# Airwell INSTALLATION INSTRUCTIONS

## – FLOW LOGIC 3 Pipe System Air Conditioner –

for Refrigerant R410A

■ **R410A Models**
**Indoor Units**

| | Indoor Unit Type | 7 | 9 | 12 | 16 | 18 | 24 | 36 | 48 |
|---|---|---|---|---|---|---|---|---|---|
| NK1FL | 1-Way Air Discharge Semi-Concealed Slim | | ST-NK1FL 9R | ST-NK1FL 12R | ST-NK1FL 16R | ST-NK1FL 18R | ST-NK1FL 24R | | |
| NK2FL | 2-Way Air Discharge Semi-Concealed | ST-NK2FL 7R | ST-NK2FL 9R | ST-NK2FL 12R | ST-NK2FL 16R | ST-NK2FL 18R | ST-NK2FL 24R | | |
| NKFL | 4-Way Air Discharge Semi-Concealed * | ST-NKFL 7R | ST-NKFL 9R | ST-NKFL 12R | ST-NKFL 16R | ST-NKFL 18R | ST-NKFL 24R | ST-NKFL 36R | ST-NKFL 48R |
| NWFL | Wall-Mounted | ST-NWFL 7R | ST-NWFL 9R | ST-NWFL 12R | ST-NWFL 16R | ST-NWFL 18R | ST-NWFL 24R | | |
| NPFL | Ceiling-Mounted | | | ST-NPFL 12R | ST-NPFL 16R | ST-NPFL 18R | ST-NPFL 24R | ST-NPFL 36R | ST-NPFL 48R |
| NDLP | Concealed-Duct | ST-NDLP 7R | ST-NDLP 9R | ST-NDLP 12R | ST-NDLP 16R | ST-NDLP 18R | ST-NDLP 24R | ST-NDLP 36R | ST-NDLP 48R |
| NDHP | Concealed-Duct High Static Pressure ** | | | | | | ST-NDHP 24R | ST-NDHP 36R | ST-NDHP 48R |
| NFFL | Floor-Standing | ST-NFFL 7R | ST-NFFL 9R | ST-NFFL 12R | ST-NFFL 16R | ST-NFFL 18R | ST-NFFL 24R | | |
| NFMFL | Concealed-Floor Standing | ST-NFMFL 7R | ST-NFMFL 9R | ST-NFMFL 12R | ST-NFMFL 16R | ST-NFMFL 18R | ST-NFMFL 24R | | |

* ST-NKFL 60R is available.

** ST-NDHP 76R and ST-NDHP 96R are available.

**Outdoor Units**

| | |
|---|---|
| C | EFL 80-3R, EFL 100-3R, EFL 120-3R, EFL 140-3R, EFL 160-3R |

* Refrigerant R410A is used in the outdoor units.

**Optional Controllers**

| | | |
|---|---|---|
| RC | Remote Controller | NRCG-FL |
| | Wireless Remote Controller (For NKFL Type) | RCIRK-FL |
| | Wireless Remote Controller (For NK2FL, NK1FL Type) | RCIRKS-FL |
| | Wireless Remote Controller (For NPFL Type) | RCIRP-FL |
| | Wireless Remote Controller (For NDLP, NDHP, NFFL, NFMFL Type) | RCIRC-FL |
| | Wireless Remote Controller (For NWFL Type) | RCIRW |
| | Simplified Remote Controller | NRCB-FL |
| | Remote Sensor | NSD |
| | System Controller | NRSC-FL |
| | Schedule Timer | NWTM-FL |



85464369140000 

Ⓦ

# IMPORTANT!
# Please Read Before Starting

This air conditioning system meets strict safety and operating standards. As the installer or service person, it is an important part of your job to install or service the system so it operates safely and efficiently.

**For safe installation and trouble-free operation, you must:**

- Carefully read this instruction booklet before beginning.
- Follow each installation or repair step exactly as shown.
- Observe all local, state, and national electrical codes.
- Pay close attention to all warning and caution notices given in this manual.


This symbol refers to a hazard or unsafe practice which can result in severe personal injury or death.


This symbol refers to a hazard or unsafe practice which can result in personal injury or product or property damage.

### If Necessary, Get Help

These instructions are all you need for most installation sites and maintenance conditions. If you require help for a special problem, contact our sales/service outlet or your certified dealer for additional instructions.

### In Case of Improper Installation

The manufacturer shall in no way be responsible for improper installation or maintenance service, including failure to follow the instructions in this document.

## SPECIAL PRECAUTIONS

### WARNING When Wiring

**ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH. ONLY A QUALIFIED, EXPERIENCED ELECTRICIAN SHOULD ATTEMPT TO WIRE THIS SYSTEM.**

- Do not supply power to the unit until all wiring and tubing are completed or reconnected and checked.
- Highly dangerous electrical voltages are used in this system. Carefully refer to the wiring diagram and these instructions when wiring. Improper connections and inadequate grounding can cause **accidental injury or death.**
- **Ground the unit** following local electrical codes.
- Connect all wiring tightly. Loose wiring may cause overheating at connection points and a possible fire hazard.

### When Transporting

Be careful when picking up and moving the indoor and outdoor units. Get a partner to help, and bend your knees when lifting to reduce strain on your back. Sharp edges or thin aluminum fins on the air conditioner can cut your fingers.

### When Installing…

**…In a Room**

Properly insulate any tubing run inside a room to prevent "sweating" that can cause dripping and water damage to walls and floors.

**…In Moist or Uneven Locations**

Use a raised concrete pad or concrete blocks to provide a solid, level foundation for the outdoor unit. This prevents water damage and abnormal vibration.

**…In an area with High Winds**

Securely anchor the outdoor unit down with bolts and a metal frame. Provide a suitable air baffle.

**…In a Snowy Area (for Heat Pump-type Systems)**

Install the outdoor unit on a raised platform that is higher than drifting snow. Provide snow vents.

### When Connecting Refrigerant Tubing

- Ventilate the room well, in the event that is refrigerant gas leaks during the installation. Be careful not to allow contact of the refrigerant gas with a flame as this will cause the generation of poisonous gas.
- Keep all tubing runs as short as possible.
- Use the flare method for connecting tubing.
- Apply refrigerant lubricant to the matching surfaces of the flare and union tubes before connecting them, then tighten the nut with a torque wrench for a leak-free connection.
- Check carefully for leaks before starting the test run.

### When Servicing

- Turn the power OFF at the main power box (mains) before opening the unit to check or repair electrical parts and wiring.
- Keep your fingers and clothing away from any moving parts.
- Clean up the site after you finish, remembering to check that no metal scraps or bits of wiring have been left inside the unit being serviced.


- Ventilate any enclosed areas when installing or testing the refrigeration system. Escaped refrigerant gas, on contact with fire or heat, can produce dangerously toxic gas.
- Confirm after installation that no refrigerant gas is leaking. If the gas comes in contact with a burning stove, gas water heater, electric room heater or other heat source, it can cause the generation of poisonous gas.

## Check of Density 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 density 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 imposed to protect the ozone layer. However, since it contains more than air, it poses the risk of suffocation if its density should rise excessively. Suffocation from leakage of refrigerant is almost non-existent. With the recent increase in the number of high density 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 to conventional individual air conditioners. If a single unit of the multi air 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 density 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 density may exceed the limit, create an opening with adjacent rooms, or install mechanical ventilation combined with a gas leak detection device. The density is as given below.

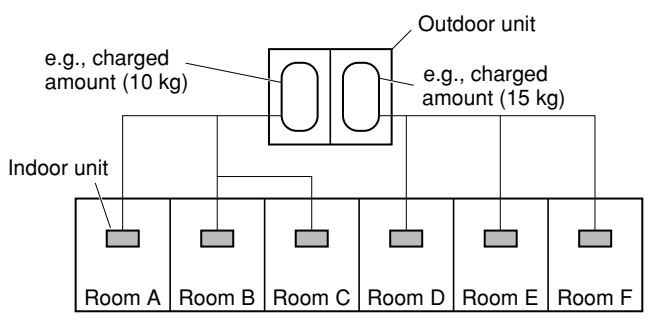
$$\frac{\textbf{Total amount of refrigerant (kg)}}{\textbf{Min. volume of the indoor unit installed room (m}^3\textbf{)}} \leq \textbf{Density limit (kg/m}^3\textbf{)}$$

The density limit of refrigerant which is used in multi air conditioners is 0.3 kg/m$^3$ (ISO 5149).

**NOTE**

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

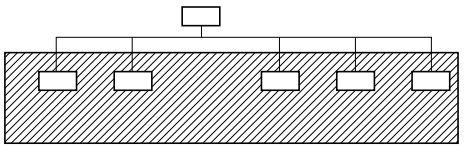
For the amount of charge in this example:



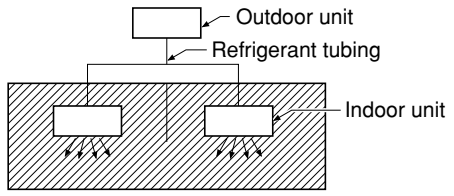

The possible amount of leaked refrigerant gas in rooms A, B and C is 10 kg.
The possible amount of leaked refrigerant gas in rooms D, E and F is 15 kg.

2. The standards for minimum room volume are as follows.

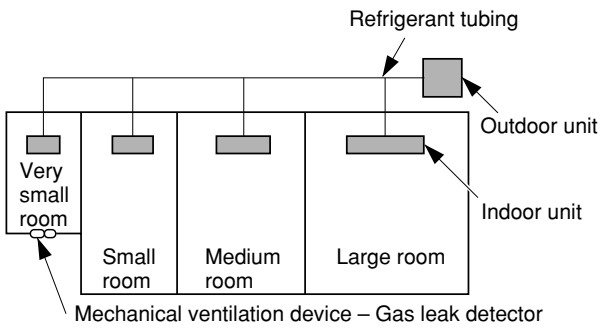
(1) No partition (shaded portion)



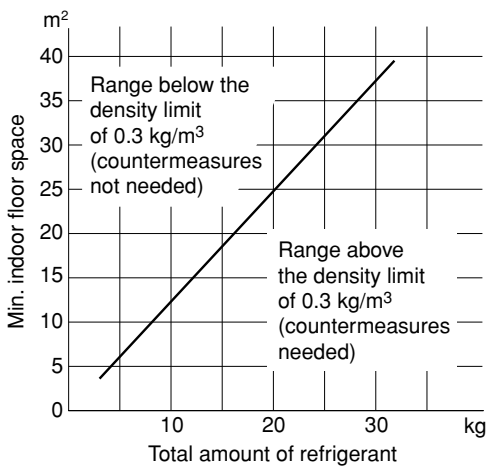
(2) When there is an effective opening with the adjacent room for ventilation of leaking refrigerant gas (opening without a door, or an opening 0.15% or larger than the respective floor spaces at the top or bottom of the door).




(3) If an indoor unit is installed in each partitioned room and the refrigerant tubing is interconnected, the smallest room of course becomes the object. But when 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.




3. The minimum indoor floor space compared with the amount of refrigerant is roughly as follows: (When the ceiling is 2.7 m high)



## Precautions for Installation Using New Refrigerant

### 1. Care regarding tubing

1-1. Process tubing

- Material: Use C1220 phosphorous deoxidized copper specified in JIS H3300 “Copper and Copper Alloy Seamless Pipes and Tubes.”
  For tubes of ø19.05 or larger, use C1220 T-1/2H material or H material, and do not bend the tubes.
- **Tubing size: Be sure to use the sizes indicated in the table below.**
- Use a tube cutter when cutting the tubing, and be sure to remove any flash. This also applies to distribution joints (optional).
- When bending tubing ø15.88 or smaller, use a bending radius that is 4 times the outer diameter of the tubing or larger.

**CAUTION**

**Use sufficient care in handling the tubing. Seal the tubing ends with caps or tape to prevent dirt, moisture, or other foreign substances from entering. These substances can result in system malfunction.**

Unit: mm

| Material | | O | | | |
|---|---|---|---|---|---|
| Copper tube | Outer diameter | 6.35 | 9.52 | 12.7 | 15.88 |
| | Wall thickness | 0.8 | 0.8 | 0.8 | 1.0 |

| Material | | 1/2 H, H | | | | | |
|---|---|---|---|---|---|---|---|
| Copper tube | Outer diameter | 19.05 | 22.22 | 25.4 | 28.58 | 31.75 | 38.1 |
| | Wall thickness | 1.0 | 1.0 | 1.0 | 1.0 | 1.1 | 1.35 |

1-2. Prevent impurities including water, dust and oxide from entering the tubing. Impurities can cause R410A refrigerant deterioration and compressor defects. Due to the features of the refrigerant and refrigerating machine oil, the prevention of water and other impurities becomes more important than ever.

**2. Be sure to recharge the refrigerant only in liquid form.**

2-1. Since R410A is a non-azeotrope, recharging the refrigerant in gas form can lower performance and cause defects in the unit.

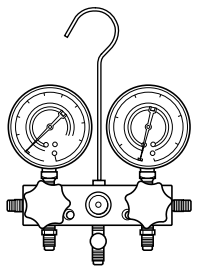
2-2. Since refrigerant composition changes and performance decreases when gas leaks, collect the remaining refrigerant and recharge the required total amount of new refrigerant after fixing the leak.

**3. Different tools required**

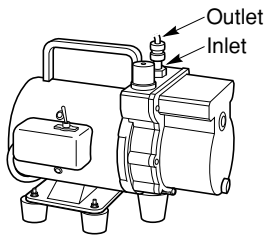
3-1. Tool specifications have been changed due to the characteristics of R410A.
Some tools for R22- and R407C-type refrigerant systems cannot be used.

| Item | New tool? | R407C tools compatible with R410A? | Remarks |
|---|---|---|---|
| Manifold gauge | Yes | No | Types of refrigerant, refrigerating machine oil, and pressure gauge are different. |
| Charge hose | Yes | No | To resist higher pressure, material must be changed. |
| Vacuum pump | Yes | Yes | Use a conventional vacuum pump if it is equipped with a check valve. If it has no check valve, purchase and attach a vacuum pump adapter. |
| Leak detector | Yes | No | Leak detectors for CFC and HCFC that react to chlorine do not function because R410A contains no chlorine. Leak detector for HFC134a can be used for R410A. |
| Flaring oil | Yes | No | For systems that use R22, apply mineral oil (Suniso oil) to the flare nuts on the tubing to prevent refrigerant leakage. For machines that use R407C or R410A, apply synthetic oil (ether oil) to the flare nuts. |

**Manifold gauge**



**Vacuum pump**

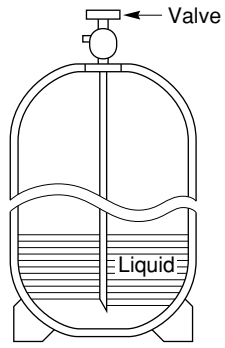



* Using tools for R22 and R407C and new tools for R410A together can cause defects.

3-2. Use R410A exclusive cylinder only.

**Single-outlet valve**

(with siphon tube)
Liquid refrigerant should be recharged with the cylinder standing on end as shown.



# CONTENTS

# 1. GENERAL

This booklet briefly outlines where and how to install the air conditioning system. Please read over the entire set of instructions for the indoor and outdoor units and make sure all accessory parts listed are with the system before beginning.

### 1-1. Tools Required for Installation (not supplied)

1. Standard screwdriver
2. Phillips head screwdriver
3. Knife or wire stripper
4. Tape measure
5. Carpenter's level
6. Sabre saw or key hole saw
7. Hacksaw
8. Core bits
9. Hammer
10. Drill
11. Tube cutter
12. Tube flaring tool
13. Torque wrench
14. Adjustable wrench
15. Reamer (for deburring)

### 1-2. Accessories Supplied with Unit

See Tables 1-1 to 1-9.

| Table | Type |
|---|---|
| 1-1 | 1-Way Air Discharge Semi-Concealed Slim |
| 1-2 | 2-Way Air Discharge Semi-Concealed |
| 1-3 | 4-Way Air Discharge Semi-Concealed |
| 1-4 | Wall-Mounted |
| 1-5 | Ceiling-Mounted |
| 1-6 | Concealed-Duct |
| 1-7 | Concealed-Duct High Static Pressure |
| 1-8 | Floor-Standing & Concealed Floor-Standing |
| 1-9 | Outdoor Unit |

### 1-3. Type of Copper Tube and Insulation Material

If you wish to purchase these materials separately from a local source, you will need:

1. Deoxidized annealed copper tube for refrigerant tubing.
2. Foamed polyethylene insulation for copper tubes as required to precise length of tubing. Wall thickness of the insulation should be not less than 8 mm.
3. Use insulated copper wire for field wiring. Wire size varies with the total length of wiring. Refer to **5. Electrical Wiring** for details.

**CAUTION**

**Check local electrical codes and regulations before obtaining wire. Also, check any specified instructions or limitations.**

### 1-4. Additional Materials Required for Installation

1. Refrigeration (armored) tape
2. Insulated staples or clamps for connecting wire (Check your local codes.)
3. Putty
4. Refrigeration tubing lubricant
5. Clamps or saddles to secure refrigerant tubing
6. Scale for weighing

**Table 1-1 (1-Way Air Discharge Semi-Concealed Slim)**

| Part Name | Figure | Q'ty | Remarks |
|---|---|---|---|
| Installation gauge (Use the packaging side pad.) |  | 1 | Gauge A (Install on tubing side.) |
| |  | 1 | Gauge B (Install on opposite side of tubing.) |
| Washer |  | 8 | Suspension brackets, upper/lower |
| Screw |  | 4 | For full-scale installation diagram |
| Insulating tape |  (White) | 2 | For gas and liquid tube flare nuts |
| Flare insulator |  | 1 | For liquid tubes |
| |  | 1 | For gas tubes |
| Drain hose |  | 1 | For drain joint |
| Hose band |  | 1 | For drain joint |
| Packing |  | 1 | For drain joint |
| Drain insulator |  | 1 | For drain joint |

- Use 3/8" or M10 for suspending bolts.
- Field supply for suspending bolts and nuts.

**Table 1-2 (2-Way Air Discharge Semi-Concealed)**

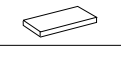
| Part name | Figure | Q'ty | Remarks |
|---|---|---|---|
| Flare insulator |  | 2 | For gas and liquid tubes |
| Insulating tape |  (White) | 2 | For gas and liquid tube flare nuts |
| Vinyl clamp |  | 8 | For flare insulator and drain insulator |
| Hose band |  | 1 | For securing drain hose |
| Packing |  | 1 | For drain joint |
| Drain insulator |  | 1 | For drain joint |
| Installation gauge (Use the packaging side pad.) |  | 1 | Gauge A (Install on tubing side.) |
| |  | 1 | Gauge B (Install on opposite side of tubing.) |
| M5 × L40 (Black screw, with washer) |  | 4 | For fastening installation gauges |
| Special washer |  | 8 | For suspension bolts |
| Drain hose (L = 25cm) |  | 1 | For securing drain hose |
| Putty |  | 1 | For sealing recessed portion of power supply |

**Table 1-3 (4-Way Air Discharge Semi-Concealed)**

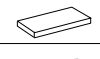
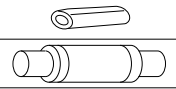
| Part name | Figure | Q'ty | Remarks |
|---|---|---|---|
| Full-scale installation diagram |  | 1 | Printed on container box |
| Flare insulator |  | 2 | For gas and liquid tubes |
| Insulating tape |  (White) | 2 | For gas and liquid tube flare nuts |
| Hose band |  | 1 | For securing drain hose |
| Packing |  | 1 | For drain joint |
| Drain insulator |  | 1 | For drain joint |
| Drain hose |  | 1 | For securing drain hose |
| Washer |  | 8 | For suspension bolts |
| Screw |  | 4 | For full-scale installation diagram |

**Table 1-4 (Wall-Mounted)**

| Part name | Figure | Q'ty | Remarks |
|---|---|---|---|
| Plastic cover |  | 1 | For improved tubing appearance |
| Tapping screw |  Truss-head Phillips 4 × 30 mm | 10 | For fixing the rear panel |
| Insulator |  | 1 | For insulating flare nut (24 type only) |

**Table 1-5 (Ceiling-Mounted)**

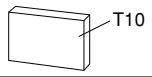
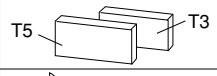
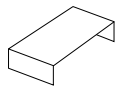
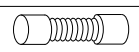
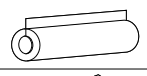
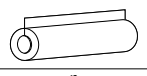
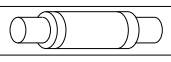
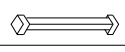
| Part name | Figure | Q'ty | Remarks |
|---|---|---|---|
| Special washer |  | 4 | For temporarily suspending indoor unit from ceiling |
| Drain insulator |  T10 | 1 | For drain hose joint |
| Flare insulator |  T5 T3 | 2 sets | For gas and liquid tube joints |
| Insulating tape |  White (heat-resisting) | 2 | For gas and liquid flare joints |
| Vinyl clamp |  | 8 | For flare and drain insulator |
| Eyelet |  | 1 | For power supply inlet |
| Full-scale installation diagram |  | 1 | Printed on container box |
| Drain hose |  L140 | 1 | For main unit + PVC pipe joints |
| Hose band |  | 2 | For drain hose connection |

**Table 1-6 (Concealed-Duct)**

| Part name | Figure | Q'ty | Remarks |
|---|---|---|---|
| Washer |  | 8 | For suspending indoor unit from ceiling |
| Flare insulator |  | 2 | For gas and liquid tubes |
| Insulating tape |  | 2 | For gas and liquid tubes flare nuts |
| Drain insulator |  | 1 | For drain hose joint |
| Hose band |  | 1 | For securing drain hose |
| Packing |  | 1 | For drain joint |
| Drain hose |  | 1 | |
| Sealing putty |  | 1 | For sealing recessed portion of power supply |
| Vinyl clamp |  | 8 | For flare and drain insulators |
| Booster cable* |  | 1 | Connector for changeover to HT tap. |

* Booster cable is housed inside the electrical component box.

- Use M10 or 3/8" for suspending bolts.
- Field supply for suspending bolts and nuts.

**Table 1-7 (Concealed-Duct High Static Pressure)**

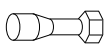
| Part name | Figure | Q'ty | Remarks |
|---|---|---|---|
| Special washer |  | 8 | For suspending indoor unit from ceiling |
| Flare insulator |  | 2 | For gas and liquid tubes |
| Drain socket |  | 1 | For drain pipe connection |
| Tube connector |  | 1 | For increasing size of liquid tube from ø6.35 to ø9.52 mm (only for 24 type) |

**Table 1-8 (Floor-Standing & Concealed Floor-Standing)**

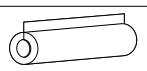
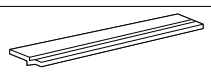
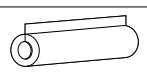
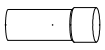
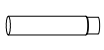
| Part name | Figure | Q'ty | Remarks |
|---|---|---|---|
| Connection pipe |  | 1 | For connecting gas tubes |
| Flare insulator |  | 2 | For gas and liquid tubes |
| Insulating tape |  (White) | 2 | For gas and liquid tube flare nuts |
| Insulating tape |  (Black) | 2 | For gas and liquid tubes |
| Vinyl clamp |  | 7 | For ends of flare insulator |
| Insulating tape (black and long) |  | 1 | For drain pipe |
| Drain insulator |  | 1 | For drain hose joint |

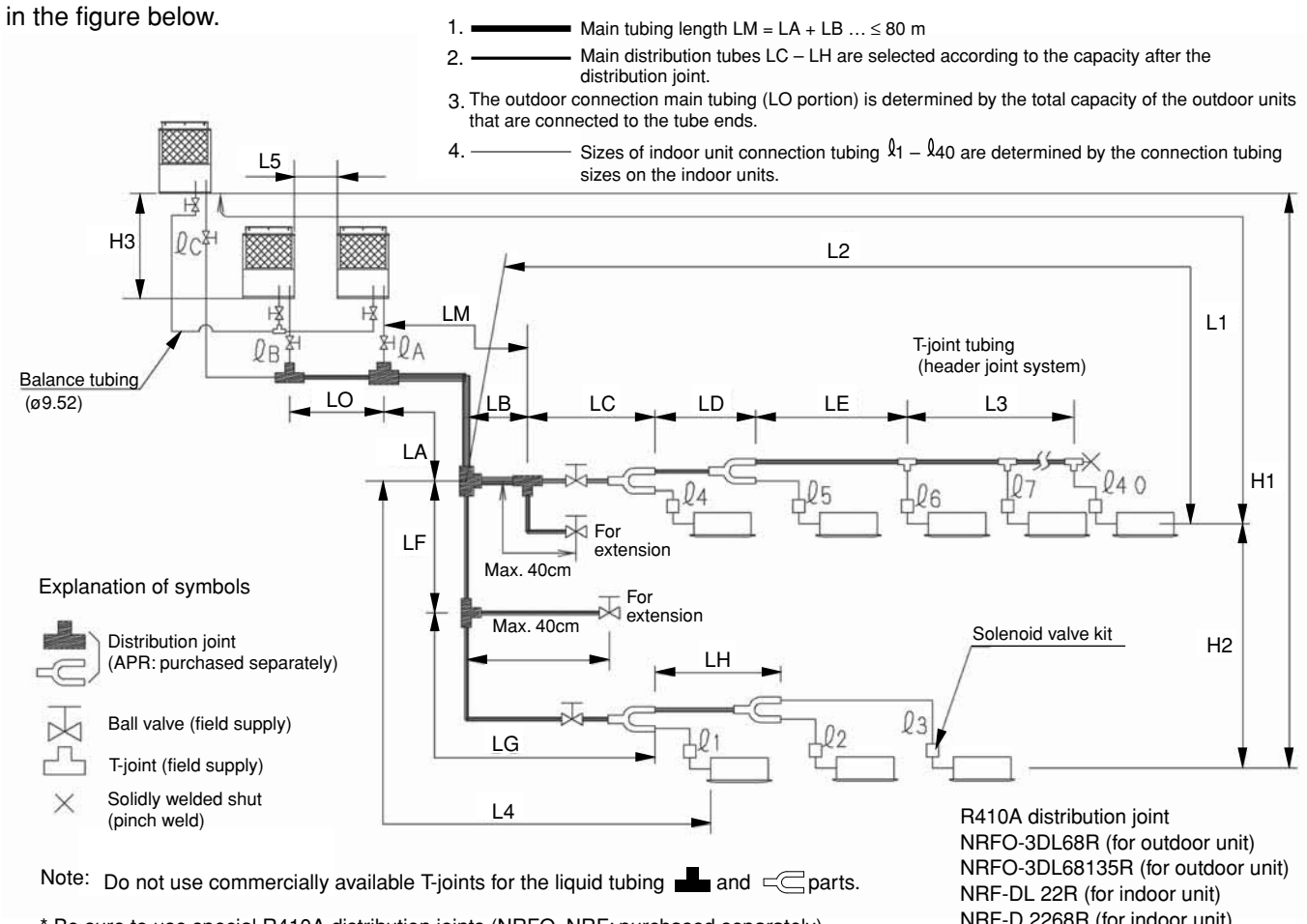
**Table 1-9 (Outdoor Unit)**

| Part name | Figure | Q'ty | | | | |
|---|---|---|---|---|---|---|
| | | 80 Model (8 hp) | 100 Model (10 hp) | 120 Model (12 hp) | 140 Model (14 hp) | 160 Model (16 hp) |
| Connection tubing | Outer diameter ø28.58  Inner diameter ø25.4 | 0 | 0 | 0 | 0 | 1 |
| | Outer diameter ø25.4  Inner diameter ø19.05 | 0 | 0 | 1 | 0 | 0 |
| | Outer diameter ø22.22  Inner diameter ø19.05 | 0 | 1 | 0 | 1 | 1 |
| | Outer diameter ø19.05  Inner diameter ø15.88 | 0 | 1 | 1 | 0 | 0 |
| | Outer diameter ø12.7  Inner diameter ø9.52 | 0 | 0 | 1 | 0 | 0 |

(hp = horse power)

### 1-5. Tubing Length

Select the installation location so that the length and size of refrigerant tubing are within the allowable range shown in the figure below.




R410A distribution joint
NRFO-3DL68R (for outdoor unit)
NRFO-3DL68135R (for outdoor unit)
NRF-DL 22R (for indoor unit)
NRF-D 2268R (for indoor unit)
NRF-D68135R (for indoor unit)

Note: Do not use commercially available T-joints for the liquid tubing and parts.

* Be sure to use special R410A distribution joints (NRFO, NRF: purchased separately) for outdoor unit connections and tubing branches.

**Table 1-10 Ranges that Apply to Refrigerant Tubing Lengths and to Differences in Installation Heights**

| Item | Mark | Contents | | Length (m) |
|---|---|---|---|---|
| Allowable tubing length | L1 | Max. tubing length | Actual length | ≤ 150 |
| | | | Equivalent length | ≤ 175 |
| | ΔL (L2 – L4) | Difference between max. length and min. length from the No.1 distribution joint | | ≤ 40 |
| | LM | Max. length of main tubing (at max. diameter) | | ≤ 80 *3 |
| | ℓ1, ℓ2~ℓ40 | Max. length of each distribution tube | | ≤ 30 |
| | L1+ℓ1+ℓ2 ~ ℓ39 + ℓA+ℓB+LF+LG+LH | Total max. tubing length including length of each distribution tube (only liquid tubing) | | ≤ 300 |
| | L5 | Distance between outdoor units | | ≤ 10 |
| Allowable elevation difference | H1 | When outdoor unit is installed higher than indoor unit | | ≤ 50 |
| | | When outdoor unit is installed lower than indoor unit | | ≤ 40 |
| | H2 | Max. difference between indoor units | | ≤ 15 |
| | H3 | Max. difference between outdoor units | | ≤ 4 |
| Allowable length of joint tubing | L3 | T-joint tubing (field-supply); Max. tubing length between the first T-joint and solidly welded-shut end point | | ≤ 2 |

L = Length, H = Height

**NOTE**

1: The outdoor connection main tubing (LO portion) is determined by the total capacity of the outdoor units that are connected to the tube ends.
2: If the longest tubing length (L1) exceeds 90 m (equivalent length), increase the sizes of the main tubes (LM) by 1 rank for the discharge tubes, suction tubes, and liquid tubes. (Use a field supply reducer.)
3: If the longest main tube length (LM) exceeds 50 m, increase the main tube size at the portion before 50 m by 1 rank for the suction tubes and discharge tubes. (Use a field supply reducer.)
(For the portion that exceeds 50 m, set based on the main tube sizes (LA) listed in the table on the following page.)

## 1-6. Tubing Size

### Table 1-11 Main Tubing Size (LA)

Unit: mm

| kW | 22.4 | 28.0 | 33.5 | 40.0 | 45.0 | 50.4 | 56.0 | 61.5 | 68.0 | 73.0 | 78.5 | 85.0 | 90.0 | 96.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total system horsepower | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 |
| Combined outdoor units | 8 | 10 | 12 | 14 | 16 | 10<br>8 | 10<br>10 | 12<br>10 | 14<br>10 | 16<br>10 | 16<br>12 | 16<br>14 | 16<br>16 | 14<br>10<br>10 |
| Suction tubing (mm) | ø19.05 | ø22.22 | ø25.40 | | ø28.58 | ø28.58 | | | | ø31.75 | | | | |
| Discharge tubing (mm) | ø15.88 | ø19.05 | | ø22.22 | | | ø25.40 | | | | ø28.58 | | | |
| Liquid tubing (mm) | ø9.52 | | ø12.70 | | | ø15.88 | | | | ø19.05 | | | | |

| kW | 101.0 | 106.5 | 113.0 | 118.0 | 123.5 | 130.0 | 135.0 |
|---|---|---|---|---|---|---|---|
| Total system horsepower | 36 | 38 | 40 | 42 | 44 | 46 | 48 |
| Combined outdoor units | 16<br>10<br>10 | 16<br>12<br>10 | 16<br>14<br>10 | 16<br>16<br>10 | 16<br>16<br>12 | 16<br>16<br>14 | 16<br>16<br>16 |
| Suction tubing (mm) | ø38.10 | | | | | | |
| Discharge tubing (mm) | ø28.58 | ø31.75 | | | | | |
| Liquid tubing (mm) | ø19.05 | | | | | | |

*1: If future extension is planned, select the tubing diameter based on the total horsepower after extension.
However extension is not possible if the resulting tubing size is two ranks higher.
*2: The balance tube (outdoor unit tube) diameter is ø9.52.
*3: Type 1 tubing should be used for the refrigerant tubes.
*4: If the length of the longest tube (L1) exceeds 90 m (equivalent length), increase the main tube (LM) size by 1 rank for the suction, discharge, and liquid tubes. (Use field-supply reducers.) (Select from Table 1-11 and Table 1-16.)
*5: If the longest main tube length (LM) exceeds 50 m, increase the main tube size at the portion before 50 m by 1 rank for the suction tubes and discharge tubes.
(For the portion that exceeds 50 m, set based on the main tube sizes (LA) listed in the table above.)

### ■ Size of tubing (LO) between outdoor units

Select the size of tubing between outdoor units based on the main tubing size (LA) as given in the table above.

### Table 1-12 Main Tubing Size After Distribution (LB, LC...)

Unit: mm
hp = horsepower

| Total capacity after distribution | Below kW / Over kW | 7.1 (2.5 hp) / – | 16.0 (6 hp) / 7.1 (2.5 hp) | 25.0 (9 hp) / 16.0 (6 hp) | 30.0 (11 hp) / 25.0 (9 hp) | 36.4 (13 hp) / 30.0 (11 hp) | 42.0 (15 hp) / 36.4 (13 hp) | 47.6 (17 hp) / 42.0 (15 hp) | 58.8 (21 hp) / 47.6 (17 hp) | 70.0 (25 hp) / 58.8 (21 hp) |
|---|---|---|---|---|---|---|---|---|---|---|
| Tubing size | Suction tubing (mm) | ø15.88 | ø19.05 | ø19.05 | ø22.22 | ø25.40 | ø25.40 | ø28.58 | ø28.58 | ø28.58 |
| | Discharge tubing (mm) | ø12.70 | ø15.88 | ø15.88 | ø19.05 | ø19.05 | ø22.22 | ø22.22 | ø22.22 | ø25.40 |
| | Liquid tubing (mm) | ø9.52 | ø9.52 | ø9.52 | ø9.52 | ø12.70 | ø12.70 | ø12.70 | ø15.88 | ø15.88 |

| Total capacity after distribution | Below kW / Over kW | 75.6 (27 hp) / 70.0 (25 hp) | 98.0 (35 hp) / 75.6 (27 hp) | 103.6 (37 hp) / 98.0 (35 hp) | – / 103.6 (37 hp) |
|---|---|---|---|---|---|
| Tubing size | Suction tubing (mm) | ø31.75 | ø31.75 | ø38.10 | ø38.10 |
| | Discharge tubing (mm) | ø25.40 | ø28.58 | ø28.58 | ø31.75 |
| | Liquid tubing (mm) | ø19.05 | ø19.05 | ø19.05 | ø19.05 |

*1: The outdoor unit connection tubing (LO) is determined by the total capacity of the outdoor units connected to the tube ends. The tubing size is selected based on the table of main tube sizes after the branch.
*2: If the total capacity of the indoor units connected to the tube ends is different from the total capacity of the outdoor units, then the main tube size is selected based on the total capacity of the outdoor units.
(For LA, LB, and LF in particular)

### Table 1-13 Outdoor Unit Tubing Connection Size ($\ell_A - \ell_C$)

| kW | 22.4 | 28.0 | 33.5 | 40.0 | 45.0 |
|---|---|---|---|---|---|
| Suction tubing | ø19.05 | ø22.22 | ø25.4 | | ø28.58 |
| | Brazing connection | | | | |
| Discharge tubing | ø15.88 | ø19.05 | | ø22.22 | |
| | Brazing connection | | | | |
| Liquid tubing | ø9.52 | | ø12.7 | | |
| | Brazing connection | | | | |
| Balance tubing | ø9.52 | | | | |
| | Flare connection | | | | |

Unit: mm

**Table 1-14 Indoor Unit Tubing Connection Size ($\ell_1 - \ell_{40}$)**

| Indoor unit type | | 7 | 9 | 12 | 18 | 25 | 36 | 48 | 60 | 76 *1 | 96 *1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total system horsepower | | 0.8 | 1 | 1.3 | 2 | 3 | 4 | 5 | 6 | 8 | 10 |
| Distribution joint – solenoid valve kit tubing | Suction tubing (mm) | ø15.88 | | | | | | | | ø19.05 | ø22.22 |
| | Discharge tubing (mm) | ø12.70 | | | | | | | | ø15.88 | ø19.05 |
| | Liquid tubing (mm) | ø9.52 | | | | | | | | | |
| Solenoid valve kit – Indoor unit tubing connection | Gas tubing (mm) | ø12.70 | | | | ø15.88 | | | | ø19.05 | ø22.22 |
| | Liquid tubing (mm) | ø6.35 | | | | ø9.52 | | | | | |

*1: For the solenoid valve kits, use NK3V 2548R with parallel specifications. Branch the tubing before and after the solenoid valve kits.

### 1-7. Straight Equivalent Length of Joints

Design the tubing system by referring to the following table for the straight equivalent length of joints.

**Table 1-15 Straight Equivalent Length of Joints**

| Gas tubing size (mm) | 12.7 | 15.88 | 19.05 | 22.22 | 25.4 | 28.58 | 31.8 | 38.1 |
|---|---|---|---|---|---|---|---|---|
| 90° elbow | 0.30 | 0.35 | 0.42 | 0.48 | 0.52 | 0.57 | 0.70 | 0.79 |
| 45° elbow | 0.23 | 0.26 | 0.32 | 0.36 | 0.39 | 0.43 | 0.53 | 0.59 |
| U-shape tube bent (R60–100 mm) | 0.90 | 1.05 | 1.26 | 1.44 | 1.56 | 1.71 | 2.10 | 2.37 |
| Trap bend | 2.30 | 2.80 | 3.20 | 3.80 | 4.30 | 4.70 | 5.00 | 5.80 |
| Y-branch distribution joint | Equivalent length conversion not needed. | | | | | | | |
| Ball valve for service | Equivalent length conversion not needed. | | | | | | | |

**Table 1-16 Refrigerant tubing (Existing tubing can be used.)**

| Tubing size (mm) | | | |
|---|---|---|---|
| Material O | | Material 1/2H • H | |
| ø6.35 | t0.8 | ø25.40 | t1.0 |
| ø9.52 | t0.8 | ø28.58 | t1.0 |
| ø12.7 | t0.8 | ø31.75 | t1.1 |
| ø15.88 | t1.0 | ø38.10 | t1.15 |
| ø19.05 | t1.0 | ø41.28 | t1.20 |
| ø22.22 | t1.15 | | |

* When bending the tubes, use a bending radius that is at least 4 times the outer diameter of the tubes.
In addition, take sufficient care to avoid crushing or damaging the tubes when bending them.

### 1-8. Additional Refrigerant Charge

Additional refrigerant charge amount is calculated below.

Required amount of additional refigerant charge = [(Amount of additional refrigerant charge per meter of each size of liquid tube × its tube length) + (...) + (...)] + [(Necessary amount of additional refrigerant charge per outdoor unit + (...) + (...)]

*Always charge accurately using a scale for weighing.

**Table 1-17-1 Amount of Additional Refrigerant Charge Per Meter, According to Liquid Tubing Size**

| Liquid tubing size | 6.35 | 9.52 | 12.7 | 15.88 | 19.05 | 22.22 |
|---|---|---|---|---|---|---|
| Amount of additional refrigerant charge/m (g/m) | 26 | 56 | 128 | 185 | 259 | 366 |

**Table 1-17-2 Necessary Amount of Additional Refrigerant Charge Per Outdoor Unit**

| EFL 80-3R | EFL 100-3R | EFL 120-3R | EFL 140-3R | EFL 160-3R |
|---|---|---|---|---|
| — | — | — | 3.2 kg | 3.2 kg |

**Table 1-18 Refrigerant Charge Amount at Shipment (for Outdoor Unit)**

| EFL 80-3R | EFL 100-3R | EFL 120-3R | EFL 140-3R | EFL 160-3R |
|---|---|---|---|---|
| 11.8 kg | 11.8 kg | 11.8 kg | 11.8 kg | 11.8 kg |

## 1-9. System Limitations

**Table 1-19 System Limitations**

| | |
|---|---|
| Max. No. allowable connected outdoor units | 3 *2 |
| Max. capacity allowable connected outdoor units | 135 kW (48 hp) |
| Max. connectable indoor units | 40 *1 |
| Max. allowable indoor/outdoor capacity ratio | 50 – 130 % |

*1: In the case of 22 hp (type 61.5 kW) or smaller units, the number is limited by the total capacity of the connected indoor units.

*2: Up to 4 units can be connected if the system has been extended. However, the following combinations are not possible.

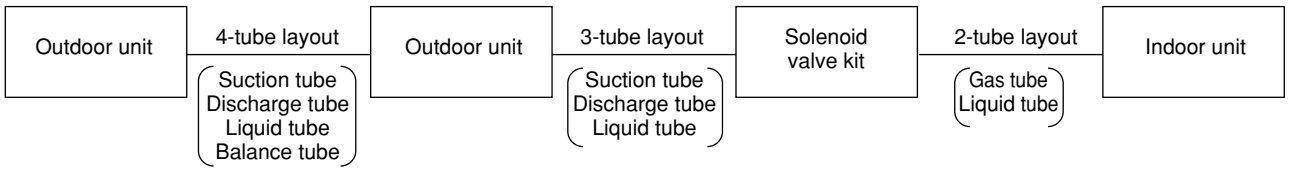
44 hp (14+14+8+8)

46 hp (16+14+8+8, 16+12+10+8, 16+10+10+10, 14+14+10+8)

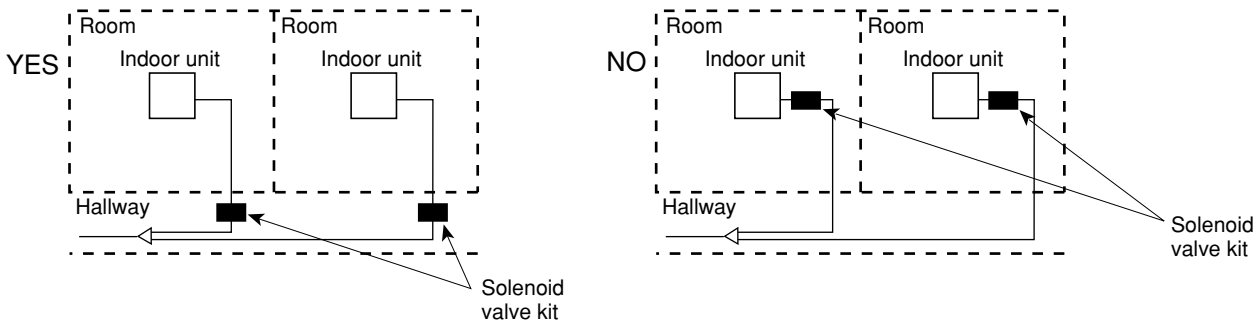
48 hp (16+16+8+8, 16+14+10+8, 16+12+12+8, 16+12+10+10, 14+14+12+8, 14+14+10+10)

## 1-10. Installation Standards

### Relationship between A/C units and refrigerant tubing




- Install the solenoid valve kit 30 m or less from the indoor unit.
- In quiet locations such as hospitals, libraries, and hotel rooms, the refrigerant noise may be somewhat noticeable. It is recommended that the solenoid valve kit be installed inside the corridor ceiling, at a location outside the room.




### Common solenoid valve kit

- Multiple indoor units under group control can utilize a solenoid valve kit in common.
- Categories of connected indoor unit capacities are determined by the solenoid valve kit.

| Type of solenoid valve kit | Total capacity of indoor units (kW) |
|---|---|
| NK3V 2548R | 5.6 < Total capacity ≤ 16.0 |
| NK3V 718R | 2.2 ≤ Total capacity ≤ 5.6 |

- If the capacity range is exceeded, use 2 solenoid valves connected in parallel.

**WARNING** **Always check the gas density limit for the room in which the unit is installed.**

### 1-11. Check of Limit Density

When installing an air conditioner in a room, it is necessary to ensure that even if the refrigerant gas accidentally leaks out, its density does not exceed the limit level for that room.
If the density could exceed the limit level, it is necessary to provide an opening between the unit and the adjacent room, or to install mechanical ventilation which is interlocked with a leak detector.

$$\frac{\text{(Total refrigerant charged amount: kg)}}{\text{(Min. indoor volume where the indoor unit is installed: m}^3\text{)}} \leq \text{Limit density 0.3 (kg/m}^3\text{)}$$

The limit density of refrigerant which is used in this unit is 0.3 kg/m$^3$ (ISO 5149).

The shipped outdoor unit comes charged with the amount of refrigerant fixed for each type, so add it to the amount that is charged in the field. (For the refrigerant charge amount at shipment, refer to the unit's nameplate.)

### 1-12. Installing Distribution Joint

**CAUTION** **Pay special attention to any location, such as a basement, etc., where leaking refrigerant can accumulate, since refrigerant gas is heavier than air.**

(1) Refer to "HOW TO ATTACH DISTRIBUTION JOINT" enclosed with the optional distribution joint kit (NRFO-3DL68R, NRFO-3DL68135R, NRF-DL 22R, NRF-D 2268R, NRF-D68135R).

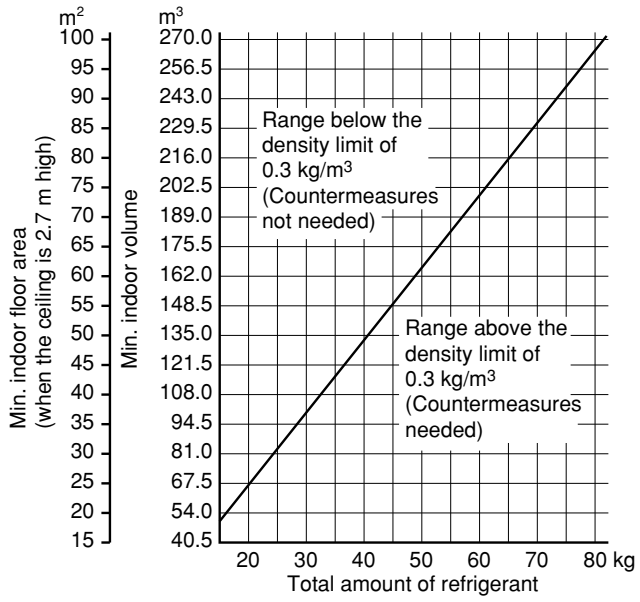
(2) When creating a branch using a commercially available T-joint (header joint system), orient the main tubing so that it is either horizontal (level) or vertical. In order to prevent accumulation of refrigerant oil in stopped units, if the main tubing is horizontal then each branch tubing length should be at an angle that is greater than horizontal. If the main tubing is vertical, provide a raised starting portion for each branch.

**[Header joint system]**

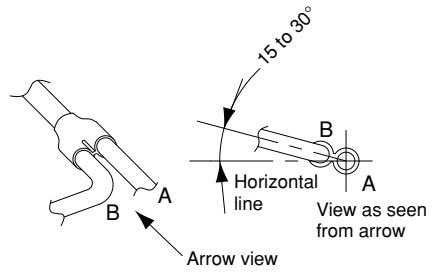
- Be sure to solidly weld shut the T-joint end (marked by "X" in the figure). In addition, pay attention to the insertion depth of each connected tube so that the flow of refrigerant within the T-joint is not impeded.
- When using the header joint system, do not make further branches in the tubing.
- Do not use the header joint system on the outdoor unit side.

(3) If there are height differences between indoor units or if branch tubing that follows a distribution joint is connected to only 1 unit, a trap or ball valve must be added to that distribution joint. (When adding the ball valve, locate it within 40 cm of the distribution joint.) **If a trap or ball valve is not added, do not operate the system before repairs to a malfunctioning unit are completed. (The refrigerant oil sent through the tubing to the malfunctioning unit will accumulate and may damage the compressor.)**

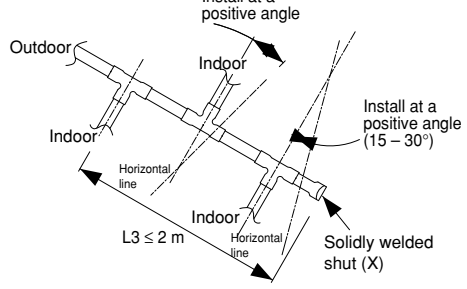
Minimum indoor volume & floor area as against the amount of refrigerant is roughly as given in the following table.




**Tube branching methods** (horizontal use)

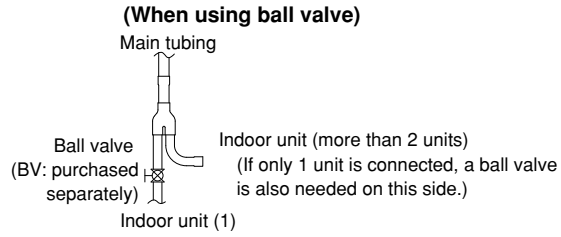



**Header joint system (Indoor)**

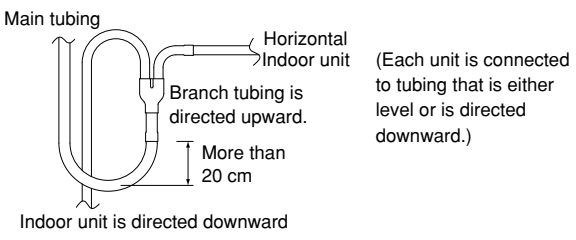



Types of vertical trap specifications

**(When using ball valve)**




**(When not using ball valve)**



### 1-13. Optional Distribution Joint Kits

See the installation instructions packaged with the distribution joint kit for the installation procedure.

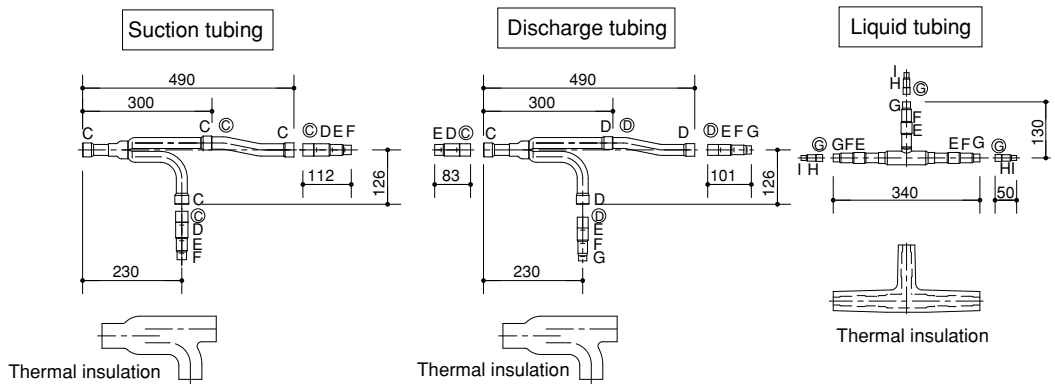
**Table 1-20**

| Model name | Cooling capacity after distribution | Remarks |
|---|---|---|
| 1. NRFO-3DL68R | 68.0 kW or less | For outdoor unit |
| 2. NRFO-3DL68135R | 135.0 kW or less | For outdoor unit |
| 3. NRF-DL22R | 22.4 kW or less | For indoor unit |
| 4. NRF-D2268R | 68.0 kW or less | For indoor unit |
| 5. NRF-D68135R | 135.0 kW or less | For indoor unit |

**■ Tubing size (with thermal insulation)**

1. NRFO-3DL68R
   For outdoor unit (Capacity after distribution joint is 68.0 kW or less.)

Example: (C below indicates inner diameter. Ⓒ below indicates outer diameter.)



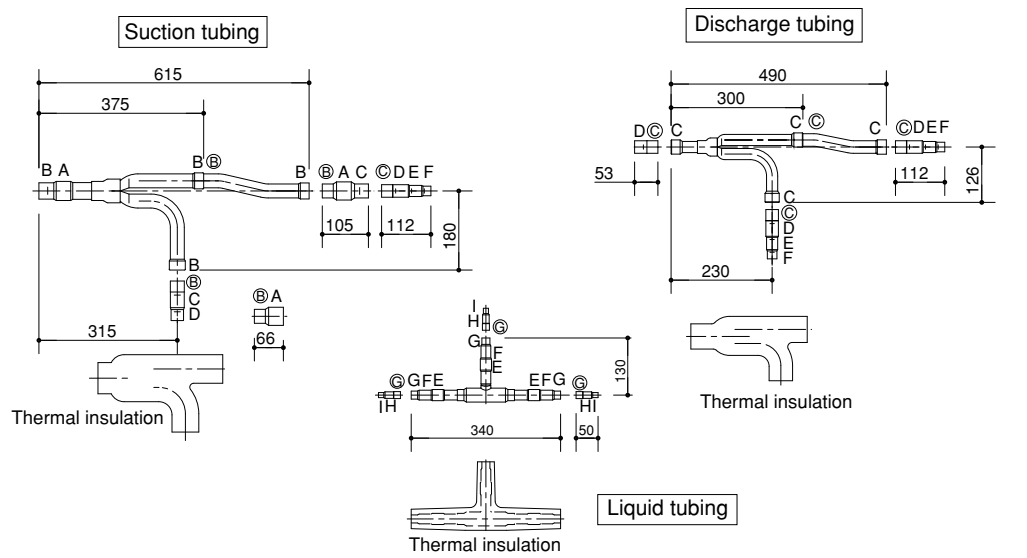

Unit: mm

**Table 1-21 Dimensions for connections of each part**

| Position | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| Dimension | – | – | ø28.58 | ø25.4 | ø22.22 | ø19.05 | ø15.88 | ø12.7 | ø9.52 | – |

2. NRFO-3DL68135R
   For outdoor unit (Capacity after distribution joint is greater than 68.0 kW and no more than 135.0 kW.)

Example: (C below indicates inner diameter. Ⓒ below indicates outer diameter.)




Unit: mm

**Table 1-22 Dimensions for connections of each part**

| Position | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| Dimension | ø38.1 | ø31.75 | ø28.58 | ø25.4 | ø22.22 | ø19.05 | ø15.88 | ø12.7 | ø9.52 | – |

**Table 1-23 Dimensions for connections of each part**

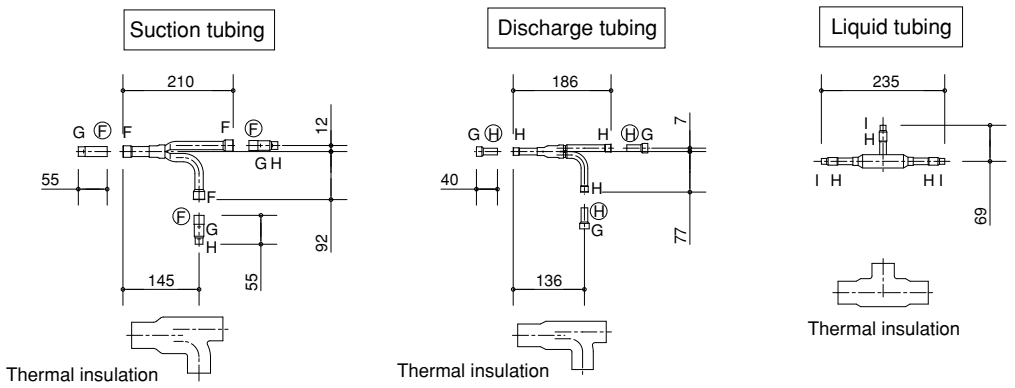
Unit: mm

| Position | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| Dimension | ø38.1 | ø31.75 | ø28.58 | ø25.4 | ø22.22 | ø19.05 | ø15.88 | ø12.7 | ø9.52 | – |

3. NRF-DL22R

Use: For indoor unit (Capacity after distribution joint is 22.4 kW or less.)

