Refrigerant
R410A

Multi Air Conditioning System for Buildings (VRF System)

INSTALLATION INSTRUCTION SHEET

(PART NO. 9374241033-02)

English

中文

Contents

OUTDOOR MODEL

MASTER	AJ □ A72LBTF AJ □ A90LBTF AJ □ 126LBTF
SLAVE	AJ □ A72UBTF AJ □ A90UBTF AJ □ 126UBTF

1. SAFETY PRECAUTIONS

- Be sure to read this Sheet thoroughly before installation.
- The warnings and precautions indicated in this Sheet contain important information pertaining to your safety. Be sure to observe them.
- After installing the unit, perform a test run to make sure the unit operates normally. Then, explain to the customer how to operate and maintain the unit.
- Hand this Sheet, together with the Operating Manual to the customer.
  Request the customer to keep them on hand for future use, such as for relocating or repairing the unit.

⚠ WARNING!	This mark indicates procedures which, if improperly performed, might lead to the death or serious injury of the user.

- **Request your dealer or a professional installer to install the unit in accordance with this Sheet.
  An improperly installed unit can cause serious accidents such as water leakage, electric shock, or fire.
  If the unit is installed in disregard of the instructions in the Installation Instruction Sheet, it will void the manufacturer's warranty.**
- **For installation purposes, be sure to use the parts supplied by the manufacturer or other prescribed parts.
  The use of non-prescribed parts can cause serious accidents such as the unit to fall, water leakage, electric shock, or fire.**
- **To install a unit that uses the R410A refrigerant, use dedicated tools and piping materials that have been manufactured specifically for R410A use. Because the pressure of the R410A refrigerant is approximately 1.6 times higher than the R22, failure to use dedicated piping material or improper installation can cause rupture or injury. Furthermore, it can cause serious accidents such as water leakage, electric shock, or fire.**
- **Do not introduce any substance other than the prescribed refrigerant into the refrigeration cycle.
  If air enters the refrigeration cycle, the pressure in the refrigeration cycle will become abnormally high and cause the piping to rupture.**
- **Be sure to install the unit as prescribed, so that it can withstand earthquakes and typhoons or other strong winds.
  Improper installation can cause the unit to topple or fall, or other accidents.**
- **If there is a refrigerant leakage, make sure that it does not exceed the concentration limit. If a refrigerant leakage exceeds the concentration limit, it can lead to accidents such as oxygen starvation.**
- **If a refrigerant leakage occurs during operation, immediately vacate the premises and thoroughly ventilate the area. If the refrigerant is exposed to fire, it will create a hazardous gas.**
- **Electrical work must be performed in accordance with this Sheet by a person certified under the national or regional regulations. Be sure to use a dedicated circuit for the unit. An insufficient power supply circuit or improperly performed electrical work can cause serious accidents such as electric shock or fire.**
- **For wiring, use the prescribed type of wires, connect them securely, making sure that there are no external forces of the wires applied to the terminal connections. Improperly connected or secured wires can cause serious accidents such as overheating the terminals, electric shock, or fire.**
- **Securely install the electrical box cover on the unit. An improperly installed electrical box cover can cause serious accidents such as electric shock or fire through exposure to dust or water.**
- **Do not turn ON the power until all work has been completed. Turning ON the power before the work is completed can cause serious accidents such as electric shock or fire.**
- **After the installation, make sure there is no refrigerant leakage. If the refrigerant leaks into the room and becomes exposed to a source of fire such as a fan heater, stove, or burner, it will create a hazardous gas.**
- **During installation, make sure that the refrigerant pipe is attached firmly before you run the compressor. Do not operate the compressor under the condition of refrigerant piping not attached properly with 2-way or 3-way valve open. This may cause abnormal pressure in the refrigeration cycle that leads to breakage and even injury.**
- **During the pump-down operation, make sure that the compressor is turned off before you remove the refrigerant piping. Do not remove the connection pipe while the compressor is in operation with 2-way or 3-way valve open. This may cause abnormal pressure in the refrigeration cycle that leads to breakage and even injury.**

⚠ CAUTION!	This mark indicates procedures which, if improperly performed, might possibly result in personal harm to the user, or damage to property.

