HITACHI

INSTALLATION MANUAL

air Home Ducted

SPLIT UNIT AIR CONDITIONER

INDOOR UNIT
RAD-DJ50QHAE
RAD-DJ60QHAE
RAD-DJ70QHAE

HFC R32

EN INSTRUCTION MANUAL

FOR SERVICE PERSONNEL ONLY

- Carefully read through the procedures of proper installation before starting installation work.
- The sales agent should inform customers regarding the correct operation of installation.

Tools Needed For Installation Work

- ⊕⊖ Screwdriver
- Measuring Tape
- Knife
- Saw
- ø 65mm Power Drill
- Allen Key (4mm)
- Wrench (14, 17, 19, 22, 24, 27mm)
- Gas Leakage Detector
- Pipe Cutter
- Plastic Tape
- Pliers
- Flare Tool

⚠ WARNING

- Flare nut must use a torque wrench without fail. Tighten with the specified tightening torque. If the flare nut is tightened too much, after a long period of time, the flare nut breaks, Gas leakage, stagnation, touching fire, rarely cause ignition.
- Sharp bending of the pipe use the polyethylene rod, bend not crushed the pipe. Gas leakage from the crushed part, stagnation, touching fire, rarely cause ignition.
- Please request your sales agent or qualified technician to install your unit. Water leakage, short circuit or fire may occur if you do the installation work yourself.
- Please observe the instructions stated in the installation manual during the process of installation. Improper installation may cause water leakage, electric shock and fire.
- A brazed, welded, or mechanical connection shall be made before opening the valves to permit refrigerant to flow between the refrigerating system parts. A vacuum valve shall be provided to evacuate the interconnecting pipe and/or any uncharged refrigerating system part.
- Mechanical connectors used indoors shall comply with ISO 14903. When mechanical connectors are reused indoors, sealing parts shall be renewed. When flared joints are reused indoors, the flare part shall be re-fabricated.
- Refrigerant tubing shall be protected or enclosed to avoid damage.
- Make sure that the units are mounted at locations which are able to provide full support to the weight of the units. If not, the units may collapse and impose danger.
- Observe the rules and regulations of the electrical installation and the methods described in the installation manual when dealing with the electrical work. Use power cables approved by the authorities of your country.
- Be sure to use the specified wire for connecting the indoor and outdoor units. Please ensure that the connections are tight after the conductors of the wire are inserted into the terminals. Improper insertion and loose contact may cause over-heating and fire.
- Please use the specified components for installation work. Otherwise, the units may collapse or water leakage, electric shock and fire may occur.
- Be sure to use the specified piping set for R32. Otherwise, this may result in broken copper pipes or faults.
- When installing or removing an air conditioner, only specified refrigerant (R32) shall be allowed, do not allow air or moisture to remain in the refrigeration cycle. Otherwise, pressure in the refrigeration cycle may become abnormally high so that a rupture may be caused.
- Be sure to ventilate fully if a refrigerant gas leak while at work. If the refrigerant gas comes into contact with fire, a poisonous gas may occur. Be aware that refrigerants may not contain an odour.
- After completion of installation work, check to make sure that there is no refrigeration gas leakage. If the refrigerant gas leaks into the room, coming into contact with fire in the fan-driven heater, space heater, etc., a poisonous gas may occur.
- Unauthorized modifications to the air conditioner may be dangerous. If a breakdown occurs please call a qualified air conditioner technician or electrician. Improper repairs may result in water leakage, electric shock and fire, etc.

⚠ CAUTION

- A circuit breaker or fuse must be installed. Without a circuit breaker or fuse the danger of electric shock exists. The external switch shall be incorporated to completely disconnect from power supply. It should disconnect all poles, and a contact separation of at least 3mm must be present.
- Do not install the unit near a location where there is flammable gas. The outdoor unit may catch fire if flammable gas leaks around it.
- Do not install the indoor unit in a machine shop or kitchen where vapor from oil or its mist flows to the indoor unit. The oil will deposit on the heat exchanger, thereby reducing the indoor unit performance and may deform and in the worst case, break the plastic parts of the indoor unit.
- Please ensure smooth flow of water when installing the drain hose.
- Piping shall be suitable supported with a maximum spacing of 1m between the supports.

(50/60QHAE) Refrigerant pipe size (outer diameter): Narrow pipe, Liquid (ø6.35mm); Wide pipe, Gas (ø12.70mm)

(70QHAE) Refrigerant pipe size (outer diameter): Narrow pipe, Liquid (ø6.35mm); Wide pipe, Gas (ø15.88mm)

SAFETY PRECAUTION

- Read the safety precautions carefully before operating the unit.
- The contents of this section are vital to ensure safety. Please pay special attention to the following sign.

⚠ WARNING ..... Incorrect methods of installation may cause death or serious injury.

⚠ CAUTION ..... Improper installation may result in serious consequence.

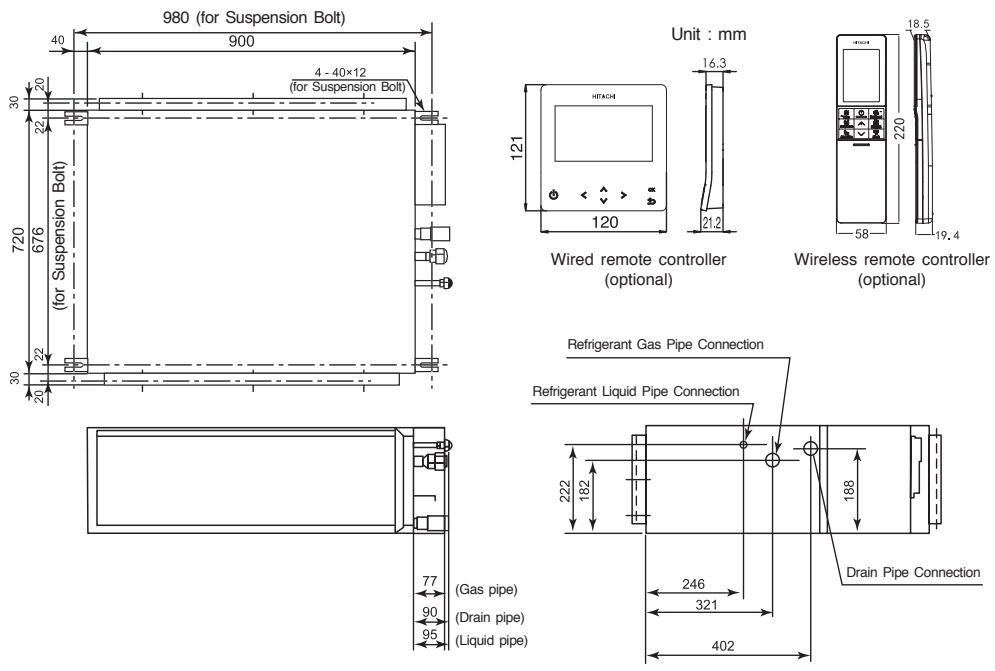
Be sure that the unit operates in proper condition after installation. Explain to customer the proper way of operating the unit as described in the user's guide.