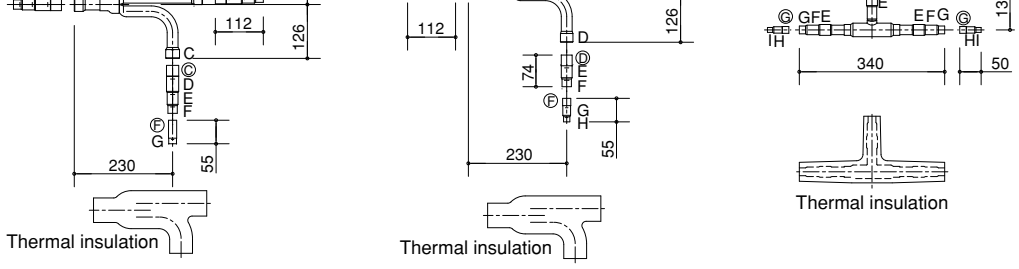
Example: (F below indicates inner diameter. Ⓕ below indicates outer diameter.)




4. NRF-D2268R

Use: For indoor unit (Capacity after distribution joint is greater than 22.4 kW and no more than 68.0 kW.)

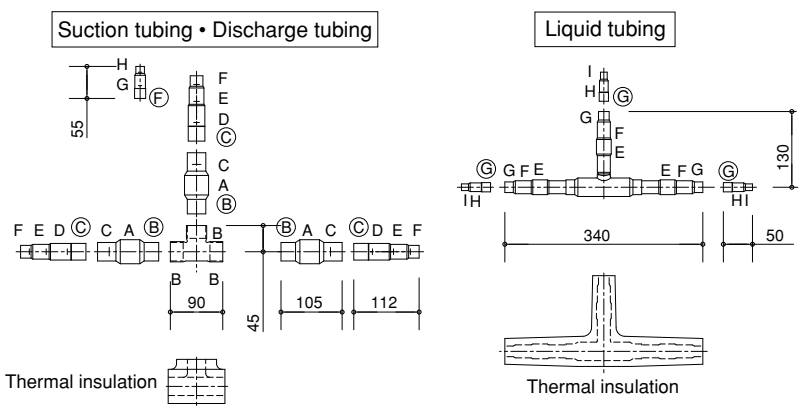
Example: (C below indicates inner diameter. Ⓒ below indicates outer diameter.)




5. NRF-D68135R

Use: For indoor unit (Capacity after distribution joint is greater than 68.0 kW and no more than 135.0 kW.)

Example: (B below indicates inner diameter. Ⓑ below indicates outer diameter.)

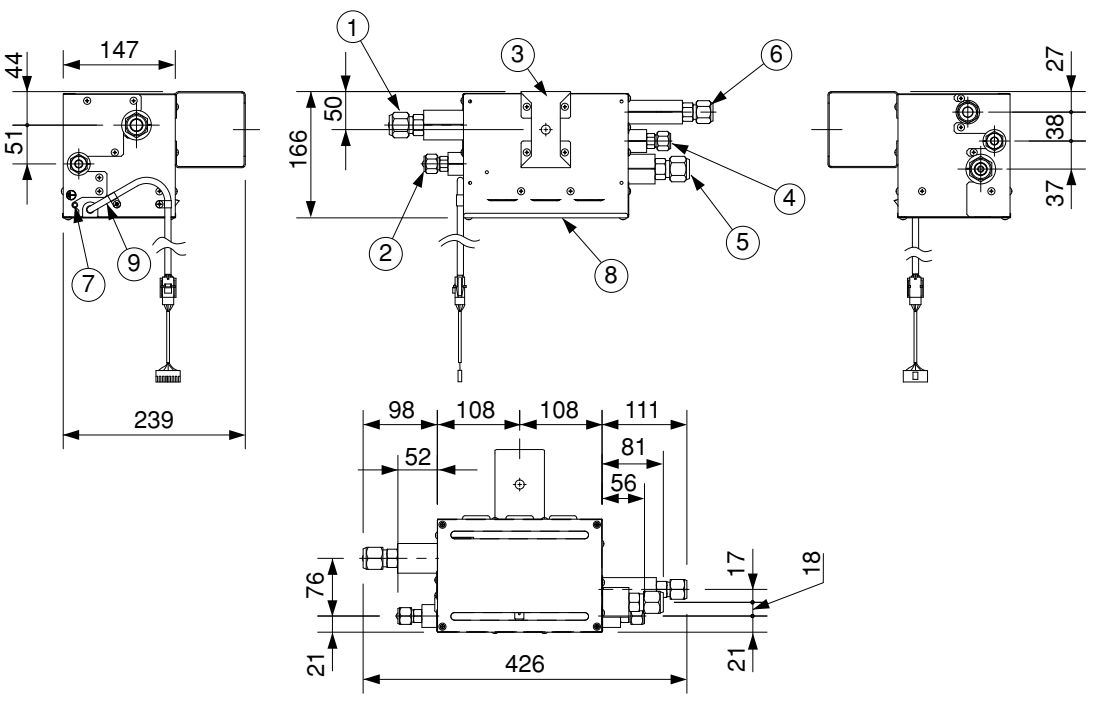


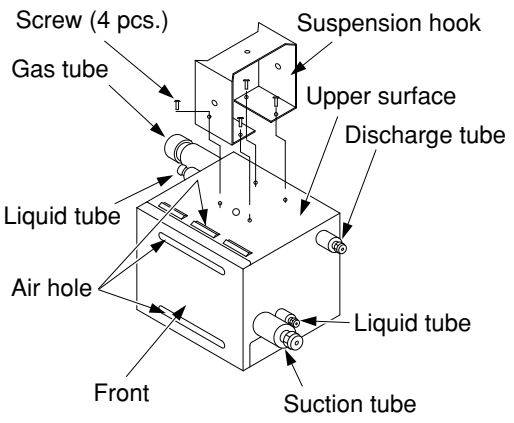
### 1-14. Optional Solenoid Valve Kit

| NK3V 718R | |
|---|---|
| **Part number** | **Types and specifications of tubing connections** |
| ① | Gas tube: ø12.7 |
| ② | Liquid tube: ø6.35 |
| ③ | Suspension hook |
| ④ | Liquid tube: ø9.52 |
| ⑤ | Suction tube: ø15.88 |
| ⑥ | Discharge tube: ø12.7 |
| ⑦ | Earth (M5 with washer) |
| ⑧ | Service panel |
| ⑨ | Power outlet (connected to a 5 m cabtyre cable with connector) |

• **Specifications**

| NK3V 718R | |
|---|---|
| Compatibility | 2.2 ≤ Total capacity of indoor units (kW) ≤ 5.6 |
| Power source | Single-phase 200V 50/60Hz (supplied by indoor unit) |
| Power input | 20 W |
| Net weight | 4.3 kg |
| Accessories | Flat washer × 2<br>Insulating tape<br>PCB connector × 1 |

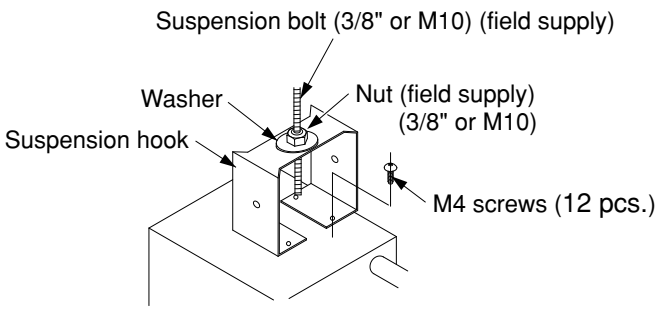




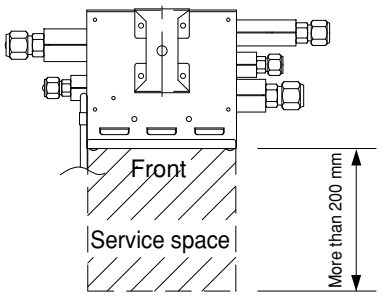

**NOTE**

**Notes on Installation**

- Be sure to secure the valve body by using its structure with the suspension bolt, etc.
- Install the valve body within a distance of 30 m from the indoor unit.
  Some refrigerant noise will be produced. Therefore in hospitals, libraries, hotel guest rooms, and other quiet locations, it is recommended that the solenoid valve kit be installed on the ceiling reverse side of a hallway or another location separated from the room.
- When installing the valve body, install with the top surface facing up. Secure 200 mm or more of space to the front so that the front service panel can be removed.
- If the supplied suspension hook will not be used, and other fastening devices will be attached in the field, use the 4 screw holes on the top surface. DO NOT use any long screws other than the supplied screws. Use of other screws may puncture the internal tubing, resulting in refrigerant leakage.
- Do not block the air holes.



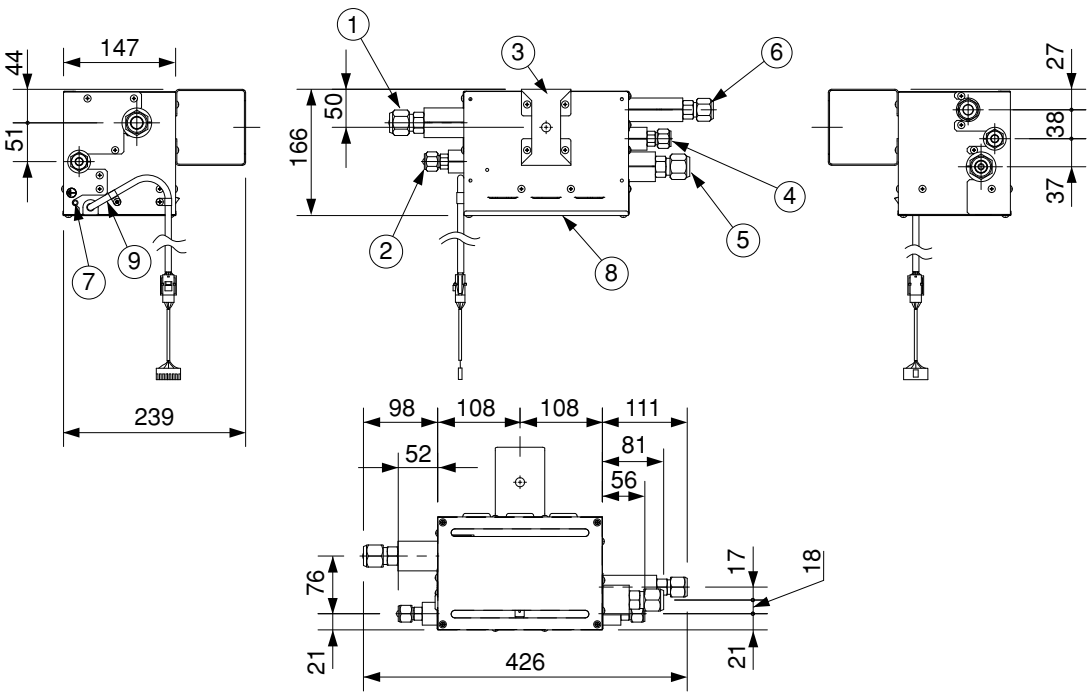

How to use suspension hook

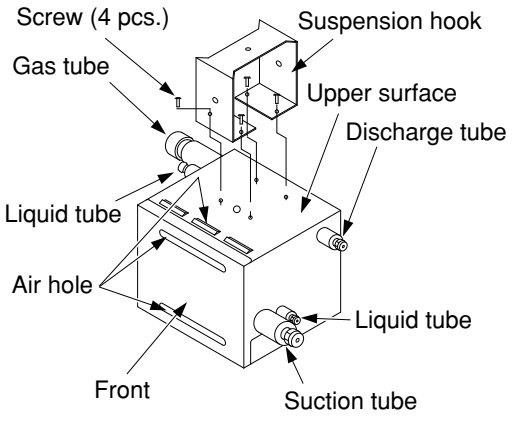


| NK3V 2548R | |
|---|---|
| **Part number** | **Types and specifications of tubing connections** |
| ① | Gas tube: ø15.88 |
| ② | Liquid tube: ø9.52 |
| ③ | Suspension hook |
| ④ | Liquid tube: ø9.52 |
| ⑤ | Suction tube: ø15.88 |
| ⑥ | Discharge tube: ø12.7 |
| ⑦ | Earth (M5 with washer) |
| ⑧ | Service panel |
| ⑨ | Power outlet (connected to a 5 m cabtyre cable with connector) |

**• Specifications**

| NK3V 2548R | |
|---|---|
| Compatibility | 5.6 < Total capacity of indoor units (kW) ≤ 16.0 |
| Power source | Single-phase 200V 50/60Hz (supplied by indoor unit) |
| Power input | 25 W |
| Net weight | 4.7 kg |
| Accessories | Washer × 2<br>Insulating tape<br>PCB connector × 1 |

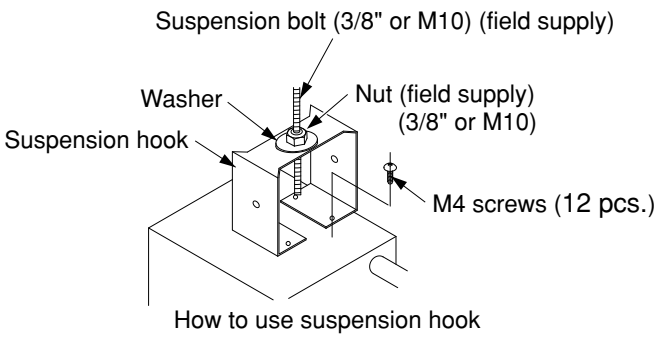




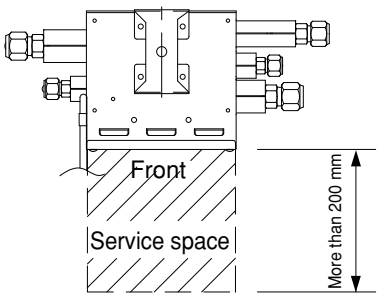

**NOTE**

**Notes on Installation**

- Be sure to secure the valve body by using its structure with the suspension bolt, etc.
- Install the valve body within a distance of 30 m from the indoor unit.
  Some refrigerant noise will be produced. Therefore in hospitals, libraries, hotel guest rooms, and other quiet locations, it is recommended that the solenoid valve kit be installed on the ceiling reverse side of a hallway or another location separated from the room.
- When installing the valve body, install with the top surface facing up. Secure 200 mm or more of space to the front so that the front service panel can be removed.
- If the supplied suspension hook will not be used, and other fastening devices will be attached in the field, use the 4 screw holes on the top surface. DO NOT use any long screws other than the supplied screws. Use of other screws may puncture the internal tubing, resulting in refrigerant leakage.
- Do not block the air holes.




How to use suspension hook



### 1-15. Example of Tubing Size Selection and Refrigerant Charge Amount

**Additional refrigerant charging**

Based on the values in Tables 1-11, 12, 13, 14, 17-1 and 17-2, use the liquid tubing size and length, and calculate the amount of additional refrigerant charge using the formula below.

Required additional refrigerant charge (kg) = $[366 \times (a) + 259 \times (b) + 185 \times (c) + 128 \times (d) + 56 \times (e) + 26 \times (f)] \times 10^{-3}$ + Necessary amount of additional refrigerant charge per outdoor unit

(a) : Liquid tubing Total length of ø22.22 (m)
(b) : Liquid tubing Total length of ø19.05 (m)
(c) : Liquid tubing Total length of ø15.88 (m)
(d) : Liquid tubing Total length of ø12.7 (m)
(e) : Liquid tubing Total length of ø9.52 (m)
(f) : Liquid tubing Total length of ø6.35 (m)

- Charging procedure

  Be sure to charge with R410A refrigerant **in liquid form**.

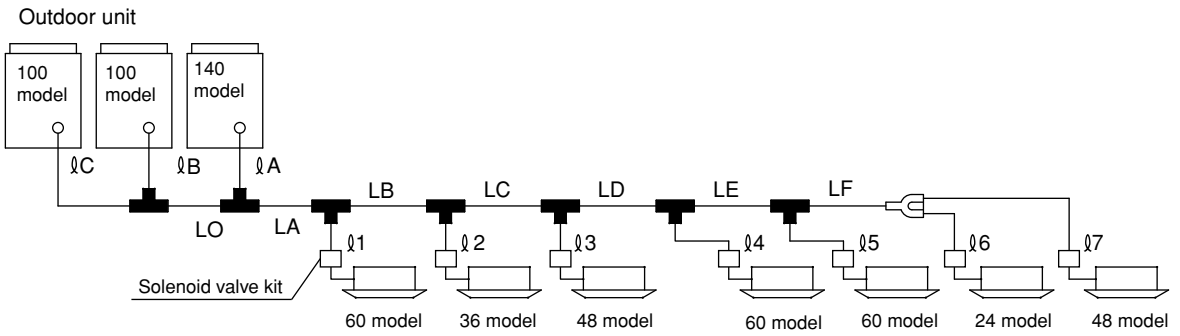
  1. After performing a vacuum, charge with refrigerant from the liquid tubing side. At this time, all valves must be in the “fully closed” position.
  2. If it was not possible to charge the designated amount, operate the system in Cooling mode while charging with refrigerant from the gas tubing side. (This is performed at the time of the test run. For this, all valves must be in the “fully open” position.)
     Charge with R410A refrigerant in liquid form.
     With R410A refrigerant, charge while adjusting the amount being fed a little at a time in order to prevent liquid refrigerant from backing up.

- After charging is completed, turn all valves to the “fully open” position.
- Replace the tubing covers as they were before.

**CAUTION**

1. **R410A additional charging absolutely must be done through liquid charging.**
2. **The R410A refrigerant cylinder has a gray base color, and the top part is pink.**
3. **The R410A refrigerant cylinder includes a siphon tube. Check that the siphon tube is present. (This is indicated on the label at the top of the cylinder.)**
4. **Due to differences in the refrigerant, pressure, and refrigerant oil involved in installation, it is not possible in some cases to use the same tools for R22 and for R410A.**

**Example:**




- Example of each tubing length

**Main tubing**

LO = 2 m
LA = 40 m
LB = 5 m
LC = 5 m
LD = 15 m
LE = 10 m
LF = 10 m

**Distribution joint tubing**

Outdoor side
ℓ A = 2 m
ℓ B = 2 m
ℓ C = 3 m

Indoor side
ℓ 1 = 30 m
ℓ 2 = 5 m
ℓ 3 = 5 m
ℓ 4 = 5 m
ℓ 5 = 2 m
ℓ 6 = 6 m
ℓ 7 = 5 m

● Obtain liquid tubing size from Tables 1-11, 12, 13, 14 and 17-1.

**Main tubing**

LO = ø15.88 m (Total capacity of outdoor unit is 56.0 kW)
LA = ø19.05 m (Total capacity of outdoor unit is 96.0 kW)
LB = ø19.05 m (Total capacity of indoor unit is 77.9 kW)
LC = ø15.88 m (Total capacity of indoor unit is 67.3 kW)
LD = ø15.88 m (Total capacity of indoor unit is 53.3 kW)
LE = ø12.7 m (Total capacity of indoor unit is 37.3 kW)
LF = ø9.52 m (Total capacity of indoor unit is 21.3 kW)

The longest main tubing length in this example (LM = 40 + 5 = 45 m)

**Distribution joint tubing**

| | | | | |
|---|---|---|---|---|
| Outdoor side | ℓA: ø12.7 | ℓB: ø9.52 | ℓC: ø9.52 | (from outdoor unit connection tubing) |
| Indoor side | ℓ1: ø9.52 | ℓ2: ø9.52 | ℓ3: ø9.52 | ℓ4: ø9.52 |
| | ℓ5: ø9.52 | ℓ6: ø9.52 | ℓ7: ø9.52 | (from indoor unit connection tubing) |

● Obtain additional charge amount.

Note 1:

The charge amounts per 1 meter are different for each liquid tubing size.

| | | |
|---|---|---|
| ø19.05 → LA + LB | : 45 m × 0.259 kg/m = | 11.655 |
| ø15.88 → LO + LC + LD | : 22 m × 0.185 kg/m = | 4.07 |
| ø12.7 → LE + ℓA | : 12 m × 0.128 kg/m = | 1.536 |
| ø9.52 → LF + ℓB – C + ℓ1 – 7 | : 73 m × 0.056 kg/m = | 4.088 |
| | Total | 21.349 kg |

Note 2:

Necessary amount of additional refrigerant charge per outdoor unit (EFL 140-3R) is 3.2kg. (See the Table 1-17-2.)

| | | |
|---|---|---|
| Note 1) | Amount of additional charge per tubing length: | 21.349 kg |
| Note 2) | Amount of additional charge per outdoor unit: | 3.2 kg |
| | Total of additional refrigerant charge amount: | 24.549 kg |

Therefore, the total of additional refrigerant charge amount reaches 24.549 kg.

● Obtain overall refrigerant charge amount.

Overall refrigerant charge amount of the system indicates the calculated value shown above the additional charge amount in addition to the total of the refrigerant charge amount (shown in the Table 1-18) at the shipment of each outdoor unit.

Refrigerant charge amount at shipment:

| | | |
|---|---|---|
| EFL 100-3R | : 11.8 | kg |
| EFL 100-3R | : 11.8 | kg |
| EFL 140-3R | : 11.8 | kg |
| Additional charge amount | : 24.549 | kg |
| Grand total | : 59.949 | kg |

Therefore, overall refrigerant charge amount of the system reaches 59.949 kg.

**CAUTION**

**Be sure to check the limit density for the room in which the indoor unit is installed.**

**Checking of limit density**

Density limit is determined on the basis of the size of a room using an indoor unit of minimum capacity. For instance, when an indoor unit is used in a room (floor area 15 $m^3$ × ceiling height 2.7 m = room volume 40.5 $m^3$), the graph at right shows that the minimum room volume should be 199.8 $m^3$ (floor area 74.0 $m^2$) for refrigerant of 59.949 kg. Accordingly, openings such as louvers are required for this room.

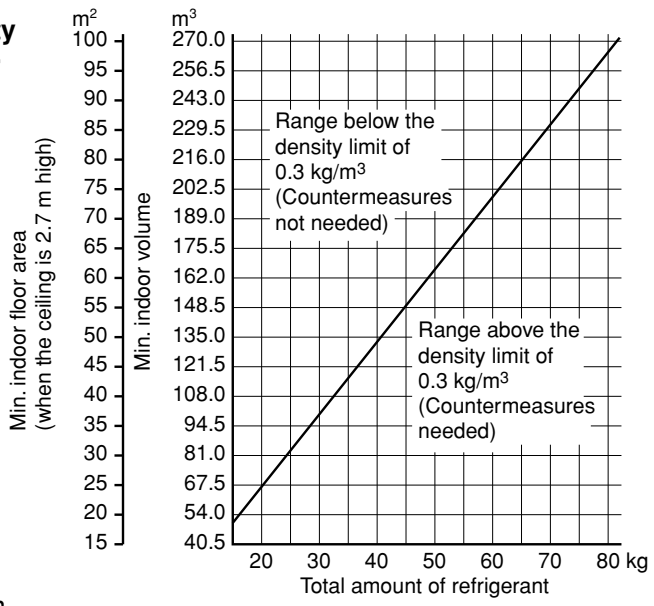
<Determination by calculation>

**Overall refrigerant charge amount for the air conditioner: kg**

**(Minimum room volume for indoor unit: $m^3$)**

$$= \frac{\textbf{59.949 (kg)}}{\textbf{40.5 (m}^3\textbf{)}} = \textbf{1.48 (kg/m}^3\textbf{)} \geq \textbf{0.3 (kg/m}^3\textbf{)}$$

Therefore, openings such as louvers are required for this room.



## 2. SELECTING THE INSTALLATION SITE

### 2-1. Indoor Unit

**AVOID:**

- areas where leakage of flammable gas may be expected.
- places where large amounts of oil mist exist.
- direct sunlight.
- locations near heat sources which may affect the performance of the unit.
- locations where external air may enter the room directly. This may cause “sweating” on the air discharge ports, causing them to spray or drip.
- locations where the remote controller will be splashed with water or affected by dampness or humidity.
- installing the remote controller behind curtains or furniture.
- locations where high-frequency emissions are generated.

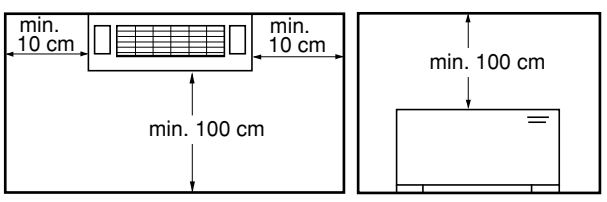
**DO:**

- select an appropriate position from which every corner of the room can be uniformly cooled.
- select a location where the ceiling is strong enough to support the weight of the unit.
- select a location where tubing and drain pipe have the shortest run to the outdoor unit.
- allow room for operation and maintenance as well as unrestricted air flow around the unit.
- install the unit within the maximum elevation difference above or below the outdoor unit and within a total tubing length (L) from the outdoor unit as detailed in Table 1-2.
- allow room for mounting the remote controller about 1 m off the floor, in an area that is not in direct sunlight nor in the flow of cool air from the indoor unit.

**NOTE**

Air delivery will be degraded if the distance from the floor to the ceiling is greater than 3 m (for NK1FL type, greater than 3.5 m).

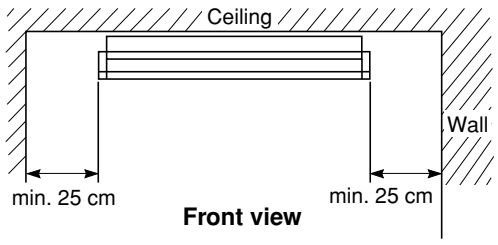
**Floor-Standing, Concealed Floor-Standing Type**




**Horizontal view** **Vertical view**

**Fig. 2-4**

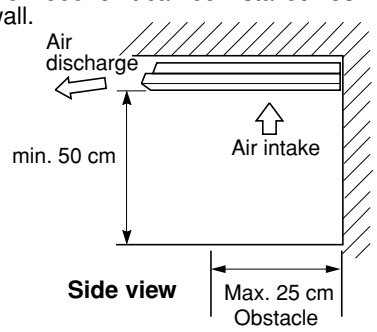
**Ceiling-Mounted Type**




**Front view**

**NOTE**

The rear of the indoor unit can be installed flush against the wall.




**Side view**

**Fig. 2-1**

**Concealed-Duct Type**
**2-Way, 4-Way Semi-Concealed Type**

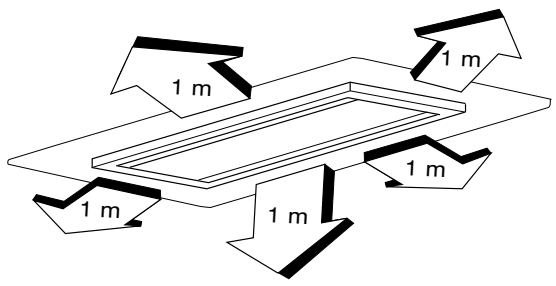
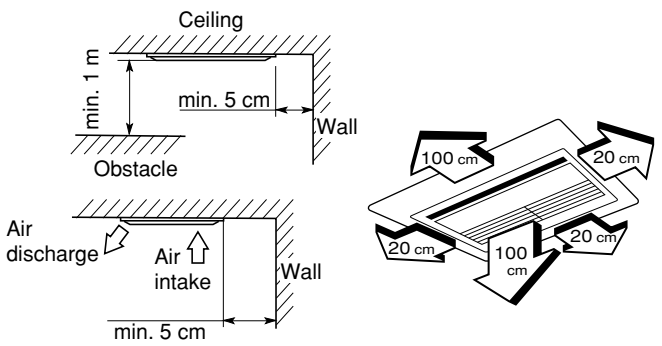



**Fig. 2-2**

**1-Way Semi-Concealed & Slim Type**

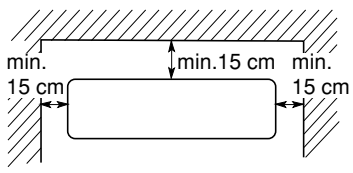
**Semi-Concealed Type** **Semi-Concealed Slim Type**




**Side view**

**Fig. 2-3**

**Wall-Mounted Type**




**Front View**

**Fig. 2-5**

### 2-2. Outdoor Unit

**AVOID:**

- heat sources, exhaust fans, etc.
- damp, humid or uneven locations
- indoors (no-ventilation location)

**DO:**

- choose a place as cool as possible.
- choose a place that is well ventilated.
- allow enough room around the unit for air intake/ exhaust and possible maintenance.

**Installation Space**

Install the outdoor unit where there is enough space for ventilation. Otherwise the unit may not operate properly. Fig. 2-7 shows the minimum space requirement around the outdoor units when 3 sides are open and only 1 side is shuttered, with open space above the unit. The mounting base should be concrete or a similar material that allows for adequate drainage. Make provisions for anchor bolts, platform height, and other site-specific installation requirements.

**CAUTION**

- **Leave space open above the unit.**
- **Construct louvers or other openings in the wall, if necessary, to ensure adequate ventilation.**

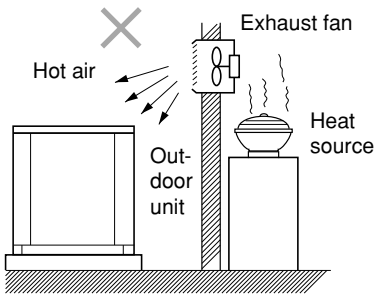
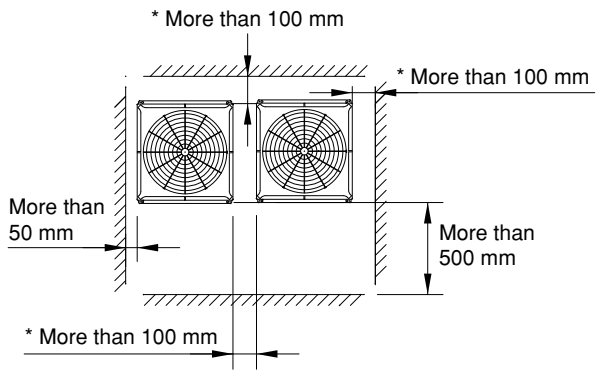



**Fig. 2-6**

Example of installation of 2 units
(When wall height is below 1800 mm)




* However, be sure to ensure a space of 300 mm or more at either the right side or the rear of the unit.

**Fig. 2-7**

**NOTE**

- Do not do any wiring or tubing within 30 cm of the front panel, because this space is needed as a servicing space for the compressor.
- Ensure a base height of 100 mm or more to ensure that drainage water does not accumulate and freeze around the bottom of the unit.
- If installing a drain pan, install the drain pan prior to installing the outdoor unit.

* Make sure there is at least 150 mm between the outdoor unit and the ground. Also, the direction of the tubing and electrical wiring should be from the front of the outdoor unit.

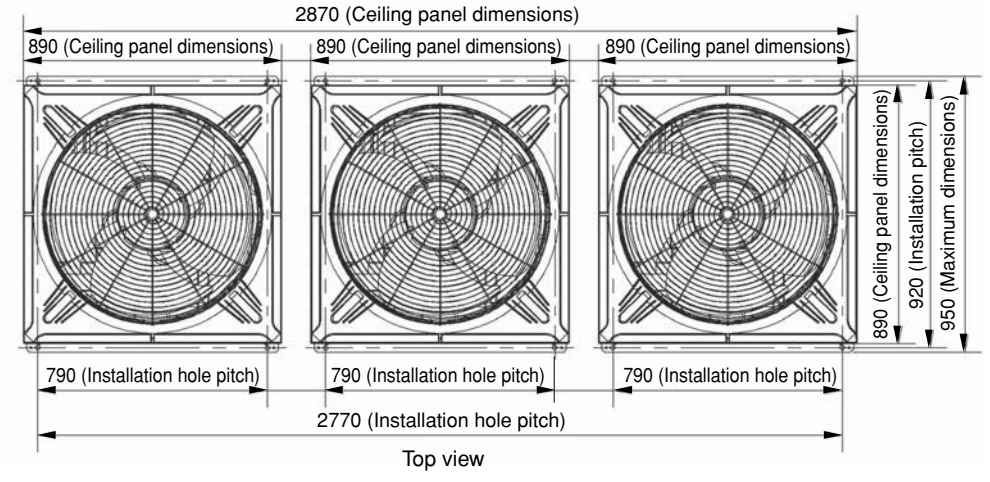



**Fig. 2-8**

### 2-3. Shield for Horizontal Exhaust Discharge

It is necessary to install an air-discharge chamber (field supply) to direct exhaust from the fan horizontally if it is difficult to provide a minimum space of 2 m between the air-discharge outlet and a nearby obstacle. (Fig. 2-9)

**CAUTION**

**In regions with heavy snowfall, the outdoor unit should be provided with a solid, raised platform and snow-proof vents. (Fig. 2-10)**

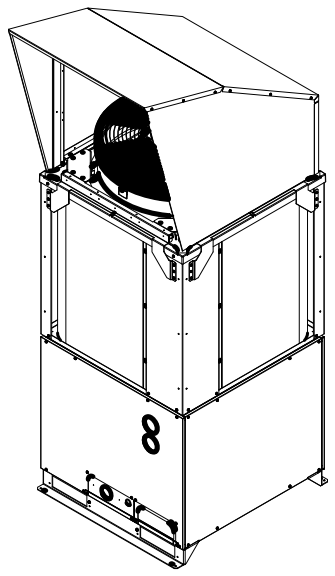


**Fig. 2-9**

### 2-4. Installing the Outdoor Unit in Heavy Snow Areas

In locations where wind-blown snow can be a problem, snow-proof vents should be fitted to the unit and direct exposure to the wind should be avoided as much as possible. (Fig. 2-11) The following problems may occur if proper countermeasures are not taken:

- The fan in the outdoor unit may stop running, causing the unit to be damaged.
- There may be no air flow.
- The tubing may freeze and burst.
- The condenser pressure may drop because of strong wind, and the indoor unit may freeze.

### 2-5. Precautions When Installing in Heavy Snow Areas

a) The platform should be higher than the maximum snow depth. (Fig. 2-10)

b) The 2 anchoring feet of the outdoor unit should be used for the platform, and the platform should be installed beneath the air-intake side of the outdoor unit.

c) The platform foundation must be solid and the unit must be secured with anchor bolts.

d) When installing on a roof subject to strong wind, countermeasures must be taken to prevent the unit from being overturned.

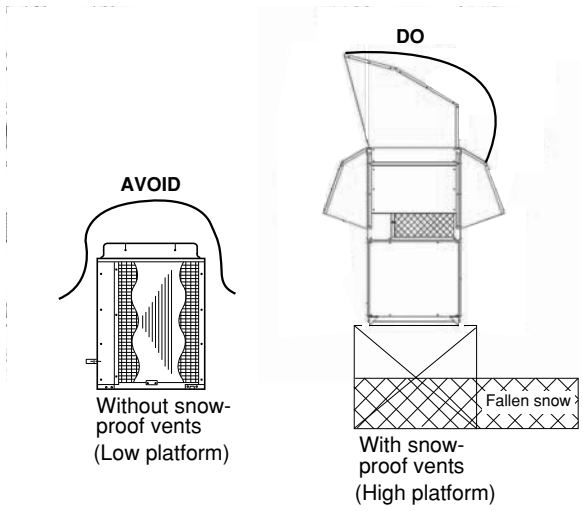



**Fig. 2-10**

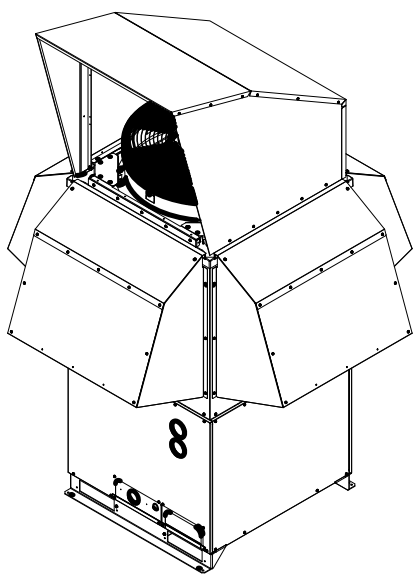
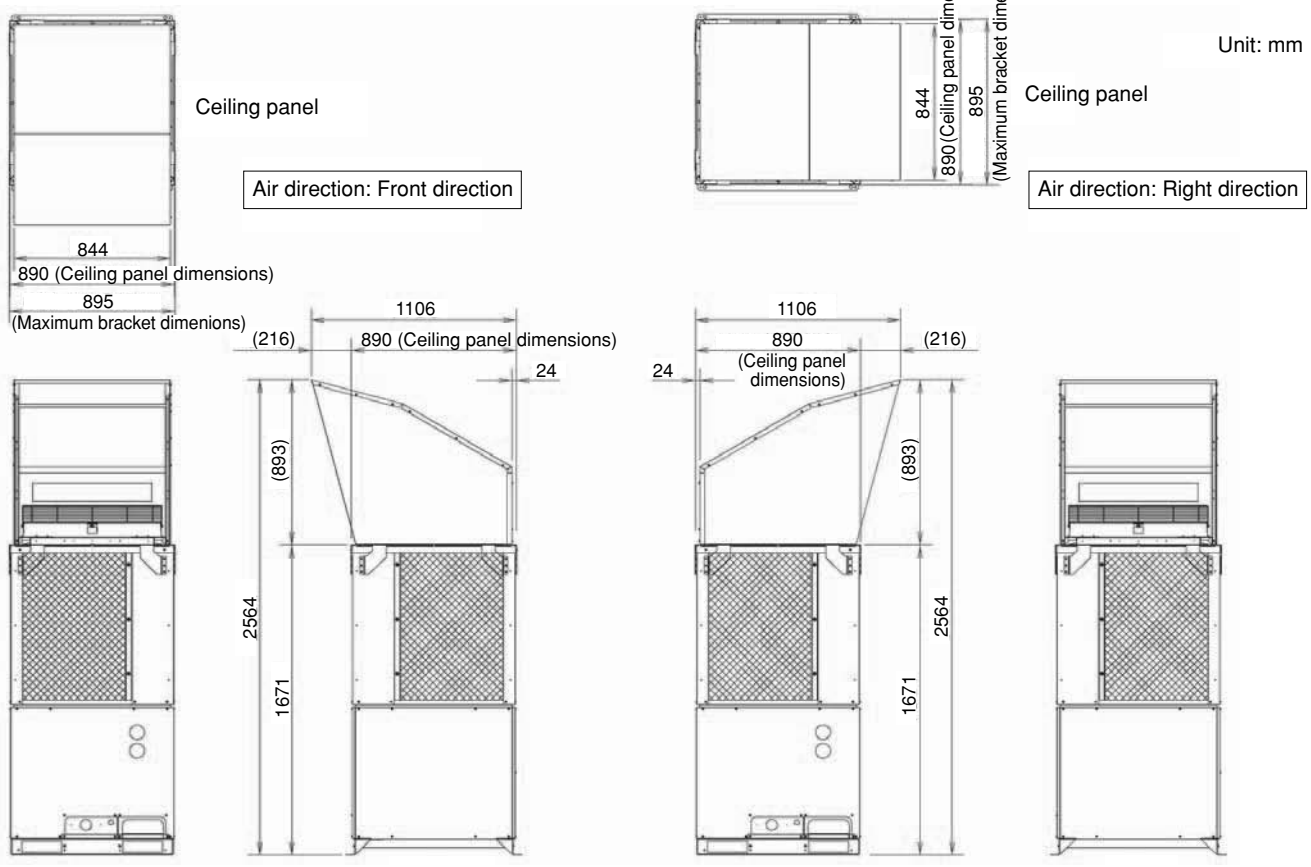


**Fig. 2-11**

## 2-6. Dimensions of Wind Ducting

### Reference diagram for air-discharge chamber (field supply)

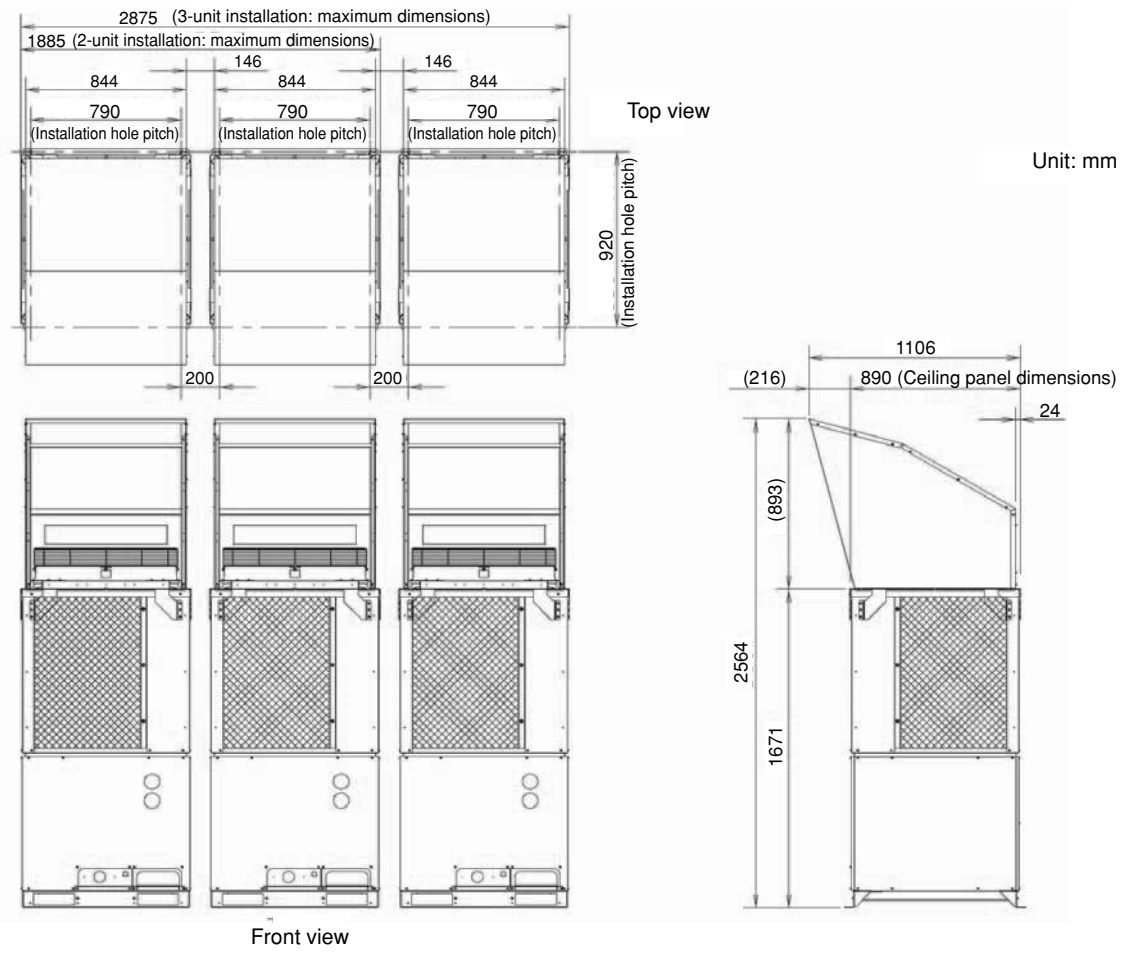
Unit: mm




Front view | Right side view | Right side view | Front view

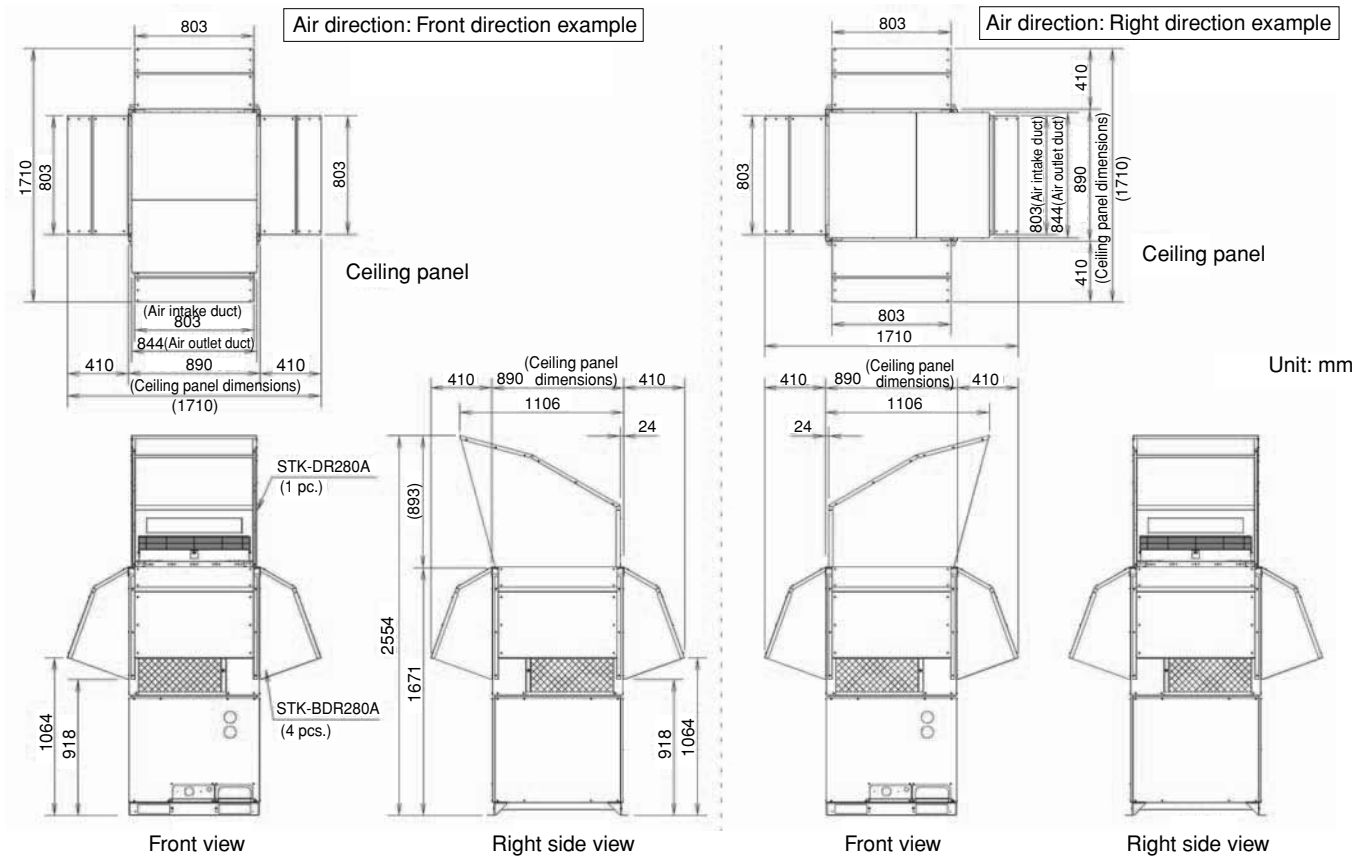
**Note:** Can be installed so that the air direction is to the front, right, left or rear direction.

### 3-unit installation



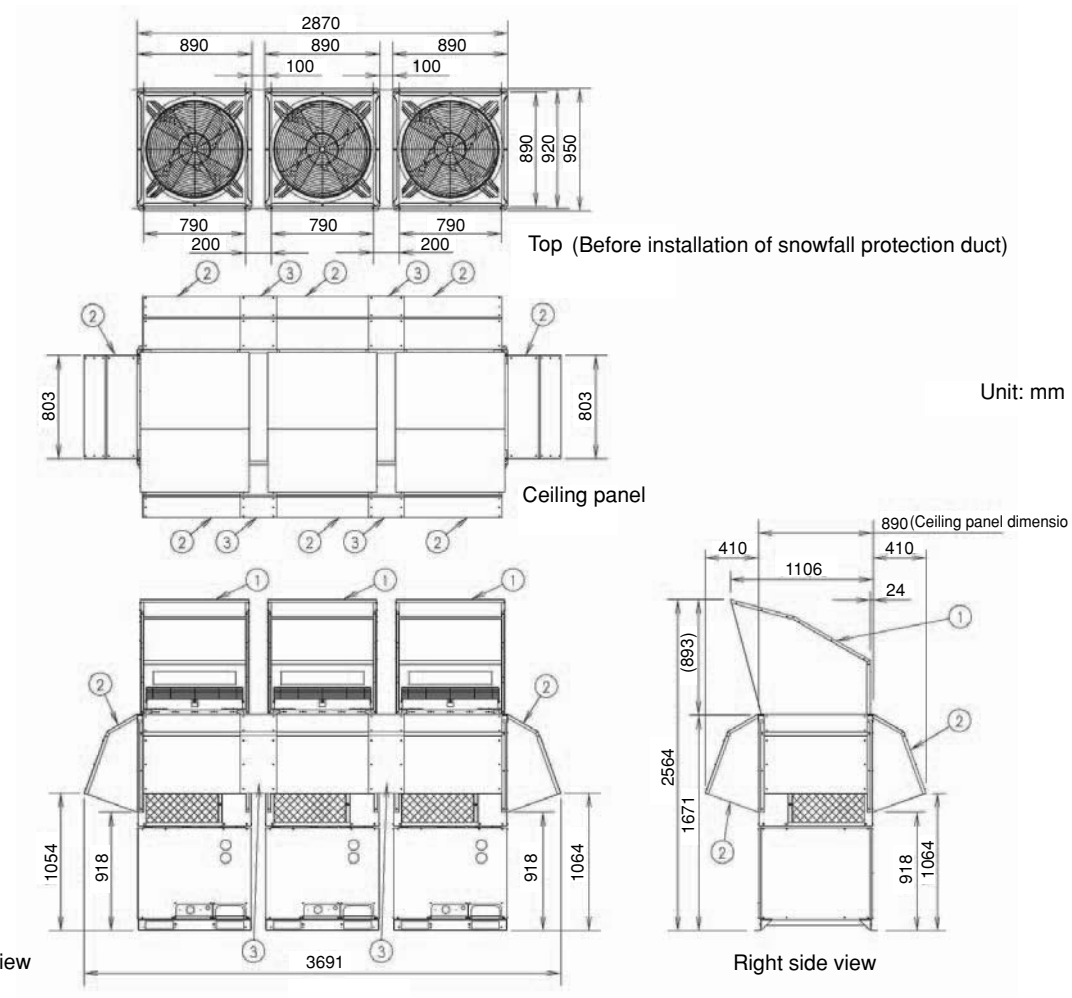
## 2-7. Dimensions of Snow Ducting

### Reference diagram for snow-proof vents (field supply)




**Note:** Can be installed so that the air direction is to the front, right, left or rear direction.

### 3-unit installation



# 3. HOW TO INSTALL THE INDOOR UNIT

## ■ 1-Way Air Discharge Semi-Concealed Slim Type (NK1FL Type)



### 3-1. Suspending the Indoor Unit

(1) The measurements of the ceiling hole and suspension bolt positions should be as shown in the figure at right.
The length of the suspension bolts should extend a minimum of 15 mm beyond the bottom of the unit suspension bracket. Refer to Fig. 3-8.

(2) Use the full-scale installation diagram (printed on the package) to determine the suspension bolt pitch.
The positional relationships between the suspension brackets and the unit, and between the brackets and the ceiling panel, should be as shown in Figs. 3-1 & 3-2.

Unit: mm

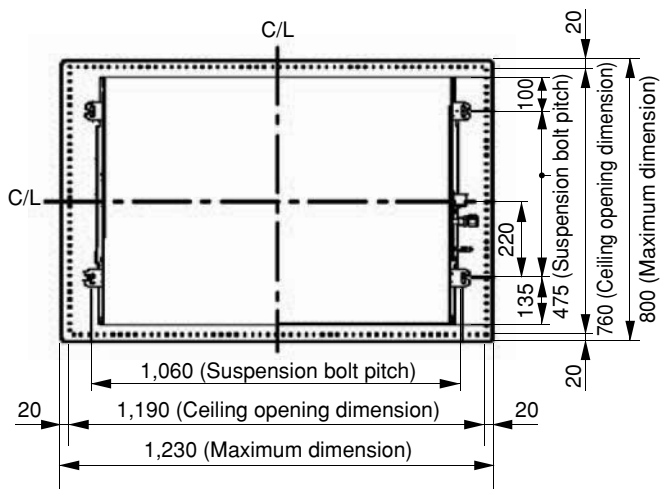



**Fig. 3-1**

Unit: mm

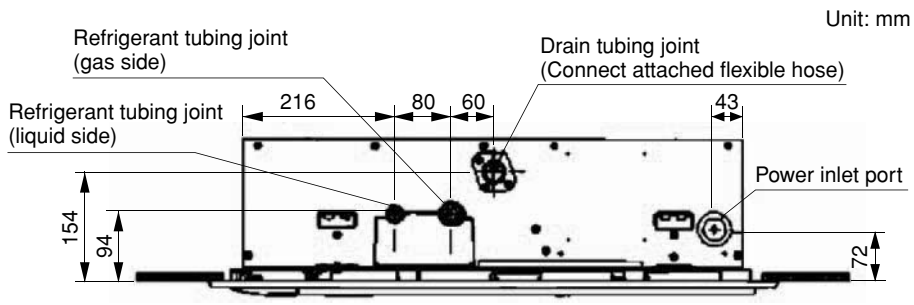



**Fig. 3-2**

(3) Depending on the ceiling type:

- Insert suspension bolts as shown in Fig. 3-3.
  or
- Use existing ceiling supports or construct a suitable support as shown in Fig. 3-4.

**WARNING**

**It is important that you use extreme care in supporting the indoor unit from the ceiling. Ensure that the ceiling is strong enough to support the weight of the unit. Before hanging the unit, test the strength of each attached suspension bolt.**

(4) Cut the ceiling material, if necessary.
(Figs. 3-1 and 3-2)

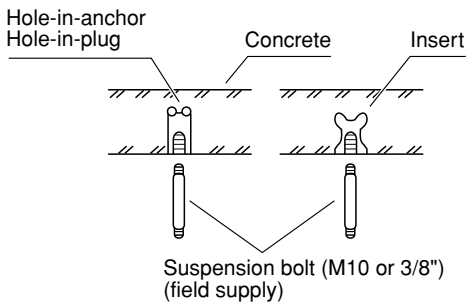



**Fig. 3-3**

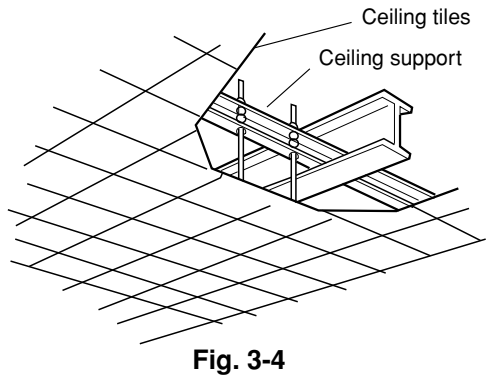



**Fig. 3-4**

(5) If the system requires fresh air to be drawn into the unit, cut and remove the insulation (both externally and internally) at the location shown as Ⓐ in Figs. 3-5 and 3-6.

