

APPENDIX A INSTALLATION INSTRUCTIONS

CU-3KE19NBU
CU-4KE24NBU
CU-4KE31NBU

(852-6-4190-584-00-2)

INSTALLATION INSTRUCTIONS

Split System Air Conditioner

Contents

This air conditioner uses the refrigerant R410A.

NOTE External diameter of service port R410A: 5/16"

IMPORTANT!

Please Read Before Starting 2

Page

Model Combinations

Combine indoor and outdoor units only as listed below.

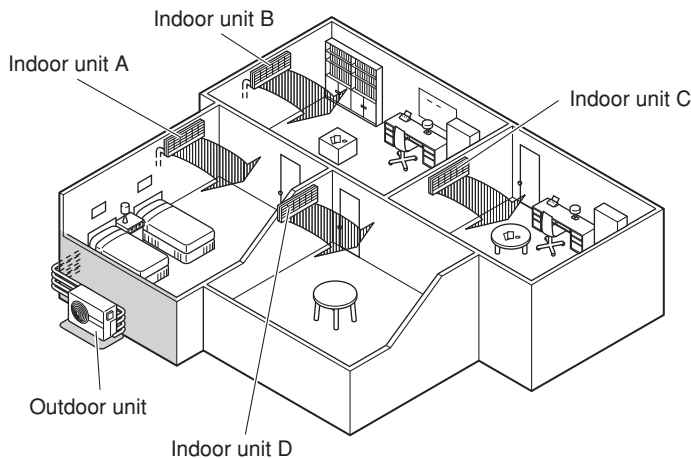
Model No.

<u>Indoor Unit</u>	<u>Outdoor Unit</u>
CS-MKE7NKH	CU-3KE19NBU
CS-MKE9NKH	CU-4KE24NBU
CS-MKE12NKH	CU-4KE31NBU
CS-MKE18NKH	
CS-MKE24NKH	
CS-MKE9NB4U	
CS-MKE12NB4U	
CS-KE18NB4UW	

Power Source:
60 Hz, single-phase, 230 / 208 VAC

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Combination example



IMPORTANT!

Please Read Before Starting

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

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

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



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.
- To prevent possible hazards from insulation failure,  the unit must be grounded.

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...

Select an installation location which is rigid and strong enough to support or hold the unit, and select a location for easy maintenance.

...In a Ceiling or Wall

Make sure the ceiling/wall is strong enough to hold the unit's weight. It may be necessary to construct a strong wood or metal frame to provide added support.

...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.



CAUTION

Keep the fire alarm and the air outlet at least 1.5 m away from the unit.

...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

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

When Connecting Refrigerant Tubing




WARNING

- When performing piping work do not mix air except for specified refrigerant (R410A) in refrigeration cycle. It causes capacity down, and risk of explosion and injury due to high tension inside the refrigerant cycle.
- Refrigerant gas leakage may cause fire.
- Do not add or replace refrigerant other than specified type. It may cause product damage, burst and injury etc.
- Ventilate the room well, in the event that 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.

- 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.
- Do not leak refrigerant while piping work for an installation or re-installation, and while repairing refrigeration parts. Handle liquid refrigerant carefully as it may cause frost-bite.




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.

Others



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 upon completing installation that no refrigerant gas is leaking. If escaped gas comes in contact with a stove, gas water heater, electric room heater or other heat source, it can produce dangerously toxic gas.
- Do not install only a single indoor unit.
- Do not touch the air inlet or the sharp aluminum fins of the outdoor unit. You may get injured. 
- Do not sit or step on the unit, you may fall down accidentally. 
- Do not stick any object into the FAN CASE. You may be injured and the unit may be damaged. 



NOTE

The illustrations are based on the typical appearance of a standard model. Consequently, the shape may differ from that of the air conditioner that you are installing.

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. If the electric wiring diagram does not appear in this manual, please check for the diagram on the indoor unit.

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

- | | | |
|------------------------------|-----------------------|-----------------------------|
| 1. Standard screwdriver | 7. Hacksaw | 13. Torque wrench |
| 2. Phillips head screwdriver | 8. Core bits | 14. Adjustable wrench |
| 3. Knife or wire stripper | 9. Hammer | 15. Reamer (for deburring) |
| 4. Tape measure | 10. Drill | 16. Vacuum pump (For R410A) |
| 5. Carpenter's level | 11. Tube cutter | 17. Manifold valve |
| 6. Sabre saw or key hole saw | 12. Tube flaring tool | |

1-2. Accessories Supplied with Unit

Table 1

Parts	Figure	Q'ty	Parts	Figure	Q'ty	Parts	Figure	Q'ty				
Labels for inter-unit cable and tube		4 each	Cushion rubber		4	Reducer (1/2" x 3/8")		<table border="1"> <tr> <td>CU-4KE24NBU</td> <td>1</td> </tr> <tr> <td>CU-4KE31NBU</td> <td>2</td> </tr> </table>	CU-4KE24NBU	1	CU-4KE31NBU	2
CU-4KE24NBU	1											
CU-4KE31NBU	2											
Reducer (3/8" x 1/2")		CU-3KE19NBU	1	Packed in the outdoor unit.								

1-3. Optional Copper Tubing Kit

Copper tubing for connecting the outdoor unit to the indoor unit is available in kits which contain the narrow and wide tubing, fittings and insulation. Consult your nearest sales outlet or air conditioning workshop.

1-4. Type of Copper Tube and Insulation Material

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

- Deoxidized annealed copper tube for refrigerant tubing as detailed in Table 2.
Cut each tube to the appropriate lengths 1' to 1'4" (30 cm to 40 cm) to dampen vibration between units.

2. Foamed polyethylene insulation for the specified copper tubes as required to precise length of tubing. Wall thickness of the insulation should be not less than 5/16" (8 mm).
3. Use insulated copper wire for field wiring. Wire size varies with the total length of wiring. Refer to 5. Wiring Instructions for details.



CAUTION

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

Table 2

Model	Narrow Tube		Wide Tube	
	Outer Dia.	Thickness	Outer Dia.	Thickness
CS-MKE7NКУ, CS-MKE9NКУ, CS-MKE12NКУ	1/4" (6.35 mm)	0.0314" (0.8 mm)	3/8" (9.52 mm)	0.0314" (0.8 mm)
CS-MKE18NКУ	1/4" (6.35 mm)	0.0314" (0.8 mm)	1/2" (12.70 mm)	0.0314" (0.8 mm)
CS-MKE24NКУ	1/4" (6.35 mm)	0.0314" (0.8 mm)	5/8" (15.88 mm)	0.0393" (1.0 mm)
CS-MKE9NB4U, CS-MKE12NB4U	1/4" (6.35 mm)	0.0314" (0.8 mm)	3/8" (9.52 mm)	0.0314" (0.8 mm)
CS-KE18NB4UW	1/4" (6.35 mm)	0.0314" (0.8 mm)	1/2" (12.70 mm)	0.0314" (0.8 mm)

1-5. Additional Materials Required for Installation

- Refrigeration (armored) tape
- Insulated staples or clamps for connecting wire (See local codes.)
- Putty
- Refrigeration lubricant
- Clamps or saddles to secure refrigerant tubing

2. Installation Site Selection

2-1. Indoor Unit



WARNING

To prevent abnormal heat generation and the possibility of fire, do not place obstacles, enclosures and grilles in front of or surrounding the air conditioner in a way that may block air flow.

AVOID:

- direct sunlight.
- nearby heat sources that may affect performance of the unit.
- areas where leakage of flammable gas may be expected.
- placing or allowing any obstructions near the air conditioner inlet or outlet.
- installing in rooms that contain instant-on (rapid-start) fluorescent lamps. (These may prevent the air conditioner from receiving signals.)
- places where large amounts of oil mist exist.
- installing in locations where there are devices that generate high-frequency emissions.

DO:

- select an appropriate position from which every corner of the room can be uniformly air-conditioned. (High on a wall is best for wall-mounted types.)
- select a location that will hold the weight of the unit.
- select a location where tubing and drain hose have the shortest run to the outside. (Fig. 1)
- allow room for operation and maintenance as well as unrestricted air flow around the unit. (Fig. 2a or 2b)
- install the unit within the maximum elevation difference (H1, H2, H3, H4) above or below the outdoor unit and within a total tubing length (L1+L2+L3, L1+L2+L3+L4) from the outdoor unit as detailed in Table 3 and Fig. 3a.

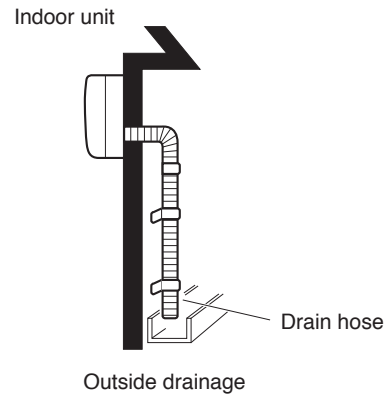
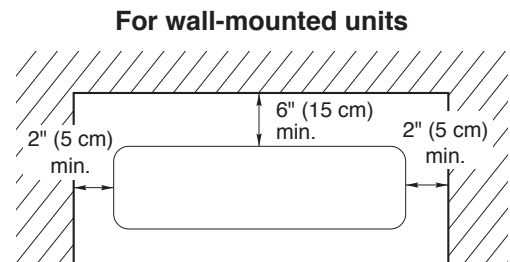


Fig. 1



Front View

Fig. 2a

For ceiling-mounted cassette units

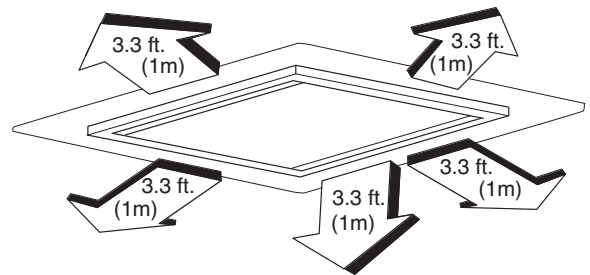


Fig. 2b



CAUTION

- Air delivery from a ceiling-mounted cassette unit will be degraded if the distance from the floor to the ceiling is greater than 10 ft. (3 m).
- For stable operation of the air conditioner, do not install wall-mounted units less than 5' (1.5 m) from floor level. (Fig. 3b)

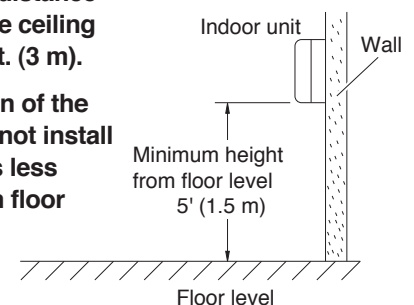


Fig. 3b

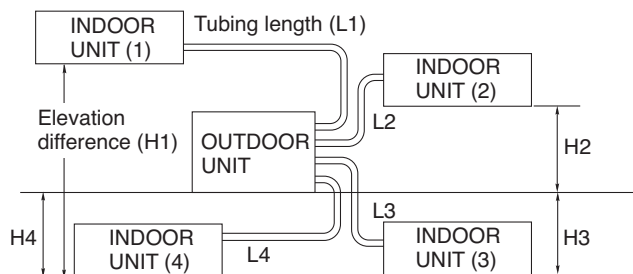


Fig. 3a

- install the indoor unit more than 3.3' (1 m) away from any antenna or power lines or connecting wires used for television, radio, telephone, security system, or intercom. Electrical noise from any of these sources may affect operation.
- install in a sturdy manner to avoid increased operating noise.

Table 3

Model	Max. Allowable Tubing Length Per Unit (ft.)	Max. Allowable Total Tubing Length at Shipment (L1+L2+L3) or (L1+L2+L3+L4) (ft.)	Limit of Total Tubing Length (L1+L2+L3) or (L1+L2+L3+L4) (ft.)	Limit of Elevation Difference (H1, H2, H3, H4) (ft.)	Required Amount of Additional Refrigerant (oz./ft.)*
CU-3KE19NBU	82	150 (L1+L2+L3)	150 (L1+L2+L3)	50	—
CU-4KE24NBU	82	150 (L1+L2+L3+L4)	200 (L1+L2+L3+L4)	50	0.22
CU-4KE31NBU	100	150 (L1+L2+L3+L4)	230 (L1+L2+L3+L4)	50	0.22

* If total tubing length becomes 150 to 200 ft. (Max.) or 150 to 230 ft. (Max.), charge additional refrigerant (R410A) by 0.22 oz./ft. No additional charge of compressor oil is necessary. For more detailed charging information, refer to the Technical & Service Manual.

