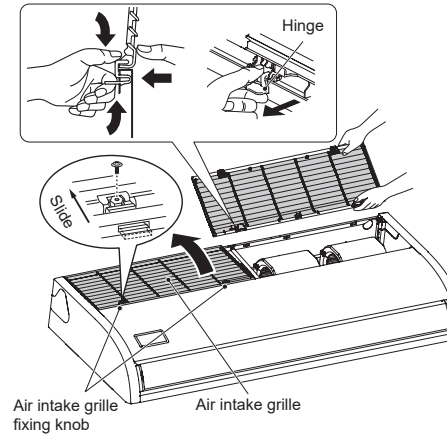
For installation of the remote controller, follow the Installation Manual attached with the remote controller.

- Pull out the remote controller cord together with the refrigerant pipe or drain pipe.
Pass the remote controller cord through upper side of the refrigerant pipe and drain pipe.
- Do not leave the remote controller at a place exposed to the direct sunlight and near a stove.
- Operate the remote controller, confirm that the indoor unit receives a signal surely, and then install it. (Wireless type)
- Keep 3'3" (1 m) or more from the devices such as television, stereo. (Disturbance of image or noise may generate.) (Wireless type)

■ Before installation

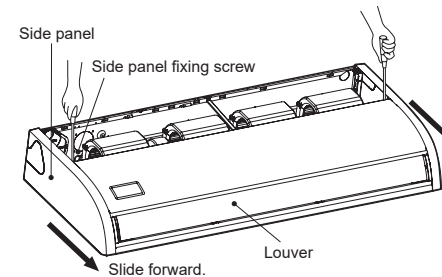
1 Removal of air intake grille

- Remove the screws of air intake grille fixing knob on a side of each filter.
- Slide the air intake grille fixing knobs (two positions) toward the arrow direction (OPEN), and then open the air intake grille.
- With the air intake grille open, hold the hinge from above and below with one hand and take out the air intake grille with the other hand while gently pushing it. (There are two air intake grilles.)

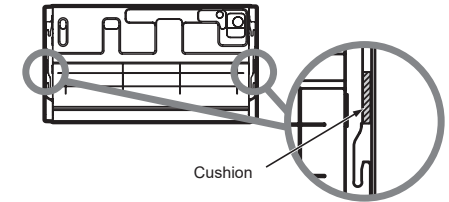


2 Removal of side panel

After removing the side panel fixing screws (1 each at right and left), slide the side panel forward and then remove it.



⚠ CAUTION



Cushions are inserted between the side panel and hanging hook for transportation. (In the two places shown above) Remove them before installation.

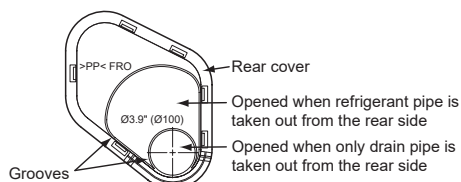
■ Draw-out direction of pipe / wire

Decide installation place of the unit and draw-out direction of pipe and wire.

■ Pipe knockout hole

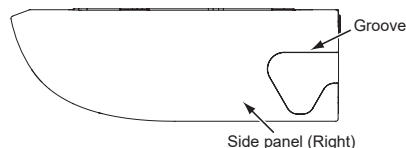
In case of taking pipe from the rear side

- * Cut off the groove section with a plastic cutter.



<In case of taking pipe from right side>

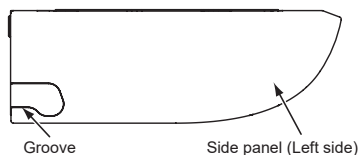
- * Cut off the groove section with a metal saw or plastic cutter.



<In case of taking pipe from left side>

Taking pipe from left side is applied only to the drain pipe.
The refrigerant pipe cannot be taken out from the left side.

- * Cut off the groove section with a metal saw or plastic

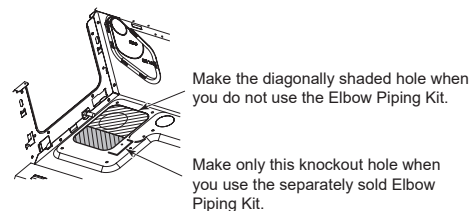


<In case of taking pipe from upper side>

Taking pipe from upper side is applied only to the refrigerant pipe.

When taking out the drain pipe from the upper side, use a drain up kit sold separately.

Open the upper pipe draw-out port (Knockout hole) shown in the external dimensions.



After piping, cut off the attached heat insulator of the top plate to pipe shape, and then seal the knockout hole.

■ Knockout hole of power wire take-in port

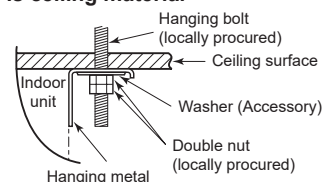
Open the power wire take-in port (Knockout hole) shown in the "External dimensions" and then mount the attached bushing.

■ Installation of indoor unit

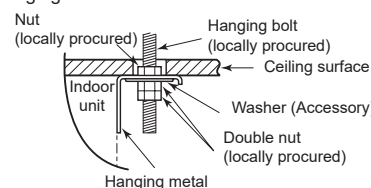
◆ Preparation before holding down main unit

- * Confirm the presence of the ceiling material beforehand because the fixing method of hanging metal when the ceiling material is set differs from that when the ceiling material is not set.

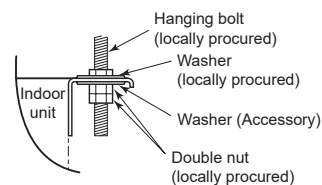
<There is ceiling material>



- Fix the hanging bracket as shown below if the ceiling is bent upwards when you fasten lower nuts to the hanging bracket.



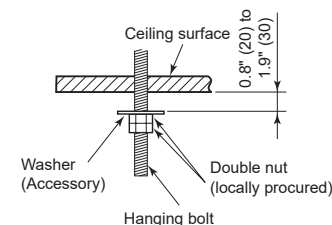
<There is no ceiling material>



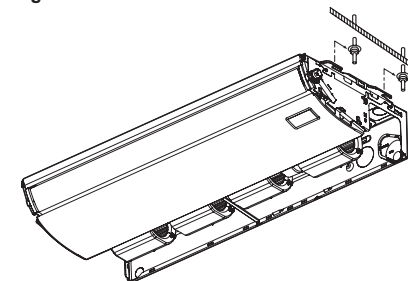
◆ Holding down of main unit

<Hanging the indoor unit directly from the ceiling>

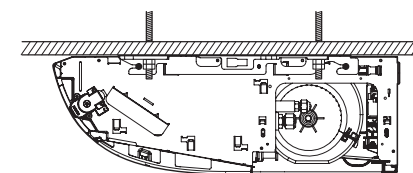
1 Attach washer and nuts to the hanging bolt.



2 Hang the unit to the hanging bolt as shown in the figure below.

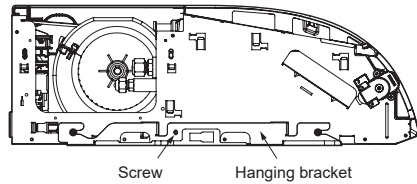


3 As shown in the figure below, fix the ceiling material securely with the double nuts.

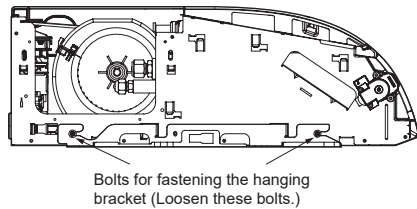


◆ Attaching the hanging bracket first

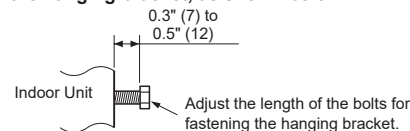
- 1 Remove the screws fastening hanging bracket onto the indoor unit.



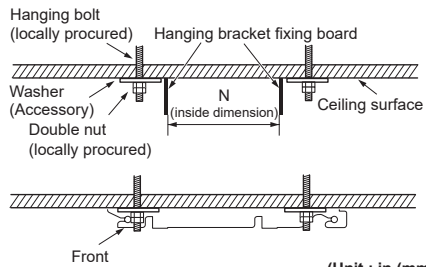
- 2 Loosen the bolts fastening hanging bracket onto the indoor unit and remove the hanging bracket.



- 3 Adjust the length of the two bolts for fastening the hanging bracket, as shown below.

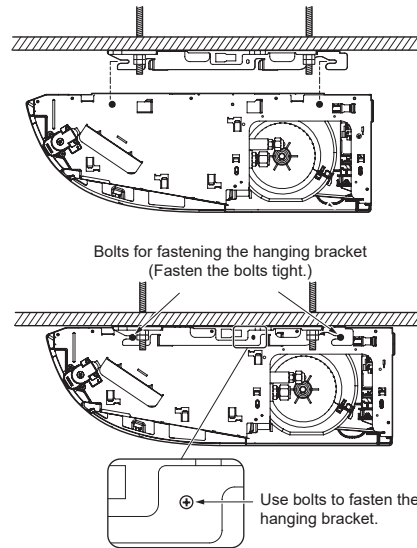


- 4 Fasten the hanging bracket with the hanging bolts and ensure that the bracket is level from front to back and from side to side.



Model RAV-	N
SM182	34.2" (867) to 34.3" (872)
SM242, SM302	46.7" (1184) to 46.9" (1189)
SM362, SM422, SM482	59.1" (1501) to 59.3" (1506)

- 5 Attach the indoor unit onto the hanging bracket and fasten it tight with the bolts and screws.