Access the full version of the User Installation Manual by scanning the code.

Cooling & Heating

<SIA2371:Ⓐ>

1 Opening on ceiling & suspension bolt

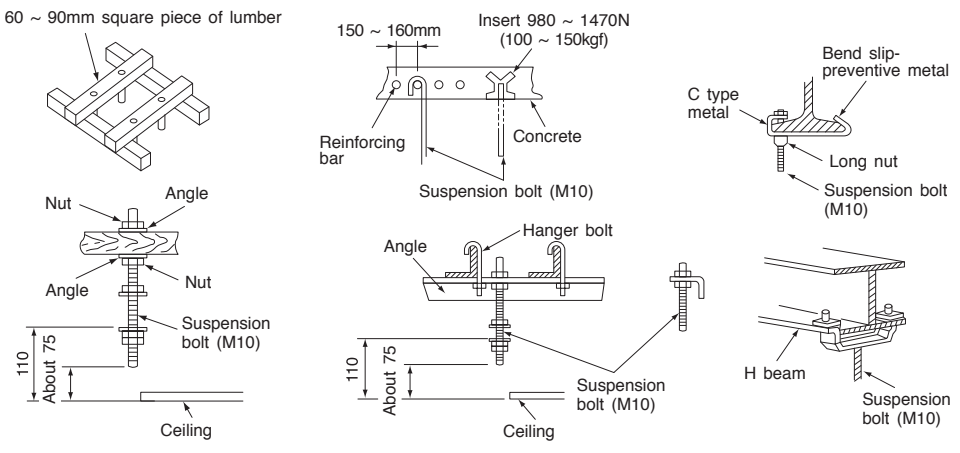


- Need a connect for refrigerant pipe, drain pipe and F cable in the ceiling after suspending the indoor unit. Arrange the drain pipe, refrigerant pipe and F cable in their installation position.
- For finishing the opening on the ceiling, arrange with the builder in detail.
- If the ceiling is already completed, connecting cables between indoor and outdoor, piping and drain piping must be done before the fitting indoor unit.

2 Preparation for installing indoor unit

Installation of suspension bolts

- Make sure to reinforce furring of ceiling (frame : ceiling joints and supporter) to maintain level of ceiling and prevent vibration of ceiling plate.
- Suspension bolts should be purchased in the field.
- Refer to diagrams shown below for length of suspension bolts.
- In case of wooden frame
- In case of steel frame **(Unit : mm)**



<IA2371:Ⓐ>

THE CHOICE OF MOUNTING SITE (Please note the following matters and obtain permission from customer before installation).

INDOOR UNIT

⚠ WARNING

- The unit should be mounted at stable, non-vibratory location which can provide full support to the unit.

⚠ CAUTION

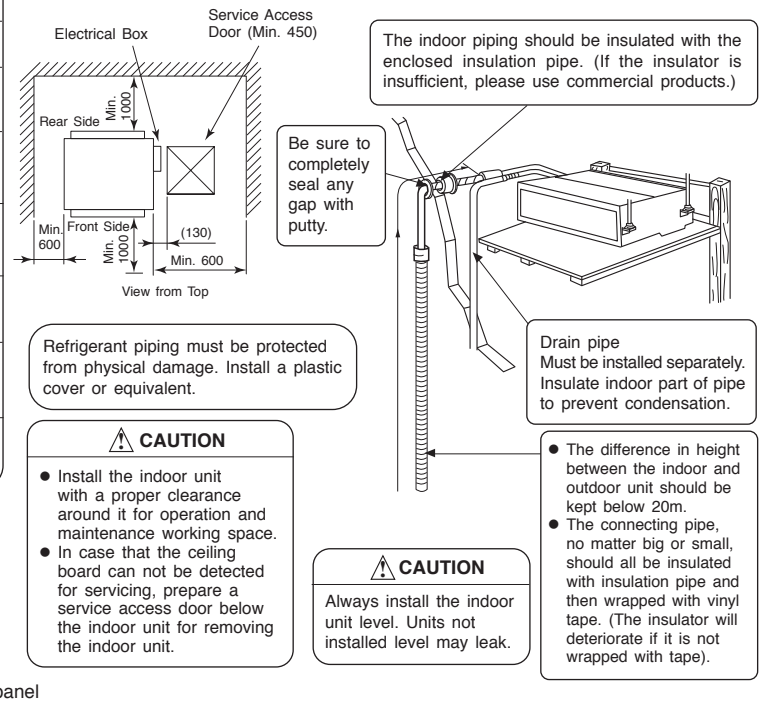
- No nearby heat source and no obstruction near the air outlet is allowed.
- The clearance distances from top, right and left are specified in figure below.
- The location must be convenient for water drainage and pipe connection with the Outdoor unit.
- To avoid interference from noise please place the unit and its remote controller at least 1m from the radio, television and inverter type fluorescent lamp.
- To avoid any error in signal transmission from the remote controller, please put the controller far away from high-frequency machines and high-power wireless systems.

	WARNING This symbol shows that this equipment uses a flammable refrigerant. If the refrigerant is leaked, together with an external ignition source, there is a possibility of ignition.
	CAUTION This symbol shows that the Operation Instructions should be read carefully.
	CAUTION This symbol shows that a service personnel should be handling this equipment with reference to the Installation Manual.
	CAUTION This symbol shows that there is information included in the Operation Manual and/or Installation Manual.

