Airwell INSTALLATION INSTRUCTIONS

– FLOW LOGIC 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-NK1FL9R	ST-NK1FL12R	ST-NK1FL16R	ST-NK1FL18R	ST-NK1FL24R		
NK2FL	2-Way Air Discharge Semi-Concealed	ST-NK2FL7R	ST-NK2FL9R	ST-NK2FL12R	ST-NK2FL16R	ST-NK2FL18R	ST-NK2FL24R		
NKFL	4-Way Air Discharge Semi-Concealed *	ST-NKFL7R	ST-NKFL9R	ST-NKFL12R	ST-NKFL16R	ST-NKFL18R	ST-NKFL24R	ST-NKFL36R	ST-NKFL48R
CAV	4-Way Air Discharge Mini Semi-Concealed	AWSI-CAV007-N11	AWSI-CAV009-N11	AWSI-CAV012-N11	AWSI-CAV016-N11	AWSI-CAV018-N11			
NWFL	Wall-Mounted	ST-NWFL7R	ST-NWFL9R	ST-NWFL12R	ST-NWFL16R	ST-NWFL18R	ST-NWFL24R		
XAV	Flat Wall-Mounted	AWSI-XAV007-N11	AWSI-XAV009-N11	AWSI-XAV012-N11					
NPFL	Ceiling-Mounted			ST-NPFL12R	ST-NPFL16R	ST-NPFL18R	ST-NPFL24R	ST-NPFL36R	ST-NPFL48R
NDLP	Concealed-Duct	ST-NDLP7R	ST-NDLP9R	ST-NDLP12R	ST-NDLP16R	ST-NDLP18R	ST-NDLP24R	ST-NDLP36R	ST-NDLP48R
DAV	Slim Concealed-Duct	AWSI-DAV007-N11	AWSI-DAV009-N11	AWSI-DAV012-N11	AWSI-DAV016-N11	AWSI-DAV018-N11			
NDHP	Concealed-Duct High Static Pressure						ST-NDHP24R	ST-NDHP36R	ST-NDHP48R
NFFL	Floor-Standing	ST-NFFL7R	ST-NFFL9R	ST-NFFL12R	ST-NFFL16R	ST-NFFL18R	ST-NFFL24R		
NFMFL	Concealed-Floor Standing	ST-NFMFL7R	ST-NFMFL9R	ST-NFMFL12R	ST-NFMFL16R	ST-NFMFL18R	ST-NFMFL24R		
DEV	Heat Exchanger with DX coil		AWSI-DEV018-N11		AWSI-DEV024-N11	AWSI-DEV030-N11			

* ST-NKFL60R is available.

Outdoor Units

C	Heat Pump Unit (single-phase)	MFL 40HR, MFL 50HR, MFL 60HR
	Cooling Unit	MFL 40HCR, MFL 50HCR, MFL 60HCR
	Heat Pump Unit (3-phase)	AWAU-GBV112-H13, AWAU-GBV140-H13, AWAU-GBV155-H13

* Refrigerant R410A is used in the outdoor units

Optional Controller

RC	Remote Controller	NRCT-FLR
	Wireless Remote Controller (For NKFL Type)	AWAC-RCIRA-FL
	Wireless Remote Controller (For NK2FL Type)	AWAC-RCIRB-FL
	Wireless Remote Controller (For NPFL, NK1FL Type)	AWAC-RCIRD-FL
	Wireless Remote Controller (For NDLP, NDHP, DAV, NFFL, NFMFL, DEV Type)	AWAC-RCIRC-FL
	Wireless Remote Controller (For CAV Type)	AWAC-RCIRF-FL
	Wireless Remote Controller (For NWFL, XAV Type)	AWAC-RCIRE-FL
	Simplified Remote Controller	NRCB-FLR
	Remote Sensor	NSDR
	System Controller	NRSC-FLR
	Schedule Timer	NWTM-FLR

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.

Note: This air conditioner uses the new refrigerant R410A. This product is intended for professional use.
Permission from the power supplier is required when installing an outdoor unit that is connected to a 16 A distribution network.

- If this equipment has been installed in a residential area and any problems caused by high harmonic waves occurred, attach a recommended harmonic filter to the equipment. For details about a suitable harmonic filter, please contact your sales distributors.
- Pay close attention to all warning and caution notices given in this manual.

WARNING

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

CAUTION

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.

CAUTION

- 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.

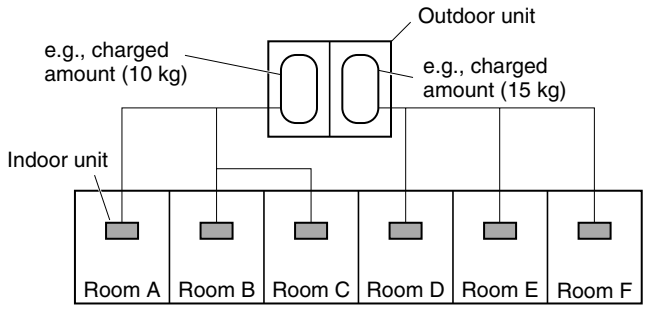
$$\frac{\textbf{Total amount of refrigerant (kg)}}{\textbf{Min. volume of the indoor unit installed room (m}^3\textbf{)}} \leq \textbf{Density limit (kg/m}^3\textbf{)}$$

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.

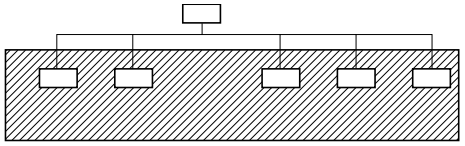
For the amount of charge in this example:



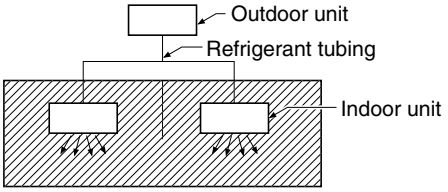
The possible amount of leaked refrigerant gas in rooms A, B and C is 10 kg.
The possible amount of leaked refrigerant gas in rooms D, E and F is 15 kg.

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

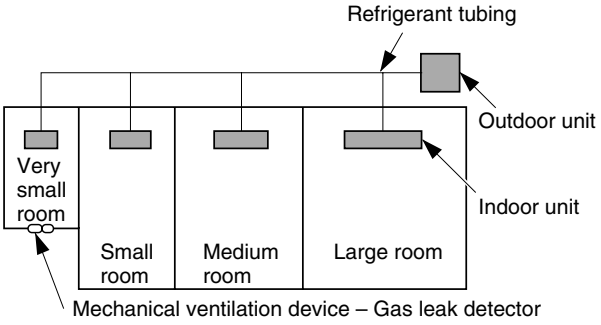
(1) No partition (shaded portion)



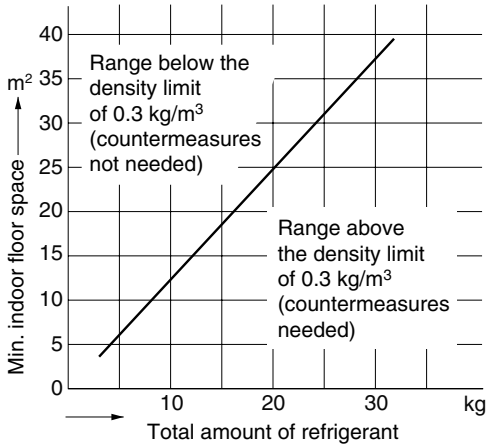
(2) When there is an effective opening with the adjacent room for ventilation of leaking refrigerant gas (opening without a door, or an opening 0.15% or larger than the respective floor spaces at the top or bottom of the door).



(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.”
- **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, 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	19.05
	Wall thickness	0.8	0.8	0.8	1.0	1.0

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 of 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.

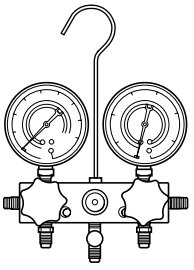
3. Different tools required

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.

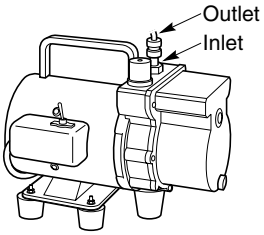
Item	New tool?	R407C tools compatible with R410A?	Remarks
Manifold gauge	Yes	No	Types of refrigerant, refrigerating machine oil, and pressure gauge are different.
Charge hose	Yes	No	To resist higher pressure, material must be changed.
Vacuum pump	Yes	Yes	Use a conventional vacuum pump if it is equipped 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.

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

Manifold gauge



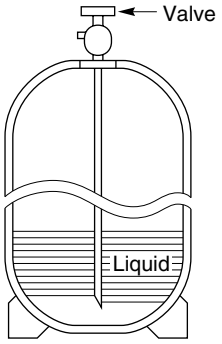
Vacuum pump



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 (Flathead) screwdriver
2. Phillips head screwdriver
3. Knife or wire stripper
4. Tape measure
5. Capenter'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 1-13.

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	4-Way Air Discharge Mini Semi-Concealed
1-5	Wall-Mounted
1-6	Flat Wall-Mounted
1-7	Ceiling-Mounted
1-8	Concealed-Duct
1-9	Slim Concealed-Duct
1-10	Concealed-Duct High Static Pressure
1-11	Floor-Standing & Concealed Floor-Standing
1-12	Heat Exchanger with DX coil
1-13	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)

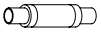
Part name	Figure	Q'ty	Remarks
Flare insulator		2	For gas and liquid tubes
Insulating tape	 (White)	2	For gas and liquid tube flare nuts
Vinyl clamp		8	For flare insulator and drain insulator
Hose band		1	For securing drain hose
Packing		1	For drain joint
Drain insulator		1	For drain joint
Installation 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 (4-Way Air Discharge Mini Semi-Concealed)

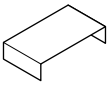
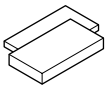
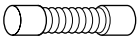
Name	Figure	Q'ty	Remarks	Name	Figure	Q'ty	Remarks
Washer		8	For temporarily suspending indoor unit from ceiling	Full-scale installation diagram		1	Printed on container box
Flare insulation	 T3 T5	2 set	For gas / liquid tube connection	Washer head screw		4	For full-scale installation diagram
Insulation tie		2	For gas / liquid tube / flare nut connection	Drain hose	 L140	1	For unit & PVC tube connection
Vinyl tie		8	For flare / drain insulating connection	Hose band		2	For drain hose connection
Drain hose insulation	 T10	1	For drain tube connection				

Table 1-5 (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 1-6 (Flat Wall-Mounted)

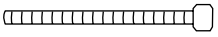
Parts	Figure	Q'ty
Tapping screw	Truss-head Phillips 4 × 30 mm 	8
Clamp		1

Table 1-7 (Ceiling-Mounted)

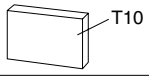
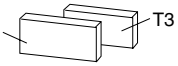
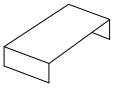
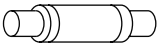
Part Name	Figure	Q'ty	Remarks
Special washer		4	For temporarily suspending indoor unit from ceiling
Drain insulator	 T10	1	For drain hose joint
Flare insulator	T5  T3	2 sets	For gas and liquid tube joints
Insulating tape	 White (heat-resisting)	2	For gas and liquid flare joints
Vinyl clamp		8	For flare 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

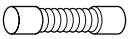
Table 1-8 (Concealed-Duct)

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

Table 1-9 (Slim Concealed-Duct)

	Name	Figure	Q'ty	Remarks		Name	Figure	Q'ty	Remarks
Unit suspension	Washer		8	For suspension fitting	Drain piping	Drain hose		1	For unit & PVC pipe connection
Refrigerant tubing	Flare insulation		2	For gas pipe / liquid pipe connection		Hose band		2	For drain hose connection
			2	For gas pipe / liquid pipe connection		Drain hose insulation		1	For drain pipe connection
	Insulation tape		2	For gas pipe / liquid pipe / flare nut connection	Others	Short circuit connection		1	For high static pressure (Located on the back of the electrical component box lid.)
	Vinyl tie		8	For flare / drain insulating connection					

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

Table 1-10 (Concealed-Duct High Static Pressure)

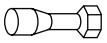
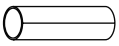
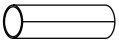
Part name	Figure	Q'ty	Remarks
Special washer		8	For suspending indoor unit from ceiling
Flare insulator		2	For gas and liquid tubes
Drain socket		1	For drain pipe connection
Tube connector		1	For increasing size of liquid tube from ϕ6.35 to ϕ9.52 mm (only for 24 type)

Table 1-11 (Floor-Standing & Concealed Floor-Standing)

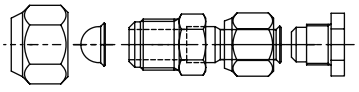
Part name	Figure	Q'ty	Remarks
Connection pipe		1	For connecting gas tubes
Flare insulator		2	For gas and liquid tubes
Insulating tape	 (White)	2	For gas and liquid tube flare nuts
Insulating tape	 (Black)	2	For gas and liquid tubes
Vinyl clamp		7	For ends of flare insulator
Insulating tape (black and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

Table 1-12 (Heat Exchanger with DX coil)

	Part name	Figure	Q'ty	Remarks
For refrigerant tubing	Flare insulator		2	For gas and liquid tubes
	Insulating tape	 Black	2	For gas and liquid tube flare nuts
		 White (For thermal insulation)	2	For gas and liquid tube flare nuts
	Clamp		4	
For drain tubing	Drain insulator		1	For drain tube connection
	Packing		1	For drain joint
	Clamp		5	For drain tubes (4) For verifying drainage from the lower drain (1)

- Use M12 for suspending bolts.
- Field supply for suspending bolts and nuts.

Table 1-13 (Outdoor Unit)

Part name	Figure	Q'ty		
		4 hp	5 hp	6 hp
Tube Discharge Assy		0	0	1
Instruction manual	 paper	1	1	1

hp = horsepower

1-5. Tubing Size

Table 1-14 Main Tubing Size (LA)

kW	11.2	14.0	15.5
System horsepower	4	5	6
Gas tubing (mm)	ø15.88		ø19.05
Liquid tubing (mm)	ø9.52		

Unit: mm

Note: When only one indoor unit is connected to a 6-hp outdoor unit, connect ø19.05 gas tubing up to just before the indoor unit, then use a socket or similar device (field supply) to change the tube diameter to ø15.88 and connect the gas tube to the indoor unit.

Table 1-15 Main Tubing Size After Distribution (LB, LC...)

Total capacity after distribution	Below kW	7.1 (2.5 hp)	15.5 (6 hp)
	Over kW	–	7.1 (2.5 hp)
Tubing size	Gas tubing (mm)	ø12.7	ø15.88
	Liquid tubing (mm)	ø9.52	ø9.52

Unit: mm
hp = horsepower

Note: In case the total capacity of connected indoor units exceeds the total capacity of the outdoor units, select the main tubing size for the total capacity of the outdoor units.

Table 1-16 Indoor Unit Tubing Connection (ℓ_1, ℓ_2··· ℓ_{n-1})

Indoor unit type	7	9	12	16	18	24	36	48	60
Gas tubing (mm)	ø12.7					ø15.88			
Liquid tubing (mm)	ø6.35					ø9.52			

Unit: mm

1-6. Straight Equivalent Length of Joints

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

Table 1-17 Straight Equivalent Length of Joints

Gas tubing size (mm)	12.7	15.88	19.05
90° elbow	0.33	0.35	0.42
45° elbow	0.23	0.26	0.32
U-shape tube bend (R60 – 100 mm)	0.90	1.05	1.26
Trap bend	2.30	2.80	3.20
Y-branch distribution joint	Equivalent length conversion not needed.		
Ball valve for service	Equivalent length conversion not needed.		

Table 1-18 Required Copper Tubing Dimensions

Unit: mm

Material		O				
Copper tubing	Outer diameter	6.35	9.52	12.7	15.88	19.05
	Wall thickness	0.8	0.8	0.8	1.0	1.0

1-7. Additional Refrigerant Charge

Additional refrigerant charge amount is calculated from the liquid tubing total length as follows.

Table 1-19 Amount of Refrigerant Charge Per Meter, According to Liquid Tubing Size

Liquid tubing size	Amount of refrigerant charge/m (g/m)
ø6.35	26
ø9.52	56

Required amount of charge = (Amount of refrigerant charge per meter of each size of liquid tube × its tube length) + (...) + (...)

*Always charge accurately using a scale for weighing.

Table 1-20 Refrigerant Charge Amount at Shipment (for outdoor unit)

Heat pump unit	4 hp	5 hp	6 hp
(kg)	3.5	3.5	3.5
Cooling only unit	4 hp	5 hp	6 hp
(kg)	3.5	3.5	3.5

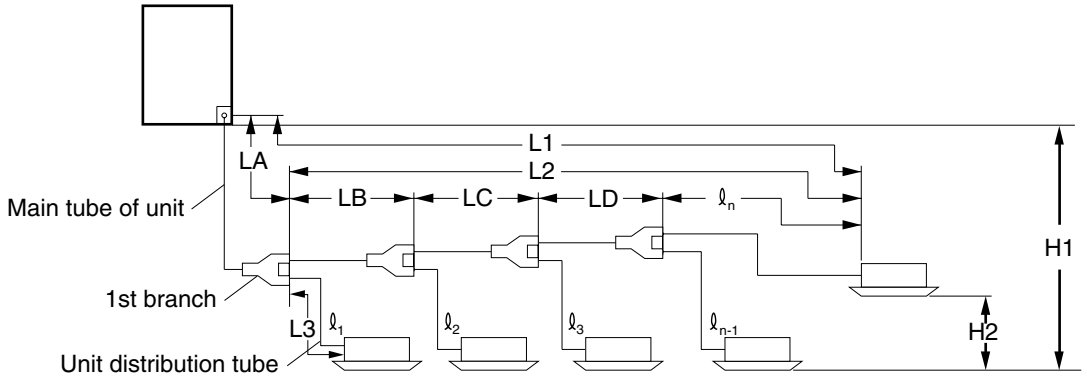
1-8. System Limitations

Table 1-21 System Limitations

Outdoor units (Type)	4 hp	5 hp	6 hp
Number of max. connectable indoor units	6	8	9
Max. allowable indoor/outdoor capacity ratio	50 – 130%		

1-9. 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.



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

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

R410A distribution joint
NRF-DL16R (for indoor unit)

Table 1-22 Ranges that Apply to Refrigerant Tubing Lengths and to Differences in Installation Heights

Items	Marks	Contents		Length (m)
Allowable tubing length	L1	Max. tubing length	Actual length	≤ 150
			Equivalent length	≤ 175
	ΔL (L2 – L3)	Difference between max. length and min. length from the No.1 distribution joint		≤ 40
	LA	Max. length of main tubing (at max. diameter)		≤ 80
	ℓ_1, ℓ_2~ ℓ_n	Max. length of each distribution tube		≤ 30
	$\ell_1+\ell_2+\sim \ell_{n-1}+L1$	Total max. tubing length including length of each distribution tube (only liquid tubing)		≤ 200
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

L = Length, H = Height

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

1-10. 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 the leak detector.

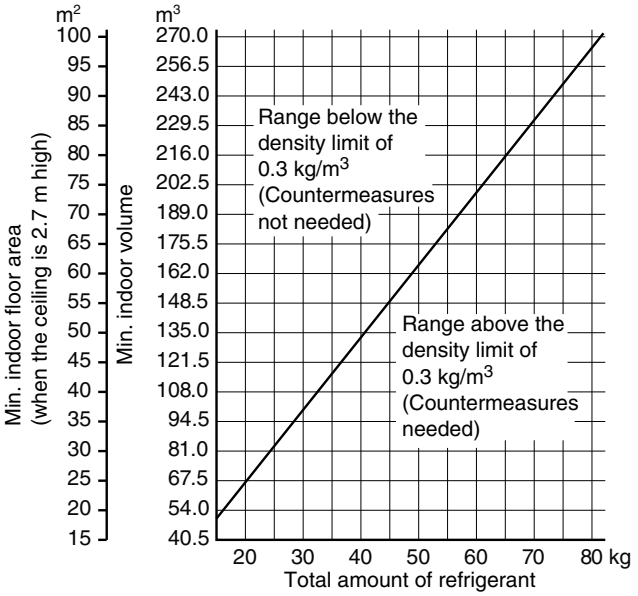
$$\frac{\text{(Total refrigerant charged amount: kg)}}{\text{(Min. indoor volume where the indoor unit is installed: m}^3\text{)}} \leq \text{Limit density 0.3 (kg/m}^3\text{)}$$

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.)

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

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



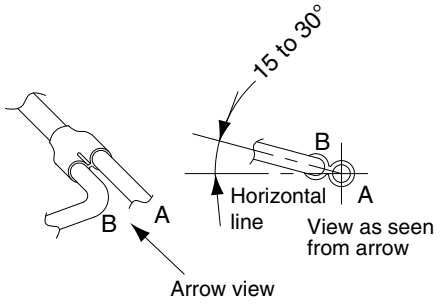
1-11. Installing Distribution Joint

(1) Refer to "HOW TO ATTACH DISTRIBUTION JOINT" enclosed with the optional distribution joint kit (NRF-DL16R).

(2) 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.

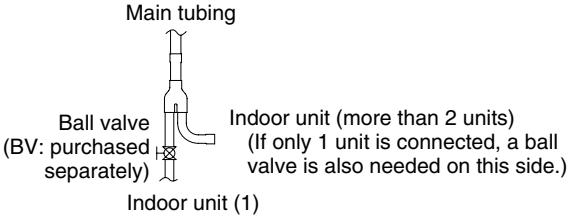
(3) If there are height differences between indoor units or if branch tubing that follows a distribution joint is connected to only 1 unit, a trap or ball valve must be added to that distribution joint. (When adding the ball valve, locate it within 40 cm of the distribution joint.) (Consult with AIRWELL separately concerning the ball valve.)
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.)

Tube branching methods (horizontal use)

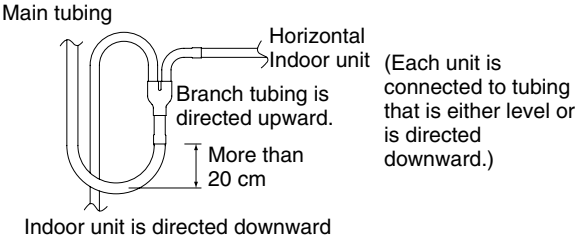


Types of vertical trap specifications

(When using ball valve)



(When not using ball valve)



1-12. Optional Distribution Joint Kit

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

Table 1-23

Model name	Cooling capacity after distribution	Remarks
NRF-DL16R	22.4 kW or less	For indoor unit

NRF-DL16R

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

Example:

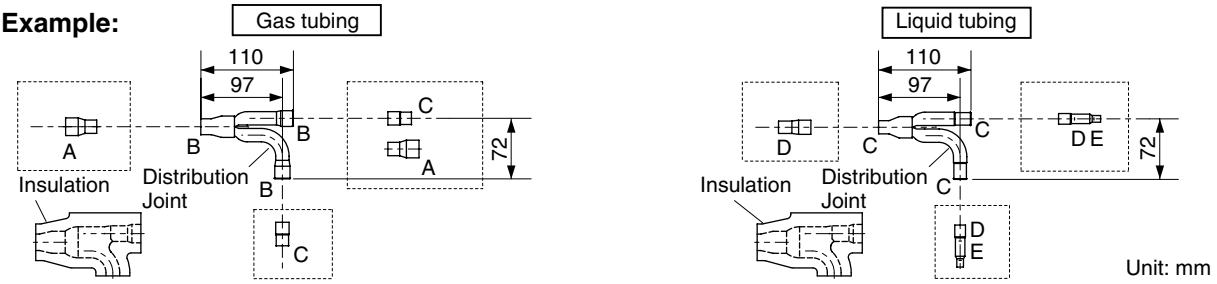


Table 1-24 Size of connection point on each part (Shown are inside diameters of tubing)

Size	Part A	Part B	Part C	Part D	Part E
mm	ø19.05	ø15.88	ø12.7	ø9.52	ø6.35

1-13. Optional Ball Valve Kit

Table 1-25

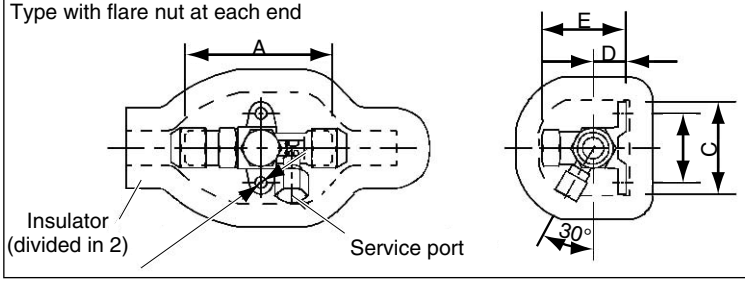
Model No.	Valve connecting tube size (mm)		Indoor unit where used
	Gas tube	Liquid tube	Total capacity of indoor units after the valve
NVL16R	15.88	9.52	16.0 kW or less
NVL5R	12.7	6.35	5.6 kW or less

NOTE

1. Because the diameter of this ball valve is approximately the same as the inner diameter of the connecting copper tube, correction for pressure loss is not necessary.
2. Airtightness must be 3.6 MPa or more.
   It is recommended that the ball valve is installed at each outdoor unit (gas tube and liquid tube), in order to prevent refrigerant from being released into the atmosphere if the outdoor unit is eventually replaced.

Dimensions

Unit: mm

Figure	Size \ Dimensions	A	B	C	D	E
Type with flare nut at each end 	ø6.35 (1/4")	72	42	54	16	44
	ø9.52 (3/8")	76	42	54	16	44
	ø12.7 (1/2")	89	42	58	20	51
	ø15.88 (5/8")	108	51	68	22	56

Note: Install the service port so that it faces the extension side.

Ball Valve Installation (for refrigerant R410A only)

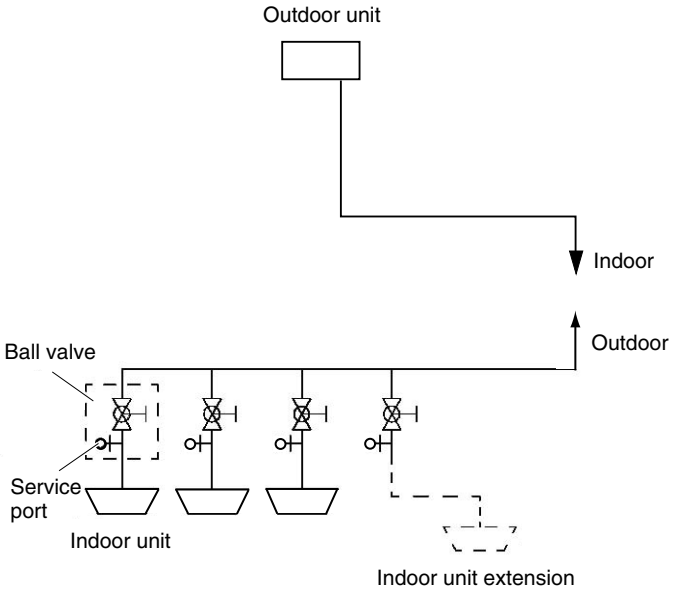
Check the size of the ball valve set you separately purchased.

Model name	Size
NVL5R	ø6.35 • ø12.7
NVL16R	ø9.52 • ø15.88

These valves are flare-nut type.

1. Installing the ball valve

(1) If the ball valve is to be installed for indoor unit extension, or near an indoor unit, install it so that the service port faces the indoor unit side.
(This facilitates indoor unit leak testing and vacuum procedures.)
Install the ball valve as close as possible to the distribution joint.



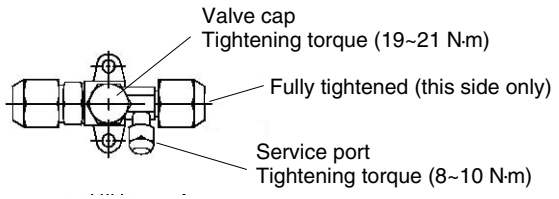
CAUTION

This ball valve is for use only in systems that utilize refrigerant R410A. The service port connection size is ø7.94. The face-to-face distance between the ø12.7 or ø15.88 flare nuts is 26 mm or 29 mm, respectively.
Be sure to use only the supplied flare nuts. Be careful to use the correct tools and materials.

2. Flare nut tightening

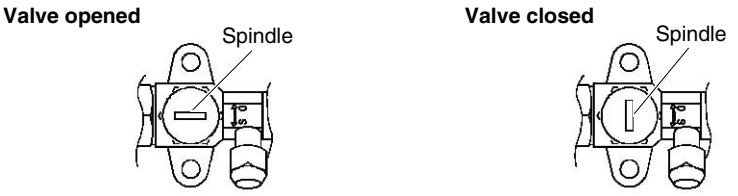
The flare nut on the service port side is fully tightened. Recommended tightening torque is (8~10 N·m).

If the valve is used for extension, it can be used as-is. In all other cases, use 2 adjustable wrenches in combination to loosen the flare nut.



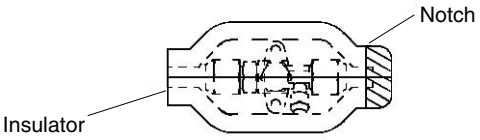
3. Opening and closing the valve

This valve is open at the time of shipment from the factory. If the valve is used for extension, be sure to close it.



4. Installing thermal insulation

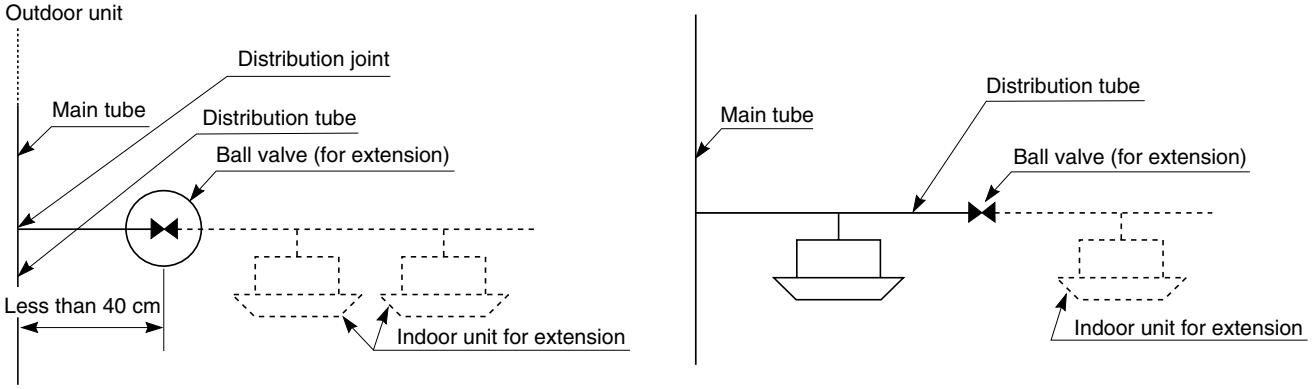
The thermal insulation used for a flare-nut type valve is in the form of a bag. When the valve is used for extension, it can be used as-is. If the valve is used for any other purpose, use a box cutter or similar tool to cut away the part shown in the figure at right.
The insulation is divided into 2 parts. After performing the leak test, use vinyl tape or other means to temporarily fasten the 2 parts together. Then carry out final finishing.



1-14. Recommended Location of Ball Valves

● Select a valve location that allows service to be easily provided for each unit or each refrigerant system.

(1) When adding ball valve for indoor unit



1. Location: Install the ball valve at the distribution tube (not main tube).
2. Installation requirements

- Be sure to install the ball valve up-grade to prevent the inadvertent flow of oil.
- Install the ball valve at the shortest distance (within 40 cm) from the main tube. If the diameter of the ball valve is smaller than that of the main tube, use a reducer or the like to reduce the size of the tubing at that location.
- Select a place where it is easy to operate, using careful consideration of the location in advance.

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

Additional refrigerant charging

Based on the values in Tables 1-14, 1-15, 1-16 and 1-19, use the liquid tubing size and length, and calculate the amount of additional refrigerant charge using the formula below.

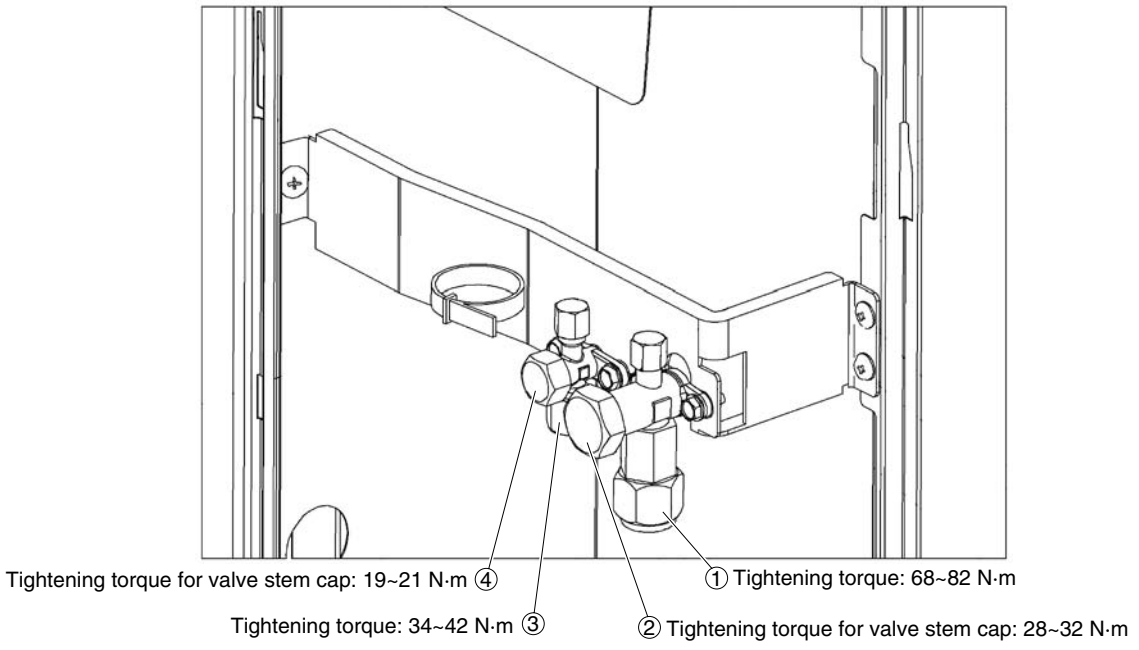
Required additional refrigerant charge (kg) $= [56 \times (a) + 26 \times (b)] \times 10^{-3}$

(a): Liquid tubing Total length of ø9.52 (m) (b): Liquid tubing Total length of ø6.35 (m)

- Charging procedure

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

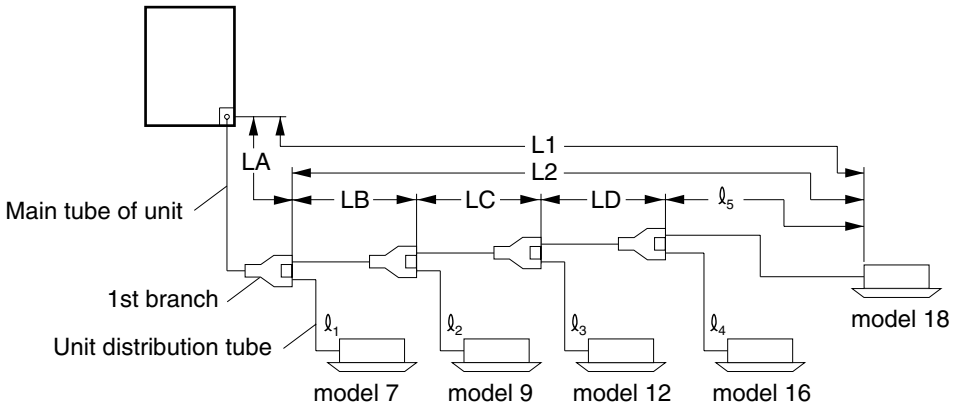
  1. After performing a vacuum, charge with refrigerant from the liquid tubing side. At this time, all valves must be in the “fully closed” position.
  2. If it was not possible to charge the designated amount, operate the system in Cooling mode while charging with refrigerant from the gas tubing side. (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	Distribution joint tubing	
LA = 40 m	Indoor side	
LB = 5 m	ℓ 1 = 5 m	ℓ 4 = 6 m
LC = 5 m	ℓ 2 = 5 m	ℓ 5 = 5 m
LD = 15 m	ℓ 3 = 2 m	

- Obtain charge amount for each tubing size
  Note that the charge amounts per 1 meter are different for each liquid tubing size.
  ø9.52 → LA + LB + LC + LD : 65 m × 0.056 kg/m = 3.64 kg
  ø6.35 → ℓ1 + ℓ2 + ℓ3 + ℓ4 + ℓ5 : 23 m × 0.026 kg/m = 0.598 kg

Total 4.238 kg

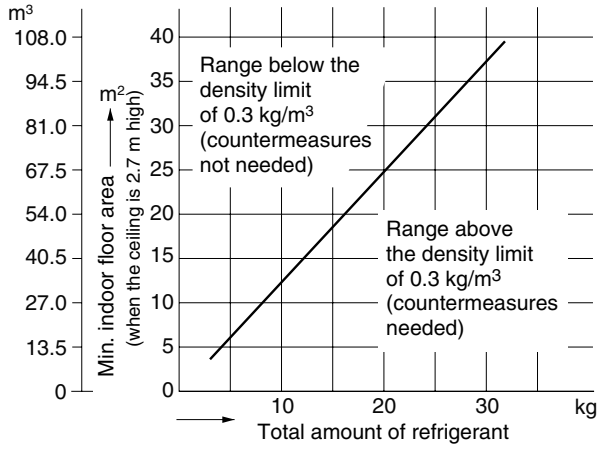
Additional refrigerant charge amount is 4.238 kg.

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 7.43 m² × ceiling height 2.7 m = room volume 20.06 m³), the graph at right shows that the minimum room volume should be 14.1 m³ (floor area 5.2 m²) for refrigerant of 4.238 kg. Accordingly, openings such as louvers are required for this room.



<Determination by calculation>

$$\frac{\text{Overall refrigerant charge amount for the air conditioner: kg}}{\text{(Minimum room volume for indoor unit: m}^3\text{)}} = \frac{4.238\ (\text{kg}) + 3.5\ (\text{kg})}{20.06\ (\text{m}^3)} = 0.39\ (\text{kg/m}^3) \geq 0.3\ (\text{kg/m}^3)$$

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.

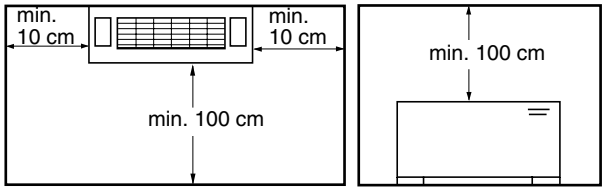
DO:

- 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 1-22.
- 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).

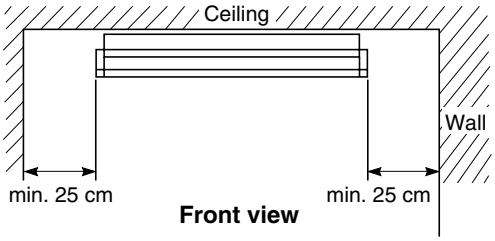
Floor-Standing, Concealed Floor-Standing Type



Horizontal view **Vertical view**

Fig. 2-4

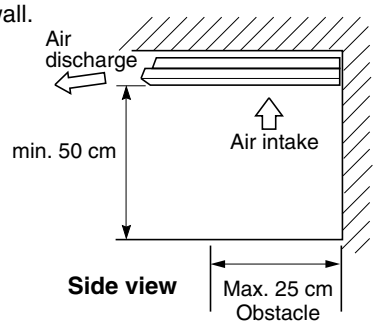
Ceiling-Mounted Type



Front view

NOTE

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



Side view

Fig. 2-1

Concealed-Duct Type, Slim Concealed-Duct Type 2-Way, 4-Way (Mini) Semi-Concealed Type

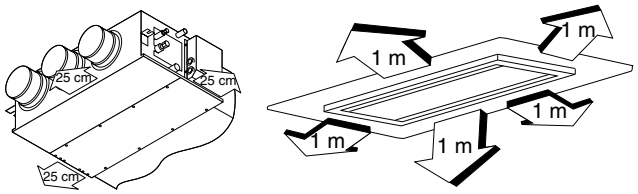
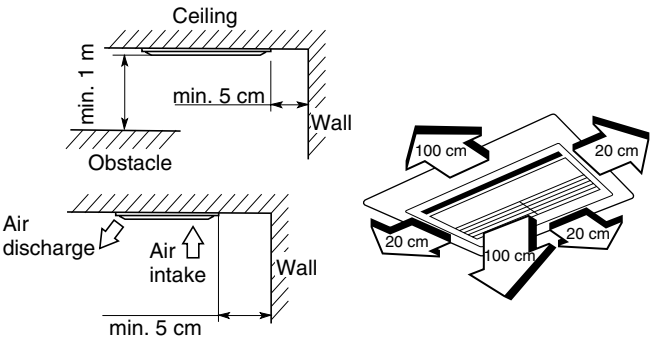


Fig. 2-2

1-Way Semi-Concealed Slim Type

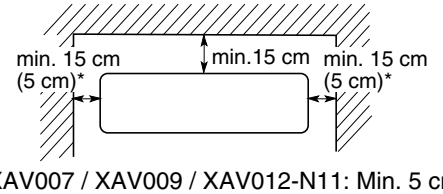
Semi-Concealed Slim Type



Side view

Fig. 2-3

(Flat) Wall-Mounted Type



* AWSI-XAV007 / XAV009 / XAV012-N11: Min. 5 cm

Front View

Fig. 2-5

Heat Exchanger with DX coil

- The distance between the indoor unit and any obstructions should be as shown in the figure below.
- If installing in a highly humid location, give consideration to preventing condensation on the main unit.

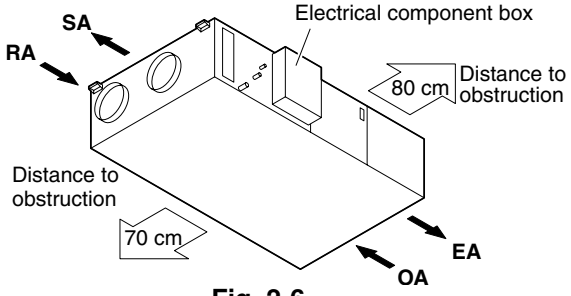


Fig. 2-6

NOTE

There is a packaging bracket located on each of the four product corners. Remove these brackets from the product.

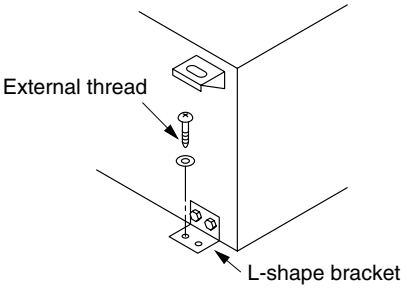


Fig. 2-7

2-2. Outdoor Unit

AVOID:

- heat sources, exhaust fans, etc. (Fig. 2-8)
- damp, humid or uneven locations.

DO:

- choose a place as cool as possible.
- choose a place that is well ventilated and outside air temperature does not exceed maximum 45°C constantly.
- allow enough room around the unit for air intake/ exhaust and possible maintenance. (Fig. 2-9)
- use lug bolts or equal to bolt down unit, reducing vibration and noise.

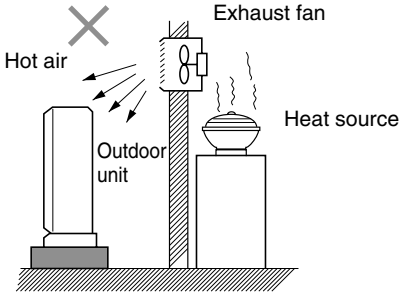


Fig. 2-8

Installation space

Distance between obstructions and the unit air inlet and outlet must be as shown below.

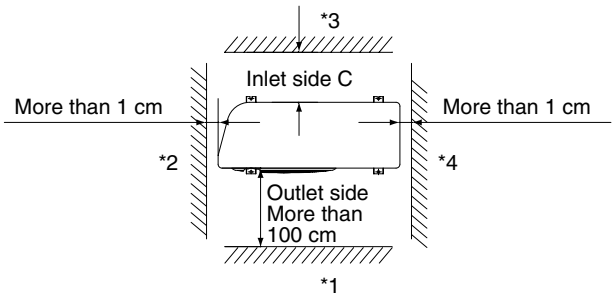


Fig. 2-9

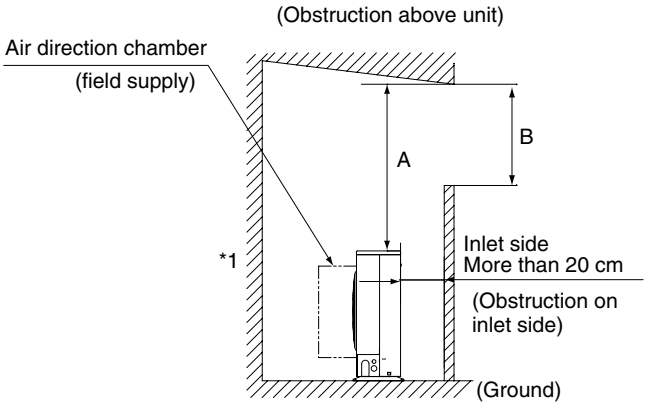


Fig. 2-10

CAUTION

- Concerning inlet-side distance “C” (Fig. 2-9)
  The minimum for distance “C” is 15 cm if there are no obstructions on the outlet side (wall *1 side) and *2 or *4 is not present. In all other cases, the minimum for distance “C” is 20 cm.
- If the unit is installed with the outlet side facing wall *1, then there must be no obstructions on 2 of the remaining 3 sides: *2, *3, *4.
- If wall *1 is on the outlet side (Fig. 2-9), or if obstructions are present on all 3 sides *2, *3, and *4 (Fig. 2-9), then the minimum distance for “A” and “B” is 2 m (Fig. 2-10). Even if there is no wall on the outlet side, a minimum of 100 cm is required.

In case of multiple installations

- provide a solid base (concrete block, 10 × 40 cm beams or equal), a minimum of 15 cm above ground level to reduce humidity and protect the unit against possible water damage and decreased service life. (Fig. 2-11)
- use lug bolts or equal to bolt down unit, reducing vibration and noise.

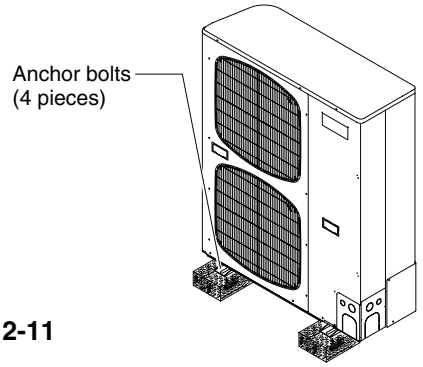


Fig. 2-11

2-3. Air Discharge Chamber for Top Discharge

Be sure to install an air discharge chamber in the field when:

- it is difficult to keep a space of min. 50 cm between the air discharge outlet and an obstacle.
- the air discharge outlet is facing a sidewalk and discharged hot air may annoy passers-by. Refer to Fig. 2-12.

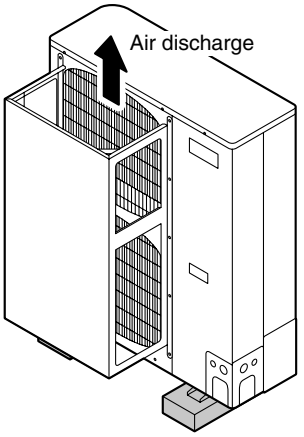


Fig. 2-12

2-4. Installing the Unit in Heavy Snow Areas

In locations with strong wind, snow-proof ducting should be fitted and direct exposure to the wind should be avoided as much as possible.

■ Countermeasures against snow and wind

In regions with snow and strong wind, the following problems may occur when the outdoor unit is not provided with a platform and snow-proof ducting:

a) The outdoor fan may not run and damage to the unit may occur.
b) There may be no air flow.
c) The tubing may freeze and burst.
d) The condenser pressure may drop because of strong wind, and the indoor unit may freeze.

2-5. Precautions for Installation in Heavy Snow Areas

(1) The platform should be higher than the max. snow depth. (Fig. 2-13)
(2) 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 outdoor unit.
(3) The platform foundation must be firm and the unit must be secured with anchor bolts.
(4) In case of installation on a roof subject to strong wind, countermeasures must be taken to prevent the unit from being blown over.

In regions with significant snowfall, the outdoor unit should be provided with a platform and snow-proof duct.