⚠ CAUTION

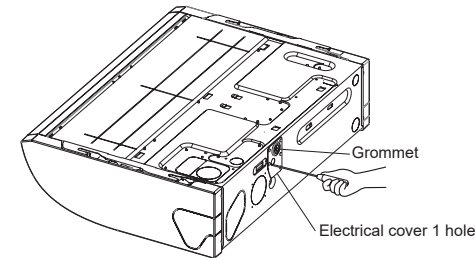
- The ceiling is not always level. Use the level gauge to measure the level of the ceiling in the width and depth directions. Adjust the bolts for the hanging brackets so that the level error will be within 0.2" (5 mm).
- Do not lower the air discharge side and the side opposite to the selected drain pipe withdraw.

■ Installation of electrical cover 2 holes type

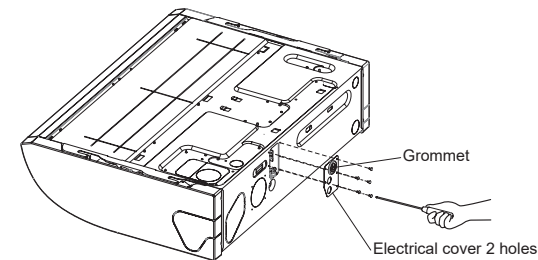
REQUIREMENT

- In case of group control, electrical cover 1 hole type need to change to electrical cover 2 holes type.

- 1 Removal of electrical cover 1 hole.
 - 1) Remove the grommet from electrical cover 1 hole.
 - 2) Remove the screws of electrical cover 1 hole (5 positions).
 - 3) Remove the electrical cover 1 hole.



- 2 Installation of electrical cover 2 holes
 - 1) Prepare electrical cover 2 holes from accessory.
 - 2) Installation electrical cover 2 holes at unit fix by screws (5 positions).
 - 3) Installation grommet at electrical cover 2 holes.

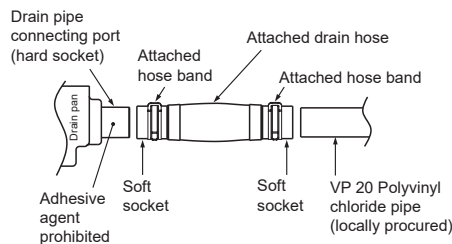
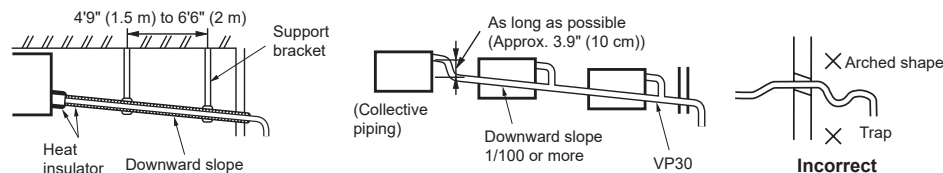


5 Drain piping

CAUTION

Following the Installation Manual, perform the drain piping work so that water is properly drained. Apply a heat insulation so as not to cause a dew condensation. Inappropriate piping work may result in water leakage in the room and wet furniture.

- Provide the indoor drain piping with proper heat insulation.
- Provide the area where the pipe connects to the indoor unit with proper heat insulation. Improper heat insulation will cause condensation to form.
- The drain pipe must be sloping downward (at an angle of 1/100 or more), and do not run the pipe up and down (arched shape) or allow it to form traps. Doing so may cause abnormal sounds.
- Restrict the length of the traversing drain pipe to 65'7" (20 m) or less. For a long pipe, provide support brackets at intervals of 4'9" (1.5 m) to 6'6" (2 m) to prevent flapping.
- Install the collective piping as shown in the following figure.
- Do not provide any air vents. Otherwise, the drain water will spout, causing water to leak.
- Do not allow any force to be applied to the connection area with the drain pipe.
- A hard PVC pipe cannot be connected to the drain pipe connecting port of the indoor unit. Be absolutely sure to use the flexible hose provided for the connections with the drain pipe connecting port.
- Adhesive agents cannot be used for the drain pipe connecting port (hard socket) of the indoor unit. Be absolutely sure to secure the pipe using the hose bands provided. Use of an adhesive agent may damage the drain pipe connecting port or cause water to leak.



Pipe material, size and insulator

The following materials for piping work and insulating process are procured locally.

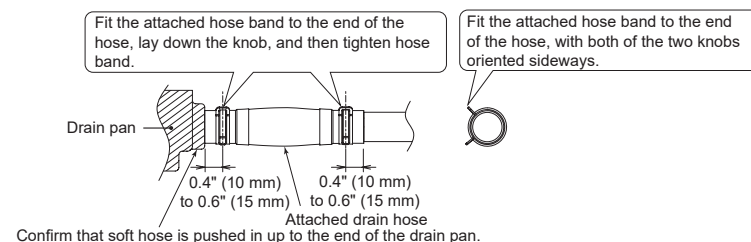
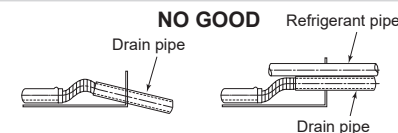
Pipe material	Hard vinyl chloride pipe VP20 (Nominal outer diameter 1.1" (26 mm))
Insulator	Foamed polyethylene foam, thickness: 0.4" (10 mm) or more

Connection of drain hose

- Insert the attached drain hose into the drain pipe connecting port on the drain pan up to the end.
- Fit the attached hose band to the end of the pipe connecting port, and then tighten it securely.

REQUIREMENT

- Fix the drain hose with the attached hose band, and set the tightening position upward.
- As the draining is the natural water draining, arrange the pipe outside of the unit on the down slope.
- If piping is performed as shown in the figure, drain cannot be discharged.

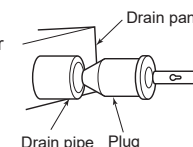


Connecting drain pipe

Connect the hard vinyl chloride pipe (locally procured) to the mounted drain hose which was attached. When Plug is detached, the drain pipe is not damaged. It causes the water leak.

In case of taking pipe from the left side

In case of taking pipe from the left side, exchange the plug from left to right. Push in the plug of which end is not sharp up to the end.



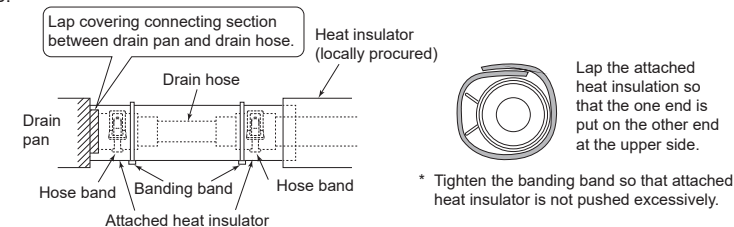
Drain up

When a down-gradient cannot be secured for the drain pipe, drain-up piping is possible.

- The height of the drain pipe must be 23.6" (600 mm) or less from the underside of the indoor unit.
- When Drain Pump Kit (sold separately) is installed, drain pipe and refrigerant pipe can only be connected from upper direction.

Heat insulating process

- Using the attached drain hose heat insulator, lap the connecting section and the drain hose without clearance, and then tighten with two handing band so that heat insulator does not open.
- Covering the attached drain hose heat insulator, lap the heat insulator (locally procured) to the drain pipe without clearance.



* Fasten the binding bands in such a manner as to not squeeze the attached insulating material excessively.

EN

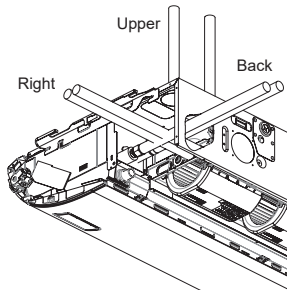
6 Refrigerant piping

CAUTION

When the refrigerant pipe is long, provide support brackets at intervals of 8'2" (2.5 m) to 9'9" (3 m) to clamp the refrigerant pipe. Otherwise, abnormal sound may be generated.
Use the flare nut attached with the indoor unit or R410A flare nut.

Take out direction of refrigerant pipe

- The refrigerant pipe connecting sections are located as shown below. (Pipes can be taken out from one of the three directions.)
- Make a pipe knockout hole, referring to the section "Pipe knockout hole".



* When Drain Pump Kit (sold separately) is installed, a refrigerant pipe can only be taken out from upper direction.

Permissible piping length and height difference

They vary depending on the outdoor unit. For details, refer to the Installation Manual attached to the outdoor unit.

Pipe size

Model RAV-	Pipe size (Unit: in (mm))	
	Gas side	Liquid side
SM182	1/2" (12.7)	1/4" (6.4)
SM242 to SM482	5/8" (15.9)	3/8" (9.5)

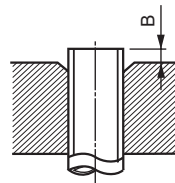
Connecting refrigerant piping

Flaring

- Cut the pipe with a pipe cutter.**
Remove burrs completely. (Remaining burrs may cause gas leakage.)
- Insert a flare nut into the pipe, and flare the pipe.**
Use the flare nut provided with the unit or the one used for the R410A refrigerant. The flaring dimensions for R410A are different from the ones used for the conventional R22 refrigerant. A new flare tool manufactured for use with the R410A refrigerant is recommended, but the conventional tool can still be used if the projection margin of the copper pipe is adjusted to be as shown in the following table.

