senville™

Applicable to

SENL/12HD/MI
SENL/18HD/MO

Split Type Wall-mounted Inverter Room Air Conditioner

INSTALLATION MANUAL

Thank you for purchasing of SENVILLE air conditioner. To guarantee safety and best efficiency, please read this manual carefully and keep a suitable storage for reference.

CONTENTS

Read This Manual

Inside you will find many helpful hints on how to install and test the air conditioner properly.
All the illustrations and specifications in the manual are subject to change without prior notice for product improvement. The actual shape should prevail.

⚠ CAUTION

- Contact an authorised service technician for repair or maintenance of this unit.
- Contact an authorised installer for installation of this unit.
- The air conditioner is not intended for use by young children or infirmed persons without supervision.
- Young children should be supervised to ensure that they do not play with the air conditioner.
- If the power cord is to be replaced, replacement work shall be performed by authorised personnel only.
- Installation work must be performed in accordance with the national wiring Standards by authorised personnel only.

SAFETY PRECAUTIONS

- Read the follow SAFETY PRECAUTIONS carefully before installation.
- Electrical work must be installed by a licensed electrician. Be sure to use the correct rating of the power plug and main circuit for the model to be installed.
- Incorrect installation due to ignoring of the instruction will cause harm or damage.

■ **The seriousness is classified by the following indications.**

⚠ **WARNING**	This symbol indicates the possibility of death or serious injury.
⚠ **CAUTION**	This symbol indicates the possibility of injury or damage to property.

■ **The items to be followed are classified by the symbols:**

⃠	Symbol with background white denotes item that is PROHIBITED from doing.

⚠ WARNING

1) Engage dealer or specialist for installation. If installation done by the user is defective, it will cause water leakage, electrical shock fire.
2) Install according to this installation instructions strictly. If installation is defective, it will cause water leakage, electrical shock fire.
3) Use the attached accessories parts and specified parts for installation. otherwise, it will cause the set to fall, water leakage, electrical shock fire.
4) Install at a strong and firm location which is able to withstand the set's weight. If the strength is not enough or installation is not properly done, the set will drop and cause injury.
5) For electrical work, follow the local national wiring standard, regulation and this installation instructions. An independent circuit and single outlet must be used. If electrical circuit capacity is not enough or defect found in electrical work, it will cause electrical shock fire.
6) Use the specified cable and connect tightly and clamp the cable so that no external force will be acted on the terminal. If connection or fixing is not perfect, it will cause heat-up or fire at the connection.
7) Wiring routing must be properly arranged so that control board cover is fixed properly. If control board cover is not fixed perfectly, it will cause heat-up at connection point of terminal, fire or electrical shock.
8) When carrying out piping connection, take care not to let air substances other than the specified refrigerant go into refrigeration cycle. Otherwise, it will cause lower capacity, abnormal high pressure in the refrigeration cycle, explosion and injury. ⃠
9) Do not modify the length of the power supply cord or use of extension cord, and do not share the single outlet with other electrical appliances. Otherwise, it will cause fire or electrical shock. ⃠

⚠ CAUTION

1) This equipment must be earthed and installed with earth leakage current breaker. It may cause electrical shock if grounding is not perfect.
2) Do not install the unit at place where leakage of flammable gas may occur. In case gas leaks and accumulates at surrounding of the unit, it may cause fire. ⃠
3) Carry out drainage piping as mentioned in installation instructions. If drainage is not perfect, water may enter the room and damage the furniture.

1. Wall-mounted type

Selecting installation place

Read completely, then follow step by step.

Indoor unit

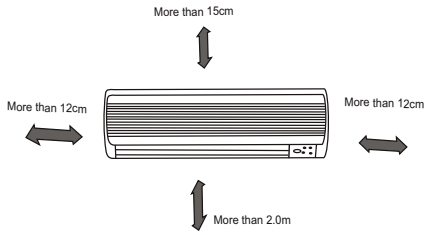


Fig.1

- Do not expose the indoor unit to heat or steam.
- Select a place where there are no obstacles in front or around the unit.
- Make sure that condensation drainage can be conveniently routed away.
- Do not install near a doorway.
- Ensure that the space on the left and right of the unit is more than 12cm.
- Use a stud finder to locate studs to prevent unnecessary damage to the wall.
- The indoor unit should be installed on the wall at a height of 2.0 metres or more from the floor.
- The indoor unit should be installed allowing a minimum clearance of 15cm from the ceiling.
- Any variations in pipe length will/may require adjustment to refrigerant charge.
- There should not be any direct sunlight. Otherwise, the sun will fade the plastic cabinet and affect its appearance. If unavoidable, sunlight prevention should be taken into consideration.