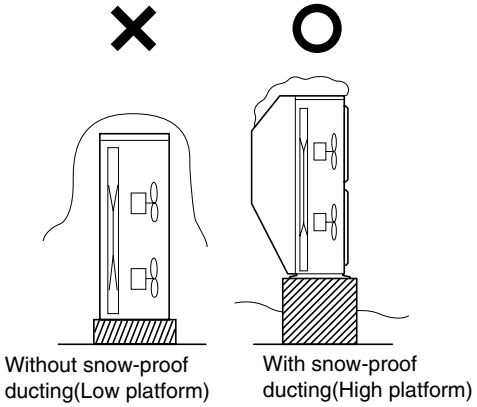


Fig. 2-13

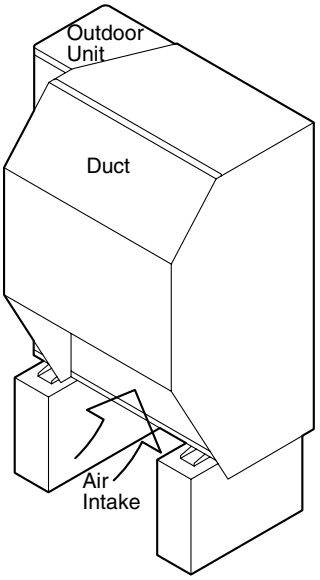


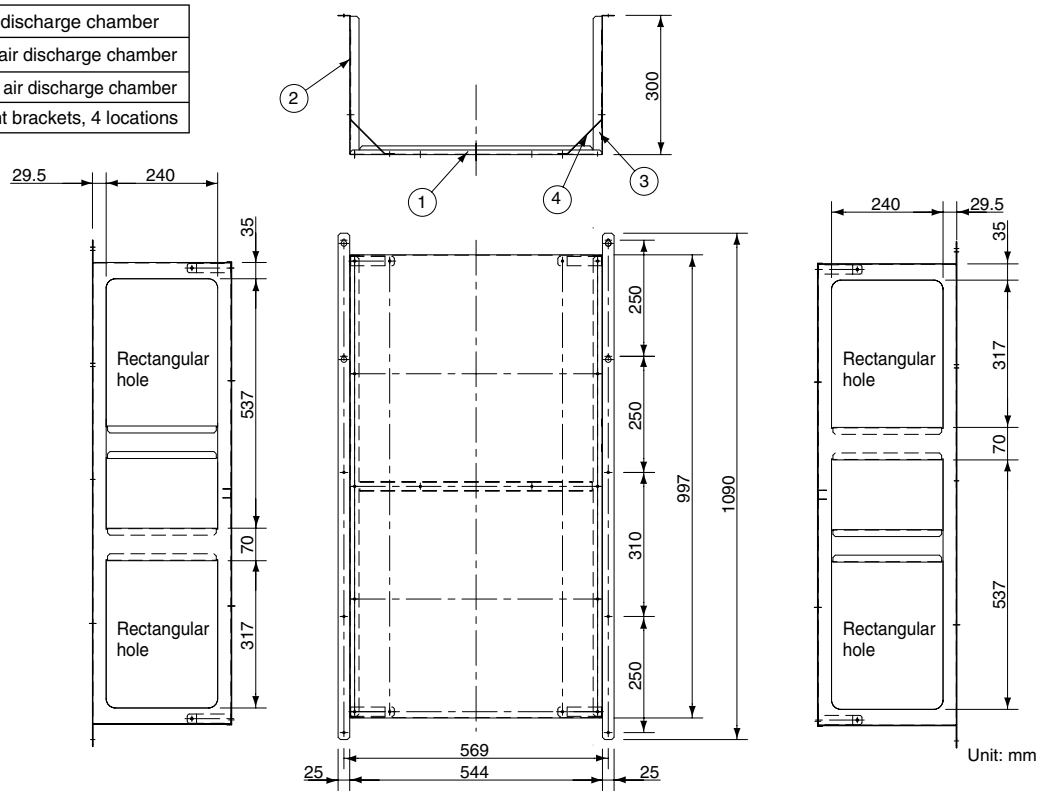
Fig. 2-14

2-6. Dimensions of Air-Discharge Chamber

Reference diagram for air-discharge chamber (field supply)

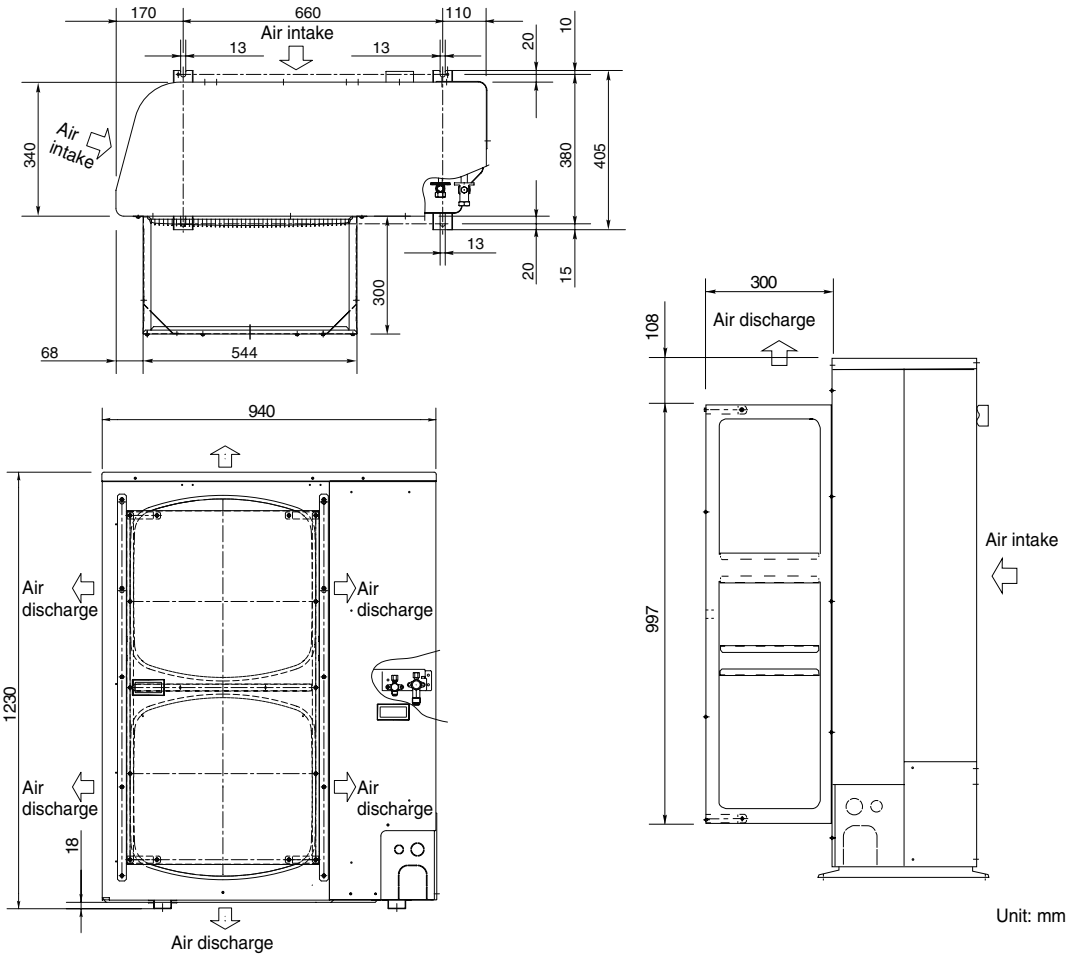
For 4, 5 and 6 hp

①	Unit front, air discharge chamber
②	Unit left side, air discharge chamber
③	Unit light side, air discharge chamber
④	Reinforcement brackets, 4 locations



2-7. Dimensions of Outdoor Unit with Air-Discharge Chamber (field supply)

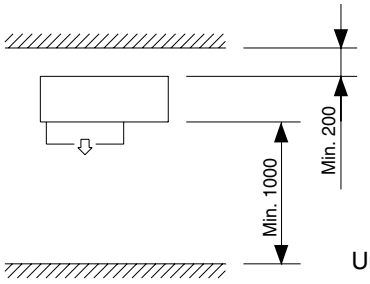
For 4, 5 and 6 hp



Reference for air-discharge chamber (field supply)
Required space around outdoor unit
For 4, 5 and 6 hp

If an air discharge chamber is used, the space shown below must be secured around the outdoor unit.
If the unit is used without the required space, a protective device may activate, preventing the unit from operating.

(1) Single-unit installation



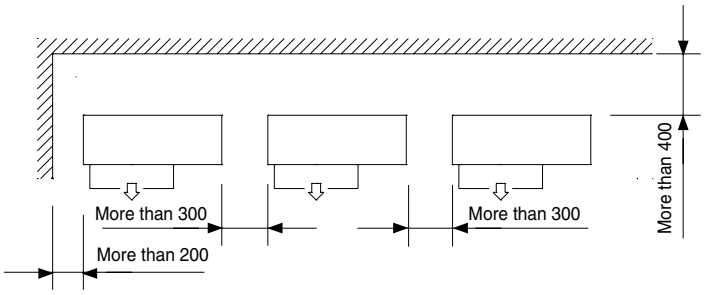
Unit: mm

CAUTION

The top and both sides must remain open.
If there are obstacles to the front and rear of the outdoor unit, the obstacle at either the front or rear must be no taller than the height of the outdoor unit.

(2) Multiple-unit installation

- Installation in lateral rows



Unit: mm

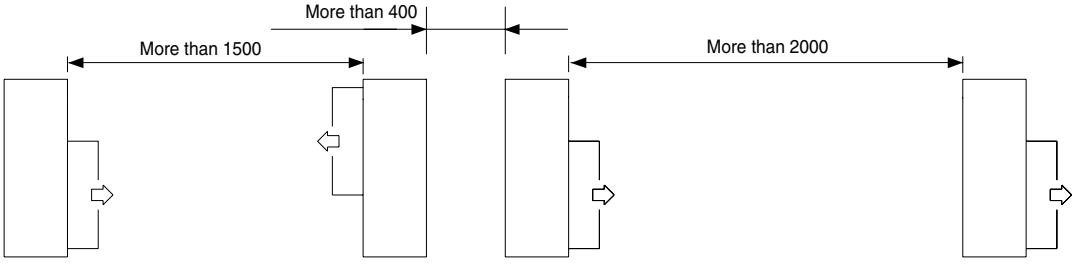
CAUTION

The front and top must remain open.
The obstacles must be no taller than the height of the outdoor unit.

- Installation in front-rear rows

Installation with intakes facing intakes or outlets facing outlets

Installation with intakes facing outlets



Unit: mm

CAUTION

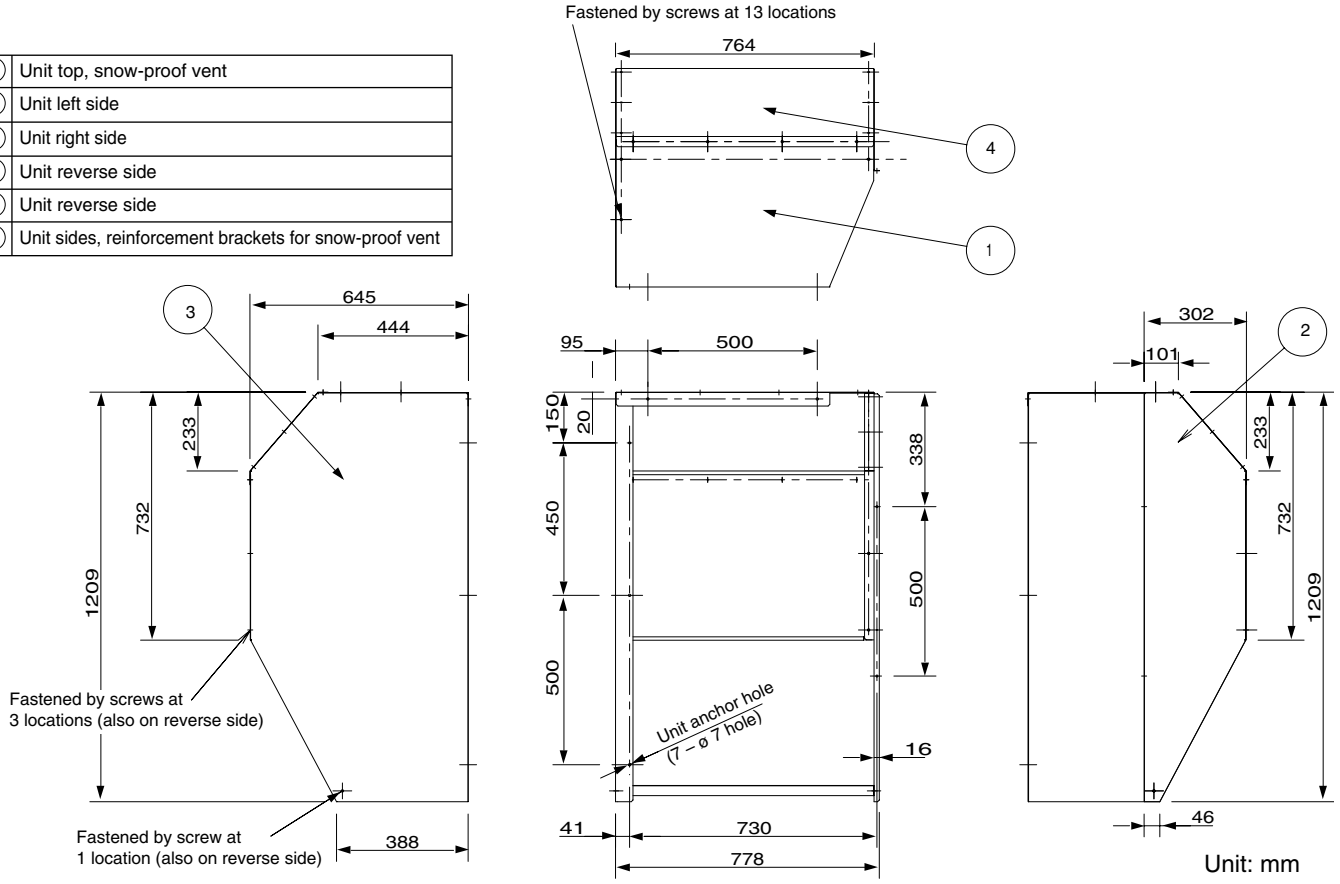
The front and both sides must remain open.

2-8. Dimensions of Snow Ducting

Reference diagram for snow-proof vents (field supply)

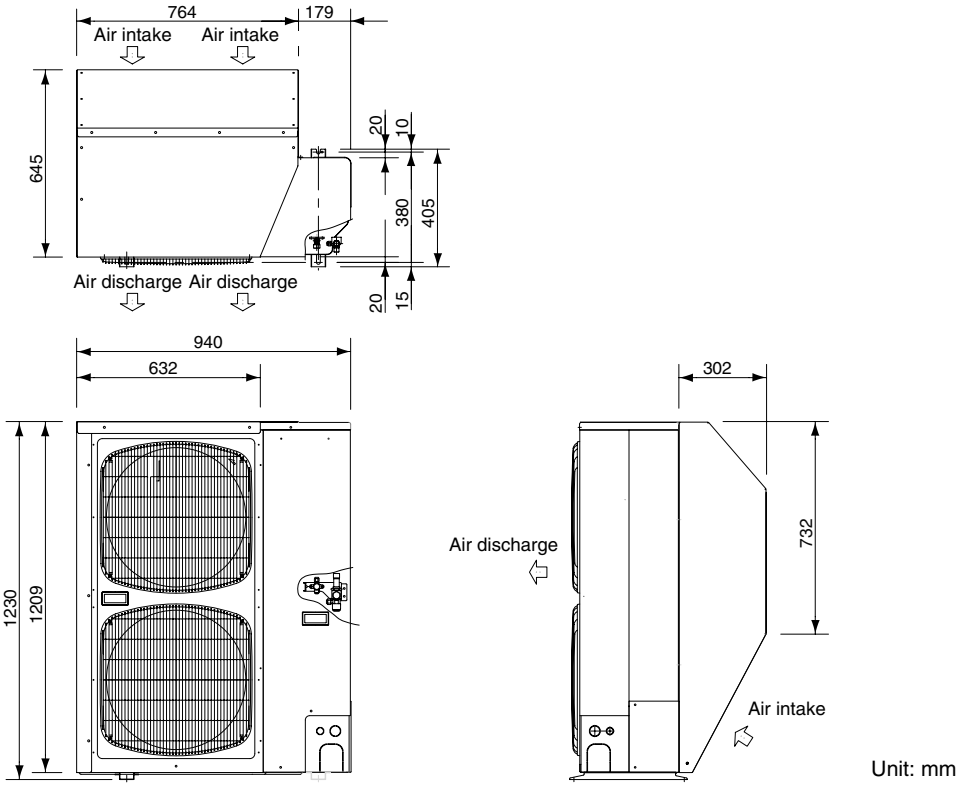
For 4, 5 and 6 hp

①	Unit top, snow-proof vent
②	Unit left side
③	Unit right side
④	Unit reverse side
⑤	Unit reverse side
⑥	Unit sides, reinforcement brackets for snow-proof vent



2-9. Dimensions of Outdoor Unit with Snow-Proof Vents (field supply)

For 4, 5 and 6 hp



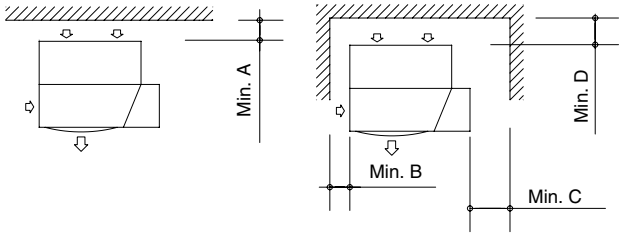
Reference diagram for snow-proof vents – 1

Space requirements for setting – (1)
4, 5 and 6 hp

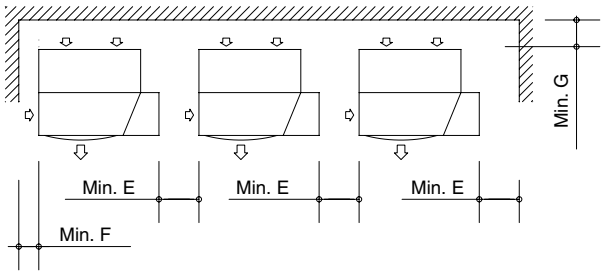
[Obstacle to the rear of unit]

● Top is open:

(1) Single-unit installation (2) Obstacles on both sides



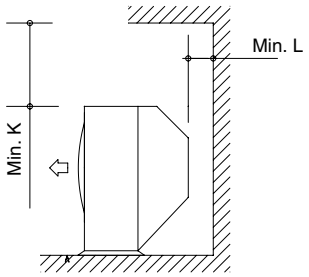
(3) Multiple-unit installation (2 or more units)



Outdoor unit	A	B	C	D	E	F	G
4, 5 and 6 hp	150	150	300	200	300	150	200

Note: In cases 2 and 3 the height of the obstacle must be no taller than the height of the outdoor unit.

● Top is blocked by an obstacle:

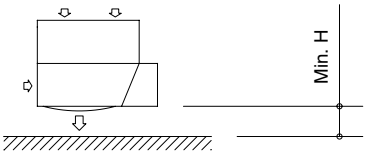


Outdoor unit	K	L
4, 5 and 6 hp	500	150

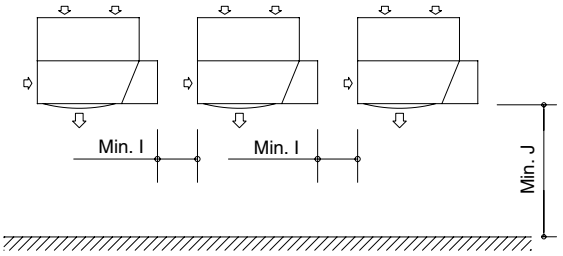
[Obstacle to the front of unit]

● Top is open:

(1) Single-unit installation

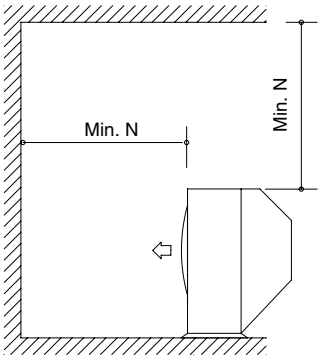


(2) Multiple-unit installation (2 or more units)



Outdoor unit	H	I	J
4, 5 and 6 hp	500	300	1000

● Top is blocked by an obstacle:



Outdoor unit	M	N
4, 5 and 6 hp	1000	1000

Unit: mm

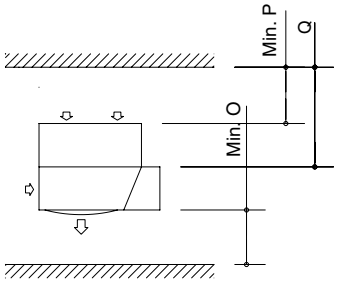
Reference diagram for snow-proof vents – 2

Space requirements for setting – (2)
4, 5 and 6 hp

[Obstacles to the front and rear of unit]

- The top and both sides must remain open. Either the obstacle to the front or the obstacle to the rear must be no taller than the height of the outdoor unit.

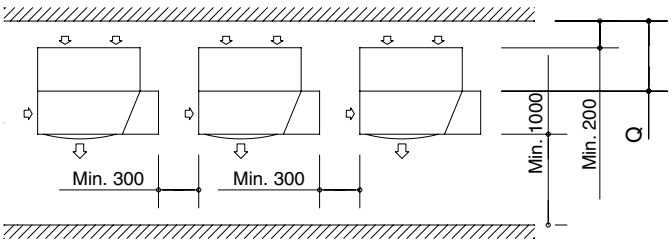
(1) Single-unit installation



Dimension Q
If a snow protection duct is attached after the unit is installed, verify that dimension Q is 500 mm or more.

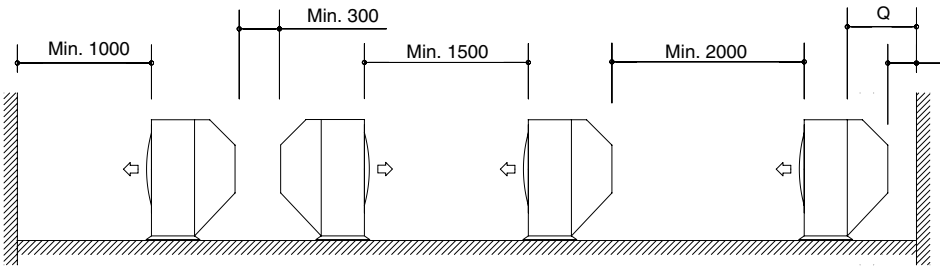
Outdoor unit	O	P
4, 5 and 6 hp	1000	150

(2) Obstacles on both sides



[Installation in front-rear rows]

- The top and both sides must remain open. Either the obstacle to the front or the obstacle to the rear must be no taller than the height of the outdoor unit.



Dimension Q
If a snow protection duct is attached after the unit is installed, verify that dimension Q is 500 mm or more.

Unit: mm

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

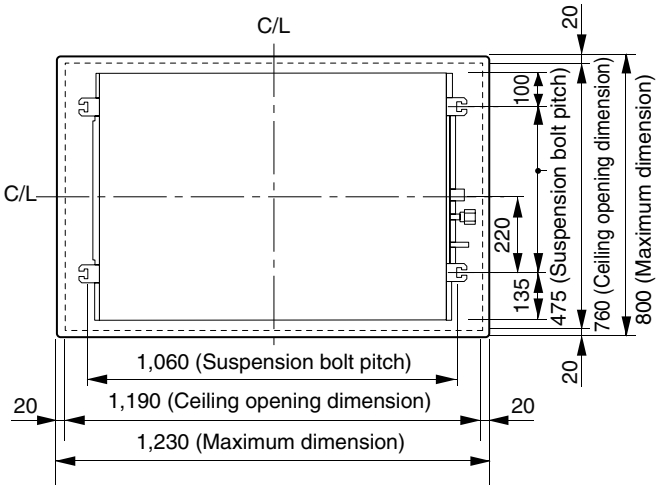


Fig. 3-1

Unit: mm

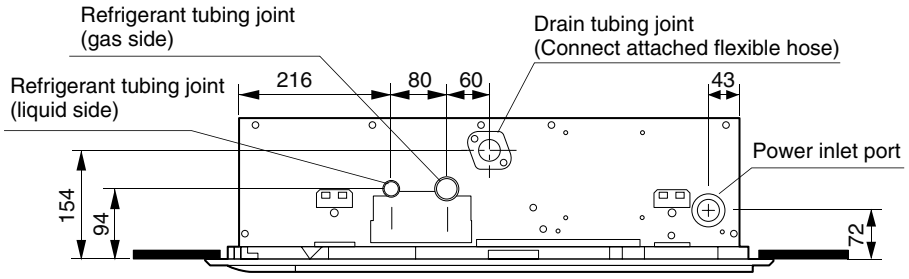


Fig. 3-2

(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.

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)

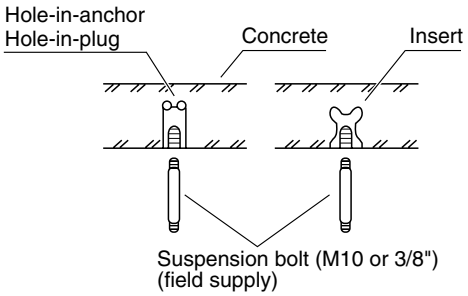


Fig. 3-3

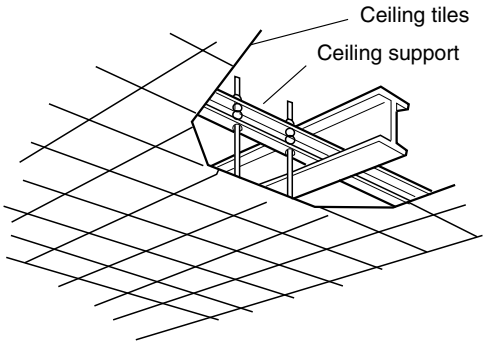


Fig. 3-4

(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 Fig. 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.

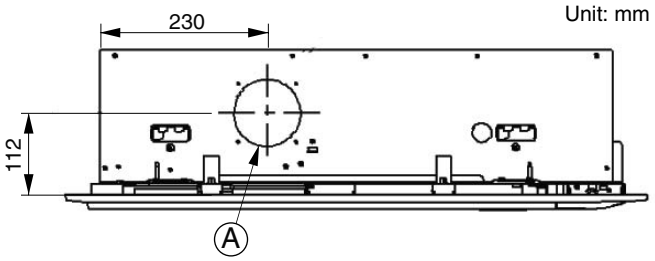
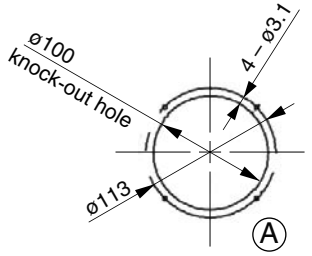


Fig. 3-5



Outdoor air intake duct connection port

Fig. 3-6

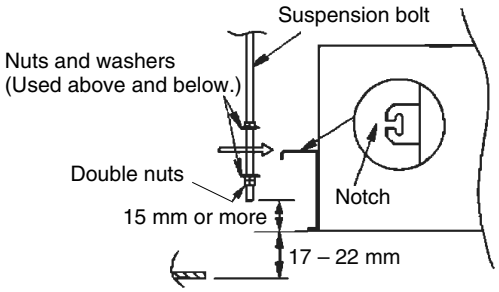


Fig. 3-7

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

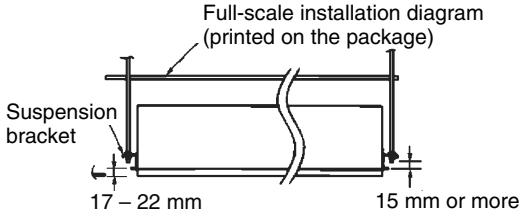


Fig. 3-8

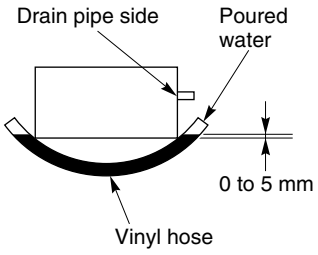


Fig. 3-9

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°.)**

(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.

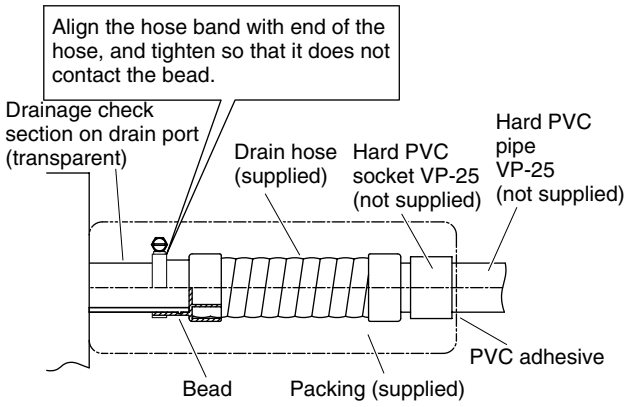


Fig. 3-10a

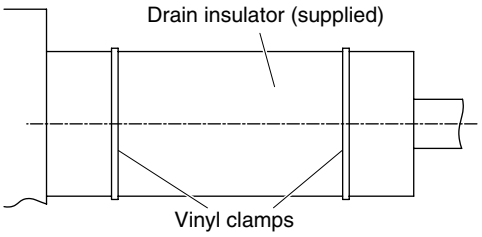


Fig. 3-10b

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.

Refer to "■ SUPPLEMENT ON DRAIN PIPING".

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.

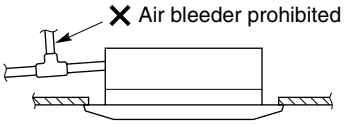


Fig. 3-11

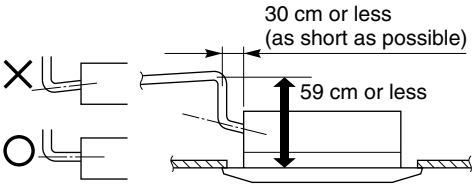


Fig. 3-12

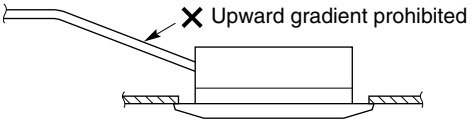


Fig. 3-13

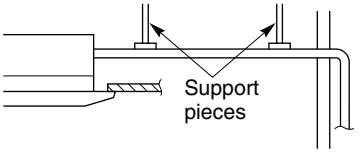


Fig. 3-14

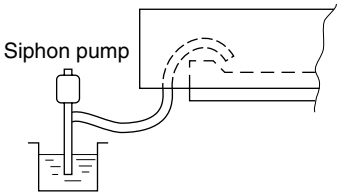


Fig. 3-15

(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.

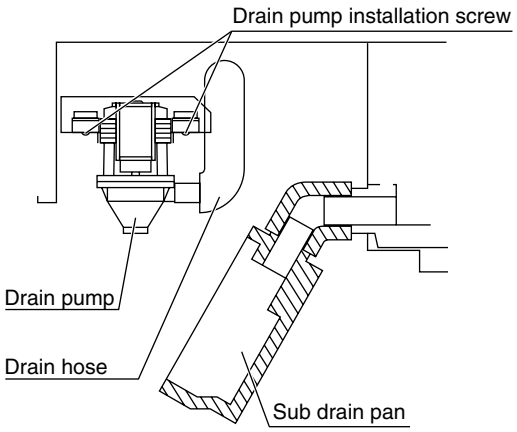


Fig. 3-16

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.

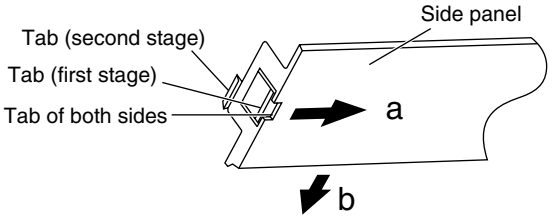


Fig. 3-17

■ 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 3-1

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:

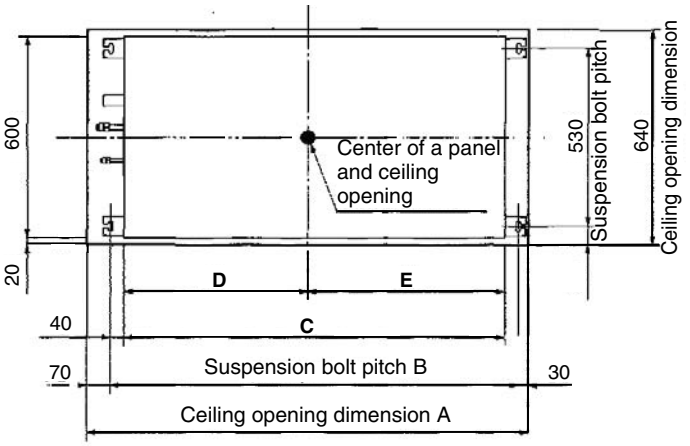
- Insert suspension bolts as shown in Fig. 3-20

  or

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

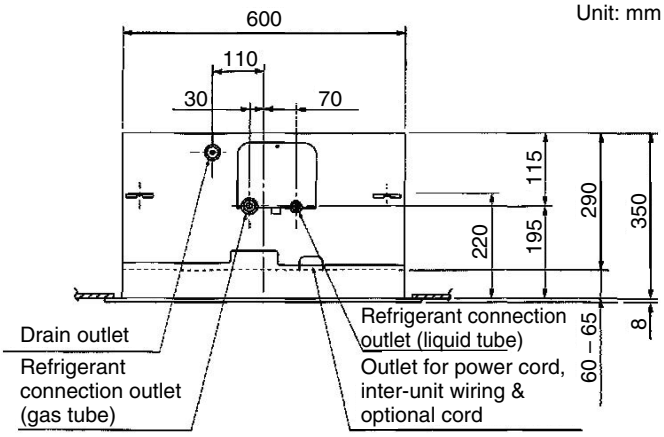
WARNING **It is important that you use extreme care in supporting the indoor unit from the ceiling. Ensure that the ceiling is strong enough to support the weight of the unit. Before hanging the unit, test the strength of each attached suspension bolt.**

(3) Cut the ceiling material, if necessary. (Refer to Figs. 3-18 and 3-19, and Table 3-1.)



Unit: mm

Fig. 3-18



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

Fig. 3-19

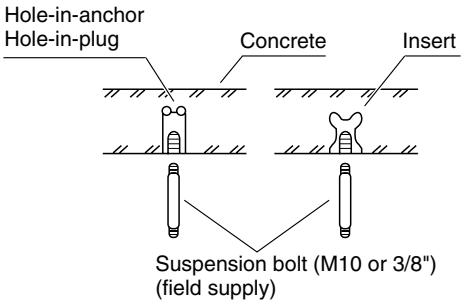


Fig. 3-20

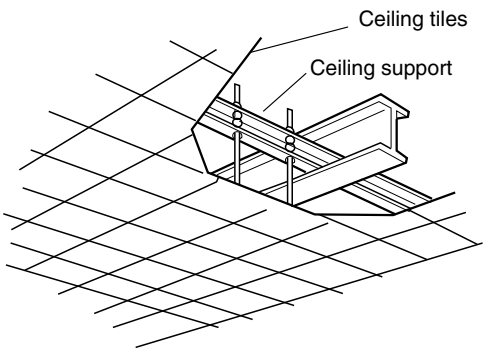


Fig. 3-21

(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 Fig. 3-22.

CAUTION

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

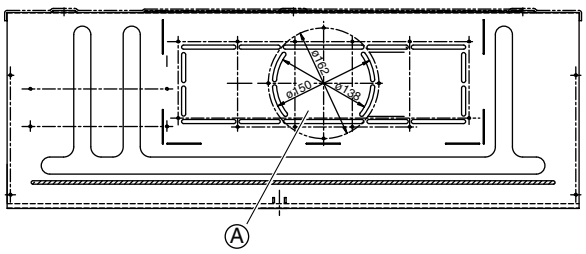


Fig. 3-22

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.

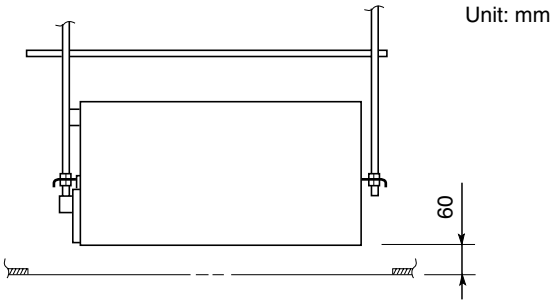


Fig. 3-23

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)

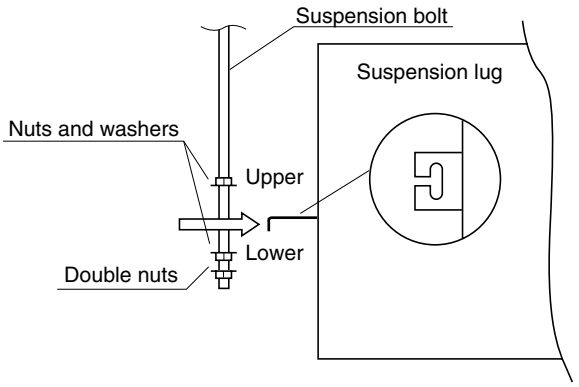


Fig. 3-24

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°.)**

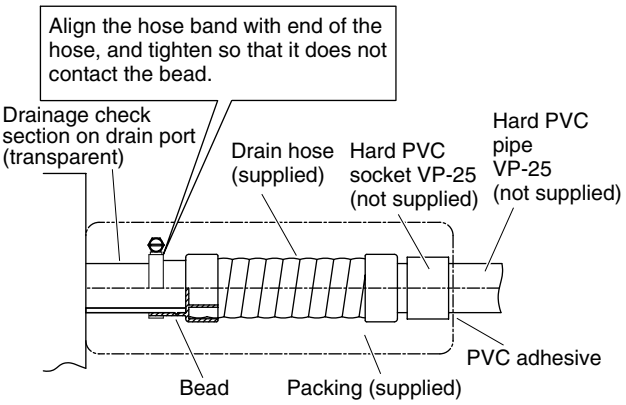


Fig. 3-25

(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.

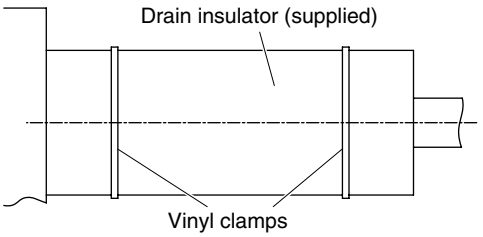


Fig. 3-26

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.**

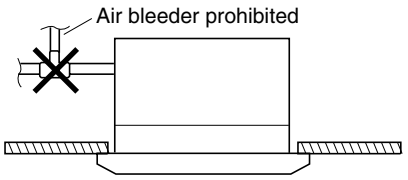


Fig. 3-27

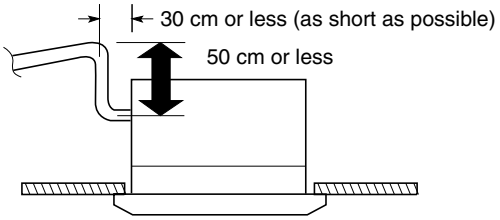


Fig. 3-28

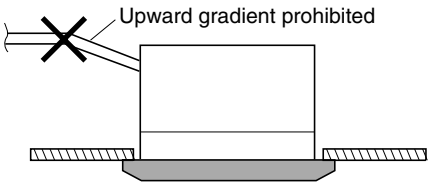


Fig. 3-29

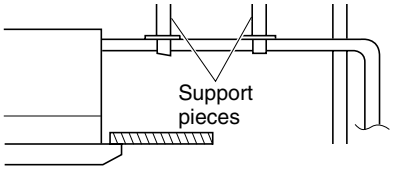


Fig. 3-30

Refer to "■ SUPPLEMENT ON DRAIN PIPING".

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.

(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.**

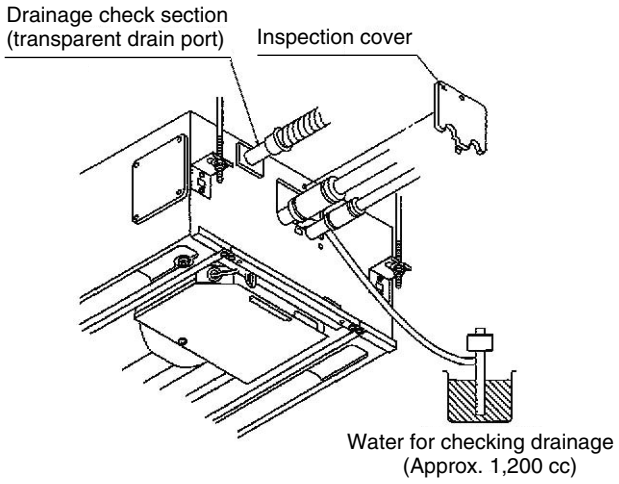


Fig. 3-31

■ 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 3-2 to make the holes in the ceiling.

Table 3-2 Unit: mm

Table \ 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 3-3) show the relationship between the positions of the suspension fitting, unit, and panel.

Table 3-3 Unit: mm

Table \ 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 Air Discharge Semi-Concealed, see the section "12. SPECIAL REMARKS".

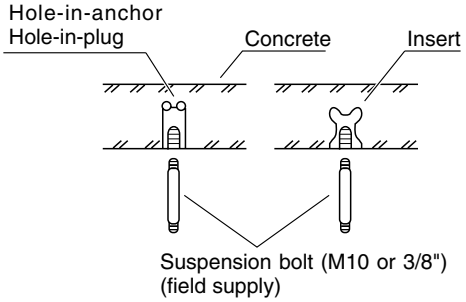


Fig. 3-32

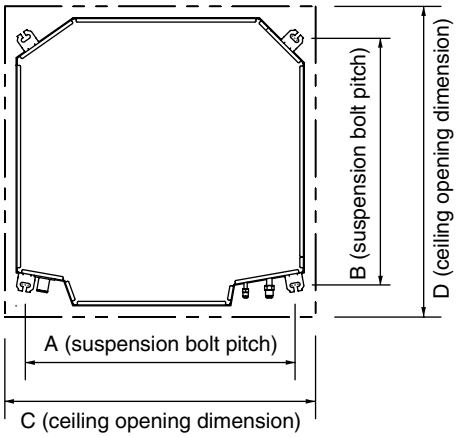


Fig. 3-33

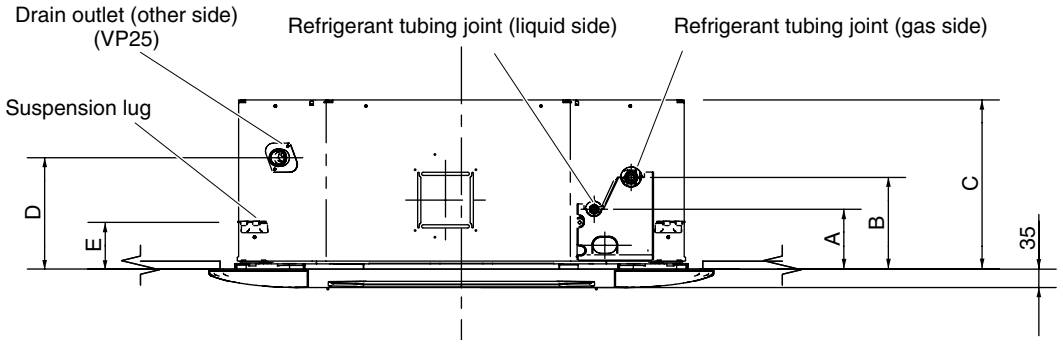


Fig. 3-34

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.

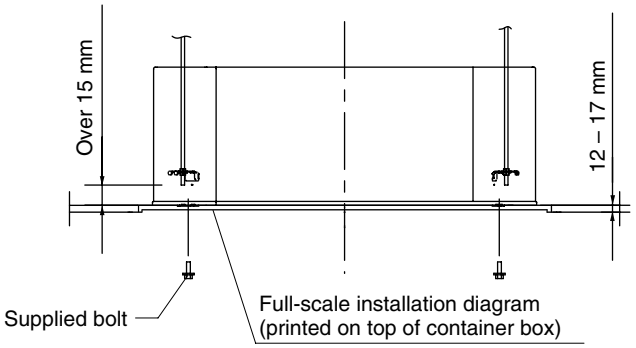


Fig. 3-35

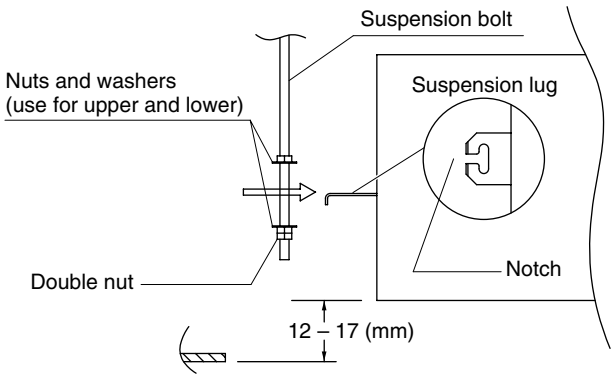


Fig. 3-36

NKFL

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)**

(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)

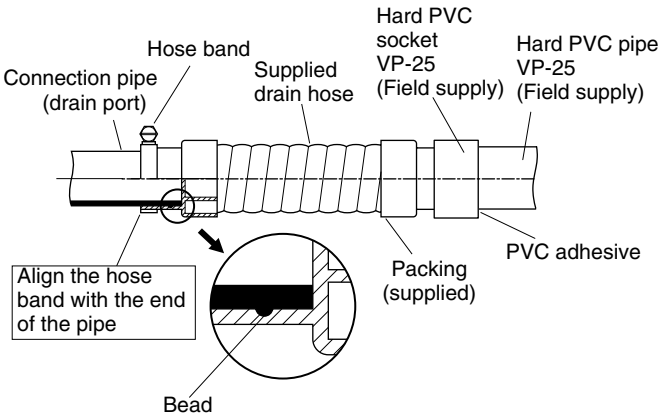


Fig. 3-37

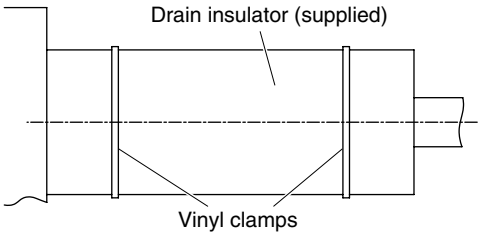


Fig. 3-38

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)

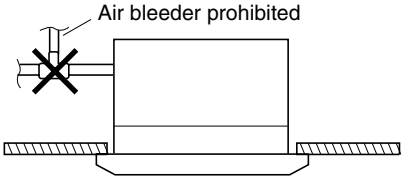


Fig. 3-39

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.**

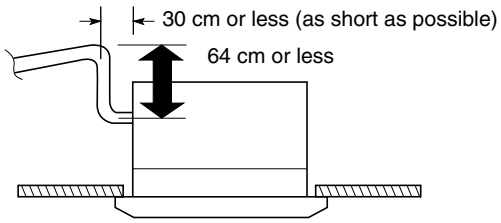


Fig. 3-40

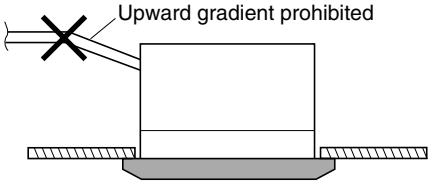


Fig. 3-41

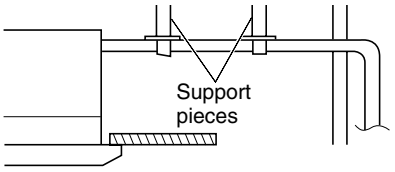


Fig. 3-42

Refer to "■ SUPPLEMENT ON DRAIN PIPING".

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.

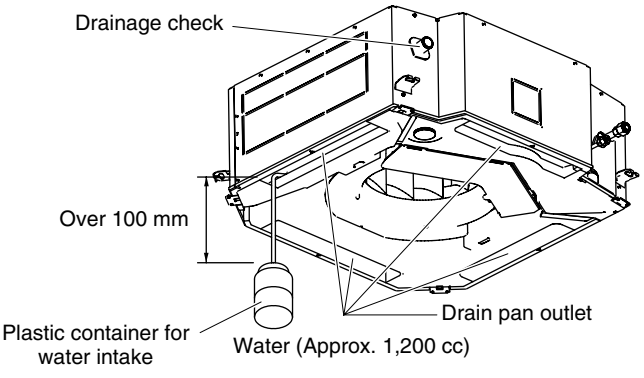


Fig. 3-43

CAUTION

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

■ 4-Way Air Discharge Mini Semi-Concealed Type (CAV Type)

3-14. Preparation for Suspending

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

3-15. Suspending the Indoor Unit

(1) Fix the suspension bolts securely in the ceiling using the method shown in the diagrams (Figs. 3-44 and 3-45), 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 the diagram (Fig. 3-45) to make the holes in the ceiling.

(3) Determine the pitch of the suspension bolts using the supplied full-scale installation diagram. The diagram (Fig. 3-46) shows the relationship between the positions of the suspension fitting, unit, and panel.

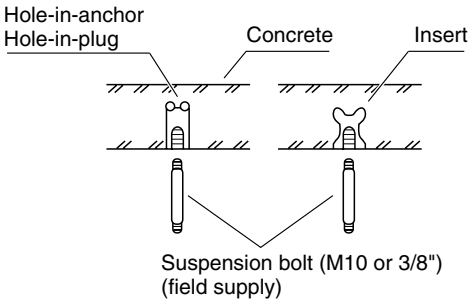


Fig. 3-44

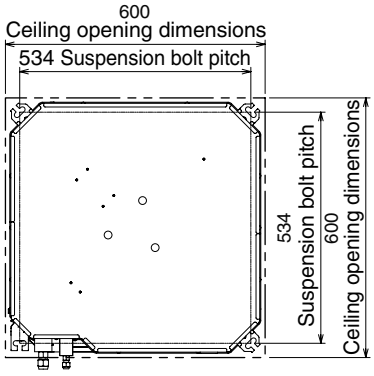


Fig. 3-45

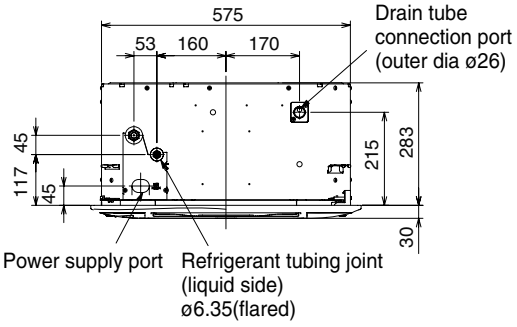


Fig. 3-46

3-16. 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. 3-47)

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. 3-47.

(3) Thread the 3 hexagonal nuts and 2 washers (field supply) onto each of the 4 suspension bolts as shown in Fig. 3-48. 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 13 to 18 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.