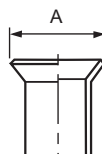
Projection margin in flaring: B (Unit: in (mm))

Outer dia. of copper pipe	R410A tool used	Conventional tool used
1/4" (6.4), 3/8" (9.5)	0 to 0.02" (0.5)	0.04" (1.0) to 0.60" (1.5)
1/2" (12.7), 5/8" (15.9)		

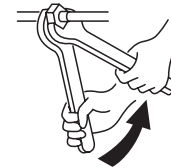


Flaring diameter size: A (Unit: in (mm))

Outer dia. of copper pipe	A ⁺⁰ / _{-0.02} (-0.4)
1/4" (6.4)	0.4" (9.1)
3/8" (9.5)	0.5" (13.2)
1/2" (12.7)	0.7" (16.6)
5/8" (15.9)	0.8" (19.7)



- In case of flaring for R410A with the conventional flare tool, pull it out approx. 0.02" (0.5 mm) more than that for R22 to adjust to the specified flare size. The copper pipe gauge is useful for adjusting projection margin size.
- The sealed gas was sealed at the atmospheric pressure so when the flare nut is removed, there will no "whooshing" sound: This is normal and is not indicative of trouble.
- Use two wrenches to connect the indoor unit pipe.



Work using double spanner

- Use the tightening torque levels as listed in the table below.

Outer dia. of connecting pipe in (mm)	Tightening torque (ft·lbs (N·m))
1/4" (6.4 mm) (dia.)	11 to 14 (14 to 18)
3/8" (9.5 mm) (dia.)	25 to 31 (34 to 42)
1/2" (12.7 mm) (dia.)	36 to 45 (49 to 61)
5/8" (15.9 mm) (dia.)	47 to 57 (63 to 77)

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

CAUTION

Tightening with an excessive torque may crack the nut depending on installation conditions.

Evacuation

Perform vacuuming from the charge port of valve of the outdoor unit by using a vacuum pump.
For details, follow to the Installation Manual attached to the outdoor unit.

- Do not use the refrigerant sealed in the outdoor unit for evacuation.

REQUIREMENT

For the tools such as charge hose, use those manufactured exclusively for R410A.

Refrigerant amount to be added

For addition of the refrigerant, add refrigerant "R410A" referring to the attached Installation Manual of outdoor unit.

Use a scale to charge the refrigerant of specified amount.

REQUIREMENT

- Charging an excessive or too little amount of refrigerant causes a trouble of the compressor. Charge the refrigerant of specified amount.
- A personnel who charged the refrigerant should write down the pipe length and the added refrigerant amount in the F-GAS label of the outdoor unit. It is necessary to fix the compressor and refrigeration cycle malfunction.

Open the valve fully

Open the valve of the outdoor unit fully. A 4 mm hexagonal wrench is required for opening the valve.
For details, refer to the Installation Manual attached to the outdoor unit.

Gas leak check

Check with a leak detector or soap water whether gas leaks or not, from the pipe connecting section or cap of the valve.

REQUIREMENT

Use a leak detector manufactured exclusively for HFC refrigerant (R410A, R134a).

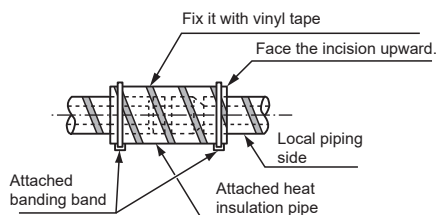
Heat insulation process

Apply heat insulation for the pipes separately at liquid side and gas side.

- For the heat insulation to the pipes at gas side, use the material with heat-resisting temperature 248°F (120°C) or higher.
- To use the attached heat insulation pipe, apply the heat insulation to the pipe connecting section of the indoor unit securely without gap.

REQUIREMENT

- Apply the heat insulation to the pipe connecting section of the indoor unit securely up to the root without exposure of the pipe. (The pipe exposed to the outside causes water leak.)
- Wrap heat insulator with its slits facing up (ceiling side).



7 Electrical connection

⚠ WARNING

- Use the specified wires for wiring connect the terminals. Securely fix them to prevent external forces applied to the terminals from affecting the terminals.**
Incomplete connection or fixation may cause a fire or other trouble.
- Connect earth wire. (grounding work)**
Incomplete grounding cause an electric shock.
Do not connect earth wires to gas pipes, water pipes, lightning conductor or telephone earth wires.
- The Appliance shall be installed in accordance with national wiring regulations.**
Capacity shortage of power circuit or incomplete installation may cause an electric shock or a fire.

⚠ CAUTION

- For power supply specifications, follow the Installation Manual of outdoor unit.
- Do not connect 208/230V~60Hz power to the terminal blocks (Ⓐ , Ⓑ) for control wiring.
Otherwise, the system will fail.
- Do not damage or scratch the conductive core and inner insulator of power and system interconnection wires during peeling them.
- Perform the electric wiring so that it does not come to contact with the high-temperature part of the pipe.
The coating may melt resulting in an accident.
- Do not turn on the power of the indoor unit until vacuuming of the refrigerant pipes completes.

■ System interconnection wires specifications

System interconnection wires*	AWG16 or more (H07RN-F or 60245 IEC 66)	Up to 229'7"(70 m)
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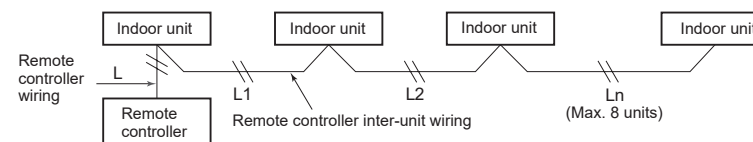
*Number of wire × wire size

Remote controller wiring

Remote controller wiring, remote controller inter-unit wiring	Wire size: AWG20 to AWG16	
Total wire length of remote controller wiring and remote controller inter-unit wiring = $L + L1 + L2 + \dots Ln$	In case of wired type only	Up to 1640'5"(500 m)
	In case of wireless type included	Up to 1312'4"(400 m)
Total wire length of remote controller inter-unit wiring = $L1 + L2 + \dots Ln$	Up to 656'2"(200 m)	

⚠ CAUTION

The remote controller wire and system interconnection wires cannot be parallel to contact each other and cannot be stored in the same conduits. If doing so, a trouble may be caused on the control system due to noise or other factor.

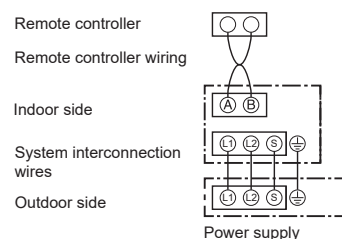


■ Wiring between indoor unit and outdoor unit

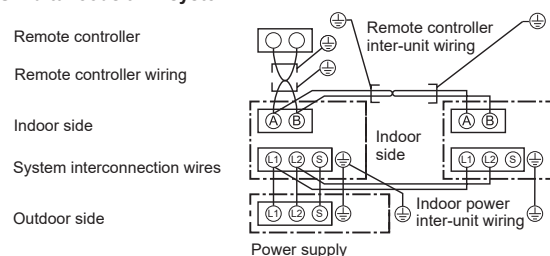
- Figure below shows the wiring connections between the indoor and outdoor units and between the indoor units and remote controller. The wires indicated by the broken lines or dot-and-dash lines are provided at the locally.
- Refer to the both indoor and outdoor unit wiring diagrams.

Wiring diagram

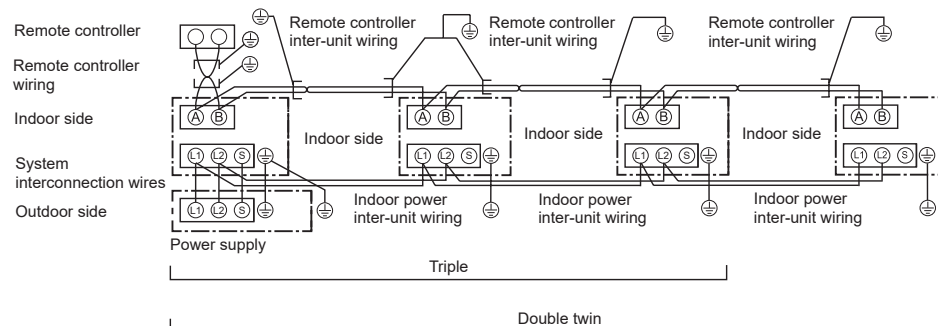
Single system



Simultaneous twin system



Simultaneous triple and double twin system



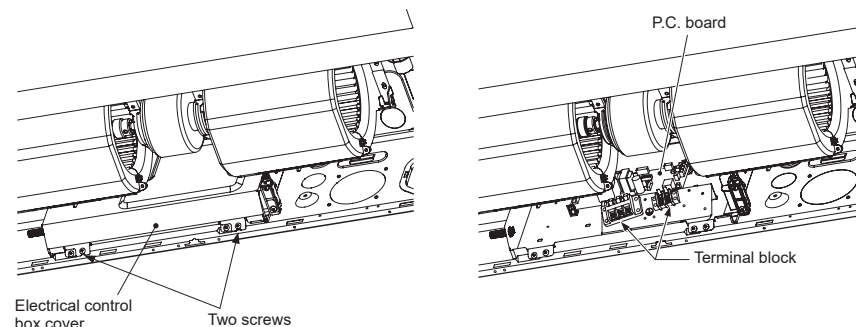
- * Use 2-core shield wire (MVVS AWG20 to AWG16 or more) for the remote controller wiring in the simultaneous twin simultaneous triple and simultaneous double twin systems to prevent noise problems. Connect both ends of the shield wire to earth leads.
- * Connect earth wires for each indoor unit in the simultaneous twin, simultaneous triple and simultaneous double twin systems.