Outdoor unit

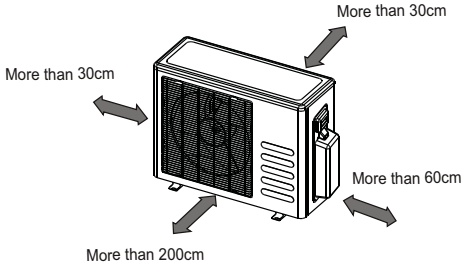


Fig.2

- If an awning is built over the outdoor unit to prevent direct sunlight or rain exposure, make sure that heat radiation from the condenser is not restricted.
- Ensure that the clearance around the back of the unit is more than 30cm and left side is more than 30cm. The front of the unit should have more than 200cm of clearance and the connection side (right side) should have more than 60cm of clearance.
- Do not place animals and plants in the path of the air inlet or outlet.
- Take the air conditioner weight into account and select a place where noise and vibration will not be an issue.
- Select a place so that the warm air and noise from the air conditioner do not disturb neighbors.

Rooftop installation:

- If the outdoor unit is installed on a roof structure, be sure to level the unit.
- Ensure the roof structure and anchoring method are adequate for the unit location.
- Consult local codes regarding rooftop mounting.
- If the outdoor unit is installed on roof structures or external walls, this may result in excessive noise and vibration, and may also be classed as a non serviceable installation.

INSTALLATION INSTRUCTIONS

Tools needed for installation:

Level gauge
Screwdriver
Electric drill,Hole core drill (Φ65mm)
Flaring tool set
Specified torque wrenches: 1.8kgf.m, 4.2kgf.m,
5.5kgf.m, 6.6kgf.m(different depending on model No.)
Spanner (half union)
Hexagonal wrench (4mm)
Gas-leak detector
Vacuum pump
Gauge manifold
Users manual
Thermometer
Multimeter
Pipe cutter
Measuring tape

Accessories

Number	Name of Accessories			Q' ty/one unit
1	Installation Plate			1
2	Plastic Expansion Sheath			5
3	Self-tapping Screw A ST3.9X25			5
4	Seal (See Page 8 for details)			1
5	Drain Joint (See page 8 for details)			1
6	Connecting pipe Assembly	Liquid side	Φ 6.35	Parts you must purchase (The minimum pipe wall-thickness of 0.7mm is required.)
		Gas side	Φ 9.53 (<12000Btu/h model)	
			Φ 12.7 (≥12000Btu/h model)	
7	Remote controller			1
8	Self-tapping Screw B ST2.9X10			2
9	Remote controller holder			1

Note: Except the above parts provided, the other parts needed during installation you must purchase.

