## FOR SERVICE PERSONNEL ONLY

# HITACHI

## SPLIT UNIT AIR CONDITIONER INSTALLATION MANUAL

HFC R32

**Outdoor Unit**

**RAM-53NP2E**

- 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

( ◉ mark is tool exclusive use for R32)
● ⊕⊖ Screwdriver ● Measuring Tape ● Knife
● Saw ● Pipe Cutter ● Hexagonal Wrench Key ( ⌶⬡ 4mm)
● Power Drill (ø 65mm ~ ø 80mm) ◉ Vacuum Pump
● Pliers or Wrench ● Torque Wrench ◉ Vacuum Pump Adaptor ● Flare Tool ● Gas Leakage Detector
◉ Manifold Valve ◉ Charge Hose ● Reamer ● File

## 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.

### ⚠ 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.

### ⚠ 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.

**1. Proper place for installation**

**1.1 Outdoor unit**

(1) Keep the space around the unit for maintenance and avoiding the effects of hindrance for normal ventilation of the unit.
(2) The northern or eastern side of the building is better to install. At the installation on the southern or western side unavoidably, some blind should be set up for the unit. (In this case, the blind must not obstruct the ventilation of the unit.)
(3) You'd better not put the unit at a place where is full of dirt and at a place where is wet in the rain.
(4) Place as near as possible to the indoor unit.
(5) Install the unit in a stable place to minimize vibration or noise.
(6) After arranging the cords and pipes, secure them in place.

**⚠ WARNING**
- This appliance must be earthed.
- Power is supplied through outdoor unit, do not connect power source to indoor unit.

**2.** In the electrical installation a separator with a contact gap of more than 3mm has to be installed. During cleaning or service the set has to be switched off with this separator.



## The Choice of Mounting Site (Please note the following matters and obtain permission from customer before installation).

OUTDOOR UNIT

### ⚠ WARNING

- The Outdoor unit must be mounted at a location which can support heavy weight. Otherwise, noise and vibration will increase.

### ⚠ CAUTION

- Do not expose the unit under direct sunshine or rain. Besides, ventilation must be good and clear of obstruction.
- The air blown out of the unit should not point directly to animals or plants.
- The clearances of the unit from top, left, right and front are specified in figure below. At least 3 of the above sides must be open air.
- Be sure that the hot air blown out of the unit and noise do not disturb the neighbourhood.
- Do not install at a location where there is flammable gas, steam, oil and smoke.
- The location must be convenient for water drainage.
- Place the Outdoor unit and its connecting cord at least 1m away from the antenna or signal line of television, radio or telephone. This is to avoid noise interference.
- Do not install outdoor unit facing strong wind direction. It may damage the fan motor.
- Do not install the outdoor unit in a place where small animals may build their nests. If small animal goes inside the unit and touches the electrical parts, failure of the unit, smoke or fire may be caused. Request your customer to keep the surrounding of the unit is clean.

Names of Outdoor Components

| No. | Item | Qty |
|---|---|---|
| ① | Bush  | 3 |
| ② | Drain Pipe  | 1 |
| ③ | Bush  | 1 |

Dimension of Mounting Stand of the Outdoor unit

(unit : mm)

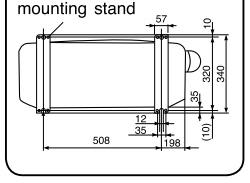



**Figure showing the Installation of Outdoor Unit.**

### ⚠ CAUTION

- This unit is chargeless up 35m pipe length.
- Installation of pipe length less than minimum pipe length requirement (3 meters) may generate an abnormal sound.

### ⚠ WARNING

**BURST HAZARD**
Do not allow air, etc. to get into refrigerant cycle (piping)

**RISK OF EXPLOSION**
Compressor must be stopped before removing refrigerant pipes.
All service valve must be fully closed after pumping down operation.