◆ Wire connection

REQUIREMENT

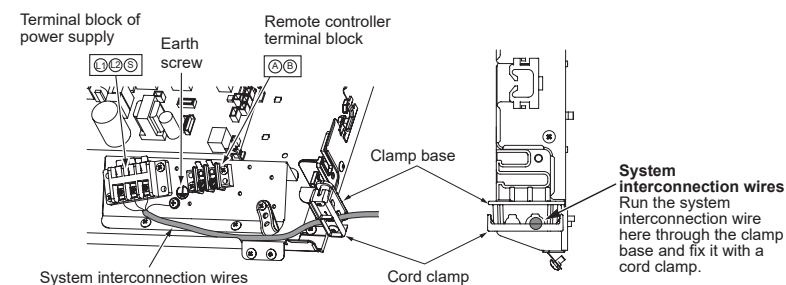
- Connect the wires matching the terminal numbers. Incorrect connection causes a trouble.
- Pass the wires through the bushing of wire connection holes of the indoor unit.
- Keep a margin (Approx. 3.9"(100 mm)) on a wire to hang down the electrical control box at servicing.
- The low-voltage circuit is provided for the remote controller. (Do not connect the high-voltage circuit)

- 1 Loosen the cover mounting screws (2 positions) of the electrical control box, and then remove the cover.
- 2 Connect the system interconnection wires and the remote controller wire to the terminal block of the electrical control box.
- 3 Tighten screws of the terminal block securely, and fix the wires with code clamp attached to the electrical control box. (Do not apply tension to the connecting section of the terminal block.)
- 4 Mount the cover of the electrical control box so that it does not pinch the wires.

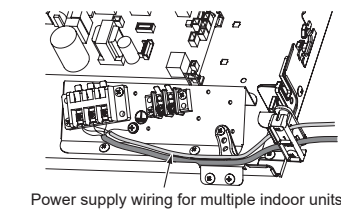


▼ Connecting the system interconnection wire

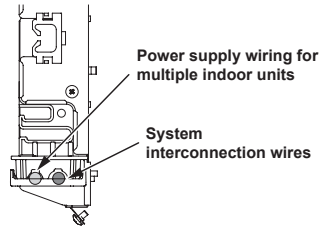
<Single connection>



<Multi-indoor-unit connection>

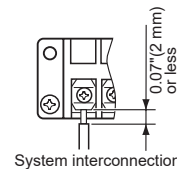
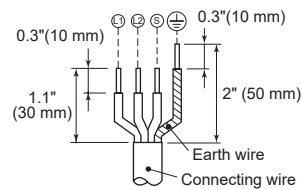


Power supply wiring for multiple indoor units



Power supply wiring for multiple indoor units

System interconnection wires

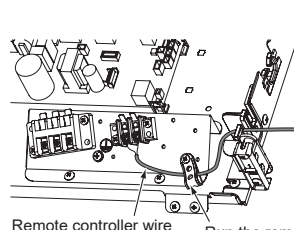
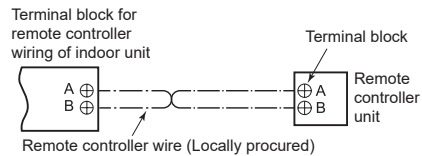


See the figure on the left for connecting wires to the terminal block.

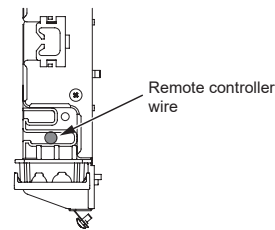
■ Remote controller wiring

Strip off approx. 0.3"(9 mm) the wire to be connected.

Wiring diagram



Remote controller wire Run the remote controller wire through the cord clamp.



Remote controller wire

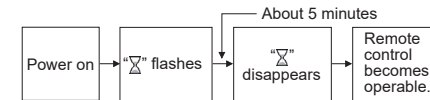
8 Applicable controls

REQUIREMENT

It takes some time before the remote control becomes operable when the remote control is used for the first time. This is not a malfunction.

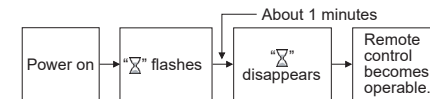
<When the power is turned on for the first time after installation>

It takes about 5 minutes before the remote control becomes operable.



<When the power is turned on from the second time>

It takes about 1 minute before the remote control becomes operable.



- Normal settings were made when the indoor unit was shipped from factory. Change the indoor unit settings as required.
- Use the wired remote controller to change the settings.
 - * The settings cannot be changed using the wireless remote controller, sub remote controller, or remote-controller-less system (for central remote controller only). Therefore, install the wired remote controller to change the settings.

■ Basic procedure for changing settings

Change the settings while the air conditioner is not working. **(Stop the air conditioner before making settings.)**

⚠ CAUTION

Set only the CODE No. shown in the following table: Do NOT set any other CODE No. If a CODE No. not listed is set, it may not be possible to operate the air conditioner or other trouble with the product may result.

■ Field setting menu



- 1 Push the [MENU] button to display the menu screen. Push and hold the [MENU] button and the [V] button at the same time to display the "Field setting menu". →Push and hold the buttons for more than 4 seconds. Push the [CANCEL] button to return.

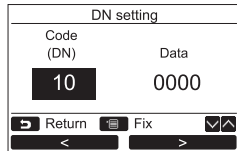
Item	Function
1. Test mode	Settings for when performing the test operation after installation
2. Register service info	Registration of information about the contact number for service, model name and serial number of the indoor unit and outdoor unit
3. Alarm history	List of latest 10 alarm data: information of check code, date, time, and unit
4. Monitor function	Monitoring data of sensor temperature, rotating speed of the compressor or other factor.
5. Setting louver position	Change the louver indication setting to match the indoor unit type.
6. Setting timer operation mode	Set whether or not the operation mode can be selected when setting the schedule timer.
7. DN setting	Advanced settings using DN code

■ DN setting

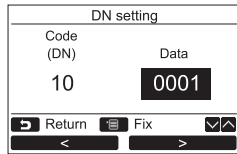
Perform the advanced settings for the air conditioner. Carry out the setting operation while the indoor unit is stopped. (Turn off the air conditioning unit before starting the setting operation.)

- Push the [] / [] button to select "7. DN setting" on the "Field setting menu" screen, then push the "Set" [] button.

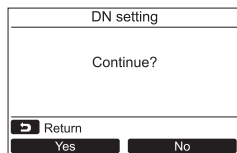
→ The fan and louver of the indoor unit operate. When the group control is used, the fan and louver of the selected indoor unit operate.



- Move the cursor to select "Code(DN)" with the "Left" [] button, then set "Code(DN)" with the [] / [] button.



- Move the cursor to select "Data" with the "Right" [] button, then set "Data" with the [] / [] button.



- Push the [] button to set the other Code (DN) and Data. After "Continue?" is displayed on the screen, push the "Yes" [] button.

- Push the "No" [] button to finish the setting operation. "Setting" appears on the screen for a while, then the screen returns to the "Field setting menu" screen.

→ Pushing the "No" [] button displays the unit selection screen when the group control is used. Push the [] button on the unit selection screen to finish the setting operation. "Setting" appears on the screen for a while, then the screen returns to the "Field setting menu" screen.

■ Installing indoor unit on high ceiling

When the height of the ceiling to be installed exceeds 11.5' (3.5 m), adjustment of air volume is necessary. Set up the high ceiling.

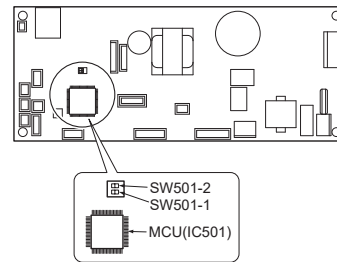
- Set according to the basic operation procedure (1 → 2 → 3 → 4 → 5 → 6).
- CODE No. in Procedure specifies [5d].
- Select [SET DATA] in Procedure from "List of installable ceiling height" in this Manual.
- For the CODE No. in Procedure 3, specify [5d].
- For the CODE No. in Procedure 4, select the SET DATA of ceiling height to be set up from the table on the below.

Model RAV-	SM182, SM242, SM302	SM362, SM422, SM482	SET DATA
Standard (Factory default)	Up to 11.5' (3.5 m)	Up to 11.5' (3.5 m)	0000
High ceiling (1)	Up to 13.1' (4.0 m)	Up to 14.1' (4.3 m)	0003

◆ Remote controller-less setting

Change the high-ceiling setting with the DIP switch on the indoor unit P.C. board.

- * Once the setting is changed, setting to 0003 is possible, however setting to 0000 requires a setting data change to 0000 using the wired remote controller (separately sold) with the normal switch setting (factory default).



SET DATA	SW501-1	SW501-2
0000 (Factory default)	OFF	OFF
0003	OFF	ON

To restore the factory defaults

To return the DIP switch settings to the factory defaults, set SW501-1 and SW501-2 to OFF, connect a separately sold wired remote controller, and then set the data of CODE No. [5d] to "0000".

■ Filter sign setting

According to the installation condition, the filter sign term (Notification of filter cleaning) can be changed. Follow to the basic operation procedure

(1 → 2 → 3 → 4 → 5 → 6).

- For the CODE No. in Procedure 3, specify [01].
- For the [SET DATA] in Procedure 4, select the SET DATA of filter sign term from the following table.

SET DATA	Filter sign term
0000	None
0001	150 H
0002	2500 H (Factory default)
0003	5000 H
0004	10000 H

■ To secure better effect of heating

When it is difficult to obtain satisfactory heating due to installation place of the indoor unit or structure of the room, the detection temperature of heating can be raised. Also use a circulator, etc. to circulate heat air near the ceiling.

Follow the basic operation procedure

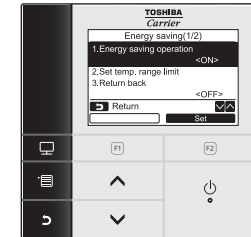
(1 → 2 → 3 → 4 → 5 → 6).

- For the CODE No. in Procedure 3, specify [06].
- For the SET DATA in Procedure 4, select the SET DATA of shift value of detection temperature to be set up from the following table.