Accessories to indoor Unit:

No.	Component's Name	Q'ty
①	Washer (M10)	8
②	Screw (4mm)	16
③	Hose Clamp	1
④	Insulation (22IDx130)	1
⑤	Insulation (43IDx130)	1
⑥	Binder	10
⑦	Filter Holder	2
⑧	Screw for Filter Holder	2

Figure showing the Installation of Indoor Unit.



Refrigerant piping must be protected from physical damage. Install a plastic cover or equivalent.

⚠ CAUTION

- Install the indoor unit with a proper clearance around it for operation and maintenance working space.
- In case that the ceiling board can not be detected for servicing, prepare a service access door below the indoor unit for removing the indoor unit.

⚠ CAUTION

- Discharge grille and suction grille shall be covered by insulation material to prevent water drop.

⚠ CAUTION

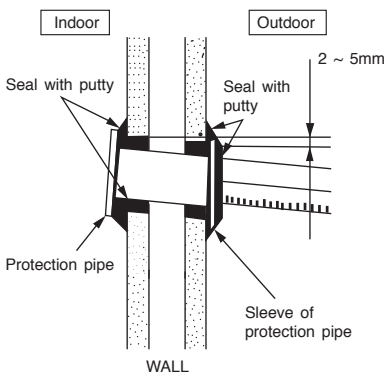
Always install the indoor unit level. Units not installed level may leak.

Other optional parts for display panel wired remote controller & wireless remote controller SPX-URFG & SPX-RKD800

No.	Item	Quantity
⚠1	Display panel	1
⚠2	Panel installation plate	1
⚠3	Panel cover	1
⚠4	Remote controller kit (wireless)	1
⚠5	Remote controller kit (wired)	1

Wall Penetration and Installation of Protection Pipe

- Drill a ø 65mm hole on wall which is slightly tilted towards the outdoor side. Drill the wall at a small angle.
- Cut the protection pipe according to the wall thickness.
- Empty gaps in the sleeve of protection pipe should be completely sealed with putty to avoid dripping of rain water into the room.



⚠ CAUTION

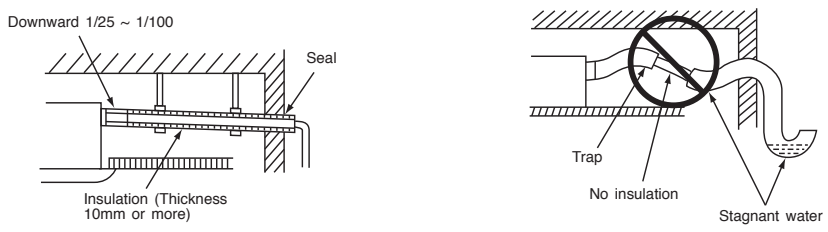
Make sure that the wire is not in contact with any metal in the wall. Please use the protection pipe as wire passing through the hollow part of the wall so as to prevent the possibility of damaged by mouse.

⚠ WARNING

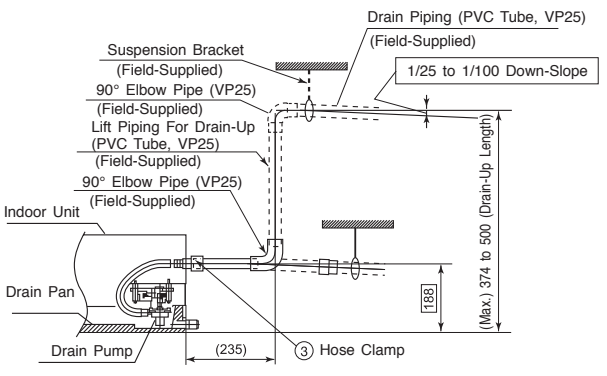
Use a protection pipe (commercial product) to protect against the following:
-Connecting cables touching the metal lath inside the wall.
-A possibility where a mouse can bite the cables, as these can cause an electrical shock or fire.
-Incomplete sealing, as high humidity can cause the water to drip.

Drain pipe installation

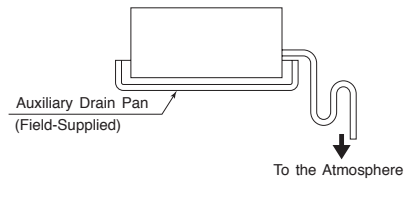
- Prepare polyvinyl chloride pipe with a 32mm outer diameter.
- Be sure to roll an insulation (thickness 10mm or more) for the drain pipe at indoor side.
- Always draw the drain pipe downward so that water flows smoothly. Fix it (ex. by hanger) to prevent a peak and trap.



- In case drain piping cannot be done smoothly due to obstacles, it can also be arranged outside of the main unit as shown in the drawing below.
- Maximum drain-up length shall not more than 500mm height.



- When the relative humidity of inlet or ambient air exceeds 80%, apply an (field-supplied) auxiliary drain pan beneath the indoor unit as shown below:



3 Installation of Indoor Unit

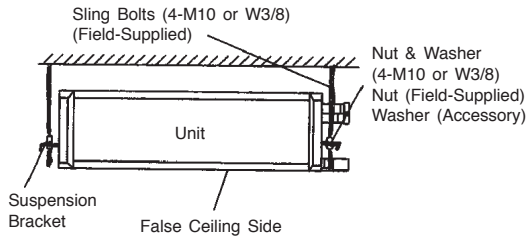
Marking of the Positions of the Sling bolts and Piping Connections

1. Mark the positions of the sling bolts, refrigerant piping connections and drain connection.
2. Ceiling Work: it basically varies according to the building structure.
   Consult with the architect or interior finish worker for more information on this.
   (a) To maintain the appropriate levelness of the ceiling and preventing the vibration, the additional reinforcement in the ground of ceiling (Building Frame) is essential.
   Also, rubber cushion can be applied for the insufficient strength of the frame around the sling part on the ceiling.
   (b) Provide a space for the air inlet grille, air outlet grille and maintenance work.
   (c) Do not suspend the indoor unit and electric light units from the same auxiliary supporting beams, and do not connect the suspension bolts on the indoor units. If connected, the light may flicker or the light unit may be rattled by the vibration of the indoor units.

