SANYO INSTALLATION INSTRUCTIONS

- ECO-i System Air Conditioner -

This air conditioner uses the new refrigerant R410A.

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

Model Combinations

Class 7 9 12 15 18 19 24 36 48 54 4-Way Air Discharge XHX3652 Х XHX1252 XHX1852 XHX2452 Semi-Concealed 4-Way Air Discharge XM XMHX1252 XMHX1852 Mini Semi-Concealed 1-Way Air Discharge AHX0752 AHX0952 AHX1252 А Semi-Concealed U Concealed Duct Type UHX0762 UHX0962 UHX1262 UHX1562 UHX1862 UHX2462 UHX3662 UHX4862 UHX5462 Slim Concealed UM UMHX0762 UMHX0962 UMHX1262 UMHX1562 UMHX1862 Duct Type Concealed-Duct High D DHX3652 DHX4852 Static Pressure THX1252 Т Ceiling-Mounted THX1852 THX2452 Κ Wall-Mounted Type KHX0752 KHX0952 KHX1252 KHX1862 KHX1962 KHX2452 F Floor-Standing Type FHX0762 FHX0962 FHX1262 FHX1562 FHX1862 FHX2462 Concealed-Floor FMHX0762 FMHX0962 FMHX1262 FMHX1562 FMHX1862 FM FMHX2462 Standing Type

Optional Controllers

	Timer Wired Remote Controller	RCS-TM80BG
	Wireless Remote Controller (For U, UM, D, F, FM Types)	RCS-BH80AAB.WL
	Wireless Remote Controller (For X Type)	RCS-SH80AAB.WL
	Wireless Remote Controller (For XM Type)	RCS-XM18AAB.WL
	Wireless Remote Controller (For A, T Types)	RCS-TRP80AAB.WL
	Wireless Remote Controller (For K Type)	RCS-SH1AAB
RC	Simplified Remote Controller	RCS-KR1EG
	System Controller	SHA-KC64UG
	Schedule Timer	SHA-TM64AGB
	Intelligent Controller	SHA-KT256EA
	Communication Adaptor	SHA-KA128AAB
	Remote Sensor	ART-K45AGB
	LonWorks Interface	SHA-LN16UAB

SANYO North America Corporation

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Indoor Units

IMPORTANT! Please Read Before Starting

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

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

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



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

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

If Necessary, Get Help

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

In Case of Improper Installation

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

SPECIAL PRECAUTIONS

WARNING When Wiring



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

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

When Transporting

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

When Installing...

...In a Room

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

... In Moist or Uneven Locations

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

... In an Area with High Winds

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

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

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

When Connecting Refrigerant Tubing

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

When Servicing

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



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

Check of Density Limit

The room in which the air conditioner is to be installed requires a design that in the event of refrigerant gas leaking out, its density will not exceed a set limit.

The refrigerant (R410A), which is used in the air conditioner, is safe, without the toxicity or combustibility of ammonia, and is not restricted by laws imposed to protect the ozone layer. However, since it contains more than air, it poses the risk of suffocation if its density should rise excessively. Suffocation from leakage of refrigerant is almost non-existent.

With the recent increase in the number of high density buildings, however, the installation of multi air conditioner systems is on the increase because of the need for effective use of floor space, individual control, energy conservation by curtailing heat and carrying power, etc. Most importantly, the multi air conditioner system is able to replenish a large amount of refrigerant compared to conventional individual air conditioners. If a single unit of the multi air conditioner system is to be installed in a small room, select a suitable model and installation procedure so that if the refrigerant accidentally leaks out, its density does not reach the limit (and in the event of an emergency, measures can be made before injury can occur).

ASHRAE and the International Mechanical Code of the ICC as well as CSA provide guidance and define safeguards related to the use of refrigerants, all of which define a Refrigerant Concentration Level (RCL) of 25 pounds per 1,000 cubic feet for R410A refrigerant. For additional guidance and precautions related to refrigerant safety, please refer to the following documents:

International Mechanical Code 2009 (IMC-2009) (or more recently revised) ASHRAE 15 ASHRAE 34

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IMPORTANT!2

Please Read Before Starting Check of Density Limit

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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 outdoor unit and make sure all accessory parts listed are with the system before beginning.

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

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

1-2. Accessories Supplied

See Tables 1-1 - 1-4.