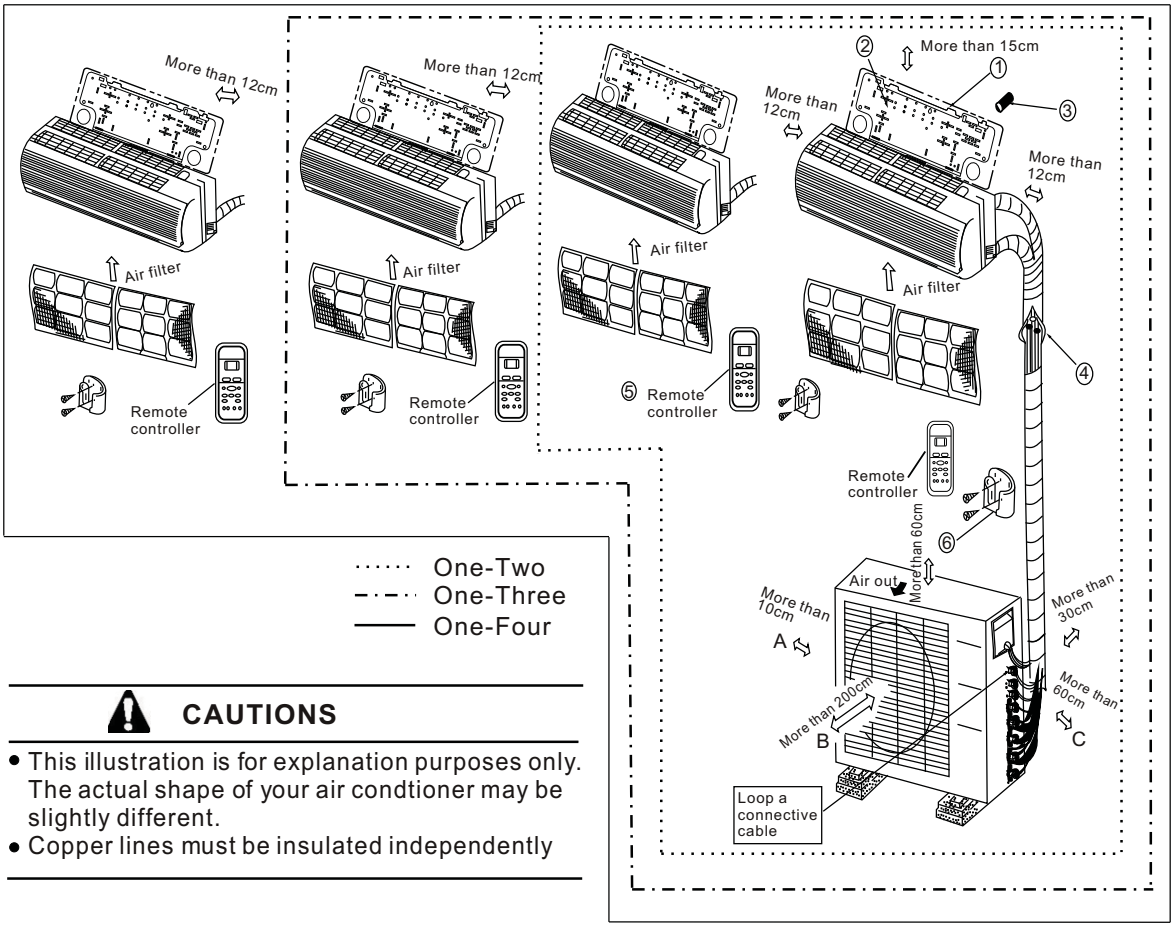


Fig.3

CAUTIONS

- This illustration is for explanation purposes only. The actual shape of your air condtioner may be slightly different.
- Copper lines must be insulated independently

CAUTION

- Use a stud finder to locate studs to prevent unnecessary damage to the wall.
- A minimum pipe run of 3 metres is required to minimise vibration & excessive noise.
- Two of the A, B and C directions should be free from obstructions.

INSTALLATION INSTRUCTIONS

Indoor unit installation(wall-mounted type)

1. Fit the Installation Plate

1. Fit the installation plate horizontally on structural parts of the wall with spaces around the installation plate.
2. If the wall is made of brick, concrete or the like, drill eight (8) 5mm diameter holes in the wall.Insert Clip anchor for appropriate mounting screws.
3. Fit the installation plate on the wall with eight (8) type "A" screws.

Note:

Fit the Installation Plate and drill holes in the wall according to the wall structure and corresponding mounting points on the installation plate. The Installation Plate may be slightly different according to the different models of indoor unit.

(Dimensions are in "mm" unless otherwise stated)

Model	A(mm)	B(mm)
＜12000Btu/h	710	250
	750	250
	780	270
≥12000Btu/h	790	265
	780	270
	815	280

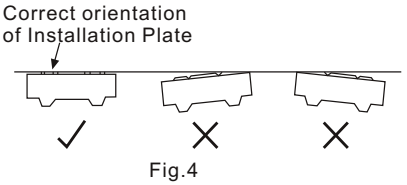
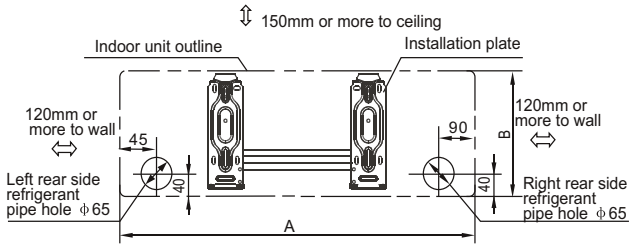
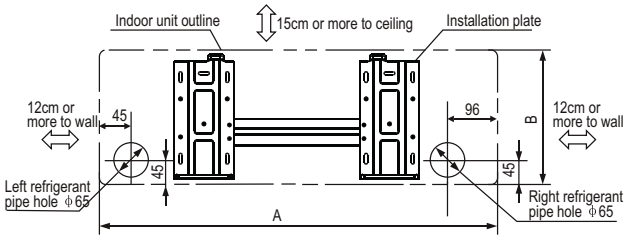


Fig.4



(1)



(2)

Fig.5

2. Drill a hole in the wall

1. Determine hole positions according to the diagramdetailed in Fig.5. Drill one (1) hole (ϕ65mm) slanting slightly to outdoor side.
2. Always use wall hole conduit when drilling metal grid, metal plate or the like.

3. Connective Pipe and Drainage Installation

Drainage

1. Run the drain hose sloping downward. Do not install the drain hose as illustrated in Fig.7.

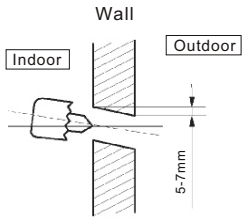


Fig.6

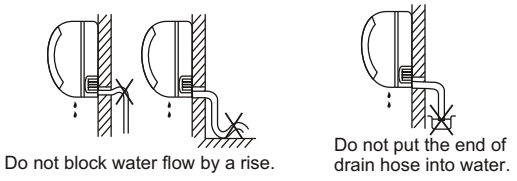


Fig.7

2. When connecting extension drain hose, insulate the connecting part of extension drain hose with a shield pipe, do not let the drain hose slack.