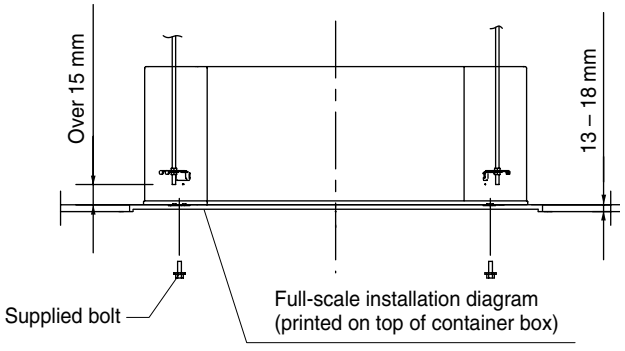


Fig. 3-47

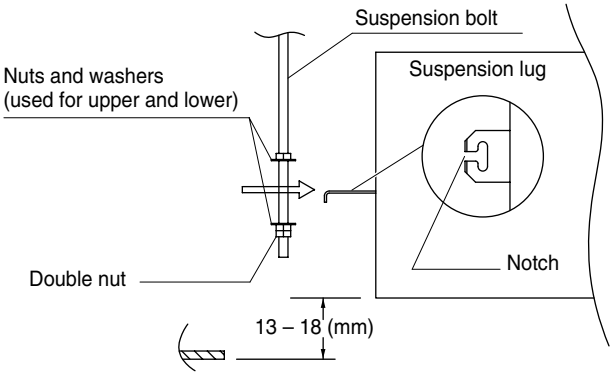


Fig. 3-48

3-17. Installing the Drain Piping

(1) Prepare standard hard PVC pipe (O.D. 26 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.

(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.
- 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).

  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.

- Wrap the hose with the supplied drain hose insulation and use the 4 twist ties so that the hose is insulated with no gaps.
- Do not bend the supplied drain hose 90° or more. The hose may slip off.

NOTE

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

CAUTION

- **In cases where it is necessary to raise the height of the drain piping, the drain piping can be raised to a maximum height of 850 mm above the bottom surface of the ceiling. Under no conditions attempt to raise it higher than 850 mm above the bottom surface of the ceiling. Doing so will result in water leakage. (Fig. 3-51)**
- **Do not use natural drainage.**
- **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. 3-52)**
- **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. 3-53)**
- **Provide insulation for any pipes that are run indoors.**

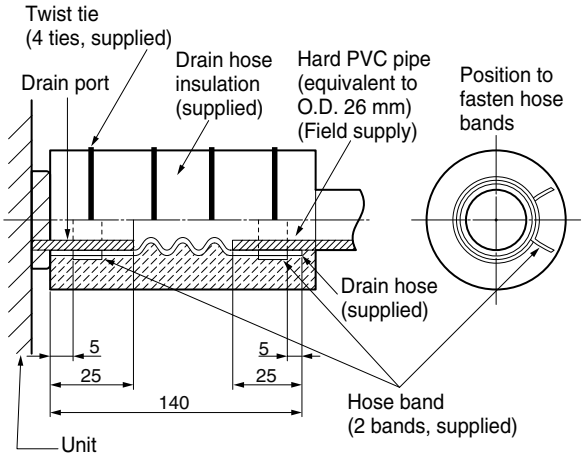


Fig. 3-49

CAUTION

Attach so that the hose band fastener is on the side of the drain port.
Attach the hose bands so that each is approximately 5 to 25 mm from the end of the supplied drain hose.

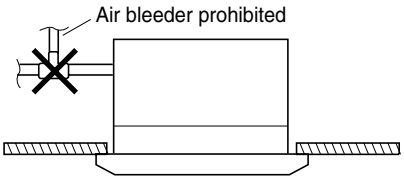


Fig. 3-50

CAUTION

Do not install an air bleeder as this may cause water to spray from the drain pipe outlet.

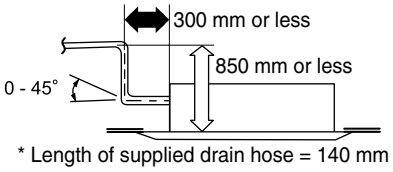


Fig. 3-51

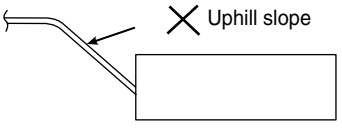


Fig. 3-52

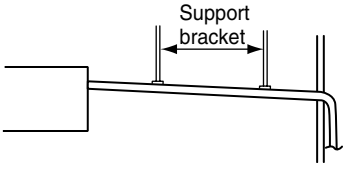


Fig. 3-53

CAV

3-18. 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 500cc of water into the drain pan to check drainage. (Fig. 3-54)

(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.

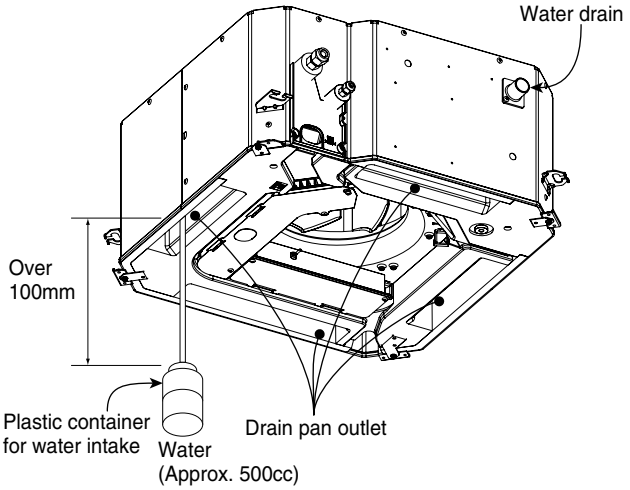


Fig. 3-54

CAUTION

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

CAV

■ Wall-Mounted Type (NWFL Type)

3-19. 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.

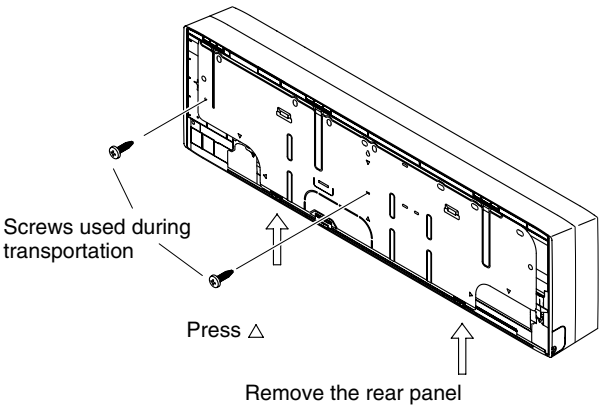


Fig. 3-55

NOTE

Tubing can be extended in 4 directions as shown in Fig. 3-56. Select the direction which will provide the shortest run to the outdoor unit.

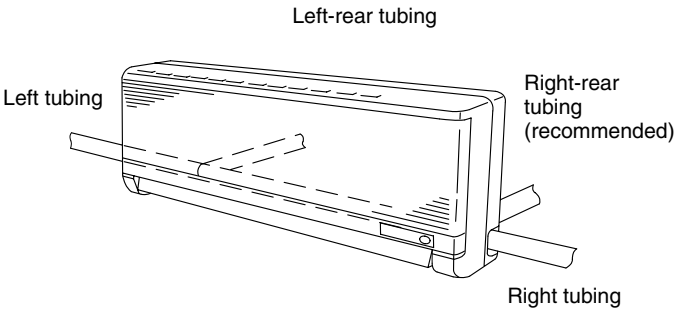


Fig. 3-56

3-20. Selecting and Making a Hole

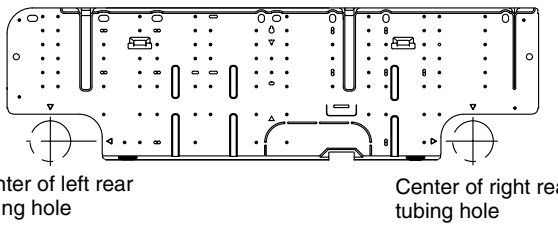
(1) Remove the rear panel from the indoor unit and place it on the wall at the location selected. Fix the rear panel and hook the unit onto it temporarily. Make sure the unit is horizontal using a carpenter's level or tape measure to measure down from the ceiling.

(2) Determine which notch of the rear panel should be used. (Fig. 3-57)

(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. 3-58)

(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. 3-59)



Tubing hole diameter	ø80

Fig. 3-57

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

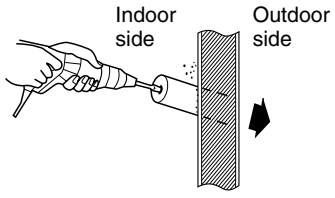


Fig. 3-58

(6) Place the plastic cover over the end of the pipe (for indoor side only) and insert in the wall. (Fig. 3-60)

NOTE

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

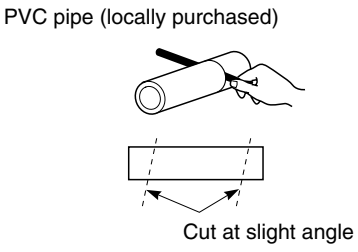


Fig. 3-59

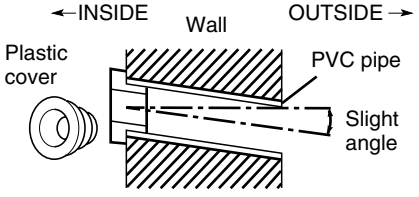


Fig. 3-60

3-21. 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. 3-61)
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. 3-62)

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

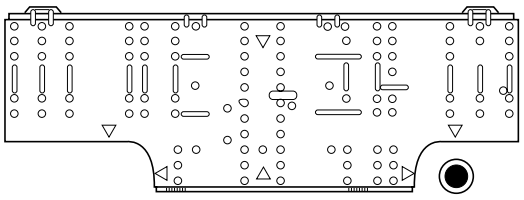


Fig. 3-61

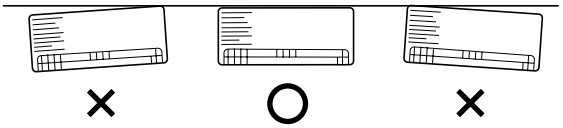


Fig. 3-62

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. 3-63)

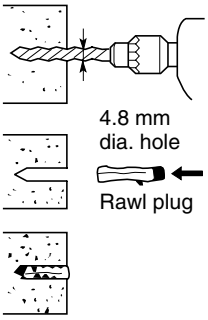


Fig. 3-63

3-22. 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. 3-64)

(2) Remove the filter. (Fig. 3-64)

(3) Adjust the flap so that it is horizontal. (Fig. 3-65)

(4) Open the installation screw covers below the grille (3 locations). (Fig. 3-65)

(5) Remove the screws. (Fig. 3-65)

(6) Remove the grille. (Fig. 3-66)

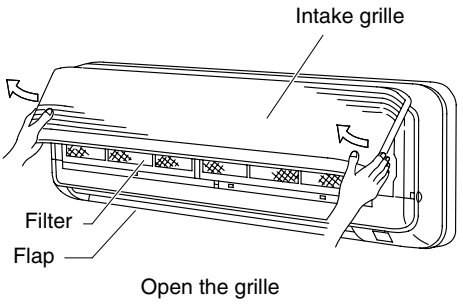


Fig. 3-64

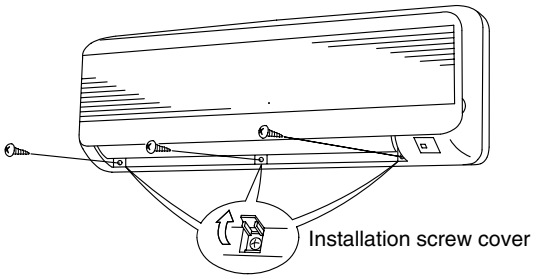


Fig. 3-65

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.

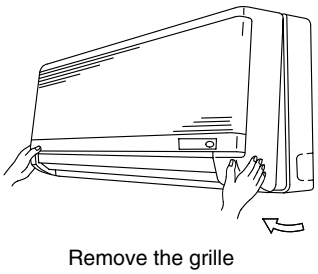


Fig. 3-66

3-23. 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. 3-67)

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. 3-68)
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. 3-69)

Raising the clamp to lift up the indoor unit will facilitate this work. (Fig. 3-70)

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 3-19. "Removing the Rear Panel from the Unit". (Fig. 3-55)
Then lift up the indoor unit to remove it.

3-24. Shaping the Tubing

Right-rear tubing

(1) Shape the refrigerant tubing so that it can easily go into the hole. (Fig. 3-71)

(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.

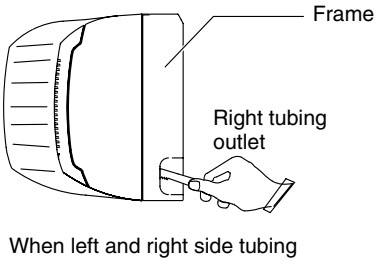


Fig. 3-67

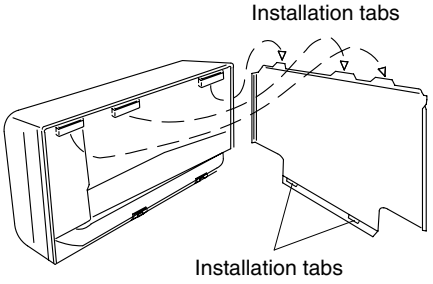


Fig. 3-68

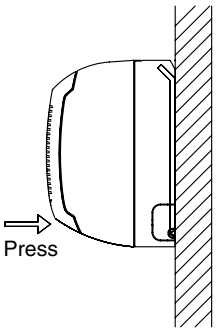


Fig. 3-69

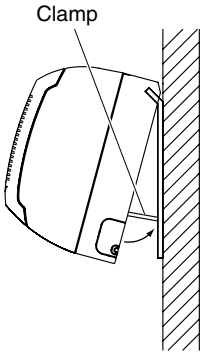


Fig. 3-70

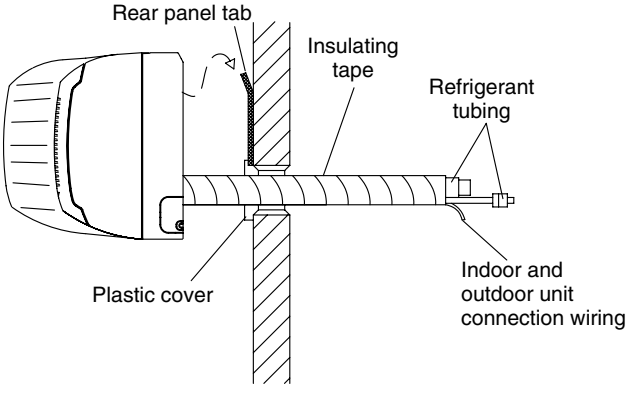


Fig. 3-71

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.

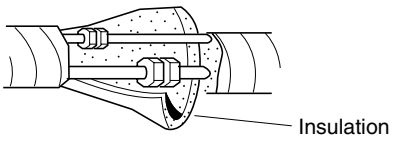


Fig. 3-72

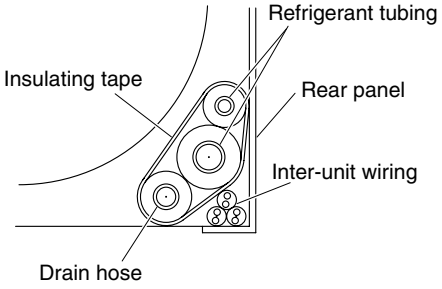


Fig. 3-73

3-25. Installing the Drain Hose

a) The drain hose should be slanted downward to the outside. (Fig. 3-74)

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.

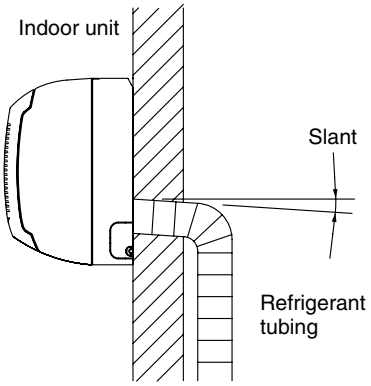


Fig. 3-74

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

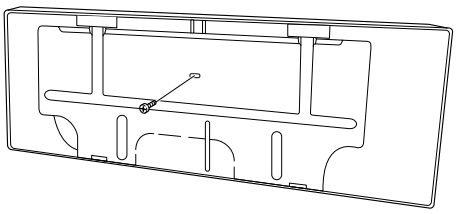
■ Flat Wall-Mounted Type (XAV Type)

3-26. Remove the Rear Panel from the Unit

(1) Remove and discard the set screw on the rear panel. (Fig. 3-75)

(2) Press the 2 △ marks on the frame cover and disengage the stationary tabs from the frame. (Fig. 3-76)

(3) Remove the rear panel.



Set screw only for transportation

Fig. 3-75

NOTE

Tubing can be extended in 5 directions as shown in Fig. 3-77. Select the direction you need providing the shortest run to the outside unit.

- When left tubing is to be done, switch the drain hose and drain cap. (For details, refer to “Switching drain hose and drain cap”.)

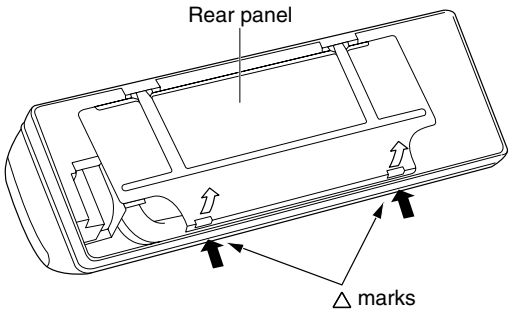


Fig. 3-76

3-27. Make a Hole

(1) Place the rear panel from the indoor unit on the wall at the location selected. Make sure the panel is horizontal, using a carpenter's level or tape measure to measure down from the ceiling.

Wait until after cutting the hole before attaching the rear panel to the wall.

(2) Deteremine which side of the unit you should make the hole for tubing and wiring. (Fig. 3-78)

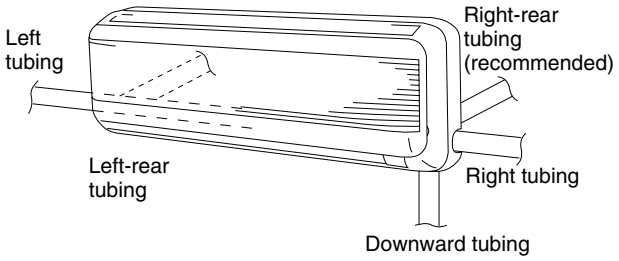


Fig. 3-77

NOTE

In the case of left-rear tubing, use the measurement points from the edge of the rear panel for precise placement of the hose outlet. (Fig. 3-78)

(3) Before making the hole, check carefully that no studs or pipes are directly run behind the spot to be cut.

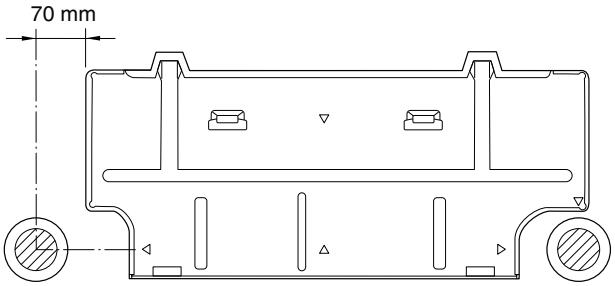


Fig. 3-78

CAUTION **Also avoid areas where electrical wiring or conduits are located.**

The above precautions are also applicable if tubing goes through the wall in any other location.

XAV

(4) Using a sabre saw, key hole saw or hole-cutting drill attachment, cut a hole in the wall. (Fig. 3-79)

Table 3-4

Hole Dia. (mm)
AWSI-XAV007-N11 / AWSI-XAV009-N11 / AWSI-XAV012-N11
65

(5) Measure the thickness of the wall from the inside edge to the outside edge and cut PVC pipe at a slight angle 6 mm shorter than the thickness of the wall. (Fig. 3-80)

(6) Place the plastic cover over the end of the pipe (for indoor side only) and insert the pipe in the wall. (Fig. 3-81)

NOTE

Hole should be made at a slight downward slant to the outdoor side.

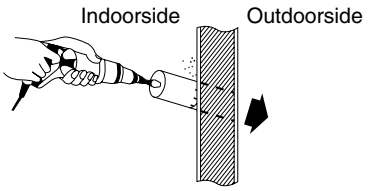


Fig. 3-79

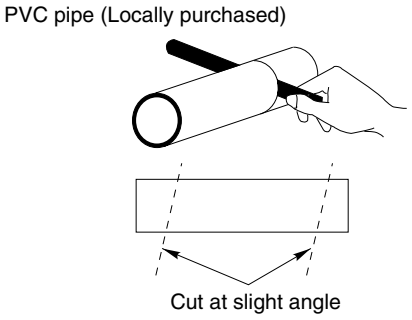


Fig. 3-80

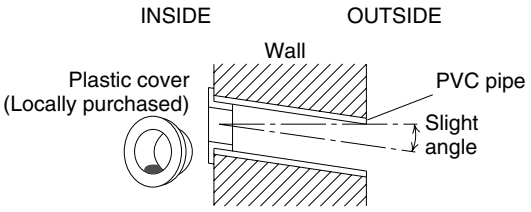


Fig. 3-81

XAV

3-28. Installing the Rear Panel on the Wall

Be sure to confirm that the wall is strong enough to suspend the unit.

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

a) If Wooden Wall

(1) Attach the rear panel to the wall with the 8 screws provided. (Fig. 3-82)

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) Double check with a carpenter's level or tape measure that the panel is level. This is important to install the unit properly. (Fig. 3-83)

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

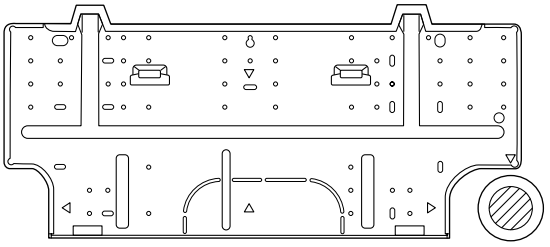


Fig. 3-82

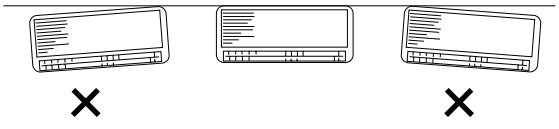


Fig. 3-83

b) If Block, Brick, Concrete or Similar Type Wall

Make 4.8 mm dia. holes in the wall. Insert rawl plugs for appropriate mounting screws. (Fig. 3-84)

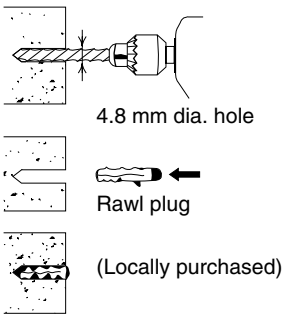


Fig. 3-84

3-29. Remove the Grille to Install the Indoor Unit

Basically, these models can be installed and wired without removing the grille. If access to any internal part is needed, follow the steps as given below.

How to remove the grille

(1) Grasp both ends of the air intake grille, and remove it by opening towards the front and pulling towards you. (Fig. 3-85)

(2) Remove the 2 screws. (Fig. 3-86)

(3) Press the 3 tabs at the top of the grille and the 3 tabs on the front face to separate the grille from the frame. (Fig. 3-87)

(4) Pull the grille toward you to remove it.

How to replace the grille

(1) When installing the grille, place the bottom of the grille into the frame first. (Fig. 3-88)

Then insert the tabs on the top of the grille and on the front face into the frame.

(2) Make sure that the grille and frame are firmly fitted together by engaging the tabs.

(3) Affix the grille with the 2 previously removed screws. (Fig. 3-86)

(4) Install the air intake grille.

a) Allow the edge of the air intake grille to slide into the top of the indoor unit, and then insert it all the way inside. (Fig. 3-89)

b) Press the bottom right and left corners and center of the air intake grille to attach it to the indoor unit. (Fig. 3-90)

NOTE

Attach so that the round pins at the top right and left corners of the air intake grille are inserted into the grooves at the top right and left of the indoor unit.

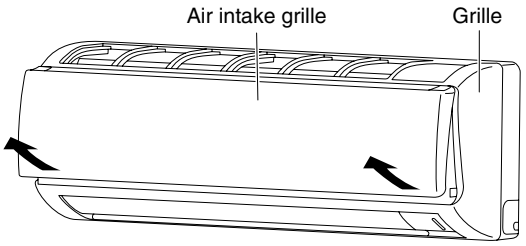


Fig. 3-85

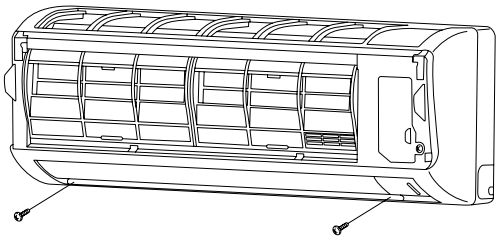


Fig. 3-86

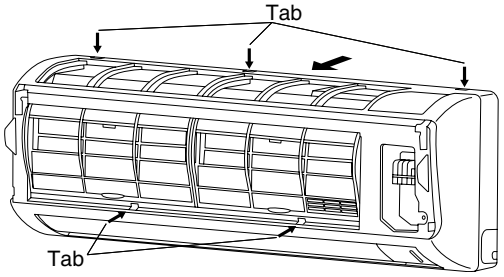


Fig. 3-87

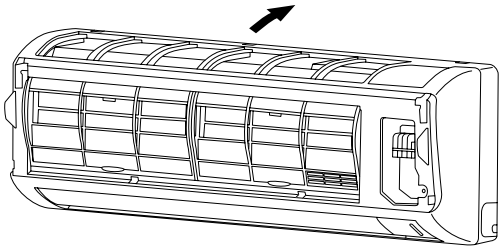


Fig. 3-88

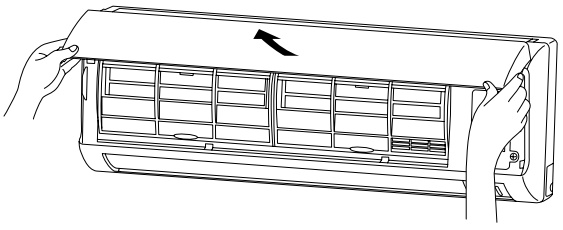


Fig. 3-89

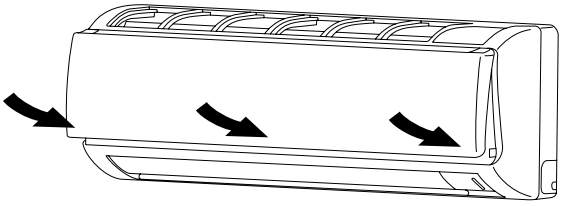


Fig. 3-90

XAV

3-30. Shape the Indoor Side Tubing

(1) Arrangement of tubing by directions

a) Right or left tubing

Cut out the corner of the right/left frame with a hacksaw or the like. (Figs. 3-91 and 3-92)

b) Right-rear or left-rear tubing

In this case, the corner of the frame need not be cut.

(2) To mount the indoor unit on the rear panel:

Hang the 2 mounting slots of the unit on the upper tabs of the rear panel. (Fig. 3-93)

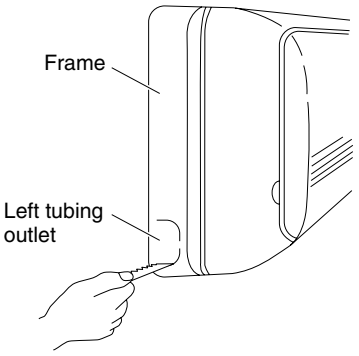


Fig. 3-91

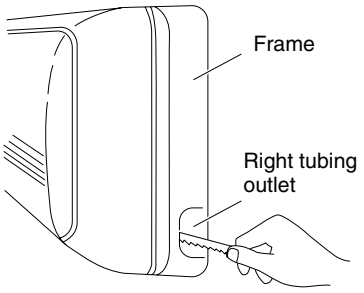


Fig. 3-92

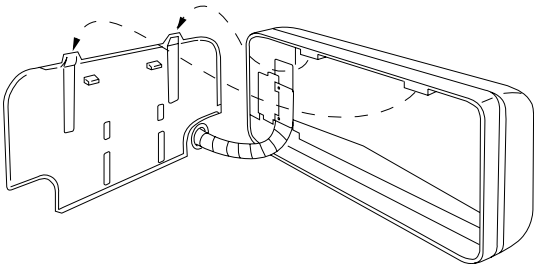


Fig. 3-93

3-31. Wiring Instructions

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, with a power supply disconnect and circuit breaker for overcurrent protection provided in the exclusive line.

(3) To prevent possible hazard due to insulation failure, the unit must be grounded.

(4) Each wiring connection must be done tightly and 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.

XAV

3-32. Wiring Instructions for Inter-unit Connections

(1) Grasp both ends of the air intake grille, and remove it by opening toward the front and pulling it toward you.

(2) Remove the screw on the right side cover plate and open the cover. (Fig. 3-94)

(3) Insert the inter-unit wiring into the through-the-wall PVC pipe. Lead the power wiring into the room allowing approx. 25 cm to extend from the wall face. (Fig. 3-95)

(4) Route the inter-unit wiring from the back of the indoor unit and pull it toward the front for connection. (Fig. 3-96)

(5) Connect the inter unit wiring to the corresponding terminals on the terminal plate (Fig. 3-96) while referring to the wiring diagram.

(6) Be sure to secure the wiring with the provided clamp.

NOTE

When closing the air intake grille, press the bottom right and left corners and center. (Fig. 3-97)

Please refer to “How to replace the grille” for installing the air intake grille.

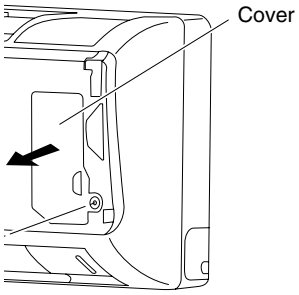


Fig. 3-94

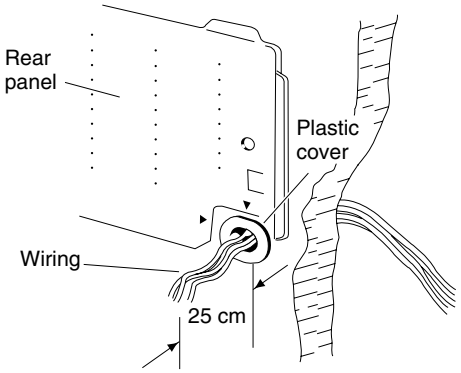


Fig. 3-95

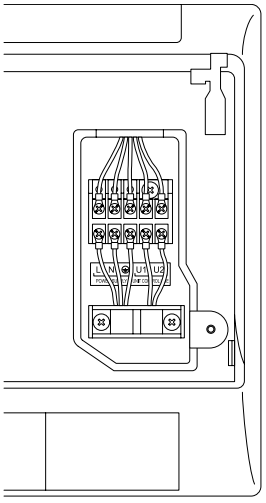


Fig. 3-96

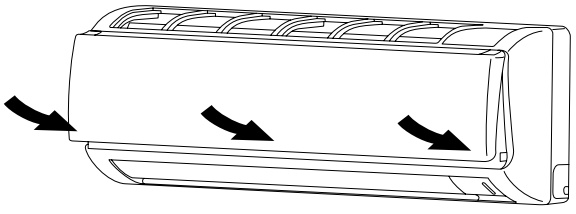


Fig. 3-97

XAV

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

When connecting each power wire to the corresponding terminal, follow the instructions “How to connect wiring to the terminal” and fasten the wire securely tight with the fixing screw of the terminal plate.

How to connect wiring to the terminal

a) For Indoor Unit

(1) Cut the wire end with a cutting pliers, then strip the insulation to expose the wire about 7 mm. See the label (Fig. 3-98) near the terminal plate.

(2) Using a screwdriver, loosen the terminal screw on the terminal plate.

(3) Insert the wire and tighten the terminal screw completely using a screwdriver.

b) For Outdoor Unit

XAV

- **For solid core wiring (or F-cable)**

(1) Cut the wire end with a cutting pliers, then strip the insulation to expose the solid wire about 25 mm. (Fig. 3-99)

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

(3) Using the pliers, bend the solid wire to form a loop suitable for the terminal screw.

(4) Shape the loop wire properly, place it on the terminal plate and fix it securely with the removed terminal screw using a screwdriver.

- **For stranded wiring**

(1) Cut the wire end with a cutting pliers, then strip the insulation to expose the stranded wiring about 10 mm and tightly twist the wire ends. (Figs. 3-100 and 3-101)

(2) Using a 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 connector. (Fig. 3-100)

(4) Place the ring connector wire, and replace and tighten the removed terminal screw using a screwdriver. (Fig. 3-102)

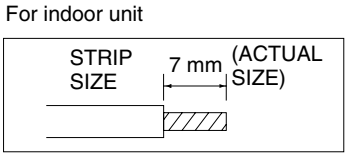


Fig. 3-98

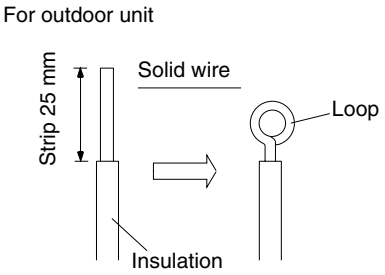


Fig. 3-99

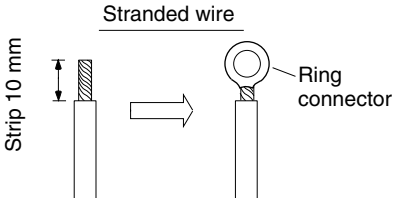


Fig. 3-100

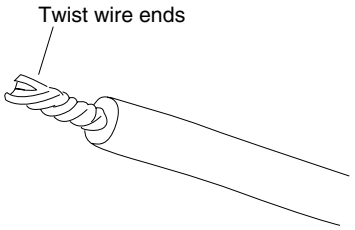


Fig. 3-101

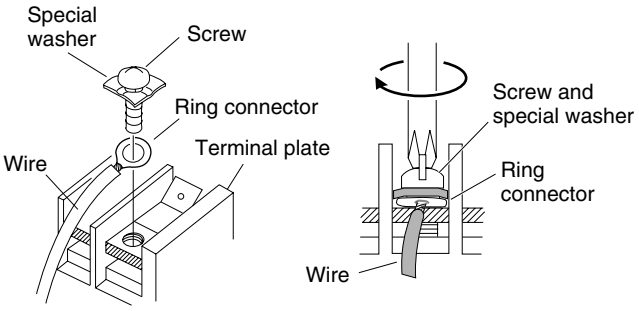


Fig. 3-102

3-33. Mounting

(1) To install the indoor unit, mount the indoor unit onto the 2 tabs on the upper part of the rear plate.

(2) Hold down the air discharge outlet and press the lower part of the indoor unit until it clicks to securely fasten to the 2 tabs on the lower part of the rear plate. (Fig. 3-103)

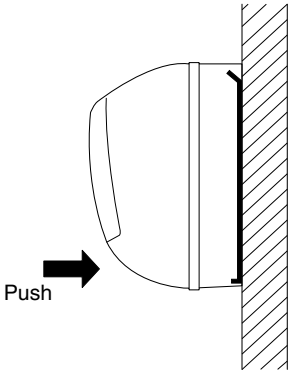


Fig. 3-103

NOTE

For tubing, choose either the right or left tubing direction and follow the steps below. This work can be made easier by placing padding material (such as styrofoam) at the rear right side of the indoor unit. (Fig. 3-104)

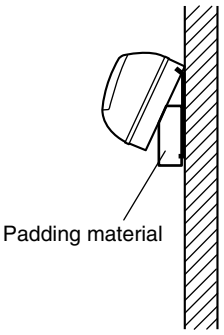


Fig. 3-104

- **Right-side tubing**

(1) Shape the refrigerant tubing so that it can easily go into the wall hole. (Fig. 3-105)

(2) 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. (Fig. 3-106)

(3) Carefully bend the tubing (if necessary) to run along the wall in the direction of the outdoor unit and then tape as far as the fittings. The drain hose should come straight down the wall to a point where water run off won't stain the wall.

(4) Connect the refrigerant tubing to the outdoor unit. (After performing a leak test on the connecting part, insulate it with the tubing insulation. (Fig. 3-107))

(5) Assemble the refrigerant tubing, drain hose, and inter-unit wiring as shown in Fig. 3-107.

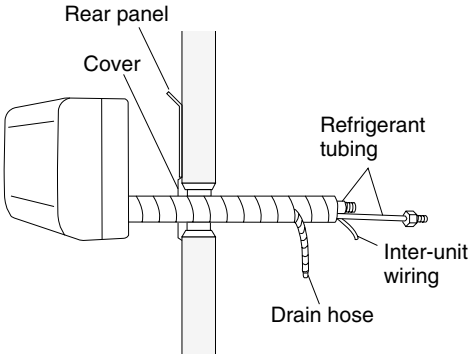


Fig. 3-105

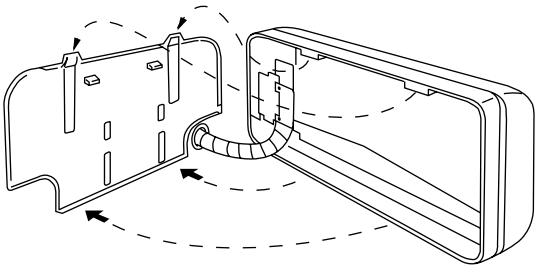


Fig. 3-106

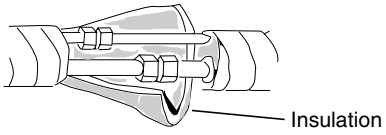


Fig. 3-107

XAV

● **Left-side tubing**

(1) Lead the tubing and drain hose through the wall, allowing sufficient length for connection. Then bend the tubing using a tube bender to make the attachment. (Fig. 3-108)

(2) Switch the drain hose and drain cap.

Switching drain hose and drain cap

a) Locate the drain hose and the drain cap. (Fig. 3-109)

b) Remove the screws fastening the drain hose on the right side, and pull out the drain hose to remove it. (Fig. 3-109)

c) Apply moderate force to pull off the drain cap on the left side. (If you cannot pull it off by hand, use a long-nose pliers.)

d) Reattach the drain hose to the left side and the drain cap to the right side. (Fig. 3-110)

Drain hose

Slide the drain hose fully onto the drain pan outlet until the drain hose edge is pushed into the insulation. Check that the screw holes in the drain bracket and the drain pan outlet are aligned and securely in contact, then fasten them with the screw. (After attaching the drain hose, check that it is attached securely.) (Fig. 3-111)

Drain cap

Use a Phillips screwdriver to push the drain cap in firmly. (If it is difficult to push in, wet the cap with water first.)

(3) Install the indoor unit on the rear panel.

(4) Connect the tubing and wiring led inside from outdoors.

(5) After completing a leak test, bundle the tubing together with armoring tape and store it inside the tubing storage area at the back of the indoor unit and hold it with clamps. (Fig. 3-112)

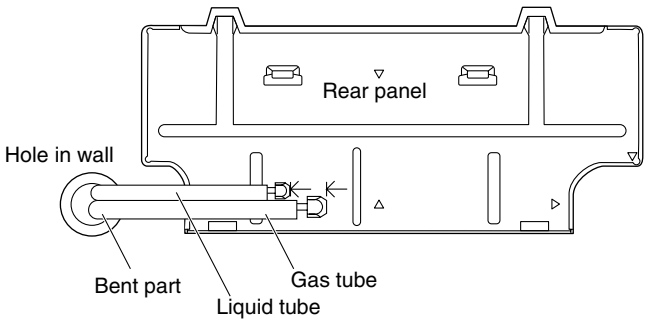


Fig. 3-108

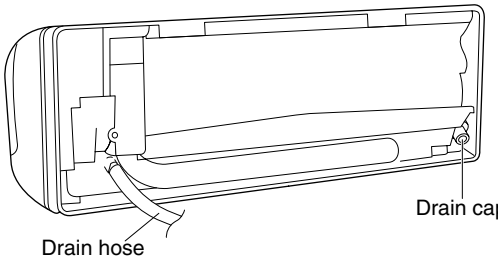


Fig. 3-109

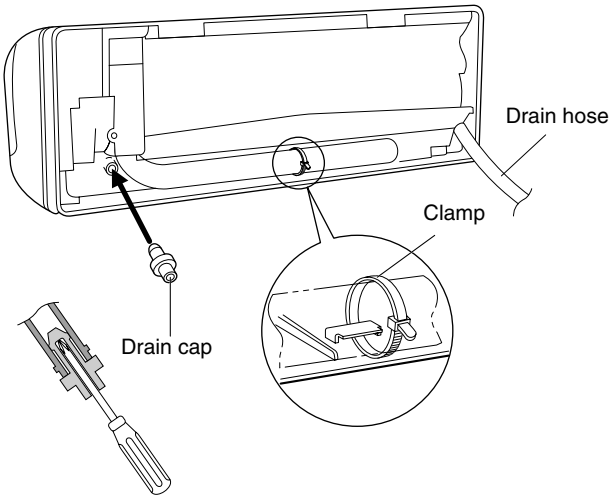


Fig. 3-110

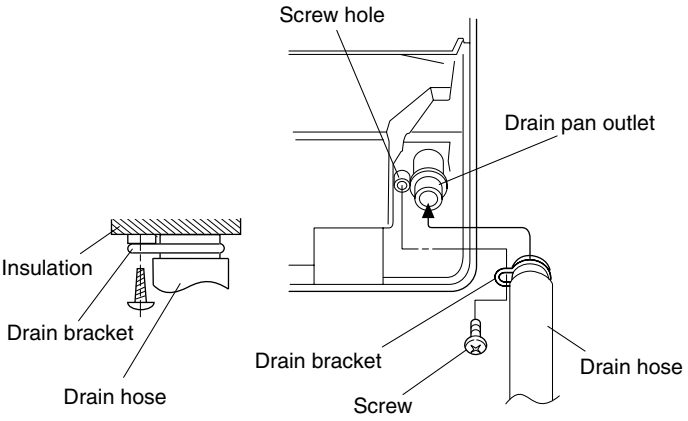


Fig. 3-111

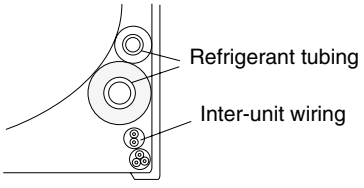


Fig. 3-112

To unmount indoor unit

Press the 2 △ marks on the lower part of the indoor unit and unlatch the tabs. Then lift the indoor unit and unmount. (Fig. 3-113)

3-34. Drain Hose

a) The drain hose should be slanted downward to the outdoors. (Fig. 3-114)

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

c) If the drain hose will run in the room, insulate the hose with insulation* so that chilled condensation will not damage furniture or floors. (Fig. 3-115)

*Foamed polyethylene or its equivalent is recommended.

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

Risk of Electric Shock

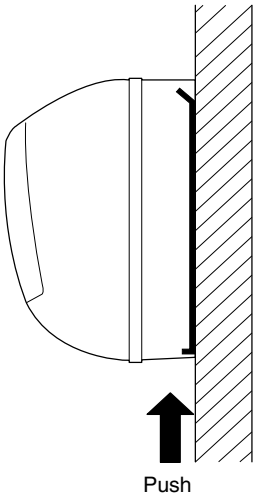


Fig. 3-113

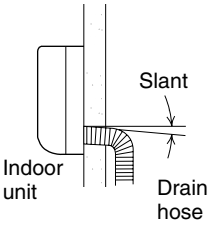


Fig. 3-114

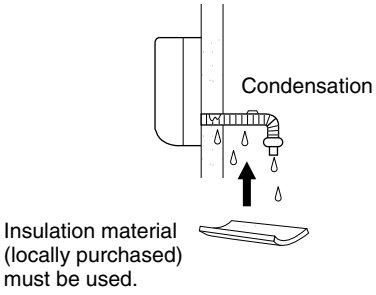


Fig. 3-115

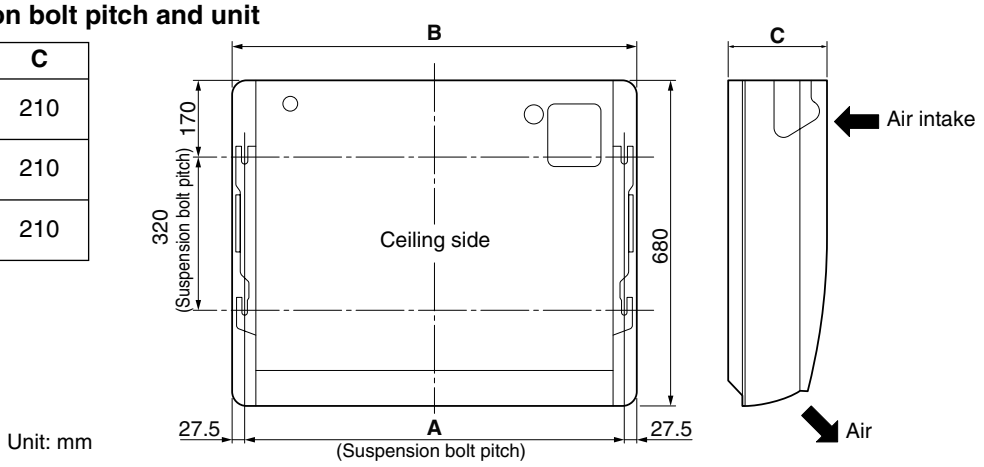
XAV

■ Ceiling Mounted Type (NPFL Type)

3-35. Required Minimum Space for Installation and Service

(1) Dimensions of suspension bolt pitch and unit

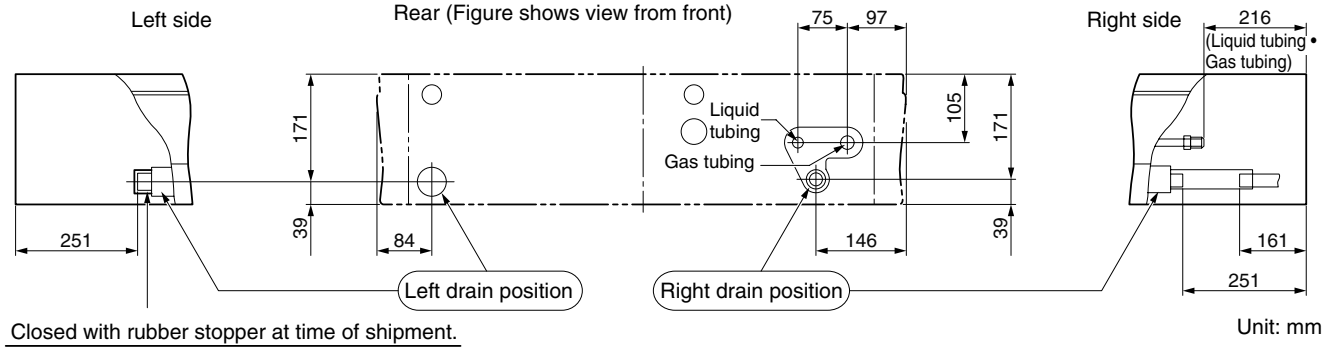
Type \ Length	A	B	C
12, 16, 18,	855	910	210
24	1125	1180	210
36, 48	1540	1595	210



Unit: mm

Fig. 3-116

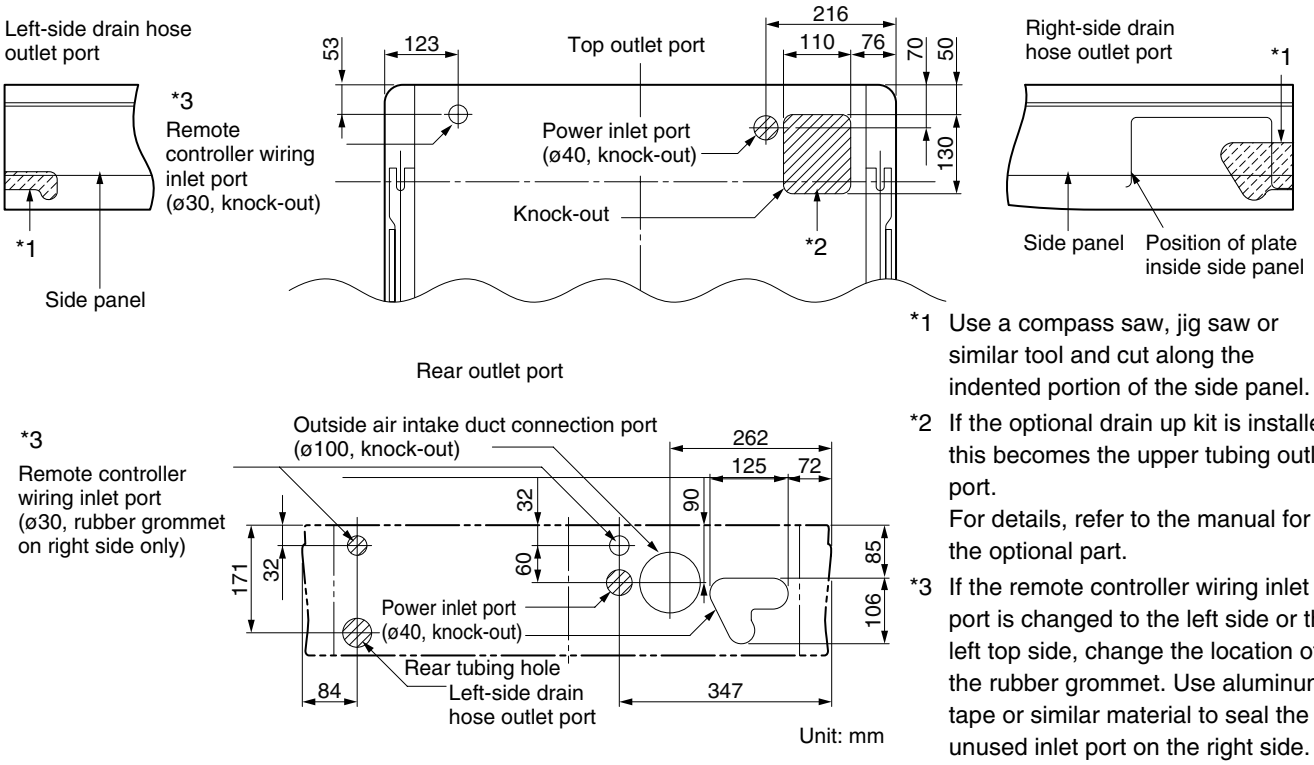
(2) Refrigerant tubing • drain hose position



Unit: mm

Fig. 3-117

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



Unit: mm

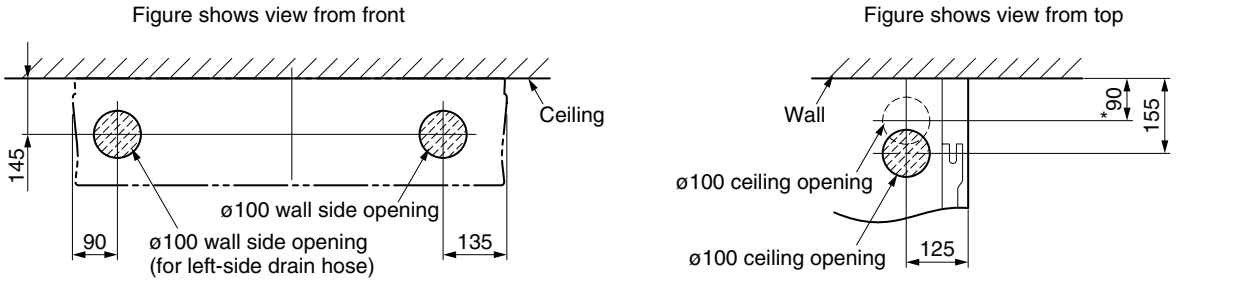
*1 Use a compass saw, jig saw or similar tool and cut along the indented portion of the side panel.