SET DATA	Detection temp shift value
0000	No shift
0001	+1.8 °F (+1 °C)
0002	+3.6 °F (+2 °C) (Factory default)
0003	+5.4 °F (+3 °C)
0004	+7.2 °F (+4 °C)
0005	+9.0 °F (+5 °C)
0006	+10.8 °F (+6 °C)

■ Energy saving

Set for the energy saving operation: Energy saving operation, Set temp. range limit, Return back and Saving operation.



- Push the [] / [] button to select "Energy saving" on the menu screen, then push the "Set" [] button.
- Push the [] / [] button to select the item to set.
- Push the "Set" [] button.

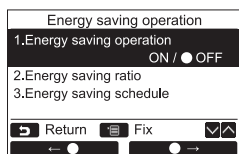
Item	Function
1. Energy saving operation	Perform the power saving operation of the air conditioner.
2. Set temp. range limit	Set the temperature range limit of the remote control operation.
3. Return back	Set the function that changes the temperature back to the specified temperature automatically if the temperature has been changed on the remote control.
4. Saving operation	Performs operation by suppressing excessive heating or excessive cooling through automatic correction of the temperature set point. * "No function" is displayed in the case of a model for which the saving operation cannot be set.

⚠ CAUTION

Refer to the Owner's Manual supplied with the air conditioner about "Energy saving operation", "Saving operation".

■ Energy saving operation

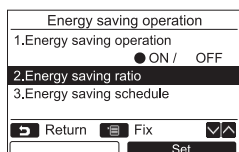
Set for the power saving operation of the air conditioner.



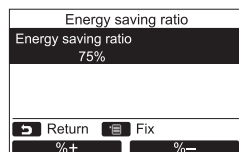
- 1 Push the [] / [] button to select "1. Energy saving operation" on the "Energy saving" screen.
- 2 To start the Energy saving operation: After setting "2. Energy saving ratio" and "3. Energy saving schedule", push the " " [F1] button to select "ON", then push the [] button. To stop the Energy saving operation: Push the " " [F2] button to select "OFF", then push the [] button.

Energy saving ratio

Carry out the setting operation while the indoor unit is stopped. (Turn off the air conditioning unit before starting the setting operation.)



- 1 Push the [] / [] button to select "2. Energy saving ratio" on the "Energy saving operation" screen, then push the " " [F2] button.



- 2 Push the " " [F1] / " " [F2] button to set the value.
→ The Energy saving ratio can be set within the range from 50% to 100% by 1%. The lower the value is set, the higher the power saving effect becomes.

- 3 Push the [] button.

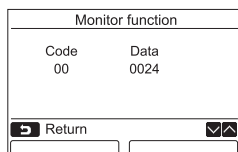
→ " Setting" appears on the screen, then the screen returns to the "Energy saving operation" screen.

NOTE

- Cooling / heating performance may be reduced a little because its power is saved during the Energy saving operation.
- " " appears on the display when the Energy saving operation is activated.
- The Energy saving operation cannot be set on the Follower remote control when the dual remote control system is used.
- The remote control may not be used for setting the Energy saving operation depending on the settings of the central control remote control or the outdoor unit.
- The Energy saving schedule operation is not available when the clock display is blinking (the clock has not been adjusted).

■ Remote controller switch monitoring function

This function is available to call the service monitor mode from the remote controller during a test run to acquire temperatures of sensors of the remote controller, indoor unit, and outdoor unit.



- 1 Push the [] / [] button to select "4. Monitor function" on the "Field setting menu" screen, then push the " " [F2] button.
→ Push the [] / [] button to select the code to check data.
- 2 Refer to the Installation Manual supplied with the indoor unit or outdoor unit or service manual for details about the check code and data.
- 3 Push the [] button to return to the "Field setting menu" screen.

Indoor unit data	
CODE No.	Data name
01	Room temperature (remote controller)
02	Indoor unit intake air temperature (TA)
03	Indoor unit heat exchanger (coil) temperature (TCJ)
04	Indoor unit heat exchanger (coil) temperature (TC)
F3	Indoor unit fan cumulative operating hours (x1 h)

Outdoor unit data	
CODE No.	Data name
60	Outdoor unit heat exchanger (coil) temperature (TE)
61	Outside air temperature (TO)
62	Compressor discharge temperature (TD)
63	Compressor suction temperature (TS)
64	—
65	Heatsink temperature (THS)
6A	Operating current (x1/10)
F1	Compressor cumulative operating hours (x100 h)

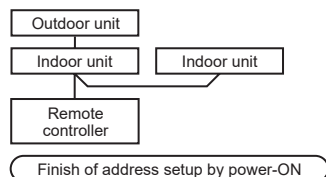
■ Group control

Simultaneous twin, triple or double twin system

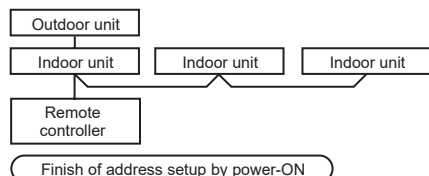
A combination with an outdoor unit allows simultaneous ON / OFF operation of the indoor units. The following system patterns are available.

- Two indoor units for the twin system
- Three indoor units for the triple system
- Four indoor units for the double-twin system

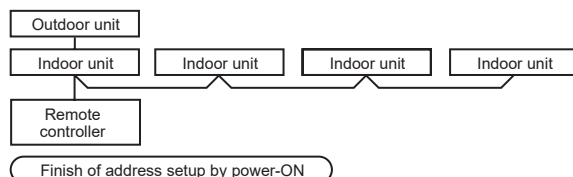
▼ Twin system



▼ Triple system



▼ Double twin



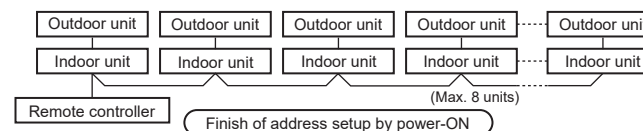
- For wiring procedure and wiring method, follow to the "Electrical connection" in this manual.
 - When the power supply has been turned on, the automatic address setup starts and which indicates that address is being set up flashes on the display part.
- During setup of automatic address, the remote controller operation is not accepted.

Required time up to the finish of automatic addressing is approx. 5 minutes.

Group control for system of multiple units

One remote controller can control maximum 8 indoor units as a group.

▼ Group control in single system



- For wiring procedure and wiring method of the individual line (Identical refrigerant line) system, follow to "Electrical connection".
- Wiring between lines is performed in the following procedure.
Connect the terminal block (A/B) of the indoor unit connected with a remote controller to the terminal blocks (A/B) of the indoor units of other indoor units by wiring the inter-unit wire of the remote controller.
- When the power supply has been turned on, the automatic address setup starts and which indicates that address is being set up flashes on the display part in about 3 minutes. During setup of automatic address, the remote controller operation is not accepted.

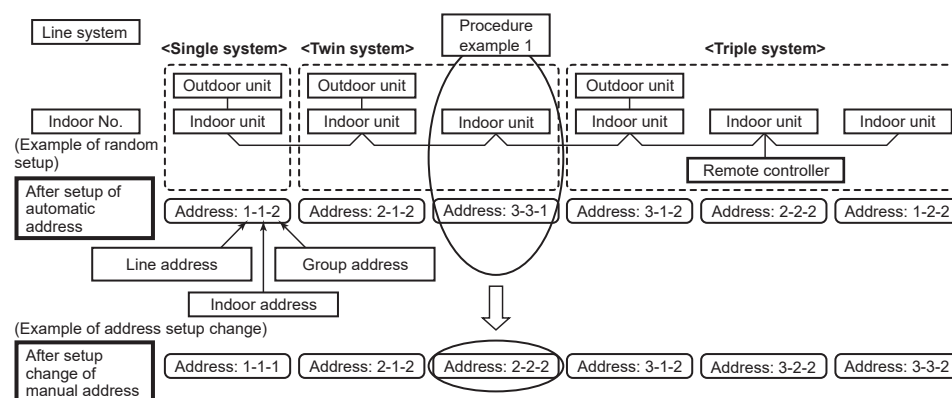
Required time up to the finish of automatic addressing is approx. 5 minutes.

NOTE

In some cases, it is necessary to change the address manually after setup of the automatic address according to the system configuration of the group control.

- The follow mentioned system configuration is a case when complex systems in which systems of the simultaneous twin and simultaneous triple unit is controlled as a group by a remote controller.

(Example) Group control for complex system

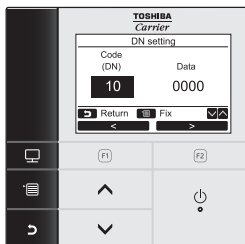


The above address is set by the automatic addressing when the power is turned on. However, line addresses and indoor addresses are set randomly. For this reason, change the setting to match line addresses with indoor addresses.

Procedure example

Manual address setup procedure

While the operation stops, change the setup.
(Stop the operation of the unit.)



- 1 Push the [MENU] button to display the menu screen.

Push and hold the [MENU] button and the [v] button at the same time to display the "Field setting menu".

→ Push and hold the buttons for more than 4 seconds.

Push the [u] / [v] button to select "DN setting" on the "Field setting menu" screen, then push the "Set" button.

→ The fan and louver of the indoor unit operate. When the group control is used, the fan and louver of the selected indoor unit operate.

Select the group-controlled function on the menu screen, then push the "Set" button.

Push the "Unit" button [F1] to select the unit to set.

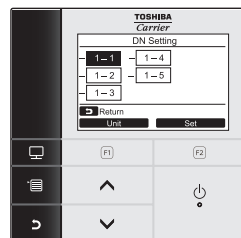
→ The selected unit changes as follows each time the button is pushed:



Push the "Set" button [F2].