### 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.

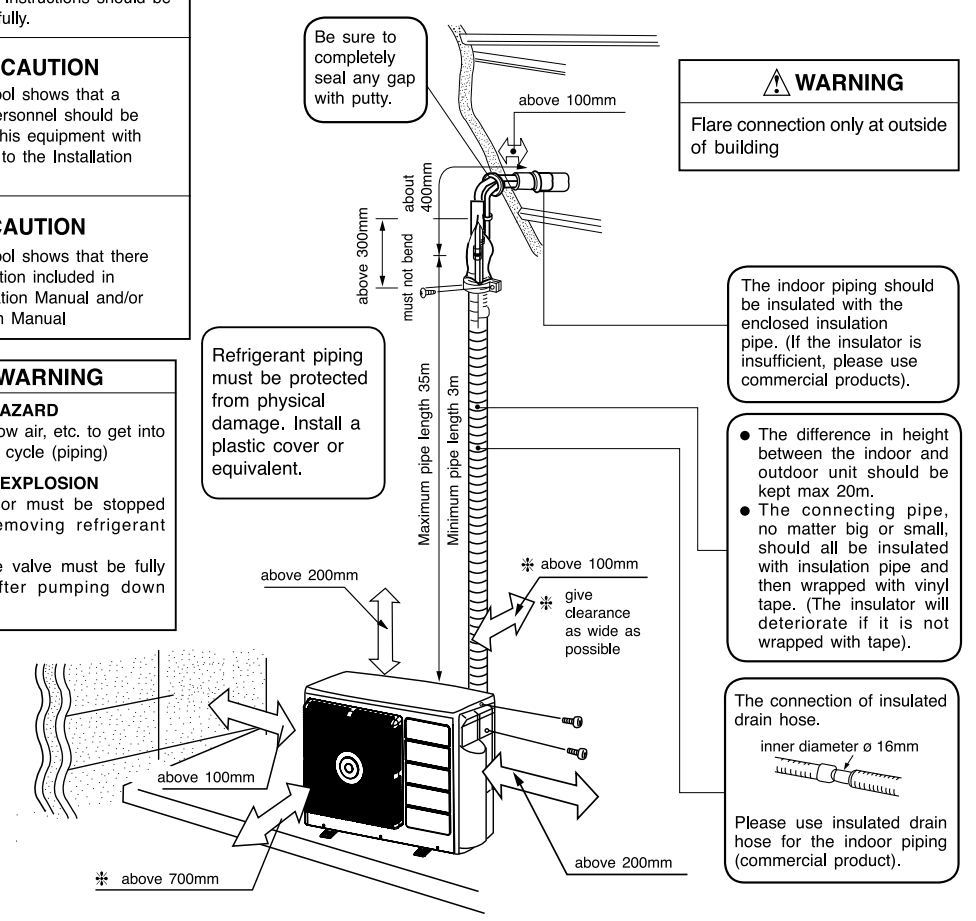
### CAUTION

This symbol shows that there is information included in the Operation Manual and/or Installation Manual

Table 1: Minimum Floor area of the room $A_{min}$ ($m^2$)

| Outdoor Model | Max Piping Length (m) | Max refrigerant charge amount (kg) | Minimum Floor Area of the room $A_{min}$ ($m^2$) | | | |
|---|---|---|---|---|---|---|
| | | | RAK-**QPE RAK-**RXE RAK-**RPE | RAI-**RPE | RAD-**QPE RAD-**RPE | RAF-**RXE |
| RAM-53NP2E | 35 | 1.80 | 3.09 | 2.07 | 2.07 | 27.80 |

** is refering to indoor model name.

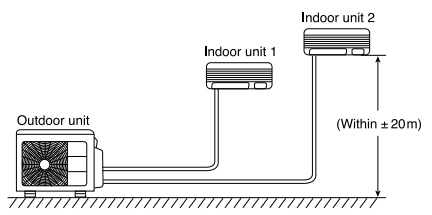



### ⚠ WARNING

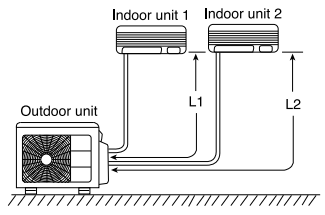
Flare connection only at outside of building

**Height difference**

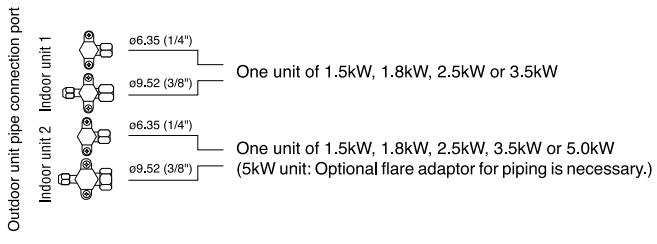
Height difference between indoor units should not be more than 5m.




**Piping length**




(L1 + L2) = Maximum 35m
Minimum piping length for each indoor unit is 3m.
Maximum piping length for one indoor unit is 25m.
※ Additional charge of refrigerant is not required.




- To the outdoor unit, up to two indoor units can be connected until the total value of each units's capacity reaches 8.5 kW.
- The pipe connection ports of the outdoor unit and connectable indoor units are shown above.