*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. 3-118

(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. 3-119

3-36. 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. 3-120).

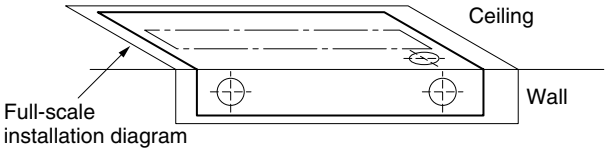


Fig. 3-120

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. 3-121.

or

b) Use existing ceiling supports or construct a suitable support as shown in Fig. 3-122.

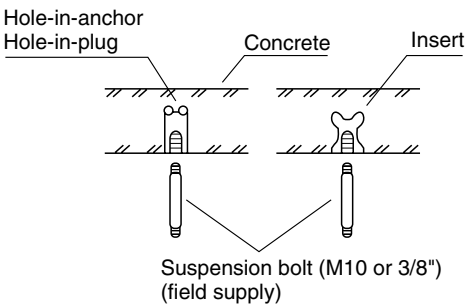


Fig. 3-121

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.

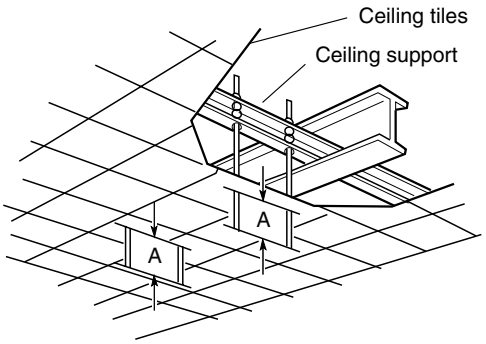


Fig. 3-122

(4) Screw in the suspension bolts, allowing them to protrude from the ceiling as shown in Figs. 3-121 and 3-122. The distance of each exposed bolt must be of equal length within 50 mm. (Fig. 3-123)

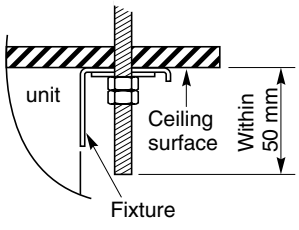


Fig. 3-123

NPFL

(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. 3-124a. Then remove both side panels sliding them along the unit toward the front after removing the 2 attachment screws. (Fig. 3-124b)

(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. 3-125a and 3-125b)

(7) Suspend the indoor unit as follows:

a) Mount 1 washer and 2 hexagonal nuts on each suspension bolt as shown in Fig. 3-125c.

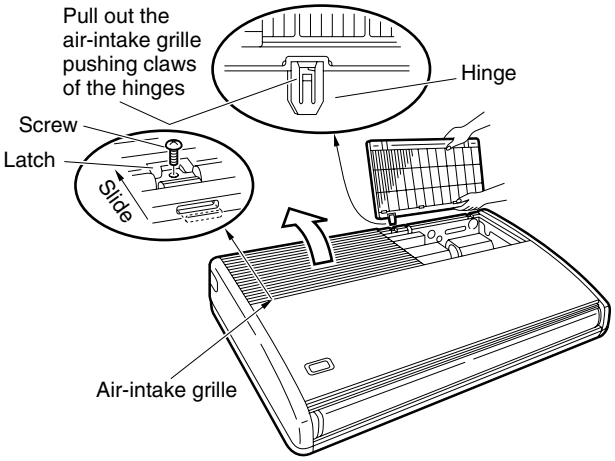


Fig. 3-124a

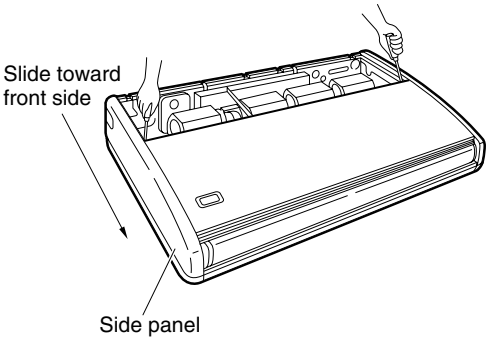


Fig. 3-124b

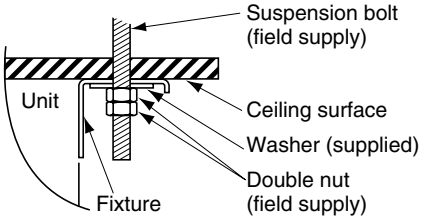


Fig. 3-125a

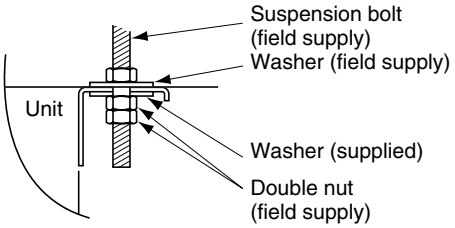


Fig. 3-125b

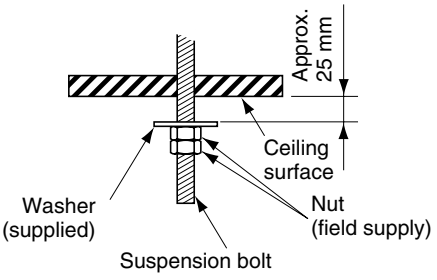


Fig. 3-125c

NPFL

b) Lift the indoor unit, and place it on the washers through the notches, in order to fix it in place. (Fig. 3-126)

c) Tighten the 2 hexagonal nuts on each suspension bolt to suspend the indoor unit as shown in Fig. 3-127.

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. 3-128)

(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. 3-129)

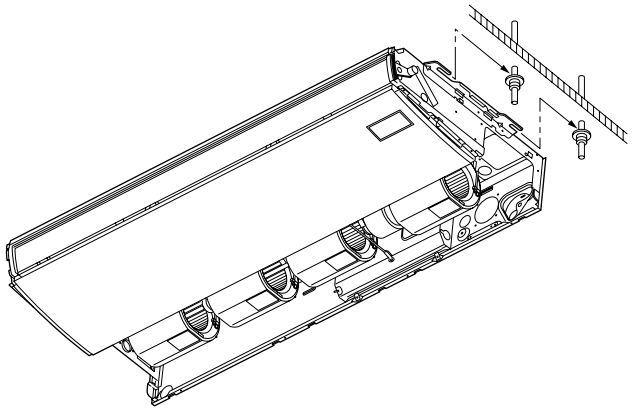


Fig. 3-126

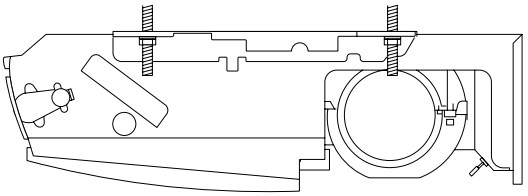


Fig. 3-127

NOTE

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

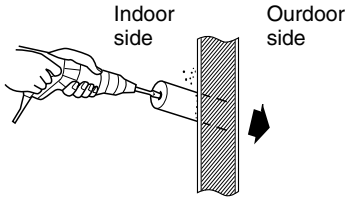


Fig. 3-128

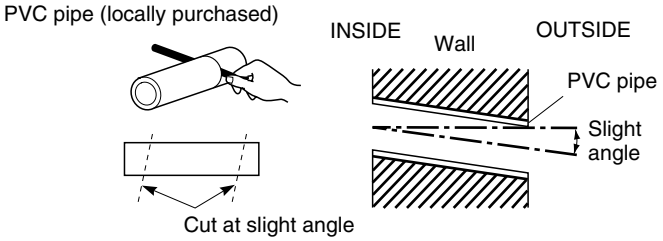


Fig. 3-129

NPFL

3-37. 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. 3-130a)

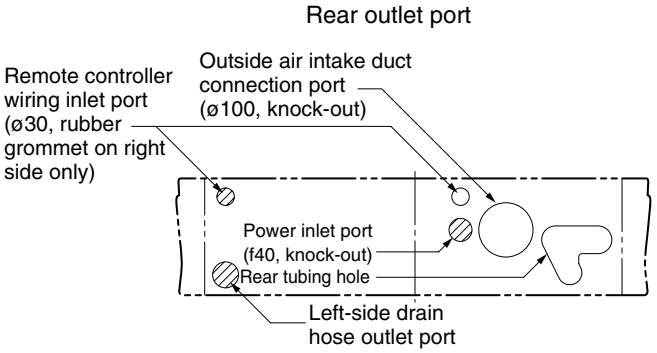


Fig. 3-130a

3-38. 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. 3-118.

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

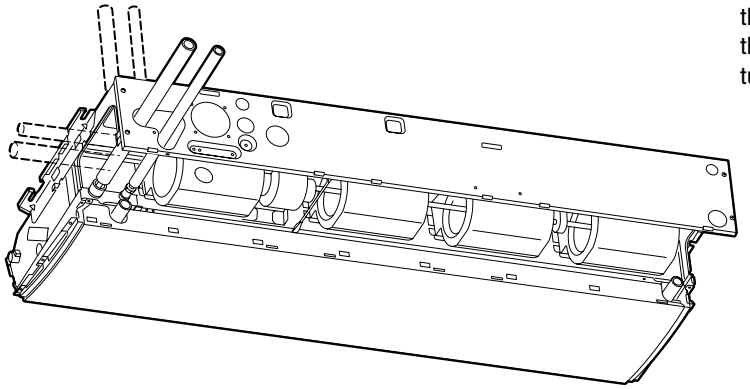


Fig. 3-130b

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.

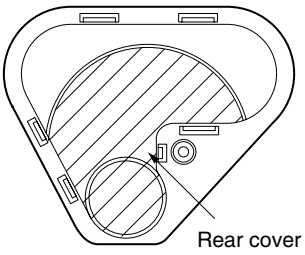


Fig. 3-130c

3-39. 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. 3-132)**
- **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. 3-131)
- 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.)*

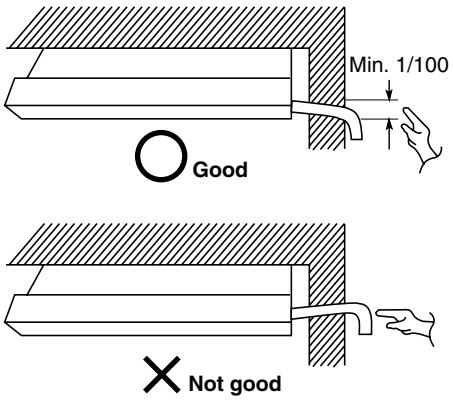
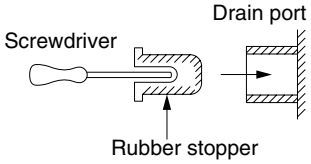
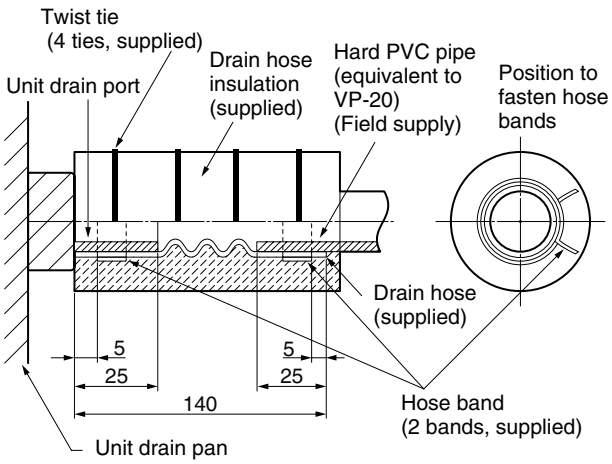


Fig. 3-131

* If the drain hose is routed through the left side, refer to Fig. 3-130b, 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. 3-132

NPFL

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. 3-130a. For the method used to insert the wiring, refer to the figure below. (Fig. 3-133)

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.

NPFL

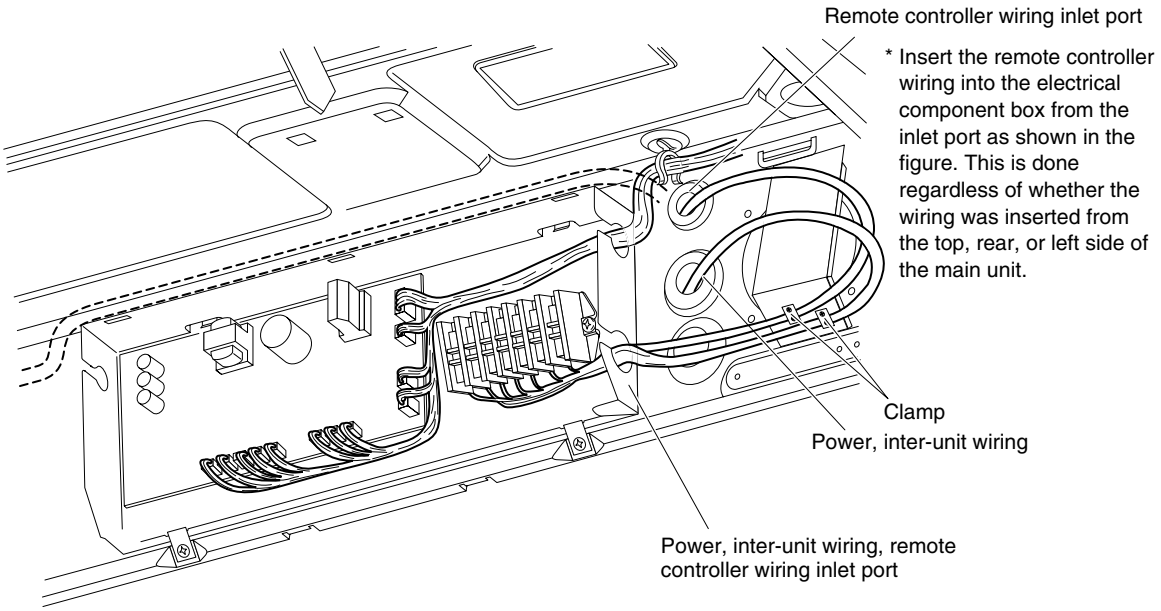
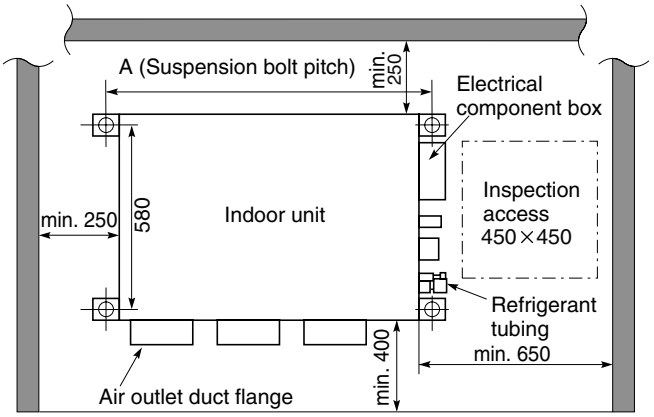


Fig. 3-133

■ Concealed-Duct Type (NDLP Type)

3-40. 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. 3-134 and Table 3-5.
- It is recommended that space is provided (450 × 450 mm) for checking and servicing the electrical system.
- Fig. 3-135 and Table 3-6 show the detailed dimensions of the indoor unit.



Unit: mm

Fig. 3-134

Table 3-5

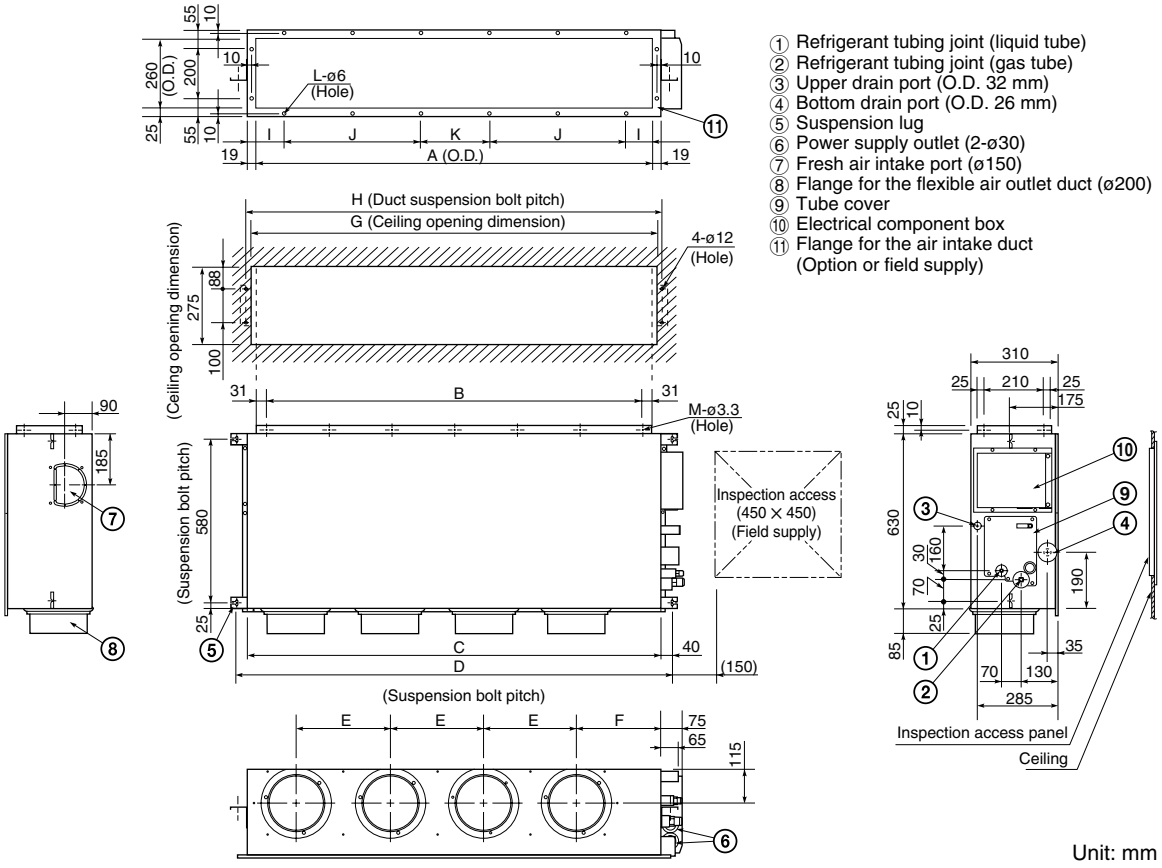
Unit: mm

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	M
7, 9, 12, 16, 18	662	600 (200X3)	700	780	290	262	680	715	180	–	340	8	12
24	962	900 (180X5)	1,000	1,080	290	272	980	1,015	130	245 (245X1)	250	12	16
36, 48	1,442	1,380 (230X6)	1,480	1,560	335	310	1,460	1,495	130	490 (245X2)	240	16	18



Unit: mm

Fig. 3-135

3-41. Suspending the Indoor Unit

Depending on the ceiling type:

- Insert suspension bolts as shown in Fig. 3-136

  or

- Use existing ceiling supports or construct a suitable support as shown in Fig. 3-137.

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. 3-134 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. 3-136. (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. 3-138 and 3-139. 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.

NDLP

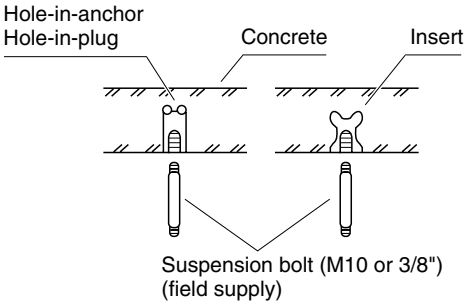


Fig. 3-136

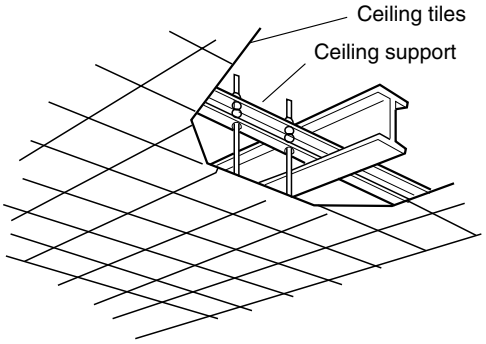


Fig. 3-137

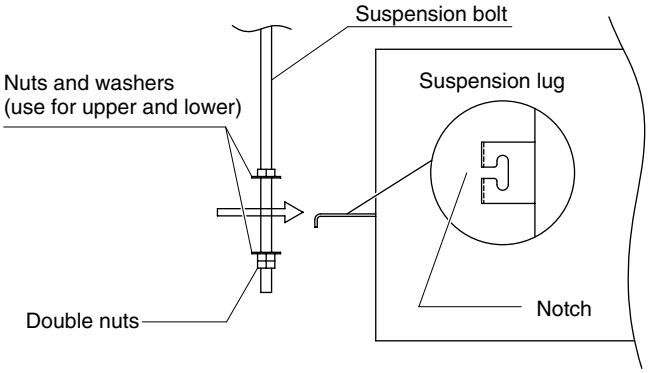


Fig. 3-138

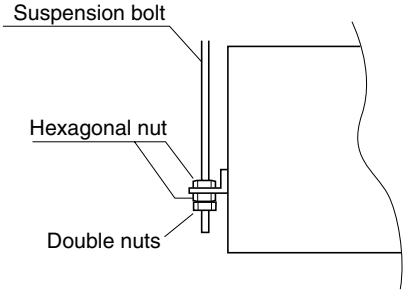


Fig. 3-139

● Fig. 3-140 shows an example of installation.

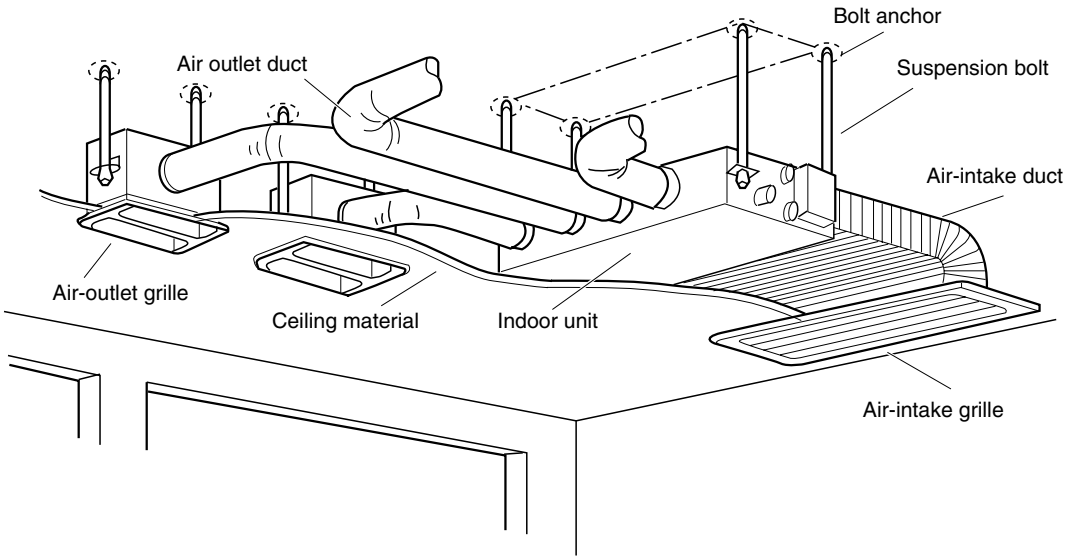


Fig. 3-140

3-42. 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. 3-141a)

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. 3-141a)**

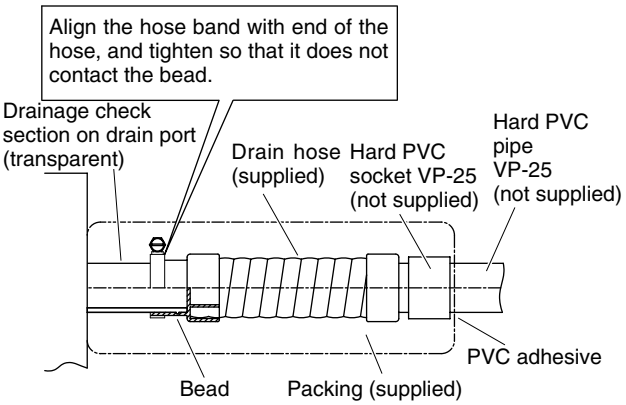


Fig. 3-141a

(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. 3-141b)

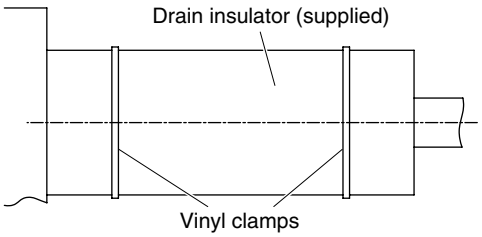


Fig. 3-141b

NOTE

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

NDLP

CAUTION

- **Do not install an air bleeder as this may cause water to spray from the drain pipe outlet. (Fig. 3-142)**

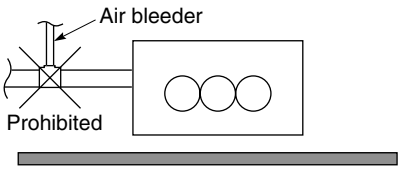


Fig. 3-142

- **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. 3-143)**
- 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. 3-144)
- 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. 3-145)

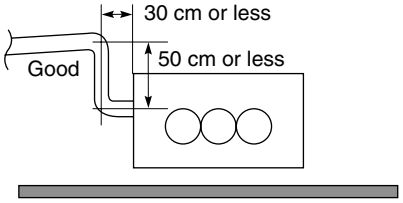


Fig. 3-143

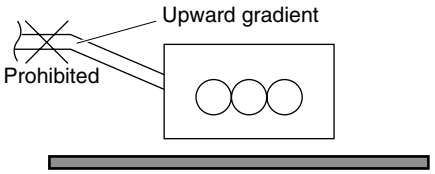


Fig. 3-144

Refer to "■ SUPPLEMENT ON DRAIN PIPING".

3-43. 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.

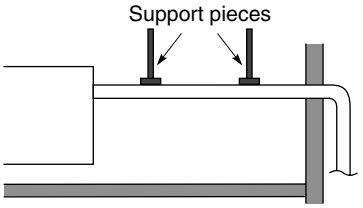


Fig. 3-145

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.

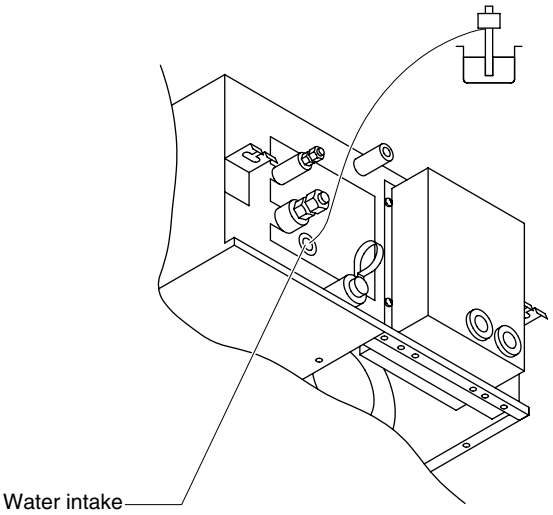


Fig. 3-146

3-44. 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. 3-147.

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

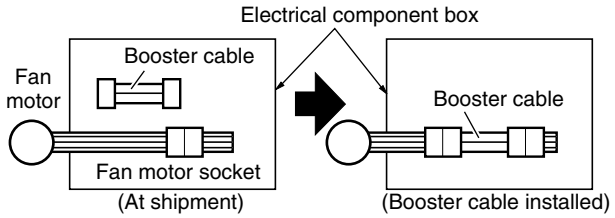
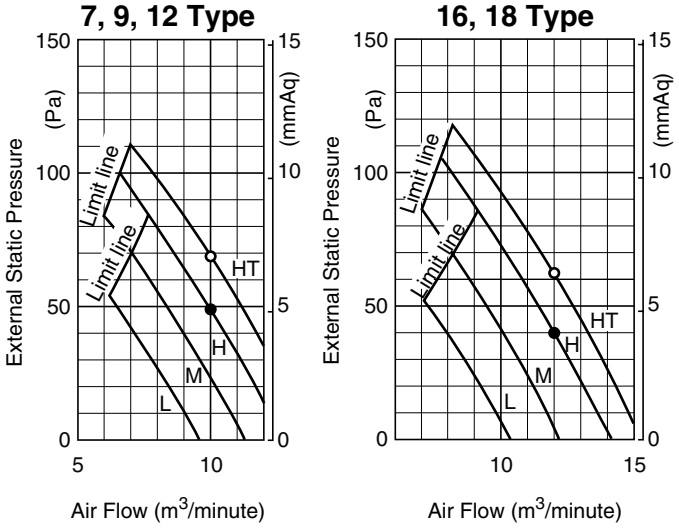
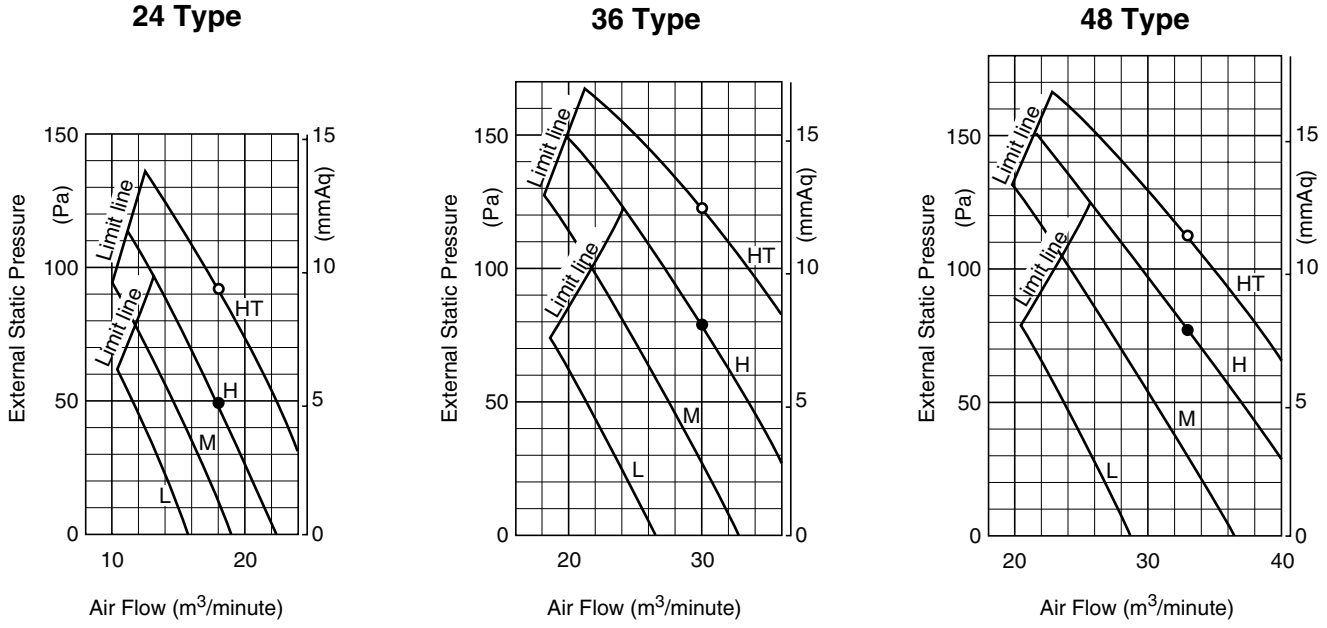


Fig. 3-147



Indoor Fan Performance



NOTE HT : Using the booster cable

H : At shipment

Fig. 3-148

■ How to read the diagram

The vertical axis is the external static pressure (Pa) while the horizontal axis represents the air flow (m^3/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 m^3/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.

NDLP

3-45. When Installing the Indoor Unit

Confirm that the indoor unit should be installed in a horizontal position. Use the level gauge or vinyl tube and check every four corner of the unit is in horizontal.

If the air outlet duct flange is positioned with downward gradient, there is in danger of water splash or drainage.

Also, dust may sometimes be contaminated inside the drain pan caused by the residual drain water.

Install the air outlet duct flange side in horizontal or upward and within the range of 10mm in the upward direction.

Never install it with a downward gradient against horizontal.

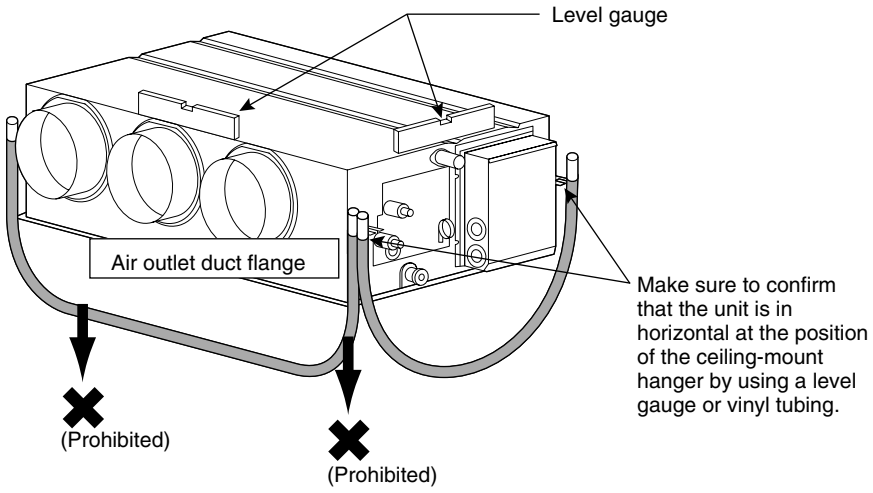


Fig. 3-149

3-46. Required Minimum Space for Installation and Service

If the ceiling tiles cannot be removed, provide the opening holes on the lower side of the indoor unit for removing the unit in order to maintain and clean the drain pan and heat exchanger or provide a minimum of 300mm or more space.

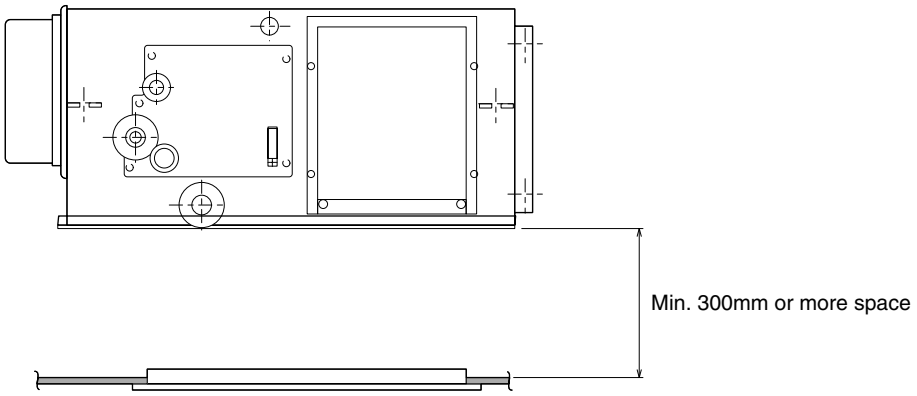


Fig. 3-150

■ Slim Concealed-Duct Type (DAV Type)

3-47. 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 the diagram.
- *H dimension means the minimum height of the unit.
- Select the *H dimension such that a downward slope of at least 1/100 is ensured as indicated in “3-52. Installing the Drain Piping”.

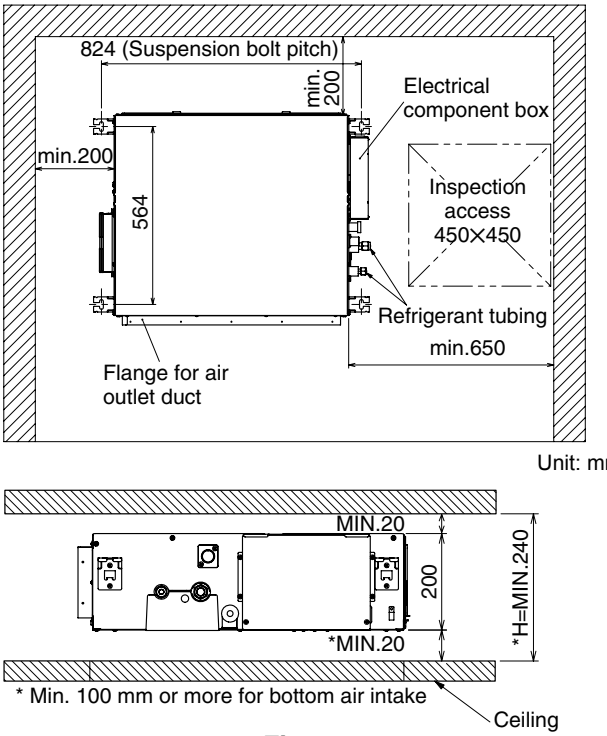
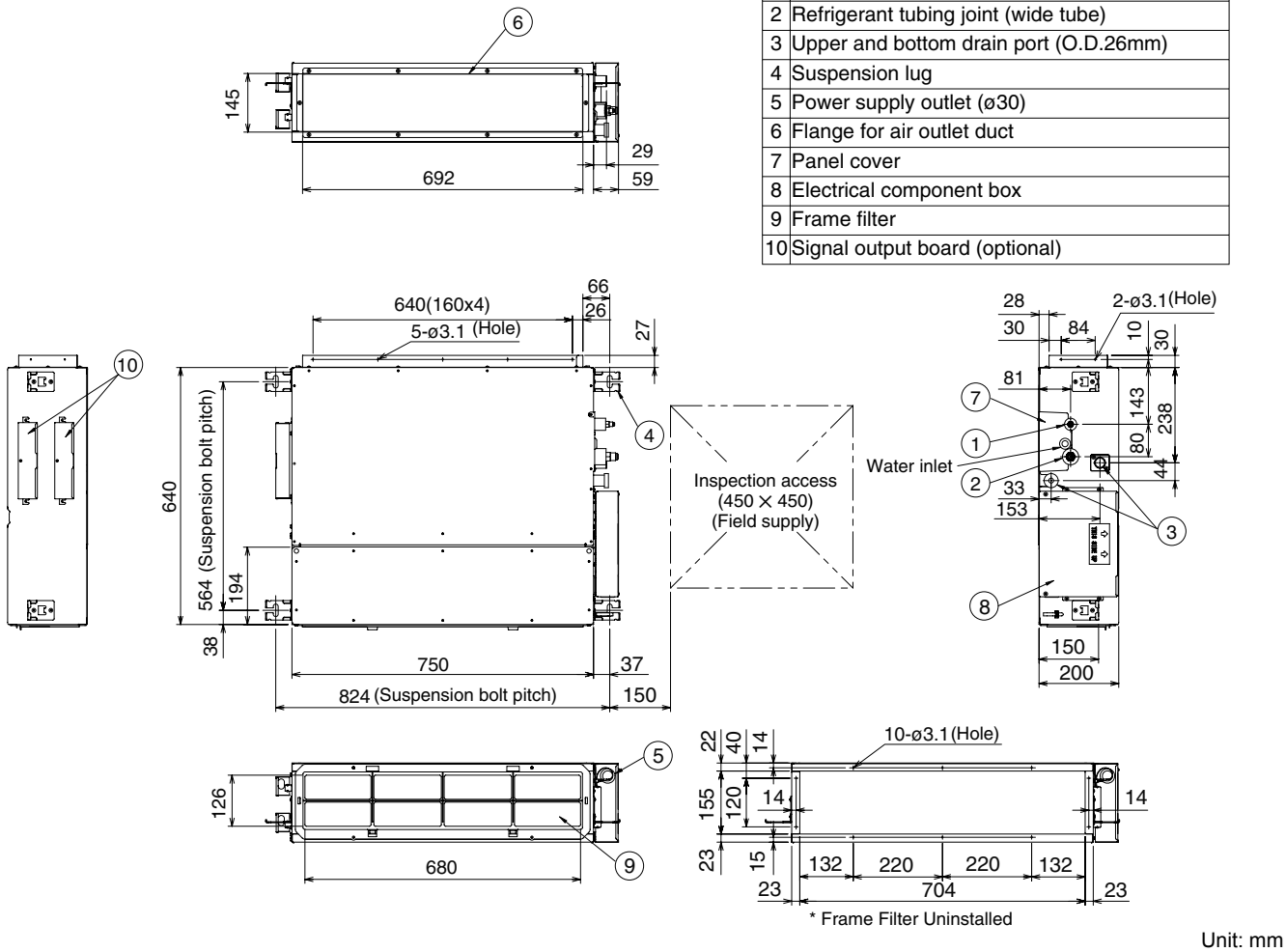


Fig. 3-151

- The diagram shows the detailed dimensions of the indoor unit.

1	Refrigerant tubing joint (narrow tube)
2	Refrigerant tubing joint (wide tube)
3	Upper and bottom drain port (O.D.26mm)
4	Suspension lug
5	Power supply outlet (ø30)
6	Flange for air outlet duct
7	Panel cover
8	Electrical component box
9	Frame filter
10	Signal output board (optional)



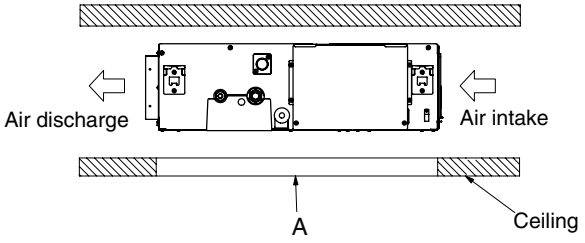
Unit: mm

Fig. 3-152

3-48. Preparations Before Installation

(1) Confirm the positional relationship between the unit and suspension bolts. (Refer to the diagram.)

- Install the inspection opening on the control box side where maintenance and inspection of the control box are easy. The drain pump can only be inspected through the bottom of the unit.
  Install the inspection opening also in the lower part of the unit.



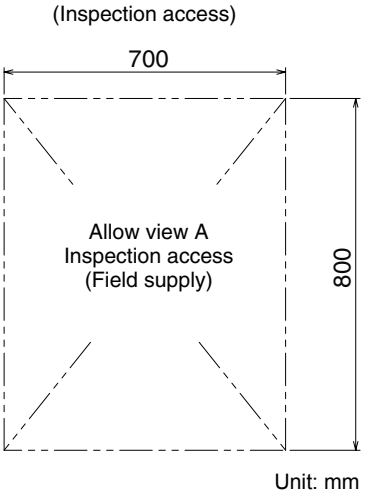


Fig. 3-153

(2) Make sure the range of the unit's external static pressure is not exceeded.
(See the technical documentation for the range of the external static pressure setting.)

(3) Open the installation hole. (Pre-set ceilings)

- Once the installation hole is opened in the ceiling where the unit is to be installed, pass refrigerant piping, drain piping, transmission wiring, and remote controller wiring (It is not necessary if using a wireless remote controller) to the unit's piping and wiring holes.

  See "7. HOW TO PROCESS TUBING, 3-52. Installing the Drain Piping" and "5. ELECTRICAL WIRING".

- After opening the ceiling hole, make sure ceiling is level if needed. It might be necessary to reinforce the ceiling frame to prevent shaking. Consult an architect or carpenter for details.

3-49. For Bottom Intake

For bottom intake, replace the chamber lid and protection net in the procedure shown in the diagram.

(1) Remove the Frame Filter Assy.
Remove the chamber lid.

(2) Refer to the diagram to attach the chamber lid and Frame Filter Assy in the direction of the arrow.
Note: Attach the lid with the dummy holes downward.

(3) Attach the Frame Filter Assy (supplied) in the manner shown in the diagram.

DAV

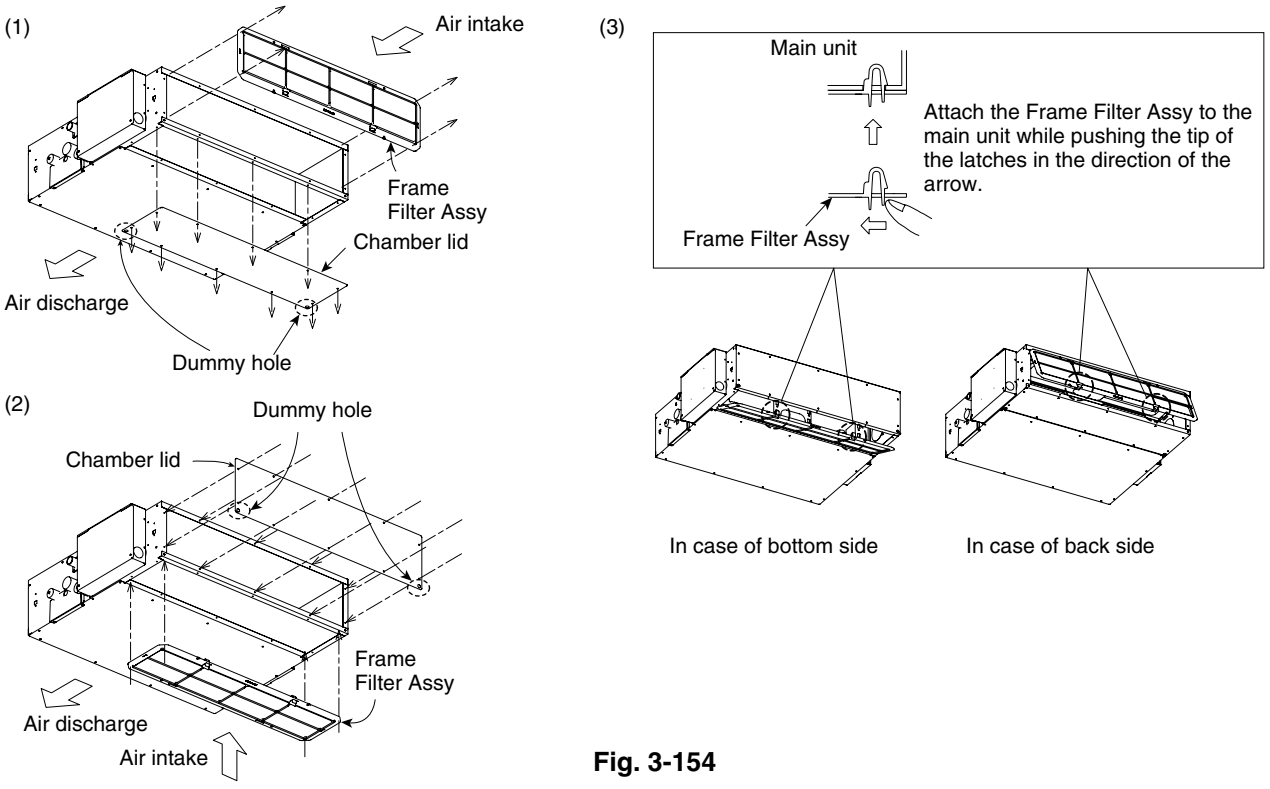


Fig. 3-154

3-50. Installing the Duct

Connect the duct supplied in the field.

Air inlet side

- Attach the duct and intake-side flange (field supply).
- Connect the flange to the main unit with 10 - ø3.1 (Hole) screws.
- Wrap the intake-side flange and duct connection area with aluminum tape or something similar to prevent air escaping.

CAUTION

When attaching a duct to the intake-side, be sure to attach an air filter inside the air passage on the intake-side. (Use an air filter whose dust collecting efficiency is at least 50% in a gravimetric technique.)
The included filter is not used when the intake duct is attached.

Air outlet side

- Connect the duct according to the air outside of the outlet-side flange.
- Wrap the outlet-side flange and the duct connection area with aluminum tape or something similar to prevent air escaping.

CAUTION

- Be sure to insulate the duct to prevent condensation from forming.
  (Material: glass wool or polyethylene foam, 25 mm thick)
- Use electric insulation between the duct and the wall when using metal ducts to pass metal laths of the net or fence shape or metal plating into wooden buildings.
- Be sure to explain about the way of maintaining and cleaning local procurements (air filter, grille [both air outlet and suction grille], etc.) to your customer.

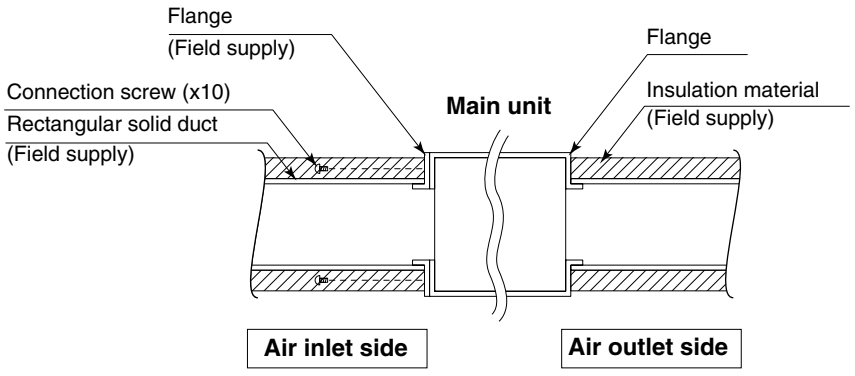


Fig. 3-155

3-51. Suspending the Indoor Unit

Depending on the ceiling type:

- Insert suspension bolts as shown in the diagram

or

- Use existing ceiling supports or construct a suitable support as shown in the diagram.