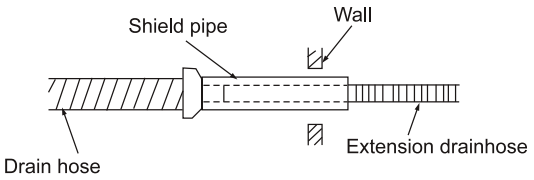


Fig.8

Connective pipe installation

1. For the left-hand and right-hand piping, remove the pipe cover from the side panel.
2. For the rear-right-hand and rear-left-hand piping, install the piping as shown in Fig.9. Bend the connective pipe to be laid at 43mm height or less from the wall.
3. Fix the end of the connective pipe. (Refer to Tightening Connection in REFRIGERANT PIPING CONNECTION)

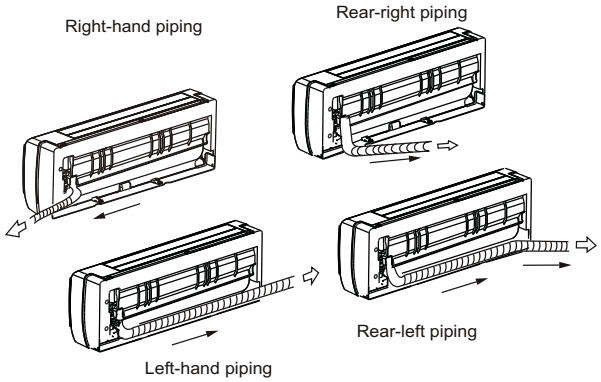


Fig.9

4. Piping and wrapping

Bundle the tubing, connecting cable, and drain hose with tape securely, evenly as shown in Fig.11.

- Because the condensed water from rear of the indoor unit is gathered in ponding box and is piped out of room. Do not put anything else in the box.

CAUTION

- Connect the indoor unit first, then the outdoor unit.
- Do not allow the piping to let out from the back of the indoor unit.
- Be careful not to let the drain hose slack.
- Heat insulated both of the auxiliary piping.
- Be sure that the drain hose is located at the lowest side of the bundle. Locating at the upper side can cause drain pan to overflow inside the unit.
- Never intercross nor intertwist the power wire with any other wiring.
- Run the drain hose sloped downward to drain out the condensed water smoothly.

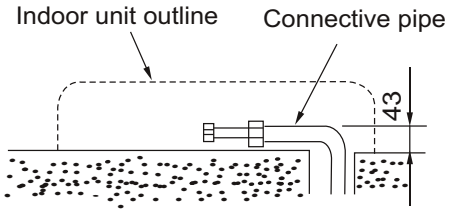


Fig.10

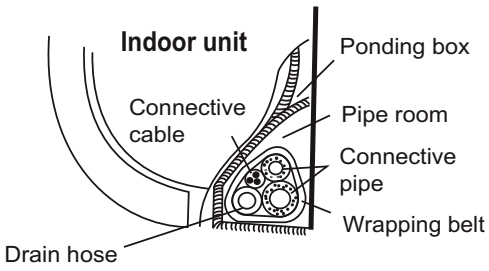


Fig.11

4. Indoor unit installation

1. Pass the piping through the hole in the wall.
2. Put the upper claw at the back of the indoor unit on the upper hook of the installation plate, move the indoor unit from side to side to see that it is securely hooked (see Fig.12).
3. Piping can easily be made by lifting the indoor unit with a cushioning material between the indoor unit and the wall. Get it out after finish piping.
4. Push the lower part of the indoor unit up on the wall, then move the indoor unit from side to side, up and down to check if it is hooked securely.

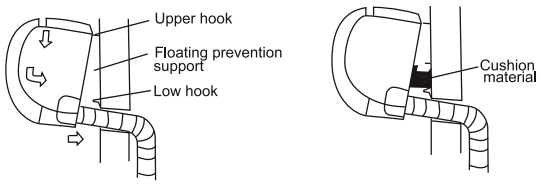


Fig.12

Indoor units that can be used in combination	Number of connected units	1-4units	
	Total of indoor units class KW	**10.5KW**	
Total length for all rooms		Max. 60m (R410A)	Max. 40m (R407c/R22)
Length for one indoor unit		Max. 15m (R410A)	Max.10m (R407c/R22)
Difference in height between indoor and outdoor units	When above outdoor unit (B)	Max. 10m	
	When below outdoor unit (A)	Max. 10m	
Difference in height between indoor units		**Max.5m**	
Compressor stop/start frequency	1 cycle time	6 min or more (from stop to stop or from start to start)	
	Stop time	3 min or more	
Power source voltage	Voltage fluctuation	within ±10% of rated voltage	
	Voltage drop during start	within ±15% of rated voltage	
	Interval unbalance	within ±3% of rated voltage	

Refrigerant pipe connection

1. Flaring work

Main cause for refrigerant leakage is due to defect in the flaring work. Carry out correct flaring work using the following procedure:

A: Cut the pipes and the cable.