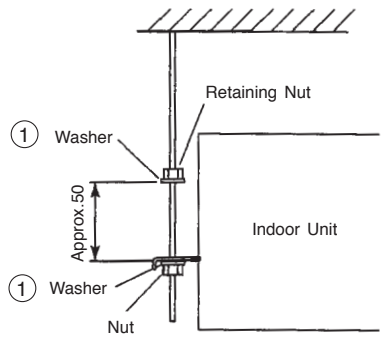
Mounting the indoor unit
Hanging indoor unit.

Field-Supplied Parts

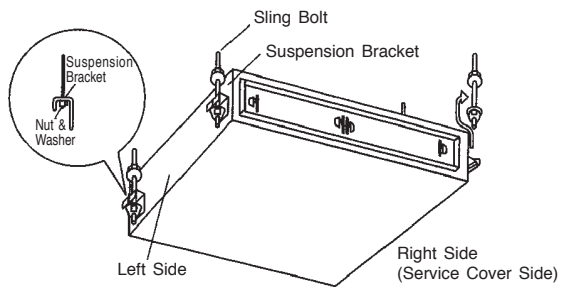
*Sling Bolts	4-M10 or W3/8
*Nut	8-M10 or W3/8



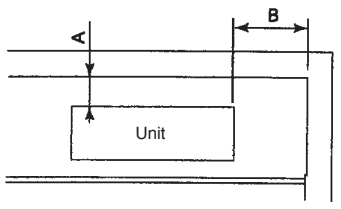
1. How to put Nuts or Sling Bolts
   Put nuts on each of the four hanging bolts.



2. Hanging the Indoor unit
- Hook suspension bracket to the nut and washer of each hanging bolt, as shown, starting at the opposite side to service cover side.
- After checking that the nut and washer are correctly fixed by the retainers of the suspension bracket, hook the suspension bracket of the service cover side to the nut and washer. (Put the sling bolts away from the unit when hooking.)
- Piping and wiring work will be required in the ceiling after hanging the unit. Therefore, determine the drawing direction of the pipe after selecting the installation location, particularly if the ceiling has existing piping. Wiring work should be carried out up to the connecting positions before hanging the unit.

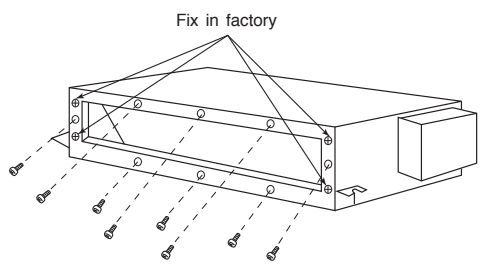


3. For reasons of disaster prevention, the distance between under the roof and the wall surface should be followed as shown in the figure below.
- Use the nonflammable material for the duct.



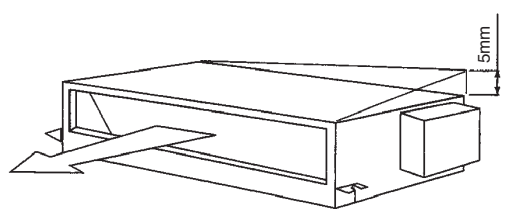
	Material of the Wall, Frame	
	Flammable	Nonflammable
A	Min. 100cm	Min. 10cm
B	Min. 60cm	Min. 5cm

4. If decided to keep the flange at discharge side, fix screw ② at 8 positions. However, if decided not to keep the flange, remove 4 screws that fixed to the flange.



Adjusting of the Unit Level

1. Check to ensure that the foundation is flat, taking into account the maximum foundation gradient.
   If not, it will occur malfunction of float switch or not operation. Then it will drop the drain water from the ceiling.



2. The unit should be installed so that the rear side of the unit is slightly (0mm to 5mm) lower than the front side, in order to avoid the incorrect position of the drain discharge.
3. Tighten the bolts of the sling nuts with the suspension brackets after adjustment is completed. Special plastic paint must be applied to the bolts in order to prevent them from loosening.

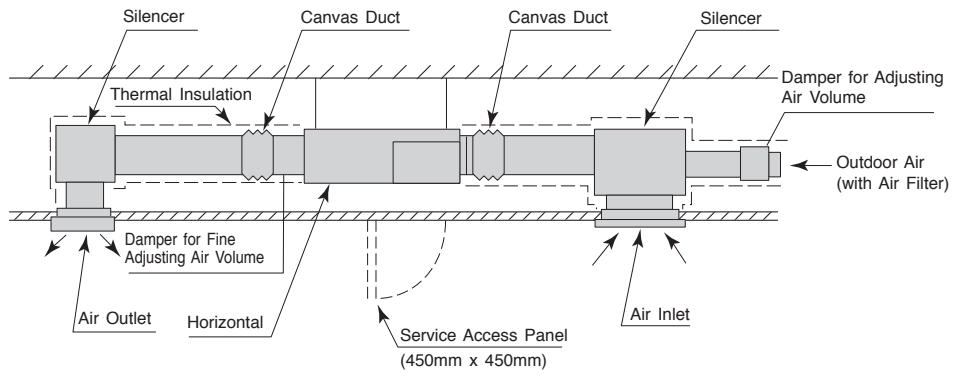
Keep the unit as well as relevant equipment covered with the vinyl cover during installation work.

Connecting Return Duct and Supply Duct

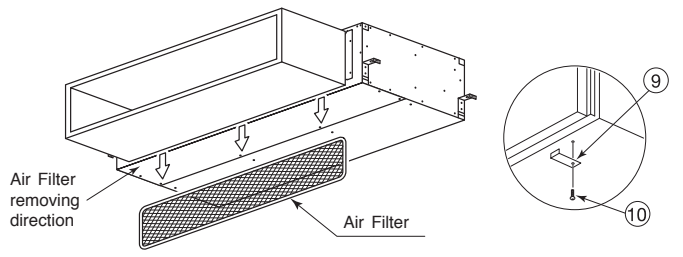
1. The return duct should be connected with the indoor through canvas ducts between inlet side of the indoor unit and ceiling of the room. The supply duct should be connected with the indoor unit through canvas ducts, in order to avoid abnormal sound vibration. The unit is equipped with a pre-drilled duct flange for the return and supply duct connection.
2. Attach the vibration proof rubber to Sling Bolt in order to avoid abnormal sound vibration.
3. Undamped natural frequency is 9 to 21 Hz.
4. Duct material should be non-flammable material.
5. Perform the heat insulation work over the duct and the duct flange for dew protection.