2-2. Connecting Indoor Units

Figures (4a) – (4k) show the different types of indoor unit connections, including the use of a reducer. To select the required indoor unit to be connected, refer to the Combination Table that was included in the outdoor unit package.

(1) Connecting indoor unit for CU-3KE19NBU

(A)

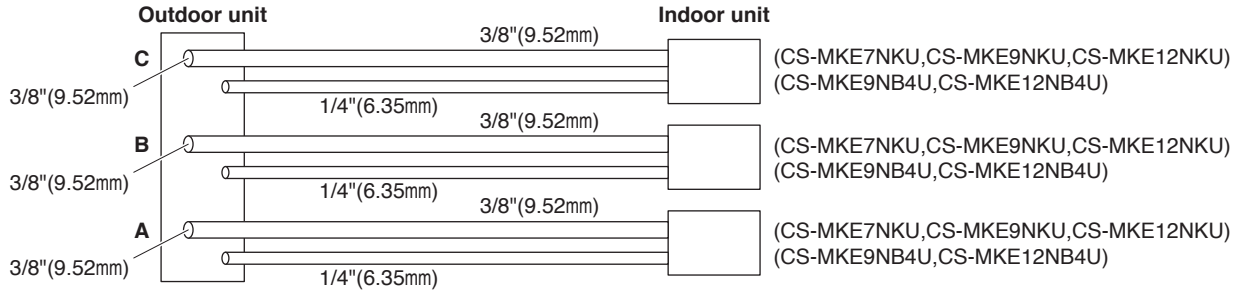


Fig. 4a

(B)

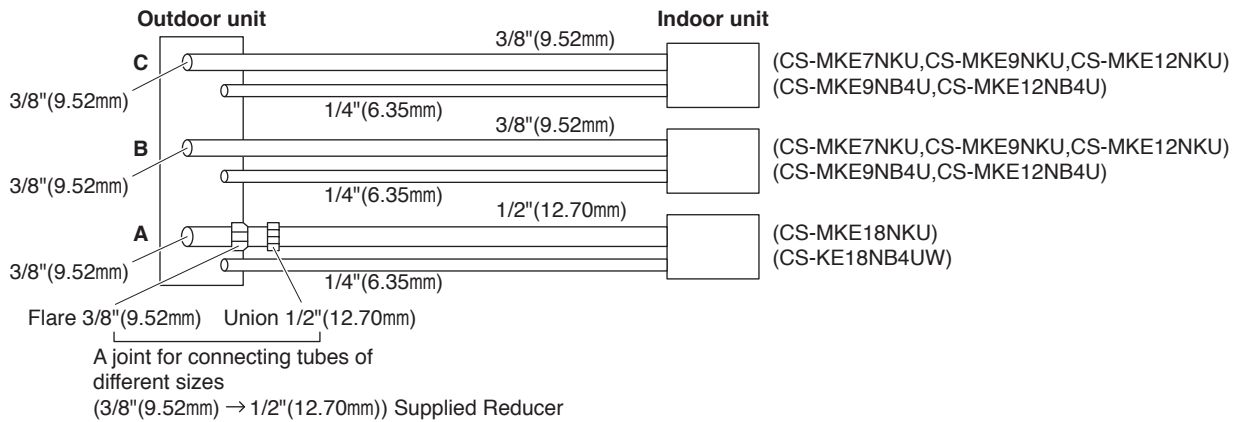


Fig. 4b

(2) Connecting indoor unit for CU-4KE24NBU

(A)

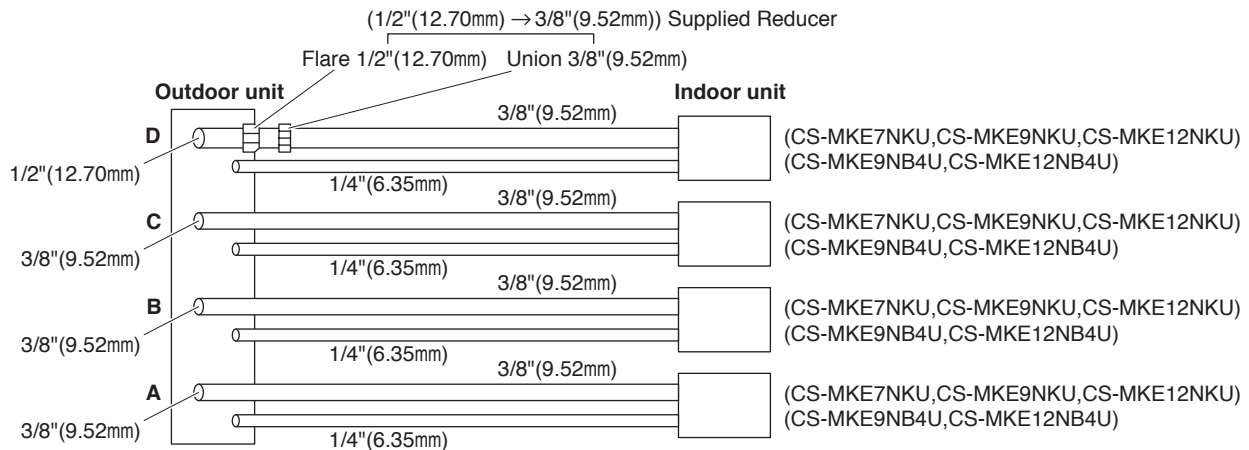


Fig. 4c

(B)

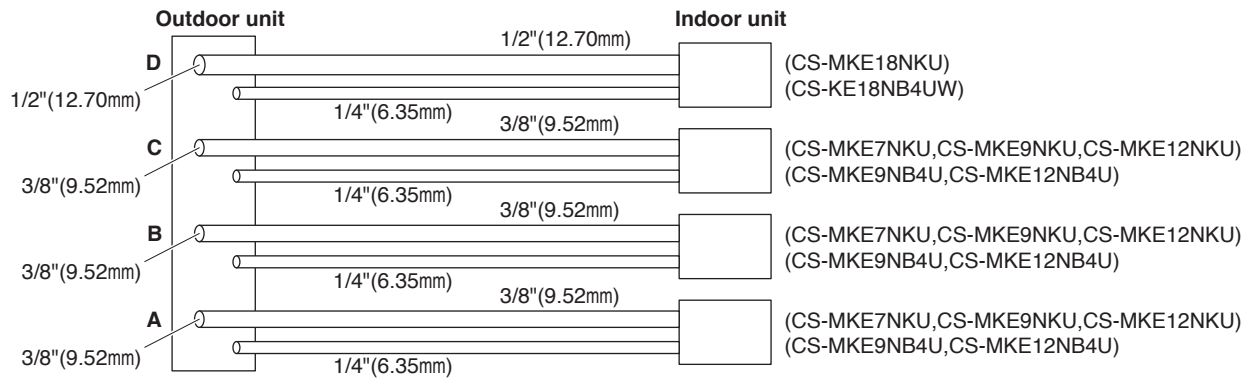


Fig. 4d

(C)

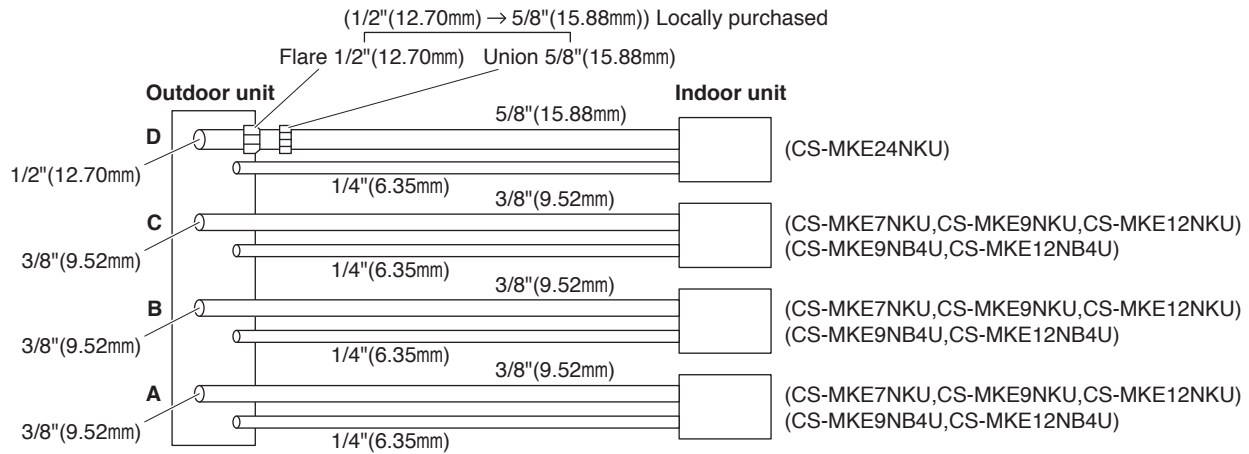


Fig. 4e

(D)

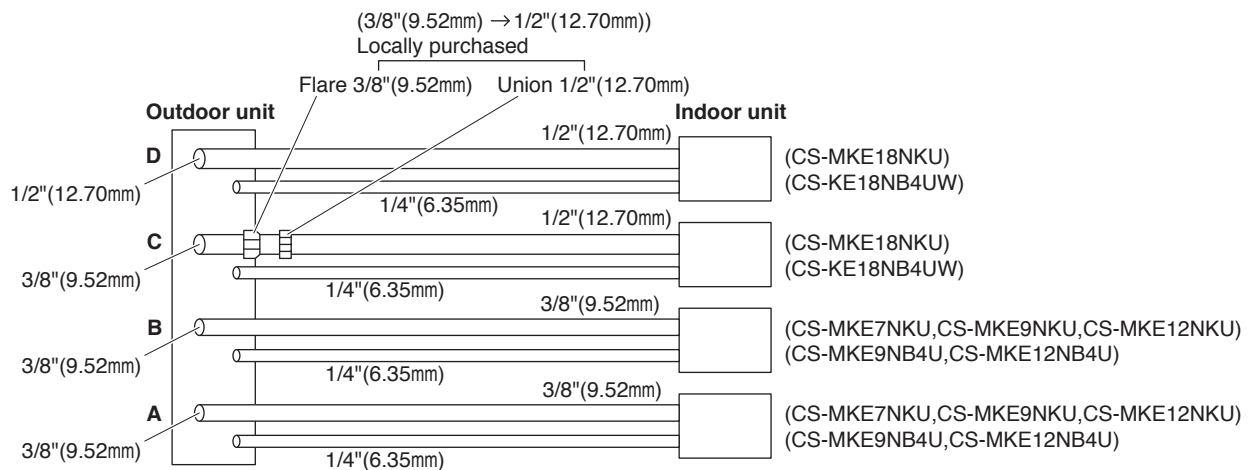


Fig. 4f

(3) Connecting indoor unit for CU-4KE31NBU

(A)