### 3-2. Placing the Unit Inside the Ceiling

(1) When suspending the unit, attach gauges A and B (with packaging pad) to the indoor unit suspension brackets using the supplied M5 screws (2 for each bracket) to create the ceiling opening dimensions.

**CAUTION**

- **Tubing and wiring work will be necessary inside the ceiling after the unit has been suspended. Therefore, if the ceiling is already installed, perform tubing and wiring up to the connection position before suspending the unit.**

(2) Attach the special washers (supplied) and nuts (field supply) to the suspension bolts (4 locations).

**CAUTION**

- **Use 3/8" or M10 nuts.**
- **The length of the suspension bolts should be such that there is clearance of at least 15 mm below the bottom of the bracket, as shown in the figure at right. If the suspension bolts are too long, they will contact the ceiling panel and louver motor cover, making installation impossible.**

(3) Thread the 3 hexagonal nuts and 2 washers (field supply) onto each of the the 4 suspension bolts as shown in Fig. 3-7. Use 1 nut and 1 washer for the upper side, and 2 nuts and 1 washer for the lower side, so that the unit will not fall off the suspension lugs.

(4) The indoor unit should be suspended from the suspension bolts (Fig. 3-7) so that the distance between the bottom of the suspension lug and the bottom surface of the ceiling is 17 to 22 mm. (Fig. 3-8) Clearance between the indoor unit and the bottom surface of the ceiling is adjustable after the ceiling panel is attached to the unit.

(5) The unit should be adjusted using water level or as shown in Fig. 3-9 so that the drain pipe side is slanted 5 mm lower than the opposite side.

(6) After completing the adjustment of the clearance, fasten all upper and lower suspension nuts tightly.

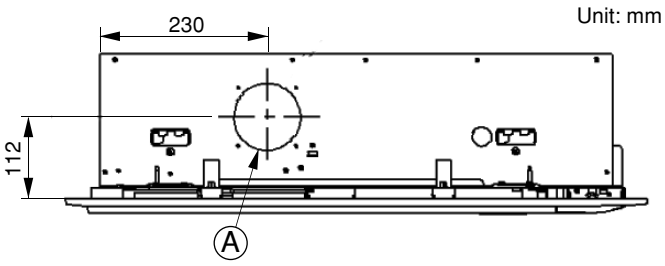
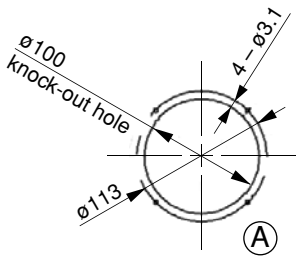



**Fig. 3-5**






Outdoor air intake duct connection port

**Fig. 3-6**

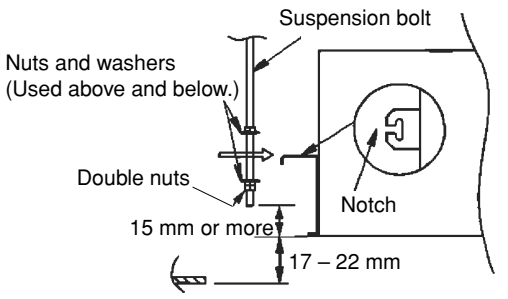



**Fig. 3-7**

Use gauges A and B to adjust the height of the indoor unit. (Gauges shown in Table 1-1.)

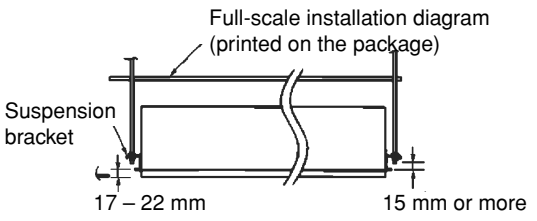



**Fig. 3-8**

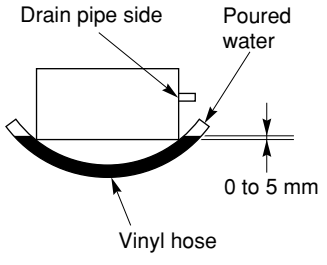



**Fig. 3-9**

NK1FL

### 3-3. Installing the Drain Piping

(1) Prepare standard hard PVC pipe (O.D. 32 mm) for the drain and use the supplied drain hose and hose band to prevent water leaks. The PVC pipe must be purchased separately. The unit's transparent drain port allows you to check drainage. (Fig. 3-10a)

**CAUTION**

- **Do not use adhesive at the drain connection port on the indoor unit.**
- **Insert the drain pipe until it contacts the socket, as shown in the figure at right, then secure it tightly with the hose band.**
- **Tighten the hose clamps so their locking nuts face upward. (Fig. 3-10a)**
- **Do not use the supplied drain hose bent at a 90° angle. (The maximum permissible bend is 45°.)**

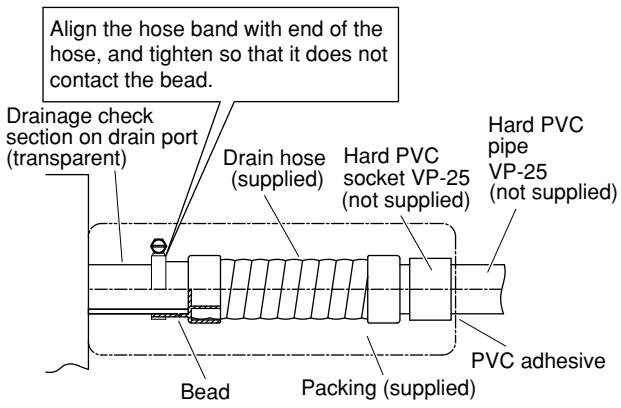



**Fig. 3-10a**

(2) After checking the drainage, wrap the supplied packing and drain pipe insulator around the pipe, then secure it with the supplied clamps. (Fig. 3-10b)

**NOTE**

Make sure the drain pipe has a downward gradient (1/100 or more) and that there are no water traps.

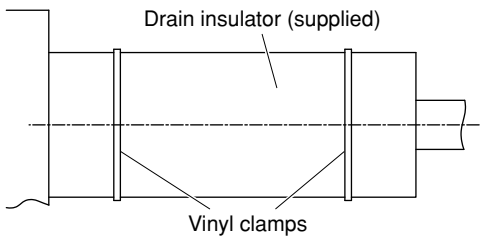



**Fig. 3-10b**

**CAUTION**

- Do not install an air bleeder as this may cause water to spray from the drain pipe outlet. (Fig. 3-11)
- If it is necessary to increase the height of the drain pipe, the pipe can be raised a maximum of 59 cm from the bottom of the ceiling. Do not raise it any higher than 59 cm, as this could result in water leaks. (Fig. 3-12)
- Do not install the pipe with an upward gradient from the connection port. This will cause the drain water to flow backward and leak when the unit is not operating. (Fig. 3-13)
- Do not apply force to the piping on the unit side when connecting the drain pipe. The pipe should not be allowed to hang unsupported from its connection to the unit. Fasten the pipe to a wall, frame, or other support as close to the unit as possible. (Fig. 3-14)
- Provide insulation for any pipes that are run indoors.

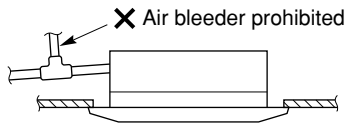



**Fig. 3-11**

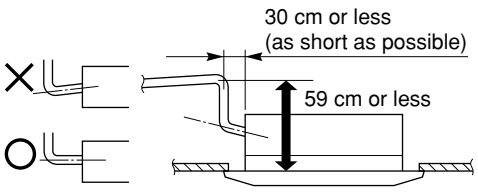



**Fig. 3-12**

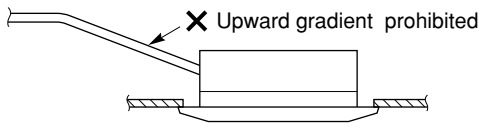



**Fig. 3-13**

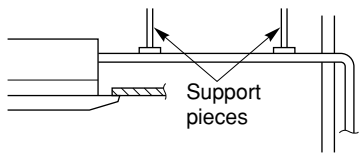



**Fig. 3-14**

### 3-4. Checking the Drainage

After wiring and drain piping are completed, use the following procedure to check that the water will drain smoothly. For this, prepare a bucket and wiping cloth to catch and wipe up spilled water.

(1) Connect power to the power terminal board (R, S terminals) inside the electrical component box.

(2) Short the check pin (CHK) on the indoor control board and operate the drain pump.

**CAUTION**

**Be careful since the fan will start when you short the pin on the indoor control board.**

(3) Pour water into the drain pan using a siphon pump through the air outlet grille. (Fig. 3-15) Check the water flow through the transparent drain pipe and see if there is any leakage.

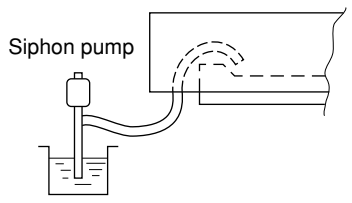



**Fig. 3-15**

(4) When the check of drainage is complete, open the check pin (CHK) and remount the insulator.

**CAUTION** **Use 4 × 8 tapping screws to fasten cover drainage. If the screws used are longer than 8 mm, it may make a hole in the drain pan and cause leakage.**



**Cleaning the sub drain pan**

Before beginning work, make necessary preparations (e.g., prepare a bucket, wiping cloth, etc.).

(1) Unscrew the 2 screws securing the cover, and place them on the reverse side to remove the cover.

(2) Release the screw securing the sub drain pan support L-shape bracket, and remove the bracket while holding the sub drain pan with your hand.

**CAUTION** **Continuing to work without holding the sub drain pan causes accumulated water in the sub drain pan to leak out.**

(3) Drain any water and clean the sub drain pan by tilting it downward. To remove the drain pump, remove the 4 drain pump installation screws, the drain hose, and the wiring.

**Removing the side panel**

(1) Push the tab on both sides of the side panel inward (a) to disengage the tab (first stage) and move the panel horizontally (b).

(2) Push the area in the vicinity of the tab (second stage) inward while holding both sides of the side panel to remove the side panel.

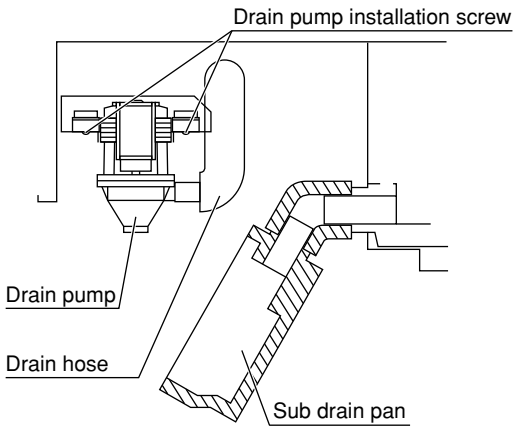



**Fig. 3-16**

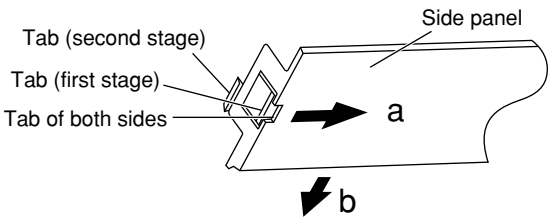



**Fig. 3-17**

## ■ 2-Way Air Discharge Semi-Concealed Type (NK2FL Type)

### 3-5. Suspending the Indoor Unit

(1) Follow the diagrams to make the holes in the ceiling.

**Table 3-2**

Unit: mm

| | A | B | C | D | E |
|---|---|---|---|---|---|
| **7, 9, 12, 16, 18** | 1,020 | 920 | 840 | 400 | 440 |
| **24** | 1,320 | 1,220 | 1,140 | 550 | 590 |

(2) Depending on the ceiling type:

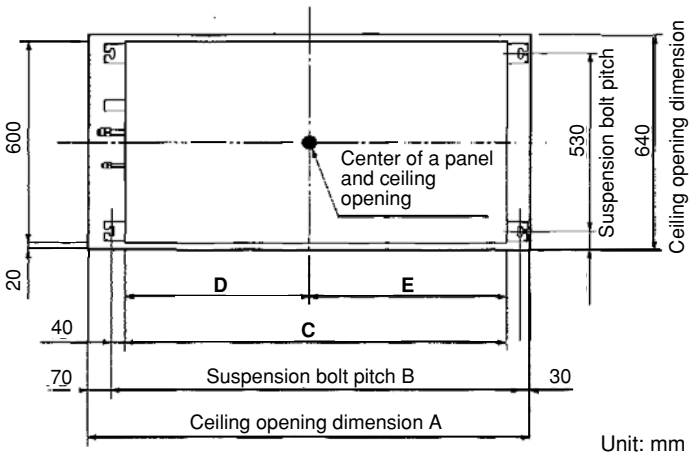
- Insert suspension bolts as shown in Fig. 3-20

  or

- Use existing ceiling supports or construct a suitable support as shown in Fig. 3-21.

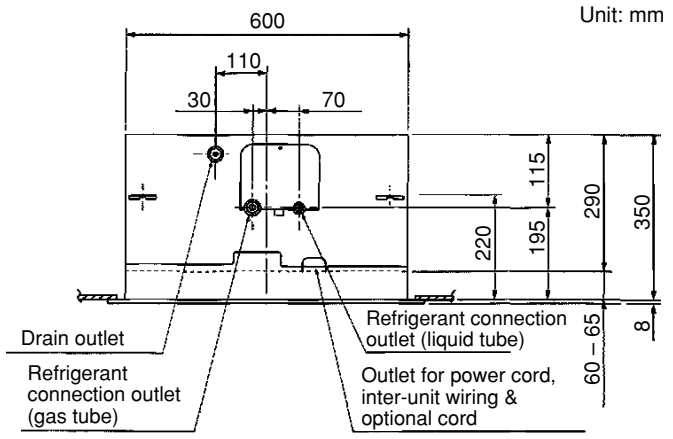
**WARNING** **It is important that you use extreme care in supporting the indoor unit from the ceiling. Ensure that the ceiling is strong enough to support the weight of the unit. Before hanging the unit, test the strength of each attached suspension bolt.**

(3) Cut the ceiling material, if necessary. (Refer to Figs. 3-18 and 3-19, and Table 3-2.)




Unit: mm

**Fig. 3-18**




Unit: mm

Adjust so that the distance between the indoor unit and the ceiling bottom is 60 to 65 mm.

**Fig. 3-19**

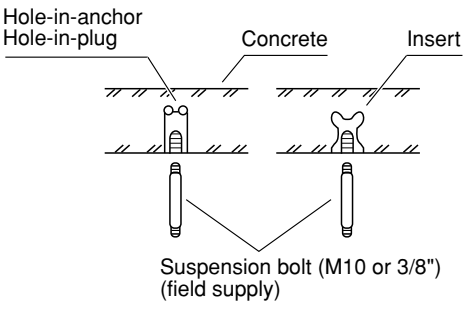



**Fig. 3-20**

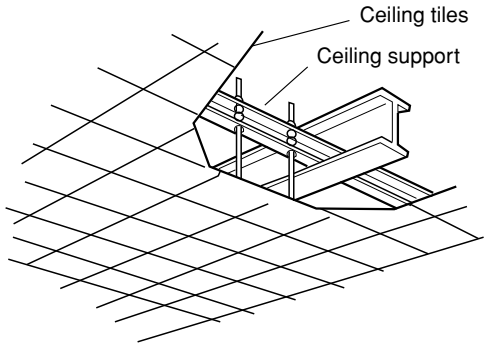



**Fig. 3-21**

(5) If the system requires fresh air to be drawn into the unit, cut and remove the insulation (both externally and internally) at the location shown as Ⓐ in Figs. 3-22a and 3-22b.

**CAUTION**

**When making the cuts to the insulation, be careful not to damage the drain pan.**

### 3-6. Placing the Unit Inside the Ceiling

(1) When placing the unit inside the ceiling, determine the pitch of the suspension bolts.

Tubing must be laid and connected inside the ceiling when suspending the unit. If the ceiling is already constructed, lay the tubing into position for connection to the unit before placing the unit inside the ceiling.

(2) Thread the 3 hexagonal nuts and 2 washers (field supply) onto each of the 4 suspension bolts as shown in Fig. 3-24. Use 1 nut and 1 washer for the upper side, and 2 nuts and 1 washer for the lower side, so that the unit will not fall off the suspension lugs.

(3) The distance between the unit and the opening in the ceiling and the distance between the bottom surface of the ceiling and the bottom surface of the flange of the unit should follow the dimensions given in Fig. 3-23. Use the supplied installation gauge to check.

### 3-7. Installing the Drain Piping

(1) Prepare a standard hard PVC pipe (O.D. 32 mm) for the drain and use the supplied drain hose and hose band to prevent water leaks. The PVC pipe must be purchased separately.

When doing this, leave a gap between the drain socket and the PVC pipe to allow the drainage to be checked. The unit's transparent drain port allows you to check the drainage. (Fig. 3-25)

**CAUTION**

- **Do not use adhesive at the drain connection port on the indoor unit.**
- **Insert the drain pipe until it contacts the socket, as shown in the figure at right, then secure it tightly with the hose band.**
- **Tighten the hose clamps so their locking nuts face upward. (Fig. 3-25)**
- **Do not use the supplied drain hose bent at a 90° angle. (The maximum permissible bend is 45°.)**

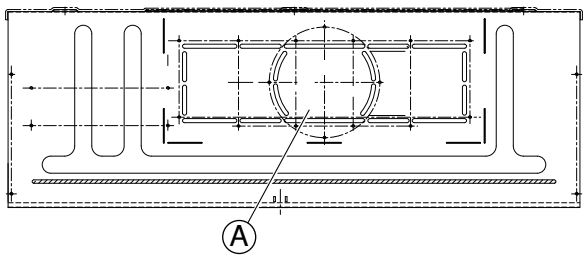



**Fig. 3-22a**

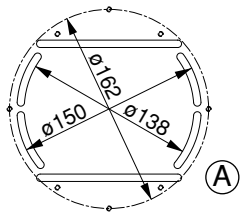



**Fig. 3-22b**

Unit: mm

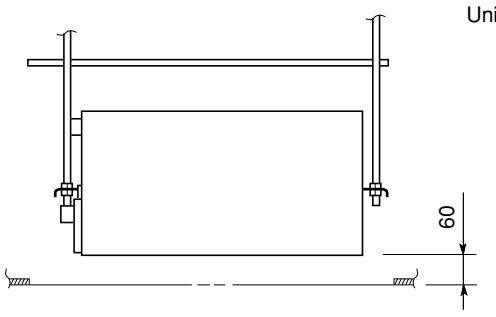



**Fig. 3-23**

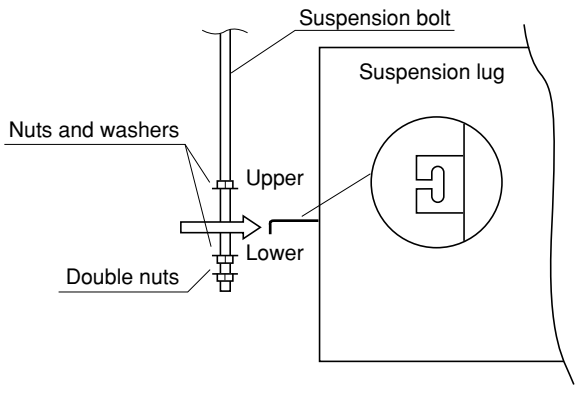



**Fig. 3-24**

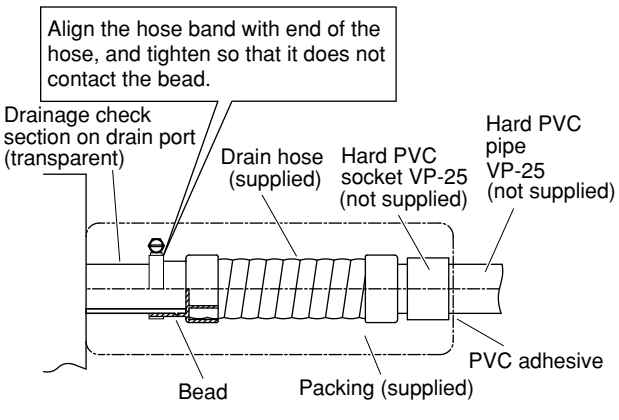



**Fig. 3-25**

(2) After checking the drainage, wrap the supplied packing and drain pipe insulator around the pipe, then secure it with the supplied clamps. (Fig. 3-26)

**NOTE**

Make sure the drain pipe has a downward gradient (1/100 or more) and that there are no water traps.

**CAUTION**

- **Do not install an air bleeder as this may cause water to spray from the drain pipe outlet. (Fig. 3-27)**
- **If it is necessary to increase the height of the drain pipe, the section directly after the connection port can be raised a maximum of 50 cm. Do not raise it any higher than 50 cm, as this could result in water leaks. (Fig. 3-28)**
- **Do not install the pipe with an upward gradient from the connection port. This will cause the drain water to flow backward and leak when the unit is not operating. (Fig. 3-29)**
- **Do not apply force to the piping on the unit side when connecting the drain pipe. The pipe should not be allowed to hang unsupported from its connection to the unit. Fasten the pipe to a wall, frame, or other support as close to the unit as possible. (Fig. 3-30)**
- **Provide insulation for any pipes that are installed indoors.**

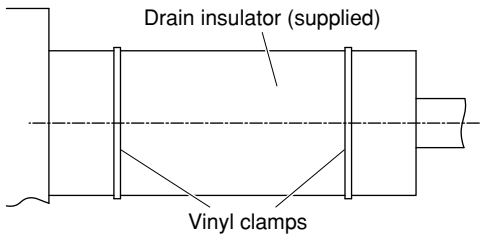



**Fig. 3-26**

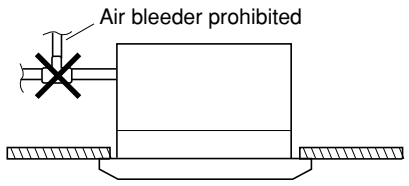



**Fig. 3-27**

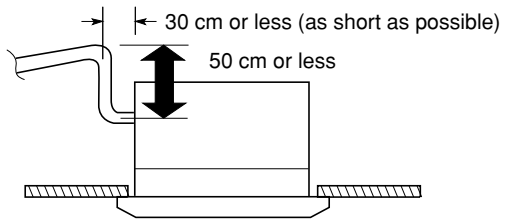



**Fig. 3-28**

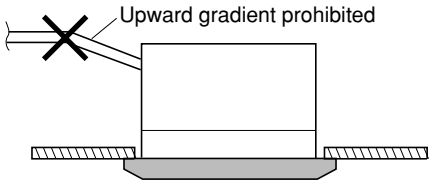



**Fig. 3-29**

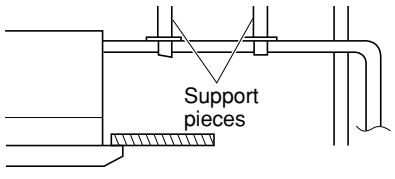



**Fig. 3-30**

NK2FL

### 3-8. Checking the Drainage

After wiring and drain piping are completed, use the following procedure to check that the water will drain smoothly. For this, prepare a bucket and wiping cloth to catch and wipe up spilled water.

(1) Connect power to the power terminal board (R, S terminals) inside the electrical component box.

(2) Remove the tube cover and through the opening, slowly pour about 1,200 cc of water into the drain pan to check the drainage.

NK2FL

(3) Short the check pin (CHK) on the indoor control board and operate the drain pump. Check the water flow through the transparent drain port and see if there is any leakage.

**CAUTION** **Be careful since the fan will start when you short the pin on the indoor control board.**

(4) When the check of drainage is complete, open the check pin (CHK) and remount the tube cover. (Fig. 3-31)

**CAUTION** **To mount the tube cover, use 4 × 8 tapping screws. (Fig. 3-31)**
**Do not use long screws as they may puncture the drain pan and cause water leakage.**

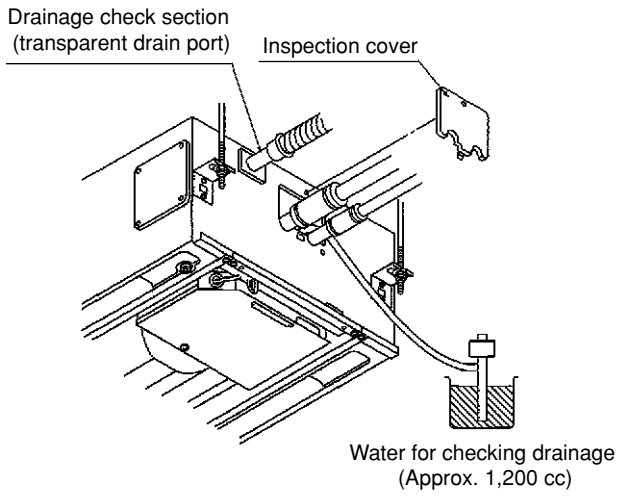



**Fig. 3-31**

## ■ 4-Way Air Discharge Semi-Concealed Type (NKFL Type)

### 3-9. Preparation for Suspending

This unit uses a drain pump. Use a carpenter's level to check that the unit is level.

### 3-10. Suspending the Indoor Unit

(1) Fix the suspension bolts securely in the ceiling using the method shown in the diagrams (Figs. 3-32 and 3-33), by attaching them to the ceiling support structure, or by any other method that ensures that the unit will be securely and safely suspended.

(2) Follow Fig. 3-33 and Table 3-3 to make the holes in the ceiling.

**Table 3-3** Unit: mm

| Type \ Length | A | B | C | D |
|---|---|---|---|---|
| **7, 9, 12, 16, 18, 24, 36, 48, 60** | 788 | 723 | 885 | 885 |

(3) Determine the pitch of the suspension bolts using the supplied full-scale installation diagram. The diagram and table (Fig. 3-34 and Table 3-4) show the relationship between the positions of the suspension fitting, unit, and panel.

**Table 3-4** Unit: mm

| Type \ Length | A | B | C | D | E |
|---|---|---|---|---|---|
| **7, 9, 12, 16, 18, 24** | 113 | 173 | 256 | 210 | 88 |
| **36, 48, 60** | 113 | 173 | 319 | 210 | 88 |

Note: For DC Fan Tap Change Procedure for 4-Way Cassette, see page 125.

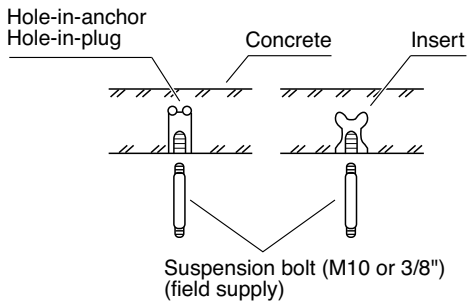



**Fig. 3-32**



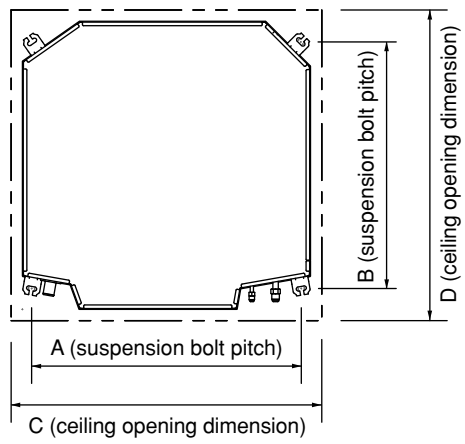



**Fig. 3-33**

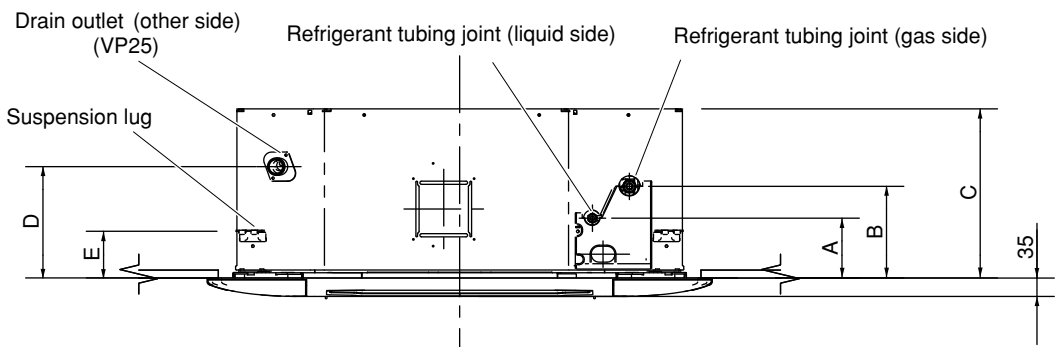



**Fig. 3-34**

### 3-11. Placing the Unit Inside the Ceiling

(1) When placing the unit inside the ceiling, determine the pitch of the suspension bolts using the supplied full-scale installation diagram. (Fig. 3-35)

Tubing and wiring must be laid inside the ceiling when suspending the unit. If the ceiling is already constructed, lay the tubing and wiring into position for connection to the unit before placing the unit inside the ceiling.

(2) The length of suspension bolts must be appropriate for a distance between the bottom of the bolt and the bottom of the unit of more than 15 mm as shown in Fig. 3-35.

(3) Thread the 3 hexagonal nuts and 2 washers (field supply) onto each of the 4 suspension bolts as shown in Fig. 3-36. Use 1 nut and 1 washer for the upper side, and 2 nuts and 1 washer for the lower side, so that the unit will not fall off the suspension lugs.

(4) Adjust so that the distance between the unit and the ceiling bottom is 12 to 17 mm. Tighten the nuts on the upper side and lower side of the suspension lug.

(5) Remove the protective polyethylene used to protect the fan parts during transport.

NKFL

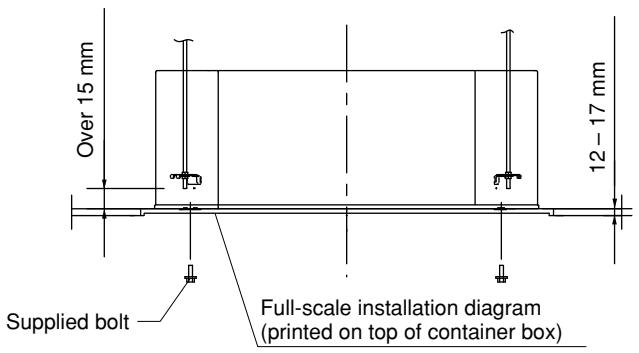



**Fig. 3-35**

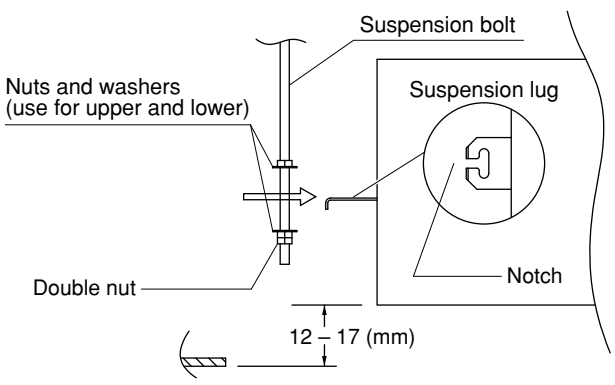



**Fig. 3-36**

### 3-12. Installing the Drain Piping

(1) Prepare a standard hard PVC pipe (O.D. 32 mm) for the drain and use the supplied drain hose and hose band to prevent water leaks.
The PVC pipe must be purchased separately. The unit's transparent drain port allows you to check drainage. (Fig. 3-37)

**CAUTION**

- **Insert the drain pipe until it contacts the socket, as shown in Fig. 3-37, then secure it tightly with the hose band.**
- **Do not use adhesive when connecting the supplied hose.**

  Reasons: 1. It may cause water to leak from the connection. Since the connection is slippery just after the adhesive has been applied, the pipe easily slips off.

  2. The pipe cannot be removed when maintenance is needed.
- **Do not bend the supplied drain hose 90° or more. The hose may slip off.**
- **Align the hose bands with the end of the hose. Tighten the hose band firmly. Please make sure that the bead is not covered by the hose band. (Fig. 3-37)**

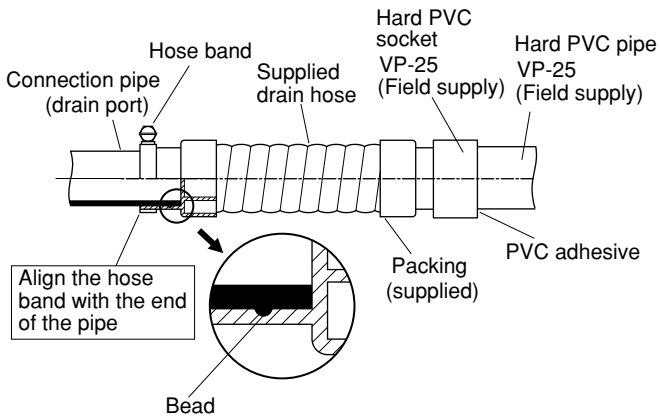



**Fig. 3-37**

(2) After checking the drainage, wrap the supplied packing and drain pipe insulator around the pipe. (Fig. 3-38)

**CAUTION**

**Tighten the hose clamps so their locking nuts face upward. (Fig. 3-37)**

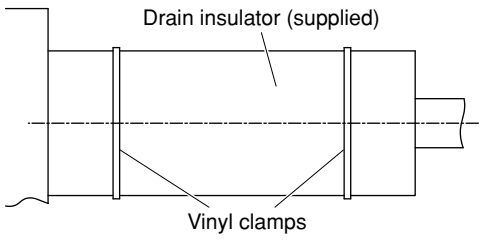



**Fig. 3-38**

**NOTE**

Make sure the drain pipe has a downward gradient (1/100 or more) and that there are no water traps.

**CAUTION**

- Do not install an air bleeder as this may cause water to spray from the drain pipe outlet. (Fig. 3-39)

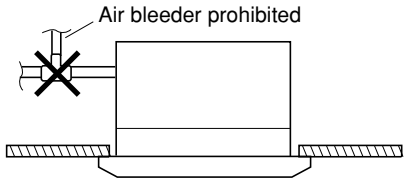



**Fig. 3-39**

NKFL

**CAUTION**

- **If it is necessary to increase the height of the drain pipe, the section directly after the connection port can be raised a maximum of 64 cm. Do not raise it any higher than 64 cm, as this could result in water leaks. (Fig. 3-40)**
- **Do not install the pipe with an upward gradient from the connection port. This will cause the drain water to flow backward and leak when the unit is not operating. (Fig. 3-41)**
- **Do not apply force to the piping on the unit side when connecting the drain pipe. The pipe should not be allowed to hang unsupported from its connection to the unit. Fasten the pipe to a wall, frame, or other support as close to the unit as possible. (Fig. 3-42)**
- **Provide insulation for any pipes that are run indoors.**



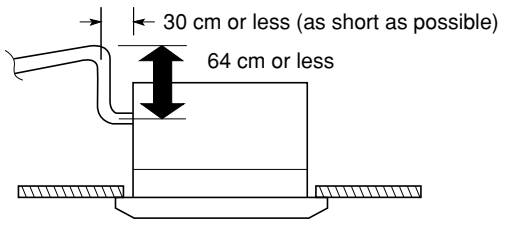



**Fig. 3-40**

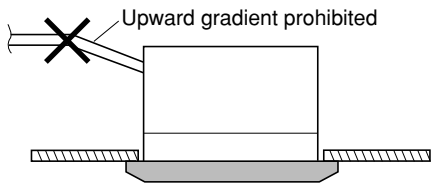



**Fig. 3-41**

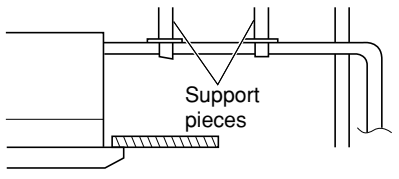



**Fig. 3-42**

### 3-13. Checking the Drainage

After wiring and drain piping are completed, use the following procedure to check that the water will drain smoothly. For this, prepare a bucket and wiping cloth to catch and wipe up spilled water.

(1) Connect power to the power terminal board (R, S terminals) inside the electrical component box.

(2) Slowly pour about 1,200 cc of water into the drain pan to check drainage. (Fig. 3-43)

(3) Short the check pin (CHK) on the indoor control board and operate the drain pump. Check the water flow through the transparent drain pipe and see if there is any leakage.

(4) When the check of drainage is complete, open the check pin (CHK) and remount the tube cover.

**CAUTION**

**Be careful since the fan will start when you short the pin on the indoor control board.**

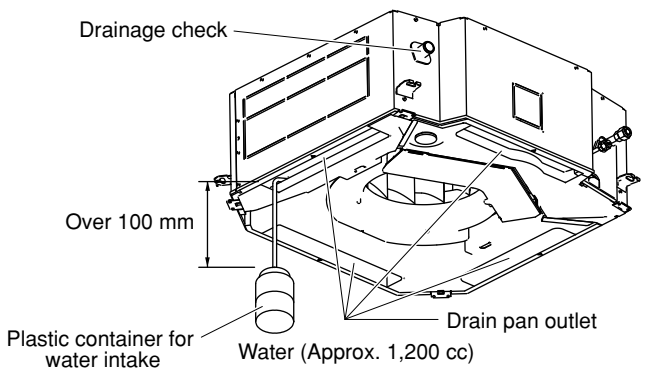



**Fig. 3-43**

## ■ Wall-Mounted Type (NWFL Type)

### 3-14. Removing the Rear Panel from the Unit

(1) Remove the set screws used to fasten the rear panel to the indoor unit during transportation.

(2) Press up on the frame at the 2 locations shown by the arrows in the figure at right, and remove the rear panel.

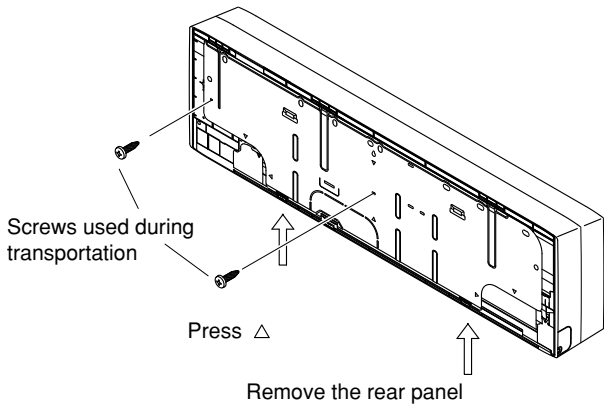



**Fig. 3-44**

**NOTE**

Tubing can be extended in 4 directions as shown in Fig. 3-45. Select the direction which will provide the shortest run to the outdoor unit.

### 3-15. Selecting and Making a Hole

(1) Remove the rear panel from the indoor unit and place it on the wall at the location selected. Fix the rear panel and hook the unit onto it temporarily. Make sure the unit is horizontal using a carpenter's level or tape measure to measure down from the ceiling.

(2) Determine which notch of the rear panel should be used. (Fig. 3-46)

(3) Before drilling a hole, check that there are no studs or pipes behind the determined location. The above precautions are also applicable if tubing goes through the wall in any other location.

(4) Using a sabre saw, key hole saw or hole-cutting drill attachment, make a hole (dia. 80 mm) in the wall. (Fig. 3-47)

(5) Measure the thickness of the wall from the inside edge to the outside edge and cut the PVC pipe at a slight angle 6 mm shorter than the thickness of the wall. (Fig. 3-48)

**CAUTION** **Avoid areas where electrical wiring or conduits are located.**

(6) Place the plastic cover over the end of the pipe (for indoor side only) and insert in the wall. (Fig. 3-49)

**NOTE**

The hole should be made at a slight downward gradient to the outside.

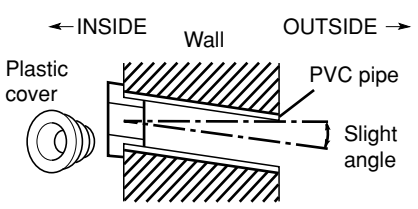



**Fig. 3-49**

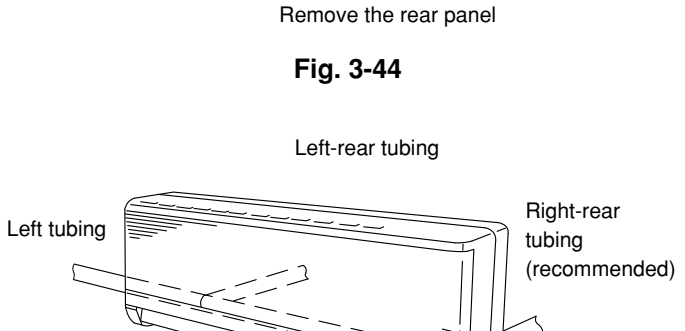
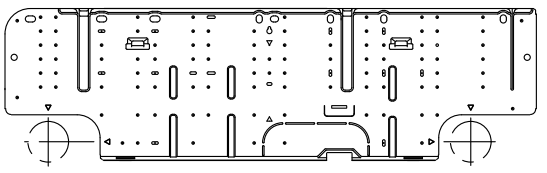



**Fig. 3-45**




| Tubing hole diameter | ø80 |
|---|---|

**Fig. 3-46**

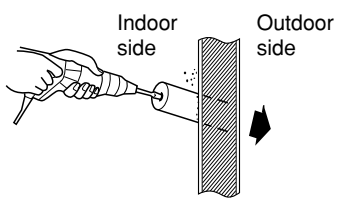



**Fig. 3-47**

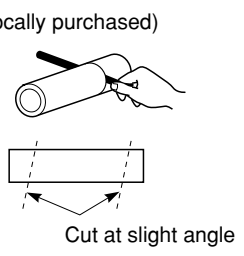



**Fig. 3-48**

NWFL

### 3-16. Installing the Rear Panel Onto the Wall

Confirm that the wall is strong enough to support the unit.

See either Item a) or b) below depending on the wall type.

**a) If the Wall is Wooden**

(1) Attach the rear panel to the wall with the 10 screws provided. (Fig. 3-50)
If you are not able to line up the holes in the rear panel with the beam locations marked on the wall, use Rawl plugs or toggle bolts to go through the holes on the panel or drill 5 mm dia. holes in the panel over the stud locations and then mount the rear panel.

(2) Check with a tape measure or carpenter's level. This is important so that the unit is correctly installed. (Fig. 3-51)

(3) Make sure the panel is flush against the wall. Any space between the wall and unit will cause noise and vibration.

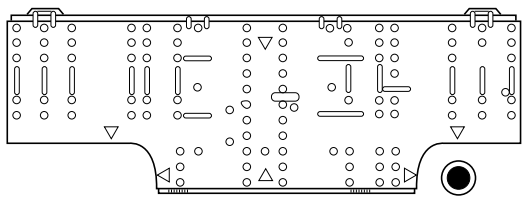


**Fig. 3-50**

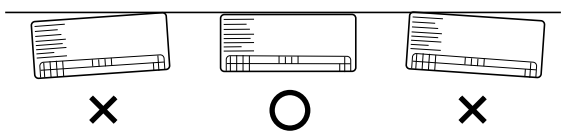


**Fig. 3-51**

**b) If the Wall is Brick, Concrete or Similar**

Drill 4.8 mm dia. holes in the wall. Insert Rawl plugs for appropriate mounting screws. (Fig. 3-52)

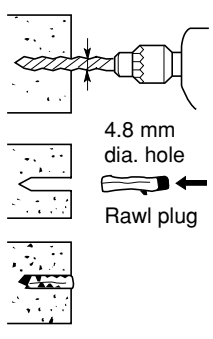



**Fig. 3-52**

### 3-17. Removing the Grille to Install the Indoor Unit

In principle, with this model wiring can be completed without removing the grille.
However, if it is necessary to change the settings on the PCB, follow the procedure below.

**Removing the grille**

(1) Lift up on both sides of the air-intake grille to open it. (Fig. 3-53)

(2) Remove the filter. (Fig. 3-53)

(3) Adjust the flap so that it is horizontal. (Fig. 3-54)

(4) Open the installation screw covers below the grille (3 locations). (Fig. 3-54)

(5) Remove the screws. (Fig. 3-54)

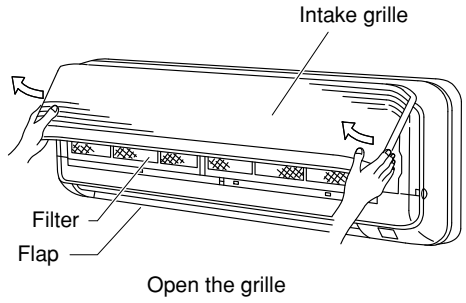
(6) Remove the grille. (Fig. 3-55)

**Attaching the grille**

(1) Close the flap.

(2) Keep the grille installation tabs aligned with the top portion of the grille, and reinstall the lower portion of the grille.
Fit the installation tabs into the grooves and press the lower portion of the grille back into its original position to install it.

(3) Press on the installation tabs to completely close the grille.
Check that the grille and frame are fitted tightly together.




Open the grille

**Fig. 3-53**

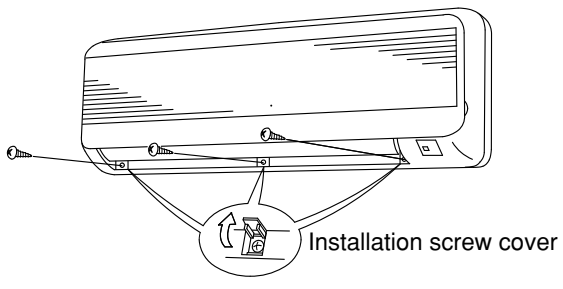
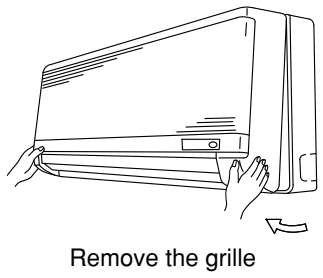



**Fig. 3-54**



Remove the grille

**Fig. 3-55**

NWFL

### 3-18. Preparing the Tubing

(1) Arrangement of tubing by directions

a) Right or left tubing

The corner of the right or left frame should be cut with a hack saw or similar. (Fig. 3-56)

b) Right-rear or left-rear tubing

In this case, the corners of the frame do not need to be cut.

(2) Be sure to insulate the part of the drain hose that is run indoors, and the refrigerant tubing.
If these are not insulated, condensation may result in dripping and damage to walls and furniture.
The flare nuts on the 24-type (only) are large; therefore, use the supplied insulation material.

(3) To mount the indoor unit on the rear panel.

1. When installing the indoor unit, position the indoor unit onto the installation tabs on the upper part of the rear panel. (Fig. 3-57)
2. Press on the air outlet to hold it in place, and press the lower part of the indoor unit until a “click” sound is heard and the indoor unit is securely fastened to the installation tabs on the lower side of the rear panel. (Fig. 3-58)

Raising the clamp to lift up the indoor unit will facilitate this work. (Fig. 3-59)

To remove the indoor unit, press up on the 2 locations ( △ marks) on the lower part of the unit frame to disconnect the installation tabs. Refer to Section 3-14. “Removing the Rear Panel from the Unit”. (Fig. 3-44)
Then lift up the indoor unit to remove it.

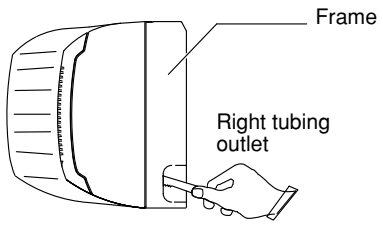
### 3-19. Shaping the Tubing

**Right-rear tubing**

(1) Shape the refrigerant tubing so that it can easily go into the hole. (Fig. 3-60)

(2) After performing a leak test, wrap both the refrigerant tubing and drain hose together with insulating tape.
The drain hose should be positioned below the refrigerant tubes, and should be given sufficient space so that no strong tension is applied to it.

(3) Push the wiring, refrigerant tubing and drain hose through the hole in the wall. Adjust the indoor unit so it is securely seated on the rear panel.




When left and right side tubing

**Fig. 3-56**

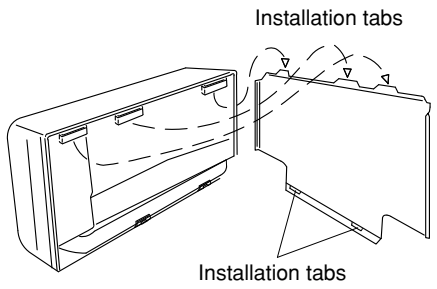



**Fig. 3-57**

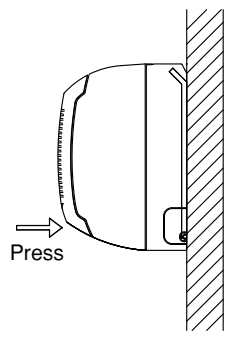



**Fig. 3-58**

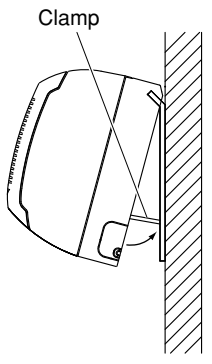



**Fig. 3-59**

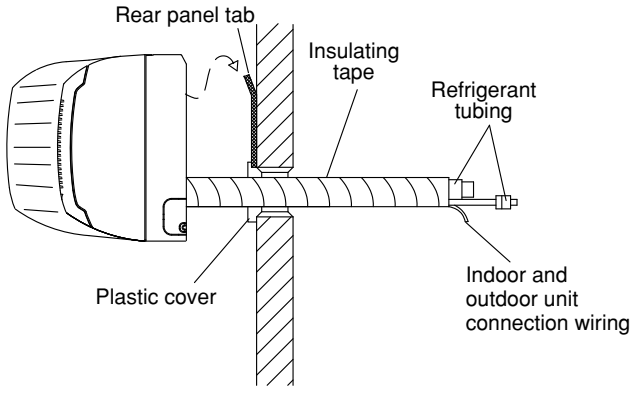



**Fig. 3-60**

NWFL

**Left or left-rear tubing**

(1) Pass the tubing and drain hose into the rear of the indoor unit. Provide sufficient length for the connections to be made.
Next, bend the tubing with a pipe bender, and connect them.

(2) After performing a leak test, wrap the refrigerant tubing and drain hose together with insulating tape, as shown in the figure at right.
Then fit the tubing into the tubing storage space in the rear of the indoor unit and clamp in place.

(3) Adjust the indoor unit so that it is securely installed onto the rear panel.

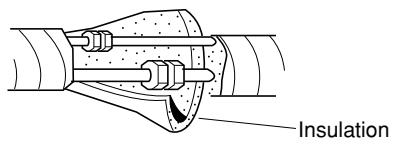



**Fig. 3-61**

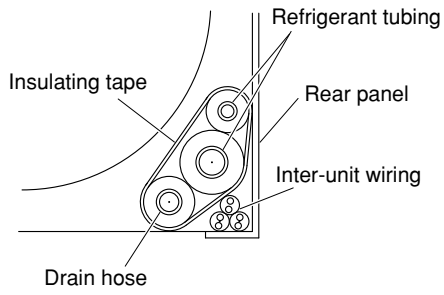



**Fig. 3-62**

### 3-20. Installing the Drain Hose

NWFL

a) The drain hose should be slanted downward to the outside. (Fig. 3-63)

b) Never form a trap in the course of the hose.

c) If the drain hose will run in the room, insulate the hose* so that chilled condensation will not damage furniture or floors.

* Foamed polyethylene or its equivalent is recommended.

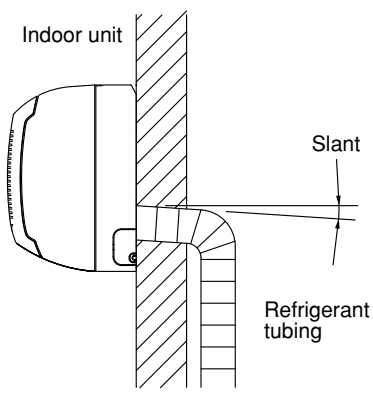



**Fig. 3-63**

**WARNING** **Do not supply power to the unit or operate it until all tubing and wiring to the outdoor unit are completed.**

## ■ Ceiling-Mounted Type (NPFL Type)

### 3-21. Required Minimum Space for Installation and Service

#### (1) Dimensions of suspension bolt pitch and unit

| Type \ Length | A | B | C |
|---|---|---|---|
| **12, 16, 18** | 855 | 910 | 210 |
| **24** | 1125 | 1180 | 210 |
| **36, 48** | 1540 | 1595 | 210 |

Unit: mm

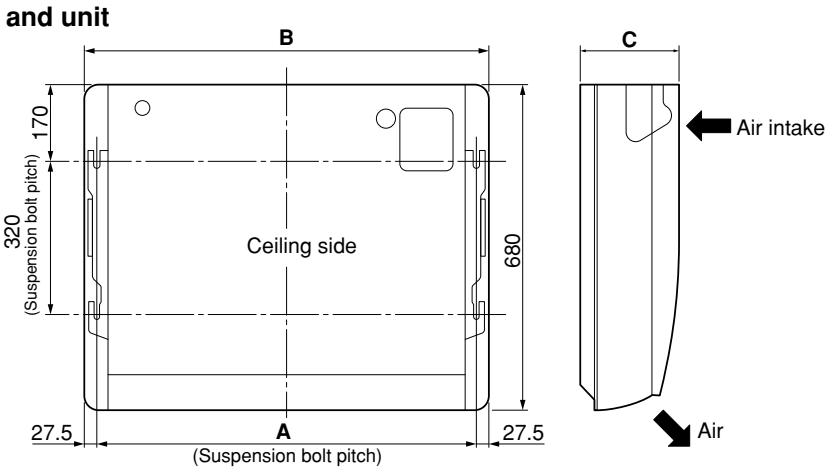



**Fig. 3-64**

#### (2) Refrigerant tubing • drain hose position

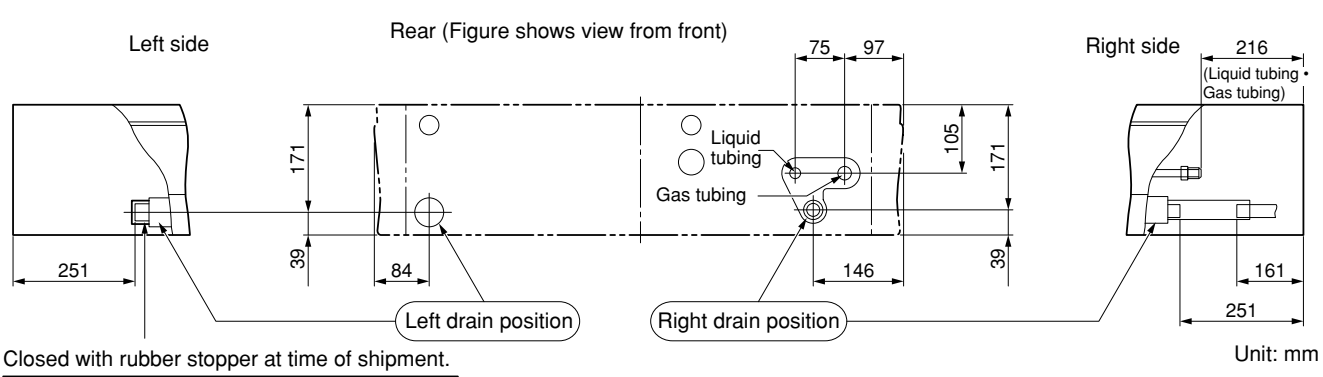
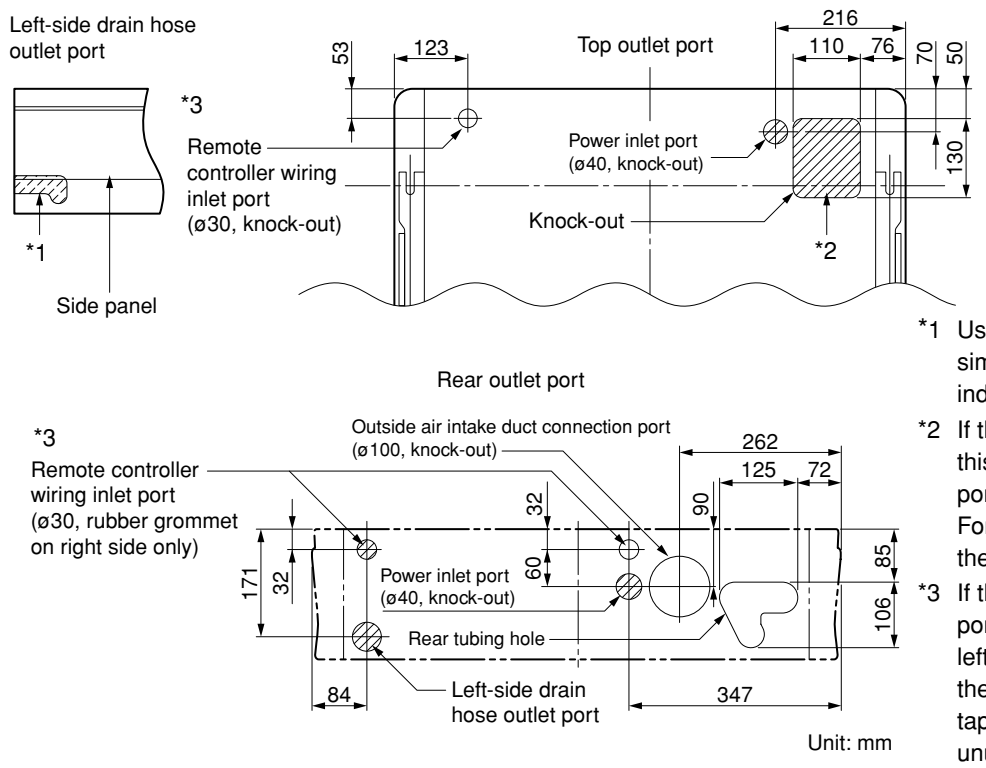



**Fig. 3-65**

#### (3) Unit opening position (Refrigerant tubing • drain hose • power inlet port • remote controller wiring inlet port)




*1 Use a compass saw, jig saw or similar tool and cut along the indented portion of the side panel.