⚠ CAUTION

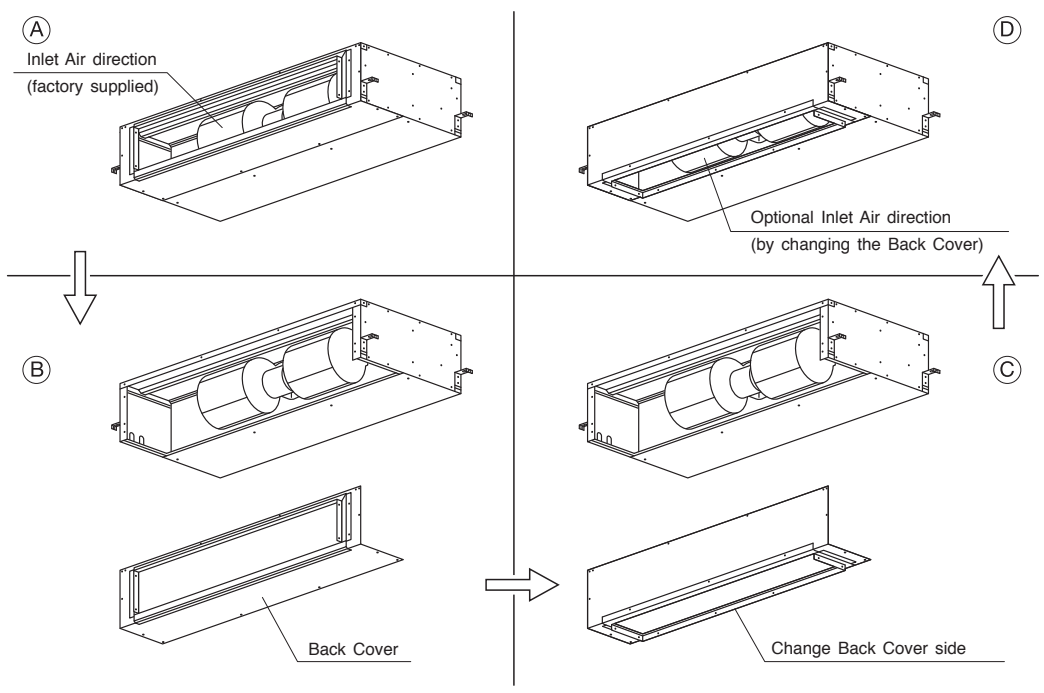
- If a lower sound level is still required, install a silencer (field-supplied).
- The facility design should be “Unit External static Pressure = Duct Pressure Loss Suction / Discharge Loss”. If the duct pressure loss becomes under to the unit external static pressure, air speed will get larger and lead to the occurrence of louder noise, splashing water and activation of motor protection circuit, and if the unit external static pressure becomes under to the duct pressure loss, some problems such as inability to change the air speed may occur. Set the airflow control damper or shift the static pressure control switch to adjust to get almost equal level between the external static pressure and the duct pressure loss. (See “Setting of External Pressure” section for the details.)
- Basically this unit is designed to install the ducts on the inlet side and the outlet side.



- Select the indoor unit position, fixing the direction of air outlet so that the cool/hot air reaches all around the room. The standard position of the indoor unit is with the wall side on the ceiling.
- Remove the factory fitted filter and filter holders before installing of full duct type.



Inlet air direction change instructions



4 Connection of drain pipe

(1) Securely glue connection part of drain hose and PVC pipe, using PVC adhesive.

⚠ CAUTION

- If the glue between the drain hose and PVC pipe is too weak, water leakage may occur.

(2) Be sure to wrap generally-available insulator (10mm or more of foamed polyethylene) around drain hose, inside the house, for insulation heat.
(3) Checking drain and water leakage.
Perform after connecting power.
- Add water to water pan of indoor unit.

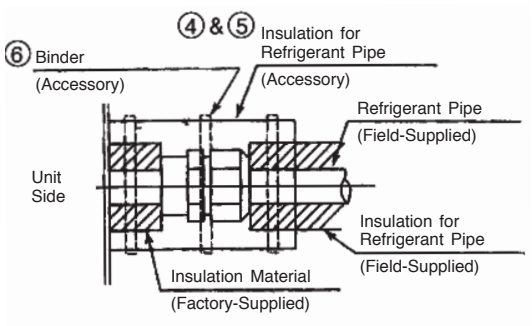
(4) Test run method can be done by using HHRC and WRC. Detail shall refer to service manual page “Service setting mode”.
(5) Perform a test run of the drain pump to check drainage operation.

⚠ CAUTION

- If checking of drainage is omitted, water loss may occur.
- If drain pump test run is left set to TEST RUN, drain pump may malfunction.

5 Pipe Connection

After connecting the refrigerant piping, seal the refrigerant pipes by using the factory supplied insulation material.



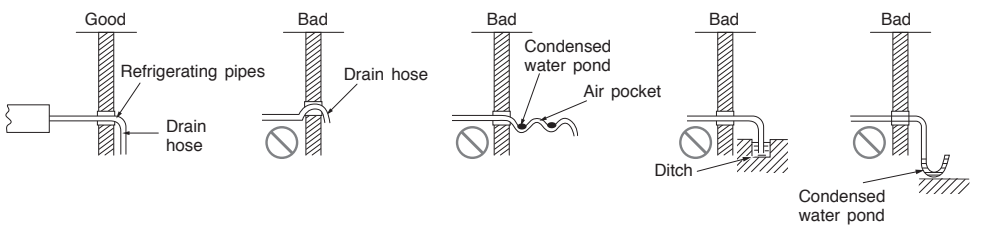
⚠ CAUTION

- The rubber strap used for fixing the insulator should not be tied with great force. Otherwise, this will damage heat insulation and causes water condensation.



6 Checking of drawing drain hose

(1) Connect the separate drain hose to the drain hose that is attached to the indoor unit.
(2) For keeping the smooth flowing of condensed water the drain hose should be inclined as shown in figure below.



⚠ CAUTION

Please ensure the smooth flow of condensed water of the indoor unit during installation. (Carelessness may result in water leakage.)

⚠ CAUTION

Be sure that the hose is not loosely connected or bent.