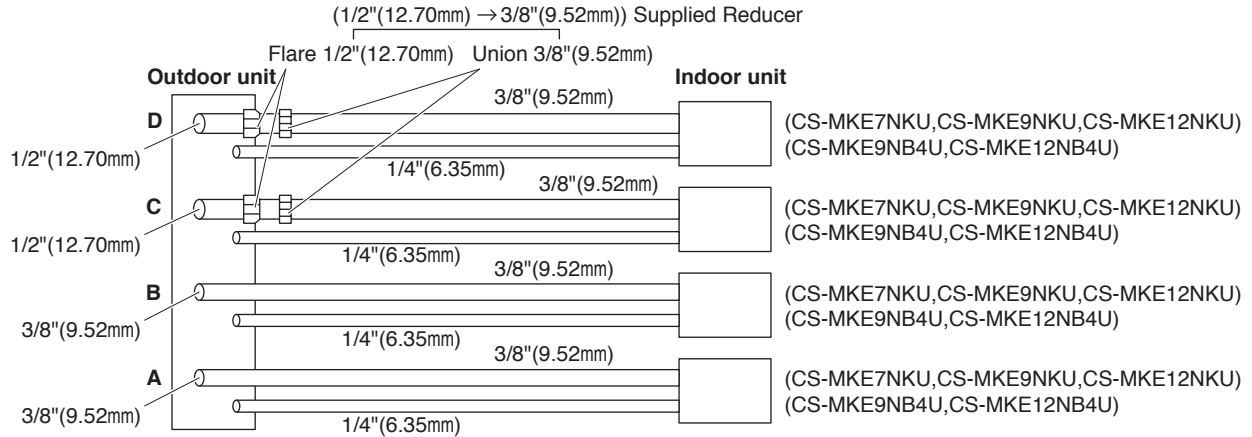


Fig. 4g

(B)

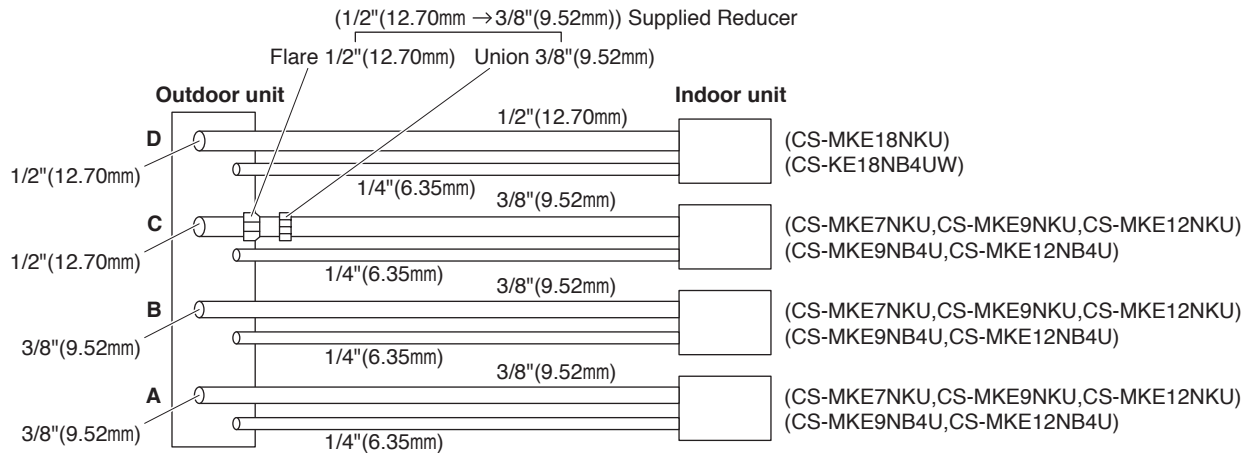


Fig. 4h

(C)

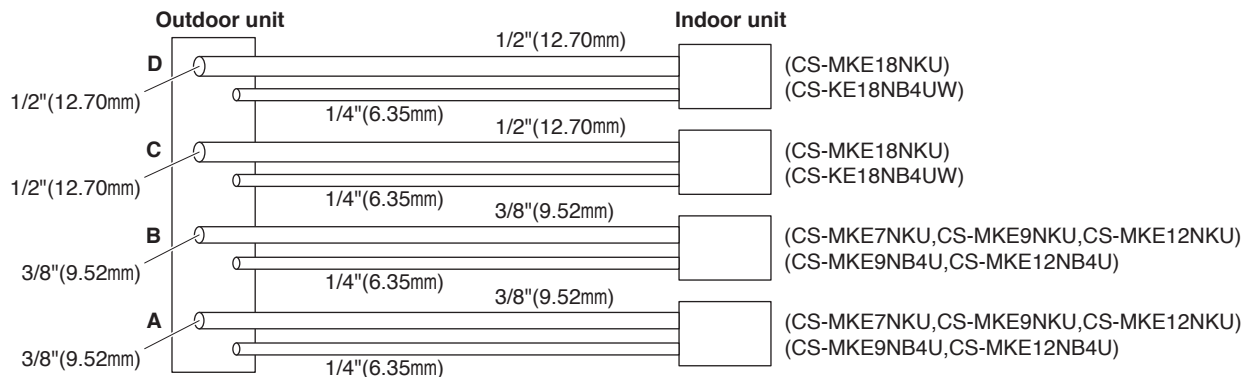


Fig. 4i

(D)

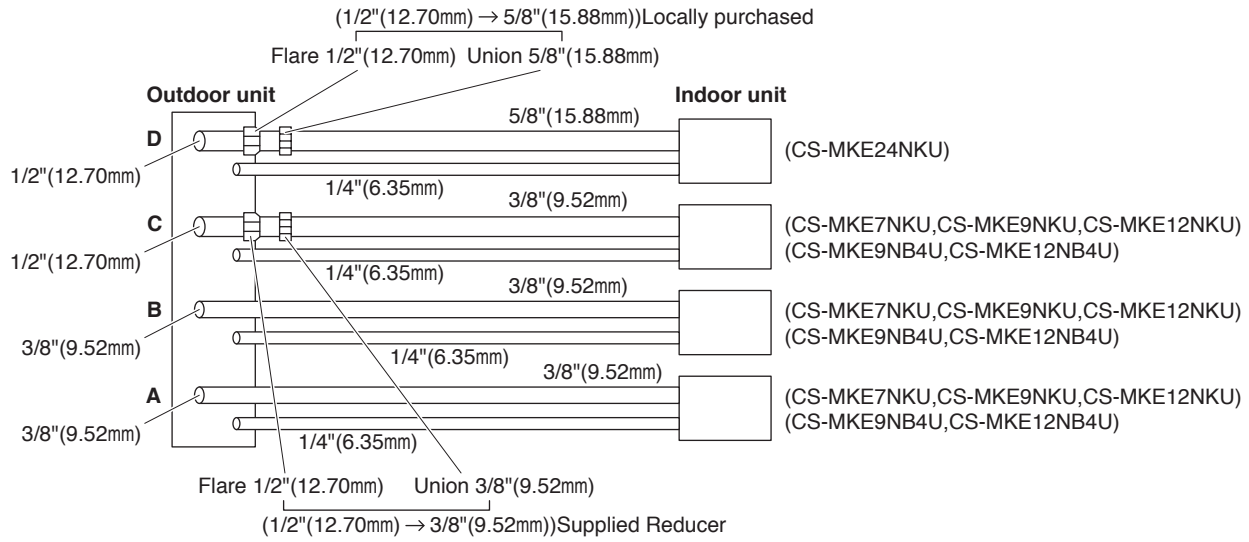


Fig. 4j

(E)

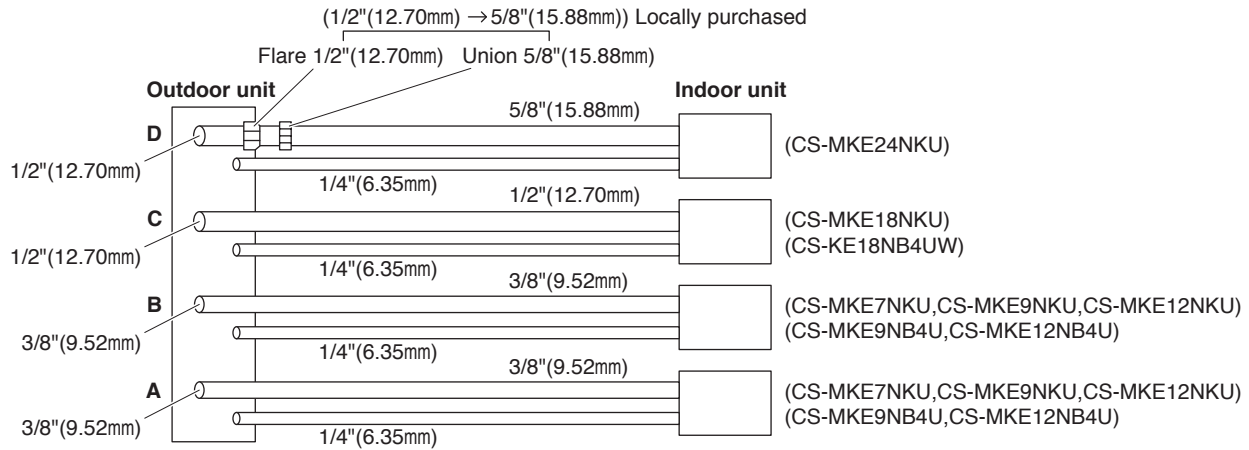


Fig. 4k

2-3. Outdoor Unit

AVOID:

- heat sources, exhaust fans, etc. (Fig. 5a)
- damp, humid or uneven locations.

DO:

- choose a place as cool as possible.
- choose a place that is well ventilated.
- install in a location where at least two sides are unobstructed, so that the flow of air at the intake port or exhaust port is not blocked, and so that sufficient space is ensured for maintenance to be carried out without trouble. In general the top also must be unobstructed. (Fig. 5b)
- provide a solid base (level concrete pad, concrete block, 6" × 1'4" (15 × 40 cm) beams or equal), a minimum of 6" (15 cm) above ground level to reduce humidity and protect the unit against possible water damage and decreased service life. (Figs. 5c and 5d)



CAUTION

A solid base must not cover the hole of the bottom plate.

- install cushion rubber under unit's feet to reduce vibration and noise. (Fig. 5e)
- use lug bolts or equal to bolt down unit, reducing vibration and noise.
- install in a location where no antenna of a television or radio exists within 10' (3 m).

2-4. Baffle Plate for the Outdoor Unit

NOTE

It is recommended to use baffle plates.

When the outdoor unit is installed in a position exposed to strong wind (such as seasonal winds with low air temperature in winter), baffle plates must be installed on the outdoor unit. (Fig. 5f)

This unit is designed so that the fan of the outdoor unit runs at low speed when the air conditioner is operated at low outdoor air temperatures. When the outdoor unit is exposed to strong wind, the system pressure drops because of the freeze protector.

Install a pair of windbaffle plates at the front and back of the outdoor unit if it will be subject to strong wind during the winter. (Figs. 5f, 5g, 5h, 5i, and 5j)