- **Do not install the unit in the following areas:**
  - **Area with high salt content, such as at the seaside.**
    It will deteriorate metal parts, causing the parts to fall or the unit to leak water.
  - **Area filled with mineral oil or containing a large amount of splashed oil or steam, such as a kitchen.**
    It will deteriorate plastic parts, causing the parts to fall or the unit to leak water.
  - **Area that generates substances that adversely affect the equipment, such as sulfuric gas, chlorine gas, acid, or alkali.**
    It will cause the copper pipes and brazed joints to corrode, which can cause refrigerant leakage.
  - **Area containing equipment that generates electromagnetic interference.**
    It will cause the control system to malfunction, preventing the unit from operating normally.
  - **Area that can cause combustible gas to leak, contains suspended carbon fibers or flammable dust, or volatile inflammables such as paint thinner or gasoline.**
    If gas leaks and settles around the unit, it can cause a fire.
- **Do not use the unit for special purposes, such as storing food, raising animals, growing plants, or preserving precision devices or art objects.**
  It can degrade the quality of the preserved or stored objects.
- **Ground the unit.**
  Do not connect the ground wire to a gas pipe, water pipe, lightning rod, or a telephone ground wire.
  Improper grounding may cause electric shock.
- **Install a ground leakage breaker.**
  If a ground leakage breaker is not installed, it may cause electric shock or fire.
- **Perform drain work in accordance with this Sheet, and ensure that the drain water is properly drained.**
  If the drain processing is improperly installed, water may drip down from the unit, wetting the furniture.
- **Do not touch the fins with bare hands.**

2. PRECAUTIONS FOR USING THE ALTERNATIVE REFRIGERANT

PRECAUTIONS FOR USING THE R410A REFRIGERANT

Pay careful attention to the following points :

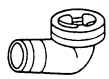
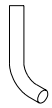
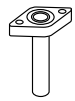
- Since the working pressure is 1.6 times higher than that of R22 models, some of the piping and installation and service tools are special. (See the table in the SPECIAL TOOLS FOR R410A section.)
  Especially, when replacing a conventional refrigerant (other than R410A) model with a new refrigerant R410A model, always replace the conventional piping and flare nuts with the R410A piping and flare nuts.
- Models that use refrigerant R410A have a different charging port thread diameter to prevent erroneous charging with R22, R407C and for safety. Therefore, check beforehand. [The charging port thread diameter for R410A is 1/2 UNF 20 threads per inch.]
- Be more careful than the installation of the refrigerant (other than R410A) models, not to enter foreign matters (oil, water, etc.) and other refrigerant into the piping. Also, when storing the piping, securely seal the openings by pinching, taping, etc.
- When charging the refrigerant, take into account the slight change in the composition of the gas and liquid phases, and always charge from the liquid phase side whose composition is stable.

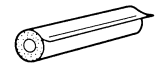
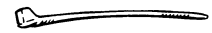
SPECIAL TOOL FOR R410A

Tool name	Contents of change
Gauge manifold	Pressure is huge and cannot be measured with a conventional gauge. To prevent erroneous mixing of other refrigerants, the diameter of each port has been changed. It is recommended to use a gauge manifold with a high pressure display range –0.1 to 5.3 MPa and a low pressure display range –0.1 to 3.8 MPa.
Charging hose	To increase pressure resistance, the hose material and base size were changed.
Vacuum pump	A conventional vacuum pump can be used by installing a vacuum pump adapter.
Gas leakage detector	Special gas leakage detector for HFC refrigerant R410A.

3. ACCESSORIES

The following installation parts are supplied. Use them as required.
Do not discard any accessories until the installation work has been completed.

Description	Q'ty	Application
Drain pipe 	3	For outdoor unit drain piping work (Heat pump model only)
Gasket 	1	Installation between flange joint assembly and 3-way valve
Joint pipe 	1	For connecting the pipe
Flange joint assembly 	1	For connecting the pipe

Description	Q'ty	Application
Terminal resistor 	1	Install it on the board of the outdoor unit (master unit only).
Coupler heat insulation 	1	For outdoor side pipe joint
Binder C 	1	For transmission cable binding

4. INSTALLATION WORK

Make sure to obtain the customer's approval for selecting and installing the unit.

4.1. SELECTING AN INSTALLATION LOCATION

⚠ WARNING

- **Install the unit in a location that can withstand its weight, and where it will not topple or fall.**
- **Calculate the proper refrigerant concentration if you will be installing it in an enclosed location.**

$$\frac{\text{Total amount of replenished refrigerant in refrigerant facility (kg)}}{\text{Capacity of smallest room where unit is installed (m}^3\text{)}} \geqq \text{Refrigerant concentration (kg/m}^3\text{) (0.3 kg/m}^3\text{)}$$

If the results of the calculation exceed the concentration limit, increase the room surface area or install a ventilation duct.