→ The setting display for the selected unit appears.

(For a group control, No. of the firstly displayed indoor unit becomes the header unit.)



(* Display changes according to the model No. of indoor unit.)

- 2 The indoor UNIT No. in the group control is displayed in order. Select the indoor unit of which setup is changed.

In this time, the position of the indoor unit of which setup is changed can be confirmed because fan of the selected indoor unit operate.

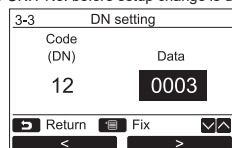
3

1. Specify CODE No. [12] with Move the cursor to select "Code(DN)" with the "<" button [F1], then set "Code(DN)" with the [u] / [v] button.
(CODE No. [12]: Line address)

2. Change the line address from [3] to [2] with Move the cursor to select "Data" with the ">" button [F2], then set "Data" with the [u] / [v] button.

3. Push the [MENU] button to set the other Code (DN) and Data. After "Continue?" is displayed on the screen, push the "Yes" button [F1].

Indoor UNIT No. before setup change is displayed.



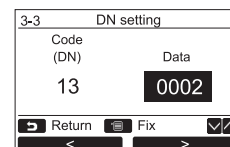
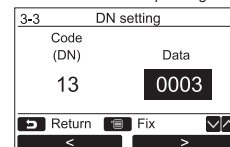
4

1. Specify CODE No. [13] with Move the cursor to select "Code(DN)" with the "<" button [F1], then set "Code(DN)" with the [u] / [v] button.
(CODE No. [13]: Indoor address)

2. Change the Indoor address from [3] to [2] with Move the cursor to select "Data" with the ">" button [F2], then set "Data" with the [u] / [v] button.

3. Push the [MENU] button to set the other Code (DN) and Data. After "Continue?" is displayed on the screen, push the "Yes" button [F1].

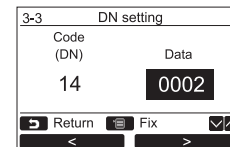
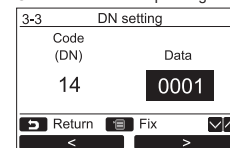
Indoor UNIT No. before setup change is displayed.



5

1. Specify CODE No. [14] with Move the cursor to select "Code(DN)" with the "<" button [F1], then set "Code(DN)" with the [u] / [v] button.
(CODE No. [14]: Group address)
2. Change the SET DATA from [0001] to [0002] with Move the cursor to select "Data" with the ">" button [F2], then set "Data" with the [u] / [v] button.
(SET DATA [Header unit: 0001] [Follower unit: 0002])
3. Push the [MENU] button to set the other Code (DN) and Data. After "Continue?" is displayed on the screen, push the "Yes" button [F1].

Indoor UNIT No. before setup change is displayed.

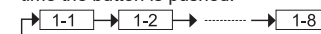


- 6 If there is other indoor unit to be changed, repeat procedure 2 to 5 to change the setup.

When the above setup has finished, push Select the group-controlled function on the menu screen, then push the "Set" button.

Push the "Unit" button [F1] to select the unit to set.

→ The selected unit changes as follows each time the button is pushed:



Push the "Set" button [F2].

→ The setting display for the selected unit appears.

before change of setup, specify CODE No. [12], [13], [14] in order with Move the cursor to select "Code(DN)" with the "<" button [F1], then set "Code(DN)" with the [u] / [v] button. and then check the changed contents.

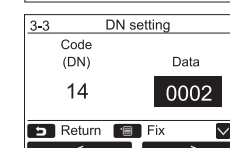
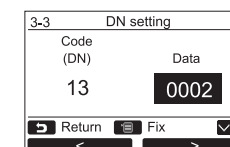
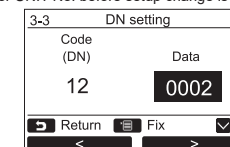
Address change check Before change:

[3-3-1] → After change: [2-2-2]

The contents of which setup was changed.

(In this case, procedure from 2 is repeated.)

Indoor UNIT No. before setup change is displayed.



- 7 After check of the changed contents, Push the "No" [F2] button to finish the setting operation. "Setting" appears on the screen for a while, then the screen returns to the "Field setting menu" screen.

→Pushing the "No" [F2] button displays the unit selection screen when the group control is used. Push the [CANCEL] button on the unit selection screen to finish the setting operation. "Setting" appears on the screen for a while, then the screen returns to the "Field setting menu" screen.



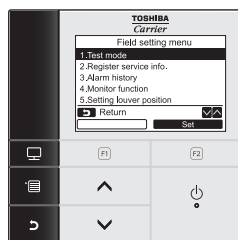
46 °F (8 °C) operation

Pre-heating operation can be set for cold regions where room temperature drops to below zero.

- 1 Push the [MENU] button to display the menu screen.

Push and hold the [MENU] button and the [v] button at the same time to display the "Field setting menu".

→Push and hold the buttons for more than 4 seconds.



Push the [v] / [v] button to select "DN setting" on the "Field setting menu" screen, then push the "Set" [F2] button.

→The fan and louver of the indoor unit operate. When the group control is used, the fan and louver of the selected indoor unit operate. Specify CODE No. [D1]

Move the cursor to select "Code(DN)" with the "<" [F1] button, then set "Code(DN)" with the [v] / [v] button.

Move the cursor to select "Data" with the ">" [F2] button, then set "Data" with the [v] / [v] button.

SET DATA	46 °F (8 °C) Operation setting
0000	None (Factory default)
0001	46 °F (8 °C) Operation setting

Push the [CANCEL] button to return.

9 Test run

Before test run

- Before turning on the power supply, carry out the following procedure.
 - By using 500 V-megger, check that resistance of 1MΩ or more exists between the terminal block 1 to 3 and the earth (grounding). If resistance of less than 1MΩ is detected, do not run the unit.
 - Check the valve of the outdoor unit being opened fully.
- To protect the compressor at activation time, leave power-ON for 12 hours or more before operating.

Execute a test run

Operate the unit with the wired remote controller as usual.

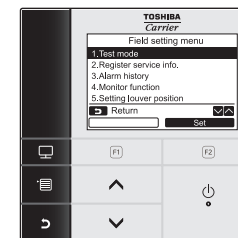
For the procedure of the operation, refer to the attached Owner's Manual.

A forced test run can be executed in the following procedure even if the operation stops by thermostat-OFF.

In order to prevent a serial operation, the forced test run is released after 60 minutes have passed and returns to the usual operation.

CAUTION

Do not use the forced test run for cases other than the test run because it applies an excessive load to the devices.



- 1 Push the [MENU] button to display the menu screen.

Push and hold the [MENU] button and the [v] button at the same time to display the "Field setting menu".

→Push and hold the buttons for more than 4 seconds.

Item	Function
1. Test mode	Settings for when performing the test operation after installation
2. Register service info	Registration of information about the contact number for service, model name and serial number of the indoor unit and outdoor unit
3. Alarm history	List of latest 10 alarm data: information of check code, date, time, and unit
4. Monitor function	Monitoring data of sensor temperature, rotating speed of the compressor or other factor.
5. Setting louver position	Change the louver indication setting to match the indoor unit type.
6. Setting timer operation mode	Set whether or not the operation mode can be selected when setting the schedule timer.
7. DN setting	Advanced settings using DN code

Push the [CANCEL] button to return.

Wireless remote controller

NOTE

- Be sure to operate the unit, following the instruction manual
- Do not run the air conditioner in forced cooling mode for a long time since it overloads the air conditioner.
- Forced heating is not available for trial runs. To perform a test run, set the unit to heating mode with the remote controller. The unit might not operate in heating mode, however, depending on temperature conditions.

1 Hold down the TEMPORARY button for over 10 seconds. With a beep sound, the unit is set to the forced cooling mode.

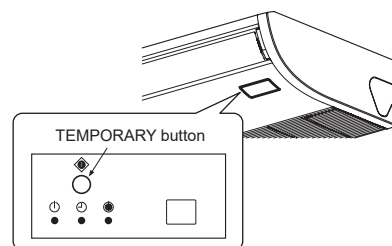
In approximately three minutes, it is forced to start in cooling mode. Determine that cool air comes out of the unit. If the unit won't start, check the wiring.

2 Push the TEMPORARY button again (for about one second) to stop a trial run.

The upper and lower wind direction changing blades close, and the unit stops operation.

Checking remote transmission

1. Push the ON/OFF button on the remote controller to determine that it works properly.
- Pushing the TEMPORARY button once (for about one second) causes the unit to enter auto operation mode. Hold down the TEMPORARY button for over 10 seconds to begin forced cooling.
- Even if you select cooling with a remote controller, the unit does not always perform cooling operation, depending on temperature conditions. Check the wiring and piping of the indoor and outdoor units in forced cooling mode.



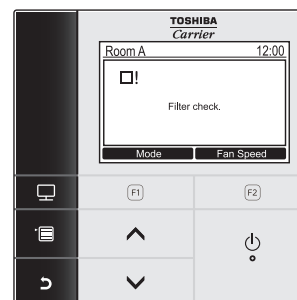
10 Maintenance

<Daily maintenance>

▼ Cleaning of air filter

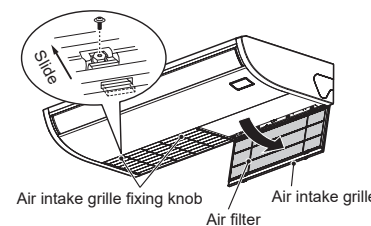
- If is displayed on the remote controller, maintain the air filter.