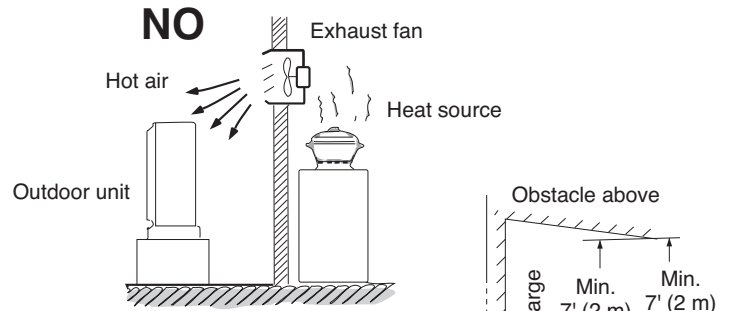


Fig. 5a

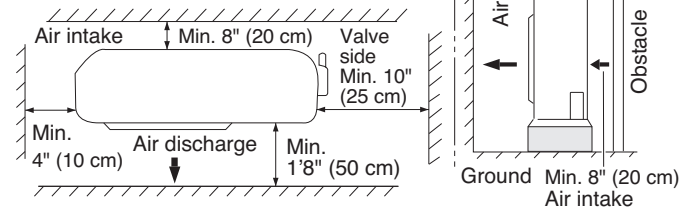


Fig. 5b

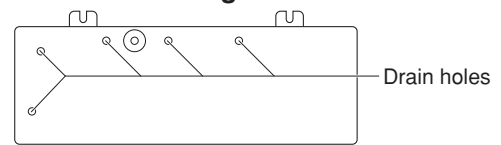


Fig. 5c

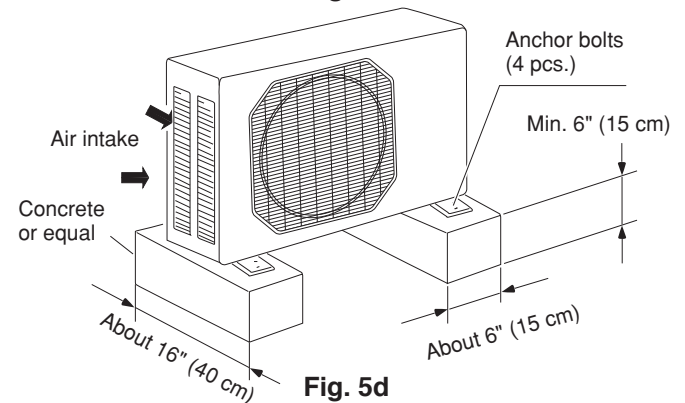


Fig. 5d

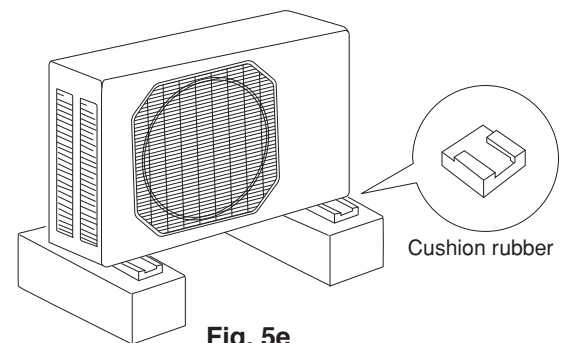


Fig. 5e

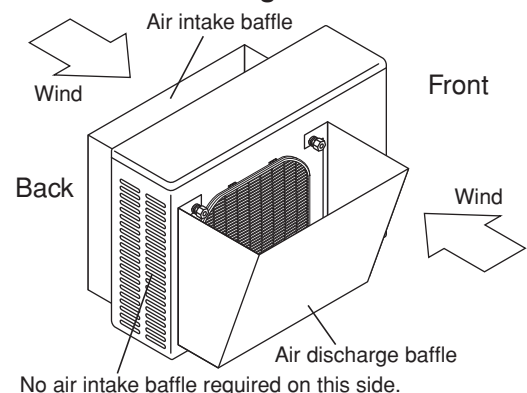


Fig. 5f

(1) Recommended dimensions of the baffle plates

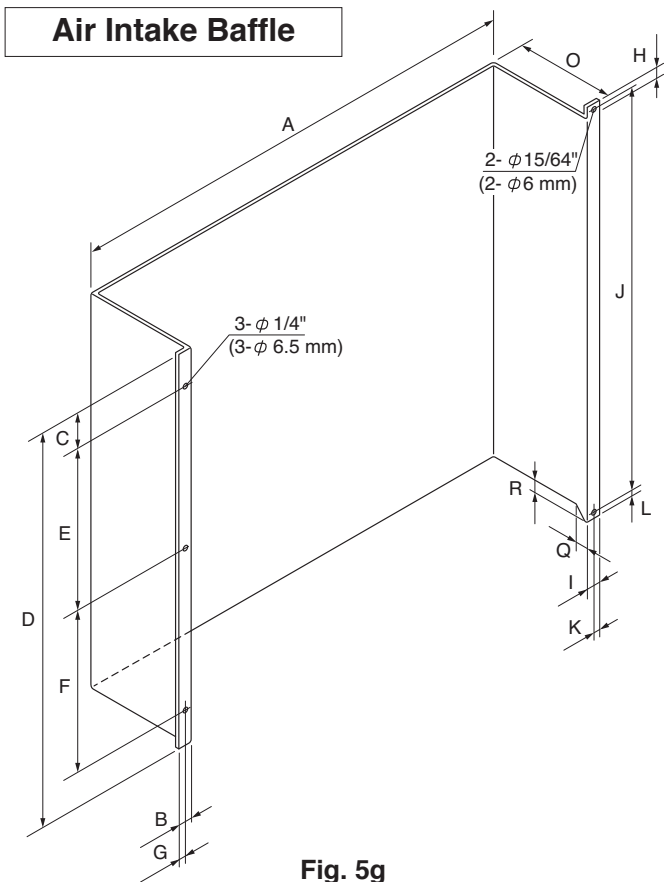


Fig. 5g

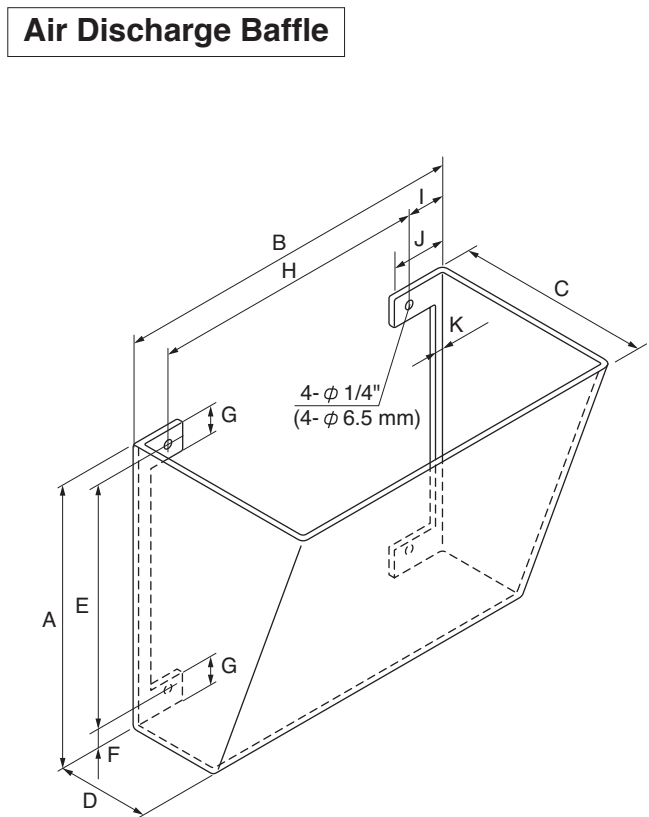


Fig. 5h

For Air Intake

Dimensions		A	B	C	D	E	F	G	H	I	J	K	L	O	Q	R
Model	(inch)	25-3/16	25/32	1-31/32	25	10-5/8	10-5/8	25/64	25/32	19/32	25-7/8	19/64	25/64	5-29/32	25/32	25/32
	(mm)	640	20	50	635	270	270	10	20	15	657	7.5	10	150	20	20
CU-4KE31NBU	(inch)	25-3/16	25/32	1-3/8	30-29/32	13-25/32	13-25/32	25/64	25/32	19/32	31-25/32	19/64	25/64	5-29/32	25/32	25/32
	(mm)	640	20	35	785	350	350	10	20	15	807	7.5	10	150	20	20

For Air Discharge

Dimensions		A	B	C	D	E	F	G	H	I	J	K
Model	(inch)	22-1/16	23-1/32	13-25/32	5-29/32	19-9/32	1-3/8	2-5/32	18-5/16	2-3/8	3-11/32	31/32
	(mm)	560	585	350	150	490	35	55	465	60	85	25

Material to be used: Metal plate with corrosion protection treatment

Plate thickness: 0.0394 to 0.0472" (1.0 to 1.2 mm)

(2) Parts required (field supply except for screws)

Air Intake Baffle

Item	Q'ty	Remarks
Baffle plate	1	
Screw 5/32 × 15/32" (4 × 12 mm) tapping	2	Attached to outdoor unit
Bolt 15/64 × 19/32 – 25/32" (M6 × 15 – 20 mm)	3	
Nut 15/64" (M6)	3	
Washer	3	
Spring washer	3	

Air Discharge Baffle

Item	Q'ty	Remarks
Baffle plate	1	
Bolt 15/64 × 13/32 – 19/32" (M6 × 10 – 15 mm)	4	
Nut 15/64" (M6)	4	
Washer	4	
Spring washer	4	

(3) Installation procedure

1. Air Intake Baffle

(1) Left side

1. Remove the top panel from the unit.
2. Remove the panel side L, and drill 3 holes of $\varnothing 1/4$ inch (6.5 mm) at the prescribed position.
3. Install the windbaffle on the unit using field supply bolts and nuts.
4. Recommended bolts to be used are 15/64" (M6 ISO standard), and the recommended length of the bolts is between 19/32 – 25/32 inch (15 – 20 mm).
5. Use washers and spring washers to tightly fasten the windbaffle to the unit.

(2) Right side

1. Remove the top panel from the unit.
2. Use 2 preholes on the panel side R to install the baffle plate.
3. Remove the panel side R from the unit by removing the screws. These screws are used in step 4 below.
4. Put (sandwich) the windbaffle between the unit and the panel side R, then install the windbaffle on the unit using the above screws. Be careful not to damage the screw holes.

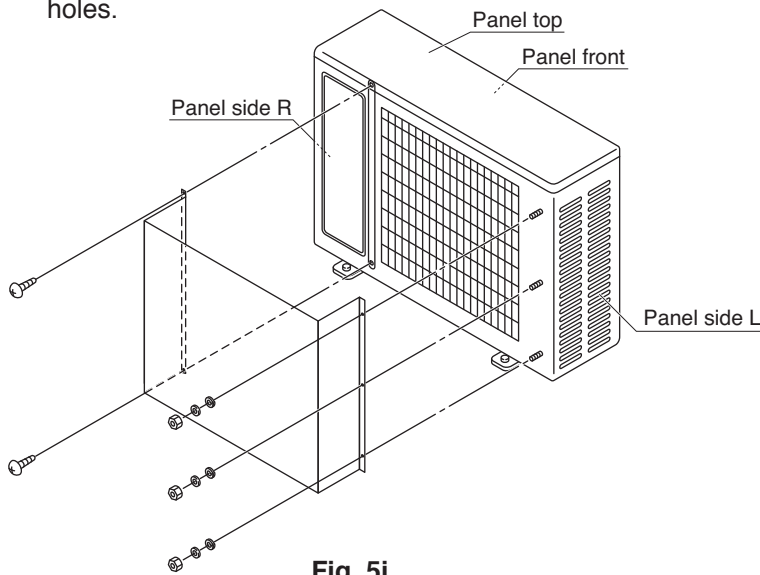


Fig. 5i

2. Air Discharge Baffle

1. Remove the panels front, top, side L and R from the unit and drill 4 holes of $\varnothing 1/4$ inch (6.5 mm) at the prescribed positions.
2. Install the windbaffle on the unit using field supply bolts and nuts.
3. Recommended bolts to be used are 15/64" (M6 ISO standard), and the recommended length of the bolts is between 13/32 – 19/32 inch (10 – 15 mm).
4. Use washers and spring washers to tightly fasten the windbaffle to the unit.

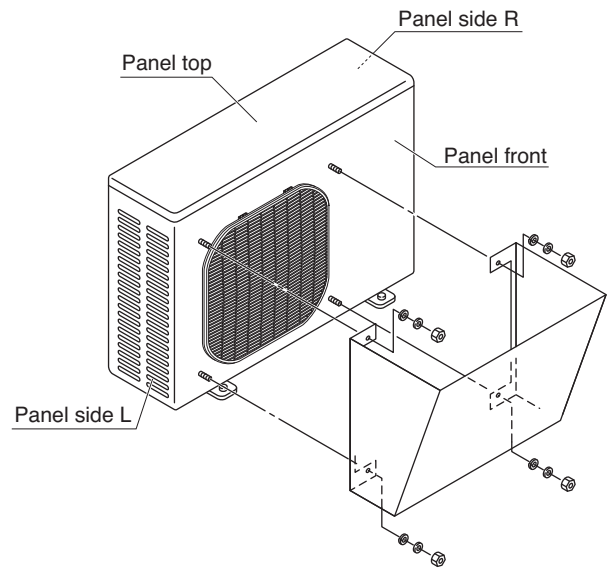


Fig. 5j

NOTE

- In order to prevent contact of the bolts and heat exchanger and other parts inside the unit, install the windbaffle using bolts from inside the unit and fasten the bolts with nuts from outside the unit.
- When the windbaffle is installed on the unit, the unit has higher wind resistance. In order to prevent the unit from falling over, anchor the legs of the unit using anchor bolts (or similar method).