7 Checking procedure after installation

7.1 Confirm the smooth water flowing from the drain hose by pouring some water into the evaporator pan.
7.2 Arrange the penetrating part of the wall presentably with the bushing for refrigerating pipes and sealer which is belonging to the pipe set as shown in Fig. 7-1.

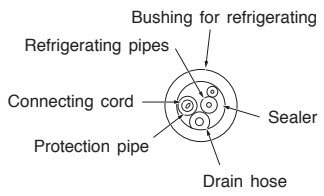


Fig. 7-1

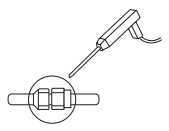


Fig. 7-2

⚠ CAUTION

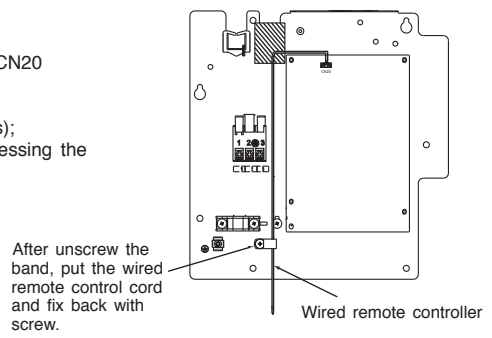
Be sure that the wire is not in contact with any metal in the wall. Please use the protection pipe around the wire passing through the hollow part of the wall so as to prevent the possibility of the wire being damaged by a mouse.

7.3 Wind the inadhesive vinyl tape which is belonged to the pipe set round the refrigerating pipes and the connecting cord.
7.4 Leakage checking of refrigerant at the coupling by gas leak detector or soapsuds, as shown in Fig. 7-2.
7.5 Checking of evaporator coldness (cooling operation).
7.6 Checking of warm wind from condenser (cooling operation).

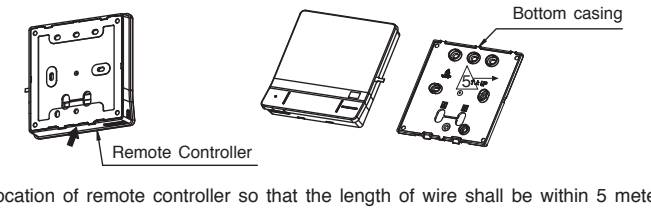
8 Installation of wired remote controller (optional)

(a) Connection to the electrical box;
- Remove the cover of electric box
- Connect the connector of wired remote controller to CN20
- Assemble back the cover of electrical box

(b) Wiring installation for wired remote controller (2 methods);
- Wired remote controller casing can be opened by pressing the slots with minus screw driver (see below diagram)



REMARK: Diagram shown is for reference only.
For SPX-URFG please refer specific manual.



- Decide the fixing location of remote controller so that the length of wire shall be within 5 meters.

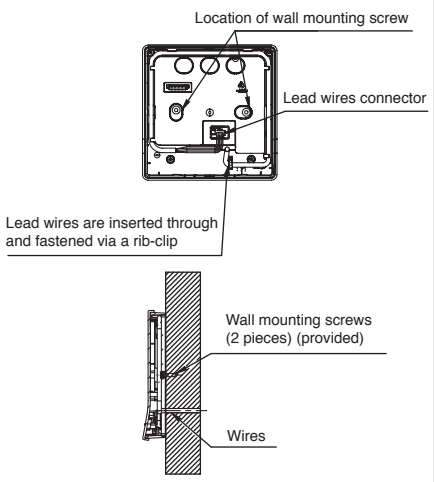
⚠ CAUTION

- Do not cut the provided wire. Excess wire should be properly wound and fitted in a safe place.
- Do not join the wire with additional wire.

Wiring installation illustrations

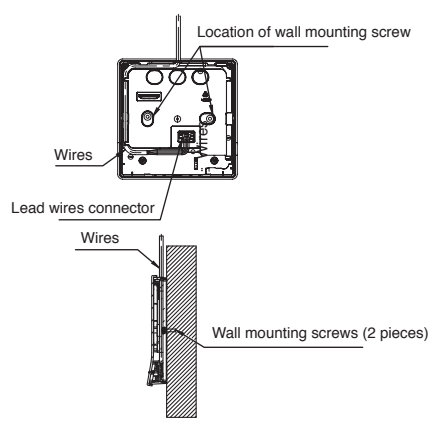
Wall recessed wiring installation (Optional)

■ When connecting the wires via the wall's recessed slot;
1. Fix the bottom casing to the wall with the provided screw.
2. Assemble the top casing to the fixed bottom casing.
(Refer to the illustration below for a detailed installation)



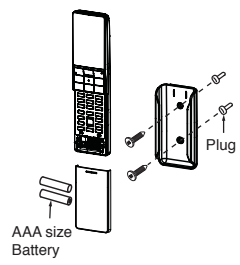
Inside top wiring installation (Alternative)

■ When the wires are to be connected from the inside top portion of top casing;
1. Break off a perforated aperture located at the top portion of the bottom casing by nipper. Smoothen the aperture by cutter.
2. Fix the bottom casing to the wall by provided screw.
3. Connect the wires to the lead wires connector.
4. Mount the wires through the provided slot on top casing.
5. Assemble the top casing to the fixed bottom casing
(Refer to the illustration below for detail installation)

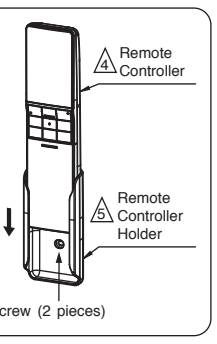


9 Installation of wireless remote controller (optional)

- The remote controller can be placed in its holder which is then fixed on a wall or beam.
- To operate the remote controller at its holder, please ensure that the unit can receive the signal transmitted from the controller at the place where the holder is to be fixed. The unit will beep when a signal is received from the remote controller. The signal transmission is weakened by the fluorescent light. Therefore, during the installation of the remote control holder, please switch on the light, even during day time, to determine the mounting location of the holder.

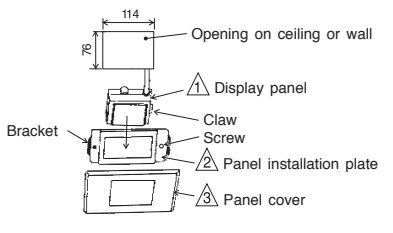


The remote controller must be able to slide in the remote controller holder, in the direction as shown in the figure, until it hooks onto the lower end of the remote controller holder.