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.
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 the diagram. (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 the diagram. 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.

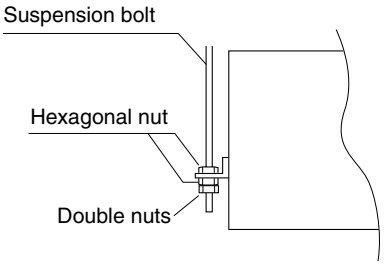


Fig. 3-158

(4) Adjust the height of the unit.

(5) Check the unit is horizontally level.

CAUTION

- Make sure the unit is installed level using a level or a plastic tube filled with water. In using a plastic tube instead of a level, adjust the top surface of the unit to the surface of the water at both ends of the plastic tube and adjust the unit horizontally.
(One thing to watch out for in particular is if the unit is installed so that the slope is not in the direction of the drain piping, this might cause leaking.)

(6) Tighten the upper nut.

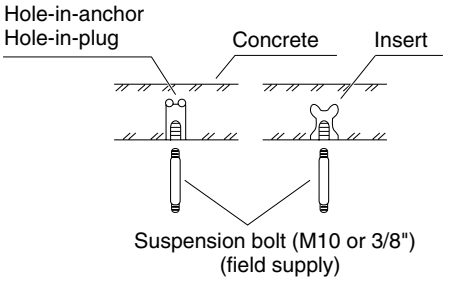


Fig. 3-156

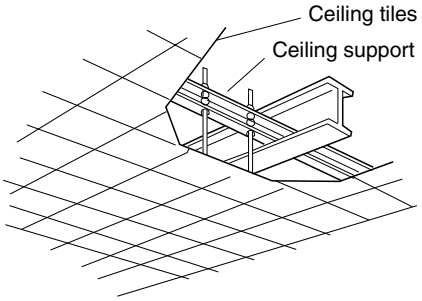


Fig. 3-157

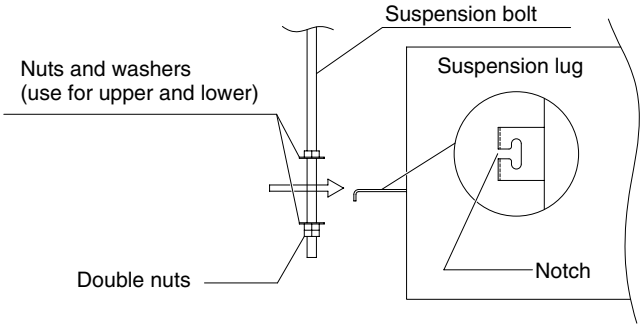


Fig. 3-159

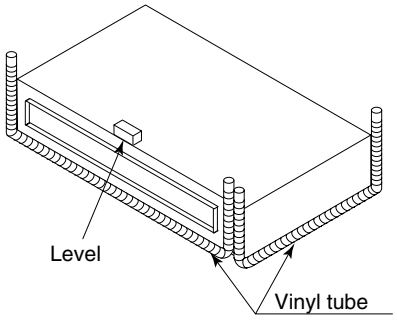


Fig. 3-160

DAV

3-52. Installing the Drain Piping

(1) Prepare standard hard PVC pipe (O.D. 26 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.

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 in the horizontal direction.**
- **Make sure that the drain port is not a downward gradient from the joint section (may lead to abnormal noise).**

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.
- **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.**
- 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.
- 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.

3-53. 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 eyelet cap and through the opening, slowly pour about 500cc 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.

Unit: mm

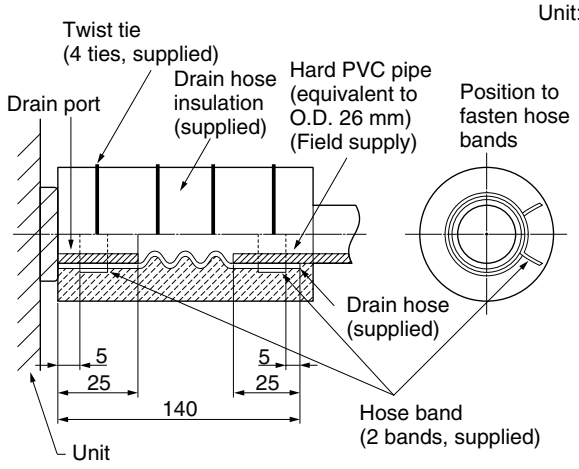


Fig. 3-161

CAUTION

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

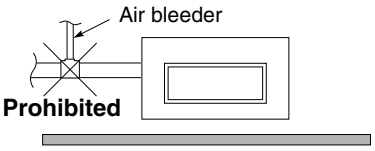


Fig. 3-162

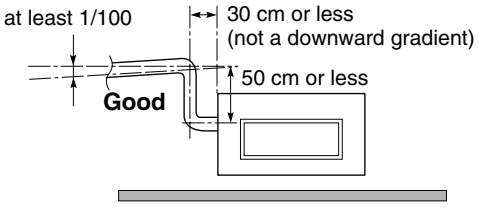


Fig. 3-163

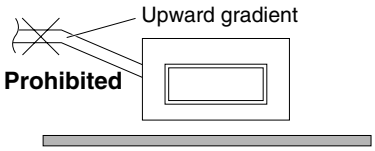


Fig. 3-164

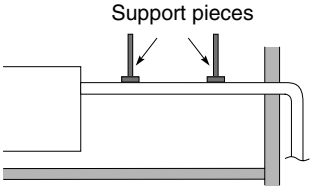


Fig. 3-165

DAV

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.

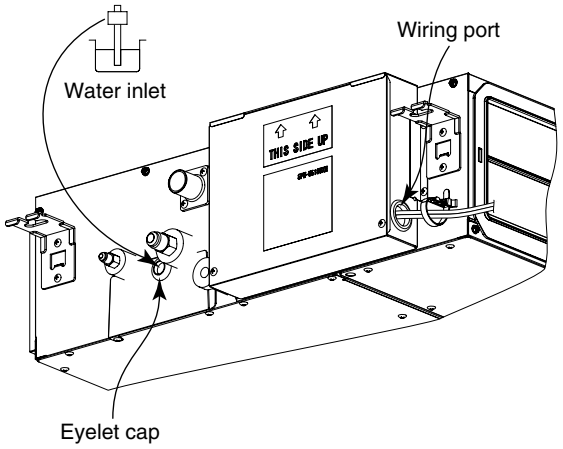
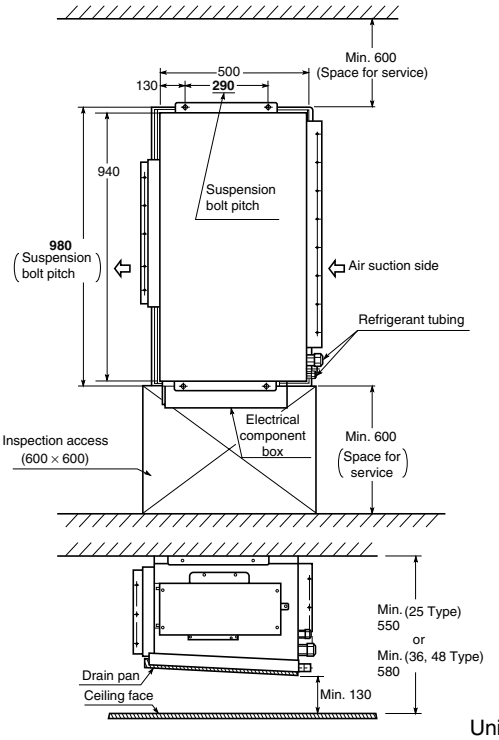


Fig. 3-166

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

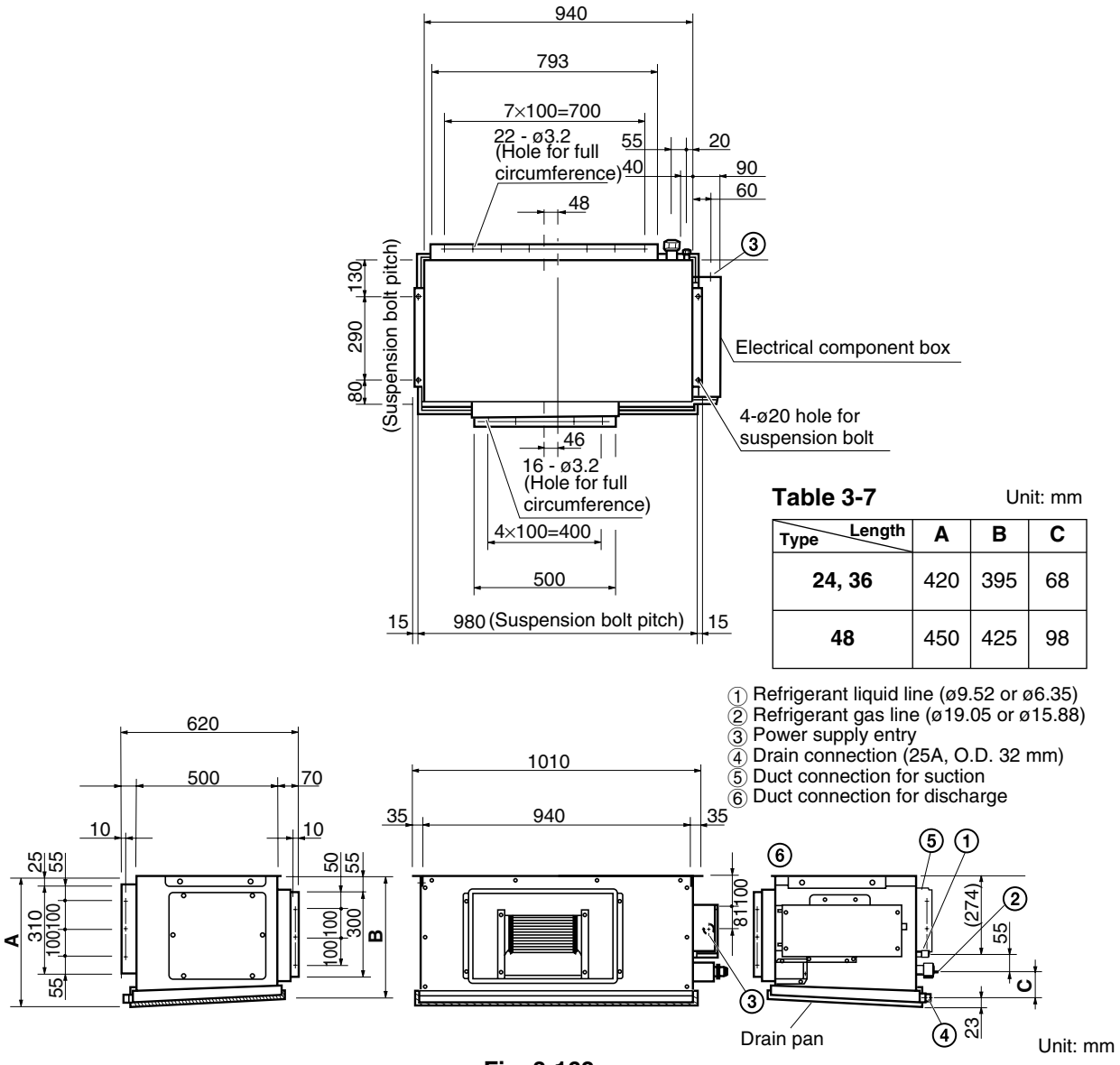
3-54. Required Minimum Space for Installation and Service (24, 36, 48 Type)

- 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. 3-167.
- It is recommended that space be provided (600 × 600 mm) for checking and servicing the electrical system.
- Fig. 3-168 and Table 3-7 show the detailed dimensions of the indoor unit.



Unit: mm

Fig. 3-167



① Refrigerant liquid line (ø9.52 or ø6.35)
② Refrigerant gas line (ø19.05 or ø15.88)
③ Power supply entry
④ Drain connection (25A, O.D. 32 mm)
⑤ Duct connection for suction
⑥ Duct connection for discharge

Table 3-7 Unit: mm

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

Unit: mm

Fig. 3-168

NDHP

3-55. Suspending the Indoor Unit

Depending on the ceiling type:

- Insert suspension bolts as shown in Fig. 3-169

  or

- Use existing ceiling supports or construct a suitable support as shown in Fig. 3-170.

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. 3-167.

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. 3-169. (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. 3-171.

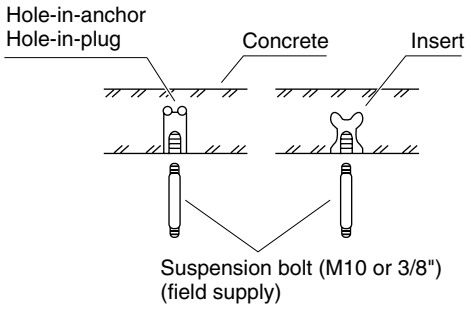


Fig. 3-169

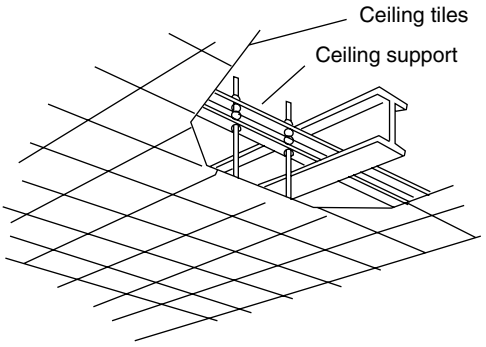


Fig. 3-170

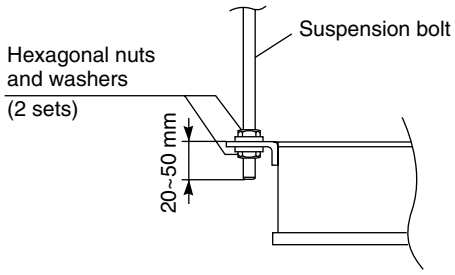


Fig. 3-171

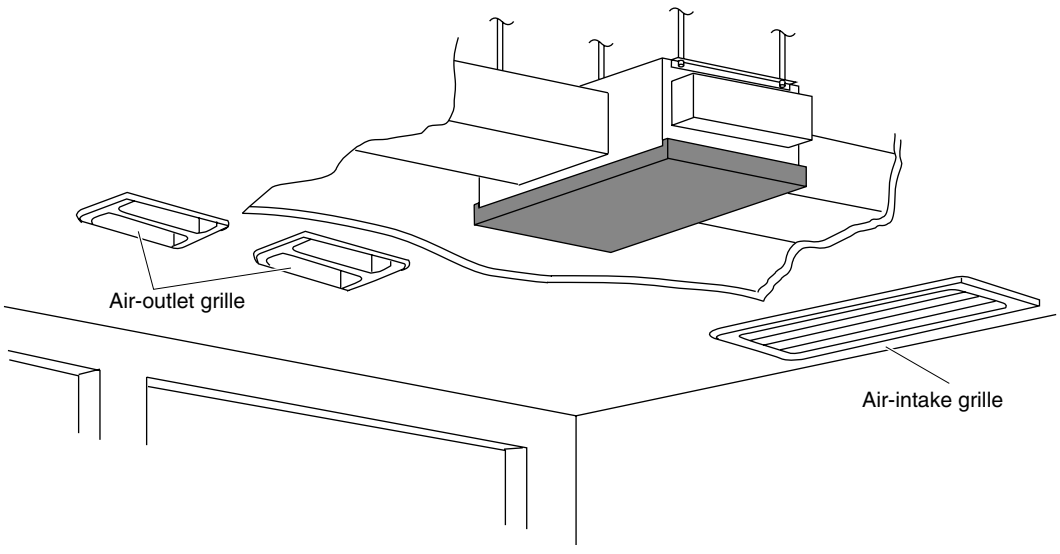


Fig. 3-172

NDHP

3-56. 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. 3-173)

(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. 3-174.

(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. 3-175)

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

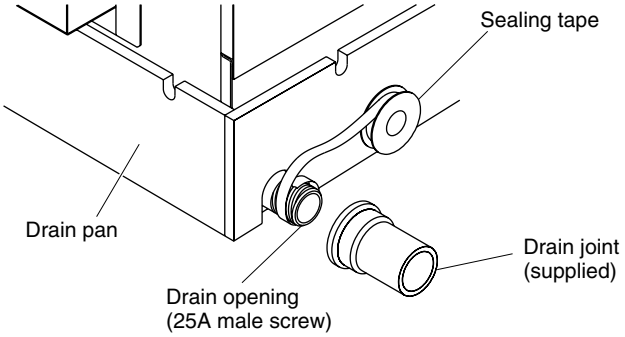


Fig. 3-173

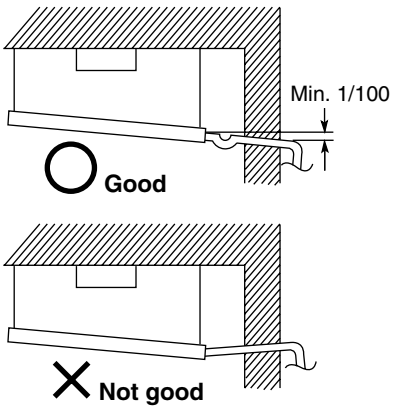


Fig. 3-174

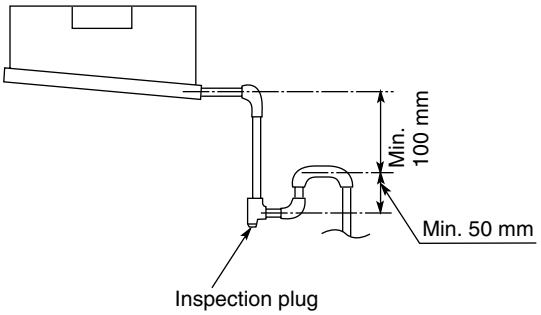


Fig. 3-175

NDHP

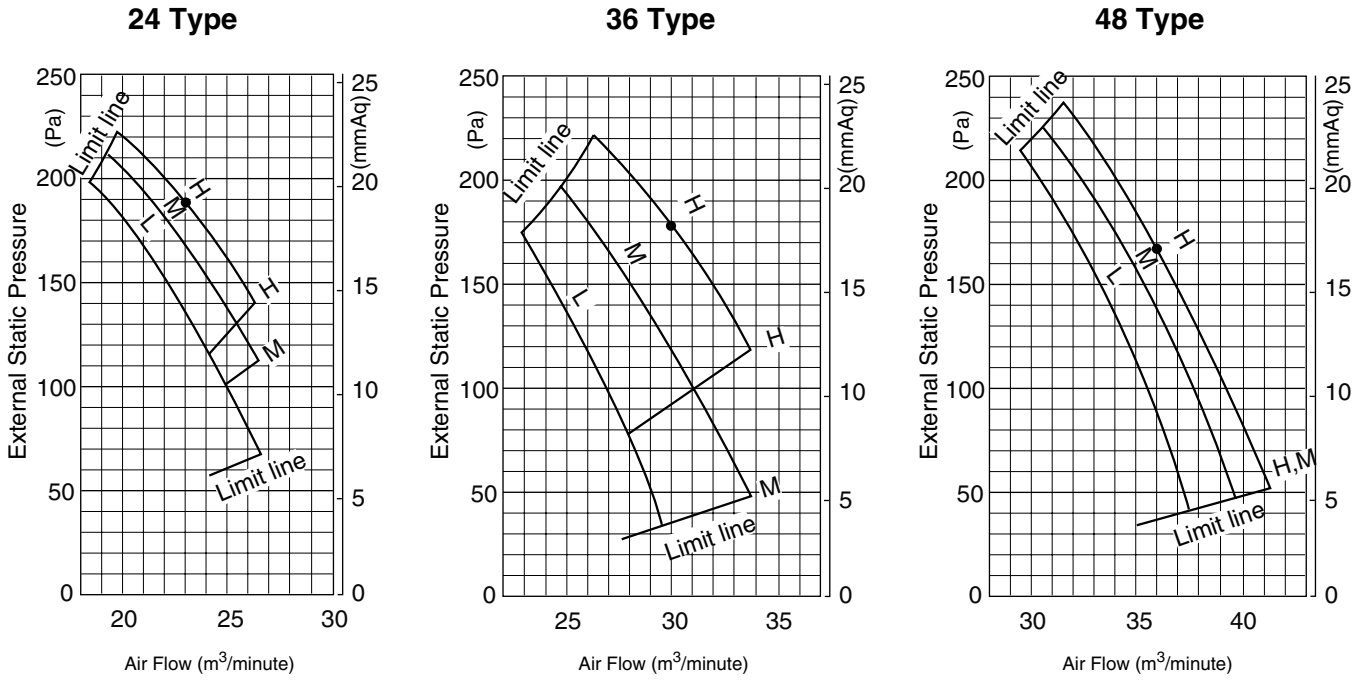
3-57. Caution for Ducting Work

- 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. 3-176

■ Floor-Standing Type (NFFL Type)
Concealed Floor-Standing Type (NFMFL Type)

3-58. Required Minimum Space for Installation and Service

Install the unit where cooled or heated air from the unit can circulate well in the room. Do not put obstacles which may obstruct the air flow in front of the air intake and outlet grilles.

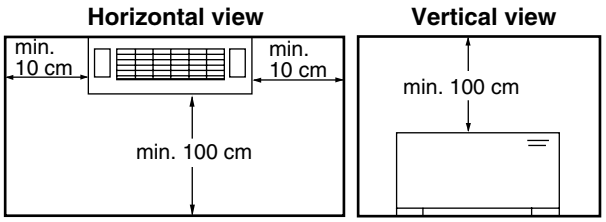


Fig. 3-177

NOTE

Ensure there is adequate space for maintenance of the electrical component box, air filter and, refrigerant tubes.

3-59. Dimensions and Part Names

① 4-ø12 holes (for fastening the indoor unit to the floor with screws)
② Air filter
③ Refrigerant connection outlet (liquid tube)
④ Refrigerant connection outlet (gas tube)
⑤ Level adjusting bolt
⑥ Drain outlet (20 A)
⑦ Power cord outlet (downward, rear)
⑧ Refrigerant tubing outlet (downward, rear)
⑨ Location for mounting the remote controller (remote controller is attachable in the room)

Table 3-8 Unit: mm

Length / Type	A	B	C	Liquid tube	Gas tube
7, 9, 12	1065	665	632	ø6.35	ø12.7
16, 18	1380	980	947		
24				ø9.52	ø15.88

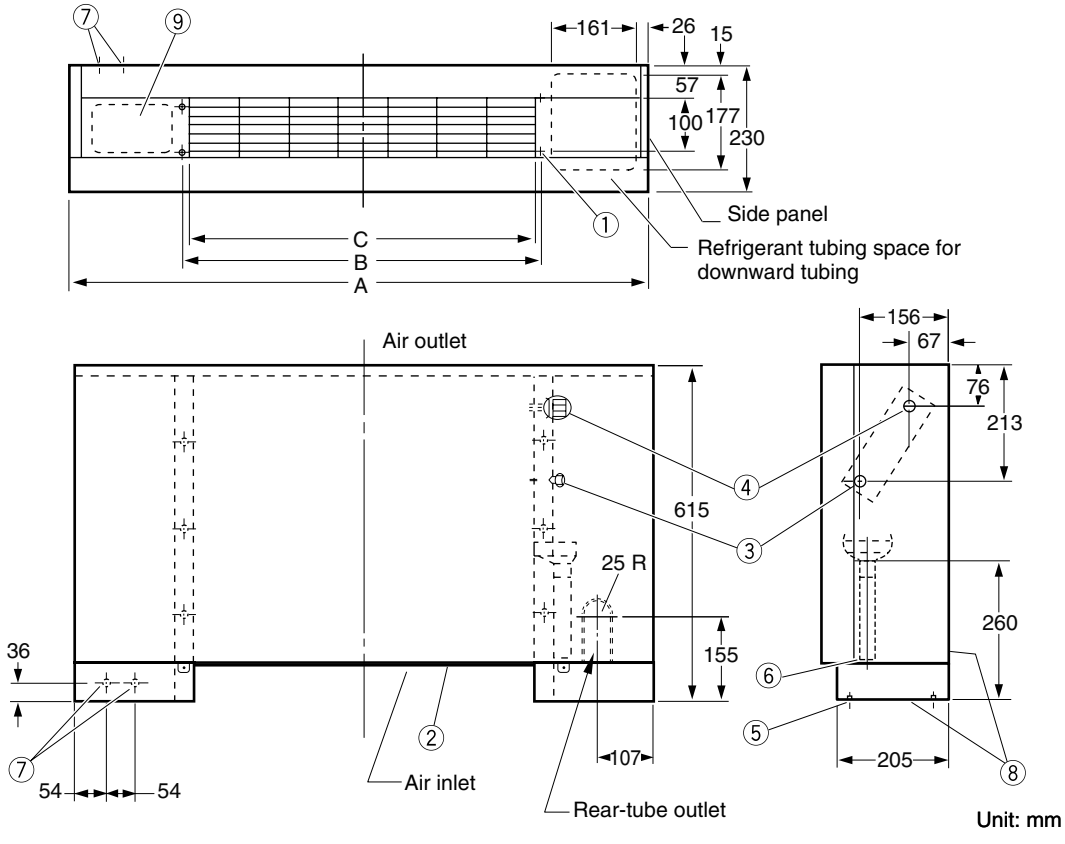


Fig. 3-178

NFFL

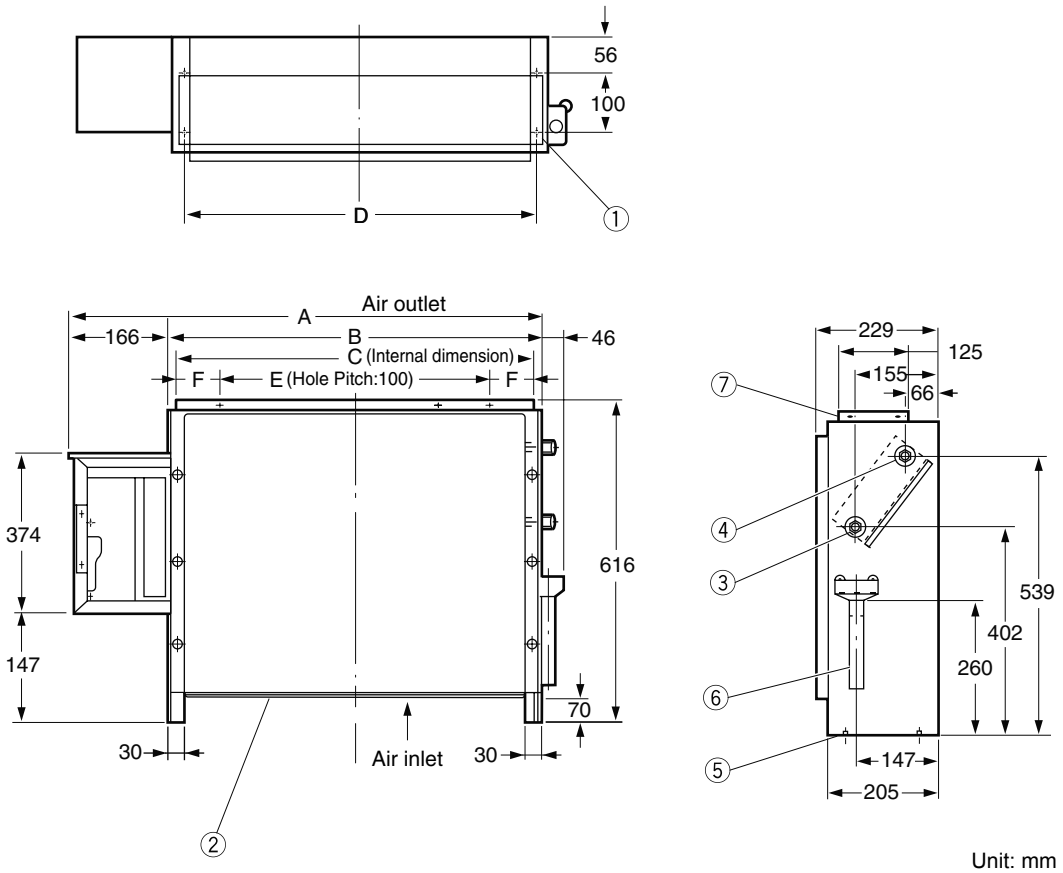
Concealed Floor-Standing Type (NFMFL Type)

①4-ø12 holes (for fastening the indoor unit to the floor with screws)
②Air filter
③Refrigerant connection outlet (liquid tube)
④Refrigerant connection outlet (gas tube)
⑤Level adjusting bolt
⑥Drain outlet (20A)
⑦Flange for air-outlet duct

Table 3-9

Unit: mm

Length / Type	A	B	C	D	E	F	Liquid tube	Gas tube
7, 9, 12	904	692	672	665	500	86	ø6.35	ø12.7
16, 18	1219	1007	1002	980	900	51		
24							ø9.52	ø15.88



Unit: mm

Fig. 3-179

NFMFL

NOTE

Make an opening in the housing of the unit so that maintenance service can be peformed on the electric component box, air filter, refrigerant tubing connection, and drain pipe.

3-60. Removing and Attaching the Front Panel (Floor-Standing Type)

NOTE

A dew-prevention heater is secured behind the front panel. When removing or attaching the panel, take care not to damage the lead wire to the heater.

How to remove the front panel

(1) Remove the 2 screws at the lower part of the front panel.

(2) Holding **A** at the upper right of the unit, push up at **B** at the lower right of the panel. The right side of the front panel is removed. Then remove the left side of the front panel following the same procedure. (Fig. 3-180)

(3) Disengage the lead wire connector (2P red) for the dew-prevention heater. (Fig. 3-180)

(4) Remove the chain connecting the front panel of the unit by unhooking it from the fixture attached to the panel. (Fig. 3-181)

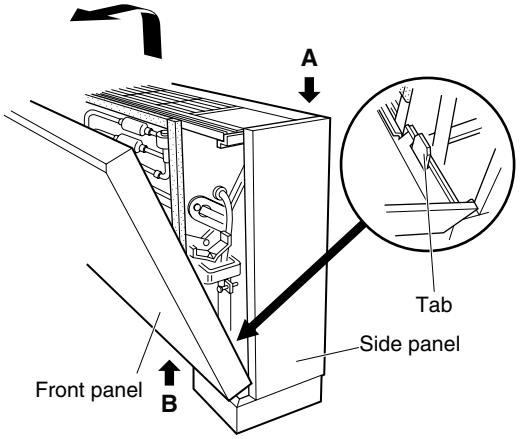


Fig. 3-180

How to attach the front panel

(1) Hook the chain to the fixture of the front panel.

(2) Connect the lead wire connector.

(3) Align the slots at the lower part of the front panel to the tabs at the lower part of the indoor unit and put the upper trim tab of the front panel on the groove of the unit. Then press down the panel.

(4) Insert the 2 screws at the lower part of the front panel.

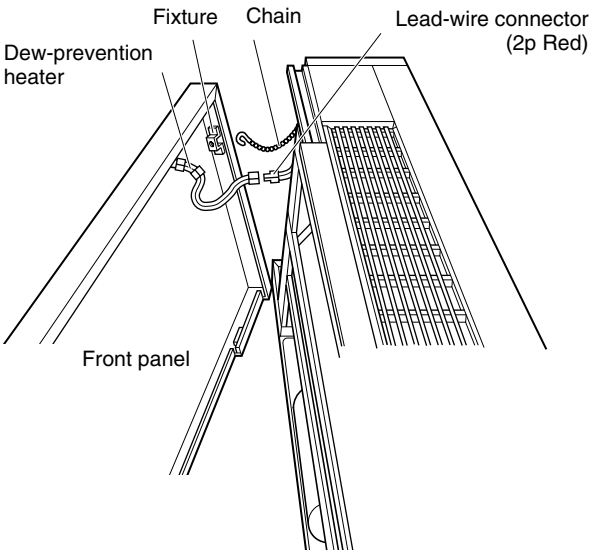


Fig. 3-181

3-61. Installing the Refrigerant Tubing

(1) When connecting the gas tube use the supplied tubing.

(2) Tubes can be extended in 2 directions: downward and at rear.

For floor-standing type

- When a rear tube is required, it can run through the rear-tube outlet of the rear panel.
- When a downward tube is required, refer to the opening dimensions shown in Fig. 3-182.

NFFL

CAUTION **Insulate both gas and liquid tubes.**

- To insulate tubes

(1) Wrap the flare nuts with the supplied white insulating tape.

(2) Wrap the flare nuts with the supplied flare insulator.

(3) Fill the clearance between the union insulator and flare insulator with black insulating tape. Fasten both ends of the flare insulator with the supplied vinyl clamps.

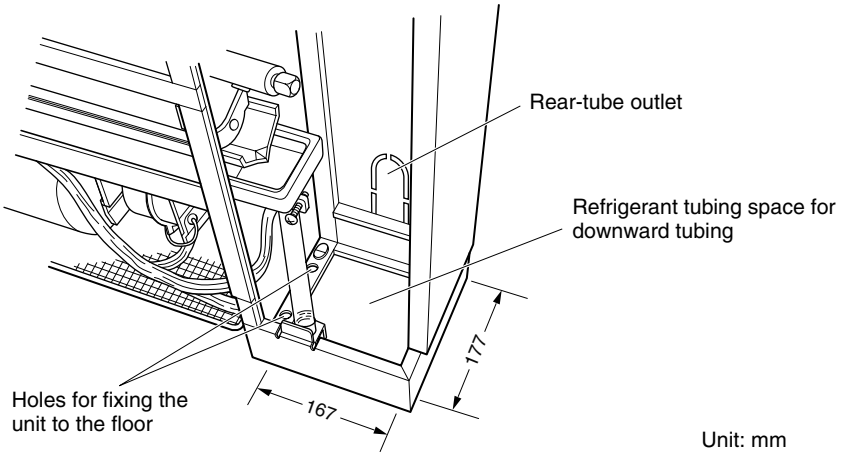


Fig. 3-182

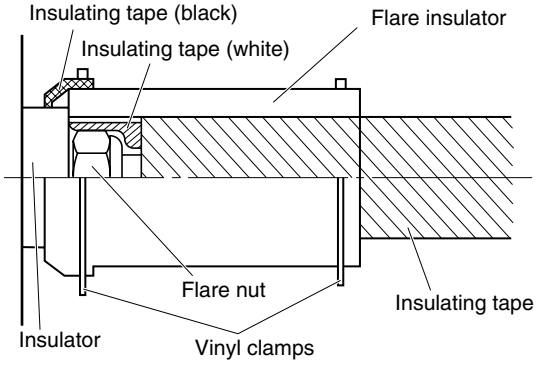


Fig. 3-183

NFFL

3-62. Installing the Drain Piping

CAUTION **Water leaks may occur if the drain pipes are connected inadequately.**

(1) When rear-side drain piping is required bend the drain hose attached to the indoor unit by 90°. Connect a drain pipe (field supply) to the drain hose through the rear tubing outlet in the rear panel. Use hard PVC pipe (VP20) for the drain piping.

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

(3) Provide insulation for the drain pipe.

(4) After the drain piping is completed, pour water into the drain pan to check if the water drains smoothly.

(5) Remove any dirt or debris in the drain pan so that the pipe is not clogged.

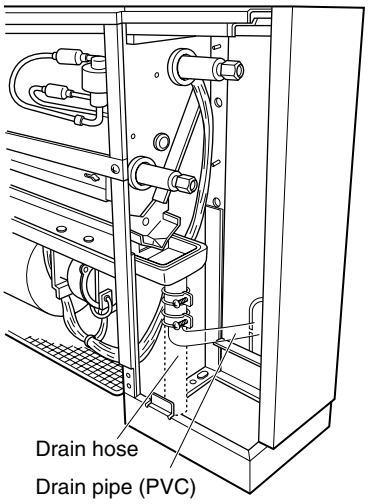


Fig. 3-184

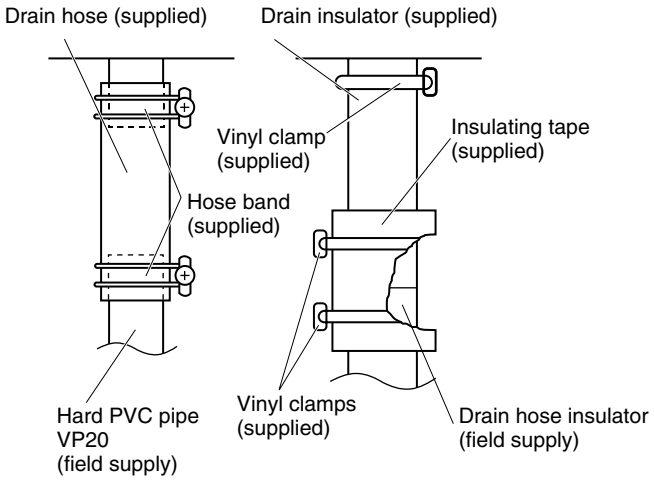


Fig. 3-185

3-63. Installing the Remote Controller

A remote controller (optional wired remote controller) can be mounted in the indoor unit (floor-standing type).

(1) Remove the cover of the optional wired remote controller. (Fig. 3-186)

(2) Remove the front panel. Remove the screws and fixture. (Fig. 3-187)

(3) Place the remote controller into the space in the unit as shown in Fig 3-187. Assemble the lead wires of the remote controller to its rear side center and route them to the lead wire guide.

(4) Secure the fixture using the supplied screws.

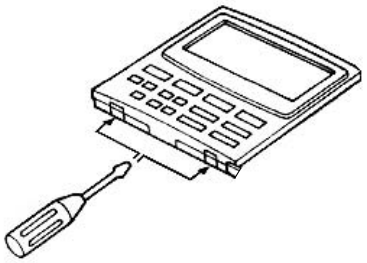


Fig. 3-186

To remove the cover from the remote controller, insert a screwdriver between the cover and the controller as shown in the figure above, and gently turn the screwdriver to open the cover.

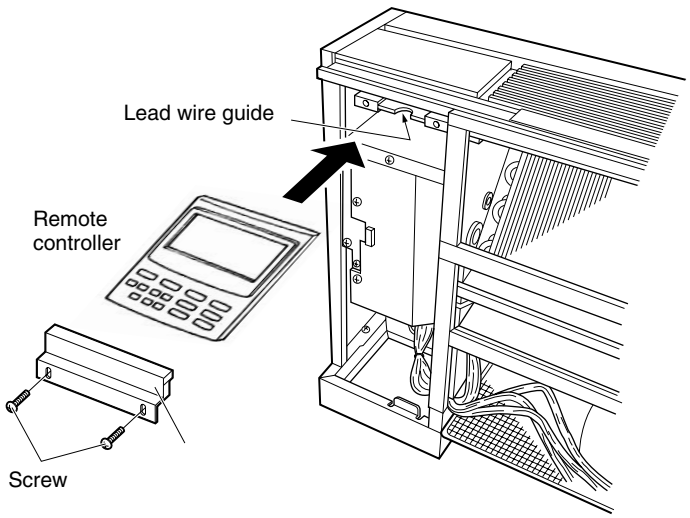


Fig. 3-187

NFFL

■ Heat Exchager with DX coil Type (DEV Type)

3-64. 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. 3-188a and Table 3-10.
- It is recommended that space is provided (450×450 mm) for checking and servicing the electrical system.
- Fig. 3-188b and Table 3-11 show the detailed dimensions of the indoor unit.

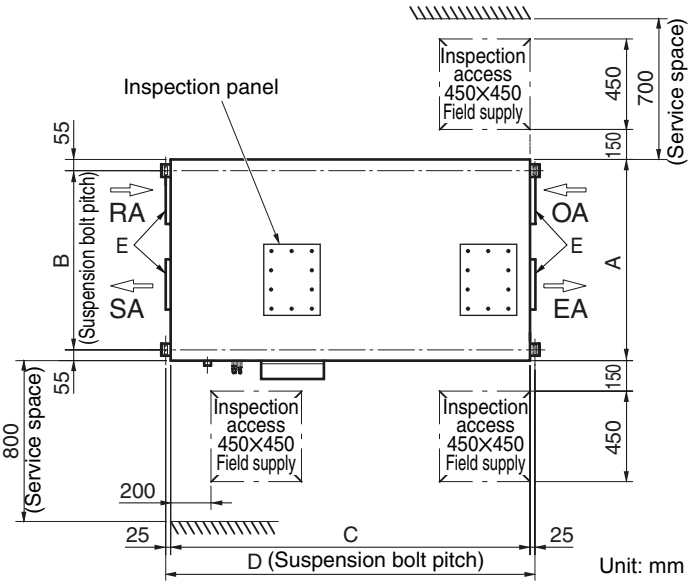


Fig. 3-188a

Table 3-10 Unit: mm

Type	A	B	C	D	E
AWSI-DEV018-N11	1000	890	1785	1835	ø250
AWSI-DEV024-N11	1120	1010	1903	1953	ø250
AWSI-DEV030-N11	1220	1110	1903	1953	ø300

Table 3-11 Unit: mm

Type	A	B	C
AWSI-DEV018-N11	425	205	175
AWSI-DEV024-N11	450	225	200
AWSI-DEV030-N11	450	225	200

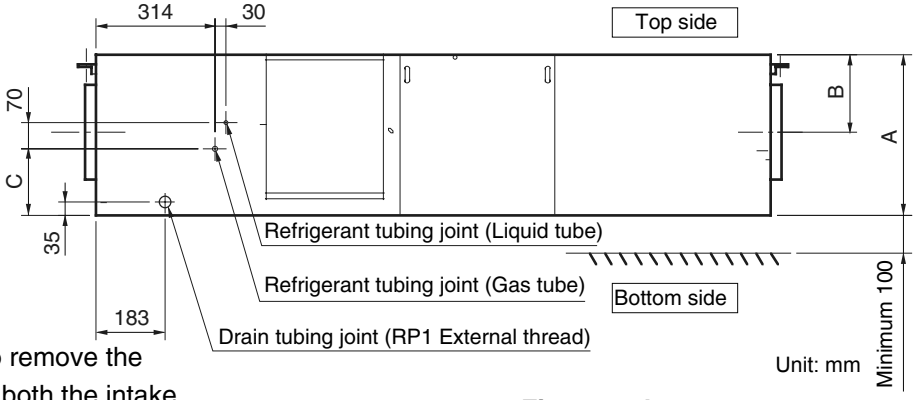


Fig. 3-188b

CAUTION

Before suspending the unit, be sure to remove the transport pads attached to the fan, on both the intake and discharge side.

Procedure:

<Intake side>

1. Remove the installation screws from the inspection panel, then remove the panel.
2. Remove all 4 pads on both sides of the fan casing.
3. Use the screws and the screws removed earlier to re-install the inspection panel onto the top of the unit.

<Discharge side>

1. Remove the pads on the fan discharge side through the discharge opening. (Fig. 3-189b)

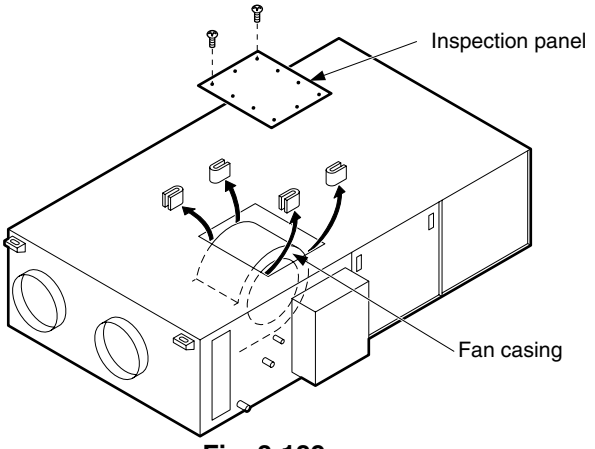


Fig. 3-189a

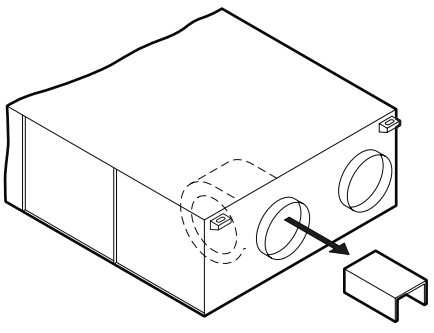
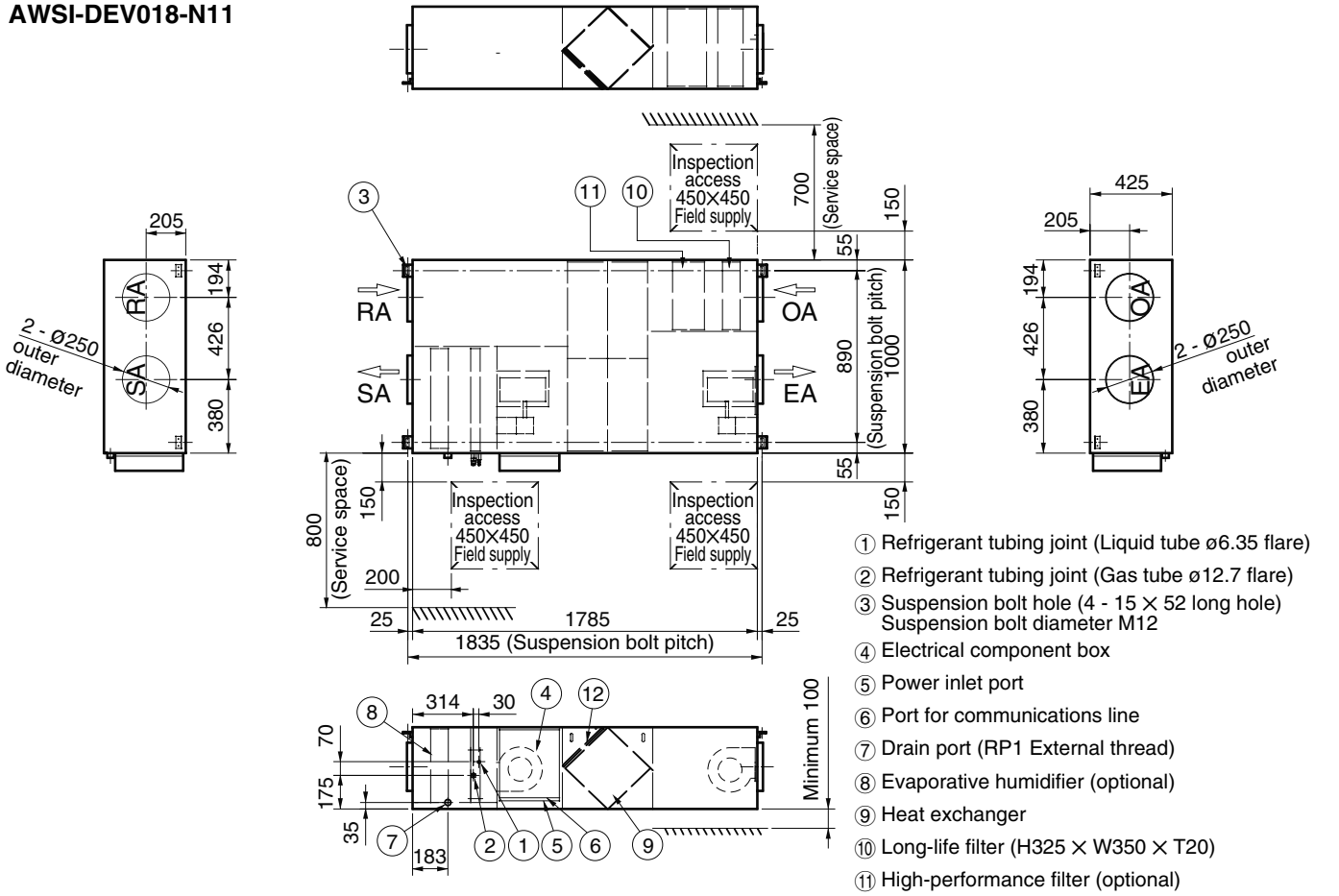


Fig. 3-189b

DEV

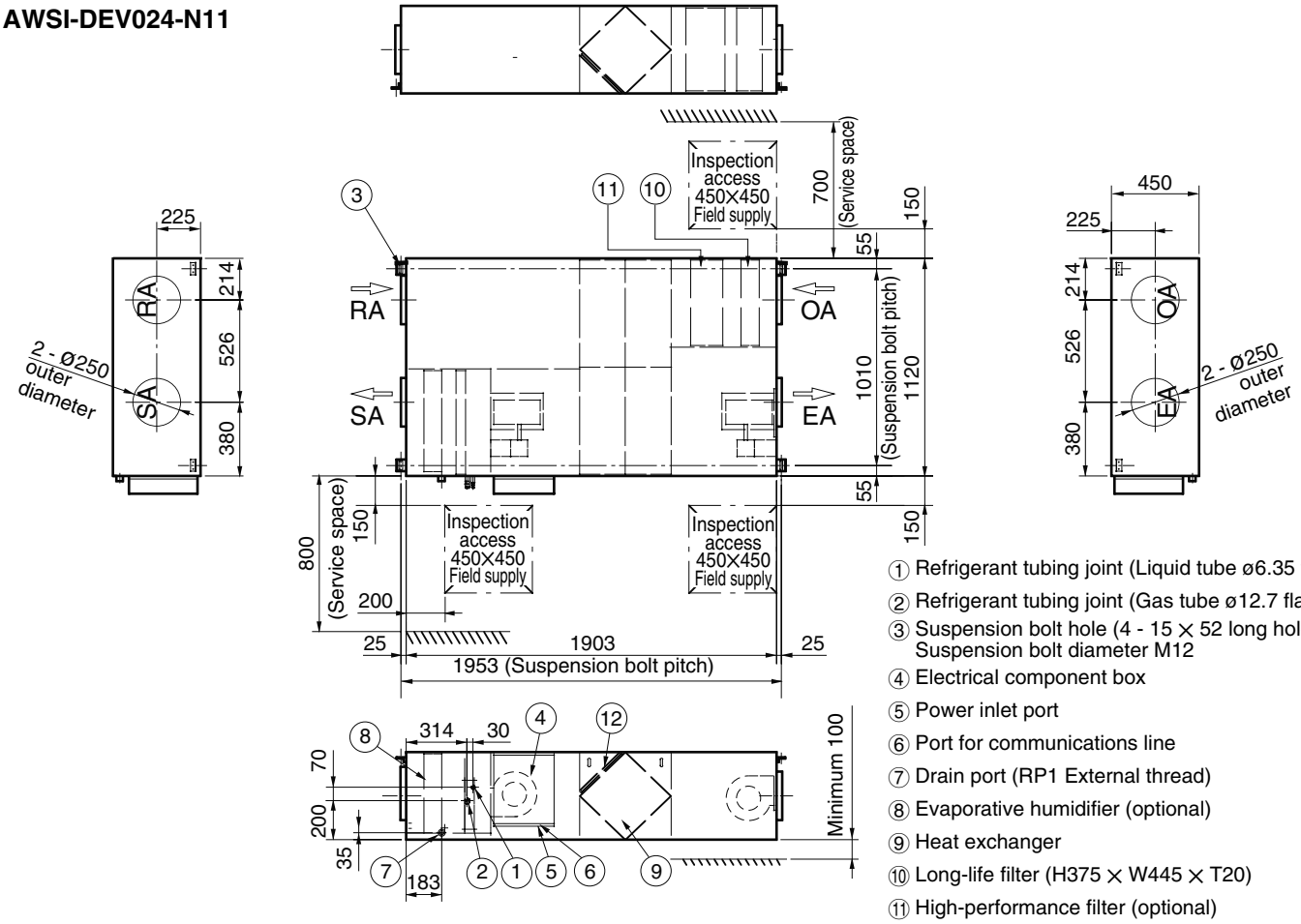
3-65. External Dimensions and Service Space

AWSI-DEV018-N11



① Refrigerant tubing joint (Liquid tube ø6.35 flare)
② Refrigerant tubing joint (Gas tube ø12.7 flare)
③ Suspension bolt hole (4 - 15 × 52 long hole)
Suspension bolt diameter M12
④ Electrical component box
⑤ Power inlet port
⑥ Port for communications line
⑦ Drain port (RP1 External thread)
⑧ Evaporative humidifier (optional)
⑨ Heat exchanger
⑩ Long-life filter (H325 × W350 × T20)
⑪ High-performance filter (optional)
⑫ Air filter (H230×W480×T10. Two filters are used.)