(4) Precautions for installation

1. Be sure not to damage painted surfaces.
2. Finish the edges of the windbaffle to avoid cuts or injury.
3. Drilling of holes must be carefully done so that no damage is caused to external or internal parts of the unit. Particular care must be taken that drill chips do not drop into the unit.

2-5. Outer Dimensions of Outdoor Unit

(1) CU-3KE19NBU

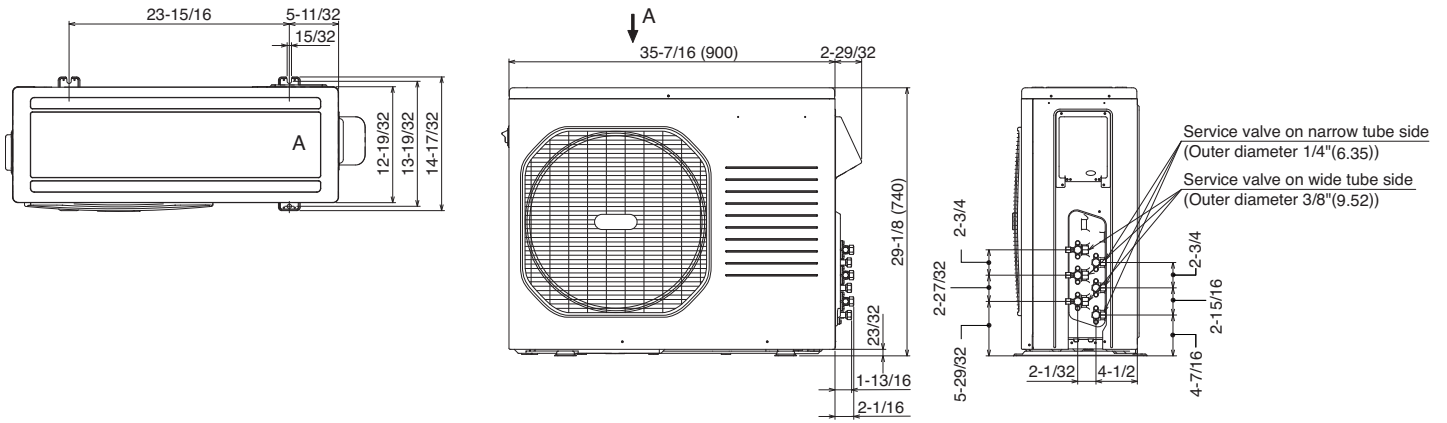


Fig. 6a

(2) CU-4KE24NBU

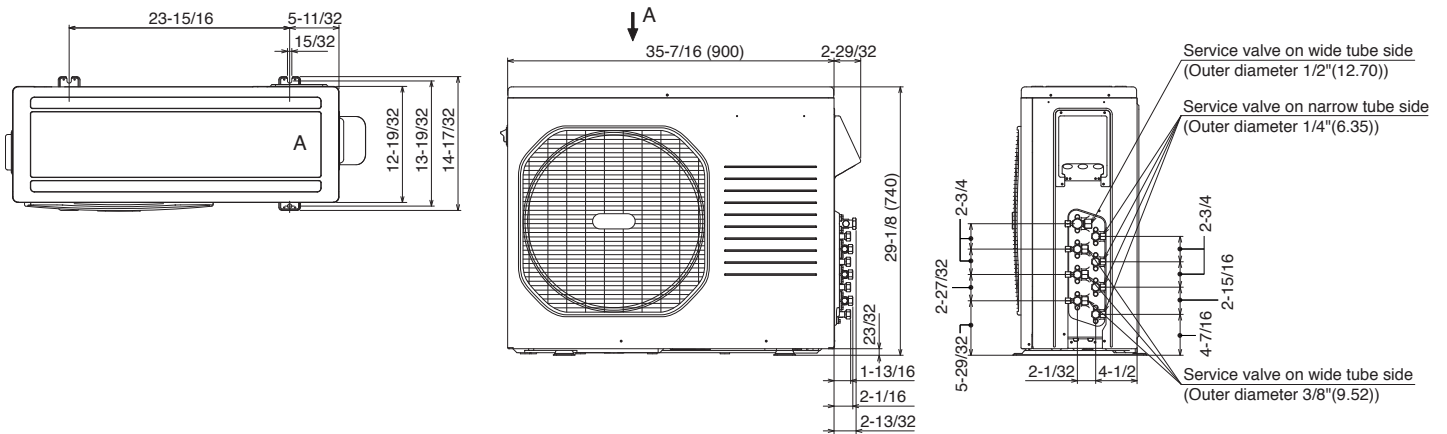


Fig. 6b

(3) CU-4KE31NBU

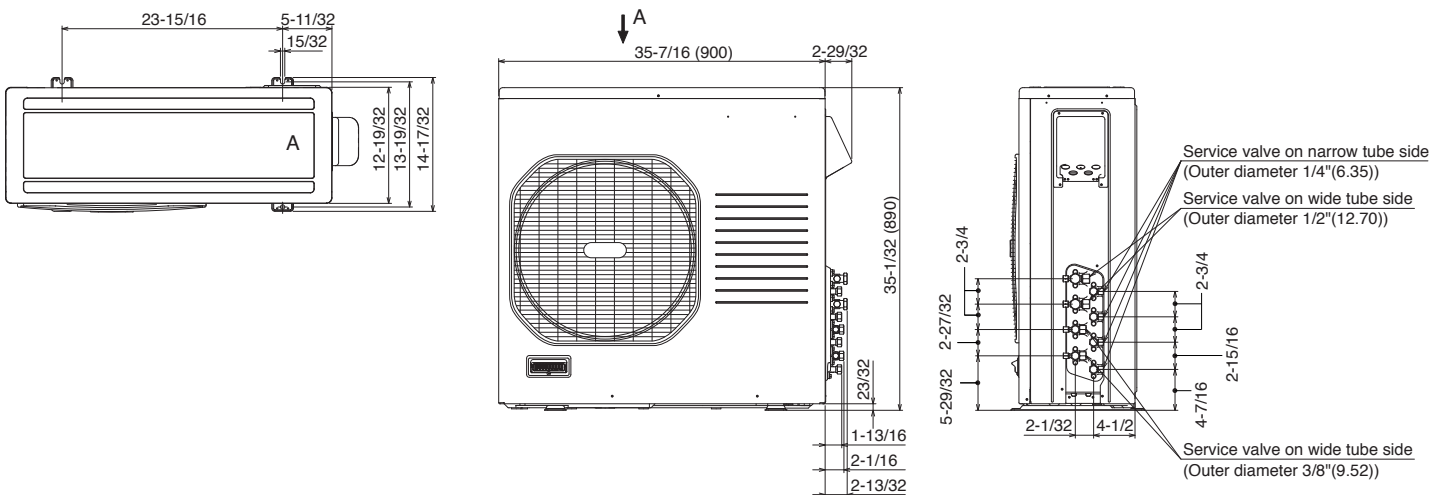


Fig. 6c

unit: inch (mm)

2-6. Diagram of Outdoor Unit Installation

Never install only a single indoor unit.

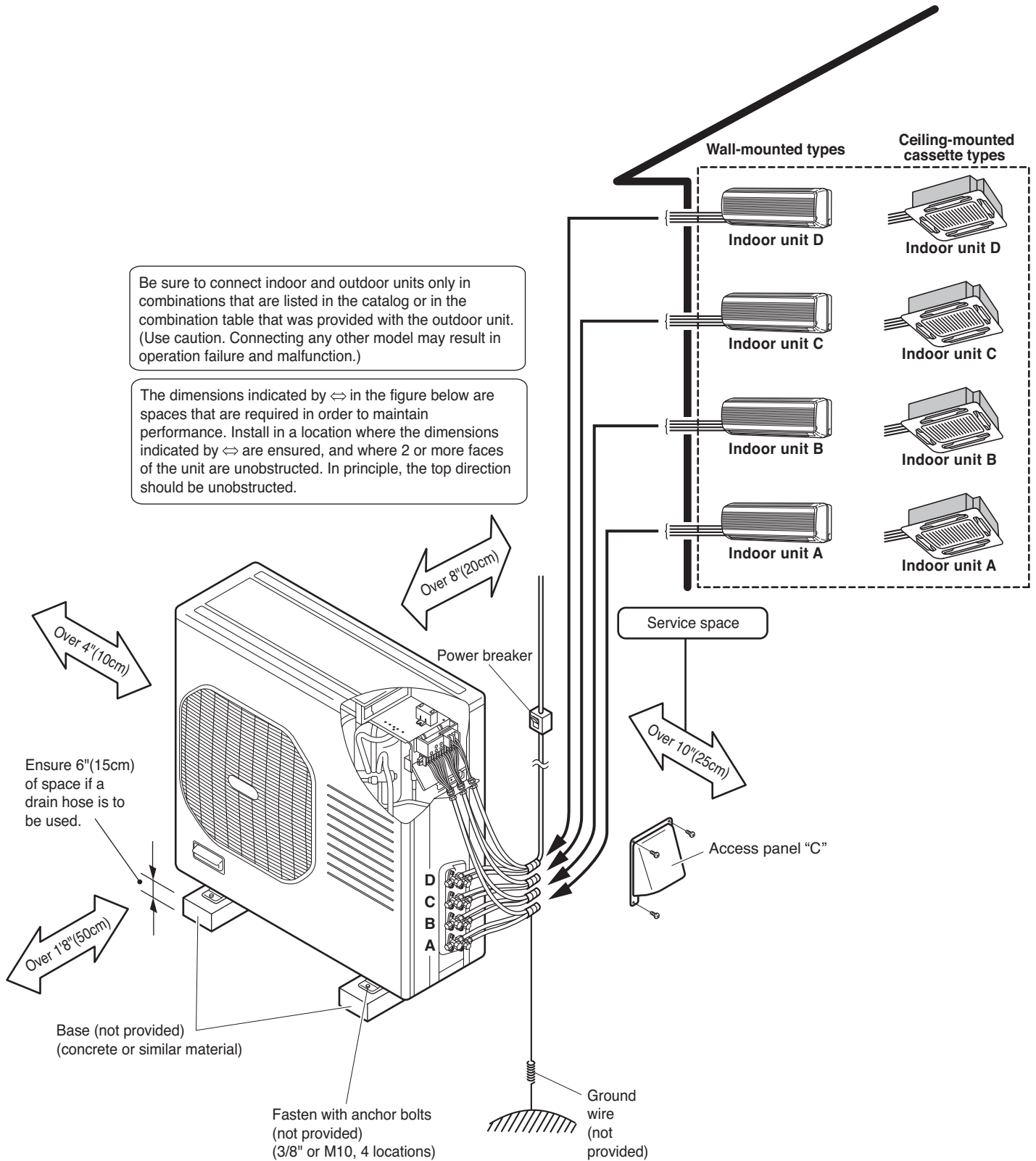


Fig. 7

3. Installation Process

3-1. Embedding the Tubing and Wiring

- Do not connect tubes to locations that are embedded.
- Be sure to bind refrigerant tubing and inter-unit cables together with vinyl tape.
- The power cable must be obtained on-site.
(#12: Less than 85 ft.)
... AWG (American Wire Gauge)
- Be sure to apply the provided labels to both ends of the inter-unit cables to prevent miswiring.
- Securely seal the end of embedded tubing with vinyl tape in order to prevent dirt or moisture entry.
- In order to prevent insulation breakdown and ground faults, do not allow the wire ends to come in contact with rainwater, or be subject to dew condensation.

3-2. Use of the Flaring Method

Many of the 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.

3-3. 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. 12" to 20" (30 to 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. 8)

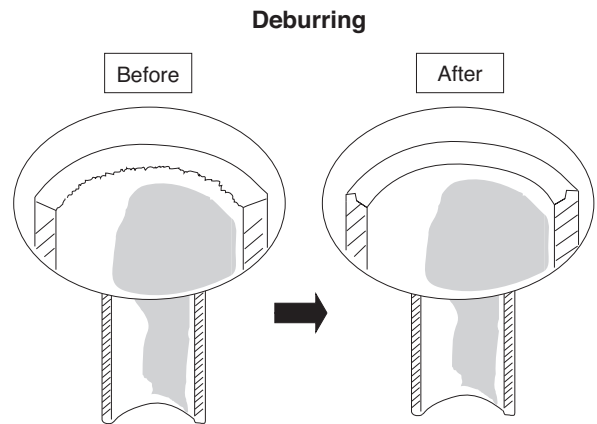


Fig. 8

NOTE

When reaming, hold the tube end downward and be sure that no copper scraps fall into the tube. (Fig. 9)

(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.* (Figs. 10 and 11)

(*Use "RIDGID" or equivalent.)