⚠ CAUTION

Select an installation location by observing the following precautions:

- **Do not tilt the outdoor unit more than 3 degrees.**
- **Install the unit in a well-ventilated area away from rain or direct sunlight.**
- **If the unit must be installed in an area within easy reach of the general public, install as necessary a protective fence or the like to prevent their access.**
- **Install the unit in an area that would not inconvenience your neighbors, as they could be affected by the airflow coming out from the outlet, noise, or vibration.**
  If it must be installed in proximity to your neighbors, be sure to obtain their approval.
- **If the unit is installed in a cold region that is affected by snow accumulation, snow fall, or freezing, take appropriate measures to protect it from those elements.**
  To ensure a stable operation, install inlet and outlet ducts.
- **Install the unit in an area that would not cause problems even if the drain water is discharged from the unit. Otherwise, provide drainage that would not affect people or objects.**
- **Install the unit in an area that has no heat sources, vapors, or the risk of the leakage of flammable gas in the vicinity.**
- **Install the unit in an area that is away from the exhaust or vent ports that discharge vapor, soot, dust, or debris.**
- **Install the indoor unit, outdoor unit, power supply cable, transmission cable and remote control cable at least 1 meter away from a television or radio.**
  The purpose of this is to prevent TV reception interference or radio noise. (Even if they are installed more than 1 meter apart, you could still receive noise under some signal conditions.)
- **Keep the length of the piping of the indoor and outdoor units within the allowable range.**
- **For maintenance purposes, do not bury the piping.**

4.2. TRANSPORTING THE PRODUCT

Transporting with ropes (Fig. 4.2-1)

- To transport the outdoor unit to the installation location by suspending it, use the four cutouts that are located in the front and back to pass a rope under the base.
- As you transport the unit, make sure the unit is vertical. The unit could fall if you tilt the unit during transport.
- For transport, use a rope that can fully withstand the weight of the unit.
- Do not apply shocks to the unit during transport.
- Use a protective plate to prevent the bell mouth from coming in contact with the rope. Failure to use a protective plate can cause the bell mouth to become deformed or damaged.
- Use 2 rope which are 8 m in length or longer.

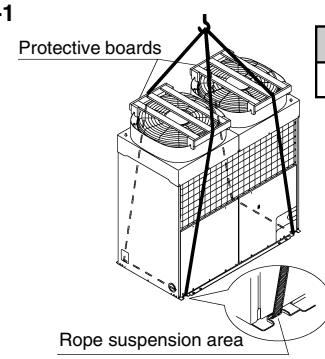
Transporting on a forklift (Fig. 4.2-2)

- To transport the unit on a forklift, slide the forks of the forklift through the opening between the unit and the delivery pallet. This will enable the unit and the delivery pallet to be removed.
- Protect the unit from scratches during installation.

Transporting on a manual forklift (Fig. 4.2-2)

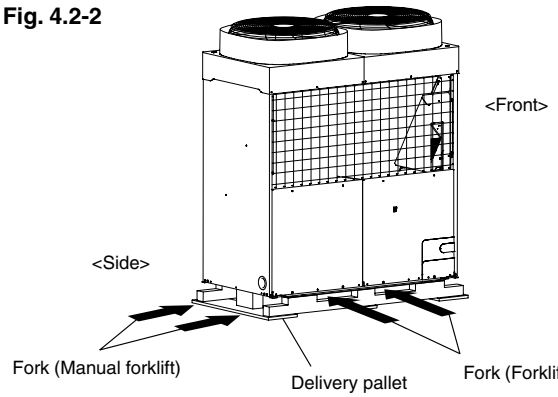
- To transport the unit on a manual forklift, slide the forks of the manual forklift through the opening of the side of the delivery pallet. This will enable the removal of the unit and the delivery pallet.
- Protect the unit from scratches during installation.

Fig. 4.2-1



Product mass
About 380 kg

Fig. 4.2-2



4.3. INSTALLATION DIMENSIONS

⚠ CAUTION
Be careful of the following issues for selecting position of outdoor unit.
• Install with sufficient space when taking into consideration such as conveyance routes, installation space, walk space and maintenance.
• Observe the installation space specifications that are shown in the figures. If installation is not performed according to the specifications, it could cause a short circuit and result in a lack of performance. As a result, outdoor unit might be stopped by high-pressure protection easily.
• During installation, take into account the installation space required for the refrigerant piping space.