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 5/16 in.
- Use insulated copper wire for field wiring. Wire size varies with the total length of wiring. Refer to "4. ELECTRICAL WIRING" for details.



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 (See your local codes.)
- 3. Putty
- 4. Refrigeration tubing lubricant
- 5. Clamps or saddles to secure refrigerant tubing
- 6. Scale for weighing

Table 1-1 (Concealed Duct)

Part Name	Figure	Q'ty	Remarks
Drain hose		1	For securing drain hose
Hose band	Ē	1	For securing drain hose
Packing	$\langle \rangle$	1	For drain joint
Drain insulator	0	1	For drain joint
Flare insulator	○	1	For liquid tube
Insulating tape	White (heat-resisting)	2	For gas and liquid tubes flare nuts
Flare insulator	0	1	For gas tube
Washer	0	8	For suspending indoor unit from ceiling
Sealing putty	\bigcirc	1	For sealing recessed portion of power supply
Vinyl clamp		8	For flare and drain insulators

Table 1-2 (Slim Concealed Duct)

Part Name	Figure	Q'ty	Remarks
Washer	0	8	For suspension fitting
Flare insulation	T3 T5	2 set	For gas / liquid tube connection
Insulation tape		2	For gas / liquid tube / flare nut connection
Vinyl tie		8	For flare / drain insulating connection
Drain hose insulation	💭 T10	1	For drain tube connection
Drain hose	()))))))))))))))))))))))))))))))))))))	1	For unit & PVC tube connection
Hose band	Ð	2	For drain hose connection
Short circuit connection		1	For high static pressure (Located on the back of the electrical component box lid.)

Table 1-3 (Wall-Mounted)

Part Name	Figure	Q'ty	Remarks
Tapping screw	🛲 🕅 5/32" × 1"	10	For fixing the rear panel
Plastic cover		1	For improved tubing appearance
Insulator		1	For insulating flare nut

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

Table 1-4 (Floor-Standing & Concealed Floor-Standing)

Part Name	Figure	Q'ty	Remarks
Connection pipe	E TH	1	For connecting gas tubes
Flare insulator	6	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)	Ø	1	For drain pipe
Drain insulator	6	1	For drain hose joint
Binding strap	0	2	

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

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 the installation manual packed with the outdoor unit.
- allow room for mounting the remote controller about 3 ft. off the floor, in an area that is not in direct sunlight nor in the flow of cool air from the indoor unit.
- The elevation ((Slim) Concealed Duct) between the bottom unit and the floor surface should be at least 8 feet.
- If the elevation ((Slim) Concealed Duct) between them is less than 8 feet, install a filter (optional/field supply) or a protective device (field supply) not to touch the electrical parts or fan with hands.
- The air intake and outtake openings should be provided with the same location of a room.

NOTE

Air delivery will be degraded if the distance from the floor to the ceiling is greater than 10 ft.



(Slim) Concealed Duct Type





Fig. 2-2

Wall-Mounted Type



Front View



Floor-Standing, Concealed Floor-Standing Type



VIEW



3. HOW TO INSTALL THE INDOOR UNIT

■ Concealed Duct Type (U Type)

3-1. 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. 3-1 and Table 3-1.
- It is recommended that space be provided $(17-23/32 \times 17-23/32)$ in.) for checking and servicing the electrical system.
- Fig. 3-2 and Table 3-2 show the detailed dimensions of the indoor unit.

A (Suspension bolt pitch	Electrical
Min. 9-27/32	Inspection access 17-23/32 17-23/32 Refrigerant
Air outlet duct flange	tubing
	Unit: in.

Fig. 3-1

Table 3-1

Table 3-1			Unit: in. (mm)
Туре	7, 9, 12, 15	18, 24	36, 48, 54
A (Length)	30-23/32 (780)	42-17/32 (1,080)	61-13/32 (1,560)
Number of duct flanges	2	3	4

Table 3-2

Unit[.] in

Dimension	•	Р	<u>^</u>	P	F	F	<u>^</u>	ц			K	No. of	holes
Туре	A	D	L	U	E	F	G	п	I	J	r	L	М
7, 9, 12, 15	26-1/16	23-5/8 (7-7/8 × 3)	27-9/16	30-23/32	11-13/32	10-5/16	26-25/32	28-5/32	7-3/32	_	13-3/8	8	12
18, 24	37-7/8	35-7/16 (7-3/32 × 5)	39-3/8	42-17/32	11-13/32	10-23/32	38-19/32	39-31/32	5-1/8	9-21/32 (9-21/32 × 1)	9-27/32	12	16
36, 48, 54	56-25/32	54-11/32 (9-1/16×6)	58-9/32	61-13/32	13-3/16	12-7/32	57-15/32	58-27/32	5-1/8	19-9/32 (9-21/32 × 2)	9-7/16	16	18



3-2. Suspending the Indoor Unit

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 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.