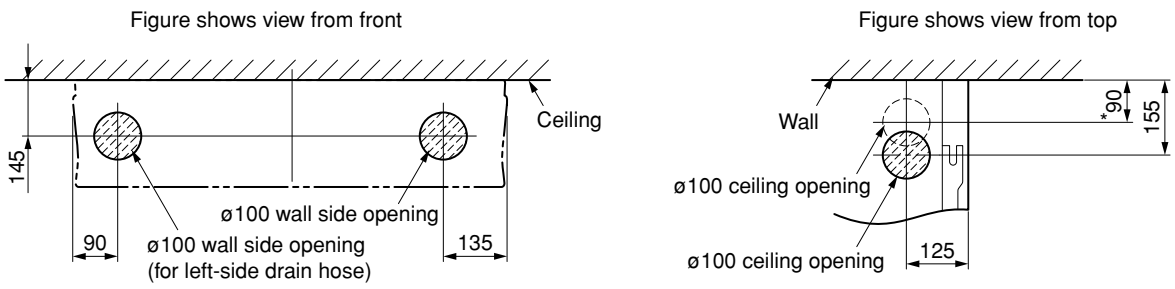
*2 If the optional drain up kit is installed, this becomes the upper tubing outlet port.
For details, refer to the manual for the optional part.

*3 If the remote controller wiring inlet port is changed to the left side or the left top side, change the location of the rubber grommet. Use aluminum tape or similar material to seal the unused inlet port on the right side.

**Fig. 3-66**

NPFL

**(4) Wall and ceiling side opening position**




* If the optional drain up kit is installed, create a ø100 hole along the dotted line (part marked with * in figure).

**Fig. 3-67**

### 3-22. Suspending the Indoor Unit

(1) Place the full-scale diagram (supplied) on the ceiling at the spot where you want to install the indoor unit. Use a pencil to mark the drill holes. (Fig. 3-68).

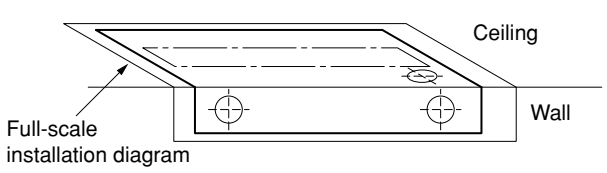



**Fig. 3-68**

**NOTE**

Since the diagram is made of paper, it may shrink or stretch slightly because of high temperature or humidity. For this reason, before drilling the holes maintain the correct dimensions between the markings.

(2) Drill holes at the 4 points indicated on the full-scale diagram.

(3) Depending on the ceiling type:

a) Insert suspension bolts as shown in Fig. 3-69.

or

b) Use existing ceiling supports or construct a suitable support as shown in Fig. 3-70.

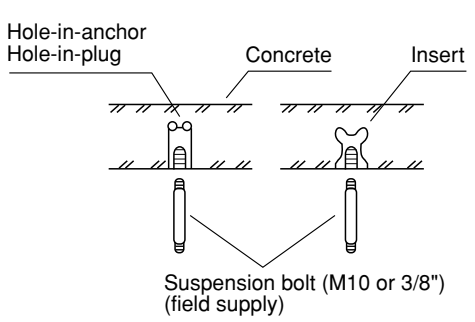



**Fig. 3-69**

**WARNING**

**It is important that you use extreme care in supporting the indoor unit from the ceiling. Ensure that the ceiling is strong enough to support the weight of the unit. Before hanging the ceiling unit, test the strength of each attached suspension bolt.**

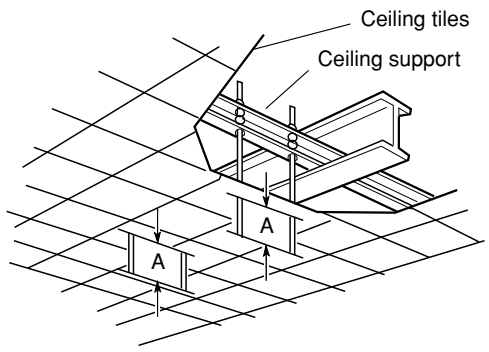



**Fig. 3-70**

(4) Screw in the suspension bolts, allowing them to protrude from the ceiling as shown in Figs. 3-69 and 3-70. The distance of each exposed bolt must be of equal length within 50 mm. (Fig. 3-71)

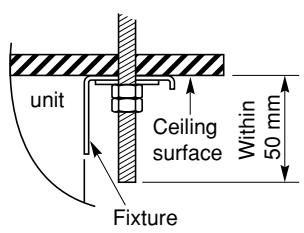



**Fig. 3-71**

(5) Before suspending the indoor unit, remove the 2 or 3 screws on the latch of the air-intake grilles, open the grilles, and remove them by pushing the claws of the hinges as shown in Fig. 3-72a. Then remove both side panels sliding them along the unit toward the front after removing the 2 attachment screws. (Fig. 3-72b)

(6) Carry out the preparation for suspending the indoor unit. The suspension method varies depending on whether there is a suspended ceiling or not. (Figs. 3-73a and 3-73b)

(7) Suspend the indoor unit as follows:

a) Mount 1 washer and 2 hexagonal nuts on each suspension bolt as shown in Fig. 3-73c.

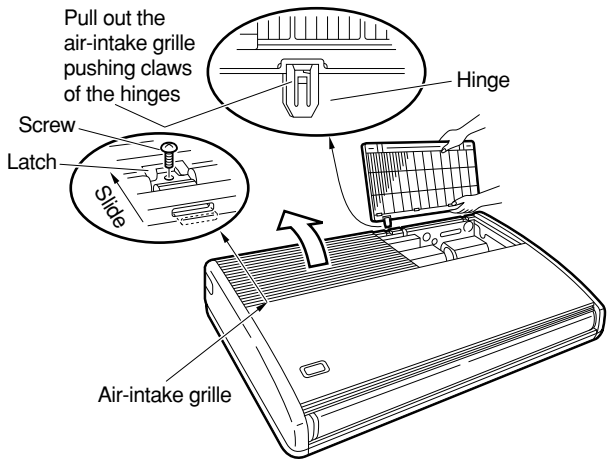



**Fig. 3-72a**

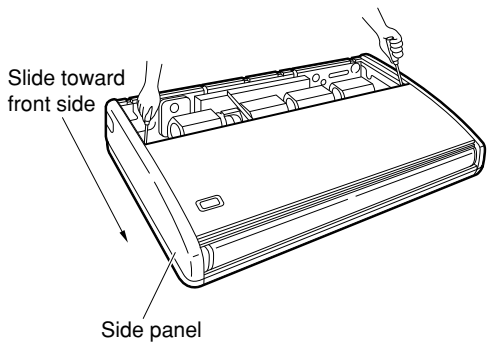



**Fig. 3-72b**

NPFL

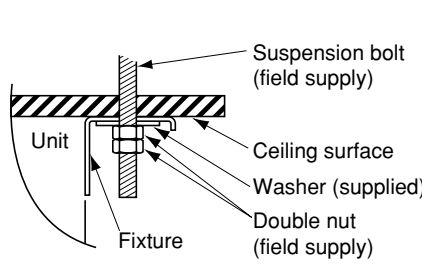



**Fig. 3-73a**

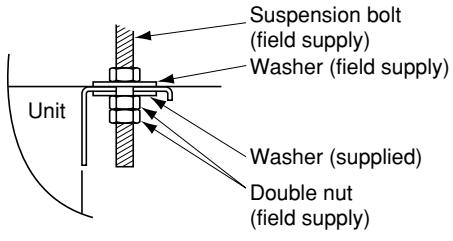



**Fig. 3-73b**

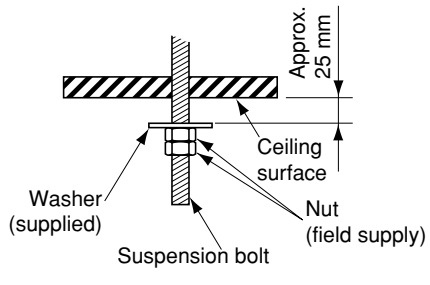



**Fig. 3-73c**

b) Lift the indoor unit, and place it on the washers through the notches, in order to fix it in place. (Fig. 3-74)

c) Tighten the 2 hexagonal nuts on each suspension bolt to suspend the indoor unit as shown in Fig. 3-75.

**NOTE**

The ceiling surface is not always level. Please confirm that the indoor unit is evenly suspended. For the installation to be correct, leave a clearance of about 10 mm between the ceiling panel and the ceiling surface and fill the gap with an appropriate insulation or filler material.

(8) If the tubing and wiring are to go towards the rear of the unit, make holes in the wall. (Fig. 3-76)

(9) Measure the thickness of the wall from the inside to the outside and cut PVC pipe at a slight angle to fit. Insert the PVC pipe in the wall. (Fig. 3-77)

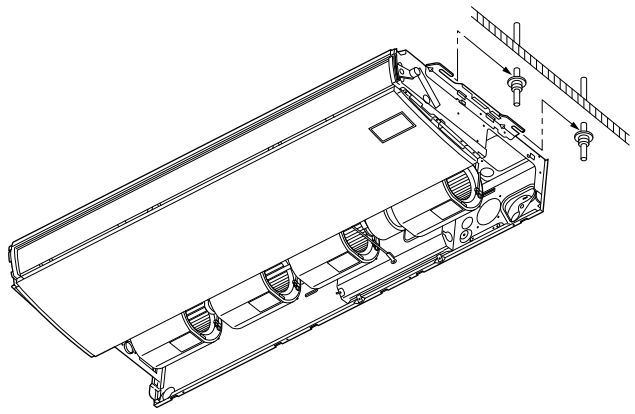


**Fig. 3-74**

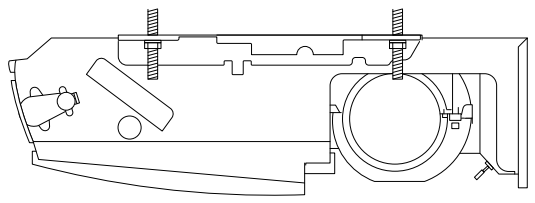


**Fig. 3-75**

**NOTE**

The hole should be made at a slight downward slant to the outside.

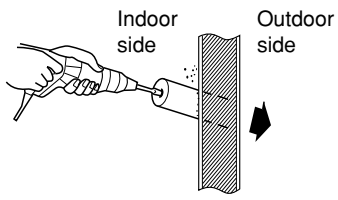



**Fig. 3-76**

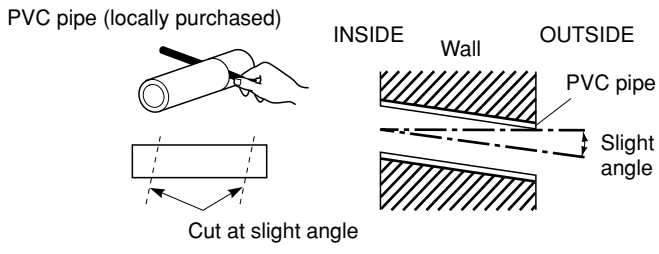



**Fig. 3-77**

### 3-23. Duct for Fresh Air

There is a duct connection port (knock-out hole) at the right-rear of the top panel of the indoor unit for drawing in fresh air. If it is necessary to draw in fresh air, remove the cover by opening the hole and connecting the duct to the indoor unit through the connection port. (Fig. 3-78a)

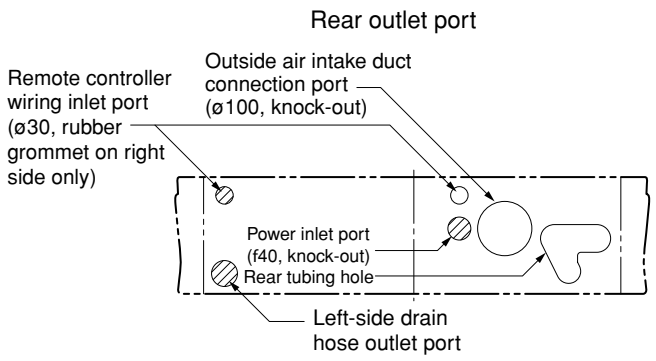



**Fig. 3-78a**

### 3-24. Shaping the Tubing

- The positions of the refrigerant tubing connections are shown in the figure below. (The tubing can be routed in 3 directions.)

* When routing the tubing out through the top or right sides, knock out the appropriate parts in the top panel and cut notches in the side panel as shown in Fig. 3-66.

* When routing the tubing out through the top, the optional L-shape tubing kit is required.

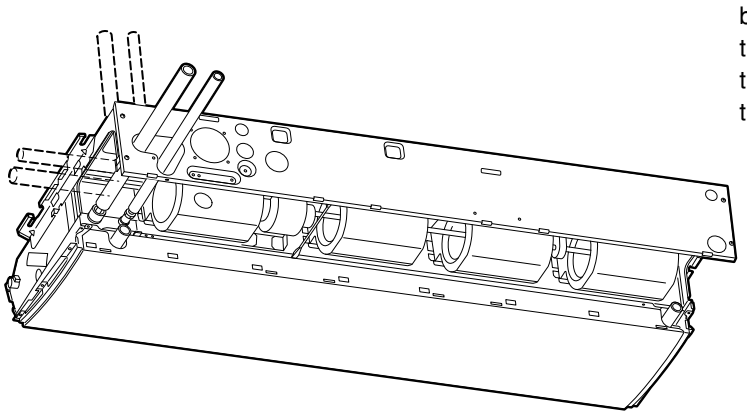


**Fig. 3-78b**

If the tubing is to be routed out together, use a box cutter or similar tool to cut out the part of the rear cover indicated by the marked area in the figure below, to match the positions of the tubes. Then draw out the tubing.

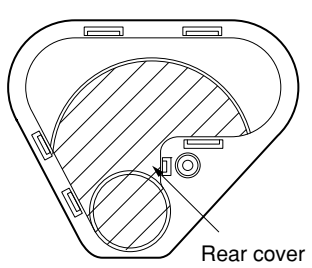



**Fig. 3-78c**

NPFL

### 3-25. Installing the Drain Piping

- Prepare standard PVC pipe for the drain and connect it to the indoor unit drain pipe with the supplied hose clamps to prevent water leaks.

(1) Drain hose connection

- The drain hose is connected below the refrigerant tubing.

(2) Installing the drain hose

- To install the drain hose, first place 1 of the 2 hose bands over the unit drain port and the other hose band over the hard PVC pipe (not supplied). Then connect both ends of the supplied drain hose.
- On the unit drain side, grasp the hose band with pliers and insert the drain hose all the way to the base.

**CAUTION**

- **Attach so that the hose band fastener is on the side of the drain port. (Fig. 3-80)**
- **Attach the hose bands so that each is approximately 5 to 25 mm from the end of the supplied drain hose.**

- If other commercially available hose bands are used, the drain hose may become pinched or wrinkled and there is danger of water leakage. Therefore be sure to use the supplied hose bands. When sliding the hose bands, be careful to avoid scratching the drain hose.
- Do not use adhesive when connecting the supplied drain hose to the drain port (either on the main unit or the PVC pipe).
- Wrap the hose with the supplied drain hose insulation and use the 4 twist ties so that the hose is insulated with no gaps.
- Connect the drain piping so that it slopes downward from the unit to the outside. (Fig. 3-79)
- Never allow traps to occur in the course of the piping.
- Insulate any piping inside the room to prevent dripping.
- After the drain piping, pour water into the drain pan to check that the water drains smoothly.
- If the drain hose is to be raised, use the optional drain up kit.
  The drain hose can be raised 60 cm above the top of the main unit. (For details, refer to the manual of the optional part.)*

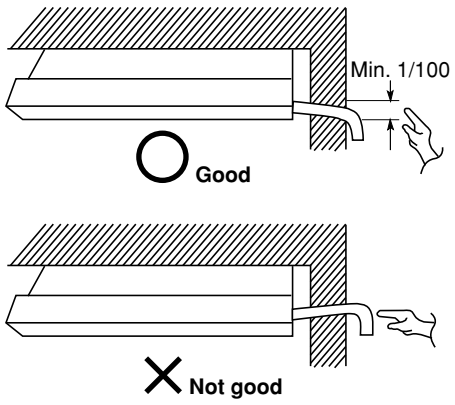



**Fig. 3-79**

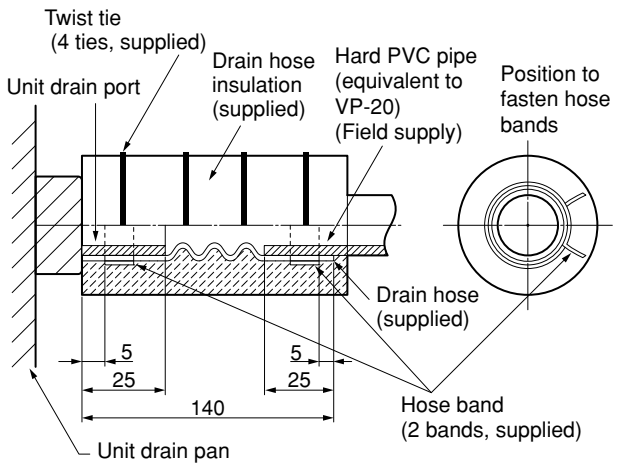
NPFL

* If the drain hose is routed through the left side, refer to Fig. 3-78b, and follow the procedure above to install the hose. Reattach the rubber stopper that was earlier removed onto the right side.


The rubber stopper can be inserted easily by using a screwdriver or similar tool to press the stopper into the drain port on the main unit. Press the stopper into the main unit drain port as far as it will go.

**CAUTION**

**Check local electrical codes and regulations before wiring. Also, check any specified instruction or limitations.**




Unit: mm

**Fig. 3-80**

**How to carry out power supply wiring**

(1) Wiring connection ports

The power inlet ports are located at the rear and top.

The remote controller wiring inlet ports are located at the rear and top (for use with the wired remote controller).
For details, refer to Fig. 3-78a. For the method used to insert the wiring, refer to the figure below. (Fig. 3-81)

**CAUTION**

**When removing the fastening bracket from the cover of the electrical component box, use caution to avoid dropping the bracket.**

(2) How to carry out wiring

- Open the knock-out hole on the rear or top of the main unit. Attach the supplied rubber grommet and pull the power wiring into the main unit.
- Feed the wiring into the wiring inlet port on the electrical component box. Connect the wiring to the terminal plate and fasten in place with the supplied clamp.
- Perform electrical and grounding work in accordance with the package A/C power specifications, and following local electrical codes and regulations.

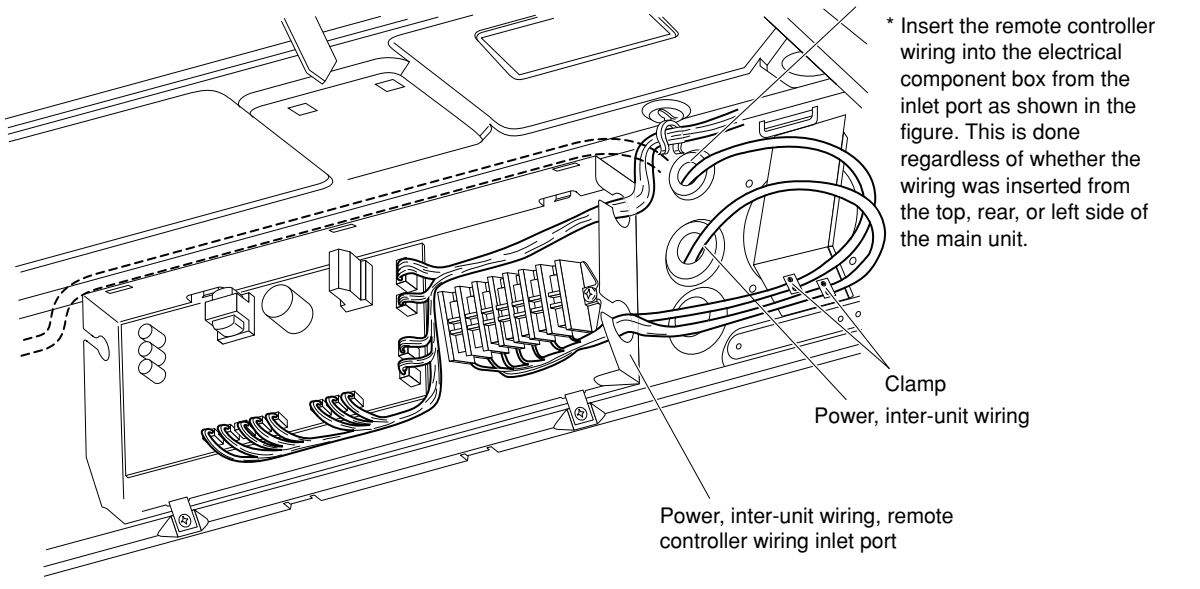


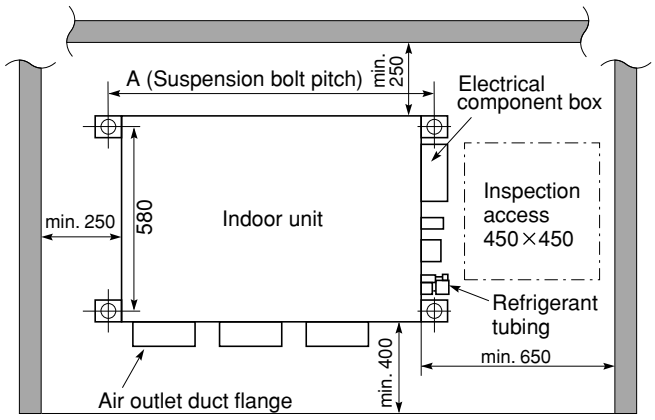

**Fig. 3-81**

NPFL

## ■ Concealed-Duct Type (NDLP Type)

### 3-26. Required Minimum Space for Installation and Service

- This air conditioner is usually installed above the ceiling so that the indoor unit and ducts are not visible. Only the air intake and air outlet ports are visible from below.
- The minimum space for installation and service is shown in Fig. 3-82 and Table 3-5.
- It is recommended that space is provided (450 × 450 mm) for checking and servicing the electrical system.
- Fig. 3-83 and Table 3-6 show the detailed dimensions of the indoor unit.




Unit: mm

**Fig. 3-82**

**Table 3-5**

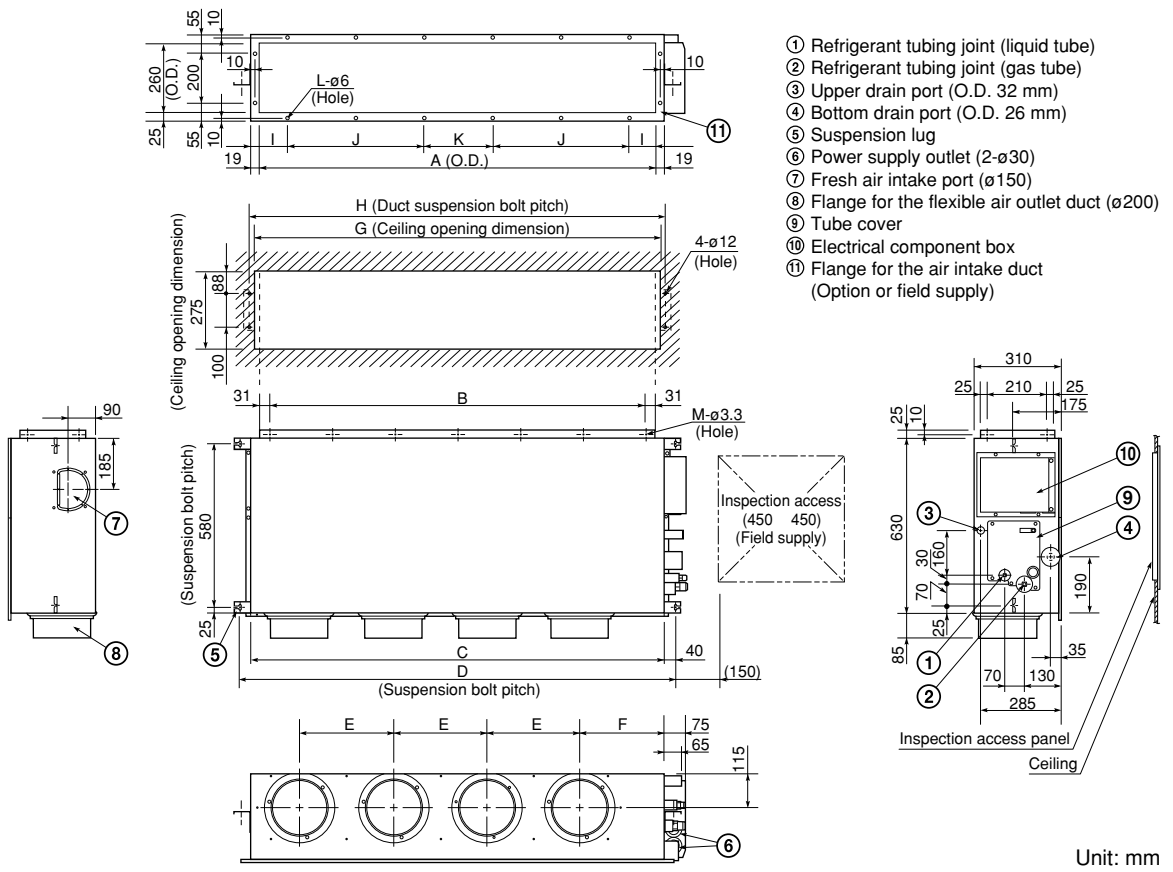
Unit: mm

| Type | 7, 9, 12, 16, 18 | 24 | 36, 48 |
|---|---|---|---|
| A (Length) | 780 | 1,080 | 1,560 |
| Number of duct flanges | 2 | 3 | 4 |

**Table 3-6**

Unit: mm

| Type \ Dimension | A | B | C | D | E | F | G | H | I | J | K | No. of holes L | No. of holes M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7, 9, 12, 16, 18 | 662 | 600 (200 × 3) | 700 | 780 | 290 | 262 | 680 | 715 | 180 | – | 340 | 8 | 12 |
| 24 | 962 | 900 (180 × 5) | 1,000 | 1,080 | 290 | 272 | 980 | 1,015 | 130 | 245 (245 × 1) | 250 | 12 | 16 |
| 36, 48 | 1,442 | 1,380 (230 × 6) | 1,480 | 1,560 | 335 | 310 | 1,460 | 1,495 | 130 | 490 (245 × 2) | 240 | 16 | 18 |




① Refrigerant tubing joint (liquid tube)
② Refrigerant tubing joint (gas tube)
③ Upper drain port (O.D. 32 mm)
④ Bottom drain port (O.D. 26 mm)
⑤ Suspension lug
⑥ Power supply outlet (2-ø30)
⑦ Fresh air intake port (ø150)
⑧ Flange for the flexible air outlet duct (ø200)
⑨ Tube cover
⑩ Electrical component box
⑪ Flange for the air intake duct (Option or field supply)

Unit: mm

**Fig. 3-83**

### 3-27. Suspending the Indoor Unit

Depending on the ceiling type:

- Insert suspension bolts as shown in Fig. 3-84

  or

- Use existing ceiling supports or construct a suitable support as shown in Fig. 3-85.

**WARNING** **It is important that you use extreme care in supporting the indoor unit inside the ceiling. Ensure that the ceiling is strong enough to support the weight of the unit. Before hanging the unit, test the strength of each attached suspension bolt.**

(1) When placing the unit inside the ceiling, determine the pitch of the suspension bolts referring to the dimensional data on the previous page. (Fig. 3-82 and Table 3-5)
Tubing must be laid and connected inside the ceiling when suspending the unit. If the ceiling is already constructed, lay the tubing into position for connection to the unit before placing the unit inside the ceiling.

(2) Screw in the suspension bolts allowing them to protrude from the ceiling as shown in Fig. 3-84. (Cut the ceiling material, if necessary.)

(3) Thread the 3 hexagonal nuts and 2 washers (field supply) onto each of the 4 suspension bolts as shown in Figs. 3-86 and 3-87. Use 1 nut and 1 washer for the upper part, and 2 nuts and 1 washer for the lower part, so that the unit will not fall off the suspension lugs.

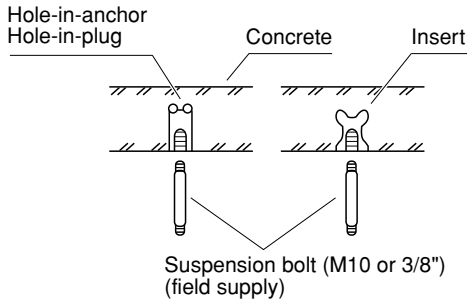



**Fig. 3-84**

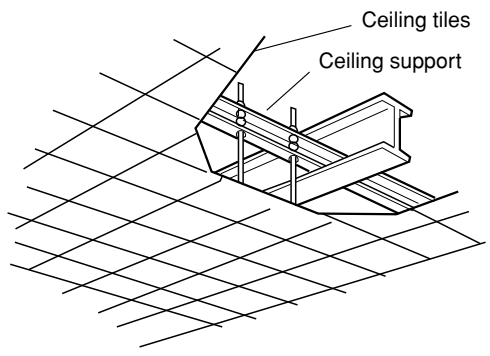



**Fig. 3-85**

NDLP

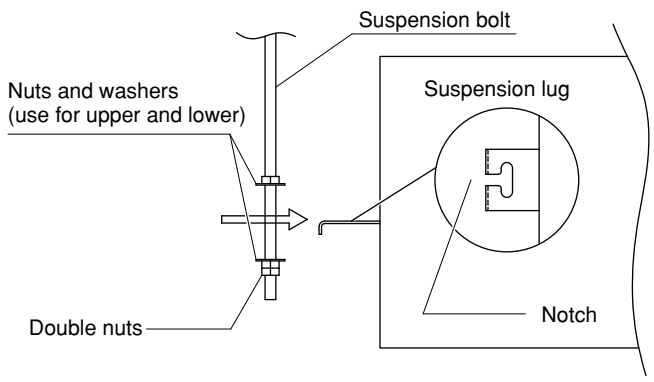



**Fig. 3-86**

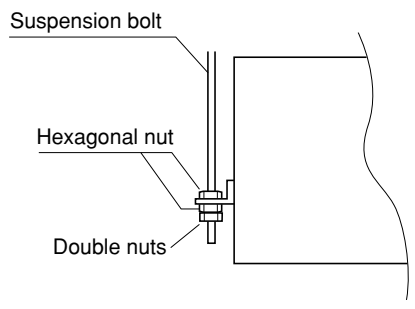



**Fig. 3-87**

● Fig. 3-88 shows an example of installation.

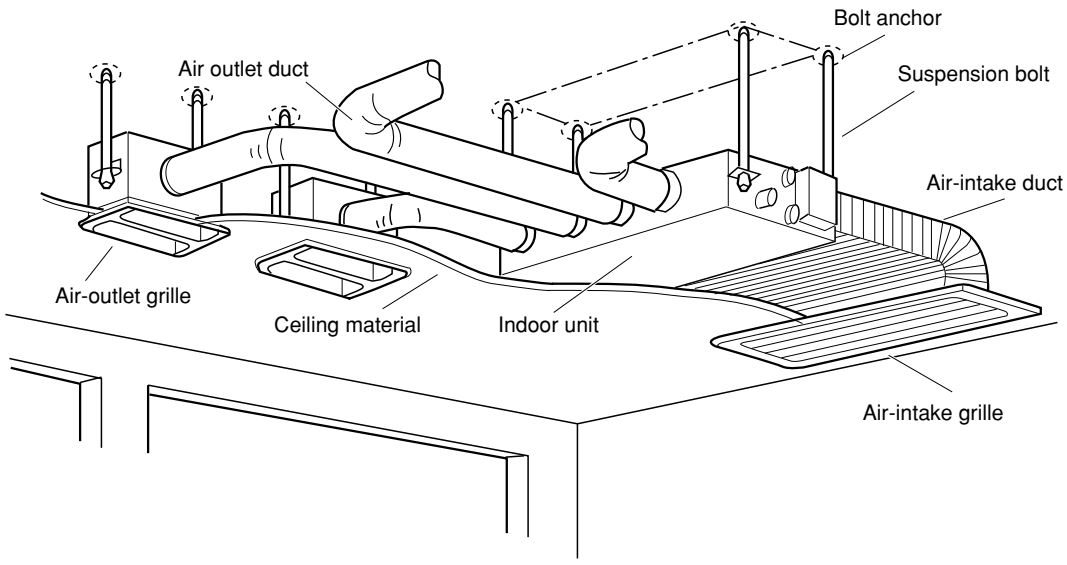



**Fig. 3-88**

### 3-28. Installing the Drain Piping

(1) Prepare standard hard PVC pipe (O.D. 32 mm) for the drain and use the supplied hose band to prevent water leaks.
The PVC pipe must be purchased separately.
The transparent drain part on the unit allows you to check drainage. (Fig. 3-89a)

**CAUTION**

- **Do not use adhesive at the drain connection port on the indoor unit.**
- **Insert the drain pipe until it contacts the socket, as shown in the figure at right, then secure it tightly with the hose band.**
- **Do not use the supplied drain hose bent at a 90° angle. (The maximum permissible bend is 45°.)**
- **Tighten the hose clamps so their locking nuts face upward. (Flg. 3-89a)**

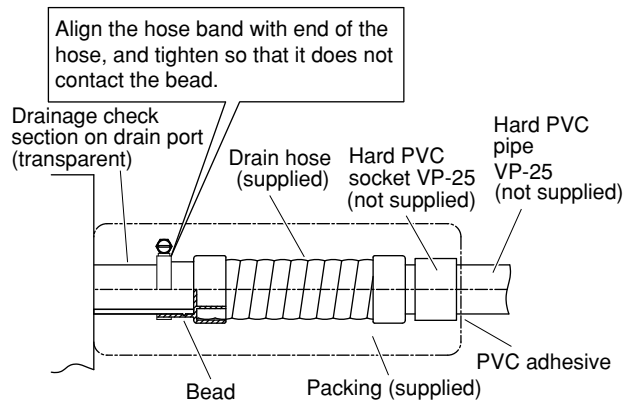



**Fig. 3-89a**

(2) After connecting the drain piping securely, wrap the supplied packing and drain pipe insulator around the pipe, then secure it with the supplied vinyl clamps. (Fig. 3-89b)

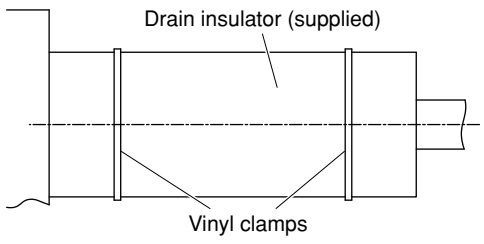



**Fig. 3-89b**

**NOTE**

Make sure the drain pipe has a downward gradient (1/100 or more) and that there are no water traps.

**CAUTION**

- **Do not install an air bleeder as this may cause water to spray from the drain pipe outlet. (Fig. 3-90)**

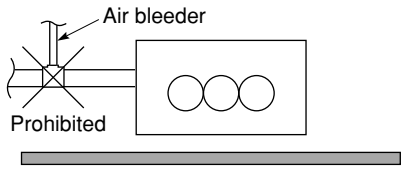



**Fig. 3-90**

- **If it is necessary to increase the height of the drain pipe, the section directly after the connection port can be raised a maximum of 50 cm. Do not raise it any higher than 50 cm, as this could result in water leaks. (Fig. 3-91)**
- Do not install the pipe with an upward gradient from the connection port. This will cause the drain water to flow backward and leak when the unit is not operating. (Fig. 3-92)
- Do not apply force to the piping on the unit side when connecting the drain pipe. The pipe should not be allowed to hang unsupported from its connection to the unit. Fasten the pipe to a wall, frame, or other support as close to the unit as possible. (Fig. 3-93)

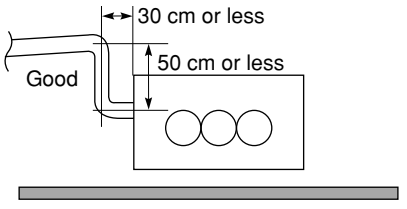



**Fig. 3-91**

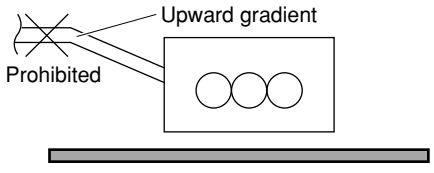



**Fig. 3-92**

### 3-29. Checking the Drainage

After wiring and drain piping are completed, use the following procedure to check that the water will drain smoothly. For this, prepare a bucket and wiping cloth to catch and wipe up spilled water.

(1) Connect power to the power terminal board (R, S terminals) inside the electrical component box.

(2) Remove the tube cover and through the opening, slowly pour about 1,200 cc of water into the drain pan to check drainage.

(3) Short the check pin (CHK) on the indoor control board and operate the drain pump. Check the water flow through the transparent drain port and see if there is any leakage.

**CAUTION**

**Be careful since the fan will start when you short the pin on the indoor control board.**

(4) When the check of drainage is complete, open the check pin (CHK) and remount the insulator and drain cap onto the drain inspection port.

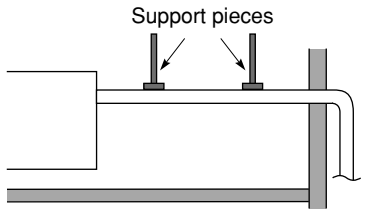



**Fig. 3-93**

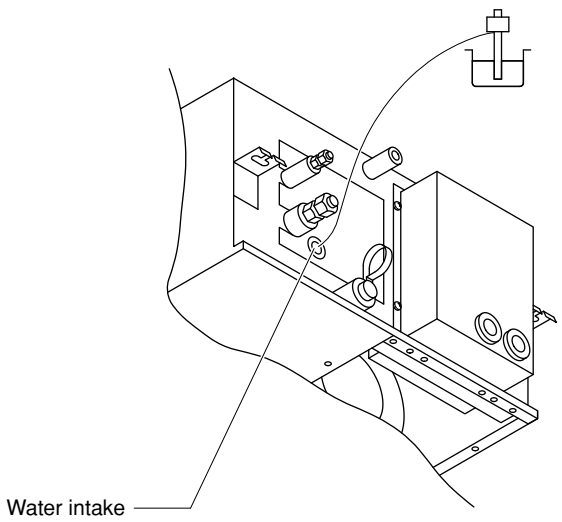



**Fig. 3-94**

NDLP

### 3-30. Increasing the Fan Speed

If external static pressure is too great (due to long extension of ducts, for example), the air flow volume may drop too low at each air outlet. This problem may be solved by increasing the fan speed using the following procedure:

(1) Remove 4 screws on the electrical component box and remove the cover plate.

(2) Disconnect the fan motor sockets in the box.

(3) Take out the booster cable (sockets at both ends) clamped in the box.

(4) Securely connect the booster cable sockets between the disconnected fan motor sockets in step 2 as shown in Fig. 3-95.

(5) Place the cable neatly in the box and reinstall the cover plate.

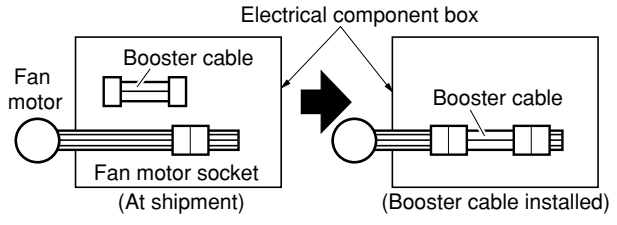
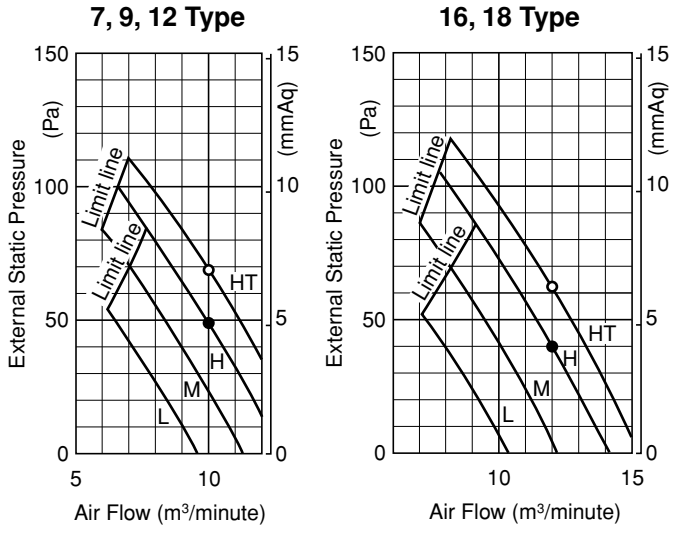
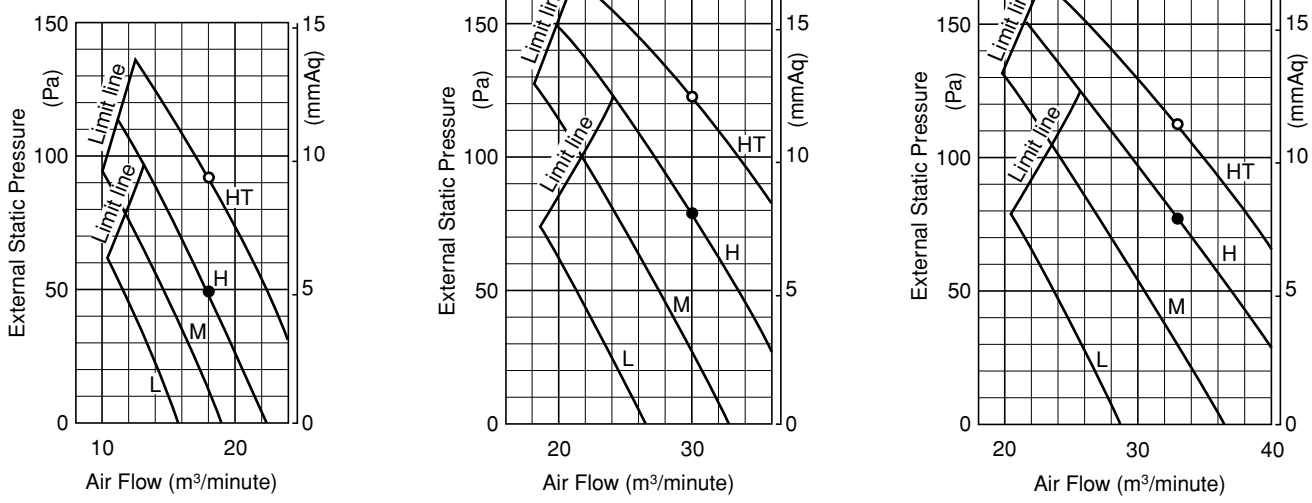



**Fig. 3-95**

**Indoor Fan Performance**




**NOTE** HT : Using the booster cable

H : At shipment

**Fig. 3-96**

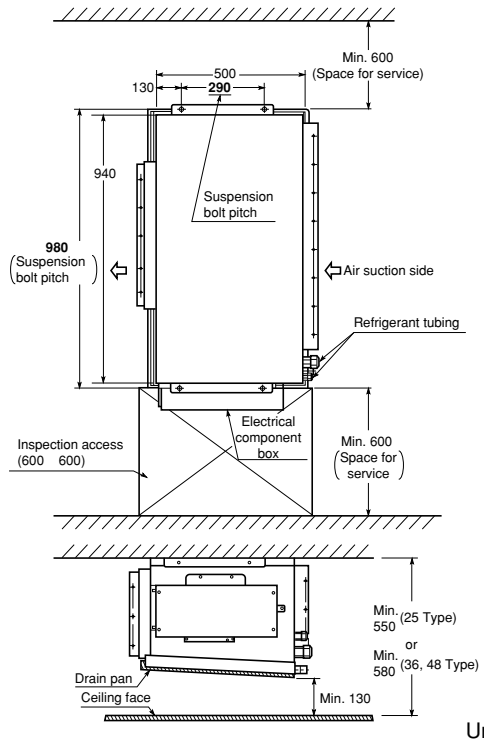
**■ How to read the diagram**

The vertical axis is the external static pressure (Pa) while the horizontal axis represents the air flow (m³/minute). The characteristic curves for “HT,” “H,” “M” and “L” fan speed control are shown. The nameplate values are shown based on the “H” air flow. For the 24 type, the air flow is 18 m³/minute, while the external static pressure is 49 Pa at “H” position. If external static pressure is too great (due to long extension of ducts, for example), the air flow volume may drop too low at each air outlet. This problem may be solved by increasing the fan speed as explained above.

## ■ Concealed-Duct High Static Pressure Type (NDHP Type)

### 3-31. Required Minimum Space for Installation and Service (24, 36, 48 Type)

- This air conditioner is usually installed above the ceiling so that the indoor unit and ducts are not visible. Only the air intake and air outlet ports are visible from below.
- The minimum space for installation and service is shown in Fig. 3-97a.
- It is recommended that space be provided (600 × 600 mm) for checking and servicing the electrical system.
- Fig. 3-97b and Table 3-7 show the detailed dimensions of the indoor unit.




Unit: mm

**Fig. 3-97a**

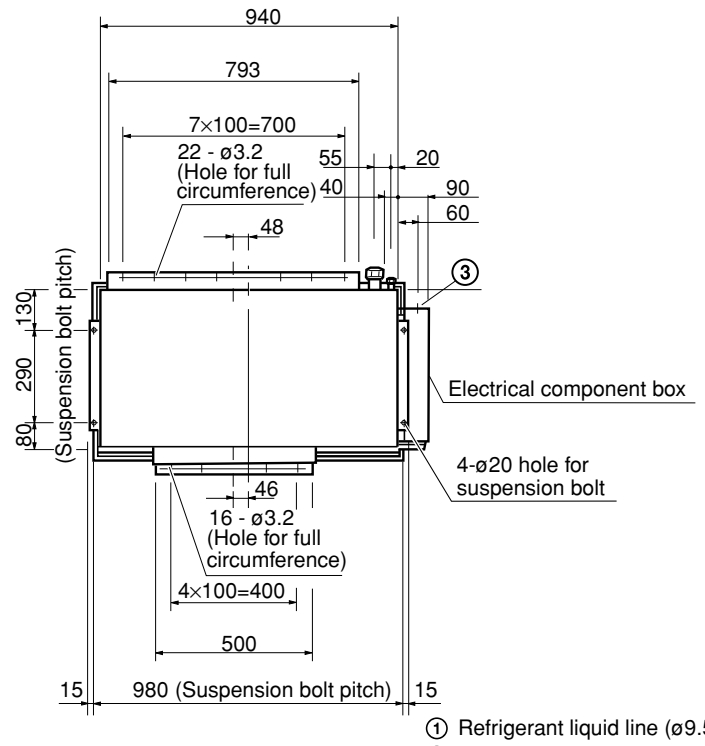
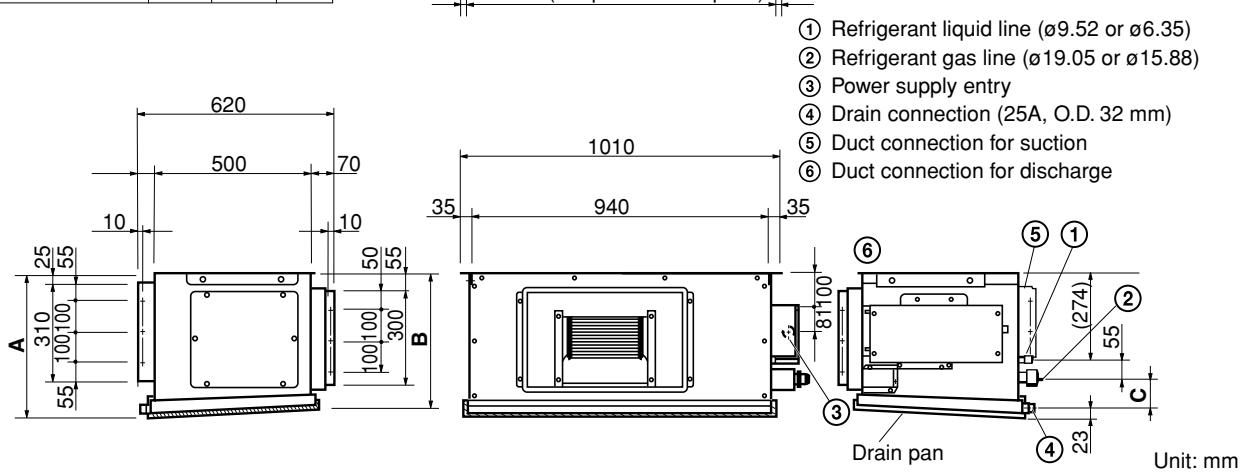



**Table 3-7** Unit: mm

| Type \ Length | A | B | C |
|---|---|---|---|
| **24, 36** | 420 | 395 | 68 |
| **48** | 450 | 425 | 98 |



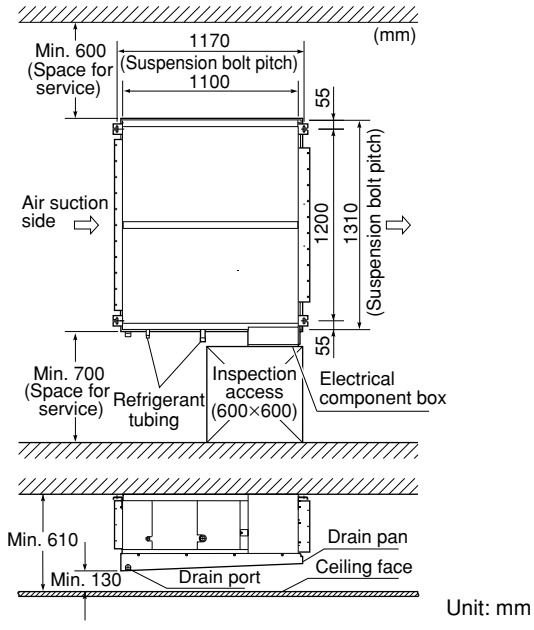

Unit: mm

**Fig. 3-97b**

NDHP

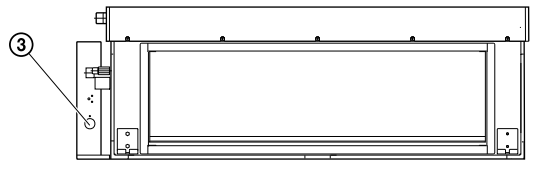
### 3-32. Required Minimum Space for Installation and Service (76, 96 Type)

- This air conditioner is usually installed above the ceiling so that the indoor unit and ducts are not visible.
- Only the air intake and air outlet ports are visible from below.
- The minimum space for installation and service is shown in Fig. 3-98a.
- It is recommended that space be provided (600 × 600 mm) for checking and servicing the electrical system.
- Fig. 3-98b shows the detailed dimensions of the indoor unit.

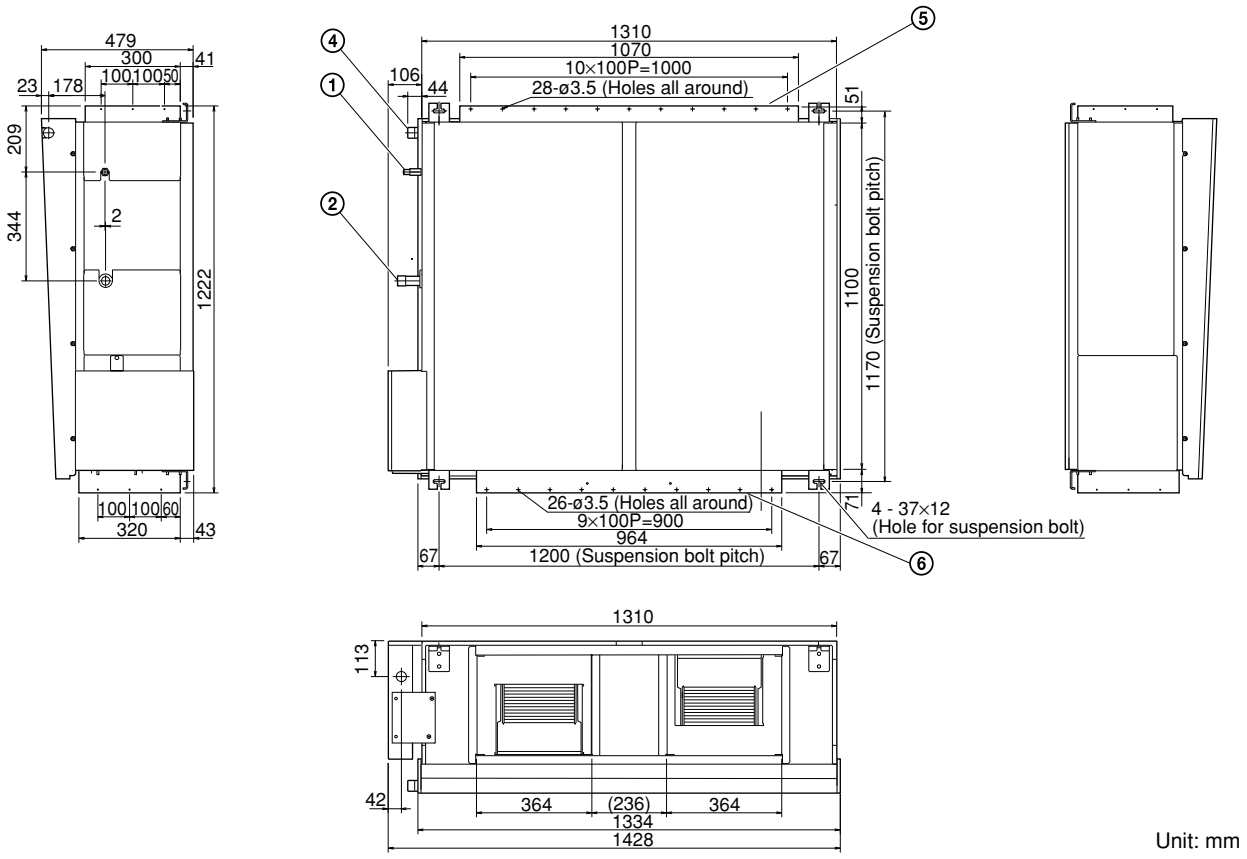



Unit: mm

**Fig. 3-98a**




① Refrigerant tubing joint (narrow tube ø12.7 mm)
② Refrigerant tubing joint (wide tube ø28.6 mm)
③ Power supply outlet
④ Drain port (O.D. 32 mm)
⑤ Duct connection for suction
⑥ Duct connection for discharge




Unit: mm

**Fig. 3-98b**

### 3-33. Suspending the Indoor Unit

Depending on the ceiling type:

- Insert suspension bolts as shown in Fig. 3-99

  or

- Use existing ceiling supports or construct a suitable support as shown in Fig. 3-100.