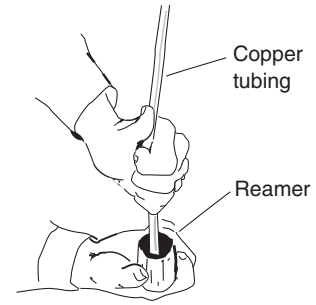


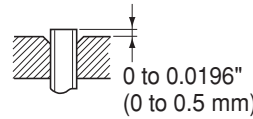
Fig. 9

NOTE

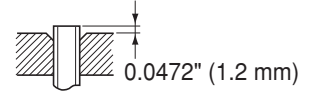
A good flare should have the following characteristics:

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

If the special R410A flare tool is used:



If the previous flare tool (clutch-type) is used:



Adjust so that the amount of tube protrusion is as shown in the figure.

Fig. 10

3-4. Caution before Connecting Tubes Tightly

a) Be sure to apply a sealing cap or water-proof tape to prevent dust or water from getting into the tubes before they are used.

b) 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. 12)

c) 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. 13)

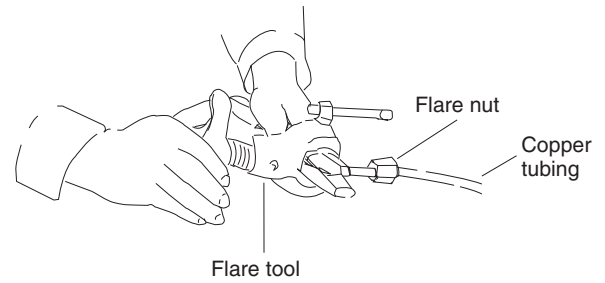


Fig. 11

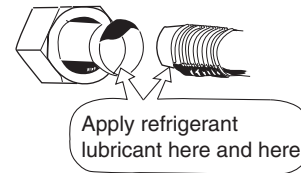


Fig. 12

3-5. Tubing Connections

a) Temporary connection:
Screw in 3 – 5 turns by hand. (Fig. 14)

b) To fasten the flare nuts, apply specified torque as:

Table 4

Tube Dia.	Nut	Tightening Torque
1/4" (6.35 mm)	21/32" (17 mm)	Approx. 120 – 160 lbs-in (140 – 180 kgf-cm)
3/8" (9.52 mm)	7/8" (22 mm)	Approx. 300 – 360 lbs-in (340 – 420 kgf-cm)
1/2" (12.70 mm)	1-1/32" (26 mm)	Approx. 430 – 480 lbs-in (490 – 550 kgf-cm)
5/8" (15.88 mm)	1-5/32" (29 mm)	Approx. 590 – 710 lbs-in (680 – 820 kgf-cm)

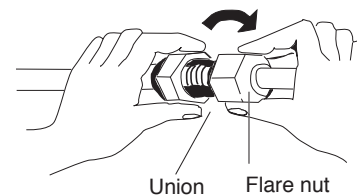


Fig. 13



Service valve on narrow tube side

Service valve on wide tube side

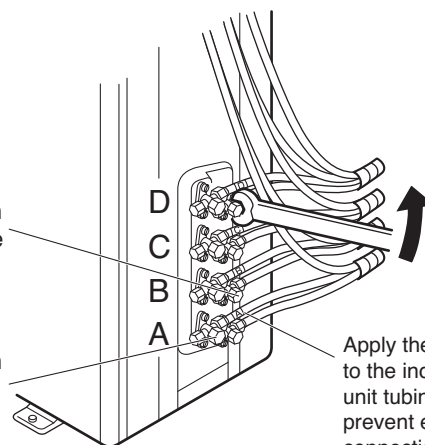


Fig. 14



CAUTION

Be sure to match refrigerant tubing and electric wiring between indoor and outdoor units.

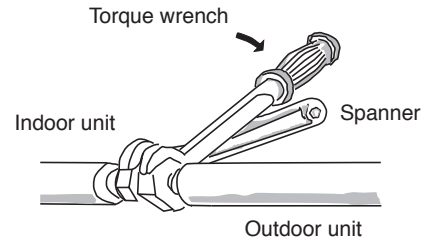


Fig. 15

3-6. Insulation of Refrigerant Tubing

IMPORTANT

To prevent heat loss and wet floors due to dripping of condensation, **both tubes must be well insulated with a proper insulation material.**

The thickness of the insulation should be a minimum 5/16" (8 mm). (Fig. 16)

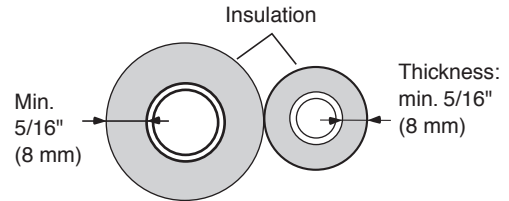


Fig. 16

■ For wall-mounted units

After connecting the refrigerant tubing to the outdoor unit and performing a leak test on the connecting part, insulate it with the tubing insulation. (Fig 17a)

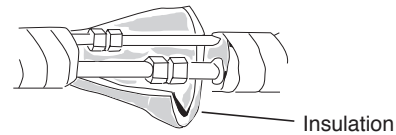


Fig. 17a

■ For ceiling-mounted cassette units

Wind the insulation tape around the flare nuts at the tube connections. Secondly cover up the tubing connections with the flare insulation (1/8" (T3, supplied)). Then wind the other flare insulation (3/16" (T5, supplied)). Finally, fasten the insulation at both ends with the supplied vinyl ties. (Fig. 17b)

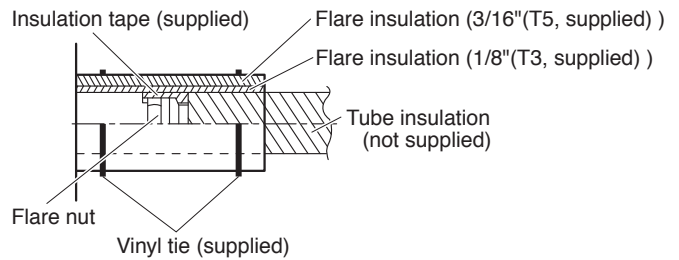


Fig. 17b

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.

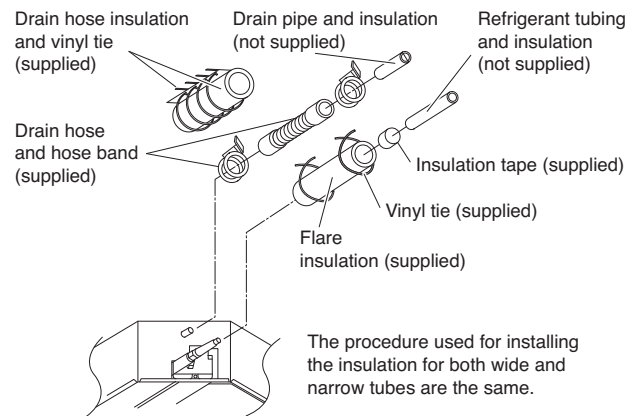


Fig. 17c

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

3-7. Taping the Tubes



CAUTION

After a tube has been insulated, never try to bend it into a narrow curve, as this may cause the tube to break or crack.

- (1) At this time, the 2 refrigerant tubes (and electrical wire if local codes permit) should be taped together with armoring tape. The drain hose may also be included and taped together as 1 bundle with the 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. (Fig. 18)
- (3) Clamp the tubing bundle to wall, using 1 clamp approx. every 47" (120 cm).

NOTE

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

3-8. 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. 19)

4. Air Purging

Air and moisture remaining in the refrigerant system have undesirable effects as indicated below. Therefore, they must be purged completely.

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

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

- In order to protect the earth's environment, be sure to use a vacuum pump to perform the air purge. (Never perform an air purge by using the refrigerant gas cylinder or other external gas, or by using the gas inside the outdoor unit.)

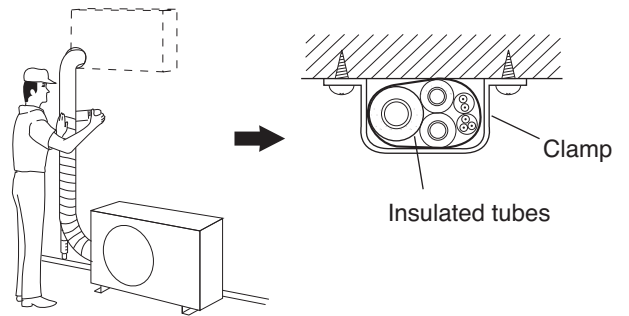


Fig. 18

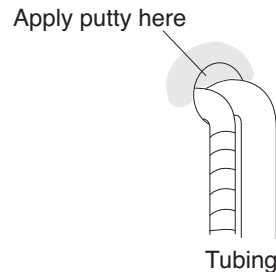


Fig. 19

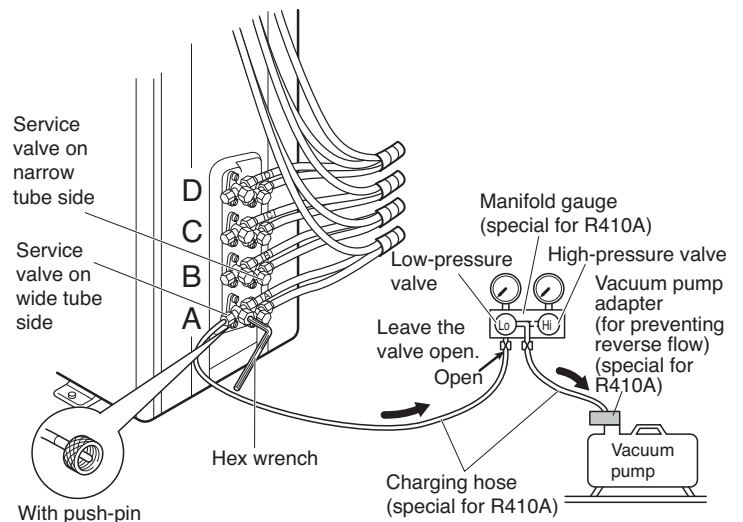


Fig. 20



CAUTION

In order to prevent charging errors with the air conditioner that uses R410A, the screw diameter at the service valve charging port has been changed. When recharging or performing other servicing, use the special charging hose and manifold gauge.

Perform the air purge for tubes A, B, C, and D. Use the same procedures for all tubes.

- (1) Check that each tube (both narrow and wide tubes) between the indoor and outdoor units have been properly connected and all wiring for the test run has been completed. Note that both narrow and wide tube service valves on the outdoor unit are kept closed at this stage.
- (2) Using an adjustable wrench or box wrench, remove the valve caps from the service valve on both narrow and wide tubes.
- (3) Connect a vacuum pump and a manifold valve (with pressure gauges) to the service port on the wide tube service valve. (Fig. 20).



CAUTION

Before using the vacuum pump adapter, read the vacuum pump adapter manual, and use the adapter correctly.



CAUTION

Be sure to 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.

- (4) With the "Lo" knob of the manifold valve open and high-pressure valve ("Hi") closed completely, run the vacuum pump. Run the pump until the pressure is -101 kPa (-76 cmHg). The operation time for the vacuum pump varies with tubing length and the capacity of the pump. The following table shows the amount of time required for evacuation:

Table 5

Required time for evacuation when capacity of 100 liter/h vacuum pump is used
20 min. or more

NOTE

The required time in Table 5 is calculated based on the assumption that the ideal (or target) vacuum condition is around 10 mmHg abs.