- When placing the unit inside the ceiling, determine the pitch of the suspension bolts referring to the dimensional data on the previous page. (Fig. 3-1 and Table 3-1) 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. 3-3. (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. 3-5 and 3-6. 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. 3-7 shows an example of installation.



3-3. Installing the Drain Piping

(1) Prepare standard hard PVC pipe (O.D. 1-1/4") 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. 3-8)



- 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. (Fig. 3-8)
- (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. 3-9)

NOTE

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



- Do not install an air bleeder as this may cause water to spray from the drain pipe outlet. (Fig. 3-10)
- 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 19-11/16". Do not raise it any higher than 19-11/16", as this could result in water leaks. (Fig. 3-11)
- 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. 3-12)
- 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. 3-13)

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) Remove the tube cover and through the opening, slowly pour approx. 0.3 gal 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. 11



Fig. 3-13



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.

3-5. 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. 3-15.
- (5) Place the cable neatly in the box and reinstall the cover plate.





The vertical axis is the external static pressure (in. WG) while the horizontal axis represents the air flow (CFM). 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 18 and 24 types, the air flow is 635 CFM, while the external static pressure is 0.20 in. WG 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.







0.60

(in.WG)

I Static Pressu 05.0

xternal

Λ

3-6. 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 3/8" in the upward direction.

Never install it with a downward gradient against horizontal.





3-7. 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 1.0 ft. or more space.



Fig. 3-18

■ Slim Concealed-Duct Type (UM Type)

- 3-8. 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 "3-13. Installing the Drain Piping".



Fig. 3-19

* Min. 4" or more for bottom air intake

Ceiling

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



Fig. 3-20

3-9. 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.





- (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 "5. HOW TO PROCESS TUBING, 3-13. Installing the Drain Piping" and "4. 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.

3-10. 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.



3-11. 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 Ø1/8" (Hole) screws.
- Wrap the intake-side flange and duct connection area with aluminum tape or something similar to prevent air escaping.



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.



- Be sure to insulate the duct to prevent condensation from forming. (Material: glass wool or polyethylene foam, 1 in. 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. 3-23

3-12. 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.



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.





- (4) Adjust the height of the unit.
- (5) Check the unit is horizontally level.



- 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. 3-25







Fig. 3-28

3-13. Installing the Drain Piping

(1) Prepare standard hard PVC pipe (O.D. 1-1/32") 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.



- 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).

ΝΟΤΕ

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



- 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 19-11/16". Do not raise it any higher than 19-11/16", 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.

3-14. 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 0.13gal 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. 3-33



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.

3-15. Increasing the Fan Speed

- For Short Circuit Connection
- The standard (before shipment) external static pressure is shown in the table below.
- When using with a higher static pressure, it is necessary to change to the high static pressure mode.

External static pressure

TYPE	7	9	12	15	18
Standard (in.WG)	0.04	0.06	0.06	0.06	0.06
High static pressure (in.WG)	0.12	0.12	0.16	0.16	0.16

When using with high static pressure mode, set the indoor unit control board as shown at right. Follow the below procedure while the unit is turned off.

- (1) Open the cover of the electrical box and confirm that it is the indoor unit control board.
- (2) Connect the short circuit connector to the short circuit pin TP3 (2P: Yellow) of the indoor unit control board.
- In case of wired remote control setting, do not use the short circuit connector.

■ For Wired Remote Control

- (2) " STIME," unit No. " 1" (or " ALL" in the case of group control), item code " [2," and settings data " [] XX" are displayed blinking on the remote controller LCD display.

At this time, the indoor unit fan (or all indoor unit fans in the case of group control) begins operating.

- ③ Press the temperature setting ▲ / ▼ buttons to select the item code " **5 d** ".
- ④ Press the timer time / buttons to select the desired setting data.
 * For item codes and setting data, refer to the right table.

5 Press the SET button.

(The display stops blinking and remains lit, and setting is completed.)







:....