**WARNING** **It is important that you use extreme care in supporting the indoor unit inside the ceiling. Ensure that the ceiling is strong enough to suport the weight of the unit. Before hanging the unit, test the strength of each attached suspension bolt.**

(1) When placing the unit inside the ceiling, determine the pitch of the suspension bolts referring to the dimensional data as given in Fig. 3-97.

Tubing must be laid and connected inside the ceiling when suspending the unit. If the ceiling is already constructed, lay the tubing into position for connection to the unit before placing the unit inside the ceiling.

(2) Screw in the suspension bolts allowing them to protrude from the ceiling as shown in Fig. 3-99. (Cut the ceiling material, if necessary.)

(3) Suspend and fix the indoor unit using the 2 hexagonal nuts (field supply) and special washers (supplied with the unit) as shown in Fig. 3-101.

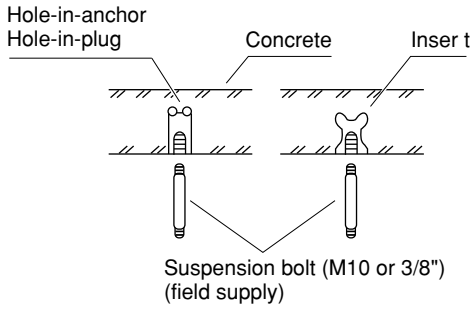



**Fig. 3-99**

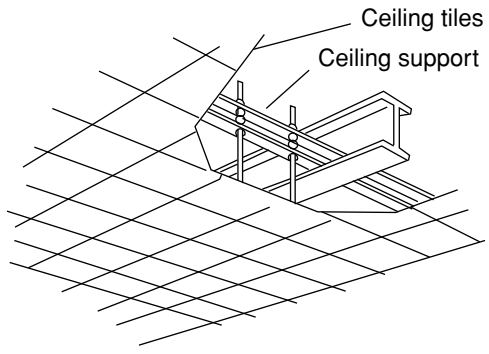



**Fig. 3-100**

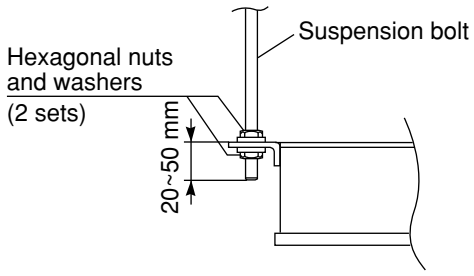



**Fig. 3-101**

NDHP

### 3-34. Installing the Refrigerant Tubing

The size of the refrigerant tubing is as shown in the table below.

**Table 3-8**

| | 76 Type | 96 Type |
|---|---|---|
| **Gas tube (mm)** | ø19.05 (Brazing connection) | ø22.22 (Brazing connection) |
| **Liquid tube (mm)** | ø9.52 (Flare connection) | ø9.52 (Flare connection) |

- When brazing the gas tubing, cool the tubing with dampened shopcloths as you work, as shown in the figure at right, to protect the unit's thermistor from the heat generated by brazing.
- Be sure to insulate both the gas tubing and liquid tubing. In addition, wrap the supplied insulation material around the tubing joints, and fasten in place with vinyl tape or other means. Failure to insulate the tubing may result in water leakage from condensation.
- Plug all gaps at tube through-holes in the unit with insulation or a similar substance to prevent air leakage.

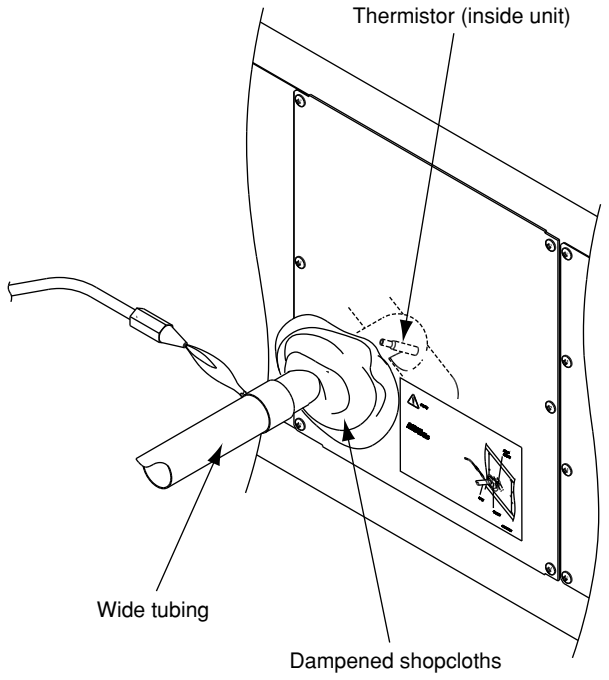



**Fig. 3-102a**

NDHP

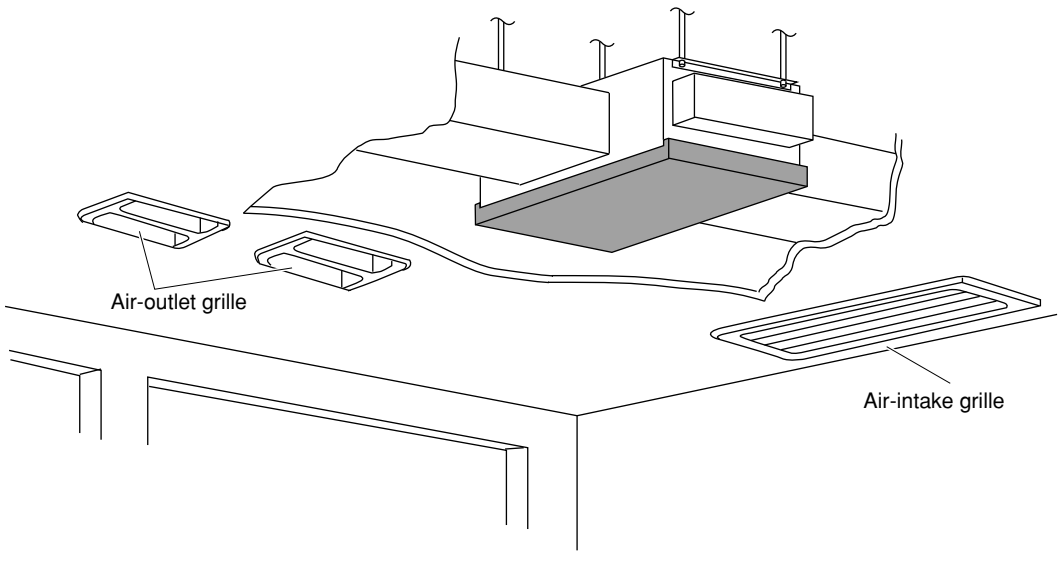



**Fig. 3-102b**

### 3-35. Installing the Drain Piping

(1) Prepare standard hard PVC pipe (O.D. 32 mm) for the drain and use the supplied drain socket to prevent water leaks. The PVC pipe must be purchased separately.
When doing this, apply adhesive for the PVC pipe at the connection point.

(2) If connecting a drain joint (supplied) to the threaded drain port, first wrap the drain port threads with sealing tape, then connect the joint. (Fig. 3-103)

(3) After connecting the drain pipe securely, wrap insulator (field supply) around the pipe.

(4) Ensure the drain pipe has a downward gradient (1/100 or more) and prepare traps as indicated in Fig. 3-104.

(5) Also, in another part of the pipe arrangement, prepare traps with an inspection plug to clean dirt or debris that may cause leaking of water. (Fig. 3-105)

(6) After connecting the drain piping, slowly pour water into the drain pan to check that the water drains smoothly.

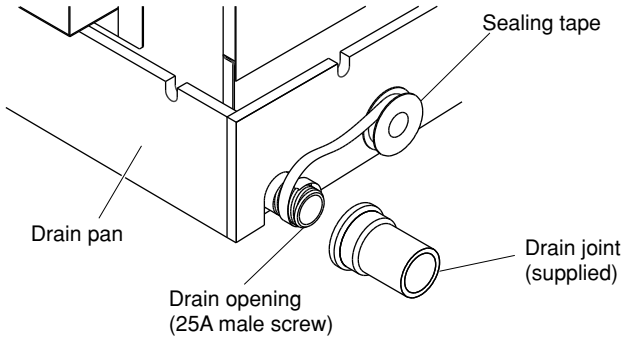



**Fig. 3-103**

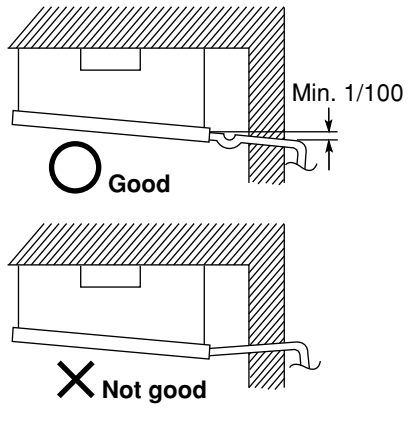



**Fig. 3-104**

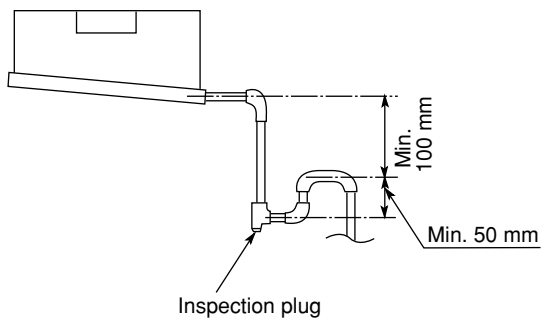



**Fig. 3-105**

NDHP

### 3-36. Caution for Ducting Work

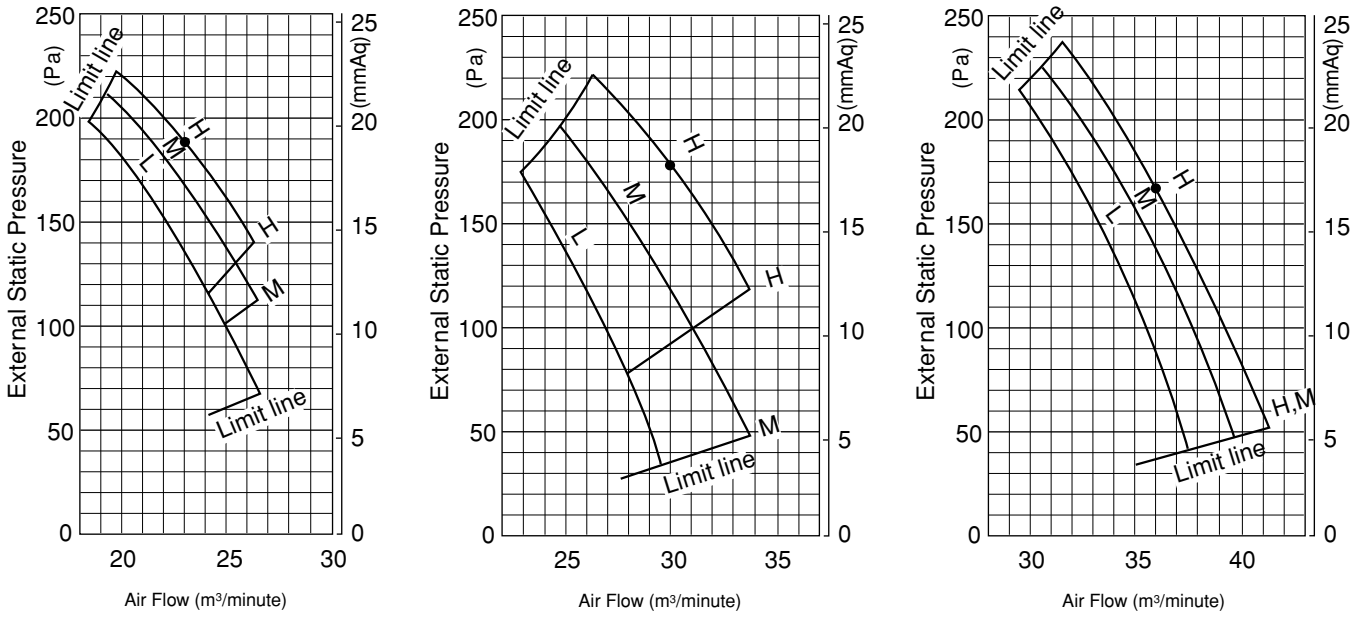
- This unit has high static pressure (applicable external static pressure Max. 167 to 216 pa (17 – 22 mm Aq). In the case of small pressure resistance (for instance, a short duct), install a damper for adjusting air flow volume as air flow volume / air flow noise increases.
- If the air conditioner is to be installed in a room such as an office or meeting room which needs a low sound level, provide a supply and return noise absorption chamber with an acoustic liner.
- Include an air filter (field supply) at the return duct.



### Indoor Fan Performance

#### How to Read the Diagram

The vertical axis is the External Static Pressure (mmAq) while the horizontal axis represents the Air Flow ($m^3$/minute). The characteristic curve for the “H,” “Med,” and “Lo” fan speed control.
The nameplate values are shown based on the “H” air flow. Therefore in the case of 24 Type, the flow is 23 $m^3$/minute, while the External Static Pressure is 19 mmAq at “H” position. If the external static pressure is too great (due to long extension of duct, for example), the air flow volume may drop too low at each air outlet.




**NOTE** H : At shipment

**Fig. 3-106**

### 3-37. Increasing the Fan Speed (96 Type only)

If external static pressure is too great (due to long extension of ducts, for example), the air flow volume may drop too low at each air outlet. This problem may be solved by increasing the fan speed using the following procedure:

(1) Remove 4 screws on the electrical component box and remove the cover plate.

(2) Disconnect the fan motor sockets in the box.

(3) Take out 2 booster cables from option carton box (sockets at both ends).

(4) Securely connect the booster cable's 2 sockets between the disconnected fan motor sockets in step 2 as shown in Fig. 3-107a.

(5) Place the cable neatly in the box and reinstall the cover plate.

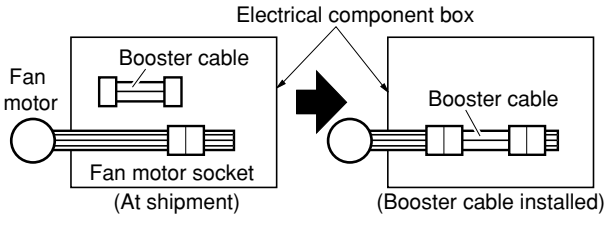
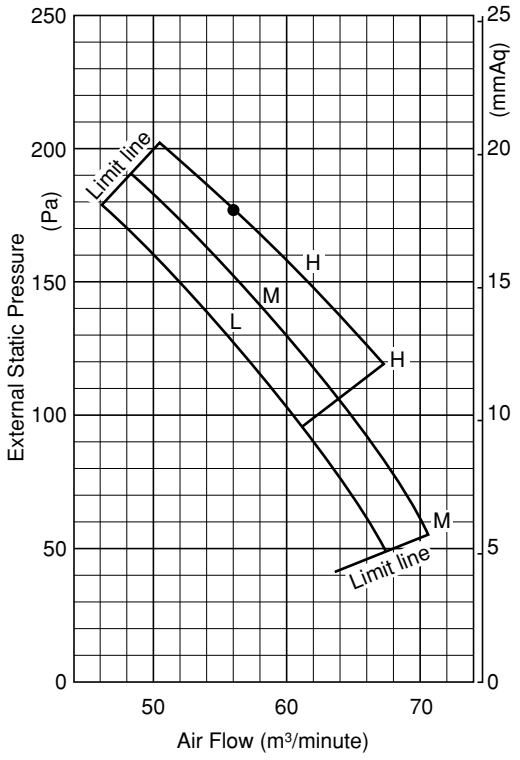


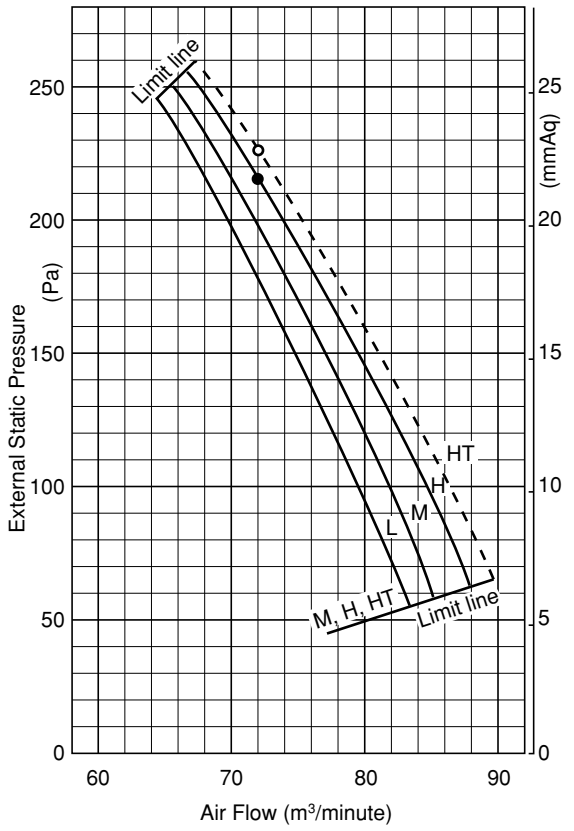

**Fig. 3-107a**

**Indoor Fan Performance**

**76 Type**




**96 Type**




**NOTE** HT : Using booster cable
H : At shipment

**Fig. 3-107b**

# 4. HOW TO INSTALL THE OUTDOOR UNIT

## 4-1. Transporting

When transporting the unit, have it delivered as close to the installation site as possible without unpacking. Use a hook for suspending the unit. (Fig. 4-1)

- When hoisting the outdoor unit, pass ropes or straps under the bottom plate as shown in the figure at right. When hoisting, the angle between the rope and top panel must be 70° or greater so that the rope does not come into contact with the fan guard. (Use 2 lengths of rope 7.5 meters long or longer.)
- When passing the ropes through the square holes of the bottom plate:
  Place the rope in the outer edge of the square holes.
- Use protective panels or padding at all locations where the rope contacts the outer casing or other parts to prevent scratching. In particular, use protective material (such as cloth or cardboard) to prevent the edges of the top panel from being scratched.
- Be careful of the fan.
  There is danger of injury if the fan starts to turn during inspection. Be sure to turn OFF the remote power switch before beginning inspection.

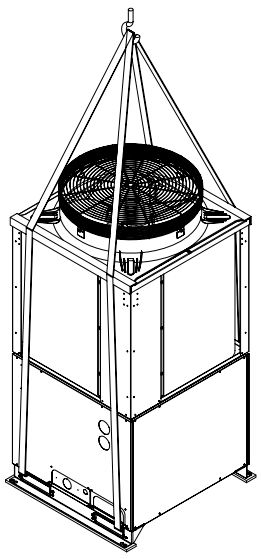
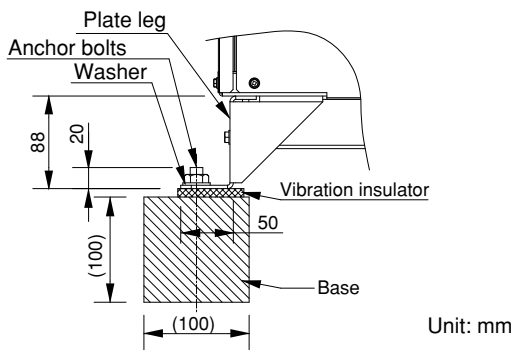


**Fig. 4-1**

## 4-2. Installing the Outdoor Unit

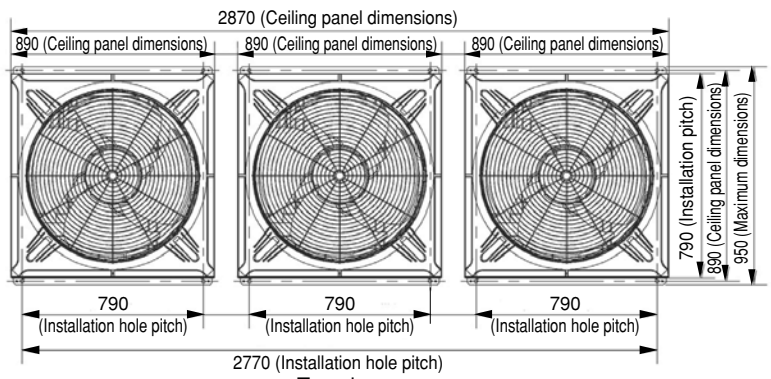
(1) Use anchor bolts (M12) or similar to securely anchor the unit in place. (Fig. 4-2)

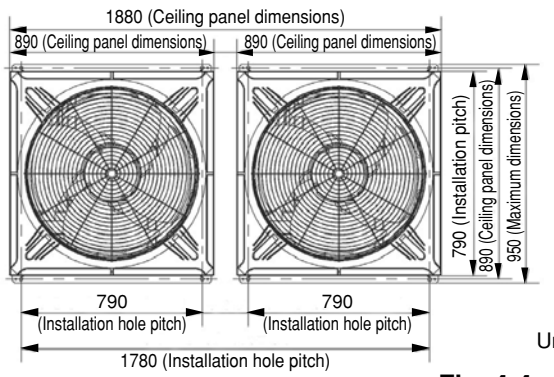
(2) Be sure the rubber vibration insulator and platform extend to the inside of the legs. In addition, the washers used to anchor the unit from the top must be larger than the installation anchor holes.
(Figs. 4-2 and 4-3)




The vibration insulator, base, or platform must be large enough to bear the full surfaces of the base plate legs.

**Fig. 4-2**

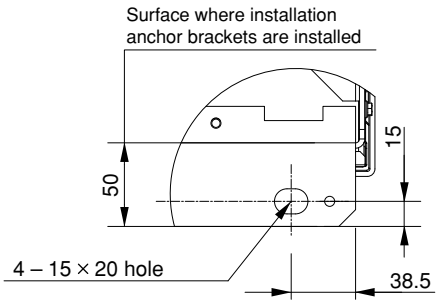



Unit: mm

**Fig. 4-4**

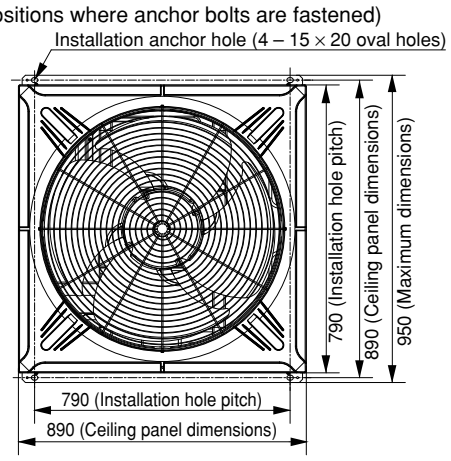
(Detailed view of legs)




Unit: mm

**Fig. 4-3**

(Positions where anchor bolts are fastened)




C

### 4-3. Remove the Brackets that Were Used for Transport

- After installing the unit, remove the 2 transport brackets from the front and rear (4 brackets total).

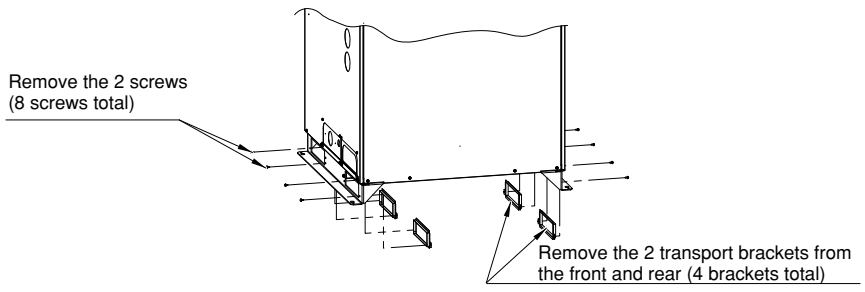



**Fig. 4-5**

### 4-4. Routing the Tubing

- The tubing can be routed out either from the front or from the bottom. (See figure.)
- The connecting valve is contained inside the unit. Therefore, remove the front panel. (See figure.)

(1) If the tubing is routed out from the front, use cutting pliers or a similar tool to cut out the tubing outlet slit (part indicated by ▨) from the tubing cover. (See figure below.)

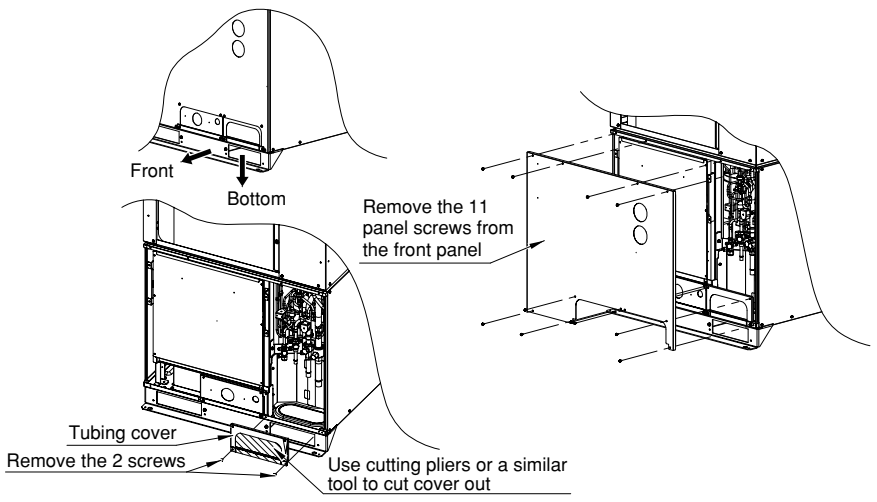



**Fig. 4-6**

(2) If the tubing is routed out from the bottom, remove the slit part (▨).

- Use a drill bit approximately 5 mm dia. to create holes at the 4 slit hole indentations (openings).
- Punch out the slit part (▨).
- Be careful not to damage the base plate.

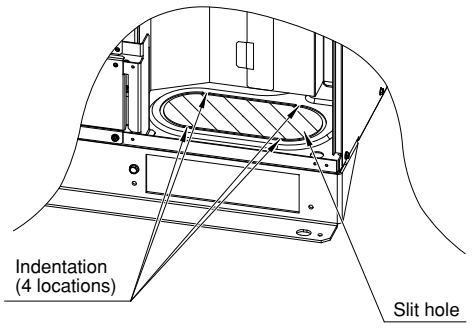



**Fig. 4-7**

C

### 4-5. Prepare the Tubing

- Material: Use C1220 phosphorous deoxidized copper as described in JIS H3300, “Copper and Copper Alloy Seamless Pipes and Tubes.”
  (For tubes that are ø25.4 or larger, use 1/2H material or H material. For all others use O material.)
- Tubing size
  Use the tubing size indicated in the table below.
- When cutting the tubing, use a tube cutter, and be sure to remove any burrs.
  (The same applies to distribution tubing (optional).)
- When bending the tubes, bend each tube using a radius that is at least 4 times the outer diameter of the tube. When bending, use sufficient care to avoid crushing or damaging the tube
- For flaring, use a flare tool, and be sure that flaring is performed correctly.

**CAUTION** **Use sufficient caution during preparation of the tubing. Seal the tube ends by means of caps or taping to prevent dust, moisture, or other foreign substances from entering the tubes.**

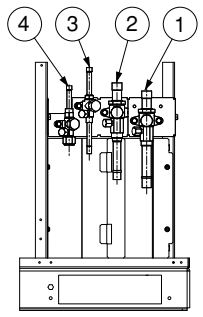
**Refrigerant tubing (Existing tubing can be used.)**

| Tubing size (mm) | | | |
|---|---|---|---|
| **Outer dia.** | **Thickness** | **Outer dia.** | **Thickness** |
| ø6.35 | t0.8 | ø25.4 | t1.0 |
| ø9.52 | t0.8 | ø28.58 | t1.0 |
| ø12.7 | t0.8 | ø31.8 | t1.1 |
| ø15.88 | t1.0 | ø38.1 | t1.15 |
| ø19.05 | t1.0 | ø41.28 | t1.2 |
| ø22.22 | t1.15 | | |

### 4-6. Connect the Tubing

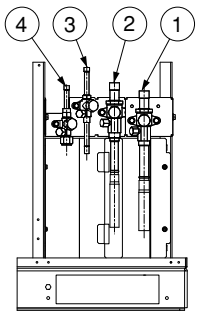
- Except for 80 type, use the supplied connector tubing. (See figure below.)

80 type (8 horsepower)



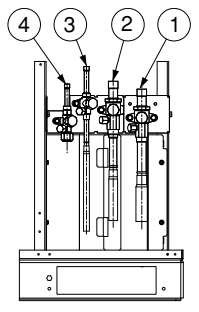

| | Refrigerant tubing | Connection method | Use supplied connector tube? |
|---|---|---|---|
| ① | Suction tube | Brazed connection | No |
| ② | Discharge tube | Brazed connection | No |
| ③ | Liquid tube | Brazed connection | No |
| ④ | Balance tube | Flared connection | No |

100 type (10 horsepower)




| | Refrigerant tubing | Connection method | Use supplied connector tube? |
|---|---|---|---|
| ① | Suction tube | Brazed connection | Yes (ø19.05 → ø22.22) |
| ② | Discharge tube | Brazed connection | Yes (ø15.88 → ø19.05) |
| ③ | Liquid tube | Brazed connection | No |
| ④ | Balance tube | Flared connection | No |

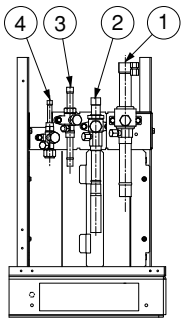
120 type (12 horsepower)




| | Refrigerant tubing | Connection method | Use supplied connector tube? |
|---|---|---|---|
| ① | Suction tube | Brazed connection | Yes (ø19.05 → ø25.4) |
| ② | Discharge tube | Brazed connection | Yes (ø15.88 → ø19.05) |
| ③ | Liquid tube | Brazed connection | Yes (ø9.52 → ø12.7) |
| ④ | Balance tube | Flared connection | No |

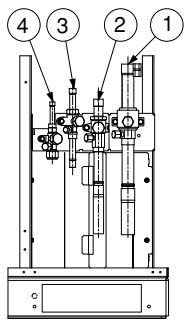
C

140 type (14 horsepower)




| | Refrigerant tubing | Connection method | Use supplied connector tube? |
|---|---|---|---|
| ① | Suction tube | Brazed connection | No |
| ② | Discharge tube | Brazed connection | Yes (ø19.05 → ø22.22) |
| ③ | Liquid tube | Brazed connection | No |
| ④ | Balance tube | Flared connection | No |

160 type (16 horsepower)

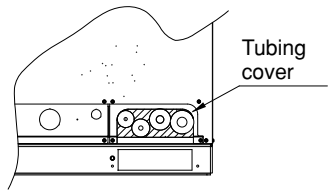



| | Refrigerant tubing | Connection method | Use supplied connector tube? |
|---|---|---|---|
| ① | Suction tube | Brazed connection | Yes (ø25.4 → ø28.58) |
| ② | Discharge tube | Brazed connection | Yes (ø19.05 → ø22.22) |
| ③ | Liquid tube | Brazed connection | No |
| ④ | Balance tube | Flared connection | No |

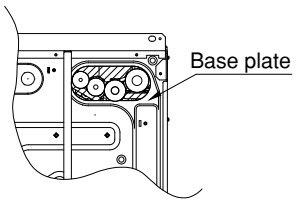
Refrigerant tube port

- Use caulking, putty, or a similar material to fill any gaps at the refrigerant tube port (▨) in order to prevent rainwater, dust or foreign substances from entering the unit.

* Perform this work even if the tubing is routed out in a downward direction.




Tubing routed out forward

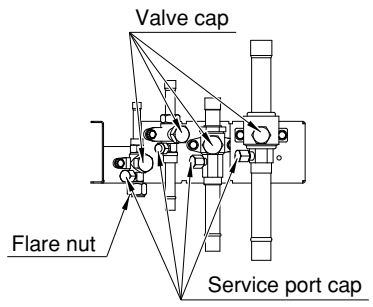



Tubing routed out downward

- Tighten each cap as specified below.

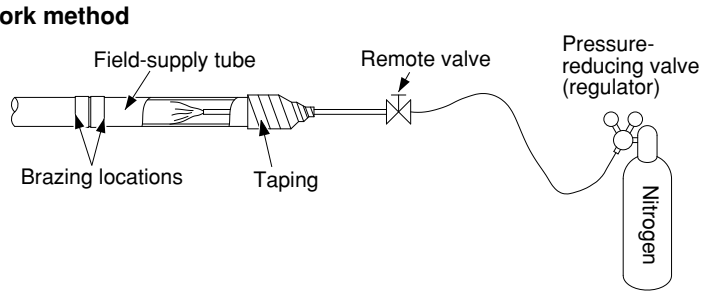
**Tightening torque for each cap**

| | |
|---|---|
| Service port cap (width 15 mm) | 7 – 12 N · m (70 – 120 kgf · cm) |
| Valve cap (width 15 mm) | 20 – 25 N · m (200 – 250 kgf · cm) |
| Flare nut (valve dia. ø9.52) | 34 – 42 N · m (340 – 420 kgf · cm) |




- Precautions for brazing
  Be sure to replace the air inside the tube with nitrogen to prevent oxide film from forming during the brazing process.
  Be sure to use a damp cloth or other means to cool the valve unit during brazing.

**Work method**




**CAUTION**

1. Be sure to use nitrogen. (Oxygen, $CO^2$, and CFC must not be used.)
2. Use a pressure-reducing valve on the nitrogen tank.
3. Do not use agents intended to prevent the formation of oxide film. They will adversely affect the refrigeration oil, and may cause equipment failure.
4. The balance tube is not used if only 1 outdoor unit is installed.
   Use the unit in the same conditions as when it was shipped from the factory.

C

# 5. ELECTRICAL WIRING

## 5-1. General Precautions on Wiring

(1) Before wiring, confirm the rated voltage of the unit as shown on its nameplate, then carry out the wiring closely following the wiring diagram.

(2) Provide a power outlet to be used exclusively for each unit, and a power supply disconnect and circuit breaker for overcurrent protection should be provided in the exclusive line.

(3) To prevent possible hazards from insulation failure, the unit must be grounded.

(4) Each wiring connection must be done in accordance with the wiring system diagram. Wrong wiring may cause the unit to misoperate or become damaged.

(5) Do not allow wiring to touch the refrigerant tubing, compressor, or any moving parts of the fan.

(6) Unauthorized changes in the internal wiring can be very dangerous. The manufacturer will accept no responsibility for any damage or misoperation that occurs as a result of such unauthorized changes.

(7) Regulations on wire diameters differ from locality to locality. For field wiring rules, please refer to your LOCAL ELECTRICAL CODES before beginning. You must ensure that installation complies with all relevant rules and regulations.

(8) To prevent malfunction of the air conditioner caused by electrical noise, care must be taken when wiring as follows:

- The remote control wiring and the inter-unit control wiring should be wired apart from the inter-unit power wiring.
- Use shielded wires for inter-unit control wiring between units and ground the shield on both sides.

(9) If the power supply cord of this appliance is damaged, it must be replaced by a repair shop appointed by the manufacture, because special purpose tools are required.

## 5-2. Recommended Wire Length and Wire Diameter for Power Supply System

**Outdoor unit**

| | (A) Power supply | | Time delay fuse or circuit capacity |
|---|---|---|---|
| | Wire size | Max. length | |
| EFL 80 – 3R | 6 mm² | 92 m | 30 A |
| EFL 100 – 3R | 6 mm² | 70 m | 35 A |
| EFL 120 – 3R | 6 mm² | 57 m | 40 A |
| EFL 140 – 3R | 10 mm² | 79 m | 40 A |
| EFL 160 – 3R | 10 mm² | 68 m | 50 A |

or

| (A) Power supply | | Time delay fuse or circuit capacity |
|---|---|---|
| Wire size | Max. length | |
| 6 mm² | 92 m | 35 A |
| 6 mm² | 70 m | 35 A |
| 10 mm² | 95 m | 50 A |
| 10 mm² | 79 m | 50 A |
| 10 mm² | 68 m | 50 A |

**Indoor unit**

| Type | (B) Power supply | Time delay fuse or circuit capacity |
|---|---|---|
| | 2.5 mm² | |
| NWFL | Max. 150 m | 10 – 16 A |
| NK1FL, NK2FL, NKFL, NPFL, NDLP, NFFL, NFMFL | Max. 130 m | 10 – 16 A |
| NDHP (24R, 36R, 48R) | Max. 60 m | 10 – 16 A |
| NDHP (76R, 96R) | Max. 50 / 30 m | 10 – 16 A |

**Control wiring**

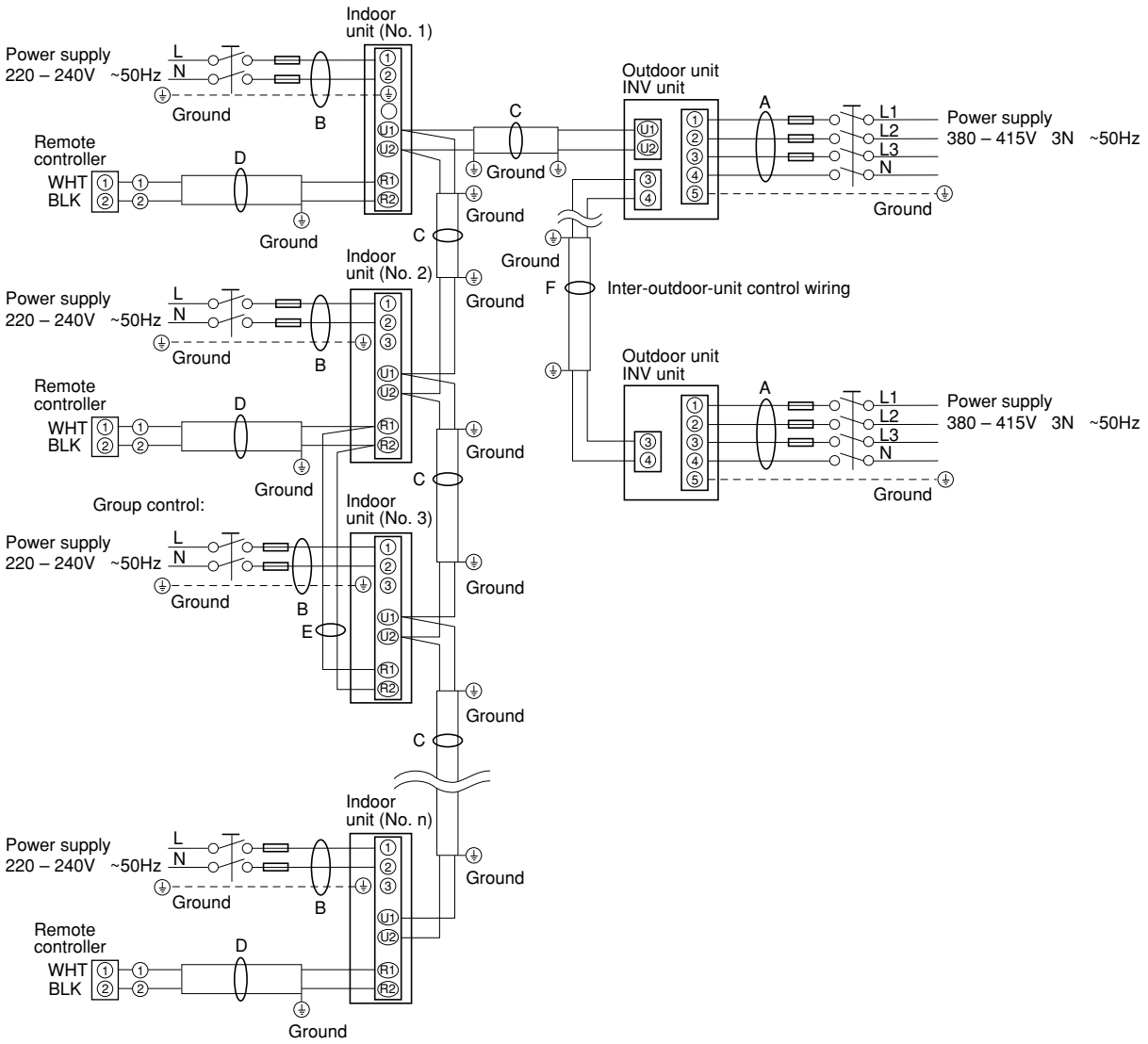
| (C) Inter-unit (between outdoor and indoor units) control wiring | (D) Remote control wiring | (E) Control wiring for group control |
|---|---|---|
| 0.75 mm² (AWG #18)<br>**Use shielded wiring*** | 0.75 mm² (AWG #18)<br>**Use shielded wiring** | 0.75 mm² (AWG #18)<br>**Use shielded wiring** |
| Max. 1,000 m | Max. 500 m | Max. 500 m (Total) |

| (F) Inter-outdoor unit control wiring |
|---|
| 0.75 mm² (AWG #18)<br>**Use shielded wiring** |
| Max. 500 m |

**NOTE**

* With ring-type wire terminal.

## 5-3. Wiring System Diagram



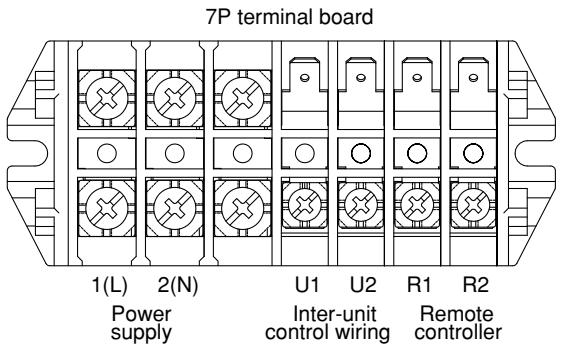

**NOTE**

(1) Refer to Section 5-2. “Recommended Wire Length and Wire Diameter for Power Supply System” for the explanation of “A,” “B,” “C,” “D,” and “E,” in the above diagrams.

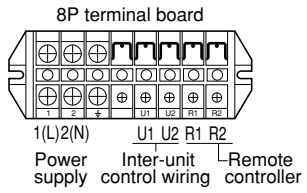
(2) The basic connection diagram of the indoor unit shows the 7P terminal board, so the terminal boards in your equipment may differ from the diagram.

(3) Refrigerant Circuit (R.C.) address should be set before turning the power on.

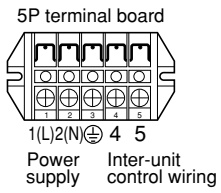
(4) Regarding the R.C. address setting, refer to page 112. Auto. address setting can be executed by remote controller automatically. Refer to page 116.




**NK2FL, NKFL, NPFL Type**




**NK1FL, NDLP, NDHP, NFFL, NFMFL Type**




**NWFL Type**

**CAUTION**

**(1) When linking outdoor units in a network (S-net link system), disconnect the terminal extended from the short plug (CN003, 2P Black, location: right bottom on the outdoor main control PCB) from all outdoor units except any one of the outdoor units.**
**(When shipping: In shorted condition.)**
**Otherwise the communication of S-net link system is not performed. For a system without link (no connection wiring between outdoor units), do not remove the short plug.**

**(2) Do not install the inter-unit control wiring in a way that forms a loop. (Fig. 5-1)**

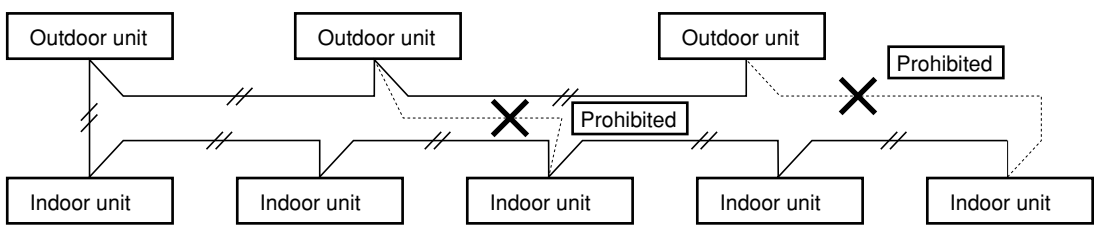



**Fig. 5-1**

**(3) Do not install inter-unit control wiring such as star branch wiring. Star branch wiring causes mis-address setting.**

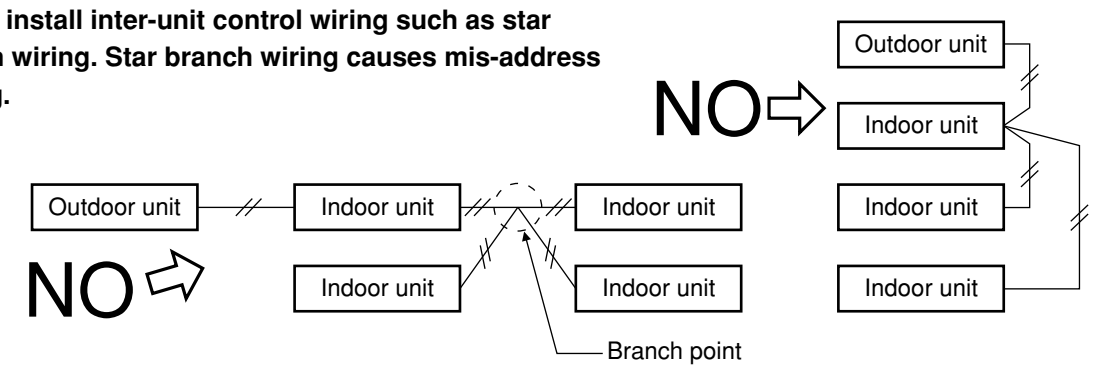



**Fig. 5-2**

**(4) If branching the inter-unit control wiring, the number of branch points should be 16 or fewer. (Branches less than 1 m are not included in the total branch number.) (Fig. 5-3)**

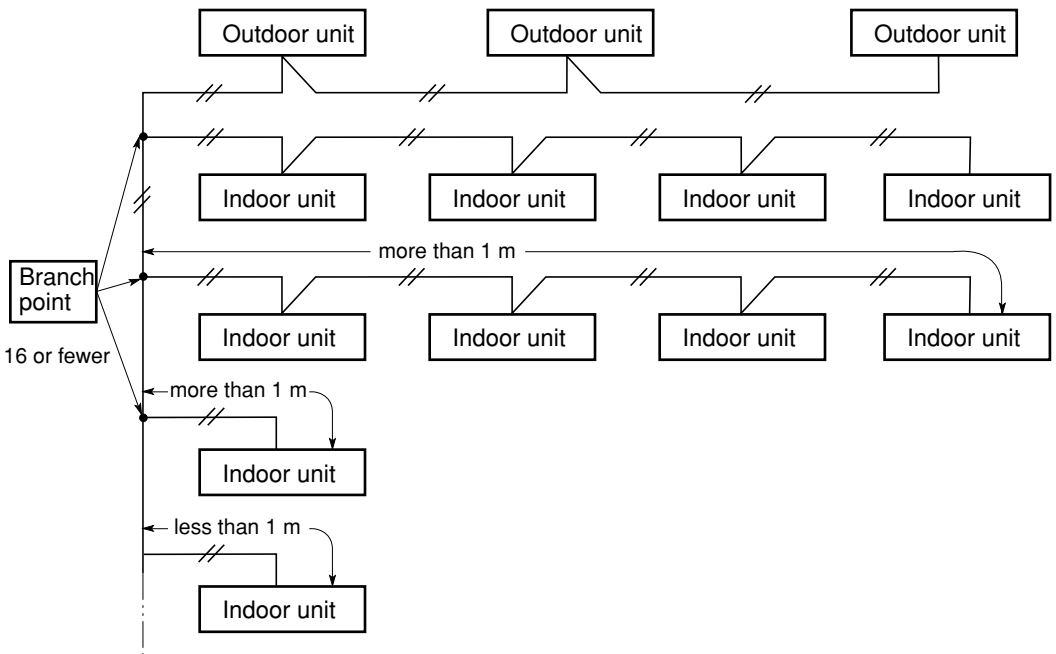



**Fig. 5-3**

**(5) Use shielded wires for inter-unit control wiring (c) and ground the shield on both sides, otherwise misoperation from noise may occur. (Fig. 5-4)**
**Connect wiring as shown in Section "5-3. Wiring System Diagram."**


**Loose wiring may cause the terminal to overheat or result in unit malfunction. A fire hazard may also exist. Therefore, ensure that all wiring is tightly connected.**

When connecting each power wire to the terminal, follow the instructions on "How to connect wiring to the terminal" and fasten the wire securely with the fixing screw of the terminal plate.

How to connect wiring to the terminal

■ For stranded wiring

(1) Cut the wire end with cutting pliers, then strip the insulation to expose the stranded wiring about 10 mm and tightly twist the wire ends. (Fig. 5-5)

(2) Using a Phillips head screwdriver, remove the terminal screw(s) on the terminal plate.

(3) Using a ring connector fastener or pliers, securely clamp each stripped wire end with a ring pressure terminal.

(4) Place the ring pressure terminal, and replace and tighten the removed terminal screw using a screwdriver. (Fig. 5-6)

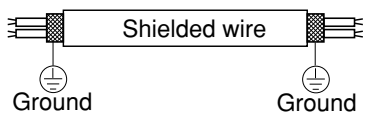



**Fig. 5-4**

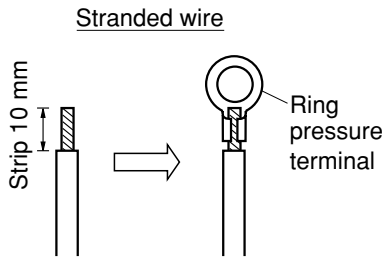



**Fig. 5-5**

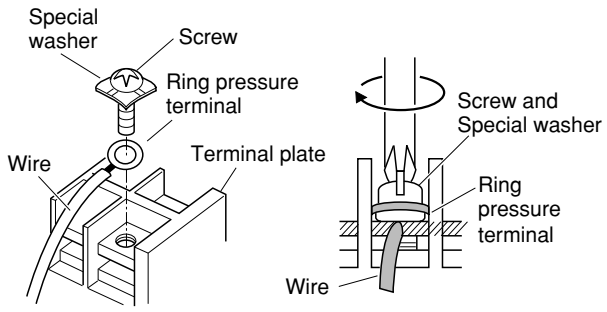



**Fig. 5-6**

## 6. HOW TO INSTALL THE REMOTE CONTROLLER (OPTIONAL PART)

Remote controller wiring can be extended to a maximum of 1,000 m.

■ How to install the remote controller (Optional Controller)

**CAUTION**

- **Do not twist the control wiring with the power wiring or run it in the same metal conduit, because this may cause malfunction.**
- **Install the remote controller away from sources of electrical noise.**
- **Install a noise filter or take other appropriate action if electrical noise affects the power supply circuit of the unit.**

The mounting position for the remote controller should be located in an accessible place for control. Never cover the remote controller or recess it into the wall.

### 6-1. When Using a Wall Box for Flush Mounting

- If local codes allow, this remote controller can be mounted using a conventional wall box for flushmounting.

(1) When you open the decorative cover, you will see 2 gaps under the remote controller. Insert a coin into these gaps and pry off the back case. (Fig. 6-1)

(2) Attach the back case with the 2 small screws provided. Using a screwdriver, push open the cut-outs on the back case. These holes are for screws. Use the spacers and take care not to tighten the screws excessively. If the back case will not seat well, cut the spacers to a suitable thickness. (Fig. 6-1)

(3) Connect the remote controller wiring (3 wires) correctly to the corresponding terminals in the electrical component box of the indoor unit.

NRCG

**CAUTION**

**When wiring, do not connect the remote controller wires to the adjacent terminal block for the power wiring. Otherwise, the unit will break down.**

(4) To finish, fit the back tabs of the case into the remote controller and mount it.

**CAUTION**

**Do not supply power to the unit or try to operate it until the tubing and wiring to the outdoor unit is completed.**

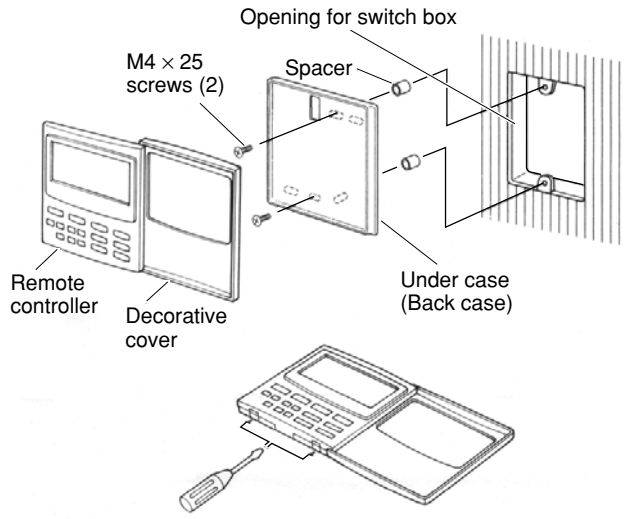
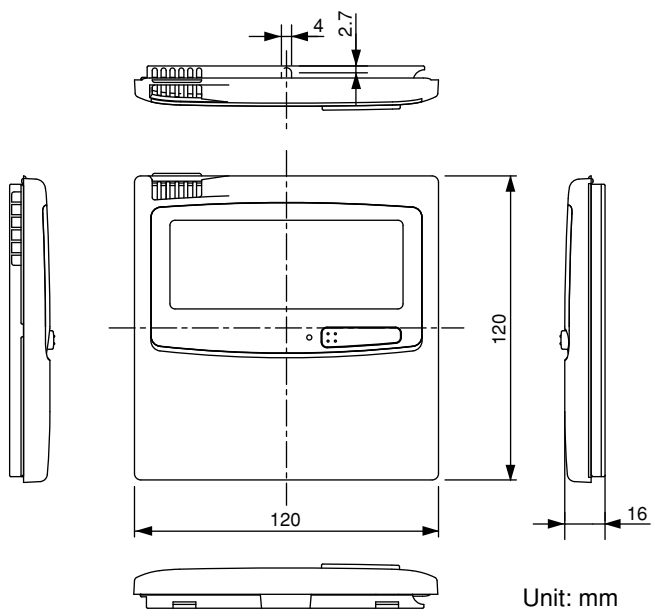



**Fig. 6-1**

**Accessories for remote controller switch**

| No. | Supplied parts | Q'ty | No. | Supplied parts | Q'ty |
|---|---|---|---|---|---|
| 1 | Remote controller switch (with 200 mm wire) | 1 | 4 | Spacers | 2 |
| 2 | Small screws M4 × 25 | 2 | 5 | Wire joints | 2 |
| 3 | Wood screws | 2 | | | |




Unit: mm

**Fig. 6-2**

### 6-2. Basic Wiring Diagram

**CAUTION**

**Install wiring correctly (incorrect wiring will damage the equipment).**

- Use shielded wires for remote control wiring and ground the shield on both sides. (Fig. 6-3) Otherwise misoperation due to noise may occur.