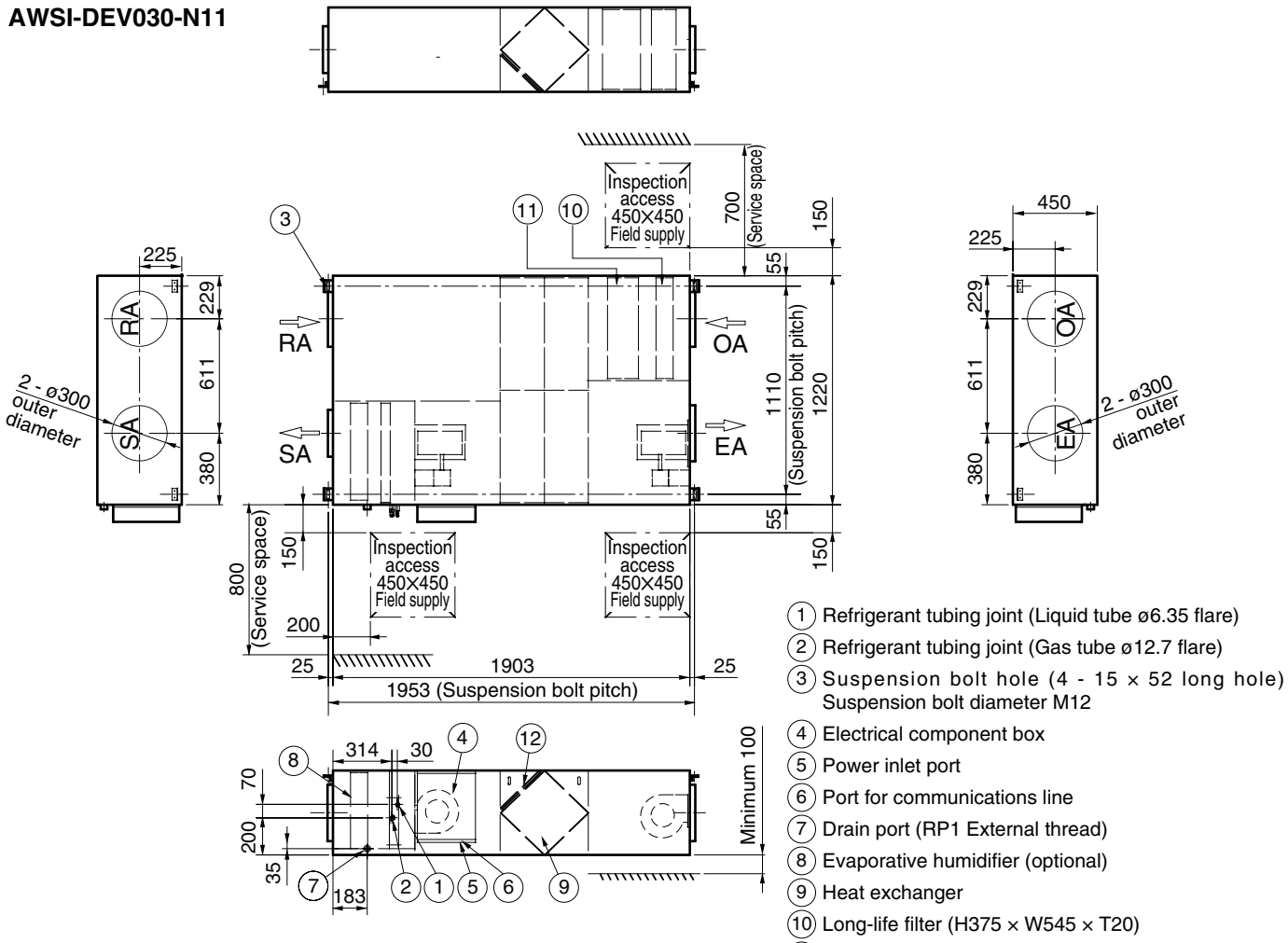
AWSI-DEV024-N11



① Refrigerant tubing joint (Liquid tube ø6.35 flare)
② Refrigerant tubing joint (Gas tube ø12.7 flare)
③ Suspension bolt hole (4 - 15 × 52 long hole)
Suspension bolt diameter M12
④ Electrical component box
⑤ Power inlet port
⑥ Port for communications line
⑦ Drain port (RP1 External thread)
⑧ Evaporative humidifier (optional)
⑨ Heat exchanger
⑩ Long-life filter (H375 × W445 × T20)
⑪ High-performance filter (optional)
⑫ Air filter (H247×W547×T10. Two filters are used.)

DEV

AWSI-DEV030-N11



(1) Refrigerant tubing joint (Liquid tube ø6.35 flare)
(2) Refrigerant tubing joint (Gas tube ø12.7 flare)
(3) Suspension bolt hole (4 - 15 × 52 long hole)
Suspension bolt diameter M12
(4) Electrical component box
(5) Power inlet port
(6) Port for communications line
(7) Drain port (RP1 External thread)
(8) Evaporative humidifier (optional)
(9) Heat exchanger
(10) Long-life filter (H375 × W545 × T20)
(11) High-performance filter (optional)
(12) Air filter (H247 × W597 × T10. Two filters are used.)

DEV

3-66. Suspending the Indoor Unit

Depending on the ceiling type:

- Insert suspension bolts as shown in Fig. 3-190

  or

- Use existing ceiling supports or construct a suitable support as shown in Fig. 3-191.

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. 3-188 and Table 3-10)
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. 3-190. (Cut the ceiling material, if necessary.)

- To suspend the unit inside the ceiling, lift up the unit and attach it to the suspension bolts as shown in the figure at right.
- In order to ensure that the unit is level, adjust either by using a level gauge, or else by using the method shown in the figure at right.

(3) Thread the 3 hexagonal nuts and 2 washers (field supply) onto each of the 4 suspension bolts as shown in Fig. 3-193. 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.

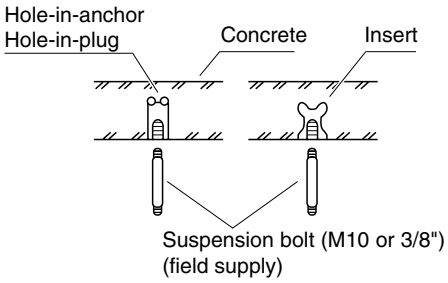


Fig. 3-190

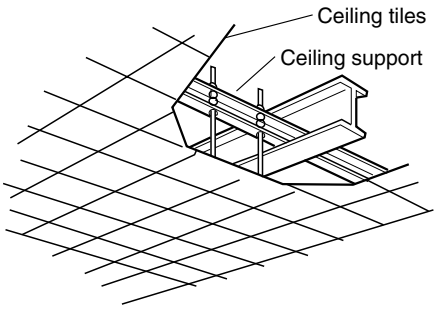


Fig. 3-191

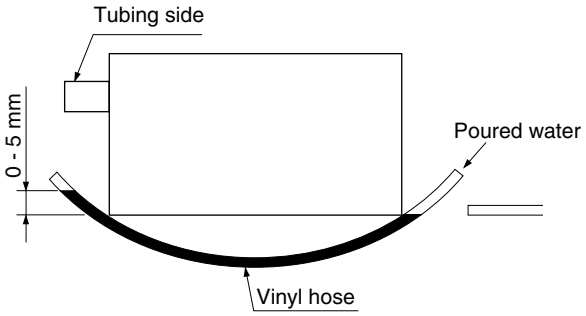


Fig. 3-192

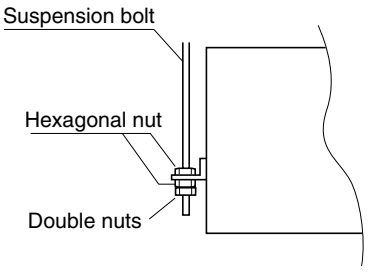


Fig. 3-193

DEV

3-67. Performing Duct Work

(1) Connect the OA and EA ducts so that there is a downward gradient (5 - 10°) leading to the suction/ discharge ports on the exterior (outdoor) side.

(2) At the time of shipping, both suction and discharge are set to "High". Therefore, use the connector-with-plug provided inside the electrical component box in order to adjust the external static pressure.

(3) Be sure to thermally insulate the discharge and suction ducts in order to prevent condensation on the ducts.

(4) Although the unit includes filters on the suction side and discharge side, it is recommended that additional easily cleanable filters be installed at each of the suction grilles.

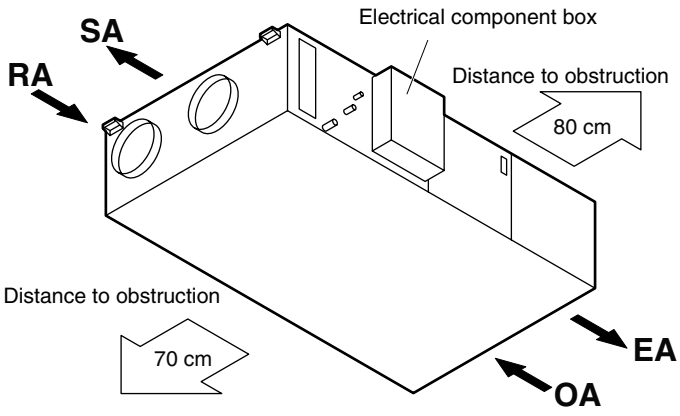


Fig. 3-194

3-68. Installing the Drain Piping

(1) The drain tube connection size is R1 (25A). Prepare standard hard PVC pipe VP25 (O.D. 32 mm) for the drain and use the supplied hose band to prevent water leaks. The PVC pipe must be purchased separately.

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.**

(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. 3-195)

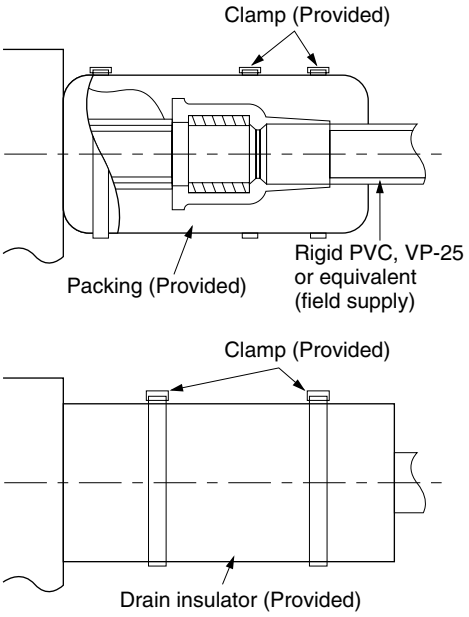


Fig. 3-195

NOTE

Make sure the drain pipe has a downward gradient (1/100 or more) and that there are no water traps. The portion of the drain tubing located on the inside must be thermally insulated.

CAUTION

- Do not install an air bleeder as this may cause water to spray from the drain pipe outlet. (Fig. 3-196)

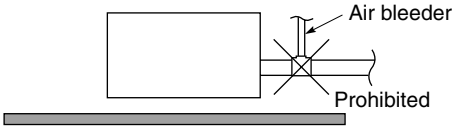


Fig. 3-196

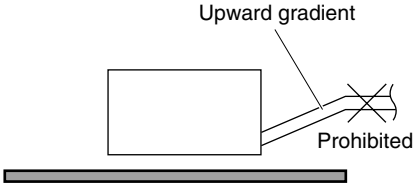


Fig. 3-197

- 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. 3-197)
- 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. 3-198)

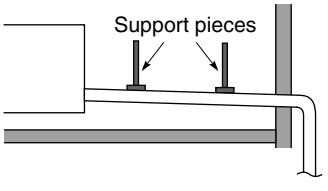
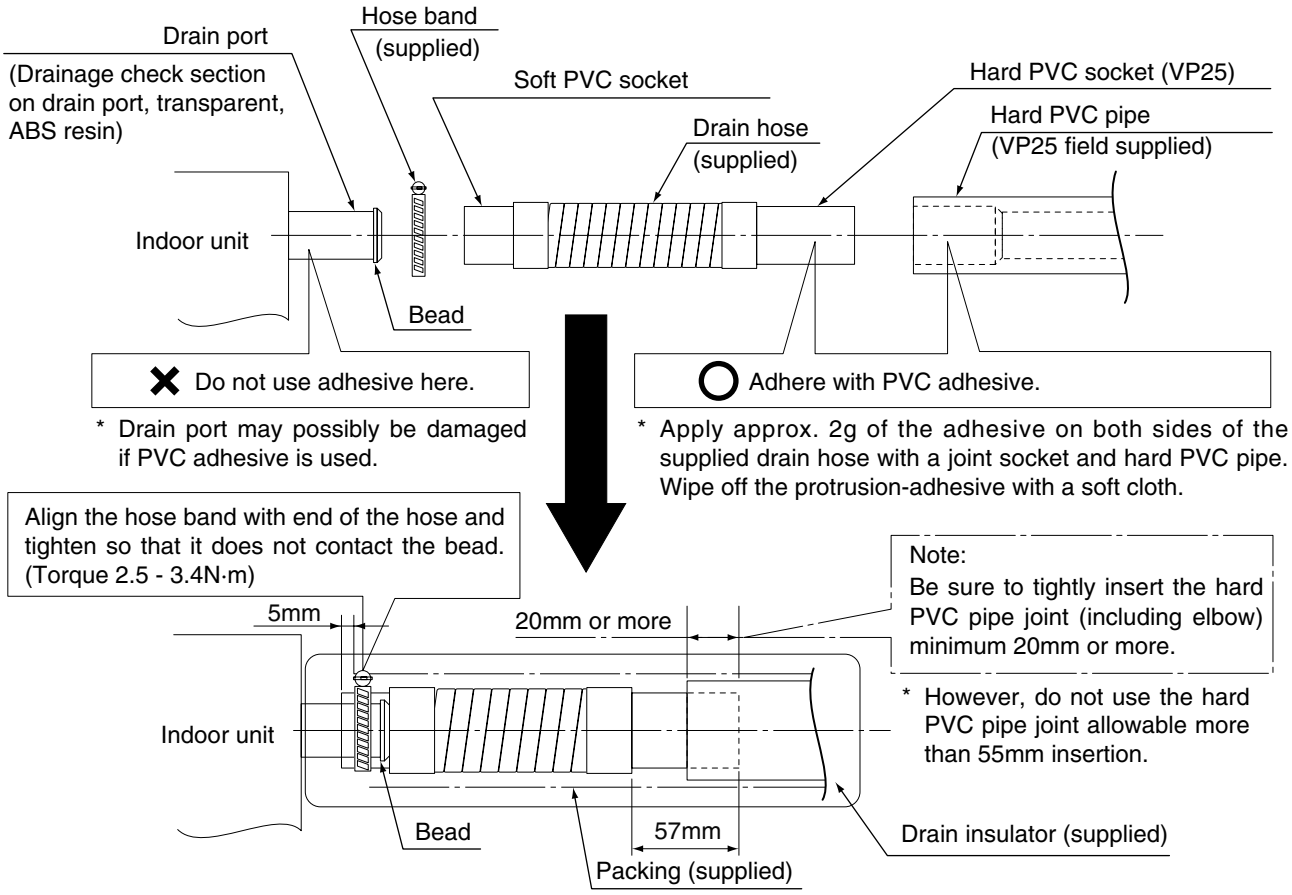


Fig. 3-198

DEV

■ SUPPLEMENT ON DRAIN PIPING

1. Drain hose installation



* After checking the drainage, wrap the supplied packing and drain pipe insulator around the pipe.

Note: There is possibility to cause water leakage unless the above steps are carried out.

2. Checkpoint after installation

After installation of indoor and outdoor units, panels and electrical wiring, check the following items.

	Checkpoint	Symptom	Check	Remark
1	Make sure whether indoor and outdoor units are correctly installed.	Fall, vibration, noise		
2	Make sure whether gas leakage is tested.	No cooling, no heating		
3	Make sure whether insulation is completed. (Refrigerant piping and drain piping)	Water leakage		
4	Make sure whether drain water is running smoothly.	Water leakage		
5	Make sure whether the power voltage matches the nameplate.	Inoperative, burnout		
6	Make sure whether there is miswiring or incorrect connection.	Inoperative, burnout		
7	Make sure whether the ground construction is completed.	Ground leakage		
8	Make sure whether the wire gauge is followed by the recommended specifications.	Inoperative, burnout		
9	Make sure whether the air intake and air outlet of the indoor and outdoor units are sealed by obstacles.	No cooling, no heating		

■ RAP (Refrigerant Accumulation Protector) Valve Kit (NRAP-FLR)

When installing a indoor unit, you must also install the RAP Valve Kit (NRAP-FLR).

- Secure the RAP valve kit using suspension bolts, etc. within 30 meters from the indoor unit.
- Do not place the RAP valve kit directly on the ceiling.

3-69. Installing the Refrigerant Tubing

For details on connecting the RAP valve kit, refer to the manual that came with the kit.

- 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.

NOTE

A solenoid valve kit is required in order to connect an indoor unit to FLOW LOGIC 3 Pipe System. In this case, the RAP valve kit is not necessary.

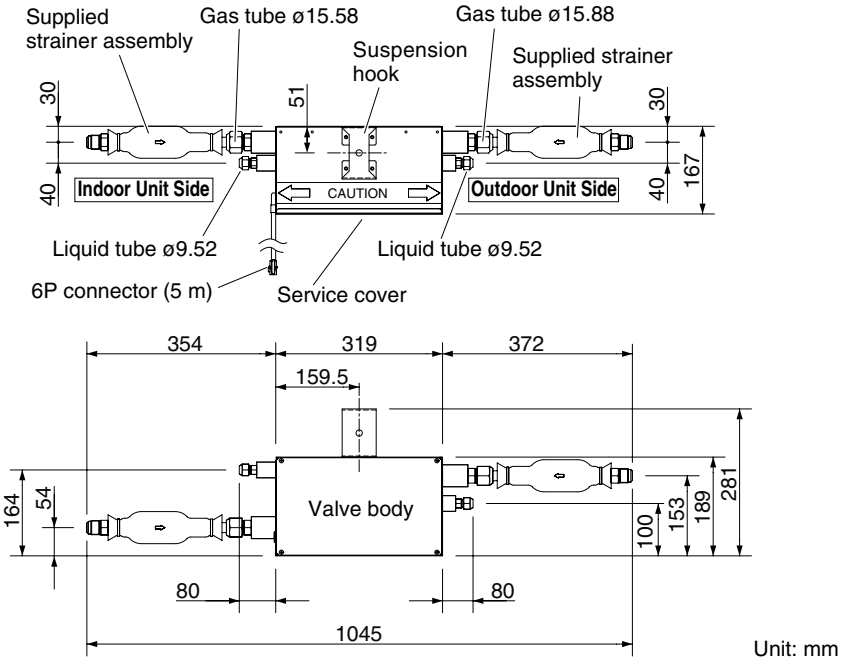


Fig. 3-199

Note:

This figure shows the valve body with the suspension hook and strainer assemblies installed.

4. HOW TO INSTALL THE OUTDOOR UNIT

4-1. Installing the Outdoor Unit

- Use concrete or a similar material to create the base, and ensure good drainage.
- Ordinarily, ensure a base height of 5 cm or more. If a drain pipe is used, or for use in cold-weather regions, ensure a height of 15 cm or more at the feet on both sides of the unit.
  (In this case, leave clearance below the unit for the drain pipe, and to prevent freezing of drainage water in cold-weather regions.)
- Refer to the Fig. 4-1 for the anchor bolt dimensions.
- Be sure to anchor the feet with the anchor bolts (M10). In addition, use anchoring washers on the top side. (Use large square 32 × 32 SUS washers with JIS nominal diameters of 10.) (Field supply)

4-2. Drainage Work

Follow the procedure below to ensure adequate draining for the outdoor unit.

- For the drain port dimensions, refer to the figure at right.
- Ensure a base height of 15 cm or more at the feet on both sides of the unit.
- When using a drain pipe, install the drain socket onto the drain port. Seal the other drain port with the rubber cap supplied with the drain socket.

4-3. Routing the Tubing and Wiring

- The tubing and wiring can be extended out in 4 directions: front, rear, right, and down.
- The service valves are housed inside the unit. To access them, remove the inspection panel. (To remove the inspection panel, remove the 3 screws, then slide the panel downward and pull it toward you.)

(1) If the routing direction is through the front, rear, or right, use a nipper or similar tool to cut out the knockout holes for the inter-unit control wiring outlet, power wiring outlet, and tubing outlet from the appropriate covers A and B.

(2) If the routing direction is down, use a nipper or similar tool to cut out the lower flange from cover A.

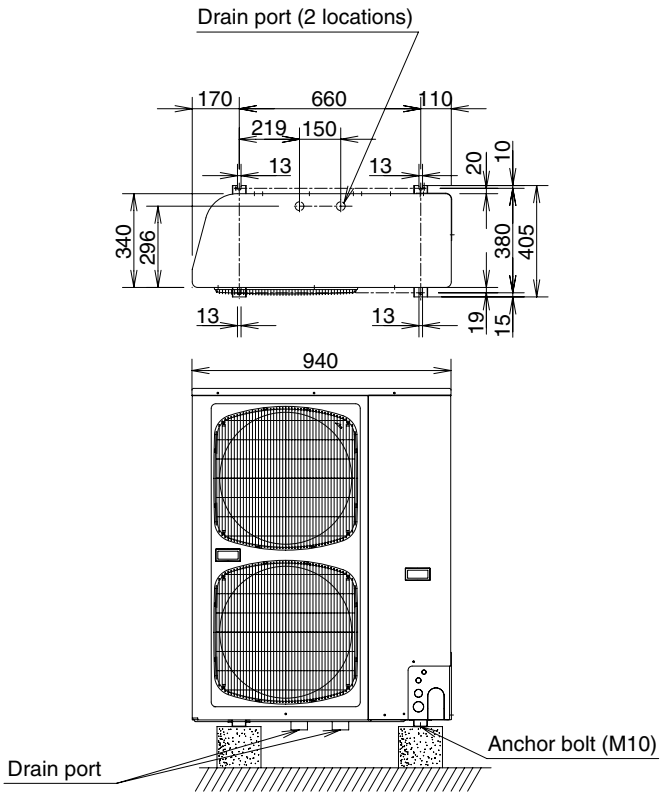


Fig. 4-1

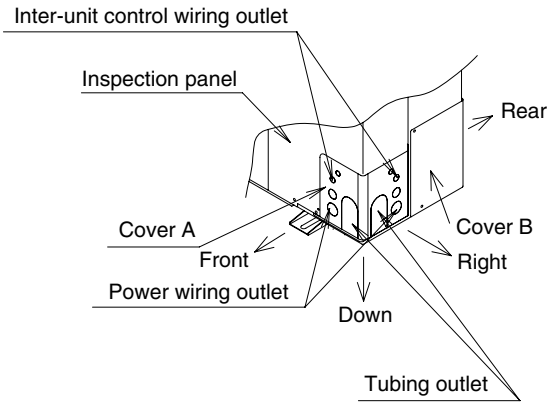


Fig. 4-2

CAUTION

- **Route the tubing so that it does not contact the compressor, panel, or other parts inside the unit. Increased noise will result if the tubing contacts these parts.**
- **When routing the tubing, use a tube bender to bend the tubes.**

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 manufacturer, 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	
MFL 40H(C)R	4 mm^2	16 m	25 A
MFL 50H(C)R	6 mm^2	24 m	35 A
MFL 60H(C)R	6 mm^2	20 m	35 A

	(A) Power supply		Time delay fuse or circuit capacity
	Wire size	Max. length	
AWAU-GBV112-H13	2.5 mm^2	50 mm	20 A
AWAU-GBV140-H13	2.5 mm^2	47 mm	20 A
AWAU-GBV155-H13	2.5 mm^2	47 mm	20 A

Indoor unit

Type	(B) Power supply 2.5 mm^2	Time delay fuse or circuit capacity
NWFL, XAV	Max. 150 m	10 – 16 A
NK1FL, NK2FL, NKFL, CAV, NPFL, NDLP, DAV, NFFL, NFMFL	Max. 130 m	10 – 16 A
NDHP	Max. 60 m	10 – 16 A
DEV (018)	Max. 85 m	10 – 16 A
DEV (024)	Max. 65 m	10 – 16 A
DEV (030)	Max. 60 m	10 – 16 A

Control wiring

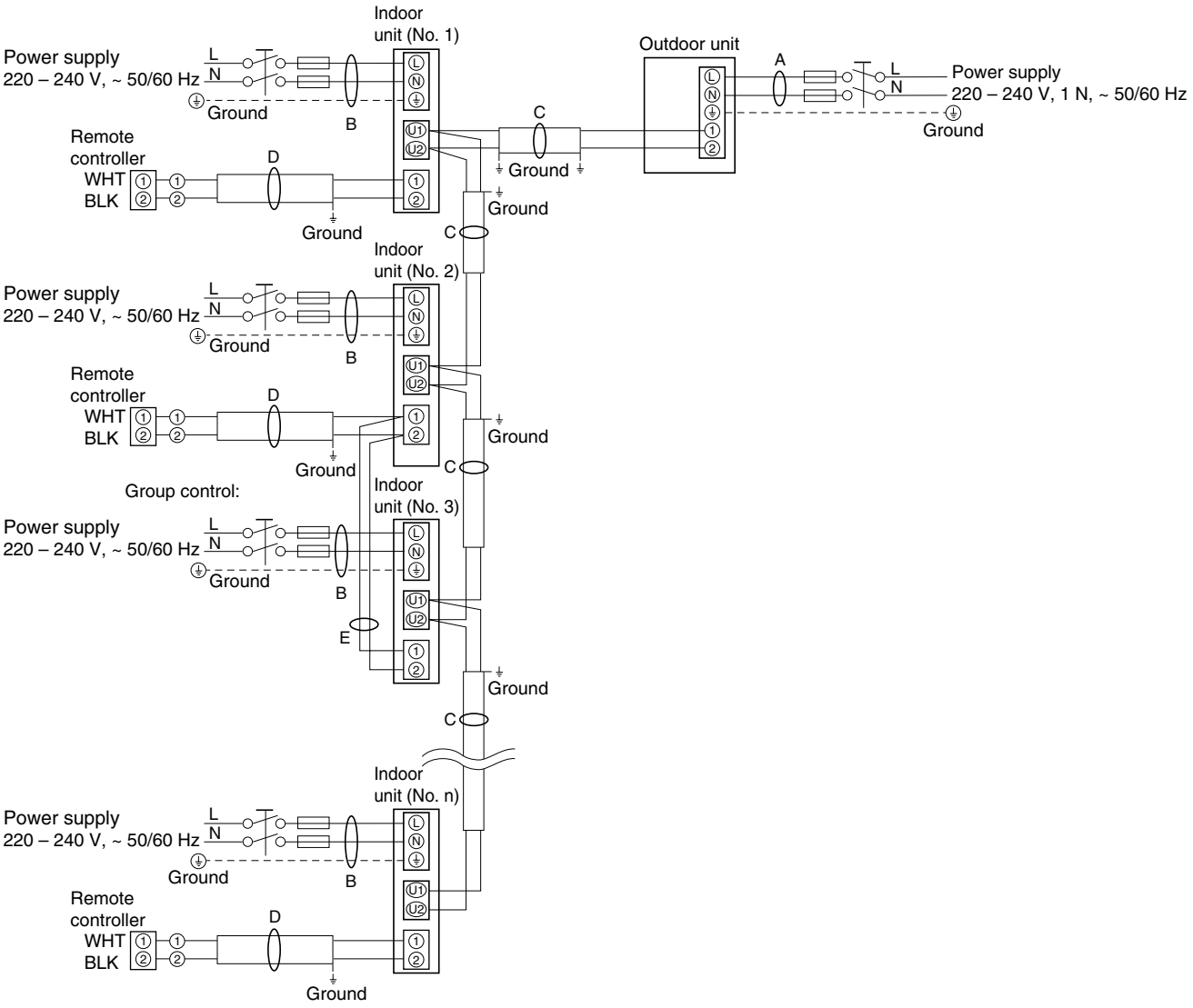
(C) Inter-unit (between outdoor and indoor units) control wiring	(D) Remote control wiring	(E) Control wiring for group control
0.75 mm^2 (AWG #18) **Use shielded wiring***	0.75 mm^2 (AWG #18) **Use shielded wiring***	0.75 mm^2 (AWG #18) **Use shielded wiring***
Max. 1,000 m	Max. 500 m	Max. 200 m (Total)

NOTE

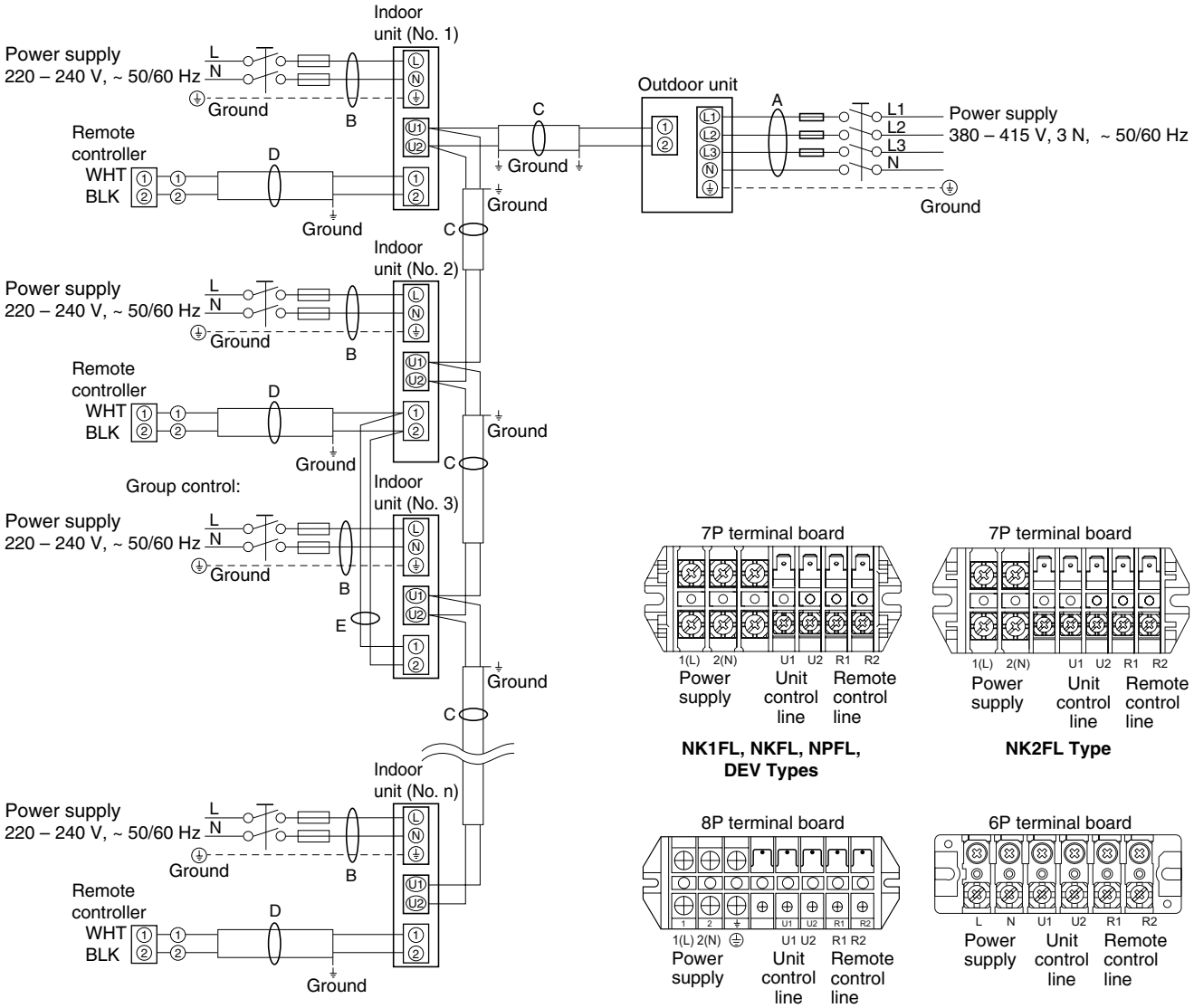
* With ring-type wire terminal.

5-3. Wiring System Diagram

(for single-phase outdoor unit)



(for 3-phase outdoor unit)

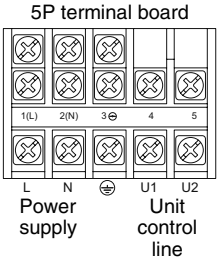


NK1FL, NKFL, NPFL, DEV Types

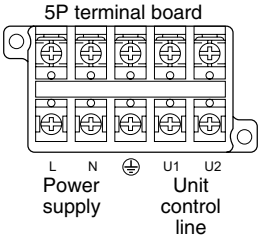
NK2FL Type

NDLP, NDHP, NFFL, NFMFL Types

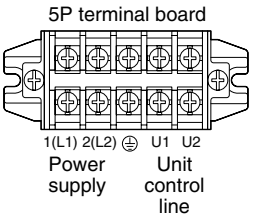
CAV, DAV Types



XAV Type



NWFL Type (Except 24 Type)



NWFL 24 Type

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 diagram.

(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 122 of the Installation Instructions. Auto. address setting can be executed by remote controller automatically. Refer to page 122 to 129 of the Installation Instructions.

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)

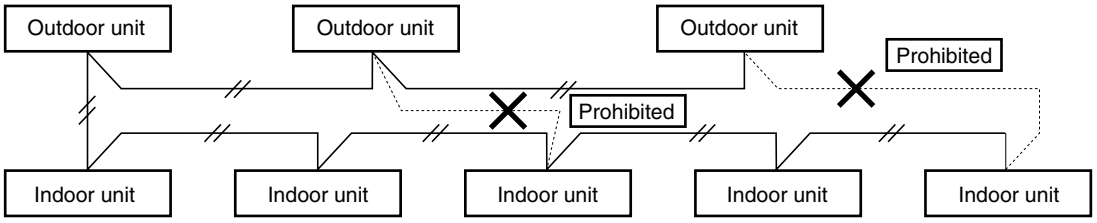


Fig. 5-1

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

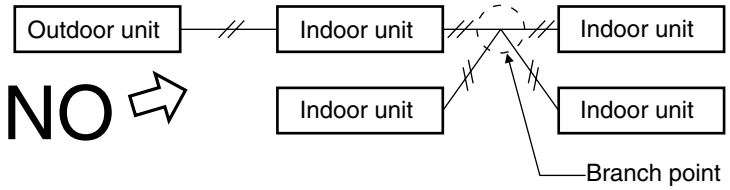


Fig. 5-2

(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)

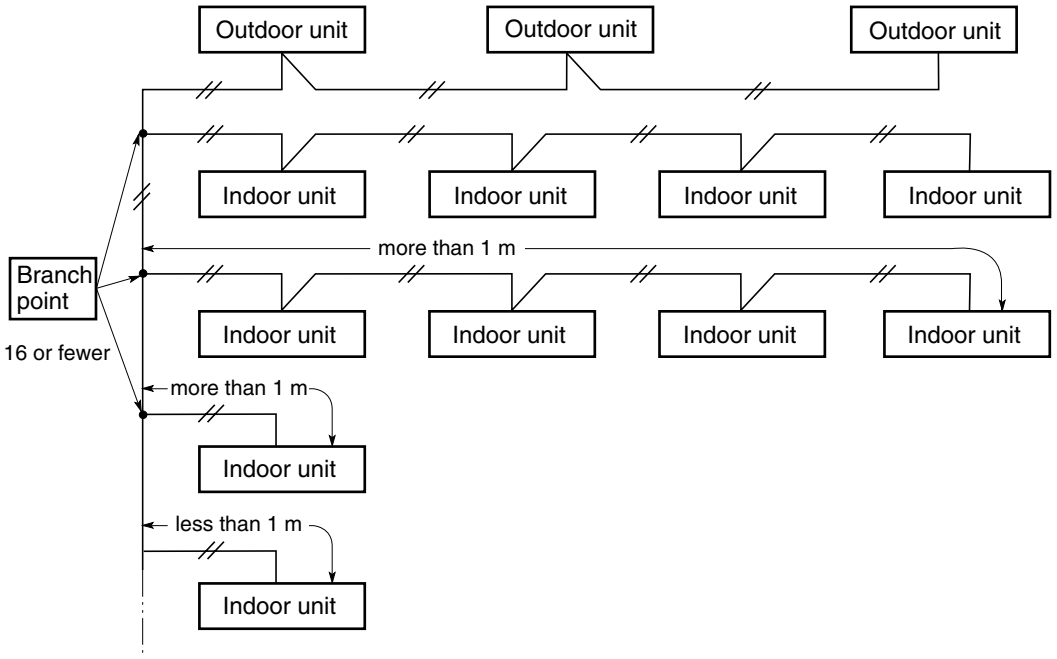


Fig. 5-3

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

WARNING **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)

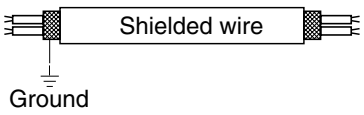


Fig. 5-4

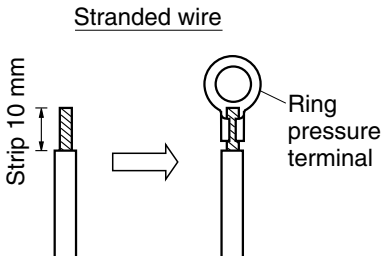


Fig. 5-5

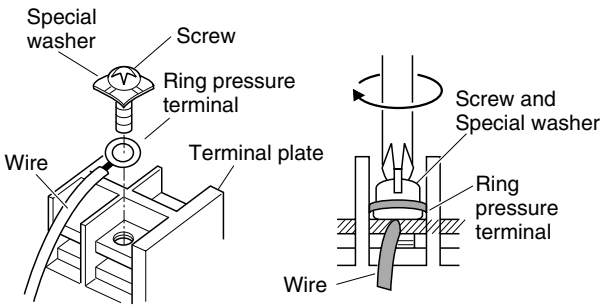


Fig. 5-6

6. HOW TO INSTALL THE REMOTE CONTROLLER: NRCT-FLR (OPTIONAL PART)

NOTE

Refer to the Instruction Manual attached to the optional Remote Control Unit.

7. HOW TO PROCESS TUBING

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

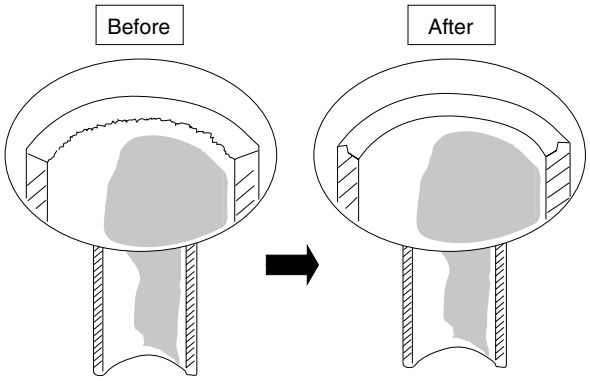


Fig. 7-1

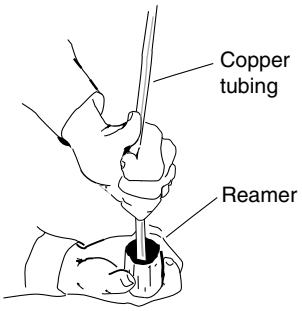


Fig. 7-2

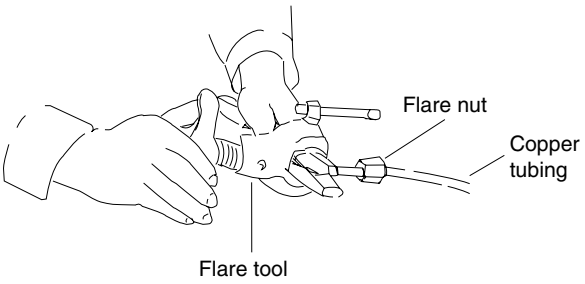


Fig. 7-3

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.

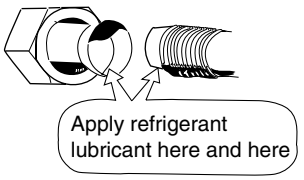


Fig. 7-4

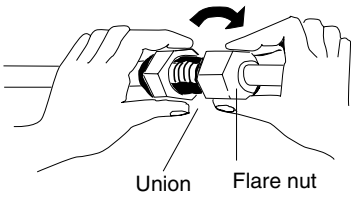


Fig. 7-5

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.**

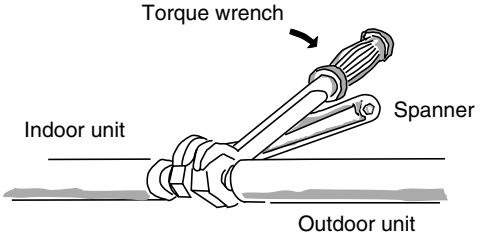


Fig. 7-6

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 adjustable 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 adjustable 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.

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

Two tubes arranged together

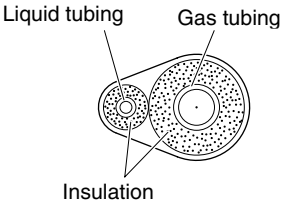


Fig. 7-7

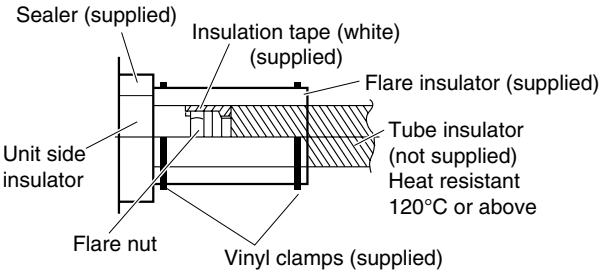


Fig. 7-8

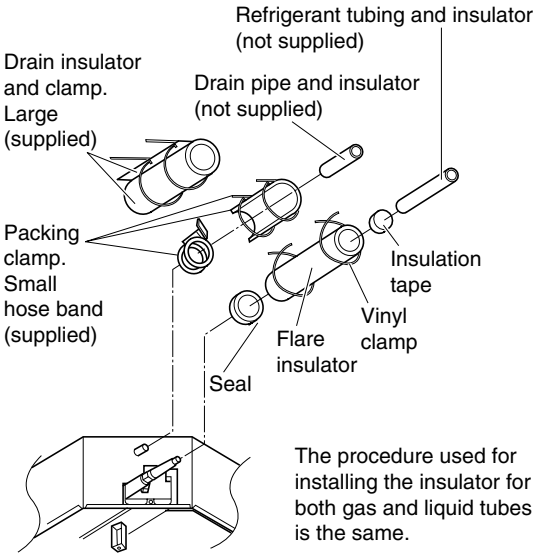


Fig. 7-9

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.

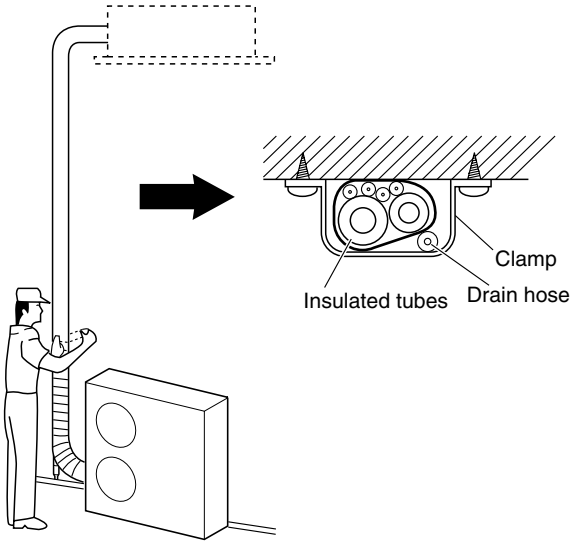


Fig. 7-10

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)

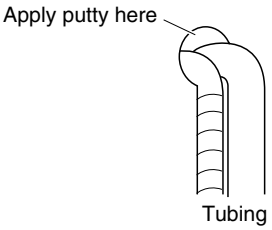


Fig. 7-11

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 (both liquid and gas tubes) between the indoor and outdoor units has been properly connected and all wiring for the test run has been completed. Remove the valve caps from both the gas tube and liquid tube service valves on the outdoor unit. Note that both liquid and gas tube service valves on the outdoor unit are kept closed at this stage.

Leak test

(1) Attach a manifold valve (with pressure gauges) and dry nitrogen gas cylinder to this service port with charge hoses.

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 36 kgf/cm^{2}G with dry nitrogen gas and close the cylinder valve when the gauge reading reaches 36 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.
(Refer to the previous page.)

Manifold gauge

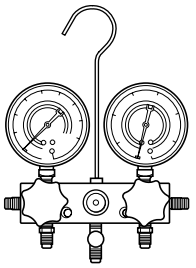


Fig. 8-1

Vacuum pump

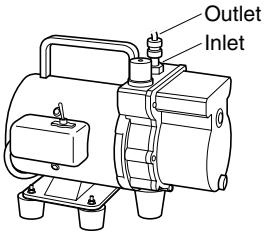


Fig. 8-2

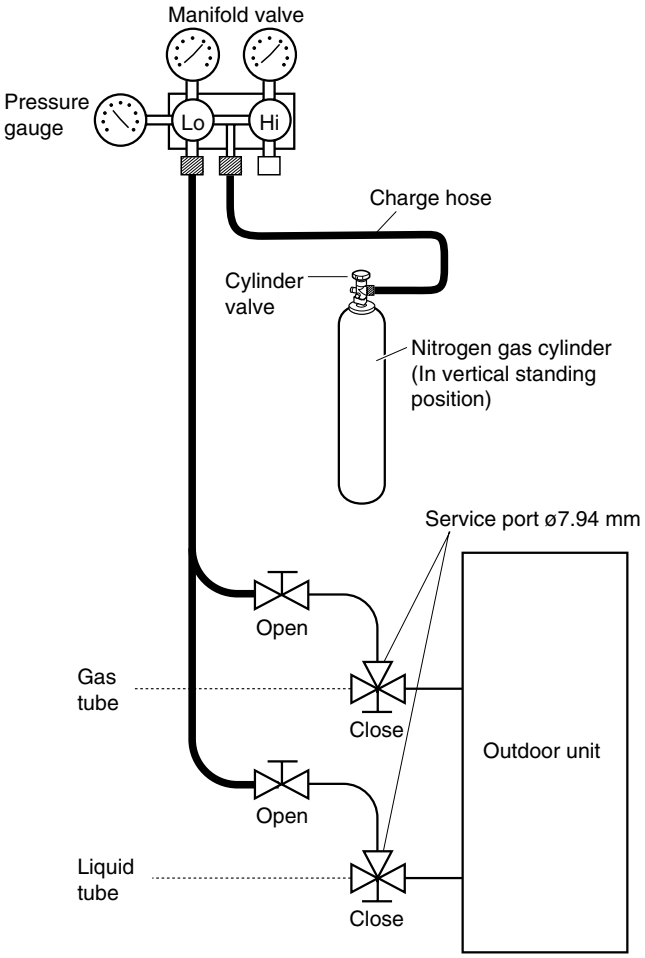


Fig. 8-3

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

NOTE

The required time in the above table is calculated based on the assumption that the ideal (or target) vacuum condition is less than –101kPa (–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. Confirm that the gauge pressure is under –101kPa (–755 mmHg, 5 Torr) after 4 to 5 minutes of vacuum pump operation.