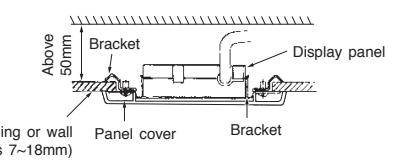


Installation of display panel (Optional)

- Select an installation position on ceiling or wall where there is no obstacle to interrupt signal reception.
- Loosen screws of panel installation plate so that bracket can be slightly moved.
- Match the display panel to panel installation plate so the fixing claws on the panel are securely hooked.
- Match brackets to the opening on ceiling or wall and tighten screws until bracket is firmly secured to ceiling material.
- Install the panel cover so inside claws are securely hooked to the panel installation plate.
- Conduct the indoor unit side housing of display panel cord to the electric box of the indoor unit and connect it with the housing at the side of the unit.



CROSS SECTION

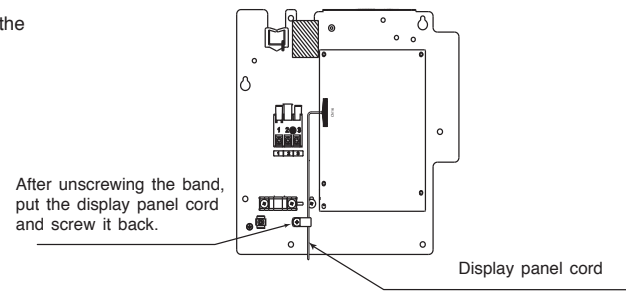


⚠ CAUTION

Please disconnect wired remote controller connector at CN20 if to use wireless remote controller.

Connection of display panel lead wires (Optional)

- Attach the connector of this panel to the connector CN16 on the control PWB.

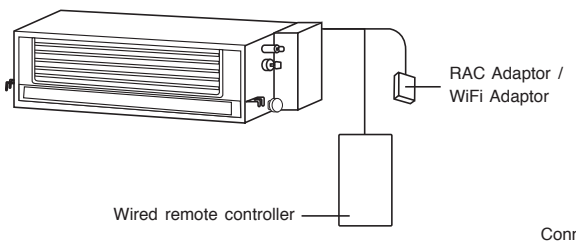


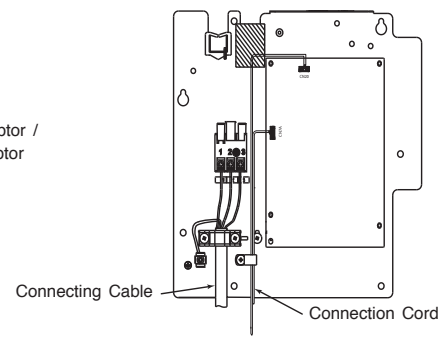
10 Setting of High static pressure

HIGH	**: 150pa**
MEDIUM	**: 100pa**
NORMAL	**: 50pa**

- Detail how to set static pressure shall refer to service manual page "Service setting mode".
- If not set to HIGH STATIC-PRESSURE, there will be reduction of cooling and heating capacities. (At the time of delivery, the setting is set as "NORMAL".)

11 How To Connect The Optional Parts
(RAC / WiFi Adapter, Wired Remote Control)





EXTERNAL COMMUNICATION

[For all optional parts, please refer to the catalog for part numbers]

When connecting the Dry contact / External Communication / WiFi (Optional)

- **To connect to Dry Contact, a separate purchase HA adaptor and Dry Contact Connecting Cord is required.**
- To connect to External Communication, a separate purchase RAC adaptor is required.
- To connect to WiFi, a separate purchase WiFi adaptor is required.
- To install the wiring, the electrical box cover must be opened, (As for Dry Contact, connect to CN6 whereas for the WiFi Adaptor or RAC Adaptor, connect to CN7A/CN7B.
- The connection cord and power cables are to be arranged and tied up as the diagram shown above.
- Please refer to the respective user manuals of the WiFi adaptor and RAC adaptor for further details.
- Please refer to the user manual for instruction on the removal and installation of the electrical box.
- For ordering all optional parts, please refer to the catalogue for part number.
- For Multi Air Conditioner, please refer to Outdoor Service Manual.

WIRED REMOTE CONTROLLER

[For all optional part, please refer catalog for part number]

To connect to the electrical box:
- Remove the cover of electrical box.
- Connect the connector of wired remote controller to CN20.
- Assemble back the cover of electrical box.
- Please refer to the respective user manual of wired remote controller for further details.
- Please be careful not to damage lead wires by edge of plate when connecting the optional parts.

12 Protection of lead wire

Wrap aluminum tape around PVC tube between electric box and indoor unit (cord band).

13 Operation test

- Please ensure that the air conditioner is in normal operating condition during the operation test.
- Explain to your customer the proper operation procedures as described in the user's manual.
- If the indoor unit does not operate, check to see that the connections are correct.

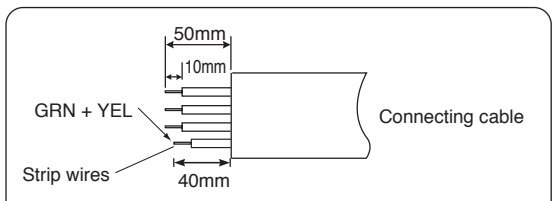
⚠ CAUTION Trial run should be conducted on one unit at a time to check for incorrect wiring of connecting cord.

CONNECTION OF CONNECTING CORD

⚠ WARNING | • THIS APPLIANCE MUST BE EARTHED.

Connection of the connecting cord

(1) Remove the cover of the electric box.
(2) Connect the connecting cords.
(3) Assemble the cover of electric box.