### ⚠ CAUTION

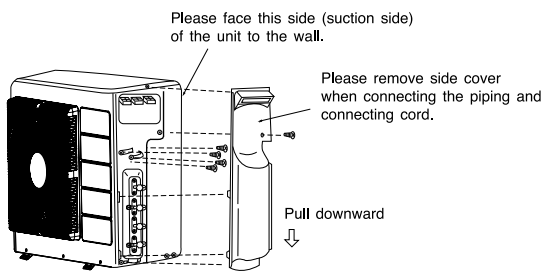
- Make sure to connect to two or three indoor units.

**Flare adaptor for piping**

The flare adaptor for piping is required depending on combination of indoor units.
- ø9.52(3/8") → ø 12.7 (1/2")
  Parts number TA261D-4 001

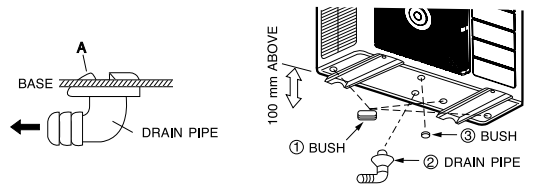
## OUTDOOR UNIT

- Please mount the Outdoor unit on stable ground to prevent vibration and increase of noise level.
- Decide the location for piping after sorting out the different types of pipe available.
- When removing side cover, please pull the handle after undoing the hook by pulling it downward.




**CONDENSED WATER DISPOSAL OF OUTDOOR UNIT**

- There are holes on the base of Outdoor unit for condensed water to exhaust.
- In order to flow condensed water to the drain, the unit is installed on a stand or a block so that the unit is 100mm above the ground as shown figure. Join the drain pipe to one hole.
- At first insert one portion of the hook to the base (Portion A), then pull the drain pipe in the direction shown by the arrow while inserting the hook into the base. After installation, check whether the drain pipe cling to the base firmly.




**When Using and Installing In Cold Areas**

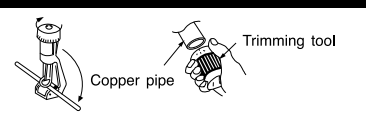
When the air conditioner is used in low temperature and in snowy conditions, water from the heat exchanger may freeze on the base surface to cause poor drainage. When using the air conditioner in such areas, do not install the bushings. Keep a minimum of 250mm between the drain hole and the ground. When using the drain pipe, consult your sales agent.

※ For more details, refer to the installation Manual for Cold Areas.

## INSTALLATION OF REFRIGERATING PIPES AND AIR REMOVAL

### 1 Preparation of Pipe

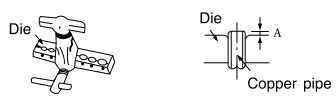
- Use a pipe cutter to cut the copper pipe.




**⚠ 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.



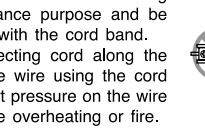

- Recommend to use R32 flaring tool.

| Outer Diameter mm (inch) | Thickness (mm) | A (mm) | | |
|---|---|---|---|---|
| | | Flare tool for R32 | Conventional flare tool | |
| | | Clutch type | 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 |

### 2 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. Prevent water from entering into the piping when working.




| | | 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")<br>12.70 (1/2") | 33.0 – 42.0 (330 ~ 420)<br>50.0 – 62.0 (500 ~ 620) |
| Valve head cap | Small dia. side | 6.35 (1/4") | 19.6 – 24.5 (200 ~ 250) |
| | Large dia. side | 9.52 (3/8")<br>12.7 (1/2") | 19.6 – 24.5 (200 ~ 250)<br>29.4 – 34.3 (300 ~ 350) |
| Valve core cap | | | 12.3 – 15.7 (125 ~ 160) |
| Spindle | Small dia. side | 6.35 (1/4")<br>9.52 (3/8") | 3.92~5.88 (40~60) |
| | Large dia. side | 12.7 (1/2")<br>15.87 (5/8") | 9.80~10.78 (100~110) |

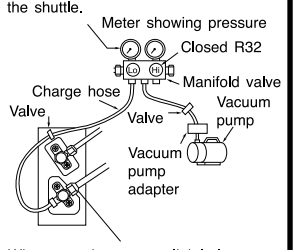
### 3 Removal Of Air From The Pipe And Gas Leakage Inspection

**AIR REMOVAL**

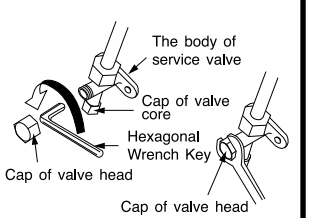
**Procedures of using Vacuum Pump for Air Removal**