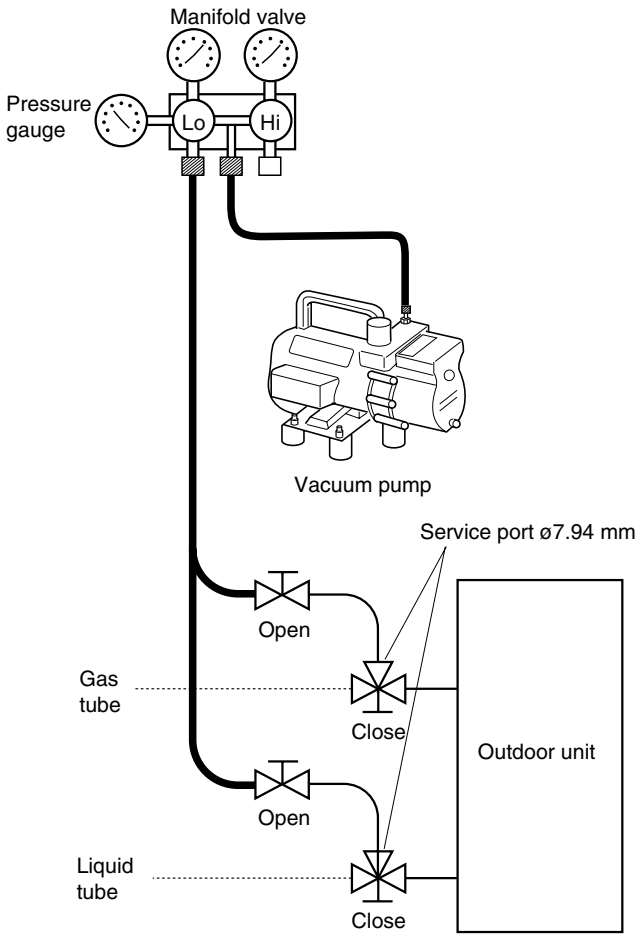


Fig. 8-4

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 “1-7 Additional Refrigerant Charge”) using the liquid tube service valve. (Fig. 8-5)
- Use a balance 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 gas tube service valve with the system in cooling operation mode at the time of test run. (Fig. 8-6)

Finishing the job

(1) With a hex wrench, turn the liquid tube service valve stem counter-clockwise to fully open the valve.

(2) Turn the gas tube service valve stem counter-clockwise to fully open the valve.

CAUTION

To avoid gas from leaking when removing the charge hose, make sure the stem of the gas tube is turned all the way out (“BACK SEAT” position).

(3) Loosen the charge hose connected to the gas tube service port (for ø7.94 mm tube) slightly to release the pressure, then remove the hose.

(4) Replace the service port cap on the gas tube service port and fasten the cap securely with an adjustable wrench or box wrench. This process is very important to prevent gas from leaking from the system.

(5) Replace the valve caps at both gas tube and liquid tube service valves and fasten them securely.

This completes air purging with a vacuum pump. The air conditioner is now ready for a test run. Refer to Section “10. TEST RUN”.

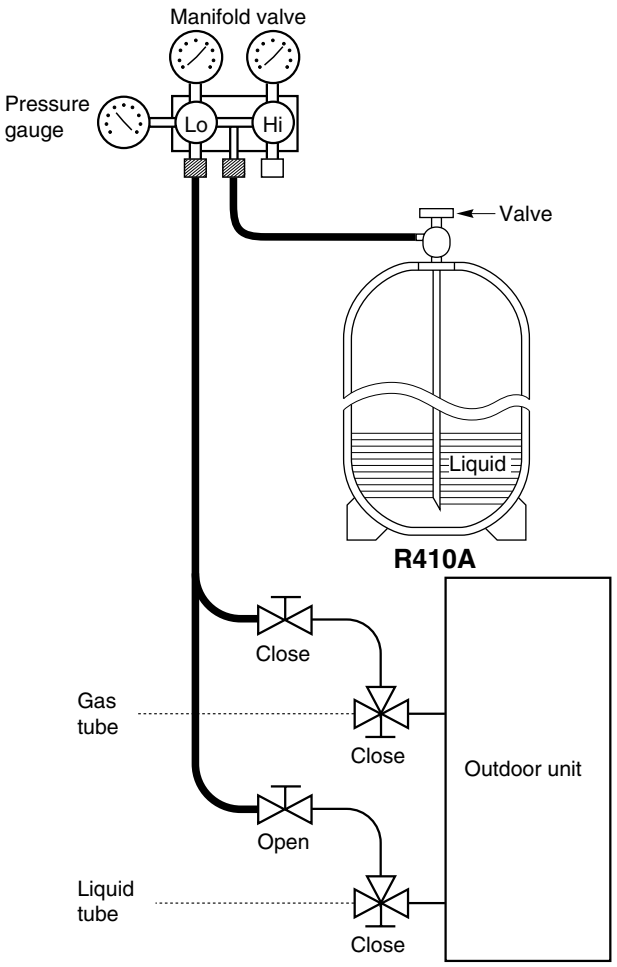


Fig. 8-5

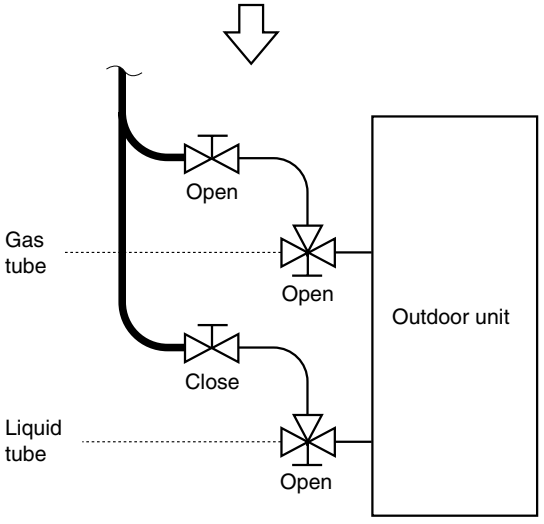
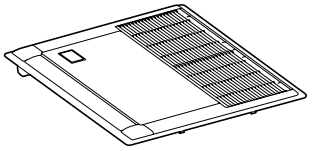
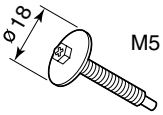
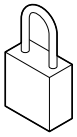


Fig. 8-6

9. HOW TO INSTALL THE CEILING PANEL

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

Component Parts Unit: mm

Part name	Quantity	Appearance	Part name	Quantity	Appearance
Ceiling panel	1		Washer-head Screw	4	 M5 × 40
			Screw	2	 4 × 12 For fastening side panel
Short-circuit connector	1	 (2P, yellow) Used for high ceiling installation	Screw	2	 4 × 35 For fastening front/rear center of panel

NK1FL

9-1. Installing the Panel on the Indoor Unit

1. Removing the intake grille

(1) Remove the 2 screws that fasten each of the 2 grilles in place. (Fig. 9-1)

(2) Slide the intake grille hooks (2 locations) in the direction of the arrow to open the intake grille. (Fig. 9-1)

(3) When the intake grille is open, use a flathead (minus) screwdriver to press on the rear hinge tabs (2 locations), then remove the intake grille. (Fig. 9-1)

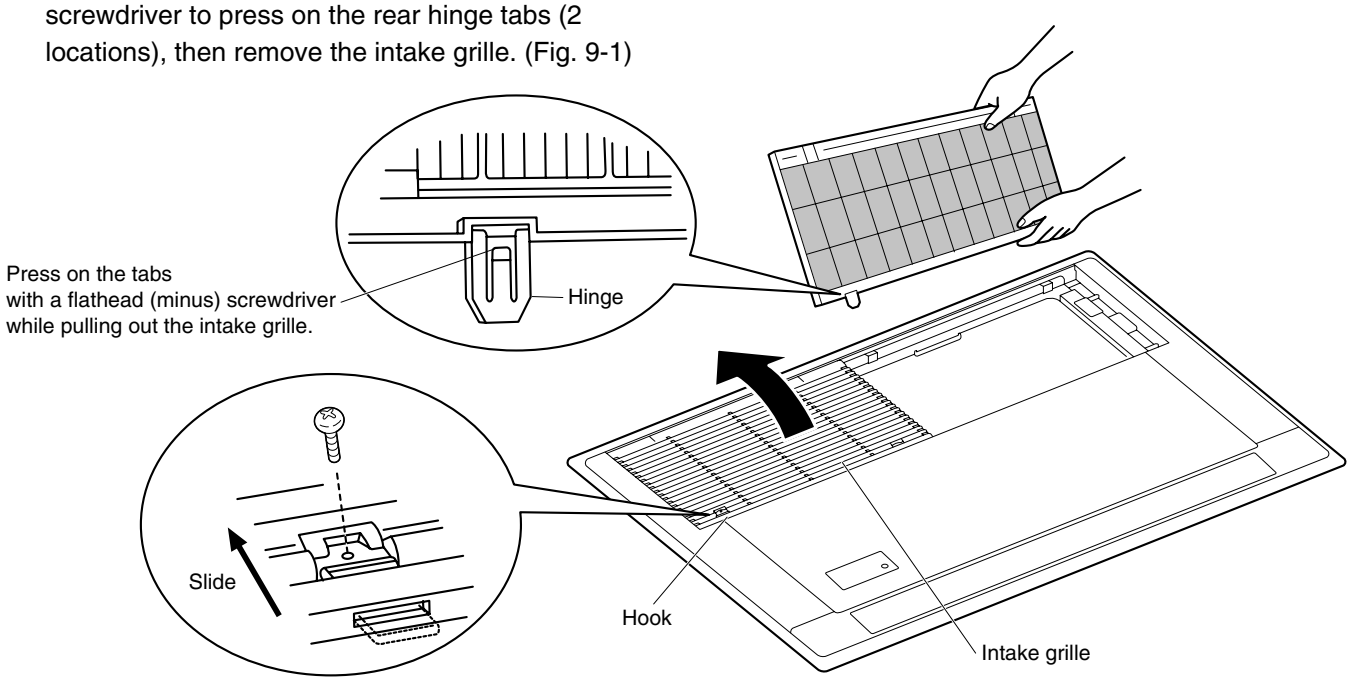


Fig. 9-1

2. Removing the side panels

(1) Slide the side panels in the direction of the arrow ① to remove them (2 locations, left and right). (Fig. 9-2)

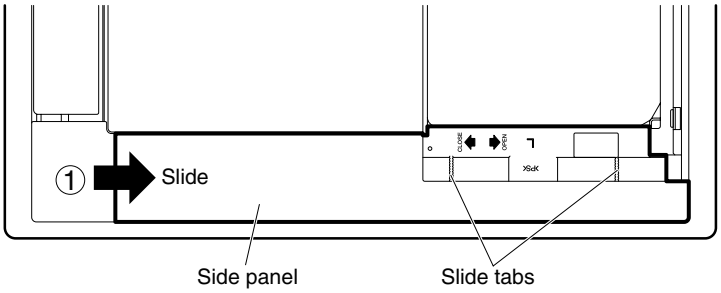


Fig. 9-2

3. Installing the ceiling panel

(1) Fasten the hooks on both sides of the ceiling panel to the indoor unit. The hooks on one side (2 locations) are stationary, while the hook on the other side is moveable. (Fig. 9-3)

(2) Place the panel at a slight angle, and fasten the panel stationary hooks onto the hook receivers on the side of the indoor unit.

(3) After verifying that the hooks are fastened, press the other side of the panel up so that it is level. Press up until the moveable hook has fastened to the hook receiver on the indoor unit.

(4) Verify that the hooks on both sides of the ceiling panel have been securely fastened before removing your hands. At this point the panel is provisionally attached to the indoor unit.

- When removing the panel, press the moveable hook toward the inside while being careful to support the panel. (Fig. 9-4)

(5) Align the panel installation holes with the screw holes in the indoor unit.

(6) Fit the supplied washer-head screws into the 4 panel installation holes, and tighten them until the panel is tightly attached to the indoor unit. (Fig. 9-5)

(7) Fit the supplied screws into the holes at the panel center (2 locations, front and rear), and tighten them. As shown in the Fig. 9-6, open the screw cover at the center of the discharge outlet, then insert and tighten the screw, and again close the cover.

(8) Verify that the panel is tightly attached to the ceiling.

- At this time, make sure there is no gap between the indoor unit and the ceiling panel, or between the ceiling panel and the ceiling surface. (Fig. 9-7)
- If there is a gap between the panel and the ceiling surface, leave the panel attached and make fine adjustments to the installation height of the indoor unit to eliminate the gap with the ceiling surface. (Fig. 9-8)

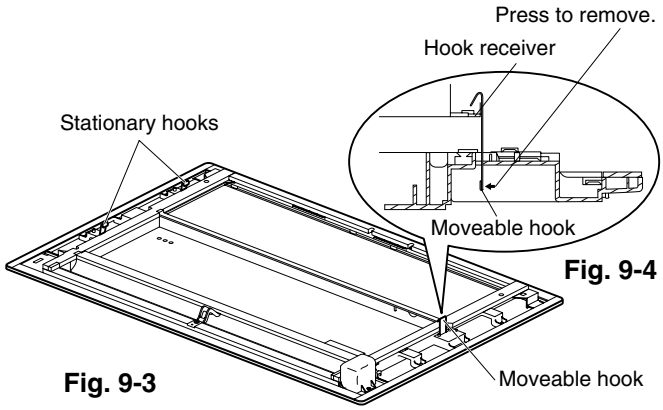


Fig. 9-4

Fig. 9-3

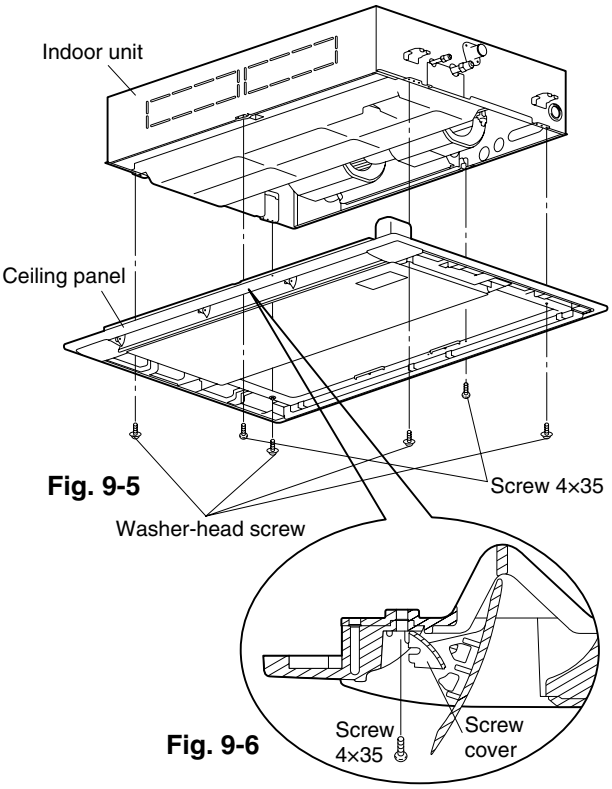


Fig. 9-5

Fig. 9-6

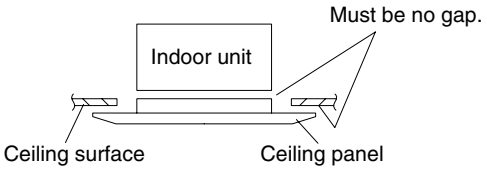


Fig. 9-7

Insert a spanner or other general tool through the side panel installation hole and make fine adjustments to the indoor unit nuts.

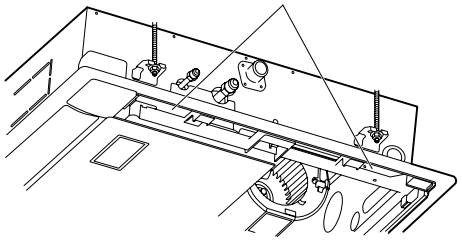
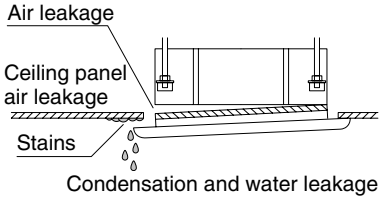


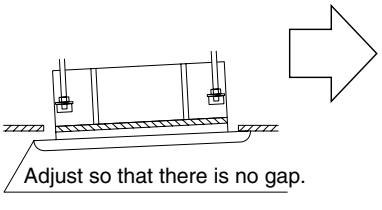
Fig. 9-8

CAUTION

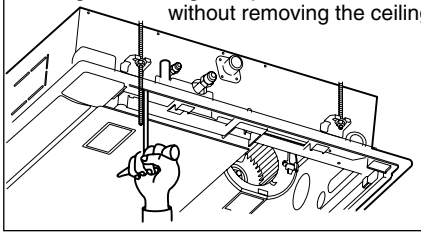
- If the screws are not fully tightened, problems such as those shown below may occur. Be sure to tighten the screws securely.



- If there is a gap between the ceiling surface and the ceiling panel even when the screws are fully tightened, readjust the height of the indoor unit.



For small adjustments that do not affect the levelness of the indoor unit, drain piping or other key elements, the unit height can be adjusted through the ceiling side panel installation holes without removing the ceiling panel.



4. Wiring the ceiling panel

(1) Remove the cover from the electrical component box. (Fig. 9-9)

(2) Fasten the wiring connector (7P, red) that emerges from the ceiling panel using the lead wire clamps on the indoor unit side (2 locations). Then connect it to the connector in the indoor unit electrical component box. (Fig. 9-10)

- If the connector is not connected, the automatic flap will not operate. Connect the connector securely.
- Verify that the wiring connector is not pinched between the electrical component box and the cover.
- Verify that the wiring connector is not pinched between the indoor unit and the ceiling panel.

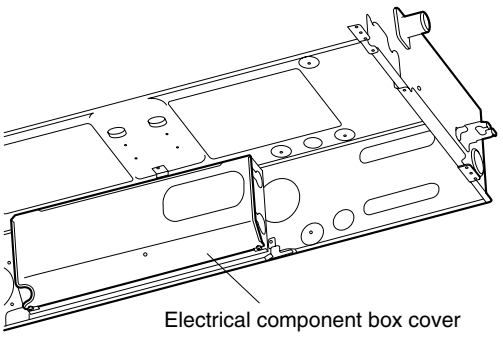


Fig. 9-9

5. Installing the side panel and intake grille

A. Installing the side panel

(1) Slide the side panel in the direction of the arrow to install it. (Fig. 9-11)

(2) Use the supplied screws (4 × 12) to attach the side panel to the ceiling panel.

B. Installing the intake grille

- To install the intake grille, follow the steps for removing the intake grille in the reverse order.
- When installing the intake grille, take care that the flap lead wire does not become pinched. (Fig. 9-12)

* Fasten with the indoor unit lead wire clamps (2 locations).

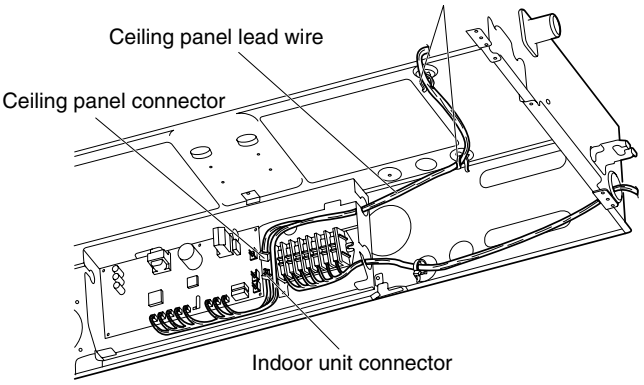
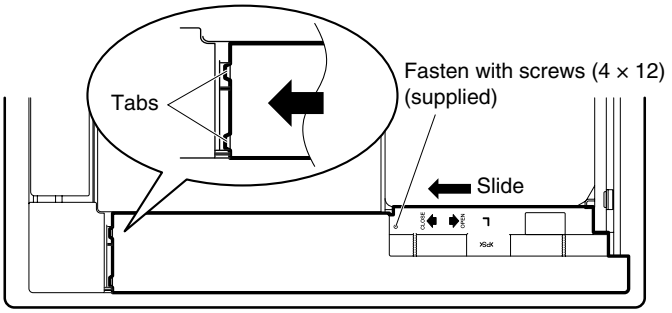


Fig. 9-10



Slide the side panel so that the side panel tabs are fastened to the ceiling panel. Then fasten in place with the supplied screws (4 × 12).

Fig. 9-11

9-2. Other

A. Check after installation

- Verify again that there is no gap between the indoor unit and the ceiling panel, or between the ceiling panel and the ceiling surface.
  *If a gap is present, water leakage and condensation may occur.
- Verify that the wiring connections are secure.
  *If the wiring is not connected, the automatic flap will not operate. (Alarm P09 will be displayed at the remote controller.) In addition, water leakage and condensation may occur.

B. Units with wireless remote controllers

- For details of the installation procedure, refer to the installation manual that was supplied with the optional wireless remote controller with receiver embedded in the indoor unit.

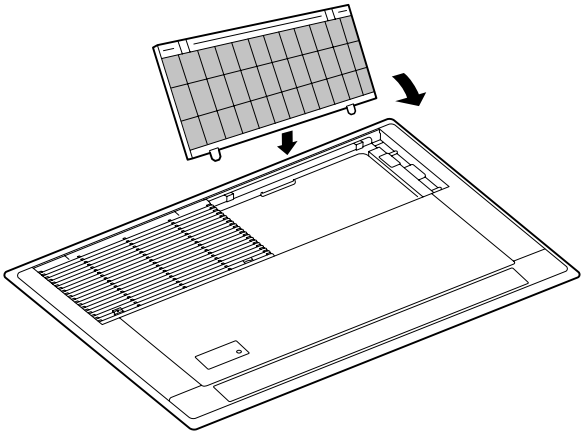


Fig. 9-12

■ 2-Way Air Discharge Semi-Concealed Type (NK2FL Type) (For 7, 9, 12, 16, 18 Types)

9-3. Before Installing the Ceiling Panel

(1) Be sure to create a ceiling opening with the dimensions shown in Fig. 3-18.

(2) Use the suspension bolts to adjust the height of the indoor unit so that the distance between the bottom of the indoor unit or optional filter chamber and the ceiling surface is 60 – 65 mm. (Fig. 9-13)

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.

9-4. Installing the Ceiling Panel

(1) Remove the air intake panel and air filter.

[1] Removing the air intake panel
Disconnect one side of the air intake panel, in sequence from A – E in Fig. 9-14, then disconnect the other side.

[2] Removing the air filter
Press the hook by hand to remove the air filter. (Fig. 9-15)

(2) Install the ceiling panel onto the indoor unit. (See Fig. 9-15. The connector is on the electrical component box.)

[1] Fasten the stationary fasteners (opposite side of the connector) to the indoor unit. (Fig. 9-16a) Next, lift up the connector side and fasten the moveable fastener onto the indoor unit. (Fig. 9-16b)
At this time, check that the moveable fastener locks with a click sound onto the indoor unit. The ceiling panel includes these provisional-fastening fasteners to facilitate installation onto the indoor unit.

[2] Check that the ceiling panel is provisionally fastened to the indoor unit.

[3] Next use the supplied screws (four M5 × L40 screws with washers) to fasten the ceiling panel in place.

[4] When installation of the ceiling panel is completed, connect the 8P red connector inside the indoor unit electrical component box to the connector from the ceiling panel. (Fig. 9-17) (If this connector is not connected, the error message “P09” is displayed on the remote controller and the unit will not operate.)

[5] Check that the ceiling panel and ceiling surface are in tight contact, then install the air filter and air intake panel.

9-5. 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. (Figs. 9-16a and 9-16b)

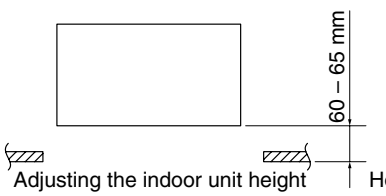


Fig. 9-13

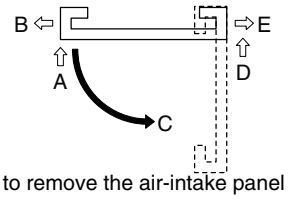


Fig. 9-14

Installing the Ceiling Panel

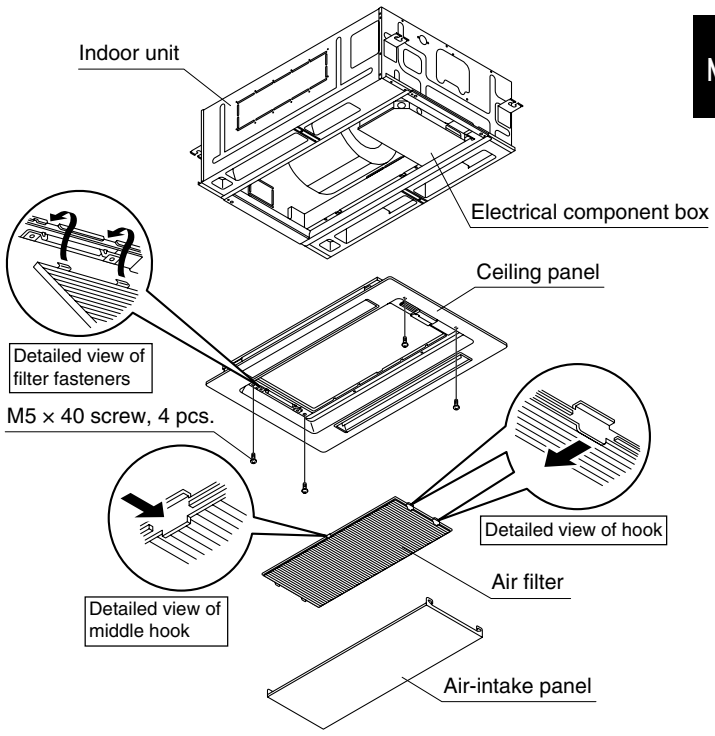


Fig. 9-15

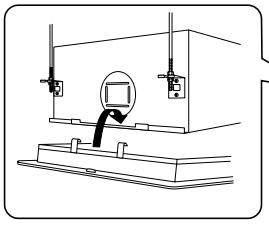


Fig. 9-16a

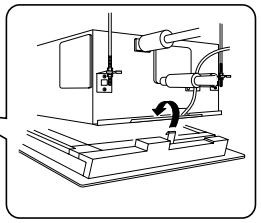


Fig. 9-16b

Connecting the connector

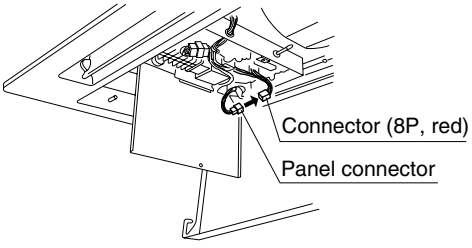


Fig. 9-17

Operating the moveable fastener

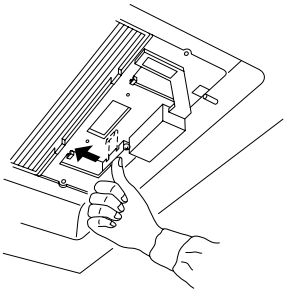


Fig. 9-18

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.

■ 2-Way Air Discharge Semi-Concealed Type (NK2FL Type) (For 24 Type)

NK2FL

9-6. 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. 9-19 while following the installation gauge.

(2) Remove the air-intake panel and the air filter from the ceiling panel as shown in Figs. 9-20 and 9-21.

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.

9-7. 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. 9-22.

NOTE

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

(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.

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. 9-20 and 9-21 in reverse.

9-8. 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. 9-22)

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.

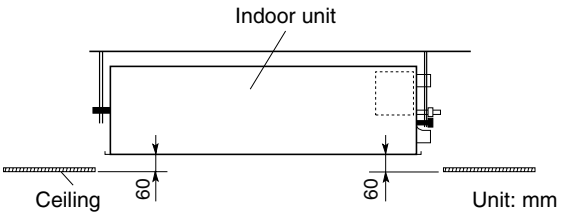


Fig. 9-19

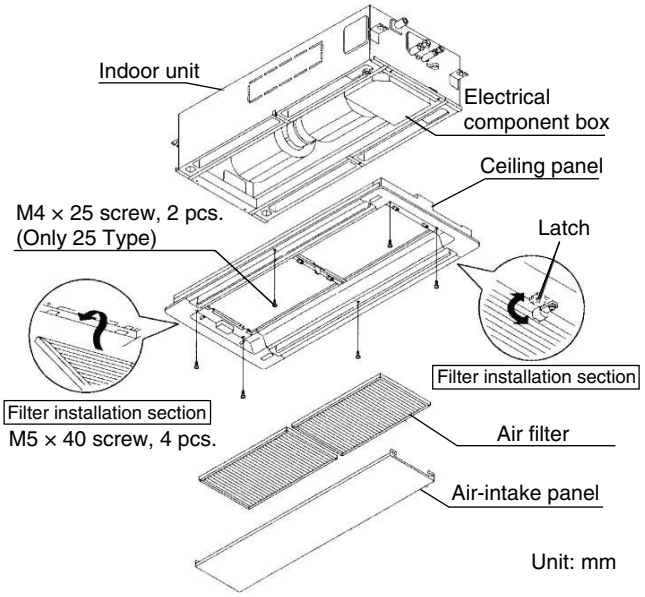


Fig. 9-20

How to remove the air-intake panel (from either side).

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

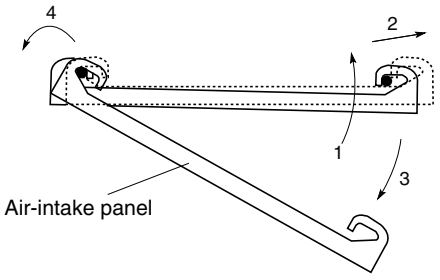


Fig. 9-21

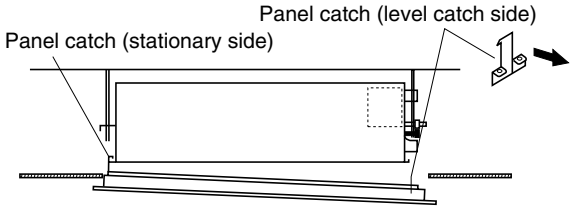


Fig. 9-22

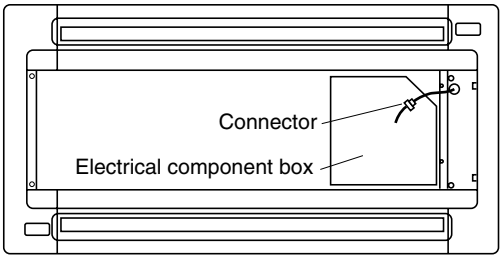


Fig. 9-23

■ 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.

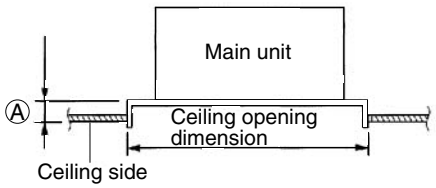


Fig. 9-24

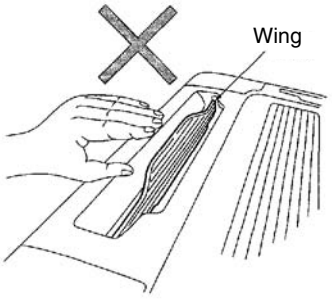


Fig. 9-25a

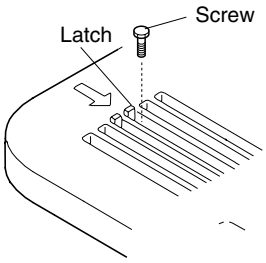


Fig. 9-25b

9-9. Before Installing the Ceiling Panel

(1) Remove the air-intake grille and air filter from the ceiling panel. (Figs. 9-25b, 9-26 and 9-27)

a) Remove the 2 screws on the latch of the air-intake grille. (Fig. 9-25b)

b) Slide the air-intake grille catches in the direction shown by the arrows ① to open the grille. (Fig. 9-26)

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. 9-27)

(2) Removing the corner cover

a) Slide the corner cover to the direction shown by the arrow ① to remove the corner cover. (Fig. 9-28).

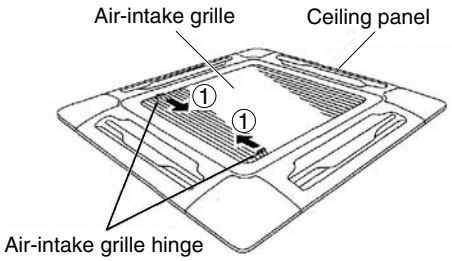


Fig. 9-26

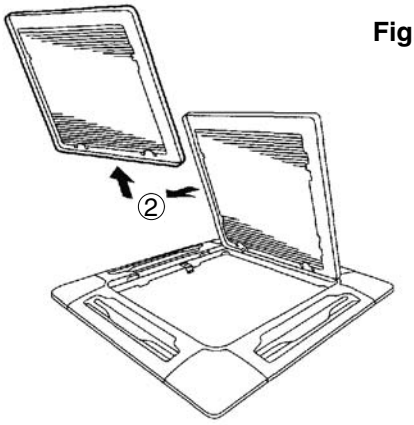


Fig. 9-27

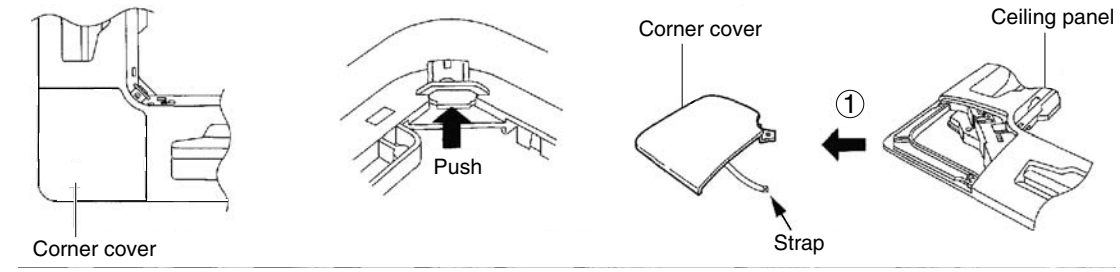


Fig. 9-28

9-10. 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. 9-29)

- 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. 9-29)

(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. 9-30)

(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. 9-31)

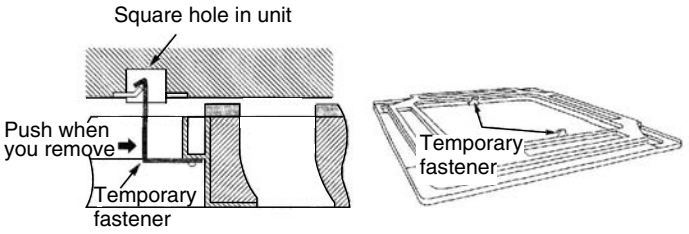


Fig. 9-29

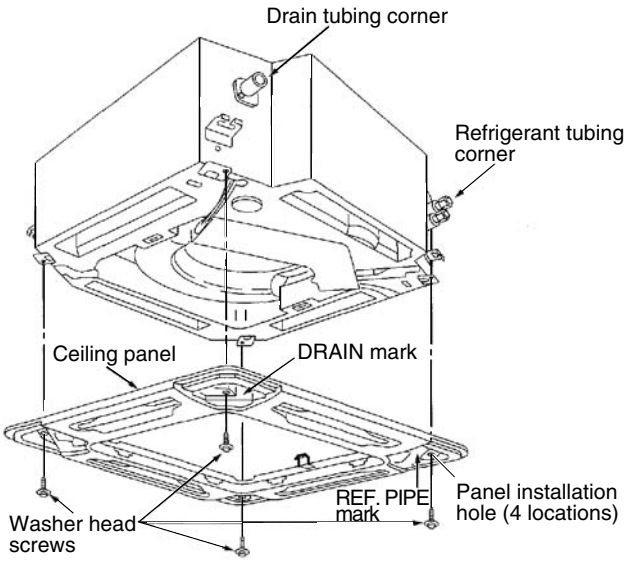


Fig. 9-30

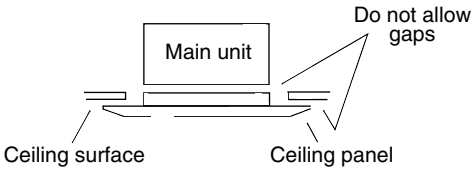


Fig. 9-31

- 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. 9-33)

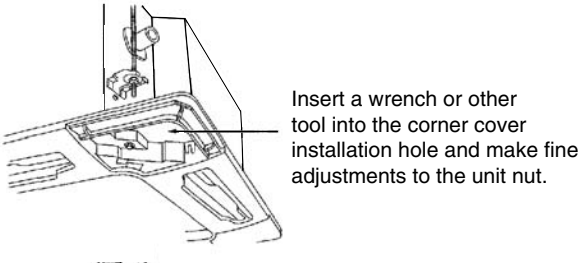


Fig. 9-32

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.

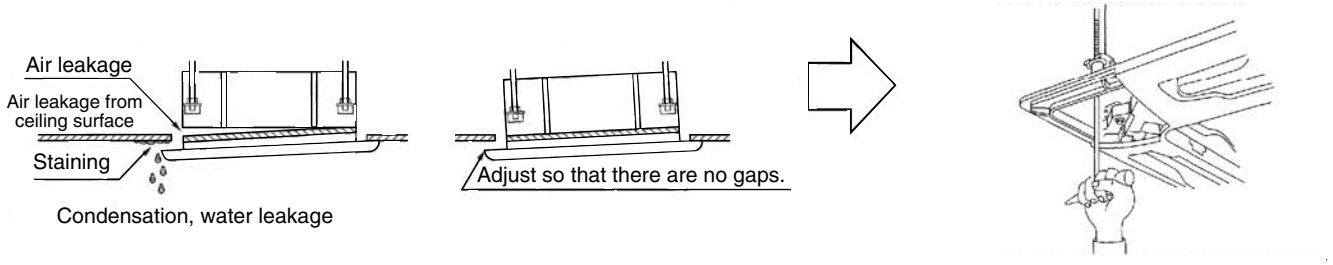


Fig. 9-33

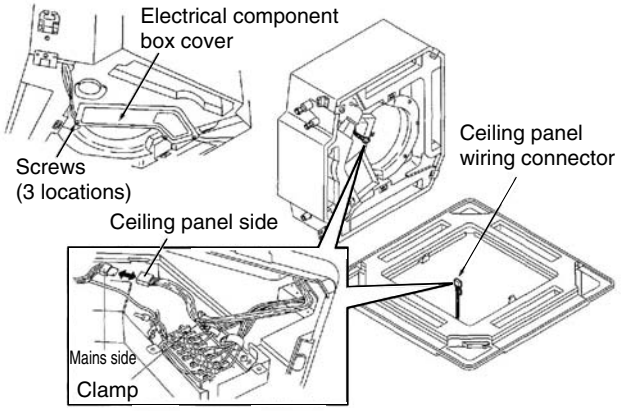
9-11. Wiring the Ceiling Panel

(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. 9-34

9-12. How to Attach the Corner & Air Intake Grille

Attaching the corner cover and air-intake grille

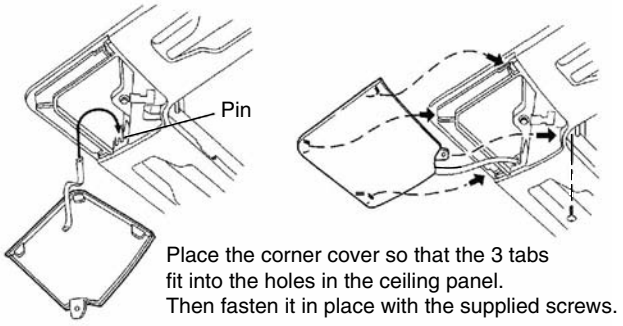
A. Attaching the corner cover

(1) Check that the safety cord from the corner cover is fastened to the ceiling panel pin, as shown in the figure. (Fig. 9-36)

(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. 9-35

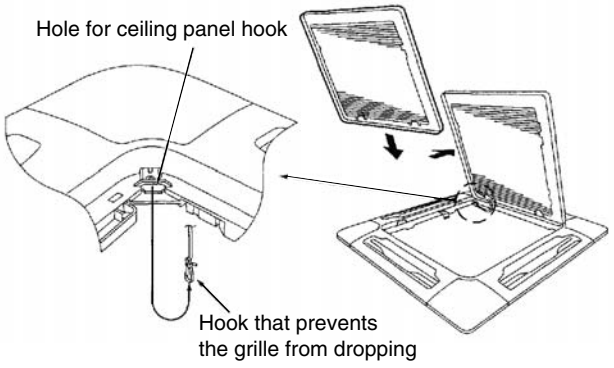


Fig. 9-36

- 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.

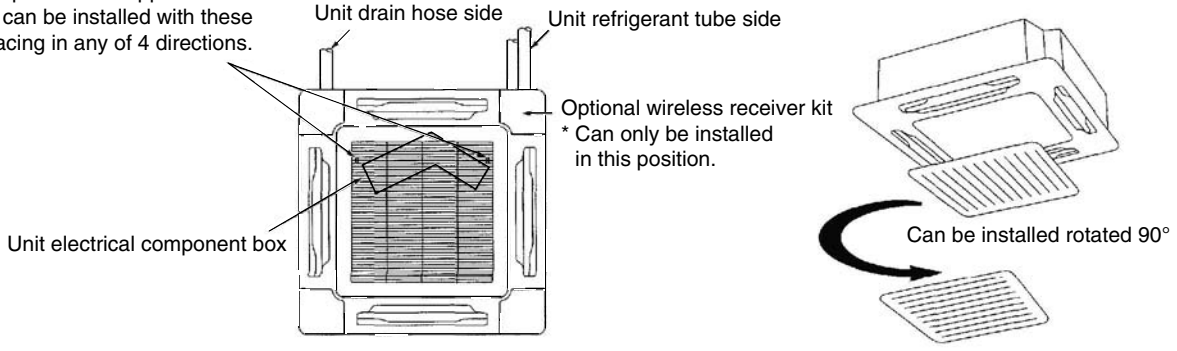


Fig. 9-37

9-13. 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.

9-14. 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.

9-15. 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.

■ 4-Way Air Discharge Mini Semi-Concealed Type (CAV Type)

Checking the unit position

(1) Check that the ceiling hole is within this range: 600 × 600 mm

(2) Confirm that the position of the indoor unit and the ceiling as shown in the diagram. If the positions of the ceiling surface and unit do not match, air leakage, water leakage, flap operation failure, or other problems may occur.

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.)**

9-16. Before Installing the Ceiling Panel

(1) Remove the air-intake grille and air filter from the ceiling panel. (See Fig. 9-40)

a) Slide the air-intake grille catches in the direction shown by the arrows ① to open the grille.

b) 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.

(2) Removing the corner cover (See Fig. 9-41)

a) Remove the screws on the corner and slide the latches in the direction of the arrow ① to disconnect the hinges (3 locations). Then, remove the air-intake grille in the direction of the arrow ②.

Ⓐ must be within the range of 13 – 18 mm.
If not within this range, malfunction or other trouble may occur.

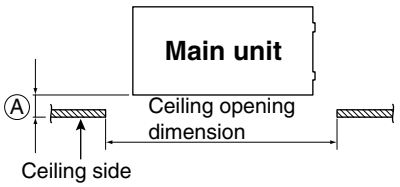


Fig. 9-38

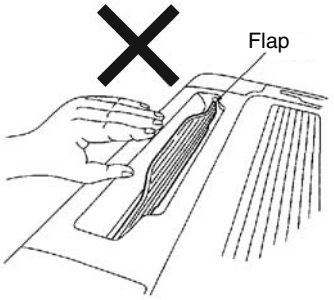
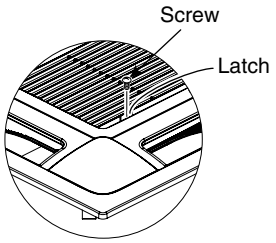


Fig. 9-39



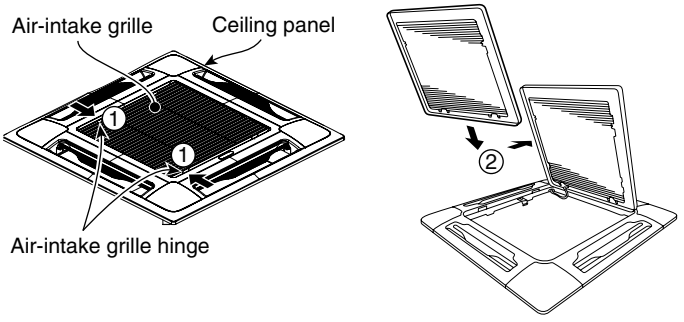
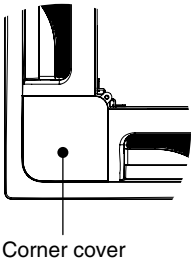
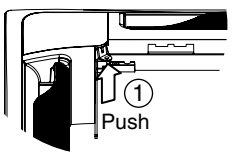


Fig. 9-40





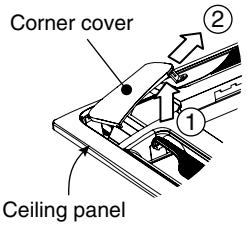


Fig. 9-41

9-17. 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) Hang the temporary latches on the inside of the ceiling panel to the receptacle on the unit to temporarily attach the ceiling panel in place.

- 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.

(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.

(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.
- 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.

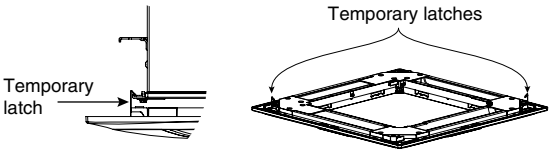


Fig. 9-42

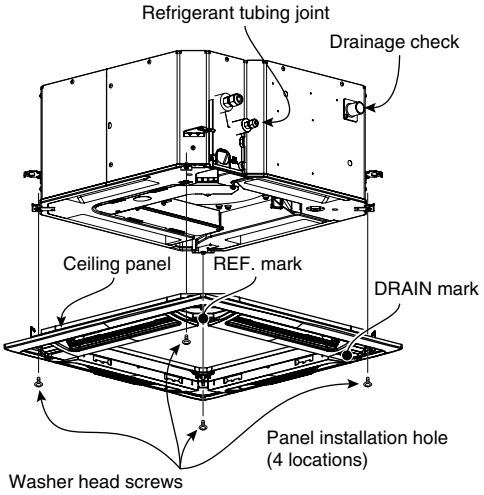


Fig. 9-43

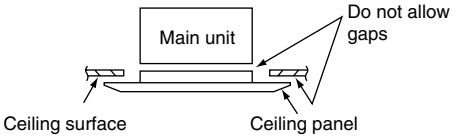
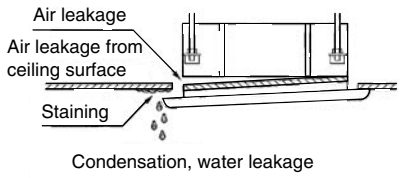


Fig. 9-44

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.

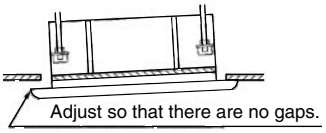


Fig. 9-45

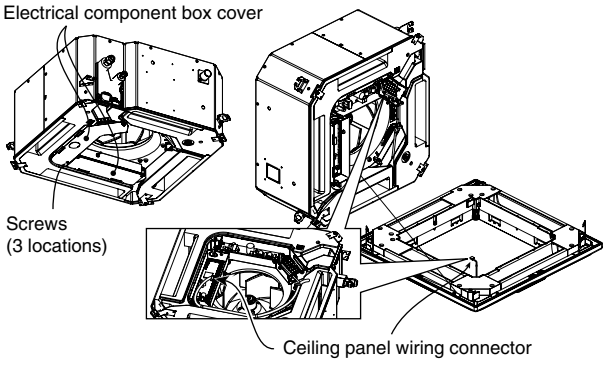
9-18. Wiring the Ceiling Panel

(1) Open the cover of the electrical component box for control PCB.

(2) Connect the 7P wiring connector (red) from the ceiling panel to the connector on the control PCB 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. 9-46

9-19. How to Attach the Corner & Air-Intake Grille

Attaching the corner cover and air-intake grille

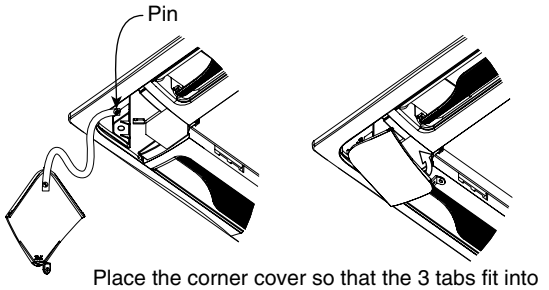
A. Attaching the corner cover

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

(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.**
- 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.



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. 9-47

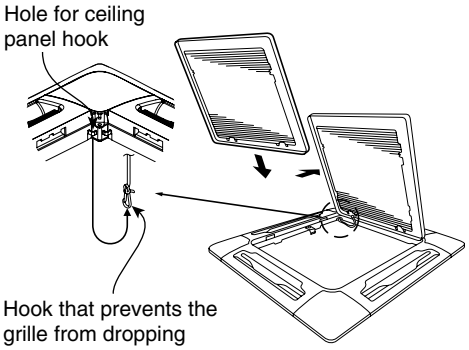


Fig. 9-48

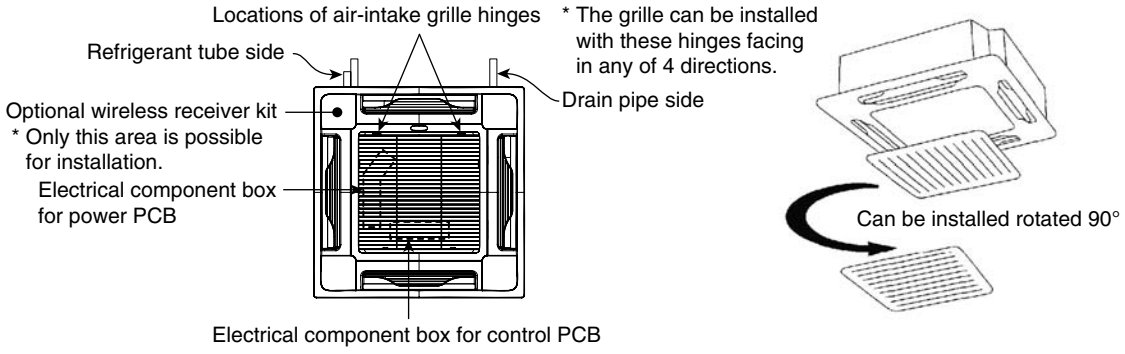


Fig. 9-49

9-20. 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.