1. Use the piping kit accessory or pipes purchased locally.
2. Measure the distance between the indoor and the outdoor unit.
3. Cut the pipes a little longer than the measured distance.
4. Cut the cable 1.5m longer than the pipe length.

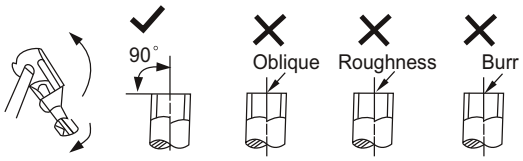


Fig.13

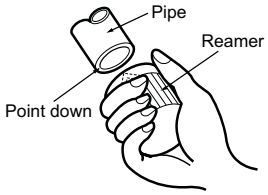


Fig.14

B: Burr removal

1. Completely remove all burrs from the cut cross section of pipe/tube.
2. Put the end of the copper tube/pipe in a downward direction as you remove burrs in order to avoid dropping burrs into the tubing.

C: Putting nut on

Remove flare nuts attached to indoor and outdoor unit, then put them on pipe/tube having completed burr removal.(not possible to put them on after flaring work)

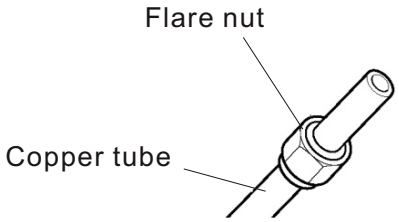


Fig.15

D: Flaring work

Firmly hold copper pipe in a die in the dimension shown in the table below.

Outer diam. (mm)	A(mm)	
	Max.	Min.
ϕ 6.35	1.3	0.7
ϕ 9.53	1.6	1.0
ϕ 12.7	1.8	1.0

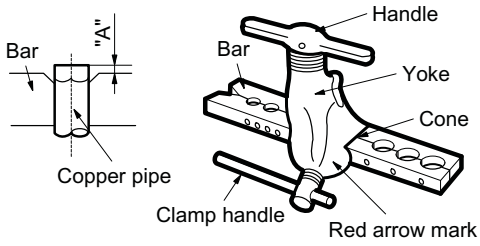


Fig.16

Tightening Connection

- Align the center of the pipes.
- Sufficiently tighten the flare nut with fingers, and then tighten it with a spanner and torque wrench as shown in Fig.51 & 52.

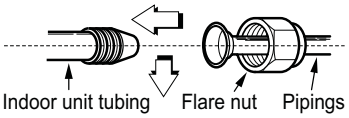


Fig.17

Outer diam.	Tightening torque(N.cm)	Additional tightening torque(N.cm)
ϕ 6.35	1570 (160kgf.cm)	1960 (200kgf.cm)
ϕ 9.53	2940 (300kgf.cm)	3430 (350kgf.cm)
ϕ 12.7	4900 (500kgf.cm)	5390 (550kgf.cm)

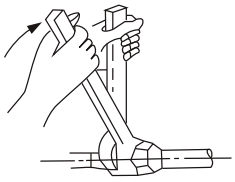


Fig.18

Caution

- Excessive torque can break nut depending on installation conditions.

Electrical work

Electric safety regulations for the initial Installation

1. If there is serious safety problem about the power supply, the technicians should refuse to install the air conditioner and explain to the client until the problem is solved.
2. Power voltage should be in the range of 90%~110%of rated voltage.
3. The creepage protector and main power switch with a 1.5 times capacity of Max. Current of the unit should be installed in power circuit.
4. Ensure the air conditioner is grounded well.
5. According to the attached Electrical Connection Diagram located on the panel of the outdoor unit to connect the wire.
6. All wiring must comply with local and national electrical codes and be installed by qualified and skilled electricians.
7. An individual branch circuit and single receptacle used only for this air conditioner must be available.

ELECTRICAL WORK

Wiring connection

NOTE: Before performing any electrical work, turn off the main power to the system.

CAUTIONS

- Do not touch the capacitor even if you have disconnected the power for there is still high voltage power on it, or electric shock hazard may occur. For your safety, you should start repairing at least 5 minutes later after the power is disconnected.
- The power is supplied from the Outdoor Unit. The four Indoor Unit are connected with a signal wires or power cords are connected reliably and correctly, or the air conditioner could not run normally.