1. As shown in right figure, remove the cap of valve core. Then, connect the charge hose. Remove the cap of valve head. Connect the vacuum pump adapter to the vacuum pump and connect the charge hose to the adapter.
2. Fully tighten the "Hi" knob of the manifold valve and completely unscrew the "Lo" knob. Run the vacuum pump for about 10~15 minutes, then completely tighten the "Lo" knob and switch off the vacuum pump.
3. Remove the charge hose and tighten the cap of valve core. Check the cap's periphery if there is any gas leakage.
4. Completely unscrew the spindle of the service valve in anti-clockwise direction to allow the flow of refrigerant (using Hexagonal Wrench key).
5. Re-cap the service valve and tighten using wrench. Check the cap's periphery if there is any gas leakage. The task is then completed.

When the meter reaches - 101KPa (-76cmHg) during pumping, fully tighten the shuttle.




When pumping starts, slightly loosen the flare nut to check of air sucked in. Then tighten the flare nut.



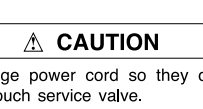

**⚠ CAUTION**

- Prevent moisture from entering pipe connection.
- Refrigerating machine oil not be applied to the outside of the flare.
  When refrigerating machine oil is applied to the outside of the flare, excessive tightening of the flare nut, cracking of the flare nut, destruction of the flare and gas leakage may occur.
- When using the control valve, do not use deteriorated packing. And, do not overtighten the steering wheel.
  Gas leakage from the service valve part, stagnation, touching fire, rarely cause ignition.

**Gas Leakage Inspection**

Please use gas leakage detector to check if leakage occurs at the connection of Flare nut as shown on the right.

If gas leakage occurs, further tighten the connection to stop leakage. (Be sure to use R32 detector)



## CONNECTION OF POWER CORD

**⚠ WARNING** • THIS APPLIANCE MUST BE EART...

### Procedures of Wiring

**1. Installation procedure and notice**

Especially, the selection of installation place need great care for the split type air conditioner, because it is very difficult to move from place to place after the first installation.

**1.1 Wiring**

(1) Connect the electrical wiring between the Indoor and Outdoor unit, as shown in Fig. 1-1. Never connect the wiring by mistake.
In case of wrong connection, the unit does not operate properly and it may cause malfunction.

(2) The connecting cord must be fixed by the band which is located near the terminal board.

**1.2 Connection of the connecting cords and power cord**

(1) Cut off the connecting cord, the power cord and strip the insulation of the wire, as shown in Fig. 1-2.

(2) Connect the connecting cord and power cord to the terminal board. (Fig. 1-3)

(3) Fix the connecting cords and power cord with steel band certainly. (Fig. 1-3)

### Detail of Cutting the Connecting Cord

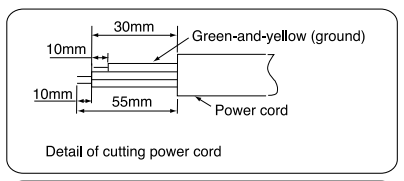



**Fig. 1-2**

Wiring Pattern
Indoor Unit

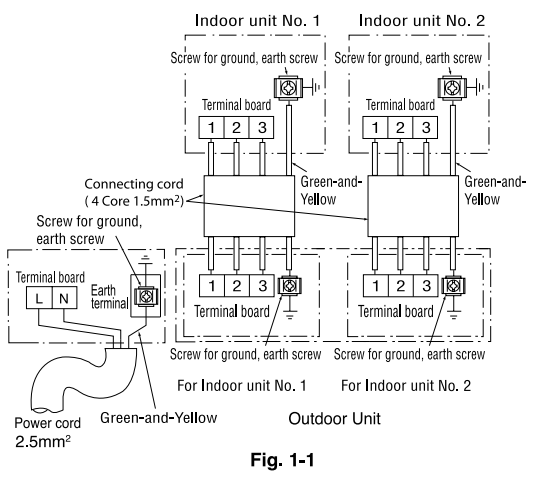


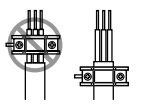

**Fig. 1-1**

Indoor earth wire connection to outdoor

| Method 1 (Separate) | Method 2 (Combine) |
|---|---|
| From Indoor 1 From Indoor 2 | From Indoor 1 From Indoor 2 |
| Screw for ground at outdoor unit | Screw for ground at outdoor unit |
| Both method of earth wire connection are acceptable. Please ensure the wire fixed firmly to the screw. | |

**⚠ WARNING**

- Leave some space in the connecting cord for maintenance purpose and be sure to secure it with the cord band.
- Secure the connecting cord along the coated part of the wire using the cord band. Do not exert pressure on the wire as this may cause overheating or fire.