9-21. 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.

9-22. 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) All loose matter is removed from the cabinet, especially steel filings, bits of wire, and clips.

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

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

(4) 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)

(5) Both the gas and liquid tube service valves are open. If not, open them now. (Fig. 10-2)

(6) 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.

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

(8) 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.

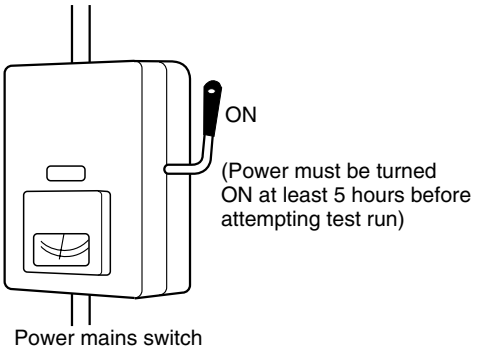


Fig. 10-1

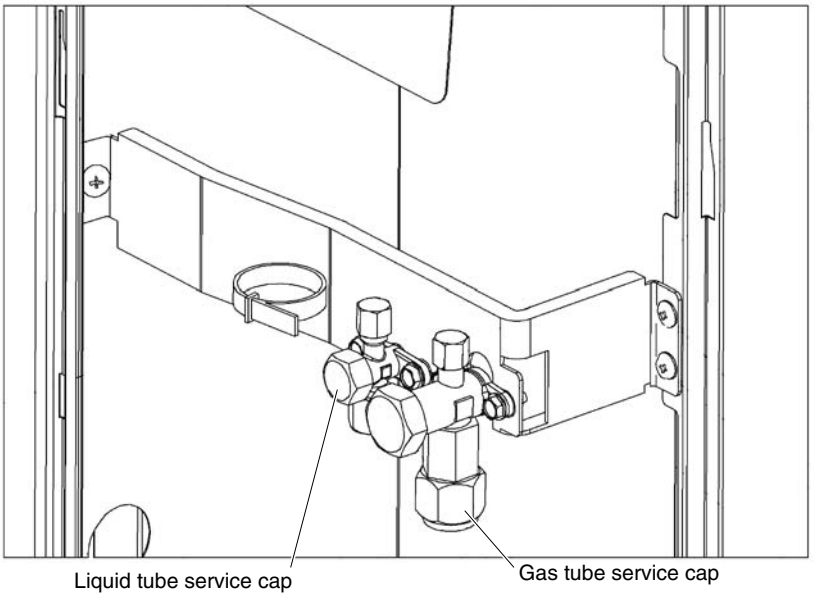
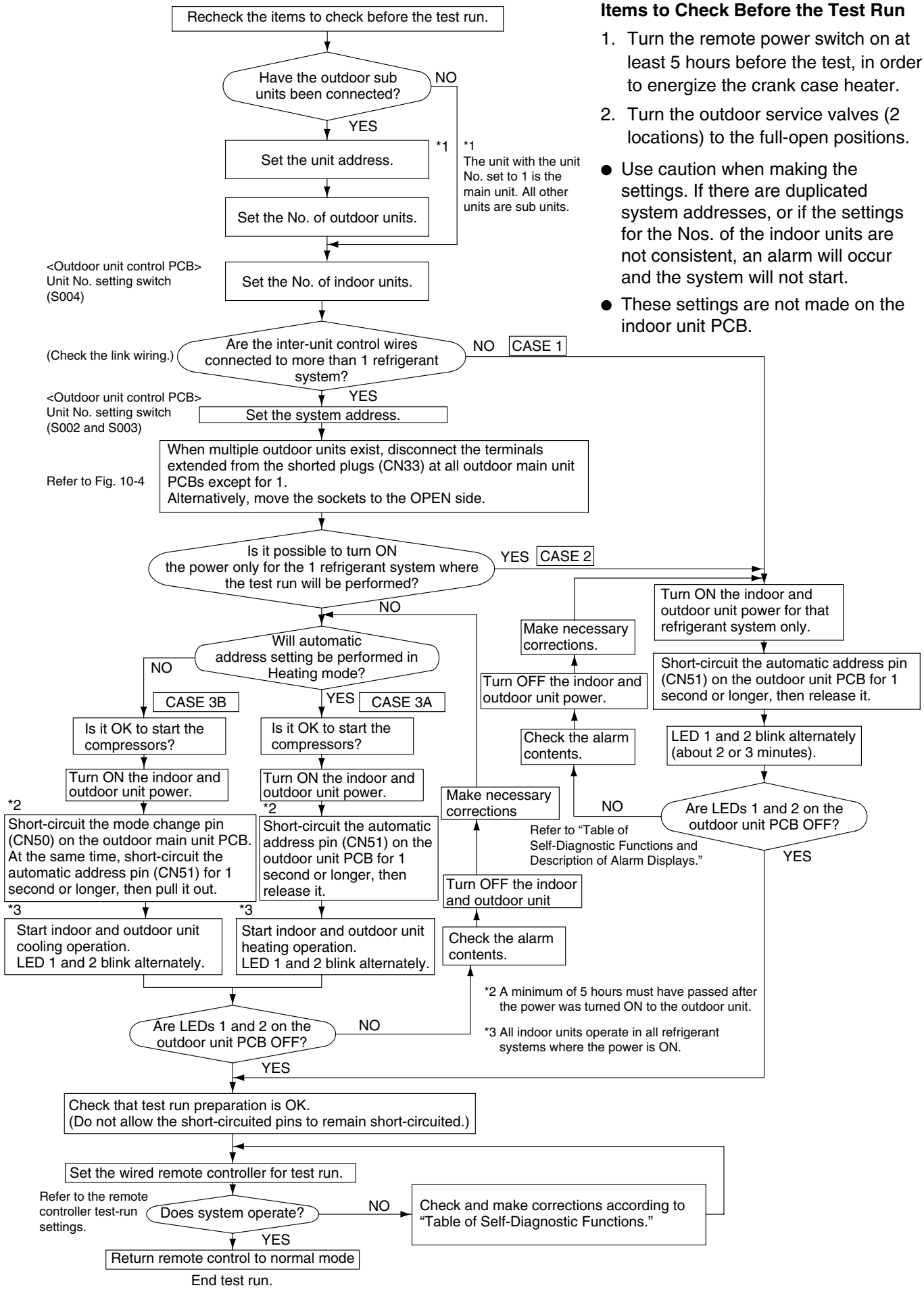


Fig. 10-2

10-2. Test Run Procedure



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 (2 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.

Fig. 10-3

10-3. Outdoor Unit PCB Setting

(for single-phase outdoor unit PCB)

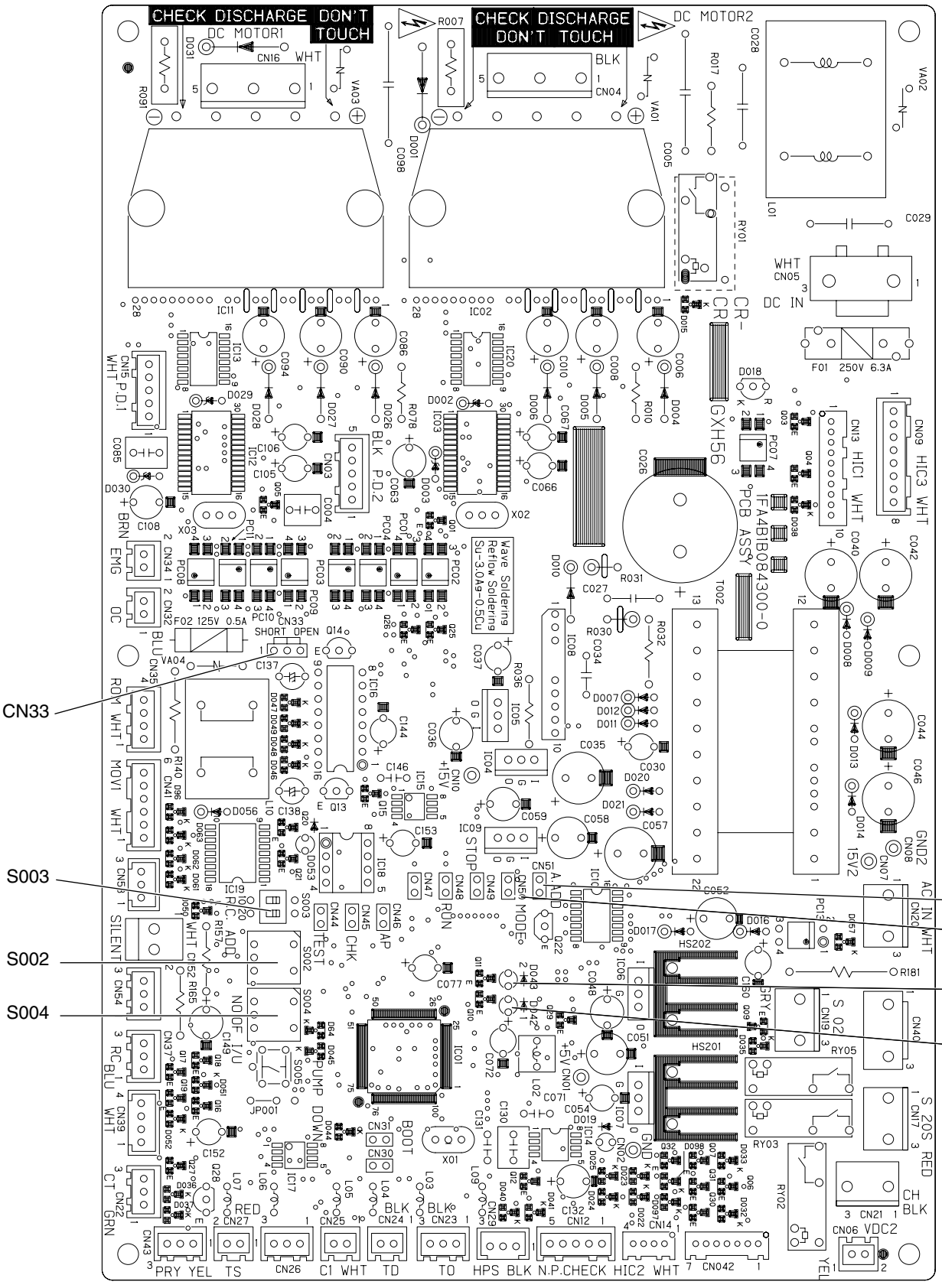


Fig. 10-4a

(for 3-phase outdoor unit PCB)

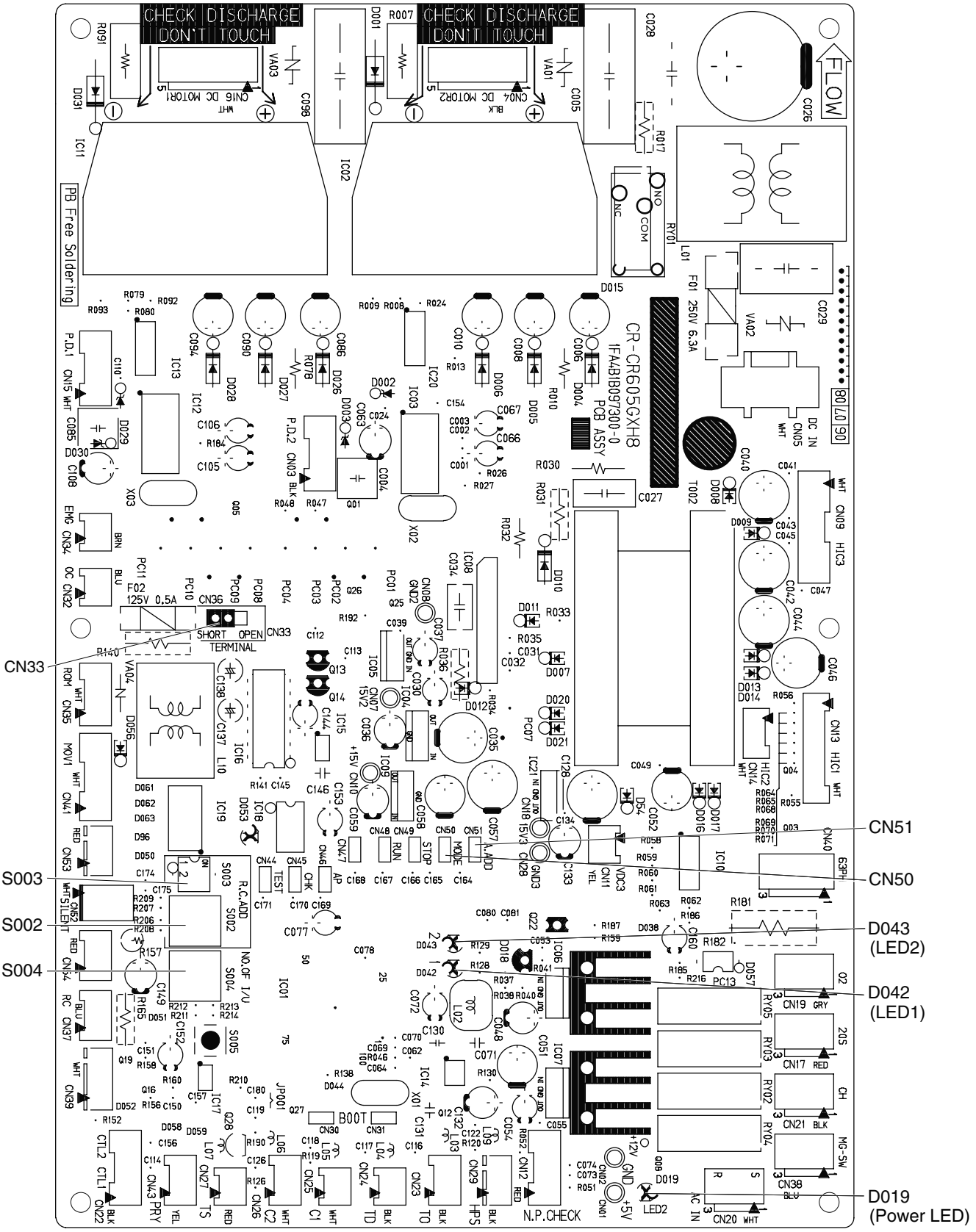
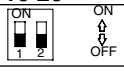
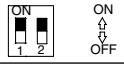


Fig. 10-4b

● **Examples of the No. of indoor units settings**

No. of indoor units	Indoor unit setting (S004) (Rotary switch, red)
1 unit (factory setting)	 Set to 1
2 units	 Set to 2
≀	≀
9 units	 Set to 9

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

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

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.

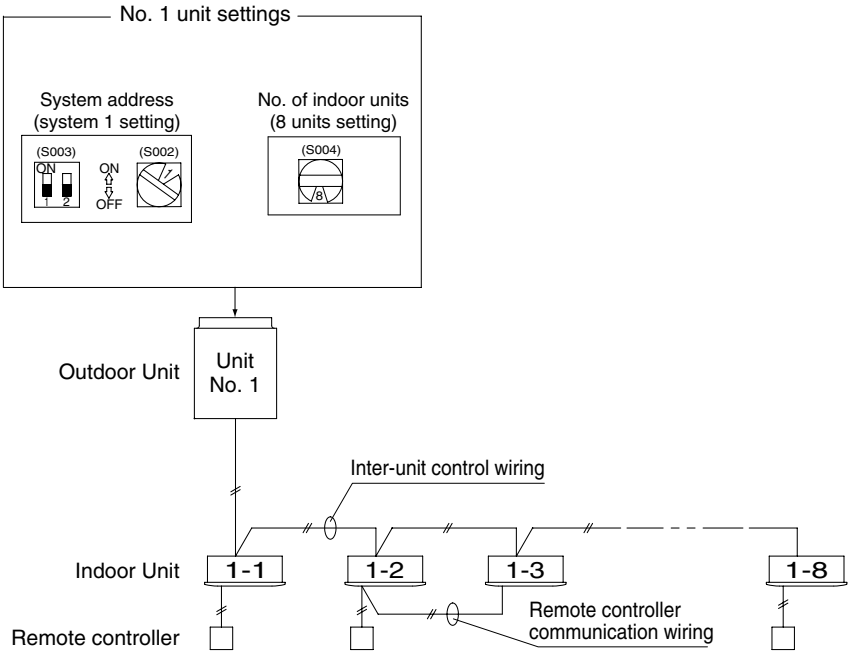


Fig. 10-5

(1) Automatic Address Setting from the Outdoor Unit

1. On the outdoor 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 8 on the outdoor unit control PCB, set the No. of indoor units rotary switch (S004) to “8.”
3. Turn ON the power to the indoor and outdoor units.
4. On the outdoor unit control PCB, short-circuit the automatic address pin (CN51) for 1 second or longer, then release it.

   ↓

   (Communication for automatic address setting begins.)

   ↓

   * To cancel, again short-circuit the automatic address pin (CN51) for 1 second or longer, then pull it out.
   The LED that indicates that automatic address setting is in progress turns OFF and the process is stopped.

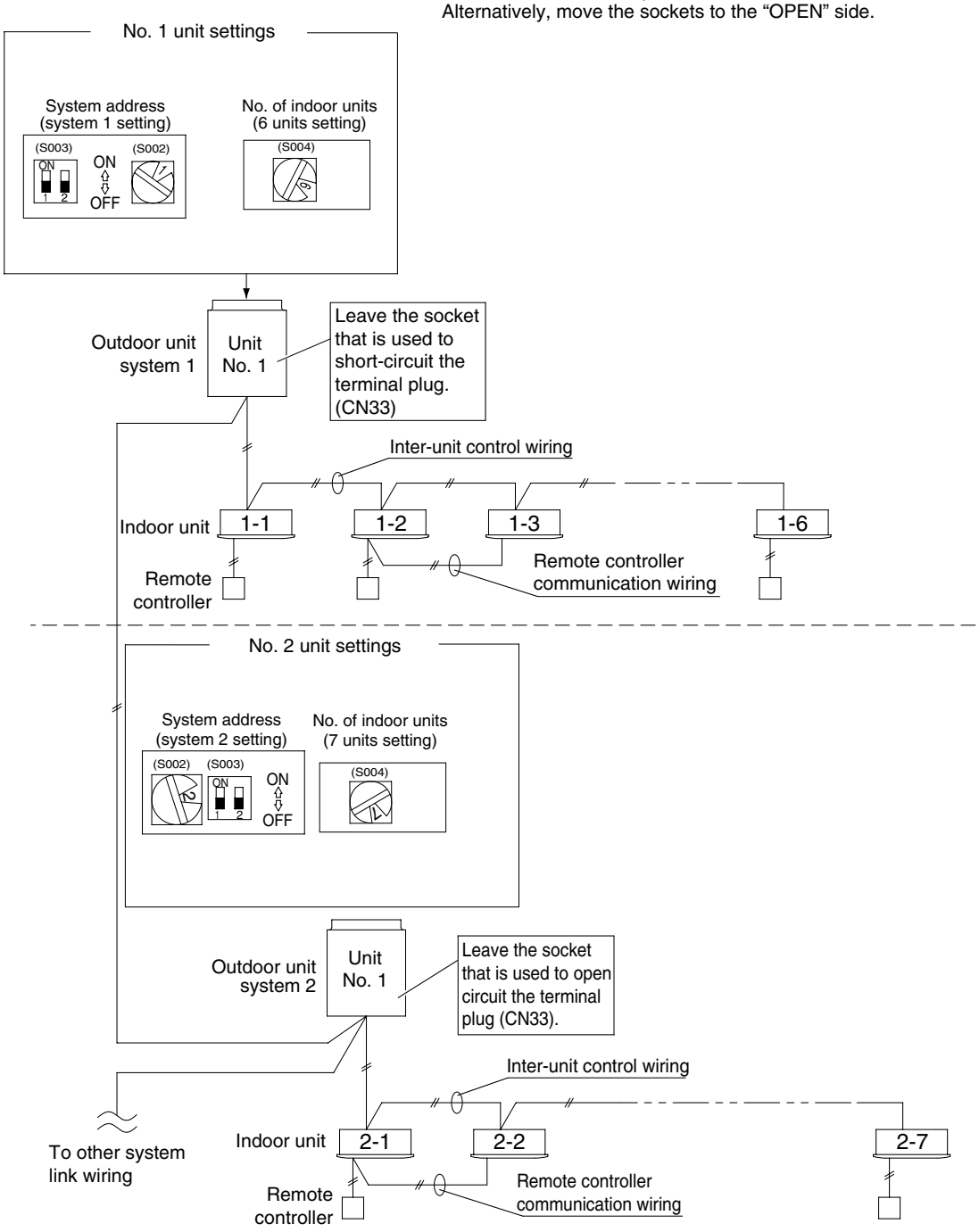
   (Automatic address setting is completed when LEDs 1 and 2 on the outdoor unit control PCB turn OFF.)

   ↓
5. Operation from the remote controllers is now possible.
   * To perform automatic address setting from the remote controller, perform steps 1 to 3, 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 units exist, remove the socket that is used to short-circuit the terminal plug (CN33) from all outdoor 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 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 6 on the outdoor unit control PCB, set the No. of indoor units rotary switch (S004) to “6.”
3. At the outdoor unit where all indoor and outdoor unit power has been turned ON, short-circuit the automatic address pin (CN51) for 1 second or longer, then pull it out.

   ↓

   (Communication for automatic address setting begins.)

   ↓ * To cancel, again short-circuit the automatic address pin (CN51) for 1 second or longer, then pull it out. The LED that indicates automatic address setting is in progress turns OFF and the process is stopped.

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

   ↓
4. Next turn the power ON only for the indoor and outdoor units of the next (different) system. Repeat steps 1 – 3 in the same way to complete automatic address settings for all systems.

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

   * To perform automatic address setting from the remote controller, perform steps 1 and 2, then use the remote controller 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 and 2 in the same way as for Case 1.
2. Turn the indoor and outdoor unit power ON at all systems.

   ↓
3. To perform automatic address setting in Heating mode, on the outdoor unit control PCB in the refrigerant system where you wish to set the addresses, short-circuit the automatic address pin (CN51) for 1 second or longer, then pull it out.
   (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 (CN51) for 1 second or longer, then pull it out.
   The LED that indicates automatic address setting is in progress turns OFF and the process is stopped.

   (Automatic address setting is completed when the compressors stop and LEDs 1 and 2 on the outdoor unit control PCB turn OFF.)
4. At the outdoor unit in the next (different) system, short-circuit the automatic address pin (CN51) for 1 second or longer, then pull it out.

   ↓

   (Repeat the same steps to complete automatic address setting for all units.)

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

   * To perform automatic address setting from the remote controller, perform steps 1 and 2, then use the remote controller 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 and 2 in the same way as for Case 1.
2. Turn the indoor and outdoor unit power ON at all systems.

   ↓
3. 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 (CN50). At the same time, short-circuit the automatic address pin (CN51) for 1 second or longer, then pull it out. (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 (CN51) for 1 second or longer, then pull it out. The LED that indicates automatic address setting is in progress turns OFF and the process is stopped.

   (Automatic address setting is completed when the compressors stop and LEDs 1 and 2 on the outdoor unit control PCB turn OFF.)
4. At the outdoor unit in the next (different) system, short-circuit the automatic address pin (CN51) for 1 second or longer, then pull it out.

   ↓

   (Repeat the same steps to complete automatic address setting for all units.)

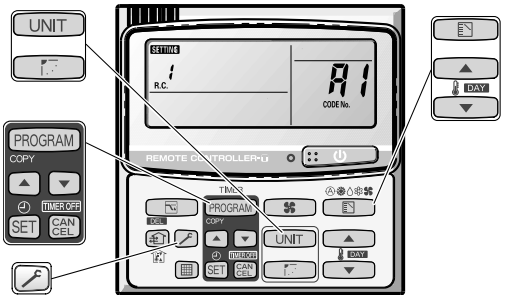
   ↓
5. Operation from the remote controllers is now possible.

* 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

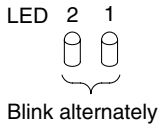
---Automatic address setting for each system: Item code “A1”



- 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, “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 unit PCB



* Do not short-circuit the automatic address setting pin (CN51) 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 D042. LED 2 is D043.

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

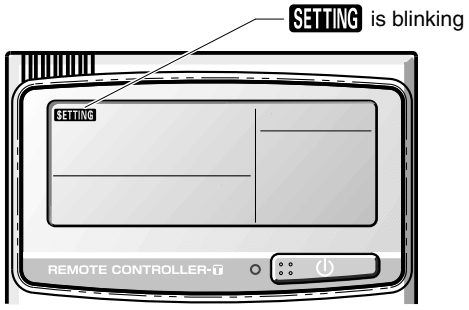
- Display details of LEDs 1 and 2 on the outdoor unit control PCB

(☼: 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.
✷	✷	Automatic address setting is in progress.
Alternating		
●	●	Automatic address setting completed.
✷	✷	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.
Simultaneous		
✷	✷	Refer to Table of Self-Diagnostic Functions and Description of Alarm Displays.
Alternating		

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

- Remote controller display during automatic setting



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 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 abraded easily.

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

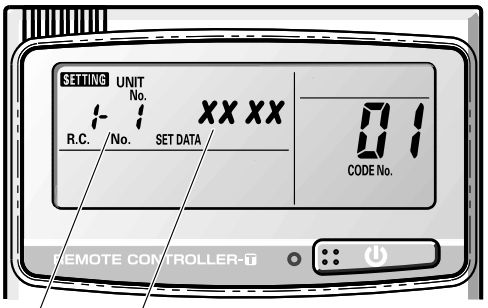
These numbers are necessary for later maintenance. Please be sure to indicate them.

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.

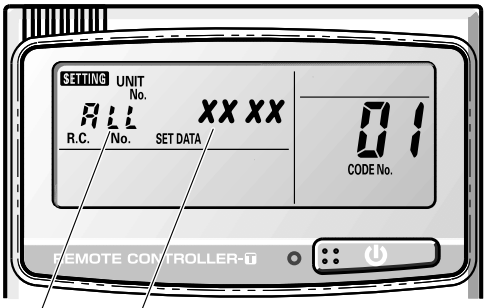


Number changes to indicate which indoor unit is currently selected.

Indoor unit address

<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.

Indoor unit address

Remote Controller Test Run Settings

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

- “TEST” 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” 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.

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.**

10-6. 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 (D042, D043) on the outdoor unit PCB. They are also displayed on the wired remote controller.

● Viewing the LED 1 and 2 (D042 and D043) alarm displays

LED 1	LED 2	Alarm contents
☼	☼	Alarm display LED 1 blinks M times, then LED 2 blinks N times. The cycle then repeats. M = 2: P alarm 3: H alarm 4: E alarm 5: F alarm 6: L alarm N = Alarm No. Example: LED 1 blinks 2 times, then LED 2 blinks 17 times. The cycle then repeats. 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. (Signal from main indoor unit in case of group control) Ex: Auto address is not completed.	(See note) <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. 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. When turning on the power supply, number of connected units does not correspond to number set. (Except R.C. address is “0.”)	Starting auto address setting is prohibited. 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 PCB.	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

Continued

Possible cause of malfunction				Alarm message
Serial communication errors Mis-setting	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 unit controllers that have operation more priority in refrigerant circuit.	Priority set remote controller	L05
			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-matched connection of outdoor units which have different kinds 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. Improper wiring connections of ceiling panel.		<<P01>> <<P09>>
		Float switch is activated.		<<P10>>
		Operation of protective function of fan inverter.		<<P12>>
		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
		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.) Negative (defective) N phase.		P16
		Outdoor unit fan motor is unusual.		P22
		Overcurrent at time of compressor runs more than 80 Hz (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) (See Note)		<<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 (TD)		F04
		Outdoor No. 1 coil gas temp. sensor (EXG1)		F06
		Outdoor No. 1 coil liquid temp. sensor (C1)		F07
		Outdoor air temp. sensor (TO)		F08
		Compressor intake port temperature sensor (TS)		F12
		High pressure sensor failure		F16
		Low pressure sensor failure		F17
EEPROM on indoor unit PCB failure				F29
Protective device for compressor is activated	Protective device for compressor No. 1 is activated.	EEPROM on the main or sub outdoor unit PCB 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
		Low pressure switch is activated.		H06
	Low oil level.			H07
	Oil sensor fault. (Disconnection, etc)	Comp. No. 1 oil sensor		H08
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. 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. Mis-wiring of control wiring between indoor unit, main outdoor unit and system controller. 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

11. HOW TO INSTALL THE WIRELESS REMOTE CONTROLLER RECEIVER

NOTE

Refer to the Instruction Manual attached to the optional Wireless Remote Control Unit and the optional Wireless Remote Control Receiver regarding the operation and installation.

12. SPECIAL REMARKS

■ DC Fan Tap Change Procedure for 4-Way Air Discharge Semi-Concealed (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)*

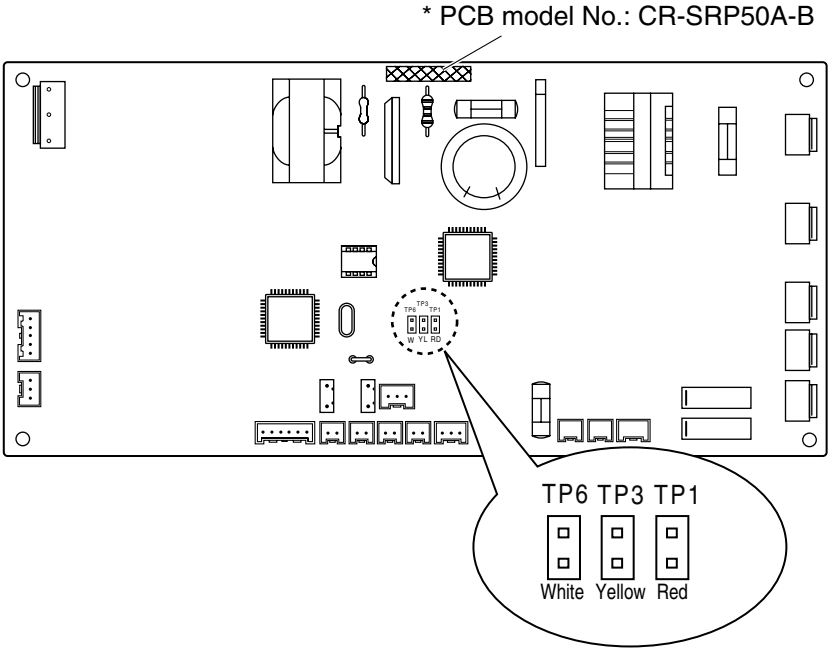
* Use field-supply air shield material.

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.

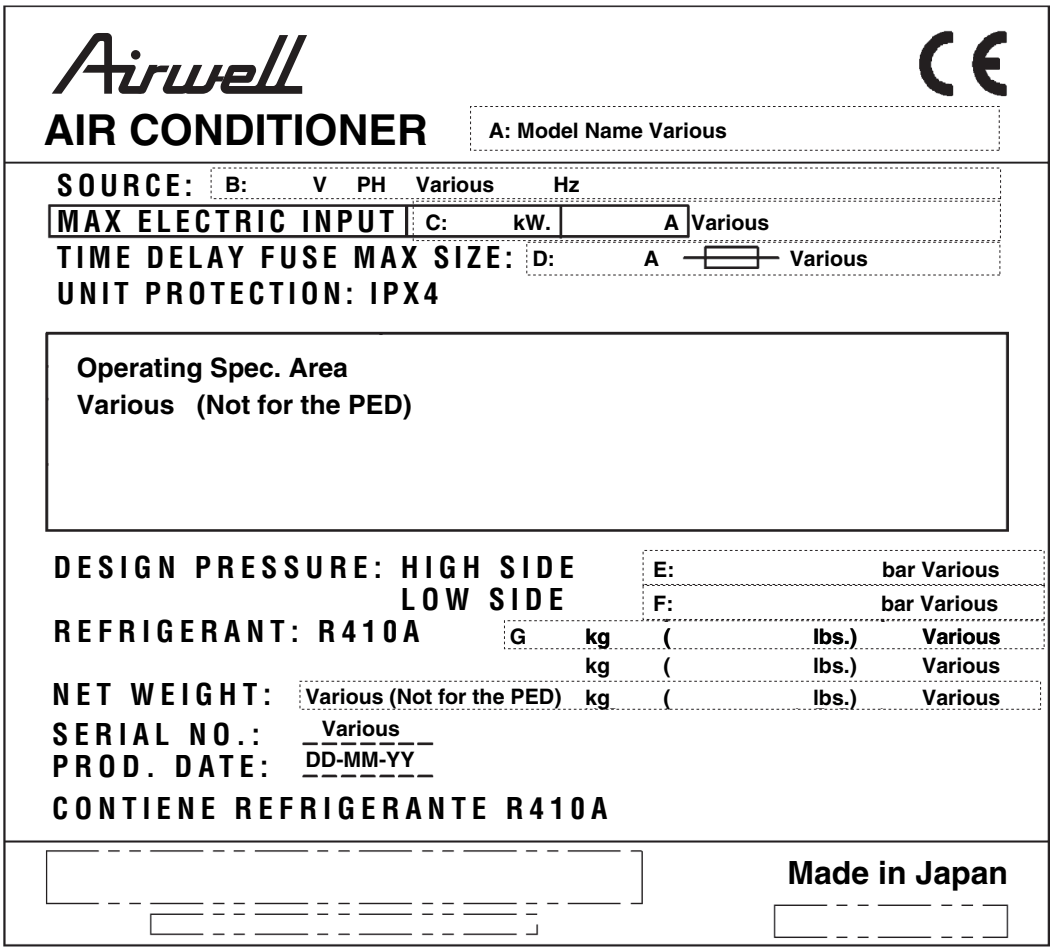
(3) Setting (b)
Open the cover of the electrical component box. Short the short-circuit pin TP6 (2P, white) on the indoor unit control PCB.

Indoor unit control PCB



13. MARKINGS FOR DIRECTIVE 97/23/EC(PED)

Rating nameplate figure



Tabulation of Various data

Single-phase outdoor unit

A	MFL 40HR	MFL 50HR	MFL 60HR	MFL 40HCR	MFL 50HCR	MFL 60HCR
B	220 - 240 V ~ 50 / 60 Hz					
C	4.28 kW, 21.0 A	4.90 kW, 24.0 A	5.72 kW, 28.0 A	4.28 kW, 21.0 A	4.90 kW, 24.0 A	5.72 kW, 28.0 A
D	25 A	35 A	35 A	25 A	35 A	35 A
E	36.0 bar					
F	22.1 bar					
G	3.5 kg					

3-phase outdoor unit

A	AWAU-GBV112-H13	AWAU-GBV140-H13	AWAU-GBV155-H13
B	380 - 415 V ~ 50 / 60 Hz		
C	6.47 kW, 9.80 A	6.80 kW, 10.3 A	7.40 kW, 11.2 A
D	20 A	20 A	20 A
E	36.0 bar		
F	22.1 bar		
G	3.5 kg		

14. APPENDIX

■ Care and Cleaning

WARNING

1. **For safety, be sure to turn the air conditioner off and also to disconnect the power before cleaning.**
2. **Do not pour water on the indoor unit to clean it. This will damage the internal components and cause an electric shock hazard.**

Air intake and outlet side (Indoor unit)

Clean the air intake and outlet side of the indoor unit with a vacuum cleaner brush, or wipe them with a clean, soft cloth.

If these parts are stained, use a clean cloth moistened with a mild liquid detergent. When cleaning the air outlet side, be careful not to force the vanes out of place.

CAUTION

1. **Never use solvents or harsh chemicals when cleaning the indoor unit. Do not wipe plastic parts using very hot water.**
2. **Some metal edges and the fins are sharp and may cause injury if handled improperly; be especially careful when you clean these parts.**
3. **The internal coil and other components of the outdoor unit must be cleaned every year. Consult your dealer or service center.**

Air filter

The air filter collects dust and other particles from the air and should be cleaned at regular intervals as indicated in the table below or when the filter indication (▦) on the display of the remote control unit (wired type) shows that the filter needs cleaning. If the filter gets blocked, the efficiency of the air conditioner drops greatly.

Type	NKFL, CAV	NK2FL	NK1FL	NPFL	NWFL, XAV	NDLP, DAV, NDHP*	NFFL, NFMFL	DEV
Period	Six months	Six months	Two weeks	Two weeks	Two weeks	(depending on filter specifications)	Two weeks	Three months

***Concealed duct type (NDLP, DAV, NDHP):**
An air filter is not provided with this air conditioner at the time of shipment. To get clean air and to extend the service life of the air conditioner, an air filter must be installed in the air intake. For installation and cleaning the air filter, consult your dealer or service center.

NOTE

The frequency with which the filter should be cleaned depends on the environment in which the unit is used.

How to clean the filter

1. Remove the air filter from the air intake grille.
2. Use a vacuum cleaner to remove light dust. If there is sticky dust on the filter, wash the filter in lukewarm, soapy water, rinse it in clean water, and dry it.

Care and Cleaning (continued)

How to remove the filter

4-way (Mini) semi-concealed type (NKFL, CAV):

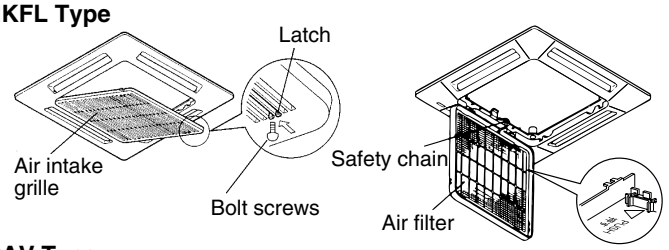
1. Use a screwdriver to remove the bolt screw on each side for the two latches. (Be sure to reattach the two bolt screws after cleaning.)
2. Press on the two latches of the air intake grille with your thumbs in the direction of the arrow to open the grille.
3. Open the air intake grille downward.

CAUTION

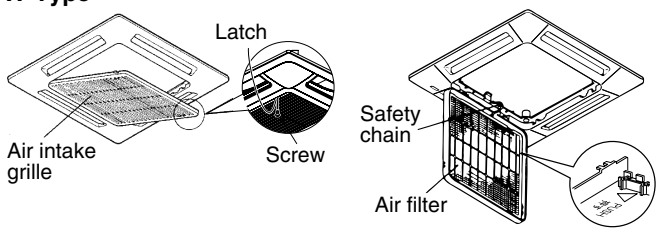
- **When cleaning the air filter, never remove the safety chain. If it is necessary to remove it for servicing and maintenance inside, be sure to reinstall the safety chain securely (hook on the grille side) after the work.**
- **When the filter has been removed, rotating parts (such as the fan), electrically charged areas, etc. will be exposed in the unit's opening. Bear in mind the dangers that these parts and areas pose, and proceed with the work carefully.**

4. Remove the air filter attached to the air intake grille.

NKFL Type

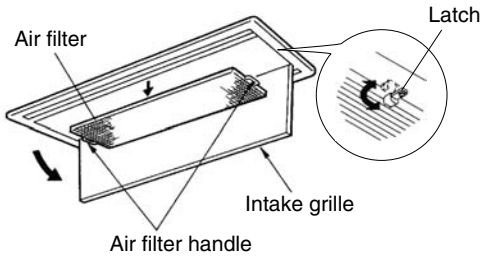


CAV Type



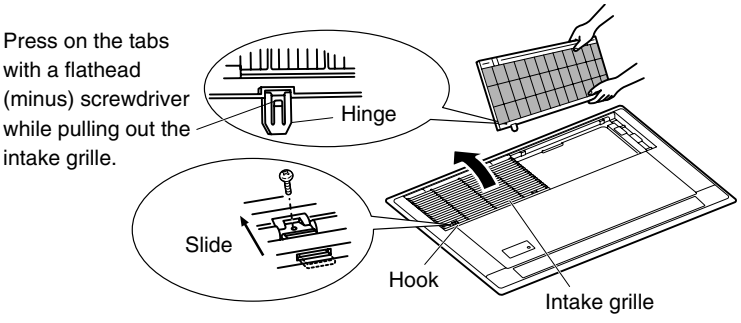
2-way semi-concealed type (NK2FL):

Grasp the intake grille, then pull it forward and allow it to drop open. Release the latch of the filter, grasp the handles and remove the air filter.



1-way semi-concealed slim type (NK1FL):

1. Remove the 2 screws which fasten each of the 2 grilles in place.
2. Slide the intake grille hooks (2 locations) in the direction of the arrow to open the intake grille.
3. When the intake grille is open, use a flathead (minus) screwdriver to press on the rear hinge tabs (2 locations), then remove the intake grille.

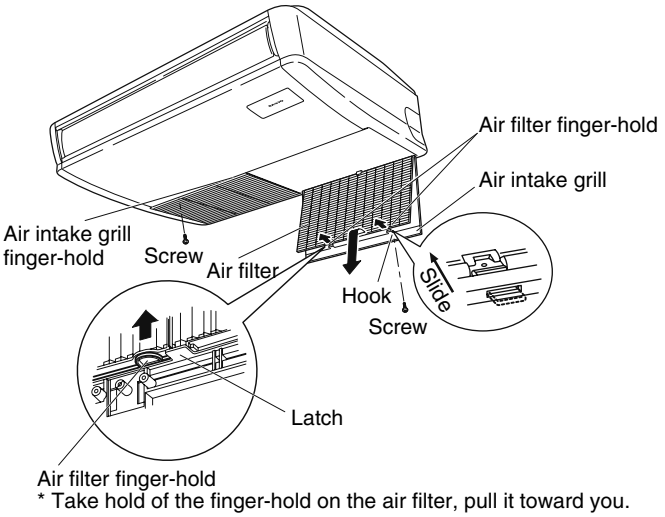


Care and Cleaning (continued)

How to remove the filter (continued)

Ceiling-mounted type (NPFL):

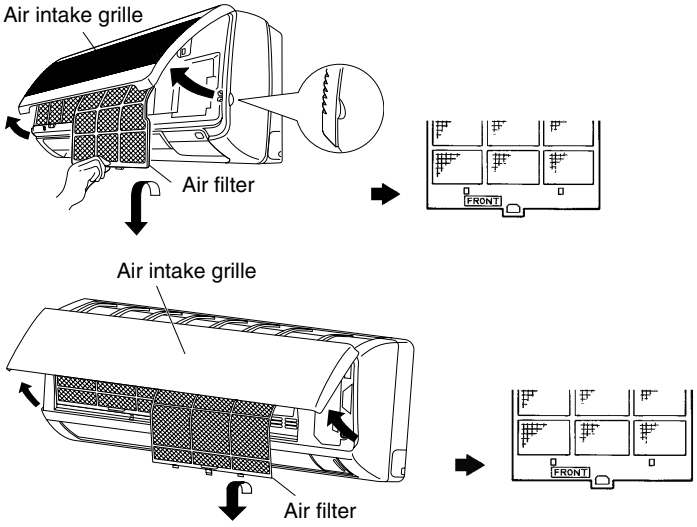
1. Take hold of the finger-hold on the air intake grille and press it to the rear, and the grille will open downward.
2. Take hold of the finger-hold on the air filter, pull it toward you.



* Take hold of the finger-hold on the air filter, pull it toward you.

(Flat) Wall-mounted type (NWFL,XAV):

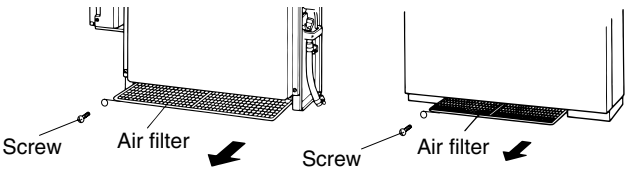
1. Move the flap on the air outlet grille to its lowest position with the remote control unit.
2. The filter is disengaged by pushing the tab up gently. Hold the air filter by the tab at the bottom, and pull downward.



When replacing the filter, make sure that the FRONT mark is facing you. Push it up until you hear it click back into position.

(Concealed) Floor standing type (NFFL, NFMFL):

1. Remove the screw at the bottom left of the front panel using a Phillips head screwdriver. (Be sure to replace the screw when cleaning is finished.)
2. Remove the filter by pulling it toward you.



Care and Cleaning (continued)

Cleaning the drain filter and drain pan

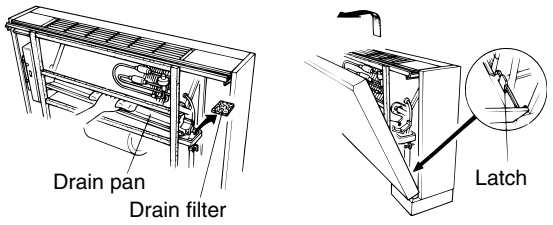
Floor standing type (NFFL)

1. **Removing the front panel**
   Open the front panel with a lifting motion to detach the latch.
2. **Cleaning**
   Remove any dirt accumulated in the drain pan, and then wipe it clean. Also, clean the drain filter in the same way as the air filter.

(1) Push up

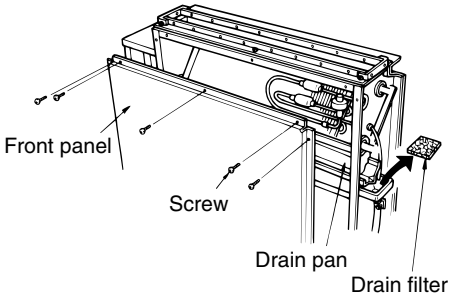
Then

(2) Pull down



Concealed Floor standing type (NFMFL)

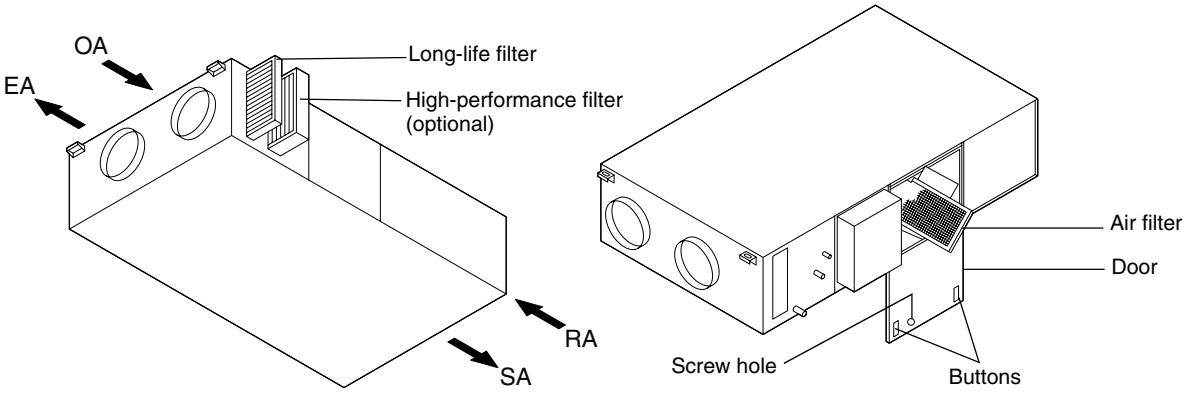
Remove the screws, open the front panel, and then remove any dirt accumulated inside the drain pan and wipe it clean. Also, clean the drain filter in the same way as the air filter.



Heat Exchanger with DX coil Type (DEV):

1. **Long-life filter**
   Remove the four screws at the location where the filter is housed, and pull the filter out toward you.
2. **Air filters**
   Remove the screw at the top of the location where the filters are housed, and push the two buttons to open the door. Now pull the filters out toward you.

   The two filters are connected.



CAUTION

1. **Certain metal edges and the condenser fins are sharp and may cause injury if handled improperly; special care should be taken when you clean these parts.**
2. **Periodically check the outdoor unit to see if the air outlet or air intake is clogged with dirt or soot.**
3. **The internal coil and other components of the outdoor unit must also be cleaned periodically. Consult your dealer or service center.**

Care: After a prolonged idle period

Check the indoor and outdoor unit air intakes and outlets for blockage; if there is a blockage, remove it.

Care: Before a prolonged idle period

- Operate the fan for half a day to dry out the inside.
- Disconnect the power supply and also turn off the circuit breaker.
- Clean the air filter and replace it in its original position.
- Outdoor unit internal components must be checked and cleaned periodically. Contact your local dealer for this service.

■ Troubleshooting

If your air conditioner does not work properly, first check the following points before requesting service. If it still does not work properly, contact your dealer or a service center.

Trouble	Possible Cause	Remedy
Air conditioner does not run at all.	1. Power failure. 2. Leakage circuit breaker has tripped. 3. Line voltage is too low. 4. Operation button is turned off. 5. The wired remote control unit or heat pump is malfunctioning. (The inspection mark ⚠ and the letters E, F, H, L, P in combination with numbers appear on the LCD of the wired remote control unit.)	1. After a power outage, press ON/OFF operation button on the wired remote control unit. 2. Contact service center. 3. Consult your electrician or dealer. 4. Press the button again. 5. Consult your dealer.
Compressor runs but soon stops.	1. Obstruction in front of condenser coil.	1. Remove obstruction.
Poor cooling (or heating) performance.	1. Dirty or clogged air filter. 2. Heat source or many people in room. 3. Doors and/or windows are open. 4. Obstacle near air intake or air discharge port. 5. Thermostat is set too high for cooling (or too low for heating). 6. (Defrosting system does not work.)	1. Clean air filter to improve the airflow. 2. Eliminate heat source if possible. 3. Shut them to keep the heat (or cold) out. 4. Remove it to ensure good airflow. 5. Set the temperature lower (or higher). 6. (Consult your dealer.)

■ Tips for Energy Saving

Avoid

- **Do not block the air intake and outlet of the unit. If either is obstructed, the unit will not work well, and may be damaged.**
- Do not let direct sunlight into the room. Use sunshades, blinds or curtains. If the walls and ceiling of the room are warmed by the sun, it will take longer to cool the room.

Do

- Always try to keep the air filter clean. (Refer to “Care and Cleaning”.) A clogged filter will impair the performance of the unit.
- To prevent conditioned air from escaping, keep windows, doors and any other openings closed.

NOTE

Should the power fail while the unit is running

If the power supply for this unit is temporarily cut off, the unit will automatically resume operation once power is restored using the same settings before the power was cut off.

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**