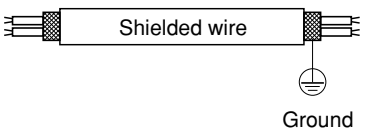
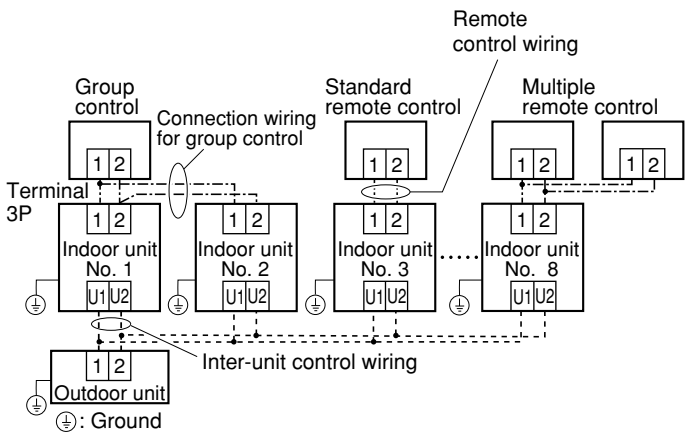



Fig. 6-3



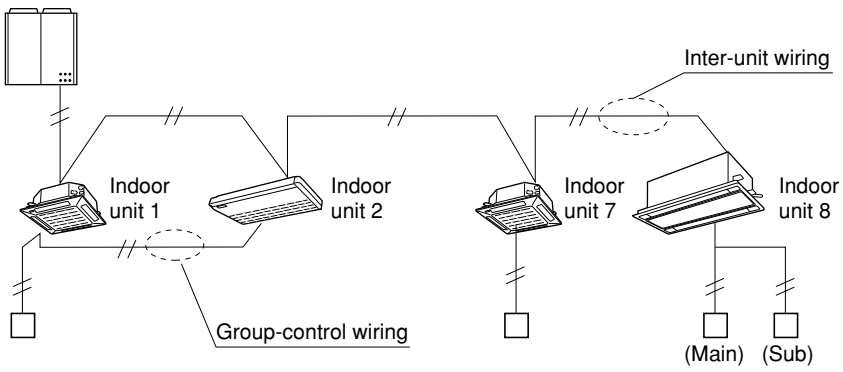




Fig. 6-4

### 6-3. Wiring System Diagrams for Group Control

This diagram shows when several units (maximum of 8) are controlled by a remote controller (main unit). In this case, a remote controller can be connected at any indoor unit.

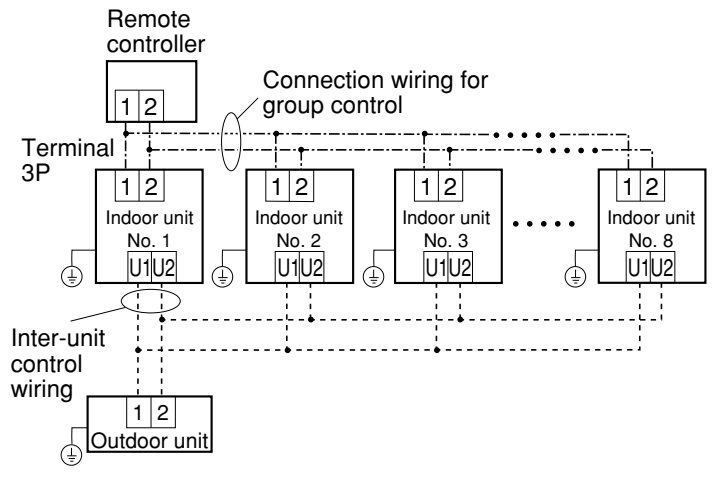
**Wiring procedure**

Wire according to the right diagram:

- Each successive unit will respond at 1-second intervals following the order of the group address when the remote controller is operated.

**Group control using 2 remote controllers**

It does not matter which of the 2 remote controllers you set as the main controller.
When using multiple remote controllers (up to 2 can be used), one serves as the main remote controller and the other as the sub-remote controller.



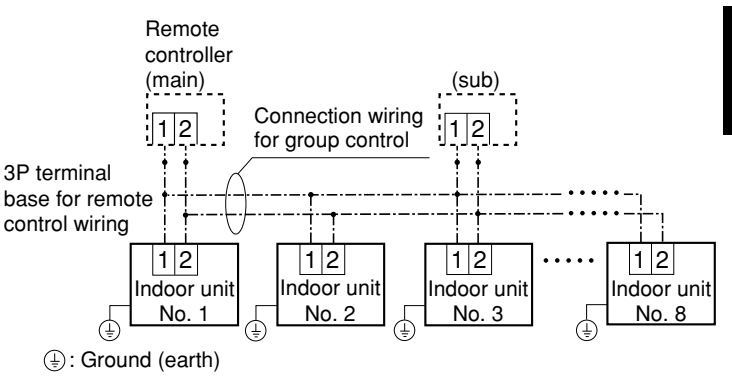




Fig. 6-5

NRCG

**Setting the main and sub remote controllers**

1. Set one of the 2 connected remote controllers as the main remote controller.
2. On the other remote controller (sub-remote controller), switch the remote controller address connector on the rear of the remote controller PCB from Main to Sub. When the connector has been switched, the remote controller will function as the sub-remote controller.
   The sub-remote controller will also operate when connected to the indoor unit (indoor unit 2 or 3).

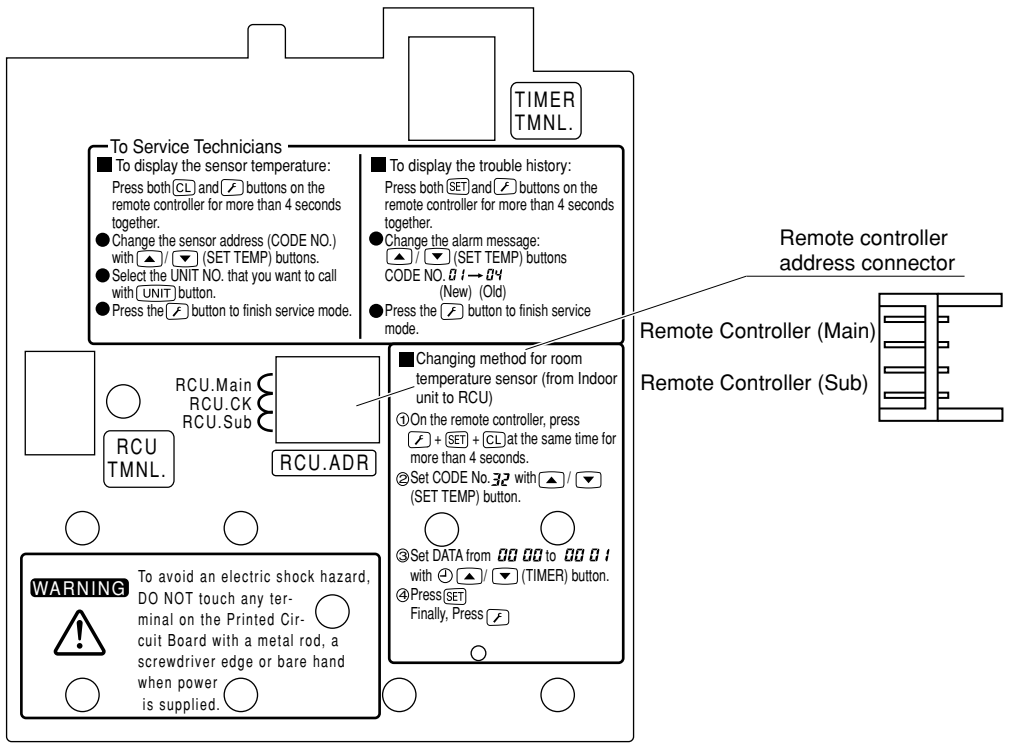


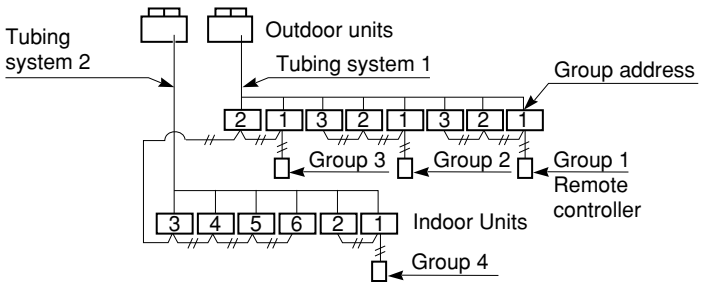

**Fig. 6-6**

**NOTE**

**Cautions on group control**

- **Group control within the same refrigerant tubing system is recommended.**

[Tubing system which is NOT recommended]




<Example 1> In the FLOW LOGIC 3 pipe system, group control extending over tubing systems becomes impossible to set, which means the indoor units cannot operate.

While Group 4 is in heating operation, if later Group 3 begins cooling operation, indoor units 1, 2 of Group 3 can be operated, but the indoor units 3-6 of Group 4 cannot operate.

NRCG

### 6-4. Switching the Room Temperature Sensors

Room temperature sensors are contained in the indoor unit and in the remote controller.
One or the other of the temperature sensors is used for operation. Normally, the indoor unit sensor is set; however, the procedure below can be used to switch to the remote controller sensor.

(1) Press and hold the [🔧] + [SET] + [CL] buttons for 4 seconds or longer.

**NOTE**

- The unit No. that is initially displayed is the indoor unit address of the group control main unit.
- Do not press the [UNIT] button.

(2) Use the temperature setting [▲] / [▼] buttons to select item code 32.

(3) Use the timer time [▲] / [▼] buttons to change the setting data from 0000 to 0001.

(4) Press the [SET] button. (The change is completed when the display stops blinking.)

(5) Press the [🔧] button.

The unit returns to normal stop status. At this time, “Remote controller sensor” is displayed on the LCD.

**NOTE**

- If 2 remote controllers are used for control, this setting can be made from either the main or sub remote controller. However, the temperature sensor that is used is the sensor in the main remote controller.
- When group control is used, the remote controller sensor will not function unless the group address is set to the address of the main indoor unit.
- If both the remote sensor and remote controller are used, do not use the temperature sensor in the remote controller.

### 6-5. Connecting to a Ventilation Fan

If a commercially available ventilation fan or similar device is run from the ventilation fan output terminal (FAN DRIVE: 2P (white), DC 12 V) (Note) on the indoor unit PCB, use the [🏠] button to enable fan operation and change the settings.

(1) Press and hold the [🔧] + [SET] + [CL] buttons for 4 seconds or longer.

**NOTE**

- The unit No. that is initially displayed is the indoor unit address of the group control main unit.
- Do not press the [UNIT] button.

(2) Use the temperature setting [▲] / [▼] buttons to select item code 31.

(3) Use the timer time [▲] / [▼] buttons to change the setting data from 0000 to 0001.

(4) Press the [SET] button. (The change is completed when the display stops blinking.)

(5) Press the [🔧] button.

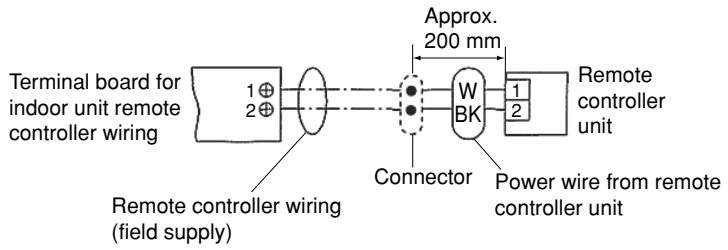
The unit returns to normal stop status. Press the [🏠] button and check that “Fan” is displayed on the LCD display.

(Note) A special adapter (optional) is required to convert the signal for use at the no-voltage A contact.

### 6-6. Wiring the Remote Controller

<Flush Mounting>

● Connection diagram



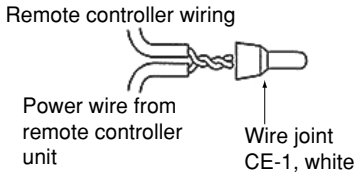

● Use 0.5 mm² – 2 mm² wires.

(1) Strip the insulation to approximately 14 mm from the ends of the wires that will be connected.

(2) Twist together the 2 wires and create a crimp connection at the wire joint.

(3) If a special crimping tool is not used, or if the connection is soldered, insulate the wires using insulation tape.

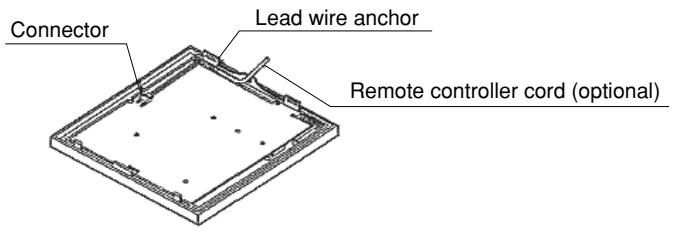
**Provided wire joint (white)**




● Use the remote controller cord (optional) for remote controller wiring.

(1) Disconnect the lead wire that is wound around the lead wire anchor on the remote controller unit. Disconnect the connector and connect the remote controller cord (optional) to the connector on the remote controller unit. Insert the remote controller cord (optional) into the groove and bend it into the correct shape, then wind it around the lead wire anchor.

(2) If the remote controller cord (optional) is used, refer to the installation manual that is provided with the cord.




NRCG

### 6-7. Meaning of Alarm Messages

**Table of Self-Diagnostics Functions and Description of Alarm Displays.**

Alarm messages are indicated by the blinking of LED 1 and 2 (D72, D75) on the outdoor unit PCB. They are also displayed on the wired remote controller.

- Viewing the LED 1 and 2 (D72 and D75) alarm displays

| LED 1 | LED 2 | Alarm contents |
|---|---|---|
| ☼ | ☼ | Alarm display<br>LED 1 blinks M times, then LED 2 blinks N times. The cycle then repeats.<br>M = 2: P alarm 3: H alarm 4: E alarm 5: F alarm 6: L alarm<br>N = Alarm No.<br>Example: LED 1 blinks 2 times, then LED 2 blinks 17 times. The cycle then repeats.<br>Alarm is “P17.” |
| Alternating | | |

(☼ : Blinking)

| Possible cause of malfunction | | | Alarm message |
|---|---|---|---|
| Serial communication errors Mis-setting | Remote controller is detecting error signal from indoor unit. | Error in receiving serial communication signal.<br>(Signal from main indoor unit in case of group control)<br>Ex: Auto address is not completed. | <E01> |
| | | Error in transmitting serial communication signal. | <E02> |
| | Indoor unit is detecting error signal from remote controller (and system controller). | | <<E03>> |
| | Indoor unit is detecting error signal from main outdoor unit. | Error in receiving serial communication signal.<br>When turning on the power supply, the number of connected indoor units does not correspond to the number set. (Except R.C. address is “0.”) | E04 |
| | | Error of the main outdoor unit in receiving serial communication signal from the indoor unit. | <E06> |
| | Improper setting of indoor unit or remote controller. | Indoor unit address setting is duplicated. | E08 |
| | | Remote controller address connector (RCU. ADR) is duplicated. (Duplication of main remote controller) | <<E09>> |
| | During auto. address setting, number of connected units does not correspond to number set.<br><br>When turning on the power supply, number of connected units does not correspond to number set.<br>(Except R.C. address is “0.”) | Starting auto. address setting is prohibited.<br>This alarm message shows that the auto address connector CN100 is shorted while other RC line is executing auto address operation. | E12 |
| | | Error in auto. address setting. (Number of connected indoor units is less than the number set) | E15 |
| | | Error in auto. address setting. (Number of connected indoor units is more than the number set) | E16 |
| | | No indoor unit is connected during auto. address setting. | E20 |
| | | Main outdoor unit is detecting error signal from sub outdoor unit. | E24 |
| | | Error of outdoor unit address setting. | E25 |
| | | The number of connected main and sub outdoor units do not correspond to the number set at main outdoor unit P.C.B. | E26 |
| | | Error of sub outdoor unit in receiving serial communication signal from main outdoor unit. | E29 |
| | Indoor unit communication error of group control wiring. | Error of main indoor unit in receiving serial communication signal from sub indoor units. | E18 |
| | Improper setting. | This alarm message shows when the indoor unit for multiple-use is not connected to the outdoor unit. | L02 |
| | | Duplication of main indoor unit address setting in group control. | <L03> |
| | | Duplication of outdoor R.C. address setting. | L04 |
| | | There are 2 or more indoor units controllers which have operation mode priority in refrigerant circuit. — Priority set remote controller | L05 |
| | | There are 2 or more indoor units controllers which have operation mode priority in refrigerant circuit. — Non-priority set remote controller | L06 |
| | | Group control wiring is connected to individual control indoor unit. | L07 |
| | | Indoor unit address is not set. | L08 |
| | | Capacity code of indoor unit is not set. | <<L09>> |
| | | Capacity code of outdoor unit is not set. | L10 |
| | | Mis-match connection of outdoor units which have different kind of refrigerant. | L17 |
| | | 4-way valve operation failure | L18 |
| Activation of protective device | Protective device in indoor unit is activated. | Thermal protector in indoor unit fan motor is activated. | <<P01>> |
| | | Improper wiring connections of ceiling panel. | <<P09>> |
| | | Float switch is activated. | <<P10>> |

Continued

| Possible cause of malfunction | | | Alarm message |
|---|---|---|---|
| Activation of protective device | Protective device in outdoor unit is activated. | Compressor thermal protector is activated. Power supply voltage is unusual. (The voltage is more than 260 V or less than 160 V between L and N phase.) | P02 |
| | | Incorrect discharge temperature. (Comp. No. 1) | P03 |
| | | High pressure switch is activated. | P04 |
| | | Negative (Defective) phase. | P05 |
| | | $O^2$ sensor (detects low oxygen level) activated | P14 |
| | | Compressor running failure resulting from missing phase in the compressor wiring, etc. (Start failure not caused by IPM or no gas.) | P16 |
| | | Incorrect discharge temperature. (Comp. No. 2) | P17 |
| | | Compressor 3 discharge temp. failure | P18 |
| | | Outdoor unit fan motor is unusual. | P22 |
| | | Overcurrent at time of compressor runs more than 80Hz (DCCT secondary current or ACCT primary current is detected at a time other than when IPM has tripped.) | P26 |
| | | IPM trip (IPM current or temperature) | H31 |
| | | Inverter for compressor is unusual. (DC compressor does not operate.) | P29 |
| Thermistor fault | Indoor thermistor is either open or damaged. | Indoor coil temp. sensor (E1) | <<F01>> |
| | | Indoor coil temp. sensor (E2) | <<F02>> |
| | | Indoor coil temp. sensor (E3) | <<F03>> |
| | | Indoor suction air (room) temp. sensor (TA) | <<F10>> |
| | | Indoor discharge air temp. sensor (BL) | <<F11>> |
| | Outdoor thermistor is either open or damaged. | Comp. No. 1 discharge gas temp. sensor (DISCH1) | F04 |
| | | Comp. No. 2 discharge gas temp. sensor (DISCH2) | F05 |
| | | Outdoor No. 1 coil gas temp. sensor (EXG1) | F06 |
| | | Outdoor No. 1 coil liquid temp. sensor (EXL1) | F07 |
| | | Outdoor air temp. sensor (AIR TEMP) | F08 |
| | | Compressor intake port temperature sensor (RDT) | F12 |
| | | High pressure sensor. Negative (defective) N phase. | F16 |
| | | Low-pressure sensor failure | F17 |
| | | Compressor 3 discharge temp. sensor failure (DISCH3) | F22 |
| | | Outdoor No. 2 coil gas temp. sensor (EXG2) | F23 |
| | | Outdoor No. 2 coil liquid temp. sensor (EXL2) | F24 |
| | | Outdoor heat exchanger 3 gas (inlet) temp. sensor failure (EXG3) | F25 |
| | | Outdoor heat exchanger 3 liquid (outlet) temp. sensor failure (EXL3) | F26 |
| EEP ROM on indoor unit P.C.B. failure | | | F29 |
| Protective device for compressor is activated | Protective device for compressor No. 1 is activated | EEP ROM on the main or sub outdoor unit P.C.B. is a failure. | F31 |
| | | Overload current is detected. | H01 |
| | | Lock current is detected. | H02 |
| | | Current is not detected when comp. No. 1 is ON. | H03 |
| | | Discharge gas temperature of the comp. No. 1 is not detected. Temp. sensor is not seated at the sensor holder. | H05 |
| | Protective device for compressor No. 2 is activated | Overload current is detected. | H11 |
| | | Lock current is detected. | H12 |
| | | Current is not detected when comp. No. 2 is ON. | H13 |
| | | Discharge gas temperature of the comp. No. 2 is not detected. | H15 |
| | Protective device for compressor No. 3 is activated | Compressor 3 current trouble (overcurrent) | H21 |
| | | Compressor 3 current trouble (locked) | H22 |
| | | Compressor 3 CT sensor disconnected or short circuit | H23 |
| | | Compressor 3 discharge temp. sensor disconnected | H25 |
| | | Low pressure switch is activated. | H06 |
| | Low oil level. | | H07 |
| | Oil sensor fault. (Disconnection, etc.) | Comp. No. 1 oil sensor | H08 |
| | | Comp. No. 2 oil sensor | H27 |
| | | Oil sensor (connection) failure | H28 |

Continued

NRCG

| Alarm messages displayed on system controller | | | |
|---|---|---|---|
| Serial communication errors Mis-setting | Error in transmitting serial communication signal | Indoor or main outdoor unit is not operating correctly.<br>Mis-wiring of control wiring between indoor unit, main outdoor unit and system controller. | C05 |
| | Error in receiving serial communication signal | Indoor or main outdoor unit is not operating correctly.<br>Mis-wiring of control wiring between indoor unit, main outdoor unit and system controller.<br>CN1 is not connected properly. | C06 |
| Activation of protective device | Protective device of sub indoor unit in group control is activated. | When using wireless remote controller or system controller, in order to check the alarm message in detail, connect wired remote controller to indoor unit temporarily. | P30 |

**NOTE**

1. Alarm messages in << >> do not affect other indoor unit operations.
2. Alarm messages in < > sometimes affect other indoor unit operations depending on the fault.

## 7. HOW TO PROCESS TUBING

The liquid tubing side is connected by a flare nut, and the gas tubing side is connected by brazing.

### 7-1. Connecting the Refrigerant Tubing

**Use of the Flaring Method**

Many of conventional split system air conditioners employ the flaring method to connect refrigerant tubes which run between indoor and outdoor units. In this method, the copper tubes are flared at each end and connected with flare nuts.

**Flaring Procedure with a Flare Tool**

(1) Cut the copper tube to the required length with a tube cutter. It is recommended to cut approx. 30 – 50 cm longer than the tubing length you estimate.

(2) Remove burrs at the end of the copper tube with a tube reamer or file. This process is important and should be done carefully to make a good flare. (Fig. 7-1)

**NOTE**

When reaming, hold the tube end downward and be sure that no copper scraps fall into the tube. (Fig. 7-2)

(3) Remove the flare nut from the unit and be sure to mount it on the copper tube.

(4) Make a flare at the end of copper tube with a flare tool. (Fig. 7-3)

**NOTE**

A good flare should have the following characteristics:

- inside surface is glossy and smooth
- edge is smooth
- tapered sides are of uniform length

**Deburring**

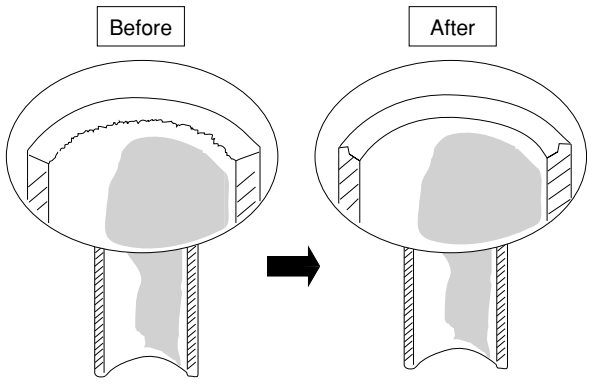



**Fig. 7-1**

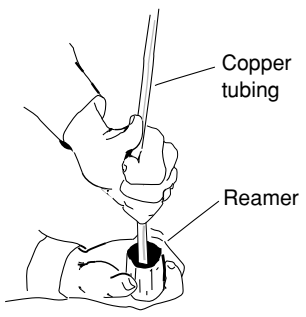



**Fig. 7-2**

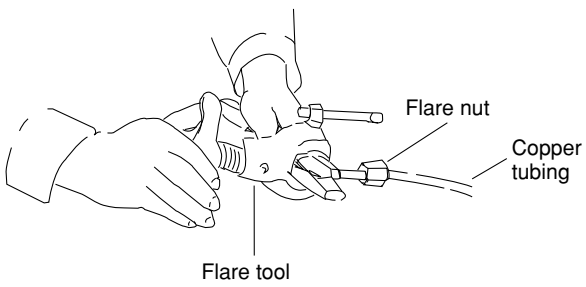



**Fig. 7-3**

**Caution Before Connecting Tubes Tightly**

(1) Apply a sealing cap or water-proof tape to prevent dust or water from entering the tubes before they are used.

(2) Be sure to apply refrigerant lubricant to the matching surfaces of the flare and union before connecting them together. This is effective for reducing gas leaks. (Fig. 7-4)

(3) For proper connection, align the union tube and flare tube straight with each other, then screw in the flare nut lightly at first to obtain a smooth match. (Fig. 7-5)

- Adjust the shape of the liquid tube using a tube bender at the installation site and connect it to the liquid tubing side valve using a flare.

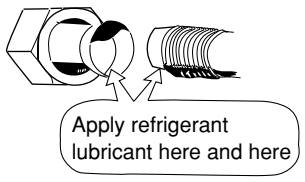



**Fig. 7-4**

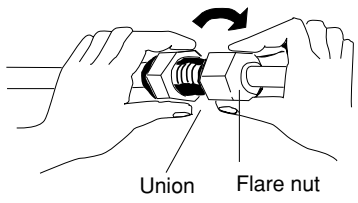



**Fig. 7-5**

**Cautions During Brazing**

- **Replace air inside the tube with nitrogen gas to prevent copper oxide film from forming during the brazing process. (Oxygen, carbon dioxide and Freon are not acceptable.)**
- **Do not allow the tubing to get too hot during brazing. The nitrogen gas inside the tubing may overheat, causing refrigerant system valves to become damaged. Therefore allow the tubing to cool when brazing.**
- **Use a reducing valve for the nitrogen cylinder.**
- **Do not use agents intended to prevent the formation of oxide film. These agents adversely affect the refrigerant and refrigerant oil, and may cause damage or malfunctions.**

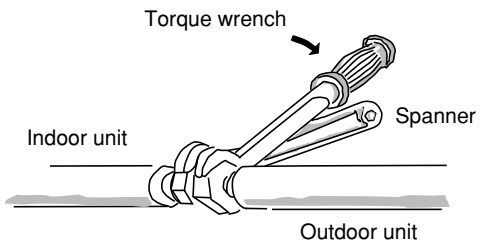



**Fig. 7-6**

## 7-2. Connecting Tubing Between Indoor and Outdoor Units

(1) Tightly connect the indoor-side refrigerant tubing extended from the wall with the outdoor-side tubing.

(2) To fasten the flare nuts, apply specified torque as at right:

- When removing the flare nuts from the tubing connections, or when tightening them after connecting the tubing, be sure to use 2 monkey wrenches or spanners as shown. (Fig. 7-6)
  If the flare nuts are over-tightened, the flare may be damaged, which could result refrigerant leakage and cause in injury or asphyxiation to room occupants.
- For the flare nuts at tubing connections, be sure to use the flare nuts that were supplied with the unit, or else flare nuts for R410A (type 2). The refrigerant tubing that is used must be of the correct wall thickness as shown in the table at right.

| Tube diameter | Tightening torque, approximate | Tube thickness |
|---|---|---|
| ø6.35 (1/4") | 14 – 18 N · m (140 – 180 kgf · cm) | 0.8 mm |
| ø9.52 (3/8") | 34 – 42 N · m (340 – 420 kgf · cm) | 0.8 mm |
| ø12.7 (1/2") | 49 – 61 N · m (490 – 610 kgf · cm) | 0.8 mm |
| ø15.88 (5/8") | 68 – 82 N · m (680 – 820 kgf · cm) | 1.0 mm |
| ø19.05 (3/4") | 100 – 120 N · m (1000 – 1200 kgf · cm) | 1.0 mm |

Because the pressure is approximately 1.6 times higher than conventional refrigerant pressure, the use of ordinary flare nuts (type 1) or thin-walled tubes may result in tube rupture, injury, or asphyxiation caused by refrigerant leakage.

- In order to prevent damage to the flare caused by over-tightening of the flare nuts, use the table above as a guide when tightening.
- When tightening the flare nut on the liquid tube, use a monkey wrench with a nominal handle length of 200 mm.

## 7-3. Insulating the Refrigerant Tubing

### Tubing Insulation

- Thermal insulation must be applied to all unit tubing, including distribution joint (purchased separately).

  * For gas tubing, the insulation material must be heat resistant to 120°C or above. For other tubing, it must be heat resistant to 80°C or above.

  Insulation material thickness must be 10 mm or greater.

  If the conditions inside the ceiling exceed DB 30°C and RH 70%, increase the thickness of the gas tubing insulation material by 1 step.

**CAUTION**

**If the exterior of the outdoor unit valves has been finished with a square duct covering, make sure you allow sufficient space to use the valves and to allow the panels to be attached and removed.**

### Taping the flare nuts

Wind the white insulation tape around the flare nuts at the gas tube connections. Then cover up the tubing connections with the flare insulator, and fill the gap at the union with the supplied black insulation tape. Finally, fasten the insulator at both ends with the supplied vinyl clamps. (Fig. 7-8)

### Insulation material

The material used for insulation must have good insulation characteristics, be easy to use, be age resistant, and must not easily absorb moisture. (Fig. 7-9)

**CAUTION**

**After a tube has been insulated, never try to bend it into a narrow curve because it can cause the tube to break or crack.**

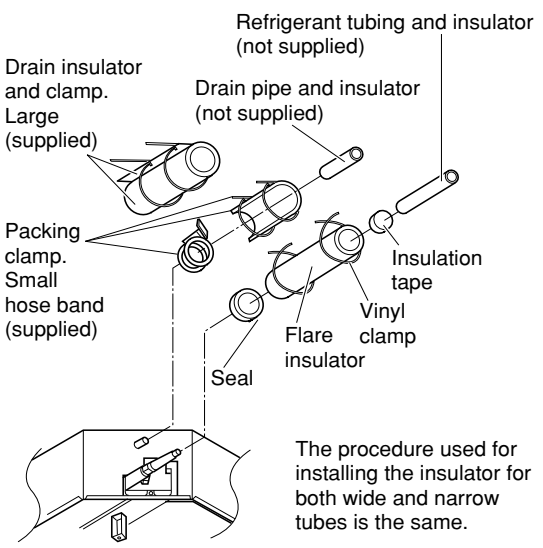
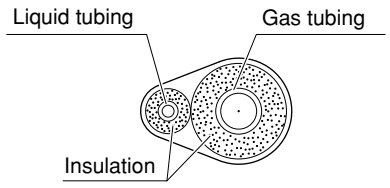
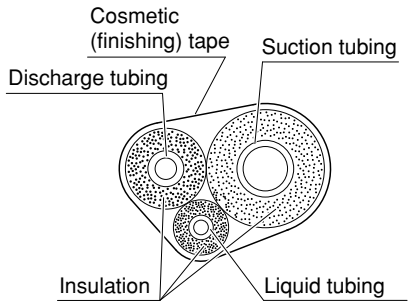



**Fig. 7-9**

**Two tubes arranged together**




**Three tubes arranged together**




**Four tubes arranged together**

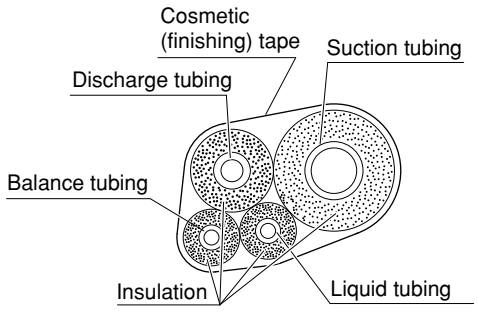



**Fig. 7-7**

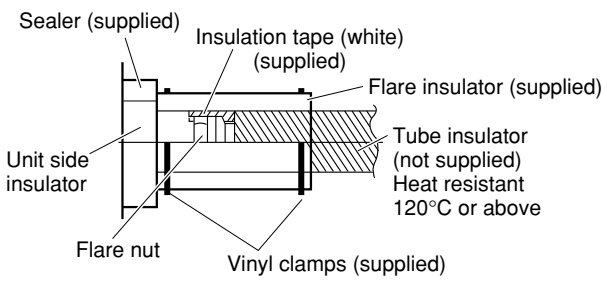



**Fig. 7-8**

**Never grasp the drain or refrigerant connecting outlets when moving the unit.**

### 7-4. Taping the Tubes

(1) At this time, the refrigerant tubes (and electrical wiring if local codes permit) should be taped together with armoring tape in 1 bundle. To prevent the condensation from overflowing the drain pan, keep the drain hose separate from the refrigerant tubing.

(2) Wrap the armoring tape from the bottom of the outdoor unit to the top of the tubing where it enters the wall. As you wrap the tubing, overlap half of each previous tape turn.

(3) Clamp the tubing bundle to the wall, using 1 clamp approx. each meter. (Fig. 7-10)

**NOTE**

Do not wind the armoring tape too tightly since this will decrease the heat insulation effect. Also ensure that the condensation drain hose splits away from the bundle and drips clear of the unit and the tubing.

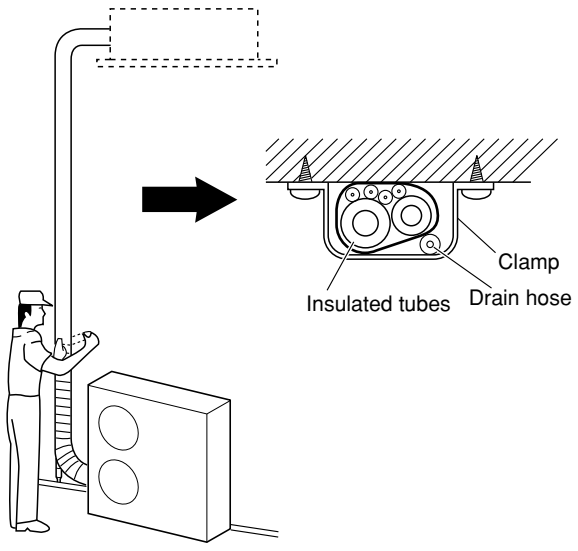



**Fig. 7-10**

### 7-5. Finishing the Installation

After finishing insulating and taping over the tubing, use sealing putty to seal off the hole in the wall to prevent rain and draft from entering. (Fig. 7-11)

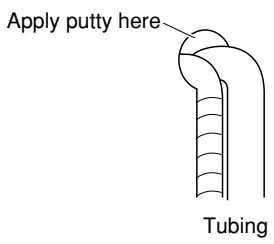



**Fig. 7-11**

## 8. AIR PURGING

Air and moisture in the refrigerant system may have undesirable effects as indicated below.

- pressure in the system rises
- operating current rises
- cooling (or heating) efficiency drops
- moisture in the refrigerant circuit may freeze and block capillary tubing
- water may lead to corrosion of parts in the refrigerant system

Therefore, the indoor unit and tubing between the indoor and outdoor unit must be leak tested and evacuated to remove any noncondensables and moisture from the system.

### ■ Air Purging with a Vacuum Pump (for Test Run) Preparation

Check that each tube between the indoor and outdoor units have been properly connected and all wiring for the test run has been completed. Remove the valve caps from all service ports on the outdoor unit. (Fig. 8-2) Note that all service valves on the outdoor unit are kept closed at this stage.
The balance tube leak test is not necessary if only 1 outdoor unit is installed.

**Leak test**

(1) Attach a manifold valve (with pressure gauges) and dry nitrogen gas cylinder to all service ports with charge hoses.
The balance tube leak test is not necessary if only 1 outdoor unit is installed.

**CAUTION**

**Use a manifold valve for air purging. If it is not available, use a stop valve for this purpose. The "Hi" knob of the manifold valve must always be kept closed.**

(2) Pressurize the system to no more than 33 kgf/cm$^2$G with dry nitrogen gas and close the cylinder valve when the gauge reading reaches 33 kgf/cm$^2$G. Then, test for leaks with liquid soap.

**CAUTION**

**To avoid nitrogen entering the refrigerant system in a liquid state, the top of the cylinder must be higher than the bottom when you pressurize the system. Usually, the cylinder is used in a vertical standing position.**

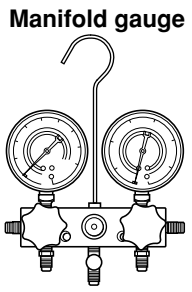



Fig. 8-1a

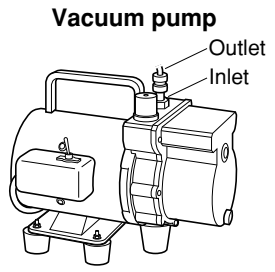



Fig. 8-1b

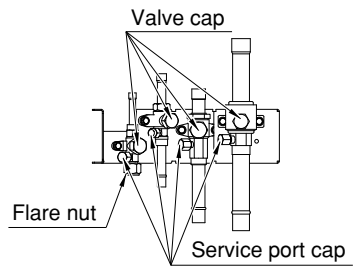



Fig. 8-2

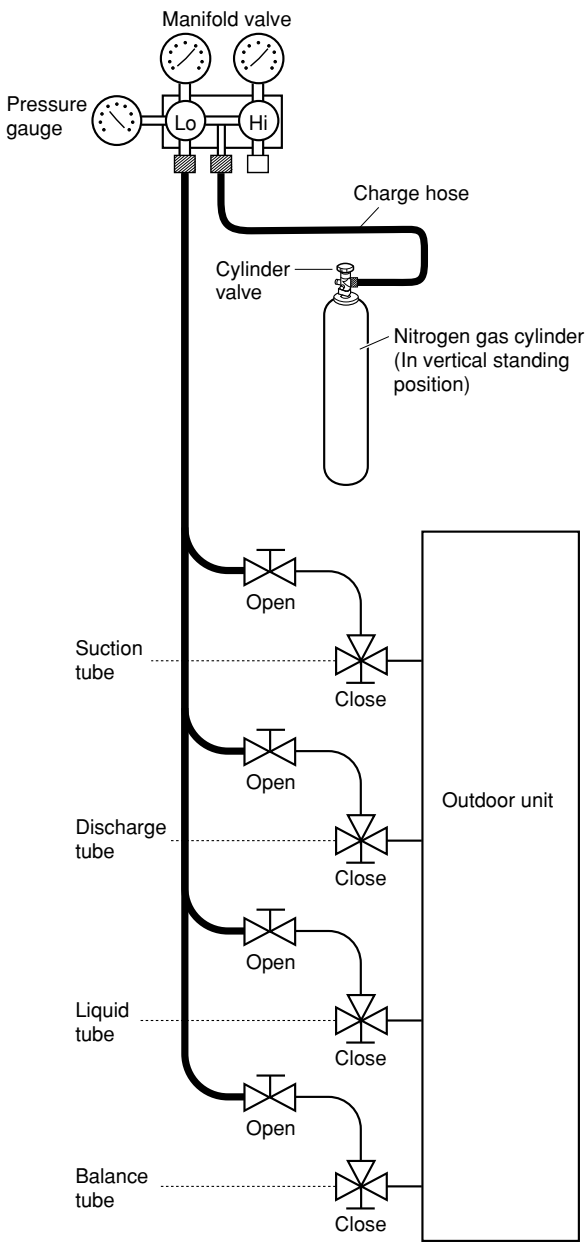



Fig. 8-3

(3) Do a leak test of all joints of the tubing (both indoor and outdoor) and all service valves. Bubbles indicate a leak. Wipe off the soap with a clean cloth after a leak test.

(4) After the system is found to be free of leaks, relieve the nitrogen pressure by loosening the charge hose connector at the nitrogen cylinder. When the system pressure is reduced to normal, disconnect the hose from the cylinder.

**Evacuation**

(1) Attach the charge hose end described in the preceding steps to the vacuum pump to evacuate the tubing and indoor unit. Confirm that the “Lo” knob of the manifold valve is open. Then, run the vacuum pump. The operation time for evacuation varies with the tubing length and capacity of the pump. The following table shows the amount of time for evacuation:

| **Required time for evacuation when 30 gal/h vacuum pump is used** | |
|---|---|
| If tubing length is less than 15 m | If tubing length is longer than 15 m |
| **45 min. or more** | **90 min. or more** |

Evacuation is not necessary for the balance tube if only 1 outdoor unit is installed.

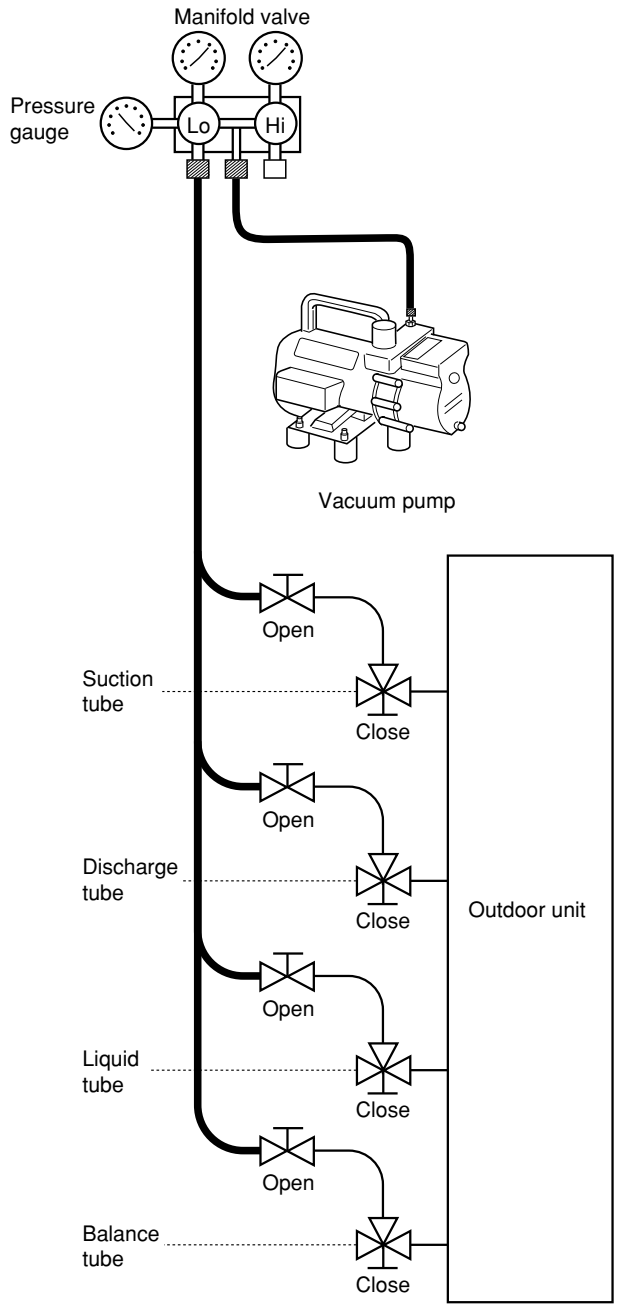



**Fig. 8-4**

**NOTE**

The required time in the above table is calculated based on the assumption that the ideal (or target) vacuum condition is less than 667 Pa (–755 mm Hg, 5 Torr).

(2) When the desired vacuum is reached, close the "Lo" knob of the manifold valve and turn off the vacuum pump. Please confirm that the gauge pressure is under 667 Pa (–755 mm Hg, 5 Torr) after 4 to 5 minutes of vacuum pump operation.

**CAUTION** **Use a cylinder designed for use with R410A respectively.**

**Charging additional refrigerant**

- Charging additional refrigerant (calculated from the liquid tube length as shown in Section 1-8 "Additional Refrigerant Charge") using the liquid tube service valve. (Fig. 8-5)
- Use a balance or scale to measure the refrigerant accurately.
- If the additional refrigerant charge amount cannot be charged at once, charge the remaining refrigerant in liquid form by using the suction tube service valve with the system in Cooling mode at the time of test run. (Fig. 8-6)
- Close the valve on the cylinder containing R410A.

**Finishing the job**

(1) With a flathead screwdriver, turn the liquid tube service valve counter-clockwise to fully open the valve.

(2) Turn the all service valve counter-clockwise to fully open the valve.

(3) Close all stop valves and loosen the "LO" knob of the manifold valve.

(4) Loosen the charge hose connected to all service port, then remove the hose.

(5) Replace all valve caps at all service ports and fasten them securely.

This completes air purging with a vacuum pump.
The air conditioner is now ready for a test run.

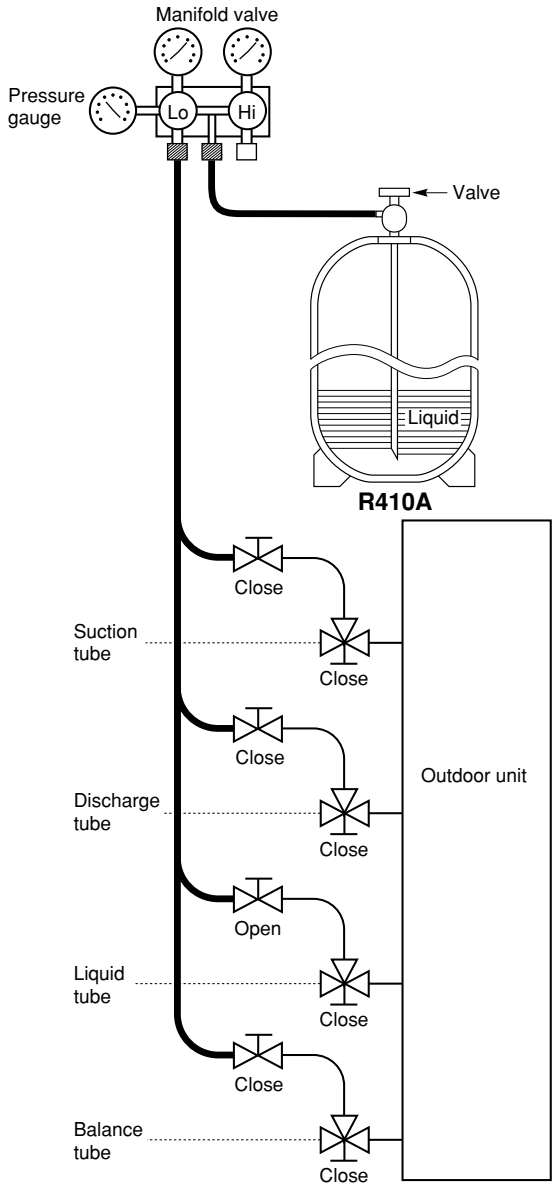



Fig. 8-5

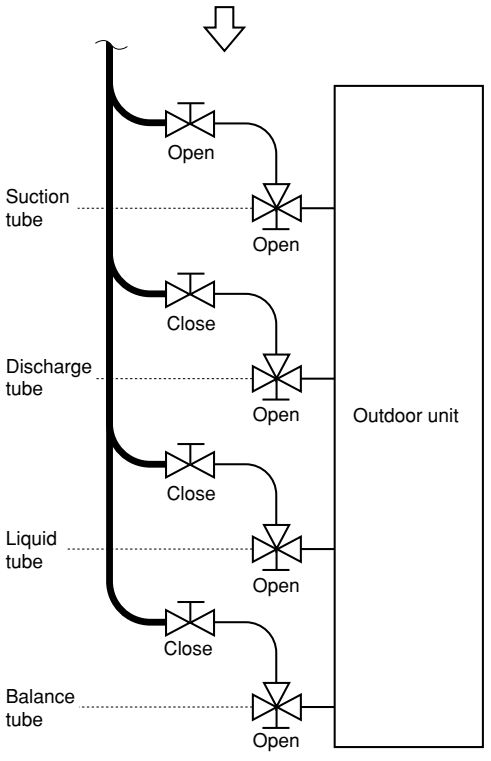



Fig. 8-6

## 9. HOW TO INSTALL THE CEILING PANEL

### ■ 1-Way Air Discharge Semi-Concealed Slim Type (NK1FL Type)

#### 9-1. Installing the Ceiling Panel

(1) Hook the 2 panel catches of the ceiling panel to the tubing side (stationary side) of the indoor unit. Then, press up on the opposite side to engage the level catch to install by opening the level catch (pressed with fingers.) (Fig. 9-1)
Make sure the ceiling panel is mounted correctly.

(2) Fasten the M6 screws (supplied) at 4 points as shown in Fig. 9-2.

**CAUTION**

**Never attempt to move the louver by hand.**
**Since the louver has an automatic air-sweeping mechanism, it may be damaged.**

(3) Install the wiring connector from the ceiling panel to the connector from the indoor unit.

**NOTE**

If the connector is not connected, a misoperation signal (“P9” on the remote control display) will be displayed when the unit is turned on.



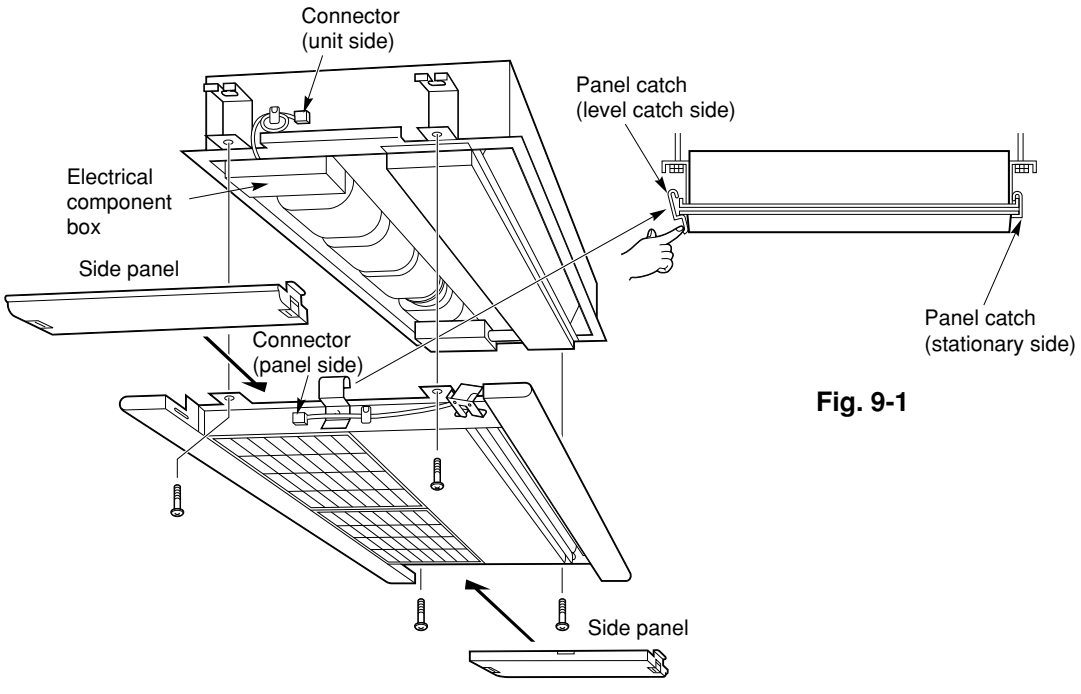



**Fig. 9-1**

**Fig. 9-2**

(4) Check to see that the ceiling panel is properly aligned with the seamline of the ceiling. If not, readjust the indoor unit by adjusting the nuts to the proper suspension point. (Fig. 9-3)

(5) For attaching and removing the side panels, see Fig. 9-4.

NK1FL

- Attaching the side panels
  Put the center claw of the side panel into the center recess of the indoor unit.
  Pressing 2 claws of the both sides of the side panel toward the inside, press the side panel onto the indoor unit.
- Removing the side panels
  Remove the side panel by pressing the 2 claws at both ends of the panel, disengage the claws and slide the panel horizontally.

**CAUTION**

**When attaching the side panels, be sure to hook the safety cords in the holes of the side panels.**

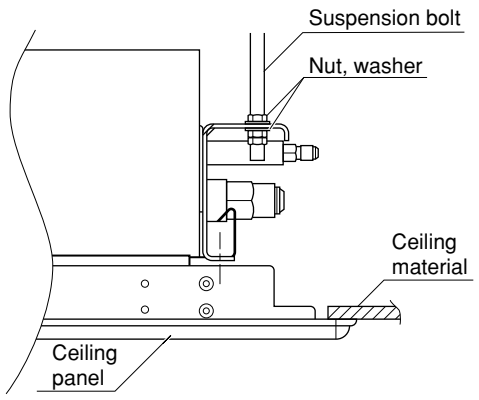



**Fig. 9-3**

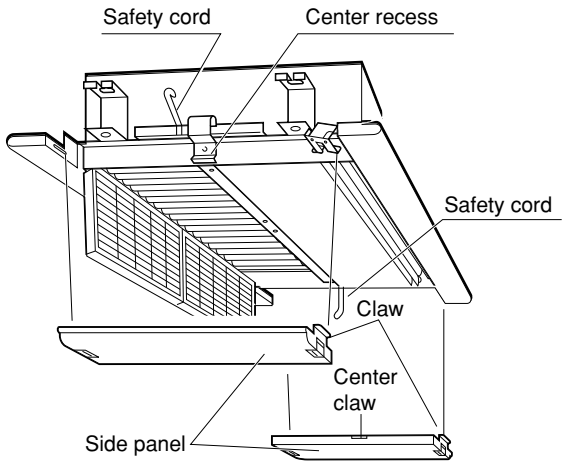



**Fig. 9-4**

## ■ 2-Way Air Discharge Semi-Concealed Type (NK2FL Type)

### 9-2. Before Installing the Ceiling Panel

(1) Adjust the distance between the unit and the surface of the ceiling (60 mm) using the 2 hexagonal nuts as shown in Fig. 9-5 while following the installation gauge.

(2) Remove the air-intake panel and the air filter from the ceiling panel as shown in Figs. 9-6 and 9-7.

**CAUTION**

**Never touch or attempt to move the air-direction louver by hand or you may damage the unit. Instead, use the remote controller if you want to change the direction of air flow.**

**How to remove the air-intake panel (from either side). (Fig. 9-7)**

(1) Push in. → (2) Slide. → (3) Pull. → (4) Remove.