**⚠ WARNING**

- The naked part of the wire core should be 10 mm and fix it to the terminal tightly. Then try to pull the individual wire to check if the contact is tight. Improper insertion may burn the terminal.
- Be sure to use only wire specified for the use of air-conditioner.
- Please refer to the manual for wire connection and the wiring technique should meet the standard of the electrical installation.
- There is an AC voltage drop between the LN terminal if the power is on. Therefore, be sure to remove the plug from its socket.

### Wiring of The Outdoor Unit

- Please remove the side cover for wire connection.

**⚠ WARNING**

- If you cannot attach the side cover due to the connecting cord, press the connecting cord in direction to the front panel to fix it.
- Be sure that the hooks of the side cover is fixed in certainly. Otherwise water leakage may occur and this causes short circuit or faults.
- The connecting cord should not touch to service valve and pipes. (It becomes high temperature in heating operation.)

### Checking for the electric source and the voltage range

- Before installation, the power source must be checked and necessary wiring work must be completed. To make the wiring capacity proper, use the wire gauges list below for the lead-in from a pole transformer and for the wiring from a switch board of fuse box to the main switch and outdoor unit in consideration of the locked rotor current.
- Investigate the power supply capacity and other electrical conditions at the installing location.
  Depending on the model of room air conditioner to be installed, request the customer to make arrangements for the necessary electrical work etc.
  The electrical work includes the wiring work up the outdoor unit . In localities where electrical conditions are poor, use of a voltage regulation is recommended.

**IMPORTANT**

**For (Power cord - L, N, Earth)**

| Cable type | Wire cross-section |
|---|---|
| 3 Core | 2.5mm² |

**⚠ WARNING**

- Connect the Connecting Cord to "Indoor 1 (1, 2, 3)" for indoor unit 1, "Indoor 2 (1, 2, 3)" for indoor unit 2.

**For (Connecting cord - 1, 2, 3, Earth)**

| Cable type | Wire cross-section | Cable length |
|---|---|---|
| 4 Core | 1.5mm² | up to 25m |

Bind connecting cords to make them fit between the convex sections.




**Fig. 1-3**

| Type of grounding rod | Length |
|---|---|
| SP-EB-2 | 900mm |

Grounding rod (optional)
(Earth wire and grounding rod are not supplied. Please use optional items below.)

IMPORTANT

| Circuit Breaker |
|---|
| 20A |

**⚠ CAUTION**

Arrange power cord so they do not touch service valve.

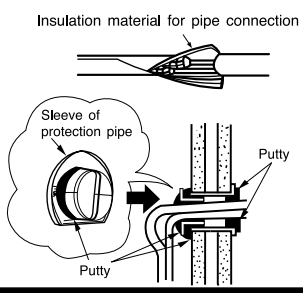
**⚠ CAUTION**

Note:
- Outdoor supply cords shall not be lighter than polychloroprene sheathed flexible cord with code designation 60245 IEC 57.

## FINAL STAGE OF INSTALLATION

### 1 Insulation And Maintenance Of Pipe Connection

- The connected terminals should be completely sealed with heat insulator and then tied up with rubber strap.
- Please tie the pipe and power line together with vinyl tape as shown in the figure showing the installation of Indoor and Outdoor units. Then fix their position with holders.
- To enchance 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 Test

**Power Source**

**⚠ CAUTION**

- Please use a new socket. Accident may occur due to the use of old socket because of 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.

**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.

### Pump Down Method When Reuse Existing Piping (R410A Model) for R32 Model

- Compressor oil of R410A model is insoluble in compressor oil of R32 model. The mixing of compressor oil may cause damage of compressor.

**Possibility of Mixing**

- Reuse of piping of R410A model is dangerous because of its compressor oil.
- When reuse piping of R410A model, pump down must be carried out properly to ensure compressor oil which is remained inside piping is collected away.

**⚠ CAUTION**

Reuse of piping R410A model only apply if previous model is Hitachi and proper pump down method is used.

**To Reuse Old Piping**

- Piping of R410A model can be reused only when air-conditioner is properly pumped down.
- The purpose of pump down is to collect back the compressor oil (which is mixed with refrigerant and circulating inside refrigeration cycle) properly into the outdoor unit of air conditioner.

**⚠ CAUTION**

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