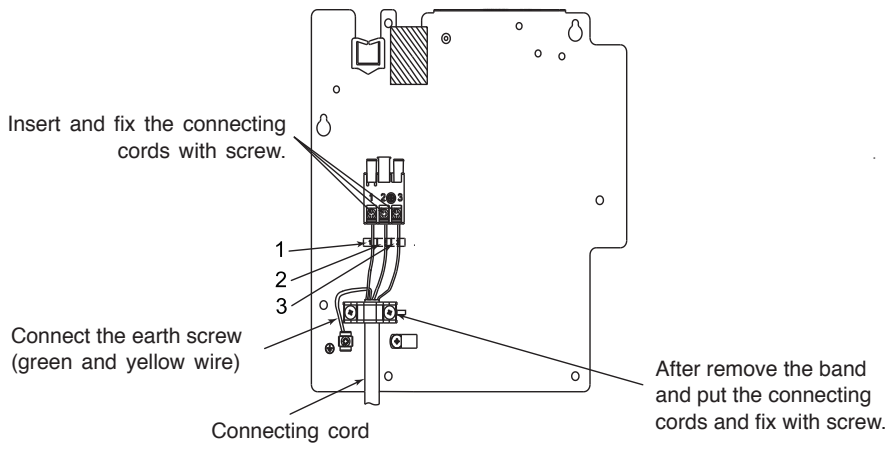
Detail of cutting the connecting cord

⚠ WARNING

- This appliance must be earthed.
- Do not make any connection in the middle of the connecting cable. It may cause overheating, smoke emission, or fire.

Wiring Of The Indoor Unit

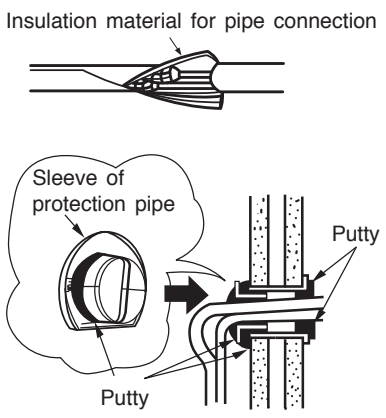
For wire connection of the Indoor unit, you need to remove electrical cover.



FINAL STAGE OF INSTALLATION

1 Insulation And Maintenance Of Pipe Connection

- The connected terminals should be completed sealed with a heat insulator and then tied up with a rubber strap.
- Please tie the pipe and power line together with vinyl tape as shown in the figure showing the installation of the Indoor and Outdoor units. Then fix their position with holders.
- To enhance the heat insulation and to prevent water condensation, please cover the outdoor part of the drain hose and pipe with insulation pipe.
- Completely seal any gap with putty.



2 Power Source And Operation

Power Source

⚠ CAUTION

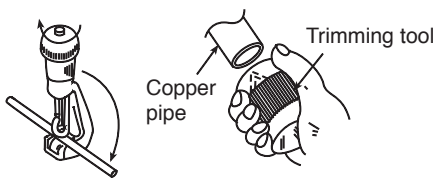
- Please use a new socket. An accident may occur while using an old socket because of the poor contact.
- Please plug in and then remove the plug for 2 – 3 times. This is to ensure that the plug is completely plugged into the socket.
- Keep additional length for the power cord and do not render the plug under external force as this may cause poor contact.
- Do not fix the power cord with U-shape nail.

⚠ WARNING

- Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer. Any unfit method or using incompatible material may cause product damage, burst and serious injury.
- The appliance/pipe-work shall be stored in a well ventilated room with indoor floor area larger than A_{min} [refer to Table 1] and without any continuously operating ignition source. Keep away from open flames, any operating gas appliances or any operating electric heater. Else, it may explode and cause injury or death.
- The appliance/pipe-work shall be installed, and/or operated in a room with floor area larger than A_{min} [refer to Table 1] and keep away from ignition sources, such as heat/spark/open flame or hazardous areas such as gas appliances, gas cooking, reticulated gas supply systems or electric cooking appliances, etc.
- Do not pierce or burn as the appliance/pipe-work is pressurized. Do not expose the appliance/pipe-work to heat, flame, sparks, or other sources of ignition. Else, it may explode and cause injury or death.

Preparation of pipe

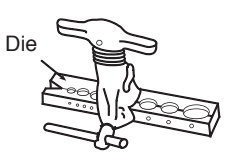
- Use a pipe cutter to cut the copper pipe.



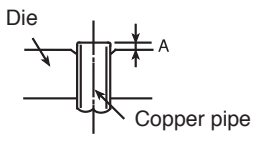
⚠ CAUTION

- Jagged edge will cause leakage.
- Point the side to be trimmed downwards during trimming to prevent copper chips from entering the pipe.

- Before flaring, please put on the flare nut.



- Please use exclusive tool.



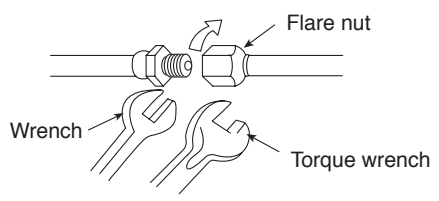
Outer Diameter mm (inch)	Thickness (mm)	A (mm)		
		Flare tool for R32 Clutch type	Conventional flare tool	
			Clutch type	Wing nut type
6.35 (1/4")	0.8	0.0 ~ 0.5	1.0 ~ 1.5	1.5 ~ 2.0
9.52 (3/8")	0.8	0.0 ~ 0.5	1.0 ~ 1.5	1.5 ~ 2.0
12.70 (1/2")	0.8	0.0 ~ 0.5	1.0 ~ 1.5	1.5 ~ 2.5
15.88 (5/8")	1.0	0.0 ~ 0.5	1.0 ~ 1.5	1.5 ~ 2.5

Pipe connection

⚠ CAUTION

In case of removing flare nut of an indoor unit, first remove a nut of small diameter side, or a seal cap of big diameter side will fly out. Free from water into the piping when working.

- Please be careful when bending the copper pipe.
- Screw in the screws manually while adjusting the center. After that, use a torque wrench to tighten the connection.



		Outer dia. of pipe	Torque N·m (kgf · cm)
Small dia. side		6.35 (1/4")	14.0 – 18.0 (140 – 180)
Large dia. side		9.52 (3/8") 12.70 (1/2") 15.88 (5/8")	33.0 – 42.0 (330 – 420) 50.0 – 62.0 (500 – 620) 63.0 – 77.0 (630 – 770)
Valve head cap	Small dia. side	6.35 (1/4")	19.6 – 24.5 (200 – 250)
	Large dia. side	9.52 (3/8") 12.7 (1/2")	19.6 – 24.5 (200 – 250) 29.4 – 34.3 (300 – 350)
Valve core cap			12.3 – 15.7 (125 – 160)