Yellow Red

Γ

TP6 TP3 TP



■ Wall-Mounted Type (K Type)

3-16. 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.

NOTE

Tubing can be extended in 4 directions as shown in Fig. 3-36. Select the direction which will provide the shortest run to the outdoor unit.

3-17. 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. 3-37)
- (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. 3-5/32") in the wall. (Fig. 3-38)
- (5) Measure the thickness of the wall from the inside edge to the outside edge and cut the PVC pipe at a slight angle 15/64" shorter than the thickness of the wall. (Fig. 3-39)
- (6) Place the plastic cover over the end of the pipe (for indoor side only) and insert in the wall. (Fig. 3-40)

NOTE

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



Avoid areas where electrical wiring or conduits are located.

3-18. 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. 3-41)

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 3/16" dia. holes in the panel over the stud locations and then mount the rear panel.



20





- (2) Check with a tape measure or carpenter's level. This is important so that the unit is correctly installed. (Fig. 3-42)
- (3) Make sure the panel is flush against the wall. Any space between the wall and unit will cause noise and vibration.

b) If the Wall is Brick, Concrete or Similar

Drill 3/16" dia. holes in the wall. Insert Rawl plugs for appropriate mounting screws. (Fig. 3-43)

3-19. 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.

3-20. 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. 3-44)

- 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. 3-45)
 - 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. 3-46)

Raising the clamp to lift up the indoor unit will facilitate this work. (Fig. 3-47)

To remove the indoor unit, press up on the 2 locations $(\triangle \text{ marks})$ on the lower part of the unit frame to disconnect the installation tabs. Refer to Section 3-16. "Removing the Rear Panel from the Unit" (Fig. 3-35).

Then lift up the indoor unit to remove it.



Fig. 3-45

Fig. 3-46



3-21. Shaping the Tubing

Right-rear tubing

- (1) Shape the refrigerant tubing so that it can easily go into the hole. (Fig. 3-48)
- (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.

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. (Fig. 3-49)
- (2) After performing a leak test, wrap the refrigerant tubing and drain hose together with insulating tape, as shown in the figure at right. (Fig. 3-50)

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.

NOTE

It is necessary to install the external electronic expansion valve kit for the model 1962. For installation, refer to "3-24. External Electronic Expansion Valve Kit (ATK-SVRK56BA)".

3-22. Installing the Drain Hose

- a) The drain hose should be slanted downward to the outside. (Fig. 3-51)
- 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.



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













Fig. 3-51

3-23. When Using Wireless Remote Controller Instead of Wired Remote Controller

When the wireless remote controller is to be used, slide the switch on the indoor unit control PCB.

- If this setting is not made, an alarm will occur. (The operation lamp on the display blinks.)
- This setting is not necessary if both the wired remote controller and wireless remote controller are used.
- The location of the switch varies depending on the type of PCB used. Check the model name before making the setting.

NOTE

This setting is necessary also in case of "non-using wired/wireless" remote controller. (ex. central control using only an intelligent/system controller)

• KHX1862 / 1962





Setting at time of factory shipment

Slide No. 3 on SW101 from $ON \rightarrow OFF$.

3-24. External Electronic Expansion Valve Kit (ATK-SVRK56BA)

Precautions in this manual are given in the form of "Warnings" or "Cautions." Both types of precautions contain important information related to your safety, the safety of users, and the correct operation, installation, or maintenance of the air conditioning system. Be sure to carefully observe all relevant precautions.



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

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

• This external electronic expansion valve is compatible with the refrigerants listed below. R410A, R407C, R22

1. Checking Parts

Please check these parts below that came in the box.

	Description	Shape	Q'ty		Description	Shape	Q'ty
	External electronic	39	-	3	Clamp (Large: 13-25/32", Small: 7-7/8")	8	Large: 2 Small: 4
	(Extension cord 26.2 ft.)		I	4	Installation manual	$\langle \rangle$	1
2	Flare insulator	0	2	5	Insulating tape	White (heat resisting)	2

2. Positioning for Installation

• The valve should be connected to the liquid tube. Determine the position for installation referring to the diagram of outer dimensions. (Fig. 3-52) Refrigerant-flow noise may occur from the external electronic expansion valve. As a guide, the distance from the indoor unit should be a minimum of 16.4 feet, but less than 26.2 feet. (Install away from locations where strictly quiet operation is required.)