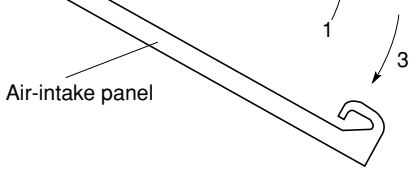



**Fig. 9-7**

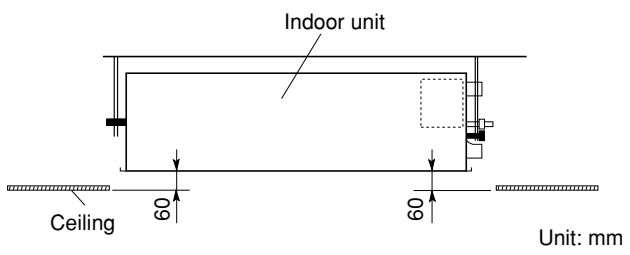



**Fig. 9-5**

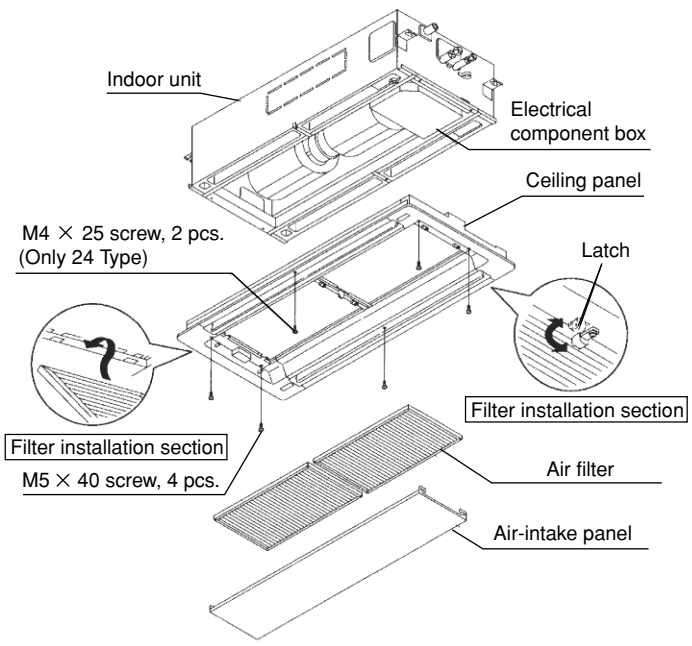



**Fig. 9-6**

NK2FL

### 9-3. Installing the Ceiling Panel

(1) Lift the ceiling panel and position it to align the panel catches with the catch recesses of the indoor unit.

(2) Hook the stationary catch first and then press up on the opposite side to engage the level catch to install as shown in Fig. 9-8.

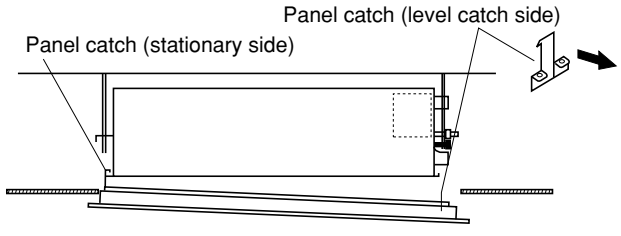



**Fig. 9-8**

**NOTE**

The ceiling panel must be mounted correctly. Listen for the click to determine it is securely shut.

NK2FL

(3) Next, check to see that the ceiling panel is properly aligned with the seamline of the ceiling. If it is not, remove the ceiling panel and slightly readjust the indoor unit body to the proper suspension point.

(4) When the ceiling panel has been properly aligned, use the 4 supplied mounting screws (M5) with washers to permanently fasten the ceiling panel.

(5) Install the wiring connector from the ceiling panel to the connector in the electrical component box of the indoor unit (8P connector if heat pump model). After installing the connector, use the clamp on the body of the indoor unit to secure the wiring.

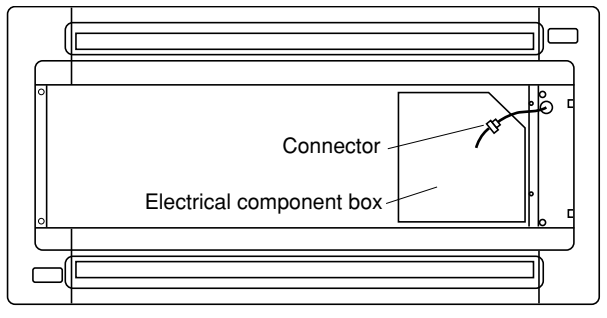



**Fig. 9-9**

**NOTE**

If the connector is not connected, a misoperation signal (“P9” on the remote control display) will be displayed when the unit is turned on.

(6) Install the air filter and air-intake grille by performing the steps in Figs. 9-6 and 9-7 in reverse.

### 9-4. When Removing the Ceiling Panel for Servicing

When removing the ceiling panel for servicing, remove the air-intake grille and air filter, disconnect the wiring connector inside the electrical component box, and then remove the 4 mounting screws.

Release one side of the panel by pressing the panel catch in the direction of the arrow. (See Caution.) Completely remove the ceiling panel by disengaging the stationary catch. (Fig. 9-8)

**CAUTION**

**When the air filter is removed, the rotator and live parts are exposed at the openings and these can cause a danger. Therefore be particularly careful.**

## ■ 4-Way Air Discharge Semi-Concealed Type (NKFL Type)

### Checking the unit position

(1) Check that the ceiling hole is within this range: 860 × 860 to 910 × 910 mm

(2) Use the full-scale installation diagram (from the packaging) that was supplied with the unit to determine the positioning of the unit on the ceiling surface. If the positions of the ceiling surface and unit do not match, air leakage, water leakage, flap operation failure, or other problems may result.

**CAUTION**

- **Never place the panel face-down. Either hang it vertically or place it on top of a projecting object. Placing it face-down will damage the surface.**
- **Do not touch the flap or apply force to it. (This may cause flap malfunction.)**

Ⓐ must be within the range of 12 – 17 mm.
If not within this range, malfunction or other trouble may result.

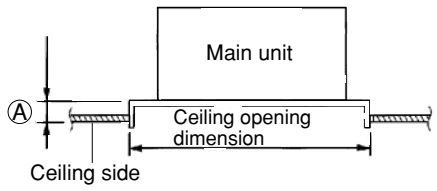



**Fig. 9-10**

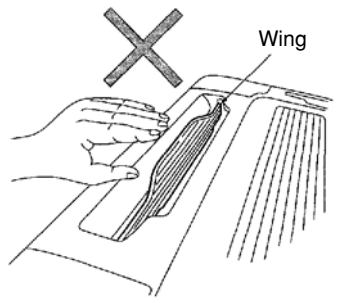



**Fig. 9-11a**

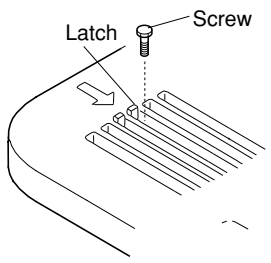



**Fig. 9-11b**

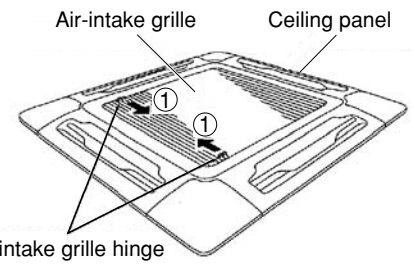



**Fig. 9-12**

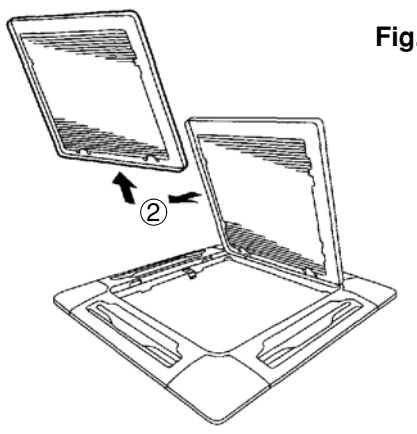



**Fig. 9-13**

### 9-5. Before Installing the Ceiling Panel

(1) Remove the air-intake grille and air filter from the ceiling panel. (Figs. 9-11b, 9-12 and 9-13)

a) Remove the 2 screws on the latch of the air-intake grille. (Fig. 9-11b)

b) Slide the air-intake grille catches in the direction shown by the arrows ① to open the grille. (Fig. 9-12)

c) With the air-intake grille opened, remove the grille hinge from the ceiling panel by sliding it in the direction shown by the arrow ② . (Fig. 9-13)

(2) Removing the corner cover

a) Slide the corner cover to the direction shown by the arrow ① to remove the corner cover. (Fig. 9-14).

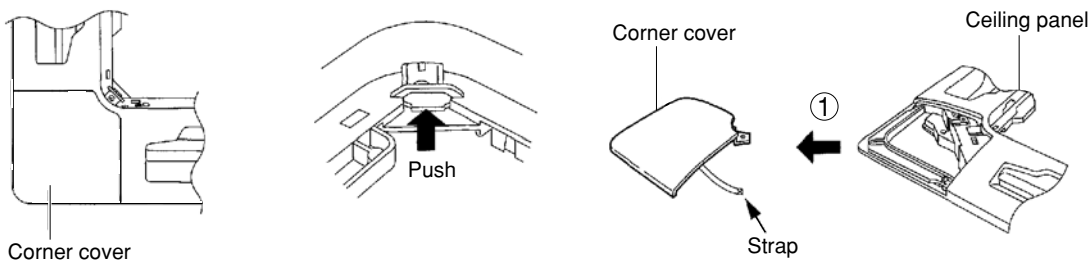



**Fig. 9-14**

NKFL

### 9-6. Installing the Ceiling Panel

The power must be turned ON in order to change the flap angle. (Do not attempt to move the flap by hand. Doing so may damage the flap.)

(1) Insert the temporary fasteners (stainless steel) on the inside of the ceiling panel into the square holes on the unit to temporarily fasten the ceiling panel in place. (Fig. 9-15)

- The ceiling panel must be installed in the correct direction relative to the unit. Align the REF. PIPE and DRAIN marks on the ceiling panel corner with the correct positions on the unit.
- To remove the ceiling panel, support the ceiling panel while pressing the temporary fasteners toward the outside. (Fig. 9-15)

(2) Align the panel installation holes and the unit screw holes.

(3) Tighten the supplied washer head screws at the 4 panel installation locations so that the panel is attached tightly to the unit. (Fig. 9-16)

(4) Check that the panel is attached tightly to the ceiling.

- At this time, make sure that there are no gaps between the unit and the ceiling panel, or between the ceiling panel and the ceiling surface. (Fig. 9-17)

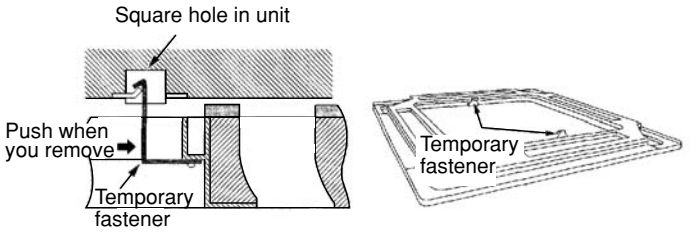



**Fig. 9-15**

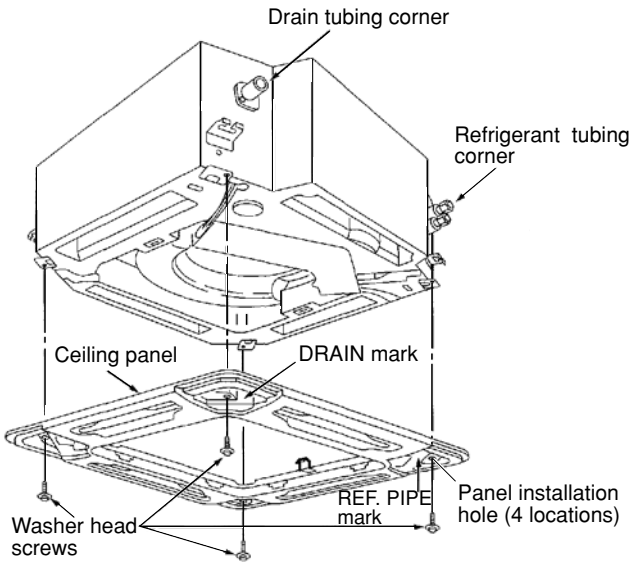



**Fig. 9-16**

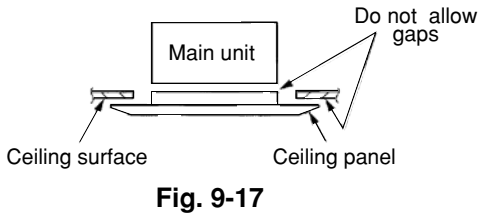



**Fig. 9-17**

- If there is a gap between the panel and the ceiling, leave the ceiling panel attached and make fine adjustments to the installation height of the unit to eliminate the gap with the ceiling. (Fig. 9-19)

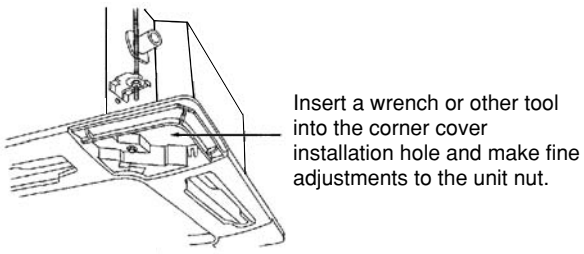



**Fig. 9-18**

**CAUTION**

- If the screws are not sufficiently tightened, trouble such as that shown in the figure below may occur. Be sure to tighten the screws securely.
- If a gap remains between the ceiling surface and the ceiling panel even after the screws are tightened, adjust the height of the unit again.

The height of the unit can be adjusted from the ceiling panel corner hole, with the ceiling panel attached, to an extent that does not affect the unit levelness, the drain hose, or other elements.

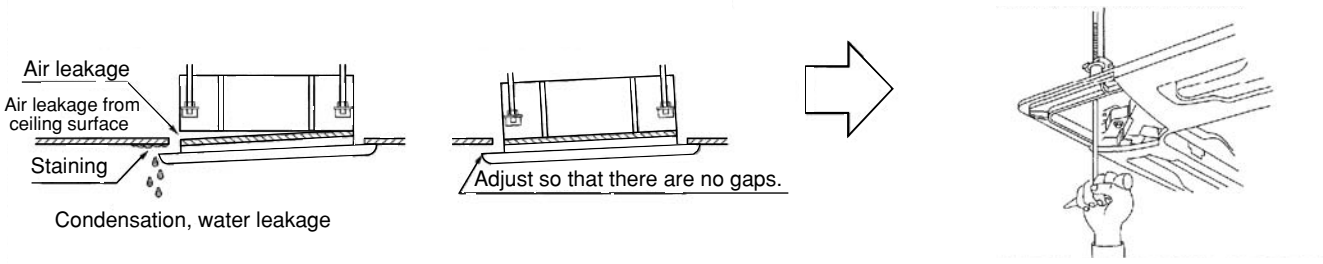



**Fig. 9-19**

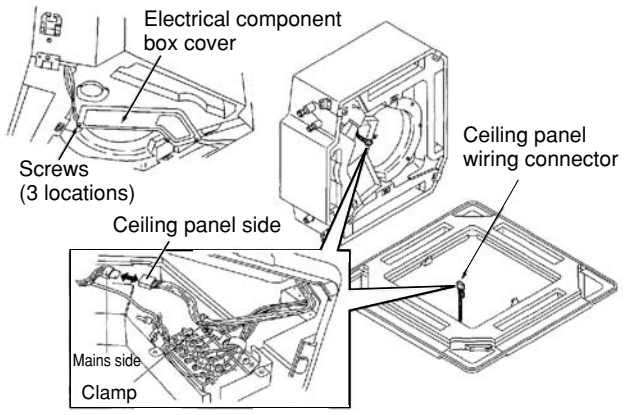
### 9-7. Wiring the Ceiling Panel

(1) Open the cover of the electrical component box.

(2) Connect the 7P wiring connector (red) from the ceiling panel to the connector in the unit electrical component box.

- If the connectors are not connected, the auto flap will not operate. Be sure to connect them securely.
- Check that the wiring connector is not caught between the electrical component box and the cover.
- Check that the wiring connector is not caught between the unit and the ceiling panel.

(Direction that the unit faces has been changed to facilitate explanation.)




* Pass the wiring connector through the clamp to fasten it in place, as shown in the figure.

**Fig. 9-20**

### 9-8. How to Attach the Corner & Air Intake Grille

**Attaching the corner cover and air-intake grille**

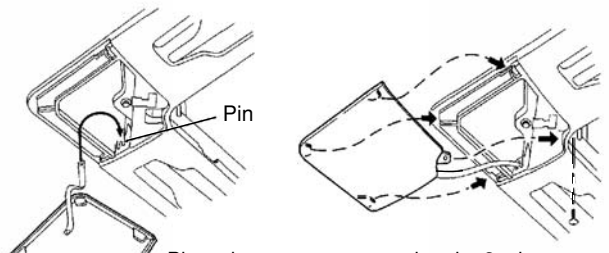
A. Attaching the corner cover

(1) Check that the safety cord from the corner cover is fastened to the ceiling panel pin, as shown in the figure. (Fig. 9-22)

(2) Use the supplied screws to attach the corner cover to the ceiling panel.

B. Attaching the air-intake grille

- To install the air-intake grille, follow the steps for **Removing the grille** in the reverse order. By rotating the air-intake grille, it is possible to attach the grille onto the ceiling panel from any of 4 directions. Coordinate the directions of the air-intake grilles when installing multiple units, and change the directions according to customer requests.
- **When attaching the air-intake grille, be careful that the flap lead wire does not become caught.**
- **Be sure to attach the safety cord that prevents the air-intake grille from dropping off to the ceiling panel unit as shown in the figure at right.**




Place the corner cover so that the 3 tabs fit into the holes in the ceiling panel. Then fasten it in place with the supplied screws.

**Fig. 9-21**

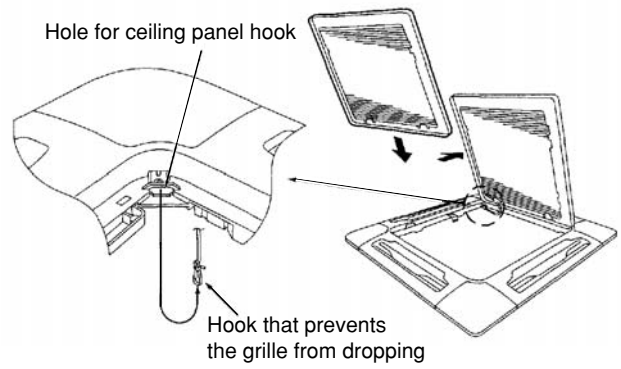



**Fig. 9-22**

- With this ceiling panel, the directions of the air-intake grille lattices when installing multiple units, and the position of the label showing the company name on the corner panel, can be changed according to customer requests, as shown in the figure below. However, the optional wireless receiver kit can only be installed at the refrigerant-tubing corner of the ceiling unit.

Locations of the air-intake grille catches at the time the product is shipped.
* The grille can be installed with these catches facing in any of 4 directions.

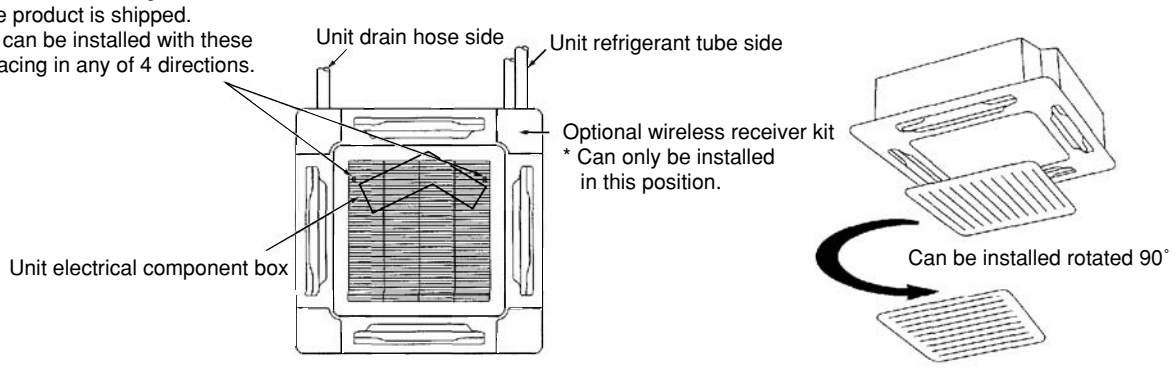



**Fig. 9-23**

### 9-9. Checking After Installation

- Check that there are no gaps between the unit and the ceiling panel, or between the ceiling panel and the ceiling surface.
  Gaps may cause water leakage and condensation.
- Check that the wiring is securely connected.
  If it is not securely connected, the auto flap will not operate. (“P09” is displayed on the remote controller.) In addition, water leakage and condensation may occur.

### 9-10. Removing the Ceiling Panel for Servicing

When removing the ceiling panel for servicing, remove the air-intake grille and air filter, disconnect the wiring connector inside the electrical component box, and then remove the 4 mounting screws.

NKFL

### 9-11. Adjusting the Auto Flap

The air-direction louver on the ceiling panel outlet can be adjusted as follows.

- Adjust the louver to the desired angle using the remote controller. The louver also has an automatic air-sweeping mechanism.

**NOTE**

- Never attempt to move the louver by hand.
- Proper air flow depends on the location of the air conditioner, the layout of the room and furniture, etc. If cooling or heating seems inadequate, try changing the direction of the air flow.

## 10. TEST RUN

### 10-1. Preparing for Test Run

- **Before attempting to start the air conditioner, check the following.**

(1) The control wiring is correctly connected and all electrical connections are tight.

(2) The transportation pads for the indoor fan have been removed. If not, remove them now.

(3) The power has been connected to the unit for at least 5 hours before starting the compressor. The bottom of the compressor should be warm to the touch and the crankcase heater around the feet of the compressor should be hot to the touch. (Fig. 10-1)

(4) If only 1 outdoor unit is installed, close the service valve on the balance tubes, and open the service valve on the other 3 tubes (suction, discharge, and liquid tubes).
If 2 or 3 outdoor units are installed, open the service valves on all 4 tubes (suction, discharge, liquid, and balance tubes).

(5) Request that the customer be present for the trial run.
Explain the contents of the instruction manual, then have the customer actually operate the system.

(6) Be sure to give the instruction manual and warranty certificate to the customer.

(7) When replacing the control PCB, be sure to make all the same settings on the new PCB as were in use before replacement.
The existing EEP ROM is not changed, and is connected to the new control PCB.

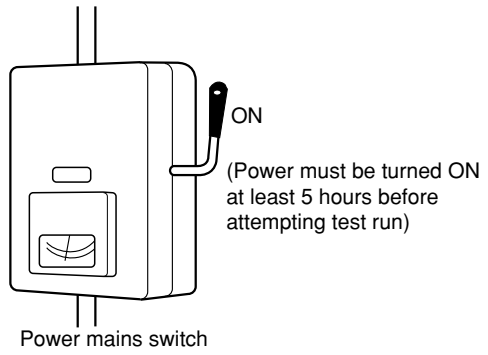



**Fig. 10-1**

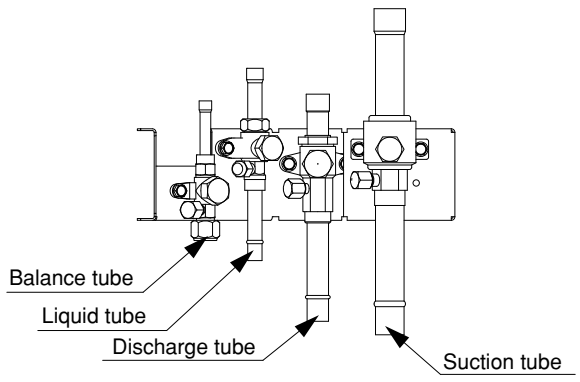



**Fig. 10-2**

## 10-2. Test Run Procedure

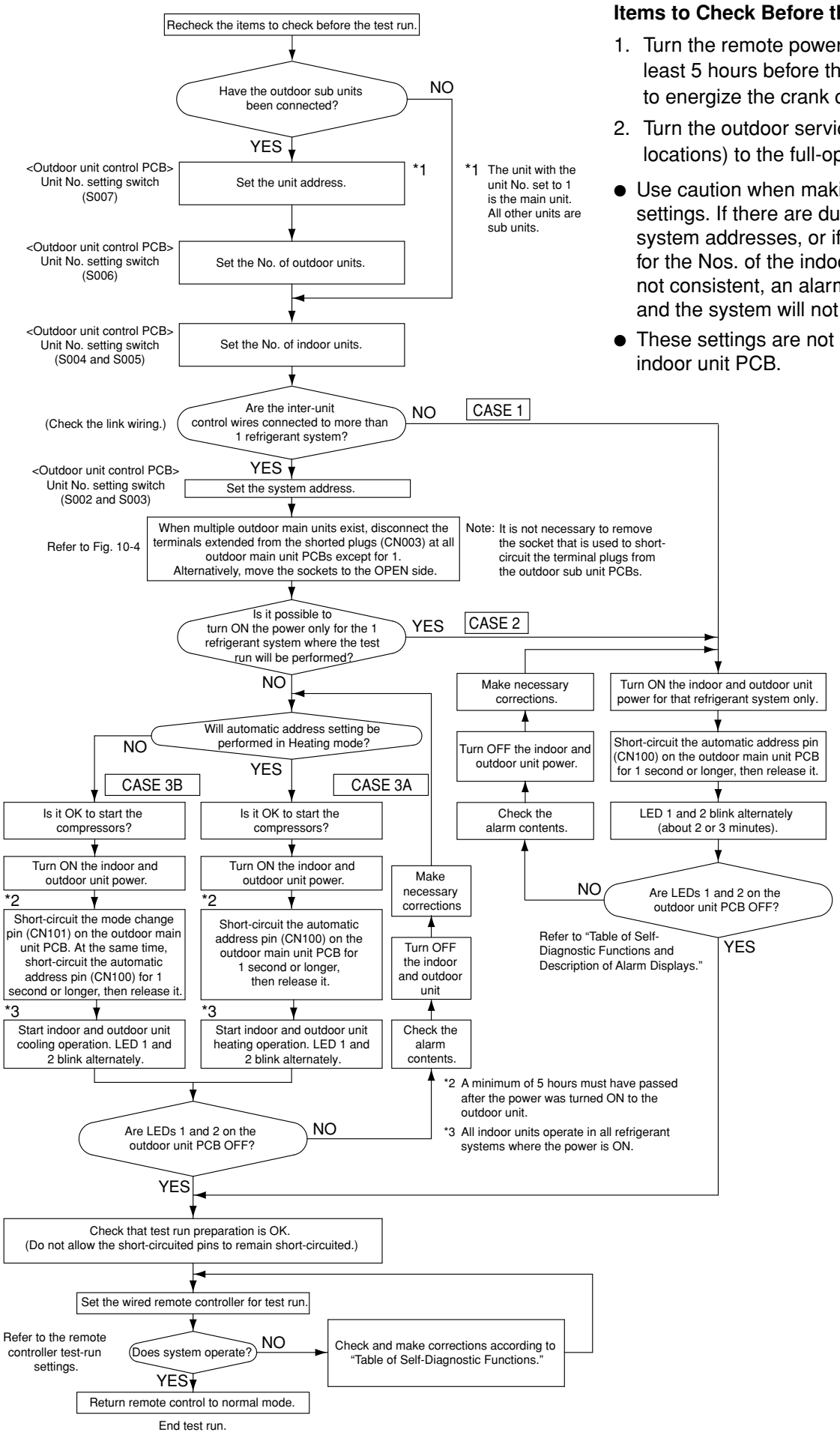



**Fig. 10-3**

### Items to Check Before the Test Run

1. Turn the remote power switch on at least 5 hours before the test, in order to energize the crank case heater.
2. Turn the outdoor service valves (4 locations) to the full-open positions.

- Use caution when making the settings. If there are duplicated system addresses, or if the settings for the Nos. of the indoor units are not consistent, an alarm will occur and the system will not start.
- These settings are not made on the indoor unit PCB.

## 10-3. Main Outdoor Unit PCB Setting

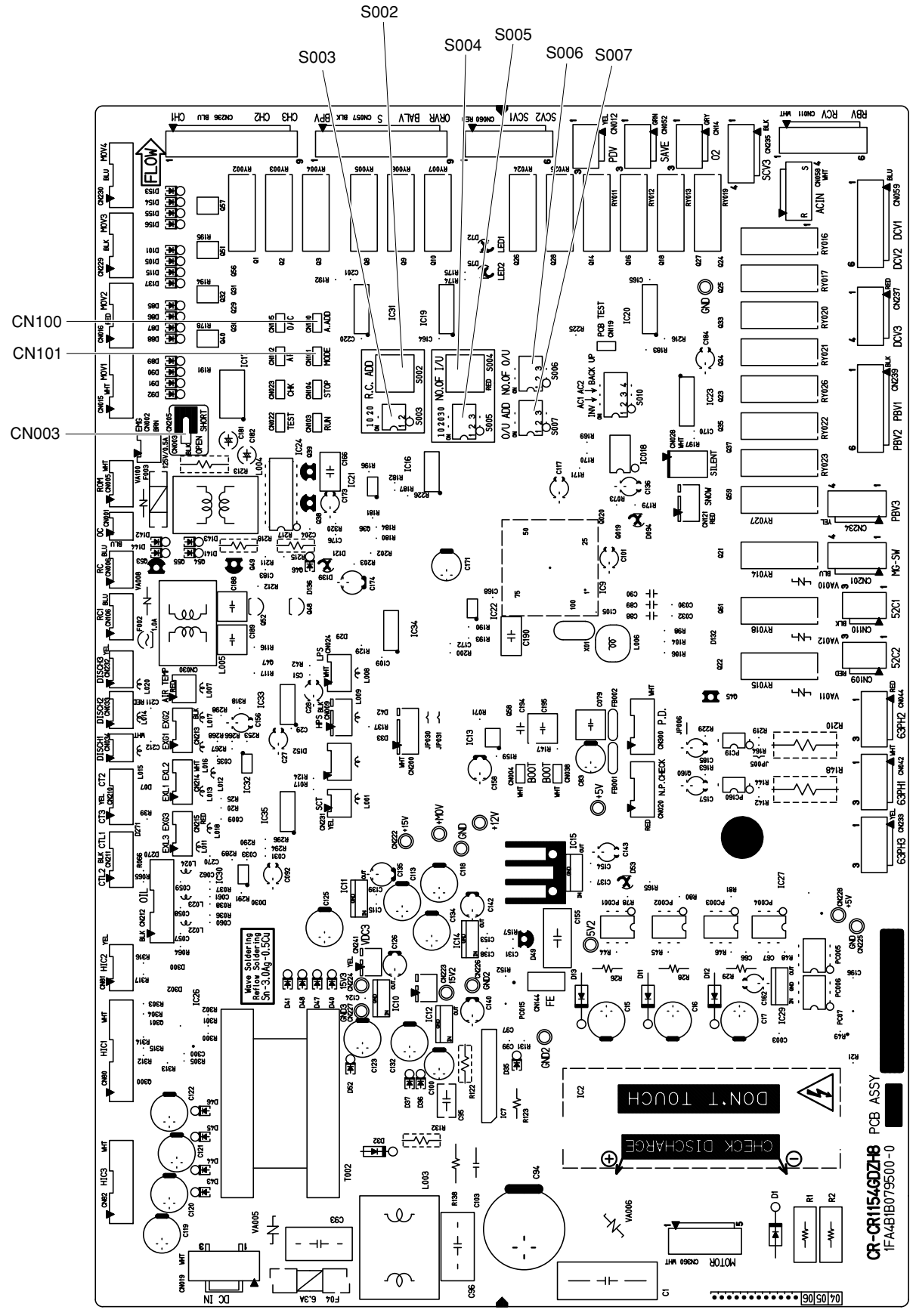
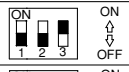
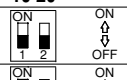
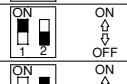
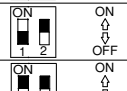
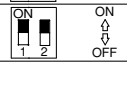



Fig. 10-4

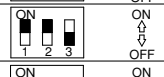
● **Examples of the No. of indoor units settings (S005, S004)**

| No. of indoor units | Indoor unit setting (S005) (3P DIP switch, blue) 10 20 30 | Indoor unit setting (S004) (Rotary switch, red) |
|---|---|---|
| 1 unit (factory setting) | All OFF  |  Set to 1 |
| 11 units | 1 ON  |  Set to 1 |
| 21 units | 2 ON  |  Set to 1 |
| 31 units | 3 ON  |  Set to 1 |
| 40 units | 1 & 3 ON  |  Set to 0 |

● **Examples of refrigerant circuit (R.C.) address settings (required when link wiring is used) (S003, S002)**

| System address No. | System address (S003) (2P DIP switch, blue) 10 20 | System address (S002) (Rotary switch, black) |
|---|---|---|
| System 1 (factory setting) | Both OFF  |  Set to 1 |
| System 11 | 1 ON  |  Set to 1 |
| System 21 | 2 ON  |  Set to 1 |
| System 30 | 1 & 2 ON  |  Set to 0 |

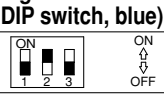
● **Examples of the No. of outdoor units settings (S006)**

| No. of outdoor units | Outdoor unit setting (S006) (3P DIP switch, blue) |
|---|---|
| 1 unit (factory setting) | 1 ON  |
| 2 units | 2 ON  |
| 3 units | 1 & 2 ON  |
| 4 units | 3 ON  |

● **Address setting of main outdoor unit (S007)**

| Unit No. setting | Address setting of outdoor unit (S007) (3P DIP switch, blue) |
|---|---|
| Unit No. 1 (main unit) (factory setting) |  |

● **Address setting of sub outdoor unit**

| Unit No. setting | Address setting of outdoor unit (S007) (3P DIP switch, blue) |
|---|---|
| Unit No. 2 (sub unit) (factory setting) | 2 ON  |
| Unit No. 3 (sub unit) | 1 & 2 ON  |
| Unit No. 4 (sub unit) | 3 ON  |

The sub unit control PCB contains the same switches as the main unit control PCB for No. of indoor units, No. of outdoor units, and system address. However it is not necessary to set these switches.

## 10-4. Auto Address Setting

### Basic wiring diagram: Example (1)

• **If link wiring is not used**
**(The inter-unit control wires are not connected to multiple refrigerant systems.)**
Indoor unit addresses can be set without operating the compressors.

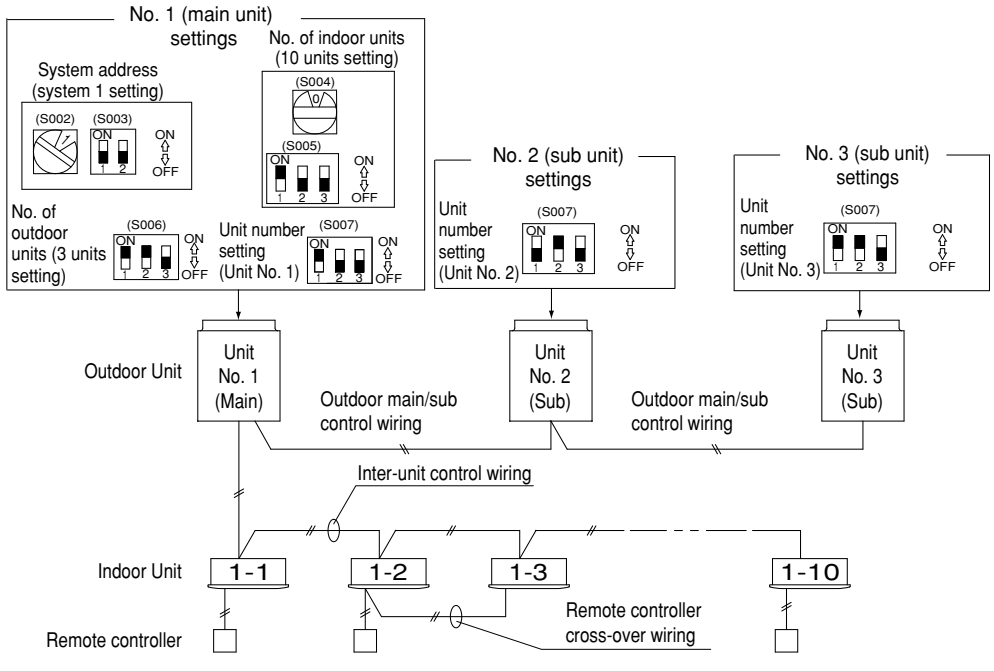
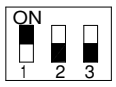
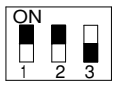
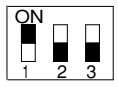



**Fig. 10-5**

### (1) Automatic Address Setting from the Outdoor Unit

1. On the outdoor main unit control PCB, check that the system address rotary switch (S002) is set to "1" and that the DIP switch (S003) is set to  "0." (These are the settings at the time of factory shipment.)
2. To set the number of indoor units that are connected to the outdoor unit to 10, on the outdoor main unit control PCB set the No. of indoor units DIP switch (S004) to  "1," and set the rotary switch (S004) to "0."
3. To set the number of outdoor units, on the outdoor main unit control PCB set the No. of outdoor units DIP switch (S006) to  (3 units), and set the unit No. DIP switch (S007) to  (unit No. 1 – main).
4. On the No. 2 (sub) unit control PCB, set the unit No. switch (S007) to  (unit No. 2).

   On the No. 3 (sub) unit control PCB, set the unit No. switch (S007) to  (unit No. 3).
5. Turn ON the power to the indoor and outdoor units.
6. On the outdoor main unit control PCB, short-circuit the automatic address pin (CN100) for 1 second or longer, then release it.

   ↓

   (Communication for automatic address setting begins.)

   ↓

   * To cancel, again short-circuit the automatic address pin (CN100) for 1 second or longer, then release it. The LED that indicates that automatic address setting is in progress turns OFF and the process is stopped. Be sure to perform automatic address setting again.

   (Automatic address setting is completed when LEDs 1 and 2 on the outdoor main unit control PCB turn OFF.)

   ↓
7. Operation from the remote controllers is now possible.

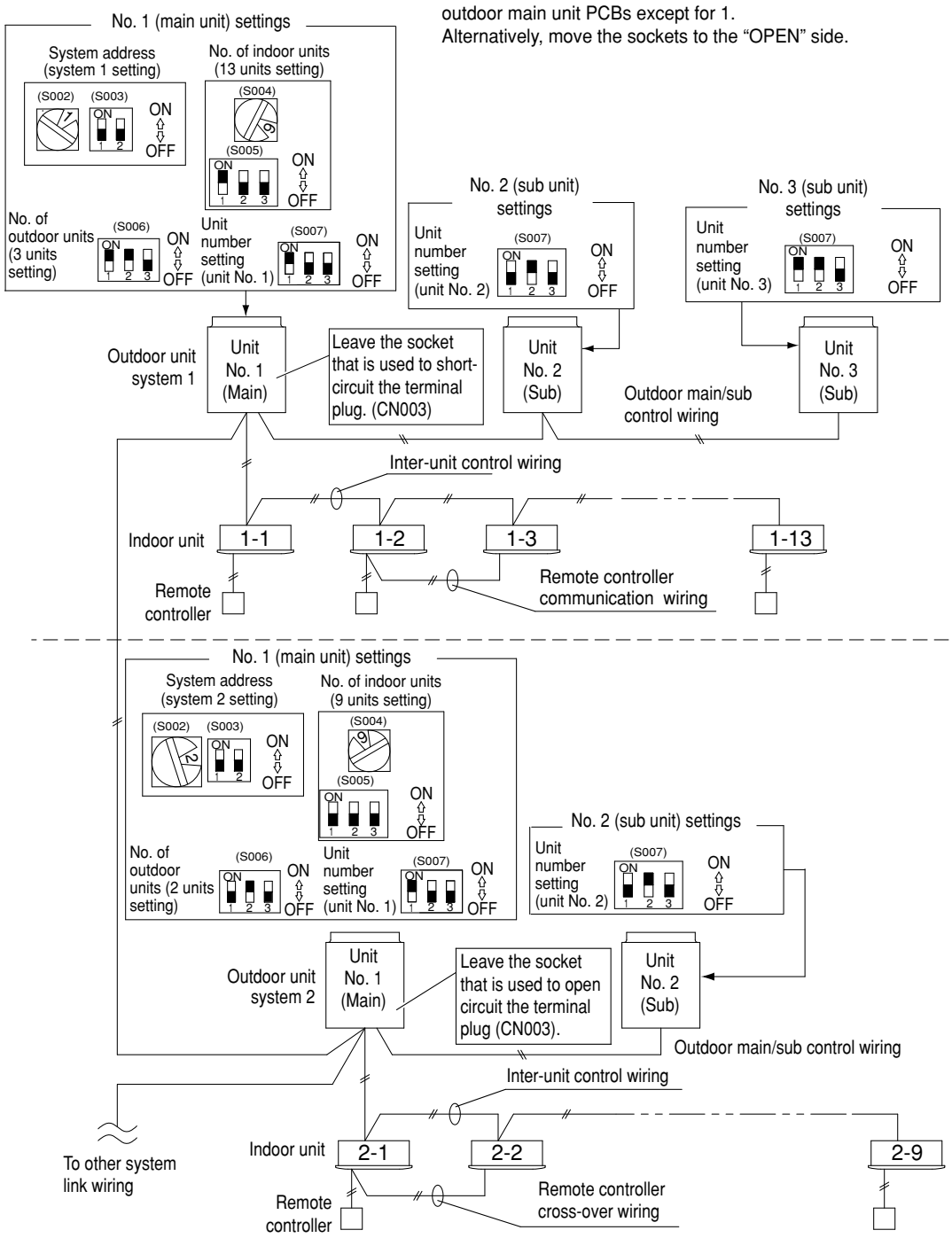
   * To perform automatic address setting from the remote controller, perform steps 1 to 5, then use the remote controller and complete automatic address setting.

● Refer to "Automatic Address Setting from the Remote Controller."

## Basic wiring diagram: Example (2)

**• If link wiring is used**

* When multiple outdoor main units exist, remove the socket that is used to short-circuit the terminal plug (CN003) from all outdoor main unit PCBs except for 1.
Alternatively, move the sockets to the “OPEN” side.




Make settings as appropriate for the cases listed below.
(Refer to the instructions on the following pages.)

**• Indoor and outdoor unit power can be turned ON for each system separately.** → Case 1

**• Indoor and outdoor unit power cannot be turned ON for each system separately.**

Automatic address setting in Heating mode → Case 2

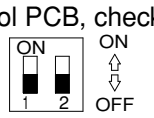
Automatic address setting in Cooling mode → Case 3

**Fig. 10- 6**

Case 1 **Automatic Address Setting (no compressor operation)**

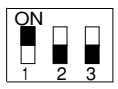
- Indoor and outdoor unit power can be turned ON for each system separately.
  Indoor unit addresses can be set without operating the compressors.

**Automatic Address Setting from Outdoor Unit**

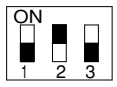
1. On the outdoor main unit control PCB, check that the system address rotary switch (S002) is set to "1" and that the DIP switch (S003) is set to 

"0." (These are the settings at the time of factory shipment.)
2. To set the number of indoor units that are connected to the outdoor unit to 13, on the outdoor main unit control PCB set the No. of indoor units DIP switch (S004) to 

"1," and set the rotary switch (S004) to "3."
3. To set the number of outdoor units, on the outdoor main unit control PCB set the No. of outdoor units DIP switch (S006) to 

(3 units).
4. On the No. 1 (main) unit control PCB, set the unit No. switch (S007) to 

(unit No. 1).

   On the No. 2 (sub) unit control PCB, set the unit No. switch (S007) to 

(unit No. 2).

   On the No. 3 (sub) unit control PCB, set the unit No. switch (S007) to 

(unit No. 3).
5. At the outdoor main unit where all indoor and outdoor unit power has been turned ON, short-circuit the automatic address pin (CN100) for 1 second or longer, then release it.

   ↓

   (Communication for automatic address setting begins.)

   ↓

   * To cancel, again short-circuit the automatic address pin (CN100) for 1 second or longer, then release it. The LED that indicates automatic address setting is in progress turns OFF and the process is stopped. Be sure to perform automatic address setting again.

   (Automatic address setting is completed when LEDs 1 and 2 on the outdoor main unit control PCB turn OFF.)

   ↓
6. Next turn the power ON only for the indoor and outdoor units of the next (different) system. Repeat steps 1 to 5 in the same way to complete automatic address settings for all systems.

   ↓
7. Operation from the remote controllers is now possible.

   * To perform automatic address setting from the remote controller, perform steps 1 to 4, then use the remote controller and complete automatic address setting.

- Refer to "Automatic Address Setting from the Remote Controller."

Case 2 **Automatic Address Setting in Heating Mode**

- Indoor and outdoor unit power cannot be turned ON for each system separately.
  In the following, automatic setting of indoor unit addresses is not possible if the compressors are not operating.
  Therefore perform this process only after completing all refrigerant tubing work.

**Automatic Address Setting from Outdoor Unit**

1. Perform steps 1 to 4 in the same way as for Case 1.
5. Turn the indoor and outdoor unit power ON at all systems.
   ↓
6. To perform automatic address setting in Heating mode, on the outdoor main unit control PCB in the refrigerant system where you wish to set the addresses, short-circuit the automatic address pin (CN100) for 1 second or longer, then release it.
   (Be sure to perform this process for one system at a time. Automatic address settings cannot be performed for more than one system at the same time.)
   ↓
   (Communication for automatic address setting begins, **the compressors turn ON, and automatic address setting in heating mode begins.**)
   (All indoor units operate.)
   ↓
   * To cancel, again short-circuit the automatic address pin (CN100) for 1 second or longer, then release it. The LED that indicates automatic address setting is in progress turns OFF and the process is stopped. Be sure to perform automatic address setting again.

   (Automatic address setting is completed when the compressors stop and LEDs 1 and 2 on the main unit control PCB turn OFF.)
7. At the outdoor main unit in the next (different) system, short-circuit the automatic address pin (CN100) for 1 second or longer, then release it.
   ↓
   (Repeat the same steps to complete automatic address setting for all units.)
   ↓
8. Operation from the remote controllers is now possible.

   * To perform automatic address setting from the remote controller, perform steps 1 to 5, then use the remote controller and complete automatic address setting.

- Refer to “Automatic Address Setting from the Remote Controller.”

Case 3 **Automatic Address Setting in Cooling Mode**

- Indoor and outdoor unit power cannot be turned ON for each system separately.
  In the following, automatic setting of indoor unit addresses is not possible if the compressors are not operating.
  Therefore perform this process only after completing all refrigerant tubing work.
  Automatic address setting can be performed during Cooling operation.

**Automatic Address Setting from Outdoor Unit**

1. Perform steps 1 to 4 in the same way as for Case 1.
5. Turn the indoor and outdoor unit power ON at all systems.
   ↓
6. To perform automatic address setting in Cooling mode, on the outdoor unit control PCB in the refrigerant system where you wish to set the addresses, short-circuit the mode change 2P pin (CN101). At the same time, short-circuit the automatic address pin (CN100) for 1 second or longer, then release it. (Be sure to perform this process for one system at a time. Automatic address settings cannot be performed for more than one system at the same time.)
   ↓
   (Communication for automatic address setting begins, **the compressors turn ON, and automatic address setting in Cooling mode begins.**)
   (All indoor units operate.)
   ↓ * To cancel, again short-circuit the automatic address pin (CN100) for 1 second or longer, then release it. The LED that indicates automatic address setting is in progress turns OFF and the process is stopped. Be sure to perform automatic address setting again.
   (Automatic address setting is completed when the compressors stop and LEDs 1 and 2 on the outdoor main unit control PCB turn OFF.)
7. At the outdoor main unit in the next (different) system, short-circuit the automatic address pin (CN100) for 1 second or longer, then release it.
   ↓
   (Repeat the same steps to complete automatic address setting for all units.)
   ↓
8. Operation from the remote controllers is now possible.

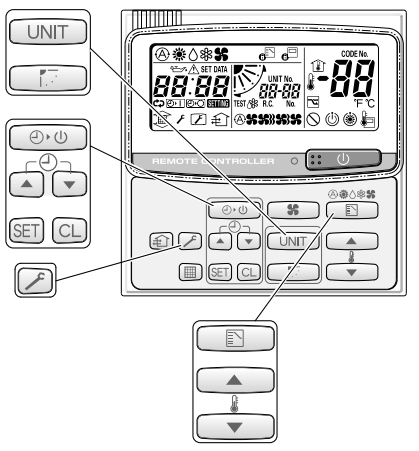
* Automatic address setting in Cooling mode cannot be done from the remote controller.

**Automatic Address Setting from the Remote Controller**

Selecting each refrigerant system individually for automatic address setting

---Automatic address setting for each system: Item code “A1”

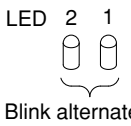
- Press the remote controller timer time ▲ button and 🔧 button at the same time. (Press and hold for 4 seconds or longer.)
- Next, press either the temperature setting ▲ or ▼ button. (Check that the item code is “A1.”)
- Use either the UNIT or ⊞ button to set the system No. to perform automatic address setting.
- Then press the SET button.
  (Automatic address setting for one refrigerant system begins.)
  (When automatic address setting for one system is completed, the system returns to normal stopped status.)
  <Approximately 4 – 5 minutes is required.>
  (During automatic address setting, “NOW SETTING” is displayed on the remote controller. This message disappears when automatic address setting is completed.)




- Repeat the same steps to perform automatic address setting for each successive system.

**Display during automatic address setting**

- On outdoor main unit PCB




* Do not short-circuit the automatic address setting pin (CN100) again while automatic address setting is in progress. Doing so will cancel the setting operation and will cause LEDs 1 and 2 to turn OFF.

* When automatic address setting has been successfully completed, both LEDs 1 and 2 turn OFF.

* LED 1 is D72. LED 2 is D75.

* If automatic address setting is not completed successfully, refer to the table below and correct the problem. Then perform automatic address setting again.

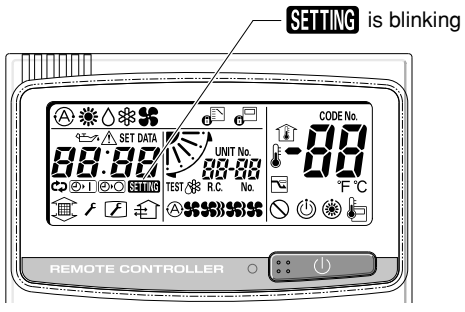
- Display details of LEDs 1 and 2 on the outdoor unit control PCB

(☼: ON ✷: Blinking ●: OFF)

| LED 1 | LED 2 | Display meaning |
|---|---|---|
| ☼ | ☼ | After the power is turned ON (and automatic address setting is not in progress), no communication with the indoor units in that system is possible. |
| ● | ☼ | After the power is turned ON (and automatic address setting is not in progress), 1 or more indoor units are confirmed in that system; however, the number of indoor units does not match the number that was set. |
| ✷ Alternating | ✷ Alternating | Automatic address setting is in progress. |
| ● | ● | Automatic address setting completed. |
| ✷ Simultaneous | ✷ Simultaneous | At time of automatic address setting, the number of indoor units did not match the number that was set. "⚠" (when indoor units are operating) indication appears on the display. |
| ✷ Alternating | ✷ Alternating | Refer to "Table of Self-Diagnostic Functions and Description of Alarm Displays." |

**Note:** "⚠" indicates that the solenoid is fused or that there is a CT detection current failure (current is detected when the compressor is OFF).

- Remote controller display



**Request concerning recording the indoor/outdoor unit combination Nos.**

After automatic address setting has been completed, be sure to record them for future reference.

List the outdoor main unit system address and the addresses of the indoor units in that system in an easily visible location (next to the nameplate), using a permanent marking pen or similar means that cannot be removed easily.

Example: (Outdoor) 1 – (Indoor) 1-1, 1-2, 1-3… (Outdoor) 2 – (Indoor) 2-1, 2-2, 2-3…

These numbers are necessary for later maintenance. Please be sure to indicate them.

**Checking the indoor unit addresses**

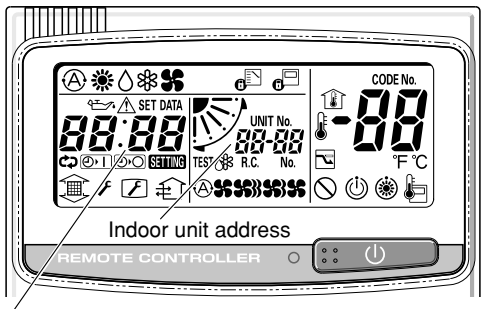
Use the remote controller to check the indoor unit address.

**<If 1 indoor unit is connected to 1 remote controller>**

1. Press and hold the button and button for 4 seconds or longer (simple settings mode).
2. The address is displayed for the indoor unit that is connected to the remote controller.
   (Only the address of the indoor unit that is connected to the remote controller can be checked.)
3. Press the button again to return to normal remote controller mode.

**<If multiple indoor units are connected to 1 remote controller (group control)>**

1. Press and hold the button and button for 4 seconds or longer (simple settings mode).
2. “ALL” is displayed on the remote controller.
3. Next, press the UNIT button.
4. The address is displayed for 1 of the indoor units which is connected to the remote controller. Check that the fan of that indoor unit starts and that air is discharged.
5. Press the UNIT button again and check the address of each indoor unit in sequence.
6. Press the button again to return to normal remote controller mode.




Number changes to indicate which indoor unit is currently selected.

**Setting for shared solenoid valve kit**

If the indoor unit solenoid valve kit is to be shared, be sure to complete the following setting.

- Set using the remote controller of the indoor unit where the solenoid valve kit will be shared.
- This setting is done after automatic address setting is completed.

1. Press and hold the and buttons simultaneously for 4 seconds or longer.
2. “ALL” is displayed on the remote controller (in the system – indoor unit No. location).
   At this time, the fans at all indoor units subject to group control operate at HH speed.
3. Use the temperature setting and buttons and select item code “0E.”
4. Use the timer time and buttons to select setting data “0001.”
   This causes all indoor units subject to group control to follow the operation mode of the main unit.
   (The initial setting is “0000.”)
5. Press the SET button.
6. Press the button to return to the normal remote controller display.

**Remote Controller Test Run Settings**

1. Press the remote controller button for 4 seconds or longer. Then press the button.

- "TEST RUN" appears on the LCD display while the test run is in progress.
- The temperature cannot be adjusted when in Test Run mode.
  (This mode places a heavy load on the machines. Therefore use it only when performing the test run.)

2. The test run can be performed using the HEAT, COOL, or FAN operation modes.
   **Note:** The outdoor units will not operate for approximately 3 minutes after the power is turned ON and after operation is stopped.
3. If correct operation is not possible, a code is displayed on the remote controller LCD display.
   (Refer to "Table of Self-Diagnostic Functions" and correct the problem.)
4. After the test run is completed, press the button again. Check that "TEST RUN" disappears from the LCD display.
   (To prevent continuous test runs, this remote controller includes a timer function that cancels the test run after 60 minutes.)

* If the test run is performed using the wired remote controller, operation is possible even if the cassette-type ceiling panel has not been installed. ("P09" display does not occur.)