1 Push the button to stop the operation, then turn off the circuit breaker.



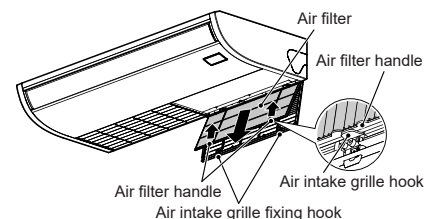
2 Open the air intake grille.

- Remove the screws of air intake grille fixing knob on a side of each filter.
- Slide the air intake grille fixing knobs (two positions) toward the arrow direction (OPEN), and then open the air intake grille.



3 Take out air filter.

- Push the handle of the air filter, and remove the hook of the air intake grille. Pull out the air filter toward you.



4 Cleaning with water or vacuum cleaner.

- If dust is heavy, wash it with tepid water including neutral detergent or water.

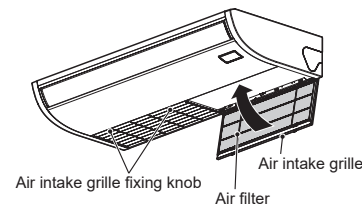


- After cleaning with water, dry it completely in the shade.

5 Mount the air filter.

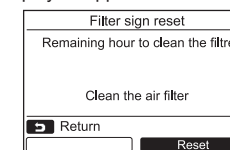
6 Close the air intake grille.

- Close the air intake grille, and then fix it securely while sliding knob closed side (CLOSE).
- Fix the screws of air intake grille fixing knob on a side of each filter.



7 Turn on the circuit breaker, then push the button on the remote controller to start the operation.

8 display disappears.



1. Push the [] / [] button to select "Filter sign reset" on the menu screen, then push the "Set" [F2] button.
2. Push the "Reset" [F2] button.

⚠ CAUTION

- Do not start the air conditioner while leaving air filter removed.
- indication will be turn off.

▼ Periodic Maintenance

- For environmental conservation, it is strongly recommended that the indoor and outdoor units of the air conditioner in use be cleaned and maintained regularly to ensure efficient operation of the air conditioner. When the air conditioner is operated for a long time, periodic maintenance (once a year) is recommended. Furthermore, regularly check the outdoor unit for rust and scratches, and remove them or apply rustproof treatment, if necessary.

As a general rule, when an indoor unit is operated for 8 hours or more daily, clean the indoor unit and outdoor unit at least once every 3 months. Ask a professional for this cleaning / maintenance work.

Such maintenance can extend the life of the product though it involves the owner's expense.

Failure to clean the indoor and outdoor units regularly will result in poor performance, freezing, water leakage, and even compressor failure.

Inspection before maintenance

Following inspection must be carried out by a qualified installer or qualified service person.

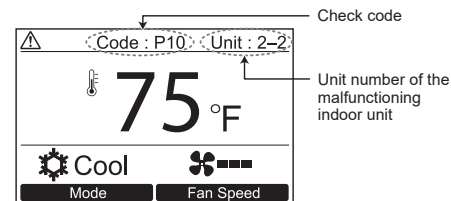
Parts	Inspection method
Heat exchanger	Look through the air discharge port to check the part. Examine the heat exchanger if there is any clogging or damages.
Fan motor	Check if any abnormal noise can be heard.
Fan	Check if any abnormal noise can be heard.
Filter	Go to installed location and check if there are any stains or breaks on the filter.
Drain pan	Look through the air discharge port to check the part. Check if there is any clogging or drain water is polluted.

▼ Maintenance List

Part	Unit	Check (visual / auditory)	Maintenance
Heat exchanger	Indoor / outdoor	Dust / dirt clogging, scratches	Wash the heat exchanger when it is clogged.
Fan motor	Indoor / outdoor	Sound	Take appropriate measures when abnormal sound is generated.
Filter	Indoor	Dust / dirt, breakage	<ul style="list-style-type: none"> Wash the filter with water when it is contaminated. Replace it when it is damaged.
Fan	Indoor	<ul style="list-style-type: none"> Vibration, balance Dust / dirt, appearance 	<ul style="list-style-type: none"> Replace the fan when vibration or balance is terrible. Brush or wash the fan when it is contaminated.
Air intake / discharge grilles	Indoor / outdoor	Dust / dirt, scratches	Fix or replace them when they are deformed or damaged.
Drain pan	Indoor	Dust / dirt clogging, drain contamination	Clean the drain pan and check the downward slope for smooth drainage.
Ornamental panel, louvres	Indoor	Dust / dirt, scratches	Wash them when they are contaminated or apply repair coating.
Exterior	Outdoor	<ul style="list-style-type: none"> Rust, peeling of insulator Peeling / lift of coat 	Apply repair coating.

11 Troubleshooting

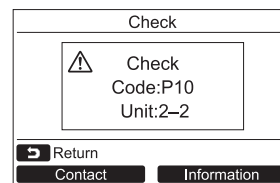
■ Confirmation and check



When an error has occurred in the air conditioner, the check code and the unit number of the indoor unit appear on the display of the remote control.

- * The check code appears only while the unit is running.

Push the [MONITOR] button or [CANCEL] button to display the check information screen.



While the check information screen appears:
Push the “ Contact” [F1] button to display the contact number for service.
Push the “ Information” [F2] button to display the model name and serial number of the unit.

■ Error codes and parts to be checked

Wired remote controller display	Wireless remote controller Sensor block display of receiving unit		Main defective parts	Judging device	Parts to be checked / error description	Air conditioner status
Indication	Operation Timer Ready GR GR OR	Flashing				
E01	● ● ●		No header remote controller	Remote controller	Incorrect remote controller setting --- The header remote controller has not been set (including two remote controllers).	*
			Remote controller communication error		No signal can be received from the indoor unit.	
E02	● ● ●		Remote controller transmission error	Remote controller	System interconnection wires, indoor P.C. board, remote controller --- No signal can be sent to the indoor unit.	*
E03	● ● ●		Indoor unit-remote controller regular communication error	Indoor	Remote controller, network adapter, indoor P.C. board --- No data is received from the remote controller or network adapter.	Auto-reset
E04	● ● ●		Indoor unit-outdoor unit serial communication error	Indoor	System interconnection wires, indoor P.C. board, outdoor P.C. board --- Serial communication error between indoor unit and outdoor unit	Auto-reset
			IPDU-CDB communication error			
E08	● ● ●		Duplicated indoor addresses ★	Indoor	Indoor address setting error --- The same address as the self-address was detected.	Auto-reset
E09	● ● ●		Duplicated header remote controllers	Remote controller	Remote controller address setting error --- Two remote controllers are set as header in the double remote controller control. (* The header indoor unit stops raising alarm and follower indoor units continue to operate.)	*
E10	● ● ●		CPU-CPU communication error	Indoor	Indoor P.C. board --- Communication error between main MCU and motor microcomputer MCU	Auto-reset
E18	● ● ●		Header unit follower unit regular communication error	Indoor	Indoor P.C. board --- Regular communication is not possible between header and follower indoor units or between twin header (main) and follower (sub) units.	Auto-reset
E31	● ● ●		IPDU communication error	Outdoor	Communication error between IPDU and CDB	Entire stop
F01	● ● ●	ALT	Indoor unit heat exchanger sensor (TCJ) error	Indoor	Heat exchanger sensor (TCJ), indoor P.C. board --- Open-circuit or short-circuit of the heat exchanger sensor (TCJ) was detected.	Auto-reset
F02	● ● ●	ALT	Indoor unit heat exchanger sensor (TC) error	Indoor	Heat exchanger sensor (TC), indoor P.C. board --- Open-circuit or short-circuit of the heat exchanger sensor (TC) was detected.	Auto-reset
F04	● ● ●	ALT	Outdoor unit discharge temp. sensor (TD) error	Outdoor	Outdoor temp. sensor (TD), outdoor P.C. board --- Open-circuit or short-circuit of the discharge temp. sensor was detected.	Entire stop
F06	● ● ●	ALT	Outdoor unit temp. sensor (TE/TS) error	Outdoor	Outdoor temp. sensors (TE/TS), outdoor P.C. board --- Open-circuit or short-circuit of the heat exchanger temp. sensor was detected.	Entire stop
F07	● ● ●	ALT	TL sensor error	Outdoor	TL sensor may be displaced, disconnected or short-circuited.	Entire stop
F08	● ● ●	ALT	Outdoor unit outside air temp. sensor error	Outdoor	Outdoor temp. sensor (TO), outdoor P.C. board --- Open-circuit or short-circuit of the outdoor air temp. sensor was detected.	Operation continued
F10	● ● ●	ALT	Indoor unit room temp. sensor (TA) error	Indoor	Room temp. sensor (TA), indoor P.C. board --- Open-circuit or short-circuit of the room temp. sensor (TA) was detected.	Auto-reset