- (5) With the vacuum pump still running, close the "Lo" knob of the manifold valve. Then stop the vacuum pump. Fully close the low-pressure valve and stop the vacuum pump. (Wait 1 – 2 minutes and check that the manifold gauge pointer does not return. If it does return, find and repair the leak, then apply the vacuum again.)
- (6) With a hex wrench, turn the valve stem on the narrow tube service valve counter-clockwise by 90 degrees (1/4 turn) for 10 seconds, and then turn the stem clockwise to close it again.



CAUTION

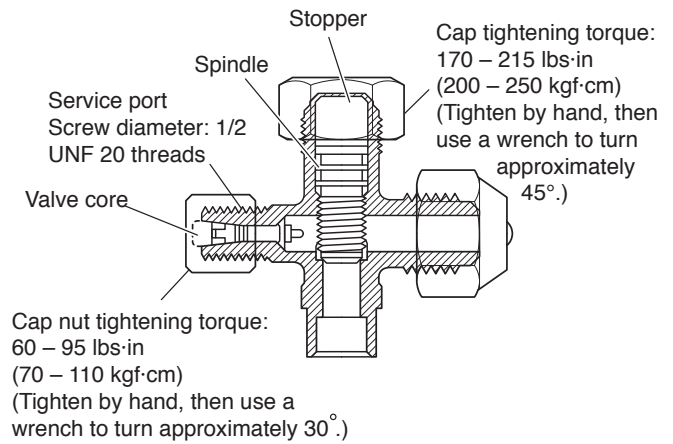
Be sure to completely insert the hex wrench before attempting to turn the valve.

- (7) With a standard screwdriver, turn the wide tube service valve stem counterclockwise to fully open the valve.
- (8) Turn the narrow tube service valve stem counter-clockwise to fully open the valve.
- (9) Loosen the vacuum hose connected to the wide tube service port slightly to release the pressure. Then, remove the hose.
- (10) Leak test all joints at the tubing (both indoor and outdoors) with liquid soap. Bubbles indicate a leak. Be sure to wipe off the soap with a clean cloth.



CAUTION

If a CFC gas detector is used, use a special detector for HFC refrigerant (such as R410A and R134a).



<Structure of service valve on wide tube side>

NOTE

External diameter of service port R410A: 5/16"

Fig. 21

- When using a hex wrench to open the spindle, an extremely small amount of refrigerant may leak. This does not indicate a problem.
- Use a hex wrench of a type to which force can be easily applied.

- (11) Replace the flare nut on the wide tube service port and fasten the flare nut securely with an adjustable wrench or box wrench. Next, mount the valve cap and tighten it with a torque wrench (the cap needs to be tightened with the torque of 180 lbs·in (200 kgf·cm)). This process is very important to prevent gas from leaking from the system.
- (12) Test run the air conditioner. (See page 26.)
- (13) While the air conditioner is running, apply liquid soap to check for any gas leaks around the service valves or caps.
- (14) If there is no leakage, stop the air conditioner.
- (15) Wipe off the soap on the tubing.

This completes air purging with a vacuum pump and the air conditioner is ready for actual operation.

■ Pump Down

In order to protect the earth's environment, be sure to perform pump-down to recover refrigerant gas without releasing it into the atmosphere.

- When relocating or disposing of the air conditioner, request this service from the dealer where the unit was purchased, or from an appropriate agent. Perform pump-down as described below.

What is pump-down?

- Pump-down refers to recovering the refrigerant gas from the refrigerant cycle at the outdoor unit. This work must be performed during cooling operation. The refrigerant gas cannot be recovered during heating operation.
- During winter, or if the temperature sensor prevents cooling operation, perform "forced cooling operation."

Pump-down procedure

- (1) Fully close the spindles at the valves on the narrow tube side of tubes A, B, C and D. (Refer to Fig. 22.)
- (2) Connect the manifold gauge to the charging port at the valve on the wide tube side of tube D. Purge the air from the charging hose. (Refer to Fig. 23.)
- (3) Perform cooling operation or forced cooling operation. When the pressure at the low-pressure side is 0.05 – 0.1 MPaG (0.5 – 1 kg/cm²G), fully close the spindles at the valves on the wide tube side of tubes A, B, C, and D, and immediately stop operation. (Refer to Fig. 23.)
In the winter, the outdoor unit may stop after 5 - 10 minutes of operation. This is in order to protect the indoor unit heat exchanger from freezing and does not indicate a problem.
- (4) Disconnect the manifold gauge and the inter-unit tubes, and attach the caps and flare nuts. At this point, pump-down is completed. (If the caps and flare nuts are not reattached, there is the danger of gas leakage.) (Refer to Fig. 24.)

If pump-down is not possible

If the air conditioner cannot be operated because of a malfunction or other cause, use a refrigerant recovery device to recover the refrigerant.

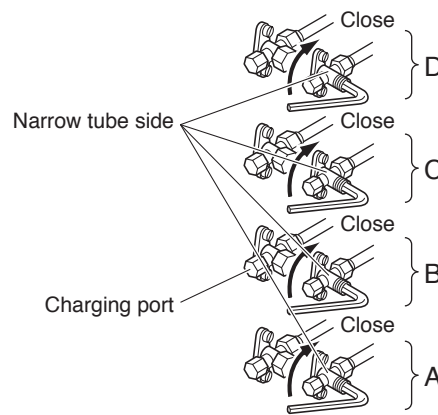


Fig. 22

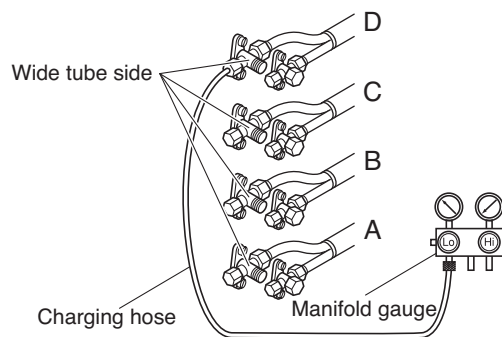


Fig. 23

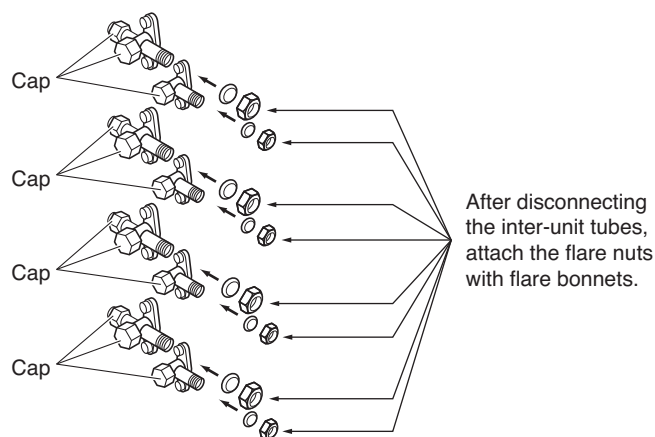


Fig. 24

5. Wiring Instructions

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, 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.

5-2. Recommended Wire Length and Diameter

Regulations on wiring diameter differ from locality to locality. For field wiring requirements, please refer to your local electrical codes. Carefully observe these regulations when carrying out the installation.

Table 6 shows maximum wire lengths for control line and power line and fuse or circuit capacity.

NOTE

Refer to the wiring system diagram (Fig. 25a or 25b) for the meaning of (A), (B), and (C) in Table 6.

Refer to your local codes or in the absence of local codes see the National Electric Code: ANSI/NFPA70.

Table 6

Model	AWG	Max. Power Line Length (ft.) (A)	Max. Control Line Length (ft.) (B) (C)	Fuse or Circuit Capacity
		(#12)	(#14)	
CU-3KE19NBU		85 (Max.)	82 (Max.)	15 A
CU-4KE24NBU		85 (Max.)	82 (Max.)	20 A
CU-4KE31NBU		85 (Max.)	100 (Max.)	20 A

... AWG (American Wire Gauge)



WARNING

- Be sure to comply with local codes on running the wire from the indoor unit to the outdoor unit (size of wire and wiring method, etc.).
- Each wire must be firmly connected.
- No wire should be allowed to touch refrigerant tubing, the compressor, or any moving part.
- Be sure to connect power wires correctly matching up numbers on terminals of the outdoor unit and respective indoor units A – D.



CAUTION

- Be sure to connect the power supply line to the outdoor unit as shown in the wiring diagram. The indoor unit draws its power from the outdoor unit.
- Do not run wiring for antenna, signal, or power lines of television, radio, stereo, telephone, security system, or intercom any closer than 3'4" (1 m) from the power cable and wires between the indoor and outdoor units. Electrical noise may affect the operation.



WARNING

- To avoid the risk of electric shock, each air conditioner unit must be grounded.
- For the installation of a grounding device, please observe local electrical codes.
- Grounding is necessary, especially for units using inverter circuits, in order to release charged electricity and electrical noise caused by high tension. Otherwise, electrical shock may occur.
- Place a dedicated ground more than 7' (2 m) away from other grounds and do not have it shared with other electric appliances.

*** NOTE**

Disconnect switch may be required by national or local codes.



CAUTION

Always comply with national and local code requirements.

5-3. Wiring System Diagram

3 indoor units with CU-3KE19NBU

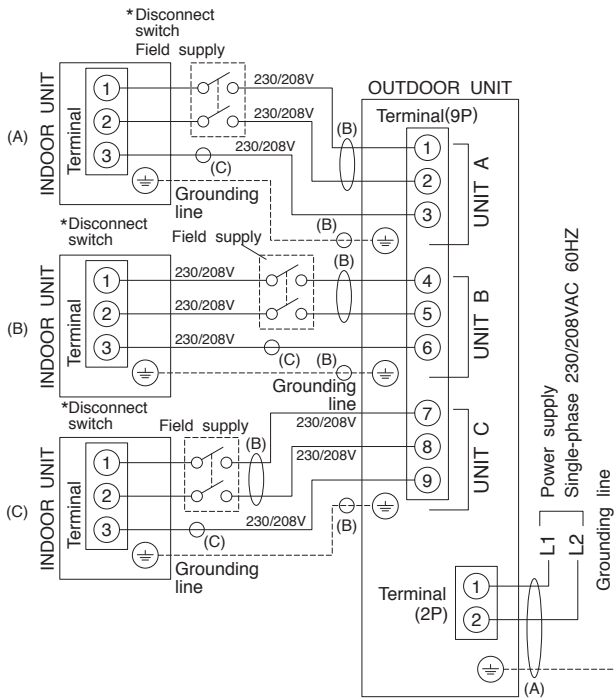


Fig. 25a

4 indoor units with CU-4KE24NBU, CU-4KE31NBU

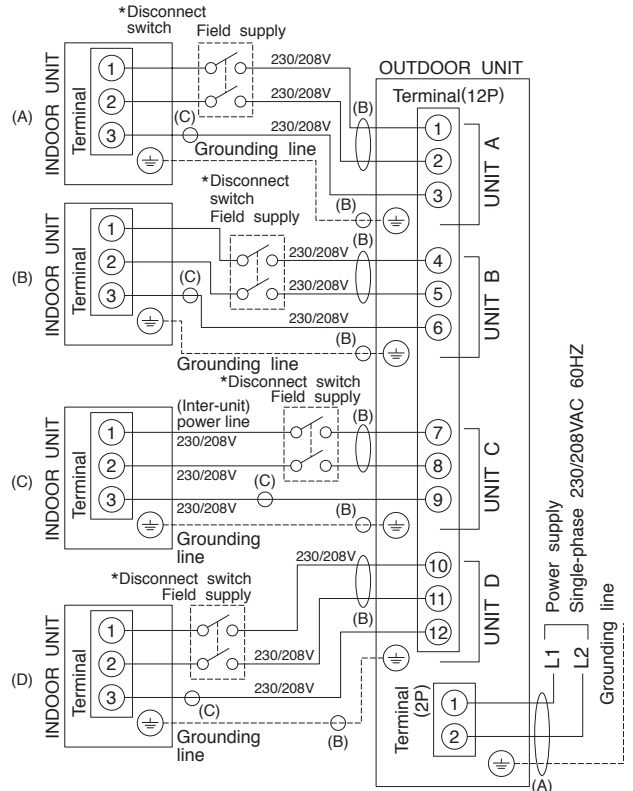


Fig. 25b

5-4. How to Connect Wiring to the Terminal



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 9/32" (7 mm). See the label (Fig. 26) 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