**10-5. Caution for Pump Down**

Pump down means refrigerant gas in the system is returned to the outdoor unit. Pump down is used when the unit is to be moved, or before servicing the refrigerant circuit. (Refer to the Service Manual)

**CAUTION**

- **This outdoor unit cannot collect more than the rated refrigerant amount as shown by the nameplate on the back.**
- **If the amount of refrigerant is more than that recommended, do not conduct pump down. In this case use another refrigerant collecting system.**

# 11. HOW TO INSTALL THE WIRELESS REMOTE CONTROLLER RECEIVER

## ■ RCIRK-FL for 4-Way Cassette (NKFL Type)

### 11-1. Installing the Receiver Unit

The only corner where the receiver unit can be installed is the one shown in Fig. 11-1. Therefore, consider the direction of the panel when it is installed on the indoor unit.

(1) Remove the intake grille.

(2) Remove the screws that fasten the adjustable corner cap, then slide the adjustable corner cap to the side to remove it. (Fig. 11-2)

(3) The square hole used for the panel wiring is filled with packing (sponge material) used for insulation.* Remove the packing, then pass the wiring from the wireless receiver unit through the grill. Twist the wires together and use a cable fastener to fasten them and fix with screw, then replace the packing in the hole as it was before. (Fig. 11-3)

* If this packing is not used, there is danger of condensation on the wiring. Be sure to replace the packing.

(4) After completing wiring as described in “Wiring the Receiver Unit” on the next page, twist the wires together and use a cable fastener to fasten them, leaving a length of wiring that is long enough to permit removal of the adjustable corner cap. (Fig. 11-3)

(5) Install the receiver unit in the panel. At this time, slide the receiver unit so that each of the 3 tabs fits into its respective hole. Take care that the wires are not pinched. (Fig. 11-4)

* Refer to the instruction manual provided with the panel.

**NOTE**

- Do not twist the control wiring together with the power wiring because this may cause a malfunction.
- Install a noise filter or take other appropriate action if electrical noise affects the power supply circuit of the unit.

* For wiring and test run procedures, refer to “Wiring the Receiver Unit” and “Test Run.”

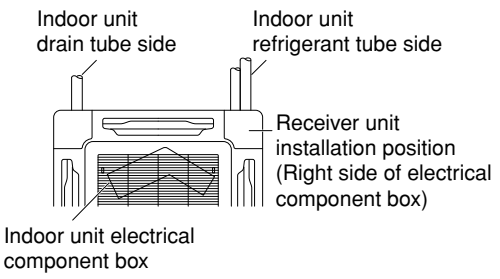



**Fig. 11-1**

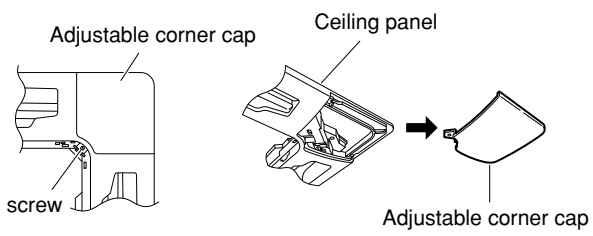



**Fig. 11-2**

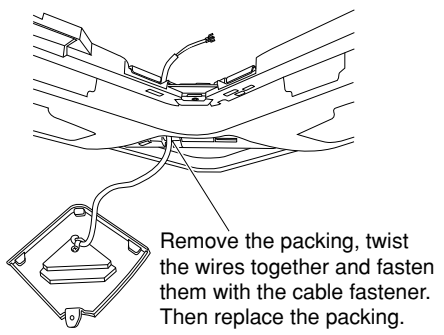



**Fig. 11-3**

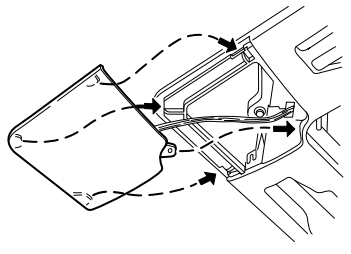
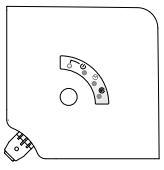
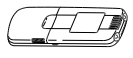
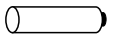


**Fig. 11-4**

NKFL

### 11-2. Accessories

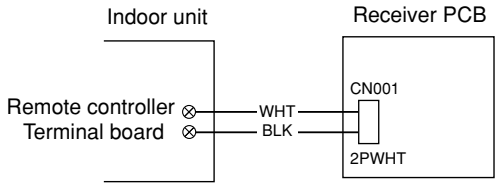
| No. | Parts | Q'ty |
|---|---|---|
| 1 | Receiver unit  | 1 |
| 2 | Remote control unit  | 1 |
| 3 | Remote control holder  | 1 |

| No. | Parts | Q'ty |
|---|---|---|
| 4 | AAA alkaline battery  | 2 |
| 5 | Tapping screw 4 × 16  | 2 |
| 6 | Clamp  | 1 |
| 7 | Fastening screw 4 × 12  | 1 |

### 11-3. Wiring the Receiver Unit

NKFL

- Connection diagram




- Connect the wire from the receiver unit to the indoor unit remote controller terminal board. (The wire has no polarity.)

### 11-4. Precautions on Simultaneous Installation of Wired Remote Controller and Wireless Remote Controller

By installing a wired remote controller, the wireless remote controller kit can permit dual remote control operation at the same time.

(Up to 2 units of remote controllers – a wireless kit and a wired unit – can be installed.)

Dual remote control operation can control 1 or multiple air conditioners using several remote controllers.

**CAUTION**

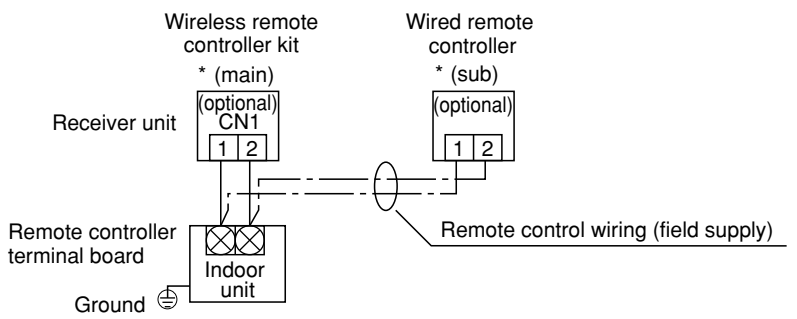
- **Be sure to determine the correct terminal numbers on the indoor unit when wiring the remote controller. The remote controller will be damaged if high voltage (such as 200 VAC) is applied.**
- **The wireless remote controller kit components cannot be used for more than 1 indoor unit at a time. (However, separate receiver units may be used simultaneously.)**
- **When a wireless remote controller kit and a wired remote controller are used simultaneously, assign either the wireless remote controller or the wired remote controller as the sub remote controller unit.**

(1) To assign the wired remote controller as the sub unit, locate the address connector at the rear of the wired remote controller PCB and disconnect it. Reconnect it to the sub unit position.

(2) To assign the wireless remote controller as the sub unit, locate the dip switch [S003] on the wireless receiver unit PCB. Set the No. 3 switch to the ON position.

**When 1 indoor unit is operated with 2 remote controllers:**

(The indoor unit runs according to which of the remote controllers is assigned as the main or sub unit.)

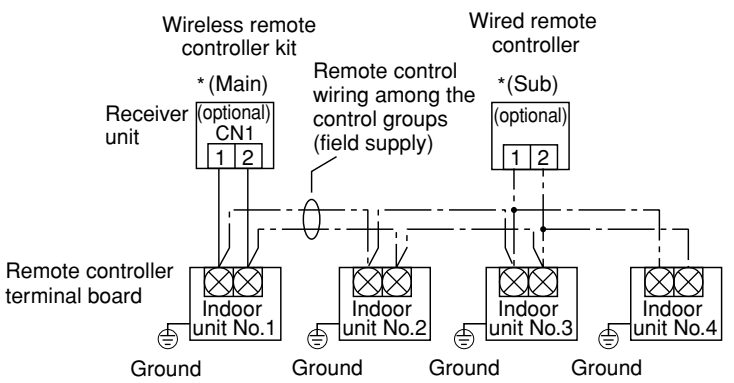



* Use field wiring cables with a cross-sectional area of at least 0.5mm$^2$ to 2mm$^2$.

* The maximum total length of crossover cables must be no longer than 400m.

**When several groups of indoor units are operated with 2 remote controllers:**

(The remote controller (main or sub unit) can operate with any indoor unit.)




* Use field wiring cables with a cross-sectional area of at least 0.5mm$^2$ to 2mm$^2$.

* The maximum total length of crossover cables must be no longer than 200m.

**Fig. 11-5**

### 11-5. How to Use the Test Run Setting

1. Set DIP switch [S003] No. 1 on the wireless receiver unit PCB from OFF to ON.
2. All indicator lamps in the display section blink during test run operation.
3. No temperature control is available during the test run.
4. After the test run, be sure to reset DIP switch No. 1 back to the OFF position and check that no indicator lamps are blinking. Then remount and attach the PCB cover as before.

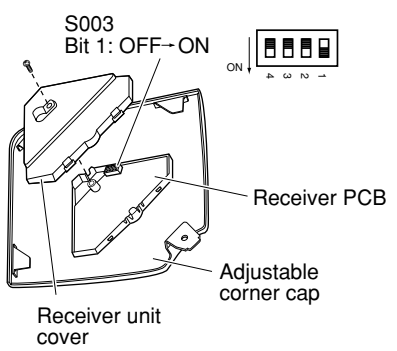



**Fig. 11-6**

**NOTE**

To avoid placing excessive operating load on the equipment, use this function only when conducting the test run.

NKFL

## ■ RCIRP-FL for Ceiling-Mounted (NPFL Type)

### 11-6. Installing the Receiver Unit

(1) To take off the side panel, open the intake grille and remove the screw. Then remove the side panel by moving it toward the front (direction of arrow). (Fig. 11-7)

(2) Wrap the end of a standard (flat) screwdriver blade with vinyl tape. Then insert the screwdriver blade into the groove on the side of the cover below the “O” mark, and pry open the cover. (Fig. 11-8)
(Take care not to scratch the panel.)

(3) Pass the lead wire through the panel, then install the receiver unit in the panel hole.
(The projections on the receiver unit engage the panel holes to attach the unit.)

(4) Fasten the receiver lead wire to the fastener that holds the louver motor wiring. (Fig. 11-9)

(5) Reattach the side panel.

(6) Route the lead wire from the receiver unit along the louver motor wiring and other wiring and fasten them with a fastener. (Fig. 11-10)

* Access the hole at the top of the electrical component box to draw in the wiring.

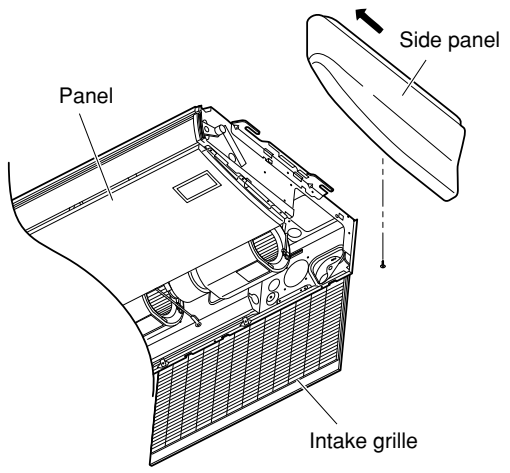



**Fig. 11-7**

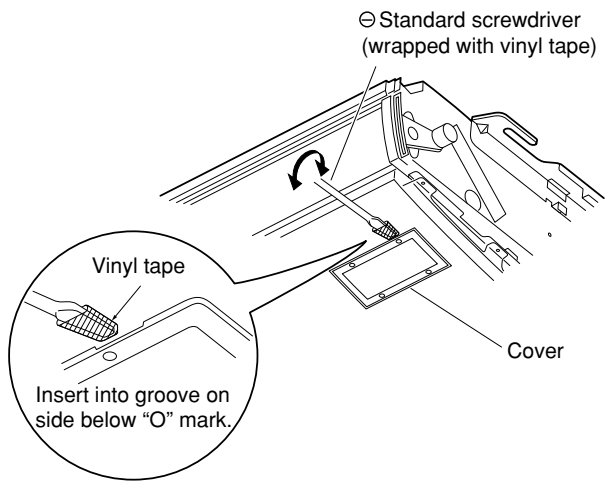



**Fig. 11-8**

**NOTE**

- Do not twist the control wiring with the power wiring because this may cause malfunction.
- Install a noise filter or take other appropriate action if electrical noise disturbs the unit’s power supply circuit.

* For the wiring and test run procedures, refer to “Wiring the Receiver Unit” and “Test Run.”

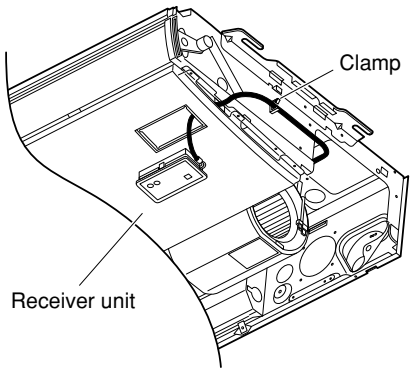



**Fig. 11-9**

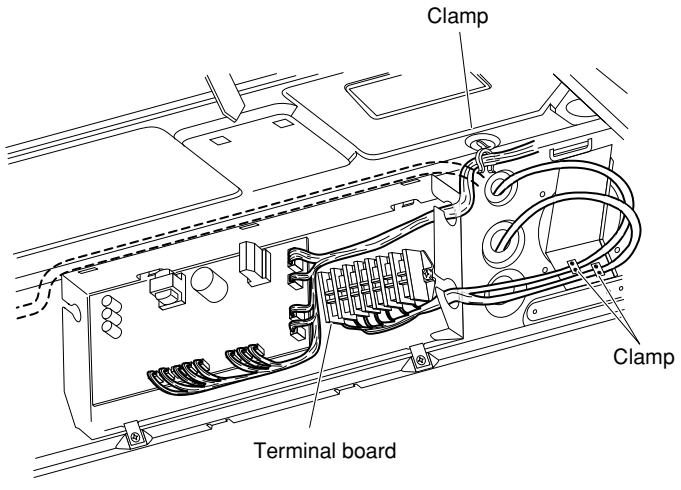
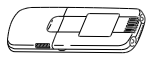



**Fig. 11-10**

NPFL

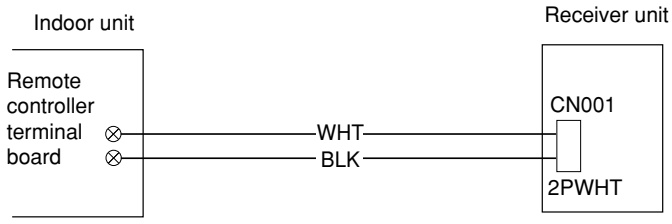
### 11-7. Accessories Supplied with Unit

| No. | Parts | Q'ty |
|---|---|---|
| 1 | Receiver unit  | 1 |
| 2 | Remote control unit  | 1 |
| 3 | Remote control holder  | 1 |

| No. | Parts | Q'ty |
|---|---|---|
| 4 | AAA alkaline battery  | 2 |
| 5 | Tapping screw $4 \times 16$  | 2 |

### 11-8. Wiring the Receiver Unit

- Connection diagram




- Connect the provided wire (already connected to the receiver unit) to the indoor unit remote controller terminal board.
  (The wire has no polarity.)

### 11-9. Precautions on Simultaneous Installation of Wired Remote Controller and Wireless Remote Controller

By installing a wired remote controller, the wireless receiver unit can permit dual remote control operation at the same time.
(Up to 2 units of remote controllers – a wireless remote controller and a wired remote controller – can be installed.)
Dual remote control operation can control 1 or multiple air conditioners using several remote controllers.

**CAUTION**

- **Be sure to determine the correct terminal numbers on the indoor unit when wiring the remote controller. The remote controller will be damaged if high voltage (such as 200 VAC) is applied.**
- **The wireless receiver unit components cannot be used for more than 1 indoor unit at a time. (However, separate receiver units may be used simultaneously.)**
- **When a wireless receiver unit and a wired remote controller are used simultaneously, assign either the wireless remote controller or the wired remote controller as the sub remote controller unit.**

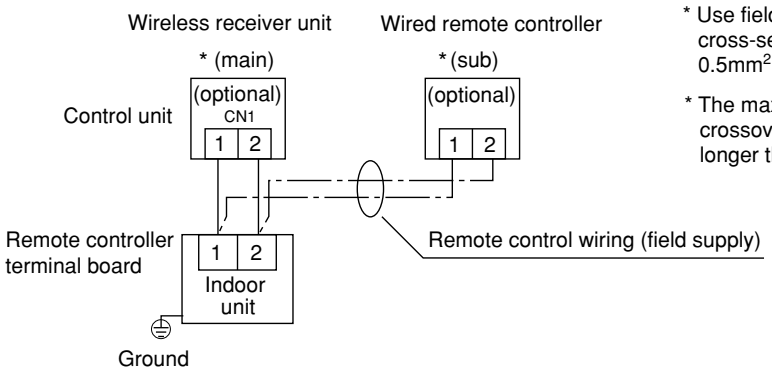
(1) To assign the wired remote controller as the sub unit, locate the address connector at the rear of the wired remote controller PCB and disconnect it. Reconnect it to the sub unit position.

(2) To assign the wireless remote controller as the sub unit, locate the DIP switch [S003] on the wireless control unit. Set the No. 3 switch to the ON position.

NPFL

**When 1 indoor unit is operated with 2 remote controllers:**

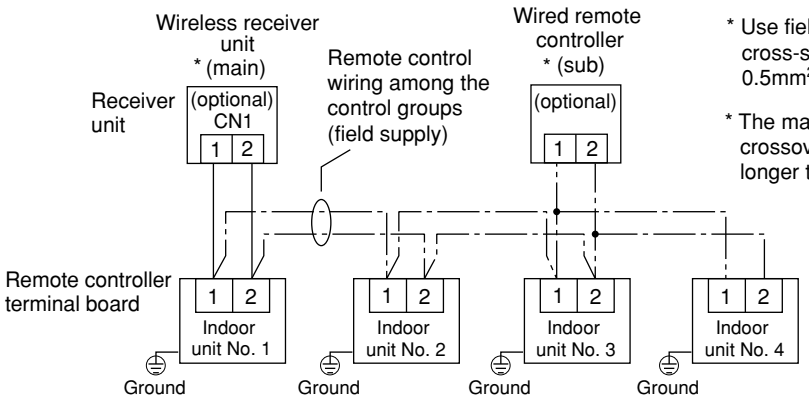
(The indoor unit runs according to which of the remote controllers is assigned as the main or sub unit.)




* Use field wiring cables with a cross-sectional area of at least 0.5mm$^2$ to 2mm$^2$.
* The maximum total length of crossover cables must be no longer than 400m.

**When several groups of indoor units are operated with 2 remote controllers:**

(The remote controller (main or sub unit) can operate with any indoor unit.)




* Use field wiring cables with a cross-sectional area of at least 0.5mm$^2$ to 2mm$^2$.
* The maximum total length of crossover cables must be no longer than 200m.

**Fig. 11-11**

NPFL

## 11-10. How to Use the Test Run Setting

1. Set DIP switch [S003] No. 1 on the wireless receiver unit PCB from OFF to ON.
2. All indicator lamps in the display section blink during test run operation.
3. No temperature control is available during the test run.
4. After the test run, be sure to reset DIP switch No. 1 back to the OFF position and check that no indicator lamps are blinking. Then remount and attach the PCB cover as before.

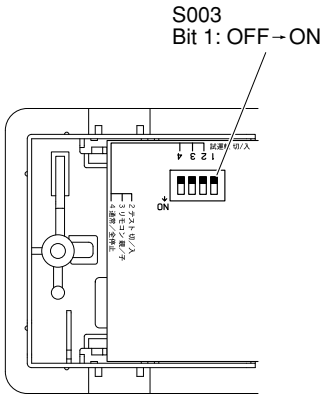



**Fig. 11-12**

**NOTE**

- To avoid placing excessive operating load on the equipment, use this function only when conducting the test run.
- The unit does not receive remote controller signals for approximately 1 minute after the power is turned ON. This is not a malfunction. (The signals are received, but have no immediate effect.)

## ■ RCIRKS-FL for 2-Way and High Ceiling 1-Way Type (NK2FL, NK1FL Type)

### For 2-way Cassette Type (NK2FL Type)

### 11-11. Installing the Display

- Remove panel cover A and install the display.

(1) Remove cover A from the rear side of the panel.

(2) Cover B is fit inside cover A. Therefore, spread cover A and remove cover B, as shown in Fig. 11-13.
Remove the tape that holds cover B in place. It was used for protection during shipping.

(3) Fit the display into the panel.

(4) Pass the display lead wire through the notch in the panel. Use the hole in the plate and a clamp to fasten the wire in place.

(5) Reattach cover A.

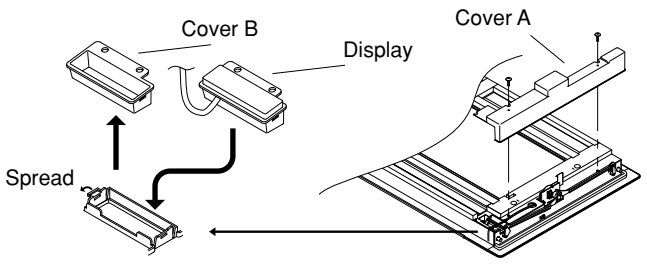



**Fig. 11-13**

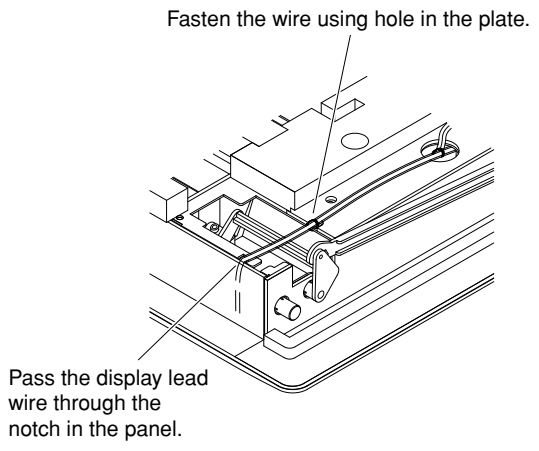



**Fig. 11-14**

### 11-12. Installing the Control Unit

**NOTE**

- Do not twist the control wiring with the power wiring because this may cause malfunction.
- Install a noise filter or take other appropriate action if electrical noise affects the power supply circuit of the unit.

(1) Use the 2 supplied screws (4 × 10) to attach the control unit at the location shown in the diagram below.

(2) Connect the display and control unit 6P connectors.

(3) Connect the control unit lead wire to the indoor unit remote controller wiring terminal.

(4) Bend the lead wire into the correct shape, and use a figure 8 clamp to fasten it in place.

(5) Attach the ceiling panel.

* For the wiring and test run procedures, refer to "Wiring the Receiver Unit" and "Test Run."

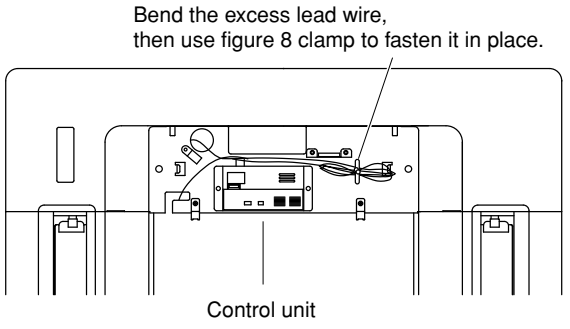



**Fig. 11-15**

NK1FL

NK2FL

**For 1-Way Air Discharge High-Ceiling Cassette Type (NK1FL Type)**



### 11-13. Installing the Display

- Remove the side panel and ceiling panel. Install the display.

(1) Remove the side panel.

a) Press the tabs on both sides of the side panel to disengage the lock. Then slide the panel sideways to remove it.

(2) Remove the ceiling panel.

a) Remove the 4 screws that fasten the ceiling panel to the indoor unit.

b) Disconnect the wiring connector (15P) between the indoor unit and the ceiling panel.

c) While pressing the ceiling panel upwards, press on the bottom of the moveable hook inside the ceiling panel (electrical component box side).
This disconnects one side of the panel.

d) Lift up the opposite side (refrigerant tubing side) of the ceiling panel to disengage the fastening hook.
The panel can then be removed.

(3) Remove cover A and cover B.

a) To remove cover A, remove the rivets from the inside of the ceiling panel.

b) Remove cover B.

(4) Install the display onto cover A.

(5) Pass the lead wire from the display into the ceiling panel hole. Then reattach cover A.

(6) Form the lead wire as shown in the figure.
At the position of the cover fastening bracket (part fastened by rivets), extend the lead wire parallel to the ceiling panel side surface, then use tape to fasten it in place.

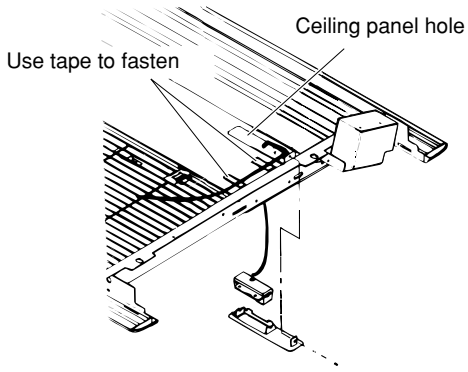



**Fig. 11-16**

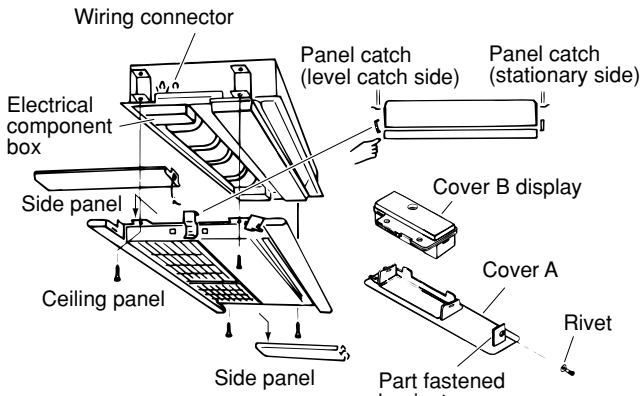



**Fig. 11-17**

### 11-14. Installing the Control Unit

**NOTE**

Do not twist the control wiring with the power wiring because this may cause malfunction.
Install a noise filter or take other appropriate action if electrical noise affects the power supply circuit of the unit.

- Attach the control unit to the indoor unit intake port.

(1) Use the 2 supplied screws ($4 \times 10$) to fasten the control unit to the service cover (cover with attached handle).

(2) Connect the control unit lead wire to the indoor unit remote controller wiring terminal.

(3) Pass the lead wire over the shaft (ceiling side) and clamp it to form it in the correct shape (power-side lead wire).

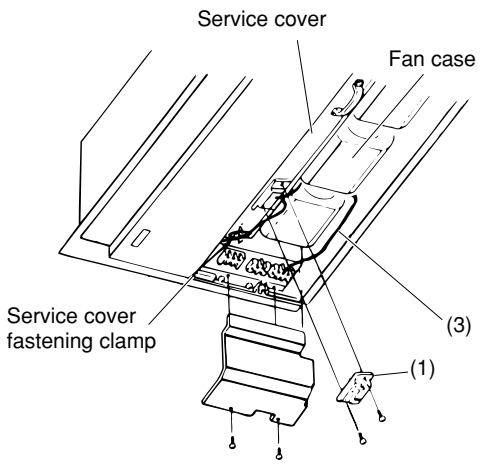



**Fig. 11-18**

(4) Attach the ceiling panel.

(5) Open the air-intake grille. Connect the display and the control unit 6P relay connector (white).
At this time, pass the lead wire from the display through the notch in the main unit, and use the supplied vinyl clamp to bind the lead wire. Then use the fastening clamp to fasten it to the service cover. Also connect the ceiling panel wiring connector.

* For the wiring and test run procedures, refer to "Wiring the Receiver Unit" and "Test Run."

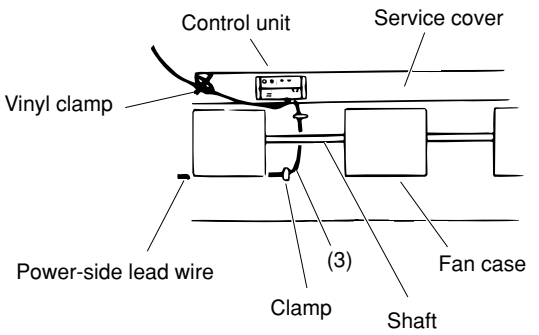



**Fig. 11-19**



### 11-15. Accessories

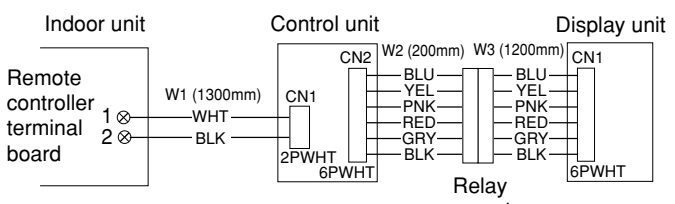
| No. | Parts | Q'ty |
|---|---|---|
| 1 | Control unit | 1 |
| 2 | Display unit | 1 |
| 3 | Remote control unit | 1 |
| 4 | Remote control holder | 1 |
| 5 | AAA alkaline battery | 2 |

| No. | Parts | Q'ty |
|---|---|---|
| 6 | Spacer | 2 |
| 7 | Tapping screw 4 × 10 | 4 |
| 8 | Tapping screw 4 × 16 Truss-head Phillips | 2 |
| 9 | Vinyl clamp L 150 | 3 |

### 11-16. Wiring the Receiver Unit

● Connection diagram

1. Connect W1 to the indoor unit remote controller wiring terminal. (It has no polarity.)
2. Connect W3 from the display and W2 from the control unit to the relay connector.




### 11-17. Precautions on Simultaneous Installation of Wired Remote Controller and Wireless Remote Controller

By installing a wired remote controller, the wireless receiver unit can permit dual remote control operation at the same time.
(Up to 2 units of remote controllers – a wireless remote controller and a wired remote controller – can be installed.)

Dual remote control operation can control 1 or multiple air conditioners using several remote controllers.

**CAUTION**

● **Be sure to determine the correct terminal numbers on the indoor unit when wiring the remote controller. The remote controller will be damaged if high voltage (such as 200 VAC) is applied.**

NK1FL

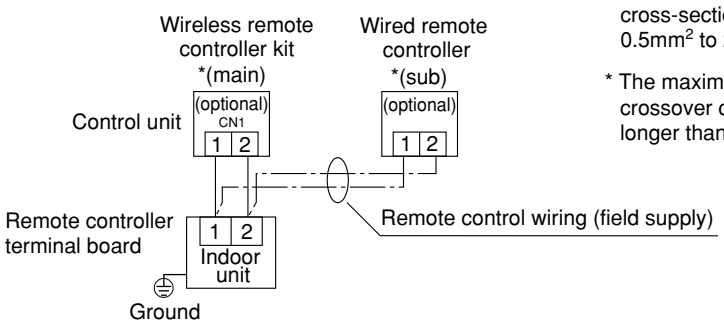
NK2FL

**CAUTION**

- **The wireless receiver unit components cannot be used for more than 1 indoor unit at a time. (However, separate receiver units may be used simultaneously.)**
- **When a wireless receiver unit and a wired remote controller are used simultaneously, assign either the wireless remote controller or the wired remote controller as the sub remote controller unit.**

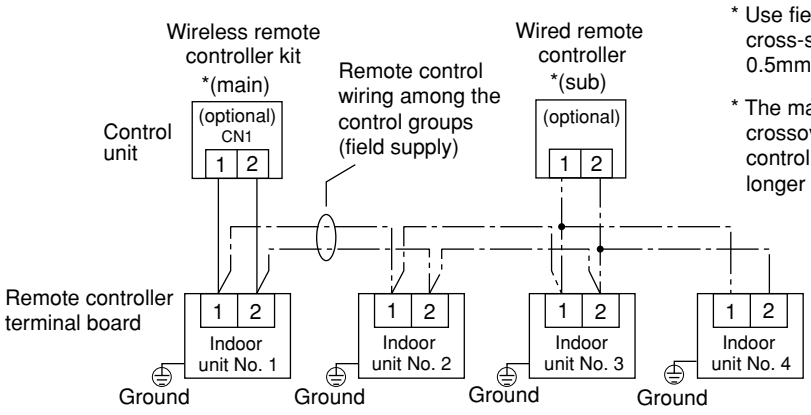
- To assign the wired remote controller as the sub unit, locate the address connector at the rear of the wired remote controller PCB and disconnect it. Reconnect it to the sub unit position.
- To assign the wireless remote controller as the sub unit, locate the DIP switch [S003] on the wireless control unit PCB. Set the No. 3 switch to the ON position.

**When 1 indoor unit is operated with 2 remote controllers:**
(The indoor unit runs according to which of the remote controllers is assigned as the main or sub unit.)




* Use field wiring cables with a cross-sectional area of at least 0.5mm$^2$ to 2mm$^2$.
* The maximum total length of crossover cables must be no longer than 400m.

**When several groups of indoor units are operated with 2 remote controllers:**
(The remote controller (main or sub unit) can operate with any indoor unit.)




* Use field wiring cables with a cross-sectional area of at least 0.5mm$^2$ to 2mm$^2$.
* The maximum total length of crossover cables among the control groups must be no longer than 200m.

**Fig. 11-20**

### 11-18. How to Use the Test Run Setting

1. Set DIP switch [DS] No. 1 on the wireless receiver unit PCB from OFF to the ON position.
2. All indicator lamps in the display section blink during test run operation.
3. No temperature control is available during the test run.
4. After the test run, be sure to reset DIP switch No. 1 back to the OFF position and check that no indicator lamps are blinking.

**NOTE**

- Be aware that test run is not possible if the ceiling panel is not attached.
- To avoid placing an excessive load on the equipment, use this function only when conducting the test run.

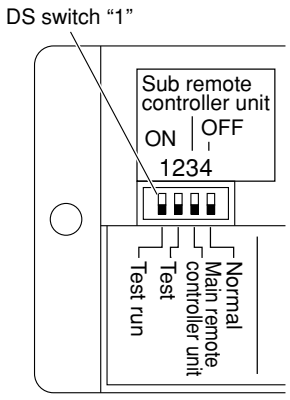
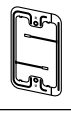
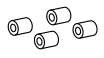



**Fig. 11-21**

## ■ RCIRC-FL for NDLP, NDHP, NFFL, NFMFL Type

### 11-19. Accessories Supplied with Separate Receiver Unit

| No. | Parts | Q'ty |
|---|---|---|
| 1 | Separate receiver unit (provided 200mm power cable)  | 1 |
| 2 | Plate mounting  | 1 |
| 3 | Screws M4 × 25  | 2 |
| 4 | Screws M4 × 40  | 2 |
| 5 | Wood screws  | 2 |

| No. | Parts | Q'ty |
|---|---|---|
| 6 | Spacer  | 4 |
| 7 | Wire joints  | 2 |
| 8 | Clamp  | 1 |
| 9 | Pattern template 95 × 51  | 1 |

unit: mm

### 11-20. Important Information for Installation of 1 Separate Receiver Unit

**<Installation location>**

- Do not install in a location where the air contains oil mist, such as in a kitchen or factory.
- Do not install next to a window, or in any other location directly exposed to sunlight and outside air.
- Do not install nearby devices which can be expected to produce electrical noise, such as elevators, automatic doors, and industrial sewing machines.
- If the receiver unit is installed near a rapid-start type or inverter-type fluorescent lamp (a lamp which does not include a glow lamp), it may not be possible to receive the wireless remote controller signal in some cases. In order to prevent interference from fluorescent lamps, leave a minimum of 2 meters between the receiver unit and the fluorescent lamps, and install the receiver unit in a location where it can receive the wireless remote controller signal when the fluorescent lamps are lit.

### 11-21. How to Install the Separate Receiver Unit

**NOTE**

- To avoid malfunction of the remote controller, do not assemble or run remote control wiring together with the power cables, and do not enclose them in the same metal conduit.
- When the power unit induces electrical noise, it is recommended that a noise filter or the like be installed.



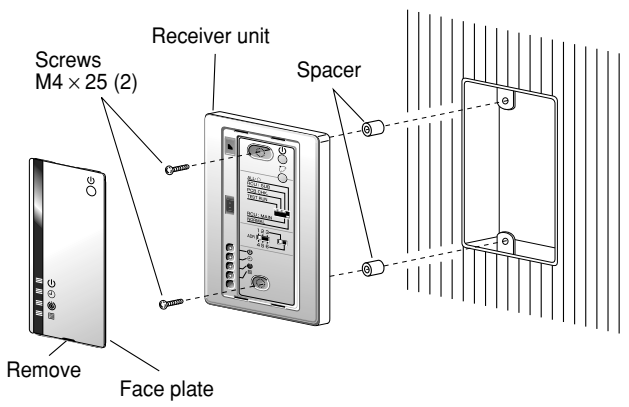



**Fig. 11-22**

- For flush mounting into a wall, install the separate receiver unit in a metal switch box (field supply) that has been recessed into the wall in advance.

1. Insert a flathead screwdriver or similar tool into the notch, and remove the face plate.
2. Fix the receiver unit with 2 M4 screws provided. Do not overly tighten, and use the provided spacers. If the receiver unit does not fit in the wall, cut spacers to adjust the clearance.
3. Connect the receiver unit wiring (2-core cable) with the cables extended from the indoor unit. (Refer to the section on receiver unit wiring.) Be sure to determine the correct terminal numbers on the indoor unit when wiring the receiver unit. The remote controller will be damaged if high voltage (such as 200 VAC) is applied.
4. Reinstall the face plate.

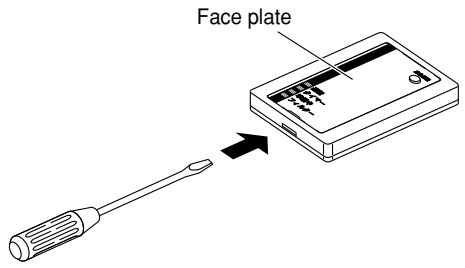



**Fig. 11-23**

- When using exposed mounting for the receiver unit, install onto a wall where the receiver unit can be attached.

1. Insert a flathead screwdriver or similar tool into the groove on the bottom of the receiver unit. Pry open with the screwdriver and remove the lower case. (Fig. 11-23).
2. In order to later pass the receiver wiring out through the upper case (thin part at the top center), use nippers or a similar tool to cut a notch in the same size as the remote controller cord (optional). (Fig. 11-24)
3. Disconnect the wires that were connected to the connector at the time of shipment.
4. Fasten the remote controller cord (optional) at the position shown in Fig. 11-25, using the provided clamp. Then connect the cord to the receiver connector.
5. Shape the remote controller cord as shown in Fig. 11-25 so that it fits at the top inside the receiver unit, above the PCB. Then attach the lower case. At this time, bend the head of the clamp so that it faces sideways.
6. Remove the nameplate and use 2 wood screws to attach the receiver unit.
7. Use the provided cord clips to fasten the remote controller cord to the wall.
8. Reattach the nameplate.

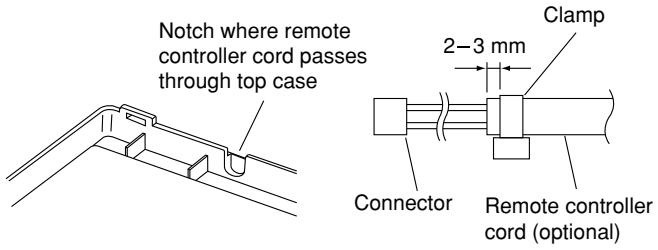



**Fig. 11-24**

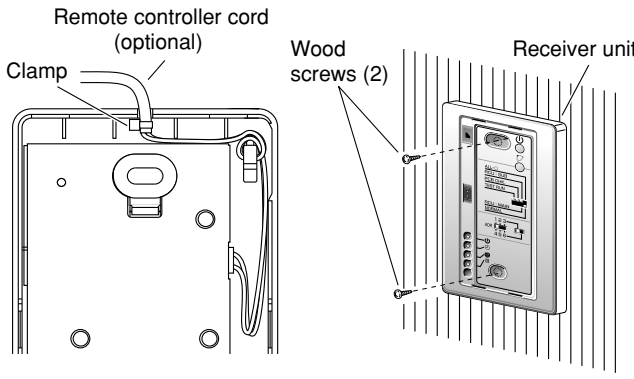



**Fig. 11-25**

- If the separate receiver unit is installed on the ceiling, use the provided ceiling mounting bracket for installation.

1. Insert a screwdriver or similar tool into the notch at the bottom to remove the receiver nameplate.
2. Cut a section out of the ceiling along the provided paper pattern (95 × 51 mm).
3. Pass the wire through the provided mounting bracket and insert the bracket into the installation hole. (Fig. 11-26)
4. Use bracket parts (A) and (B) to securely grip the ceiling material. (Fig. 11-27)
5. Connect the receiver wire (2-core) to the wire from the indoor unit.
   (Refer to “Wiring the Receiver Unit.”)
   Check the terminal number on the indoor unit before wiring the receiver unit and be sure not to wire incorrectly. (The unit will be damaged if high voltage, such as 200 VAC, is applied.)
6. Adjust the provided spacers so that they are several millimeters larger than the thickness of the ceiling material. Pass the 2 supplied screws (M4 × 40) through the spacers and tighten them enough to hold the receiver unit in place.
7. Return parts (A) and (B) through the gap between the ceiling and receiver unit so that they are contained in the openings. Then tighten the screws. Do not tighten the screws excessively. This may result in damage or deformation of the case. Tighten to the point where the receiver unit can be moved slightly by hand. (Fig. 11-28)
8. Reattach the nameplate.

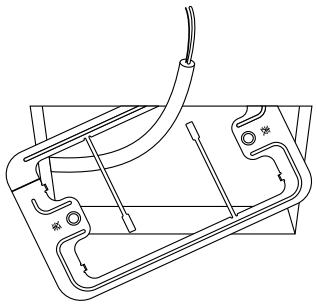


**Fig. 11-26**

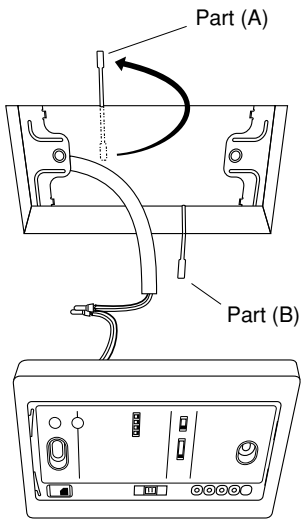



**Fig. 11-27**

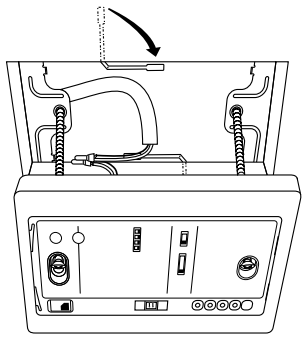


**Fig. 11-28**

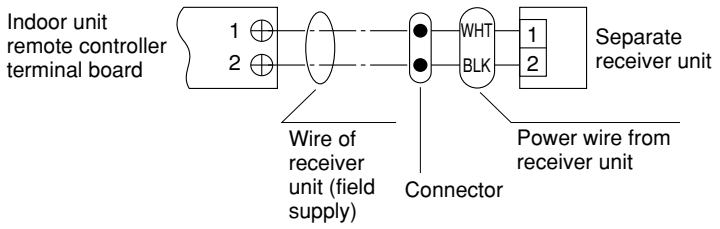
### 11-22. Wiring the Separate Receiver Unit

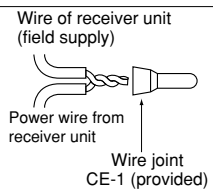
* Use wires that are 0.5 mm² – 2 mm² in diameter.

* The wiring length must not exceed 400 m.

**<Flush Mounting>**

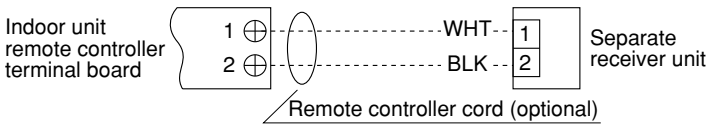
● Connection diagram




| | |
|---|---|
| Provided wire joint (WHT 2) |   1. Strip the insulation to approximately 14mm from the ends of the wires to be connected.<br>2. Twist together the 2 wires and create a crimp connection at the wire joint.<br>3. If a special crimping tool is not used, or if the connection is soldered, insulate the wires using insulation tape. |

**<Exposed Mounting>**

● Connection diagram




● Use the remote controller cord (optional) for wiring the separate receiver unit.

1. For the methods used to install the remote controller cord, refer to “For flush mounting into a wall, install the separate receiver unit in a metal switch box (field supply) that has been recessed into the wall in advance” on P. 116.
2. When using the remote controller cord (optional), refer to the instruction manual that came with the cord.
   Check the terminal number on the indoor unit before wiring the remote controller and be sure not to wire incorrectly. (The unit will be damaged if high voltage, such as 200 VAC, is applied to it.)

### 11-23. Important Information for Installation of 2 Separate Receiver Units

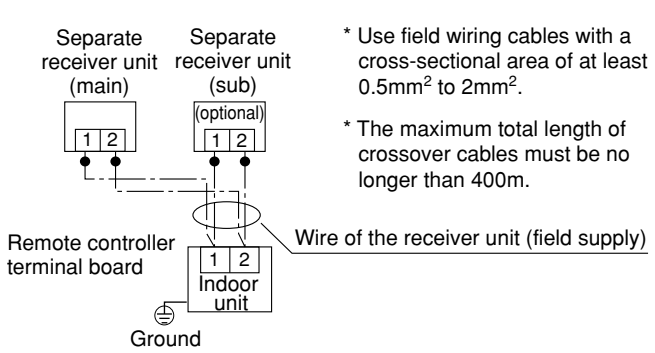
When using 2 receiver units to operate 1 or more indoor units at the same time, follow the procedure below to install them.

- Installation method

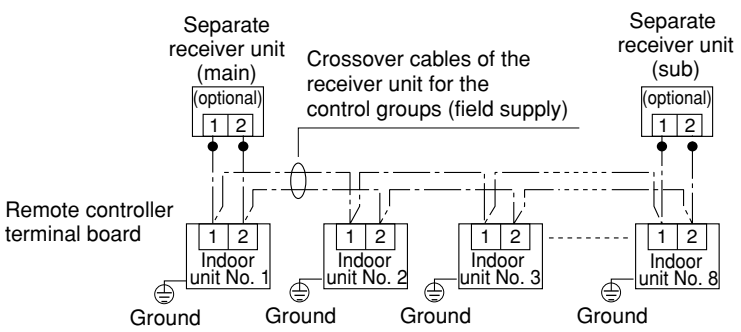
1. If 2 remote controllers are installed, set one of them as the “main remote controller” (setting at time of factory shipment).
2. At the other remote controller, remove the receiver nameplate and switch the DIP switch to “sub remote controller.” Under these conditions, the receiver unit functions as the sub receiver unit.
   * The TIMER lamp lights only at the remote controller that receives the signal.

- Basic wiring diagram
  * When connecting the wires, be careful not to wire incorrectly.
    (Incorrect wiring will damage the unit.)

- Using 2 separate receiver units to control 1 indoor unit:




- Using 2 separate receiver units to control a group of multiple indoor units:
  * The main and sub receiver units will operate regardless of the indoor unit in which they are installed.




* Use wires that are 0.5 mm² – 2 mm² in diameter.
* The wiring length must not exceed 400 m.

**11-24. Test Run Setting**

1. Remove the receiver unit face plate, and set the DIP switch to “Test Run - ON” position.
2. Run the air conditioner using the wireless remote controller by pressing the “ON/OFF” button.

- All LEDs (“RUN,” “TIMER” and “STANDBY”) blink during test run operation.

- No temperature control is effective with the wireless remote controller in the “Test Run – ON” position.
  To avoid mechanical strain on the air conditioner, do not use this mode except for conducting a test run.

3. Select any one of the operation modes HEAT, COOL or FAN for the test run.
   * The outdoor unit will not start running for about 3 minutes after the power ON button is pressed.
4. After the test run operation, stop the air conditioner using the wireless remote controller, and then reset the DIP switch in the receiver unit as it was before. (To prevent constant test running of the air conditioner, the receiver unit has a 60-minute off-timer function.)

## 12. SPECIAL REMARKS

### ■ DC Fan Tap Change Procedure for 4-Way Cassette (NKFL Type)

<Steps> Be sure to turn OFF the power (at mains) before beginning the work below.

(1) In the table below, check the field-supply parts that will be used. (If this setting is not made, the airflow may decrease and condensation may occur.)

| Setting | |
|---|---|
| (a) | Air shield material (for use with 3-direction discharge)* |
| | Air shield material (for use when a discharge duct is connected)* |
| (b) | Air shield material (for use with 2-direction discharge)* |

* Use field-supply air shield material.

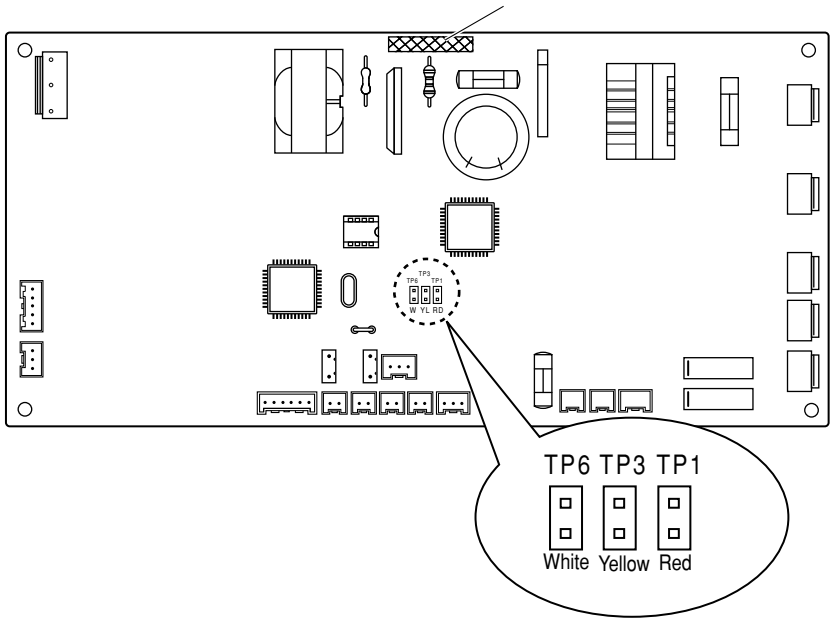
Setting (a): Go to (2).
Setting (b): Go to (3).

(2) Setting (a)
Open the cover of the electrical component box. Short the short-circuit pin TP3 (2P, yellow) on the indoor unit control PCB.

(3) Setting (b)
Open the cover of the electrical component box. Short the short-circuit pin TP6 (2P, white) on the indoor unit control PCB.

**Indoor unit control PCB**

* PCB model No.: CR-SRP50A-B



## 13. MARKINGS FOR DIRECTIVE 97/23/EC(PED)

**Rating nameplate figure**

*Airwell* CE 0035
AIR CONDITIONER

A: Model Name *Various*

SOURCE: B: V PH *Various* 50 Hz
MAX ELECTRIC INPUT C: kW. A *Various*
TIME DELAY FUSE MAX SIZE: D: A *Various*
UNIT PROTECTION: IPX4

Operating Spec. Area
*Various* (Not for the PED)

MAX. WORKING PRESSURE: HIGH SIDE: E: bar. *Various*
LOW SIDE: F: bar. *Various*
REFRIGERANT: R410A G: kg *Various*
NET WEIGHT *Various* (Not for the PED)
PRODUCTION DATE: DD-MM-YY

1-1-1 Sakata, Oizumi-machi
Ora-gun Gunma Pref., Japan

Made in Japan
Serial Number Various

**Tabulation of *Various* data**

| | | | | | |
|---|---|---|---|---|---|
| A | EFL 80-3R | EFL 100-3R | EFL 120-3R | EFL 140-3R | EFL 160-3R |
| B | 380 – 415 V 3 N ~ 50 Hz | | | | |
| C | 9.53 kW, 16.1 A | 12.7 kW, 21.4 A | 15.4 kW, 25.9 A | 18.1 kW, 31.2 A | 20.7 kW, 35.9 A |
| D | 30 A | 35 A | 40 A | 40 A | 50 A |
| E | 33.0 bar | | | | |
| F | 22.1 bar | | | | |
| G | 11.8 kg | | | 11.8 kg | |

# Instructions for venting fluorinated gas

## EN (English)

Do not vent **R407C** into atmosphere : **R407C** is a fluorinated greenhouse gas, covered by Kyoto Protocol, with a Global Warming Potential (GWP) = **1530**

Do not vent **R410A** into atmosphere : **R410A** is a fluorinated greenhouse gas, covered by Kyoto Protocol, with a Global Warming Potential (GWP) = **1730**

## IT (Italian)

Non disperdere **R407C** nell'atmosfera : **R407C** è un gas fluorinato a effetto serra, coperto dal protocollo di Kyoto, con potenziale di riscaldamento globale (GWP) = **1530**

Non disperdere **R410A** nell'atmosfera : **R410A** è un gas fluorinato a effetto serra, coperto dal protocollo di Kyoto, con potenziale di riscaldamento globale (GWP) = **1730**

## FR (French)

Ne déchargez pas **R407C** dans l'atmosphère : **R407C** est un gaz fluoré à effet serre, couvert par le protocole de Kyoto, avec un potentiel de chauffage global (GWP) = **1530**

Ne déchargez pas **R410A** dans l'atmosphère : **R410A** est un gaz fluoré à effet serre, couvert par le protocole de Kyoto, avec un potentiel de chauffage global (GWP) = **1730**

## DE (German)

Zerstreuen Sie **R407C** in Atmosphäre nicht : **R407C** ist ein fluoriertes Gas, abgedeckt durch Kyoto Protokoll, mit einem globalen wärmenden Potential (GWP) = **1530**

Zerstreuen Sie **R410A** in Atmosphäre nicht : **R410A** ist ein fluoriertes Gas, abgedeckt durch Kyoto Protokoll, mit einem globalen wärmenden Potential (GWP) = **1730**

## ES (Spanish)

No expulsar **R407C** a la atmósfera : el **R407C** es un gas fluorado de efecto invernadero, cubierto por el protocolo de Kyoto, con potencial de calentamiento global (GWP) = **1530**

No expulsar **R410A** a la atmósfera : el **R410A** es un gas fluorado de efecto invernadero, cubierto por el protocolo de Kyoto, con potencial de calentamiento global (GWP) = **1730**

## PO (Portuguese)

Não exale **R407C** na atmosfera : **R407C** é um fluorinated gás, coberto pelo protocolo de Kyoto, com um global Protencial Aquecendo-se (GWP) = **1530**

Não exale **R410A** na atmosfera : **R410A** é um fluorinated gás, coberto pelo protocolo de Kyoto, com um global Protencial Aquecendo-se (GWP) = **1730**

## GR (Greek)

Μην αερίστε **R407C** στην ατμόσφαιρα: **R407C** είναι ένα φθοριωμένο θερμοκήπιο αέριο, που καλύπτεται από το πρωτόκολλο του Κιότο, με έναν σφαιρικό Δυνατότητα θέρμανσης (GWP) = **1530**

Μην αερίστε **R410A** στην ατμόσφαιρα: **R410A** είναι ένα φθοριωμένο θερμοκήπιο αέριο, που καλύπτεται από το πρωτόκολλο του Κιότο, με έναν σφαιρικό Δυνατότητα θέρμανσης (GWP) = **1730**

Airwell