Connect the cable to the outdoor unit

1. Remove the electrical control board cover from the outdoor unit by loosening the screw as shown in Fig.51.
2. Connect the connective cables to the terminals as identified with their respective matched numbers on the terminal block of indoor and outdoor units.
3. Secure the cable onto the control board with the cord clamp.
4. To prevent the ingress of water, from a loop of the connective cable as illustrated in the installation diagram of indoor and outdoor units.
5. Insulate unused cords (conductors) with PVC-tape.Process them so they do not touch any electrical or metal parts.

CAUTIONS

Make sure to connect the indoor unit (A,B, C, D) to the Hi and Lo valve and terminals of signal wires(A, B, C, D) of outdoor unit as identified with their respective matched connection. Wrong wiring connections may cause some electrical parts to malfunction.

Minimum norminal cross-sectional area of conductors:

Rated current of appliance (A)	Nominal cross-sectional area (mm^2)
>3 and ≤6	0.75
>6 and ≤10	1
>10 and ≤16	1.5
>16 and ≤25	2.5

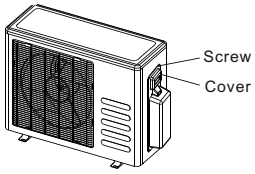


Fig.19

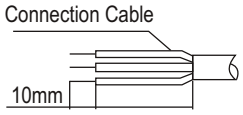


Fig.20

Terminal block of outdoor unit

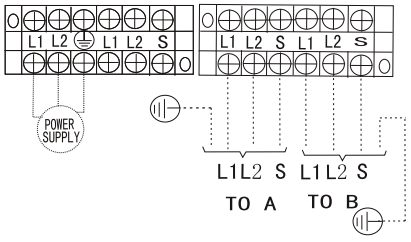


Fig.21

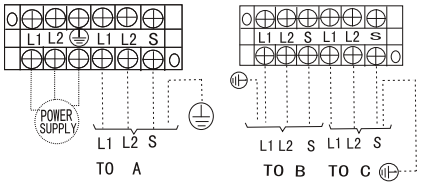


Fig.22

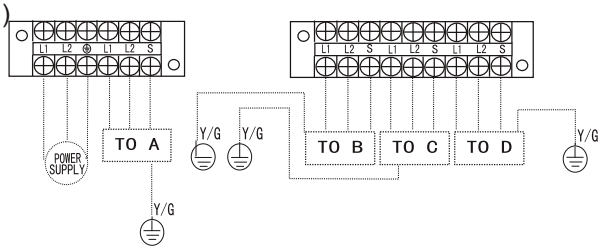


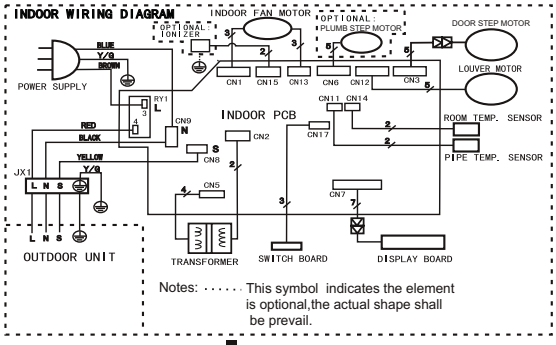
Fig.23

NOTE:

For some models, the indoor unit is especially designed to used as either MULTI models or MONO models. If your air conditioner is not set to the MULTI position, see the following INDOOR WIRING DIAGRAM to modify the indoor unit from MONO model to MULTI model. (Fig.56 & 57)

1. Carefully remove the front panel and frame, then remove the Electricall control cover by loosen the screw.
2. Remove the POWER SUPPLY cord of MONO model(Fig.56).
3. Unplug the "L" RED wire connected with "4" on pinboard of RY1, then connect it with "3" on pinboard of Ry1.
4. Reinstall the Electrical Control cover and screw, rip off the white paper above the Slide Switch and move it to the MULTI position(see Fig. 56).
5. Reinstall the front panel and frame.
6. Now the indoor unit can be used as MULTI models(Fig.57). Because the control system is changed, the AUTO CLEAN function is unavailable for MULTI models.