■ 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 15/16" (25 mm). (Fig. 27)
- (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 3/8" (10 mm) and tightly twist the wire ends. (Figs. 28 and 29)
- (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. 28)
- (4) Place the ring connector wire, and replace and tighten the removed terminal screw using a screwdriver. (Fig. 30)

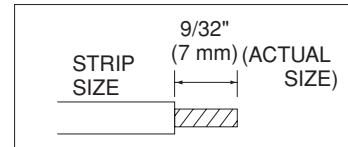


Fig. 26

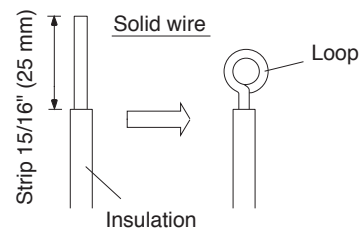


Fig. 27

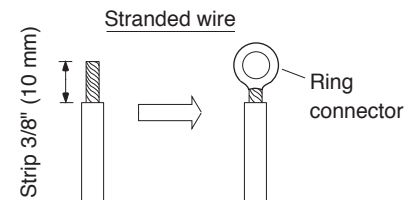


Fig. 28

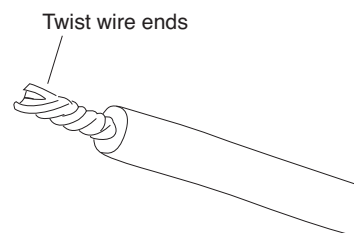


Fig. 29

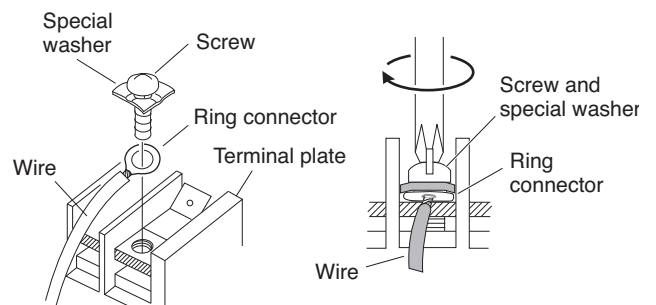


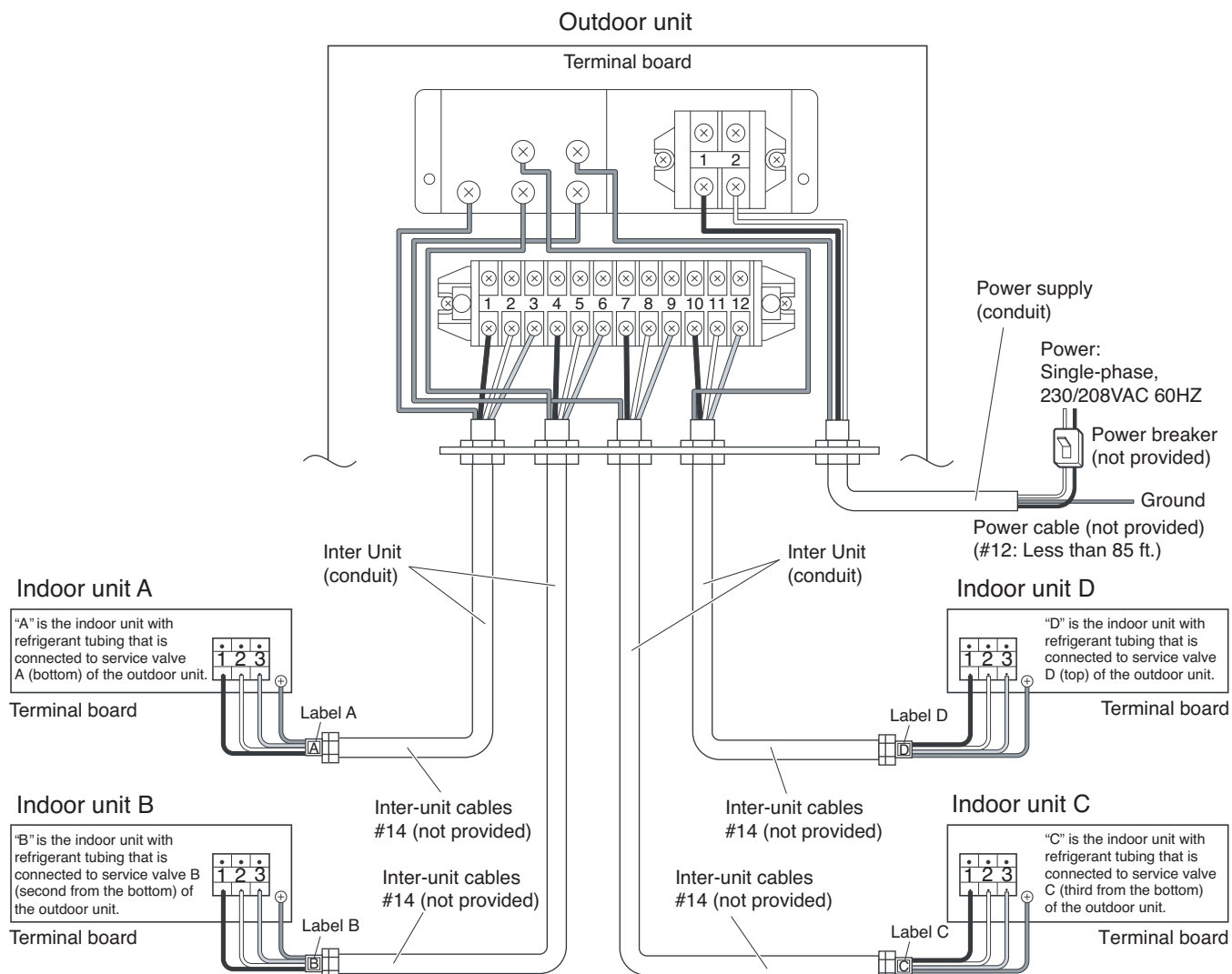
Fig. 30

5-5. Wiring Instructions for the Outdoor Unit



CAUTION

- Be sure to correctly align inter-unit cables A, B, C and D.



Be sure to perform grounding.

- Attach a ground wire to either the outdoor unit or indoor unit.
- If there is a grounding terminal inside the room, use the grounding screw inside the indoor unit.

- Be sure to apply the provided labels to both ends of the inter-unit cables to prevent miswiring. The units will not function if the wiring connections are incorrect.

... AWG (American Wire Gauge)

Fig. 31

- Use a dedicated air conditioner circuit for power.
- To make connections to the outdoor unit, remove the inspection panel and tubing panel.
- Do not bring the inter-unit cables or power cable into contact with tubing or service valves.
- Use outdoor unit cable fasteners and fasten the inter-unit cables at the location where the cables are double-sheathed.
- Arrange the wiring so that the inter-unit cables are contained in the inspection panel and tubing panel, as shown in Fig. 31.

Regulations on wire size differ from locality to locality. For field wiring requirements, please refer to your local electrical codes. Make sure that the installation fully complies with all local and national regulations.

- (1) Remove access panel "C". (Fig. 32)
- (2) Connect the inter-unit and power supply line according to the drawing on the panel side.
- (3) Be sure to size each wire allowing approx. 4" (10 cm) longer than the required length for wiring. Store excess wiring inside the cabinet.
- (4) When connections are completed, check that all connections are correct as shown in the wiring system diagram on panel side.
- (5) Be sure to ground the unit according to your local codes.

6. Test Run

Performing a test run

- Refer to the test run procedures in the indoor unit installation manual.
- Perform the test run separately for each connected indoor unit. If 2 units are operated simultaneously, it is not possible to correctly check for errors in tubing and wiring.
- If the room temperature is 59°F (15°C) or below, it may not be possible to check for tubing errors with cooling operation. If this occurs, perform heating operation for each unit individually, and check that warm air is discharged from each unit. If there is cold air mixed in with the warm air, check the tubing connections again.

Checking tubing and wiring

Perform the test run and check that operation is normal. If there is an error in tubing or wiring, the refrigerant may flow to indoor unit B when indoor unit A is operated (for example).



- Stop operation immediately if there is an error in tubing or wiring. Turn the power (breaker) to OFF, and check whether the inter-unit cables are connected incorrectly, or whether the narrow tubes A and B are connected in reverse. Correct the connections.
- If there is an error in tubing, pump-down must be performed. Be sure to perform pump-down. After making corrections, again purge the air from the tubes.

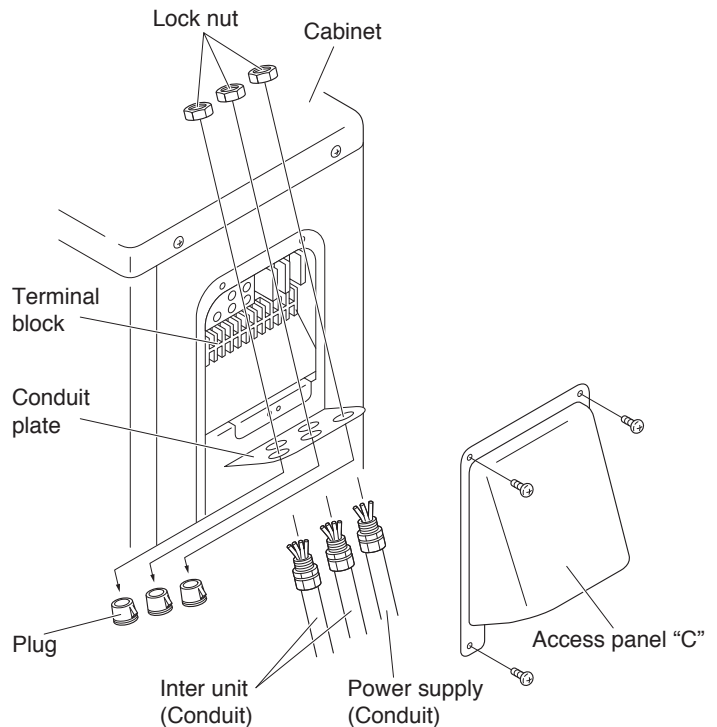


Fig. 32

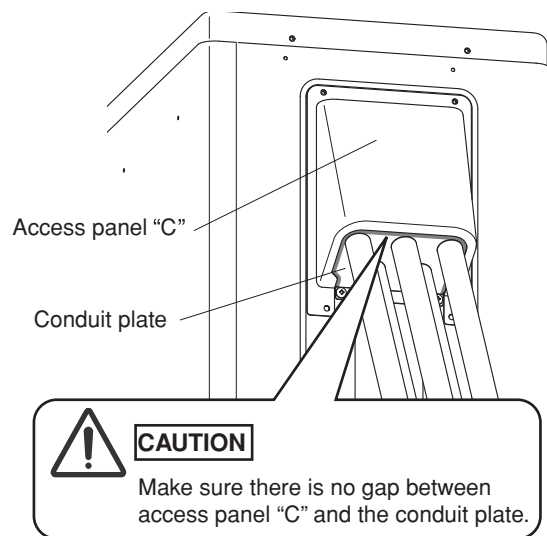


Fig. 33

7. Connecting a Home Automation Device

The HA (white) 4P terminal is located on the indoor unit PCB. If a HA device will be used, connect it to this terminal.

8. Installation Check Sheet

- The strength of the installation location is sufficient to support the air conditioner weight.
- The indoor and outdoor units are installed level and vertically.
- The power and voltage are as specified.
- Inter-unit cables are securely fastened to the terminal board.
- Inter-unit cables are securely fixed.
- The power cable and inter-unit cables are not connected anywhere along their paths.
- The ground wire is securely connected.
- An air purge of the refrigerant circuit has been conducted.
- A leak test of the tubing connections has been performed.
- Thermal insulation has been applied to the tubing connections.
- Drain connections are secure and water drains properly.
- Putty has been used to close the hole in the wall.
- All service valves are fully open.
- Remote controller signals are being positively received.