If this distance is unavailable, install inside the ceiling or in another location where noise insulation is possible. This is a functional component, and therefore may require inspection and replacement. Consider this when deciding the installation location. (For example, place near an inspection port, or provide one.)

• This valve is for indoor use. Do not install the valve outdoors.

Diagram of outer dimensions



Fig. 3-52

3. Cutting and Flaring of Liquid Tube

After determining the position for installation, cut the liquid tube and flare the connecting portion. (Pay attention to the notes below when flaring the tubes.)

NOTE

- After cutting the tube, deburr and finish the end face smoothly and correctly.
- Do not damage tubes while flaring.
- Take care not to allow dirt and deburred chips into the tube.
- Use the flare nut which came with External Electronic Expansion Valve Kit.
- The flaring dimensions for R410A are different from the conventional dimensions for R407C and R22. For R410A, the specially created flaring tool is recommended. However a conventional tool can be used by adjusting the amount of copper tube projection as shown in the table below.

		Unit . In.					
Rigid (clutch type)							
R4 ⁻	R407C, R22						
If special R410A	If conventional	If conventional					
tool is used	tool is used	tool is used					
B = 0 - 1/64	3/64 - 1/16	0 - 1/64					





4. Connection of External Electronic Expansion Valve with Tubing

In connection with tubing, take care to fit the external electronic expansion valve in the right direction. Be sure to install with the mark on the label pointing upwards. Also when connecting the flare, use the arrow marks on the label to check the directions of the indoor unit side and outdoor unit side. (The wiring outlet side faces the indoor unit.) (Refer to Fig. 3-54.)



Fig. 3-54

• Tightening flare nuts



Be sure to use 2 spanners together when removing or tightening the flare nuts. After connection with the tubing, tighten the flare nuts by the correct torque. Failure to tighten the nuts correctly can cause loosening and damage on the flared portion, resulting in accidents by oxygen deficiency due to refrigerant leaks.

Tubing size	Tightening torque
1/4" (Ø6.35)	120 - 160 lbs∙inch (140 - 180 kgf ∙ cm)
3/8" (Ø9.52)	300 - 360 lbs∙inch (340 - 420 kgf • cm)

5. Flare Insulation of Tubing

After completing a leakage test, apply heat insulation. (Fig. 3-55)

* Use the flare insulator provided with the product.



Fig. 3-55

6. Securing the External Electronic Expansion Valve After Connection with Tubing

After connection with tubing, secure the external electronic expansion valve using the supplied clamps (large) to hold it against the gas tube. (Fig. 3-56)



* Be careful not to tighten the clamps with excessive force in order to avoid deforming the tubing or other parts. Fig. 3-56

7. Wiring Procedure



Be sure to turn the power off at the mains before removing or connecting connectors to avoid electric shock hazard.

Connection of External Electronic Expansion Valve with Extension Cord

- (1) Turn the power off.
- (2) Turn the power on.
- (3) Wait 1 minute after the power is on and then turn the power off again at the mains.
 - * The electronic expansion valve becomes full-open in the 1 minute. Do not give instructions for operation through the remote control during this time.
- (4) Open the electrical component box. From the control PCB, disconnect the connector to the indoor unit internal electronic expansion valve.
- (5) Connect the external electronic expansion valve connector to the indoor unit control PCB (PMV). (Fig. 3-57) After completing the wiring process, close the cover of the electrical component box.
- (6) Turn on the main breaker. This procedure is now completed.



Fig. 3-57

The model KHX1962 is only applied for the following procedure.

- (1) Turn the power off.
- (2) Open the electrical component box.
- (3) Connect the external electronic expansion valve connector to the indoor unit control PCB (PMV). (Fig. 3-58) After completing the wiring process, close the cover of the electrical component box.
- (4) Turn on the main breaker. This procedure is now completed.



Fig. 3-58

Floor-Standing Type (F Type) Concealed Floor-Standing Type (FM Type)

3-25. 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.