MONO MODELS



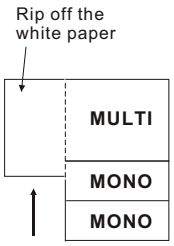


Fig.24

MULTI MODELS

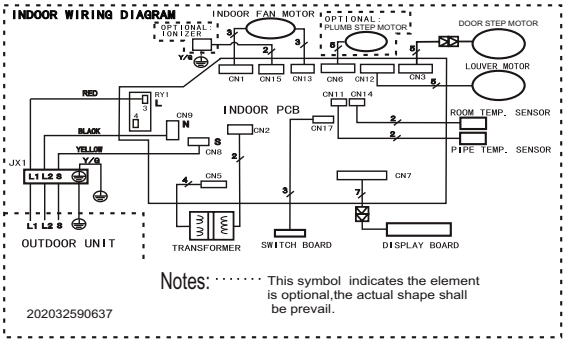


Fig.25

AIR PURGING

CAUTION

After the confirmation of the above conditions, prepare the wiring as follows:

1) Never fail to have an individual power circuit specifically for the air conditioner. As for the method of wiring, be guided by the circuit diagram posted on the inside of control cover.

2) The screw which fasten the wiring in the casing of electrical fittings are liable to come loose from vibrations to which the unit is subjected during the course of transportation. Check them and make sure that they are all tightly fastened. (If they are loose, it could cause burn-out of the wires.)

3) Specification of power source.

4) Confirm that electrical capacity is sufficient.

5) See to that the starting voltage is maintained at more than 90 percent of the rated voltage marked on the name plate.

6) Confirm that the cable thickness is as specified in the power source specification.

7) Always install an earth leakage circuit breaker in a wet or moist area.

8) The following would be caused by voltage drop.

Vibration of a magnetic switch, which will damage the contact point, fuse breaking, disturbance of the normal function of the overload.

9) The means for disconnection from a power supply shall be incorporated in the fixed wiring and have an air gap contact separation of at least 3mm in each active(phase) conductors.

Air purging

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

- Pressure in the system rises.
- Operating current rises.
- Cooling or heating efficiency drops.
- Moisture in the refrigerant circuit may freeze and block capillary tubing.
- Water may lead to corrosion of parts in the refrigeration system.

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

Air purging with vacuum pump

- Preparation
  Check that each tube(both liquid and gas side tubes) between the indoor and outdoor units have been properly connected and all wiring for the test run has been completed. Remove the service valve caps from both the gas and the liquid side on the outdoor unit. Note that both the liquid and the gas side service valves on the outdoor unit are kept closed at this stage.
- Pipe length and refrigerant amount:

Connective pipe length	Air purging method	Additional amount of refrigerant to be charged
Less than 5m	Use vacuum pump.	————
More than 5m	Use vacuum pump.	R22: (Pipe length-5m)x30g/m R410A: (Pipe length-5m)x15g/m R407c: (Pipe length-5m)x30g/m

- When relocate the unit to another place, perform evacuation using vacuum pump.
- Make sure the refrigerant added into the air conditioner is liquid form in any case. (Not applicable to the units adopt freon R22)

Caution in handling the packed valve

- Open the valve stem until it hits against the stopper. Do not try to open it further.
- Securely tighten the valve stem cap with a spanner or the like.
- Valve stem cap tightening torque (See Tightening torque table in previous page).

When Using the Vacuum Pump

(For method of using a manifold valve, refer to its operation manual.)

1. Completely tighten the flare nuts, A, B, C, D, connect the manifold valve charge hose to a charge port of the low-pressure valve on the gas pipe side.
2. Connect the charge hose connection to the vacuum pump.
3. Fully open the handle Lo of the manifold valve.
4. Operate the vacuum pump to evacuate. After starting evacuation, slightly loose theflare nut of the Lo valve on the gas pipe side and check that the air is entering(Operation noise of the vacuum pump changes and a compound meter indicates 0 instead of minus)
5. After the evacuation is complete, fully close the handle Lo of the manifold valve and stop the operation of the vacuum pump. Make evacuation for 15 minutes or more and check that the compound meter indicates -76cmHg (-1x10^{5}Pa).
6. Turn the stem of the packed valve B about 45° counterclockwise for 6~7 seconds after the gas coming out, then tighten the flare nut again. Make sure the pressure display in the pressure indicator is a little higher than the atmosphere pressure.
7. Remove the charge hose from the Low pressure charge hose.
8. Fully open the packed valve stems B and A.
9. Securely tighten the cap of the packed valve.