Wired remote controller display	Wireless remote controller Sensor block display of receiving unit		Main defective parts	Judging device	Parts to be checked / error description	Air conditioner status
Indication	Operation Timer Ready GR GR OR	Flashing				
F12	● ● ●	ALT	TS sensor error	Outdoor	TS sensor may be displaced, disconnected or short-circuited.	Entire stop
F13	● ● ●	ALT	Heat sink sensor error	Outdoor	Abnormal temperature was detected by the temp. sensor of the IGBT heat sink.	Entire stop
F15	● ● ●	ALT	Temp. sensor connection error	Outdoor	Temp. sensor (TE/TS) may be connected incorrectly.	Entire stop
F29	● ● ●	SIM	Indoor unit, other P.C. board error	Indoor	Indoor P.C. board --- EEPROM error	Auto-reset
F31	● ● ●	SIM	Outdoor unit P.C. board	Outdoor	Outdoor P.C. board --- In the case of EEPROM error.	Entire stop
H01	● ● ●		Outdoor unit compressor breakdown	Outdoor	Current detect circuit, power voltage --- Minimum frequency was reached in the current releasing control or short-circuit current (Idc) after direct excitation was detected	Entire stop
H02	● ● ●		Outdoor unit compressor lock	Outdoor	Compressor circuit --- Compressor lock was detected.	Entire stop
H03	● ● ●		Outdoor unit current detect circuit error	Outdoor	Current detect circuit, outdoor unit P.C. board --- Abnormal current was detected in AC-CT or a phase loss was detected.	Entire stop
H04	● ● ●		Case thermostat operation (1)	Outdoor	Malfunction of the case thermostat	Entire stop
H06	● ● ●		Outdoor unit low-pressure system error	Outdoor	Current, high-pressure switch circuit, outdoor P.C. board --- Pressure sensor error was detected or low-pressure protective operation was activated.	Entire stop
L03	● ● ●	SIM	Duplicated header indoor units ★	Indoor	Indoor address setting error --- There are two or more header units in the group.	Entire stop
L07	● ● ●	SIM	Group line in individual indoor unit ★	Indoor	Indoor address setting error --- There is at least one group-connected indoor unit among individual indoor units.	Entire stop
L08	● ● ●	SIM	Indoor group address not set ★	Indoor	Indoor address setting error --- Indoor address group has not been set.	Entire stop
L09	● ● ●	SIM	Indoor unit capacity not set	Indoor	Indoor unit capacity has not been set.	Entire stop
L10	● ● ●	SIM	Outdoor unit P.C. board	Outdoor	In the case of outdoor P.C. board jumper wire (for service) setting error	Entire stop
L20	● ● ●	SIM	LAN communication error	Network adapter central control	Address setting, central control remote controller, network adapter --- Duplication of address in central control communication	Auto-reset
L29	● ● ●	SIM	Other outdoor unit error	Outdoor	Other outdoor unit error	Entire stop
					1) Communication error between IPDU MCU and CDB MCU 2) Abnormal temperature was detected by the heat sink temp. sensor in IGBT.	Entire stop
L30	● ● ●	SIM	Abnormal external input into indoor unit (interlock)	Indoor	External devices, outdoor unit P.C. board --- Abnormal stop due to incorrect external input into CN80	Entire stop
L31	● ● ●	SIM	Phase sequence error, etc.	Outdoor	Power supply phase sequence, outdoor unit P.C. board --- Abnormal phase sequence of the 3-phase power supply	Operation continued (thermost at OFF)

Wired remote controller display	Wireless remote controller Sensor block display of receiving unit		Main defective parts	Judging device	Parts to be checked / error description	Air conditioner status
	Operation Timer Ready GR GR OR	Flashing				
P01	● ○ ○	ALT	Indoor unit fan error	Indoor	Indoor fan motor, indoor P.C. board --- Indoor AC fan error (fan motor thermal relay activated) was detected.	Entire stop
P03	○ ● ○	ALT	Outdoor unit discharge temp. error	Outdoor	An error was detected in the discharge temp. releasing control.	Entire stop
P04	○ ● ○	ALT	Outdoor unit high-pressure system error	Outdoor	High-pressure switch --- The IOL was activated or an error was detected in the high-pressure releasing control using the TE.	Entire stop
P05	○ ● ○	ALT	Open phase detected	Outdoor	The power wire may be connected incorrectly. Check open phase and voltages of the power supply.	Entire stop
P07	○ ● ○	ALT	Heat sink overheat	Outdoor	Abnormal temperature was detected by the temp. sensor of the IGBT heat sink.	Entire stop
P10	● ○ ○	ALT	Indoor unit water overflow detected	Indoor	Drain pipe, clogging of drainage, float switch circuit, indoor P.C. board --- Drainage is out of order or the float switch was activated.	Entire stop
P12	● ○ ○	ALT	The fan error of the indoor unit	Indoor	Abnormal operation of the indoor fan motor, indoor P.C. board, or indoor DC fan (over current or lock, etc.) is detected.	Entire stop
P15	○ ● ○	ALT	Gas leakage detected	Outdoor	There may be gas leakage from the pipe or connecting part. Check for gas leakage.	Entire stop
P19	○ ● ○	ALT	4-way valve error	Outdoor (Indoor)	4-way valve, indoor temp. sensors (TC/TCJ) --- An error was detected due to temperature drop of the indoor unit heat exchanger sensor when heating.	Auto-reset
P20	○ ● ○	ALT	High-pressure protective operation	Outdoor	High-pressure protection	Entire stop
P22	○ ● ○	ALT	Outdoor unit fan error	Outdoor	Outdoor unit fan motor, outdoor unit P.C. board --- An error (overcurrent, locking, etc.) was detected in the outdoor unit fan drive circuit.	Entire stop
P26	○ ● ○	ALT	Outdoor unit inverter ldc activated	Outdoor	IGBT, outdoor unit P.C. board, inverter wiring, compressor --- Short-circuit protection for compressor drive circuit devices (G-Tr/IGBT) was activated.	Entire stop
P29	○ ● ○	ALT	Outdoor unit position error	Outdoor	Outdoor unit P.C. board, high-pressure switch --- Compressor motor position error was detected.	Entire stop
P31	○ ● ○	ALT	Other indoor unit error	Indoor	Another indoor unit in the group is raising an alarm. E03/L07/L03/L08 alarm check locations and error description	Auto-reset

○ : Lighting ○ : Flashing ● : OFF ★ : The air conditioner automatically enters the auto-address setting mode.

ALT : When two LEDs are flashing, they flash alternately. SIM : When two LEDs are flashing, they flash in synchronization.

Receiving unit display OR : Orange GR : Green

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. With the recent increase in the number of high concentration buildings, however, the installation of multi air conditioner systems is on the increase because of the need for effective use of floor space, individual control, energy conservation by curtailing heat and carrying power etc.

Most importantly, the multi air conditioner system is able to replenish a large amount of refrigerant compared with conventional individual air conditioners. If a single unit of the multi 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).

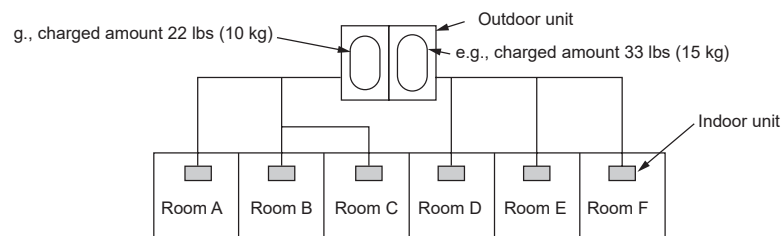
In a room where the concentration may exceed the limit, create an opening with adjacent rooms, or install mechanical ventilation combined with a gas leak detection device. The concentration is as given below.

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

The concentration limit of R410A which is used in multi air conditioners is 0.019 lbs/ft³ (0.3 kg/m³.)

▼ NOTE 1

If there are 2 or more refrigerating systems in a single refrigerating device, the amounts of refrigerant should be as charged in each independent device.



For the amount of charge in this example:

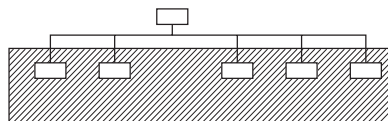
The possible amount of leaked refrigerant gas in rooms A, B and C is 22 lbs (10 kg.)

The possible amount of leaked refrigerant gas in rooms D, E and F is 33 lbs (15 kg.)

▼ NOTE 2

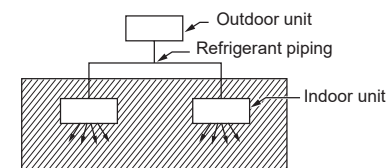
The standards for minimum room volume are as follows.

- 1) No partition (shaded portion)

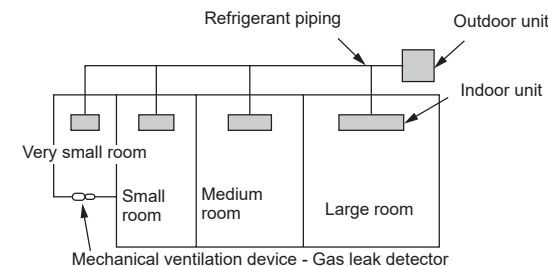


Important

- 2) When there is an effective opening with the adjacent room for ventilation of leaking refrigerant gas (opening without a door, or an opening 0.15% or larger than the respective floor spaces at the top or bottom of the door).

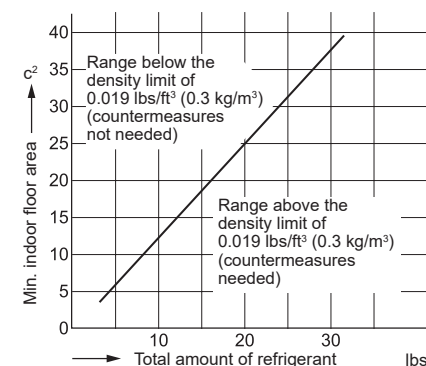


- 3) If an indoor unit is installed in each partitioned room and the refrigerant piping is interconnected, the smallest room of course becomes the object. But when a mechanical ventilation is installed interlocked with a gas leakage detector in the smallest room where the density limit is exceeded, the volume of the next smallest room becomes the object.



▼ NOTE 3

The minimum indoor floor area compared with the amount of refrigerant is roughly as follows:
(When the ceiling is 8'9" ft (2.7 m) high)



Toshiba Carrier (Thailand) Co., Ltd.

144 / 9 Moo 5, Bangkadi Industrial Park, Tivanon Road, Tambol Bangkadi, Amphur Muang, Pathumthani 12000, Thailand



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