NOTE

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

3-26. Dimensions and Part Names

Floor-Standing Type (F Type)

- 4-Ø15/32" 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)
- ④ Location for mounting the remote controller (remote controller can be attached within the room)



Fig. 3-59

Unit : in

Length Type	А	В	с	Liquid tube	Gas tube
7, 9, 12	41-59/64	26-3/16	24-7/8	01/4	o1/0
15, 18	E4 01/64	20 27/64	27 0/22	01/4	01/2
24	54-21/04	54 38-37/64 37-9/32		Ø3/8	Ø5/8



Fig. 3-60

Concealed Floor-Standing Type (FM Type)

(1) 4-Ø15/32" 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)
- O Flange for air-outlet duct

							L	Jnit : in.
Length Type	Α	В	С	D	Е	F	Liquid tube	Gas tube
7, 9, 12	35-19/32	27-1/4	26-29/64	26-3/16	19-11/16	3-25/64	G1/4	o1/0
15, 18	17 62/64	20 41/64	20.20/64	20 27/64	25 7/16	0.1/64	01/4	01/2
24	47-03/04	39-41/04	39-29/04	30-37/04	35-7/10	2-1/04	Ø3/8	Ø5/8



NOTE

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

3-27. 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.
- (3) Cut off the binding strap to loosen the glass fiber tube.
- (4) Disengage the lead-wire connector from the dewprevention heater by pressing the tab.
- (5) Remove the string connecting the front panel of the unit by unhooking it from the fixture attached to the panel.

How to attach the front panel

- (1) Hook the string to the fixture of the front panel.
- (2) Expose the tip of the dew-prevention heater from the glass fiber tube in order to make connection smoothly.
- (3) Connect the lead-wire connector to the dew-prevention heater until the click sounds.
- (4) After the connection, tighten the glass fiber tube nearby connected area inside the tube with the binding strap.
- (5) 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.
- (6) Insert the 2 screws at the lower part of the front panel.









3-28. 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 reartube outlet of the rear panel.
- When a downward tube is required, refer to the opening dimensions shown in Fig. 3-64.



Fig. 3-64



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.

3-29. Installing the Drain Piping



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 a 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 that the water drains smoothly.
- (5) Remove any dust or debris in the drain pan so that the pipe is not clogged.

3-30. 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. 3-68)
- (2) Remove the front panel. Remove the screws and fixture. (Fig. 3-69)
- (3) Place the remote controller into the space in the unit as shown in Fig. 3-69. 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.



To remove the cover from the remote controller, insert a screwdriver between the cover and the controller as shown in the figure above, and pry off the cover.









Fig. 3-67



Fig. 3-69

■ 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		

4. ELECTRICAL WIRING

4-1. 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 disorder 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 malfunction 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.
- (9) If the power supply cord of this appliance is damaged, it must be replaced by a repair shop appointed by the manufacture, because special purpose tools are required.

4-2. Recommended Wire Length and Wire Diameter for Power Supply System

Indoor unit

Туре	Time delay fuse or circuit capacity
К	10 – 16A
U, UM	10 – 16A
F, FM	10 – 16A

Control wiring

(A) Inter-unit (between outdoor and indoor units) control wiring*	(B) Remote control wiring	(C) Control wiring for group control
AWG #18 (0.75 mm²)	AWG #18 (0.75 mm ²)	AWG #18 (0.75 mm ²)
Max. 3,280 ft.	Max. 1,640 ft.	Max. 650 ft. (Total)

NOTE

* With ring-type wire terminal.

(D) Inter-outdoor unit control wiring

AWG #18 (0.75 mm²)

Max. 980 ft.



NOTE

- (1) Refer to Section 4-2. "Recommended Wire Length and Wire Diameter for Power Supply System" for the explanation of "A," "B," "C," and "D," 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.







(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. 4-1)



(3) Do not install inter-unit control wiring such as star branch wiring. Star branch wiring causes misaddress setting. (Fig. 4-2)



Fig. 4-2

(4) If branching the inter-unit control wiring, the number of branch points should be 16 or fewer. (Branches less than 3.3 ft. are not included in the total branch number.) (Fig. 4-3)



Fig. 4-3



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 approx.3/8 in. and tightly twist the wire ends. (Fig. 4-4)
- (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. 4-5)





Fig. 4-5

4-4. Important Note When Wiring for Common Type

Connect the wires referring to the diagram. Note that the control wirings (Low voltages) shall be segregated from the power supply wires (High voltage) as follows:

- Connect the Inter-unit control wiring to U1/U2 terminals and the remote control wire to R1/ R2.(excepting K type).
- 2. Connect the power supply wires to "L1, L2" of the terminal block. Be sure to connect the grounding conductor of the incoming power supply to the earth (ground) screw.
- 3. Securely affix the power supply wires and remote control wires by the clamping strap or clamping clip not to cross each other and not to leave the wirings loose. When loosening the clamping clip, twist the strap and it will come undone.