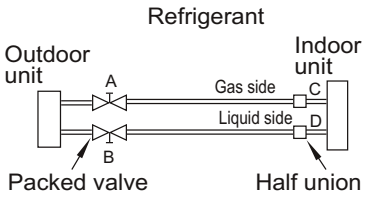


Fig.26

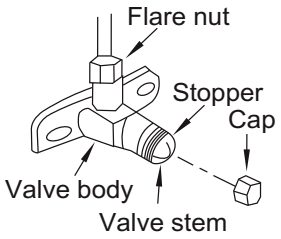


Fig.27

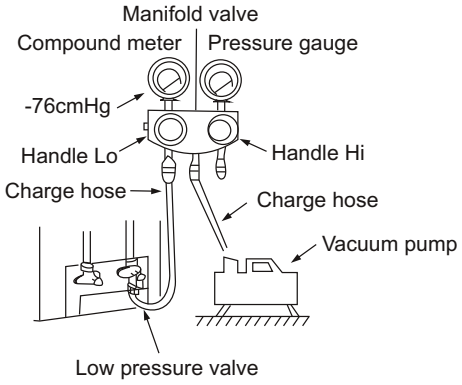


Fig.28

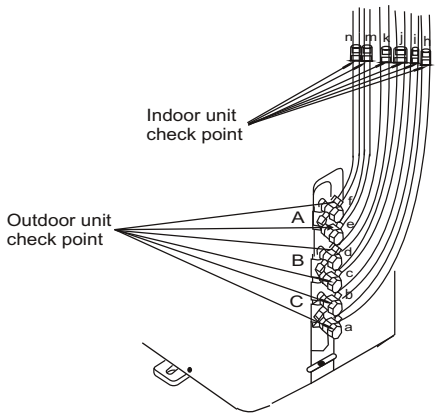
AIR PURGING

Safety and leakage check

● **Electrical safety check**

Perform the electric safe check after completing installation:

1. Insulated resistance
   The insulated resistance must be more than 2MΩ.
2. Grounding work
   After finishing grounding work, measure the grounding resistance by visual detection and grounding resistance tester. Make sure the grounding resistance is less than 4Ω.
3. Electrical leakage check (performing during test running)
   During test operation after finishing installation, the serviceman can use the electroprobe and multimeter to perform the electrical leakage check. Turn off the unit immediately if leakage happens. Check and find out the solution ways till the unit operate properly.



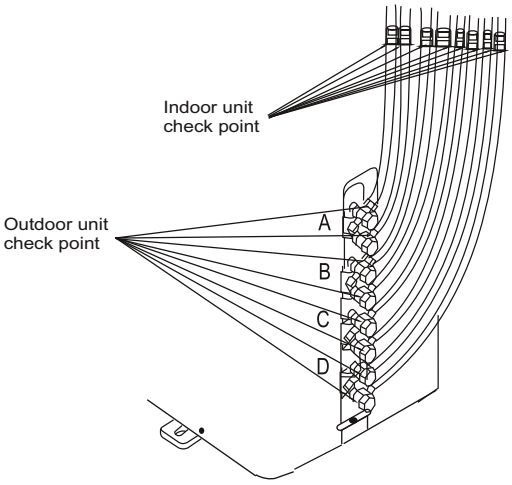
a,b,c,d,h,i,j , k are points for one-two type.
a,b,c,d,e,f,,h,i,j,k,m,n are points for one-three type.

Fig.29

● **Gas leak check**

1. **Soap water method:**
   Apply a soap water or a liquid neutral detergent on the indoor unit connection or outdoor unit connections by a soft brush to check for leakage of the connecting points of th piping. If bubbles come out, the pipes have leakage.

2. **Leak detector**
   Use the leak detector to check for leakage.



One-four type

Fig.30

CAUTION

A: Lo packed valve B: Hi packed valve
C and D are ends of indoor unit connection.

NOTE: The illustration is for explanation purpose only. The actual order of A, B, C and D on the machine may be slightly different from the unit you purchased. The actual shape shall prevail.

Test running

Perform test operation after completing gas leak check at the flare nut connections and electrical safety check.

- Check that all tubing and wiring have been properly connected.
- Check that the gas and liquid side service valves are fully open.

1. Connect the power, press the ON/OFF button on the remote controller to turn the unit on.
2. Use the MODE button to select COOL, HEAT, AUTO and FAN to check if all the functions works well.
3. When the amient temperature is too low(lower than 17°C), the unit cannot be controlled by the remote controller to run at cooling mode, manual operation can be taken. Manual operation is used only when the remote controller is disable or maintenance necessary.
   - Hold the panel sides and lift the panel up to an angle until it remains fixed with a clicking sound.
   - Press the Manual control button to select the AUTO or COOL, the unit will operate under Forced AUTO or COOL mode(see User Manual for details).
4. The test operation should last about 30 minutes.

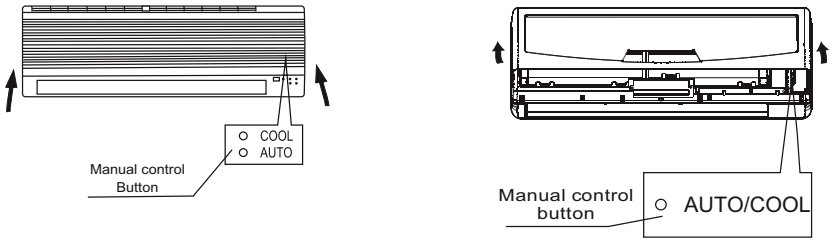


Fig.31