Important Note When Wiring for Common Type (Continued)



5. HOW TO PROCESS TUBING

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

5-1. 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. 1 2 ft. 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. 5-1)

NOTE

When reaming, hold the tube end downward and be sure that no copper scraps fall into the tube. (Fig. 5-2)

- (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. 5-3)

NOTE

A good flare should have the following characteristics:

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







Fig. 5-2



Fig. 5-3

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. 5-4)
- (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. 5-5)
- 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.

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.

5-2. 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. 5-6)
 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.



Fig. 5-4



Fig. 5-5



Fig. 5-6

Tube diameter	Tightening torque, approximate	Tube thickness
ø1/4" (ø6.35 mm)	120 – 160 lbs ⋅ inch (140 – 180 kgf ⋅ cm)	1/32" (0.8 mm)
ø3/8" (ø9.52 mm)	300 – 360 lbs ⋅ inch (340 – 420 kgf ⋅ cm)	1/32" (0.8 mm)
ø1/2" (ø12.7 mm)	430 – 530 lbs ⋅ inch (490 – 610 kgf ⋅ cm)	1/32" (0.8 mm)
ø5/8" (ø15.88 mm)	590 – 710 lbs ⋅ inch (680 – 820 kgf ⋅ cm)	5/128" (1.0 mm)
ø3/4" (ø19.05 mm)	870 – 1040 lbs inch (1000 – 1200 kgf cm)	over 5/128" (over 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 an adjustable wrench with a nominal handle length of 7-7/8 in.

5-3. Insulating the Refrigerant Tubing

Tubing Insulation

- Thermal insulation must be applied to all unit tubing, including the distribution joint (purchased separately). (Fig. 5-7)
 - * For gas tubing, the insulation material must be heat resistant to 248°F or above. For other tubing, it must be heat resistant to 176°F or above.

Insulation material thickness must be 25/64 in. or greater.

If the conditions inside the ceiling exceed DB 86°F and RH 70%, increase the thickness of the gas tubing insulation material by 1 step.



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. 5-8)

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. 5-9)



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.

Two tubes arranged together



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

5-4. 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 ft. (Fig. 5-10)

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.

5-5. 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. 5-11)





Fig. 5-11

6. APPENDIX

■ NAME OF PARTS





UM type (SLIM DUCT)



K Type (Wall-Mounted)



F type (Floor-standing)



FM type (Concealed floor standing)



Care and Cleaning



- 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.



- 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.

Туре	U	UM	K	F, FM
Period	(depending on filter	Two weeks	Two weeks	Two weeks
	specifications)		TWO WEEKS	

*Concealed duct type (U):

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.

How to remove the filter

- Wall-mounted type 1. Move the flap on the air outlet grille to its lowest position with the remote control unit.
 - (K): 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 1. Remove the screw at the bottom left of the front panel using a Phillips head

- (F, FM): screwdriver. (Be sure to replace the screw when cleaning is finished.)
 - 2. Remove the filter by pulling it toward you.



Cleaning the drain filter

and drain pan

Floor standing type (F) 1. Remove the front panel

- Remove the 2 screws fixed to the bottom of the front panel before opening the panel. Open the front panel with a lifting motion to detach the latch.
- Disengage the dew-prevention heater from the lead-wire connector. Refer to " 3-27 Removing and Attaching the Front Panel ".

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





Concealed Floor standing type

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



(FM)





- 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.	 Power failure. Leakage circuit breaker has tripped. Line voltage is too low. Operation button is turned off. The wired remote control unit or heat pump is malfunctioning. (The inspection mark	 After a power outage, press ON/ OFF operation button on the wired remote control unit. Contact service center. Consult your electrician or dealer. Press the button again. Consult your dealer.
Compressor runs but soon stops.	1. Obstruction in front of condenser coil.	1. Remove obstruction.
Poor cooling (or heating) perfor- mance.	 Dirty or clogged air filter. Heat source or many people in room. Doors and/or windows are open. Obstacle near air intake or air dis- charge port. Thermostat is set too high for cooling (or too low for heating). (Defrosting system does not work.) 	 Clean air filter to improve the air- flow. Eliminate heat source if possible. Shut them to keep the heat (or cold) out. Remove it to ensure good airflow. Set the temperature lower (or higher). (Consult your dealer.)

■ Tips for Energy Saving

- 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.



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