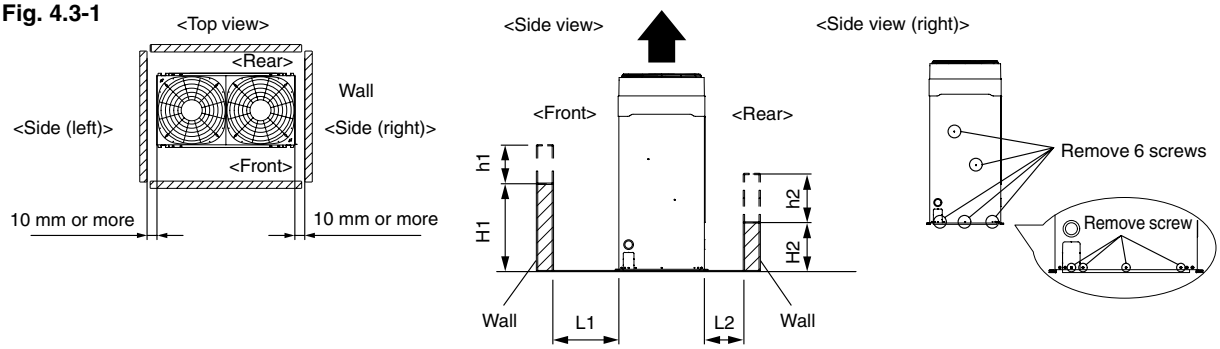
Single unit installation

① The installation space must be satisfied for each wall (front, rear, sides) are shown below (Fig. 4.3-1):

- There must be no obstructions on the blowing side of the fan.
  If there are obstructions on the blowing side of the fan, a discharge duct must be used.
- The wall height on the front must be H1 (600 mm) or less.
- The wall height on the rear must be H2 (300 mm) or less.
- If the wall height on the front exceeds H1 = 600 mm, the distance h1 (the distance by which it exceeds H1) must be added to the L1 (500 mm) service space.
- If the wall height on the front exceeds H2 = 300 mm, the distance h2 (the distance by which it exceeds H2) must be added to the L2 (300 mm) service space.
- There is no limit to the wall height on the side.
- The sides of the unit and the walls must be separated by a distance of 10 mm or more.
  If the distance from the sides of the unit to the walls is 150 mm or less, the 6 screws on the right side of the unit must be removed before installation.

- If H1 ≦ 600 mm, then L1 ≧ 500 mm
- If H2 ≦ 300 mm, then L2 ≧ 300 mm
- If H1 > 600 mm, then L1 ≧ 500 mm + h1
- If H2 > 300 mm, then L2 ≧ 300 mm + h2

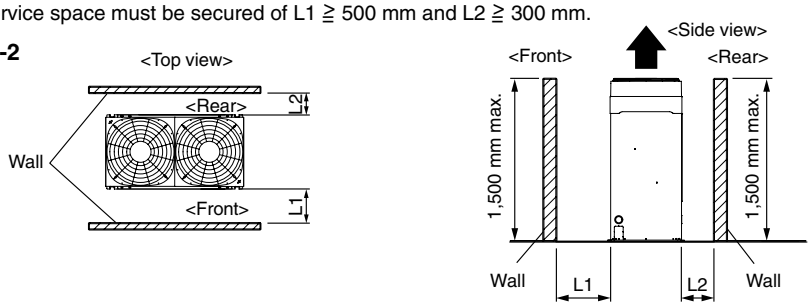
Fig. 4.3-1



② If unit needs to install at a high front and rear wall height because of a small installation space (Fig. 4.3-2):

- There must be no obstructions on the blowing side of the fan.
  If there are obstructions on the blowing side of the fan, a discharge duct must be used.
- If space cannot be secured on the front and rear (L1 < 500 mm + h1, L2 < 300 mm + h2), do not install walls on the sides.
  If there is a high wall front or rear side, at least 2 sides must be opened.
- The wall height on the front and rear must be 1,500 mm or less.
- A service space must be secured of L1 ≧ 500 mm and L2 ≧ 300 mm.

Fig. 4.3-2



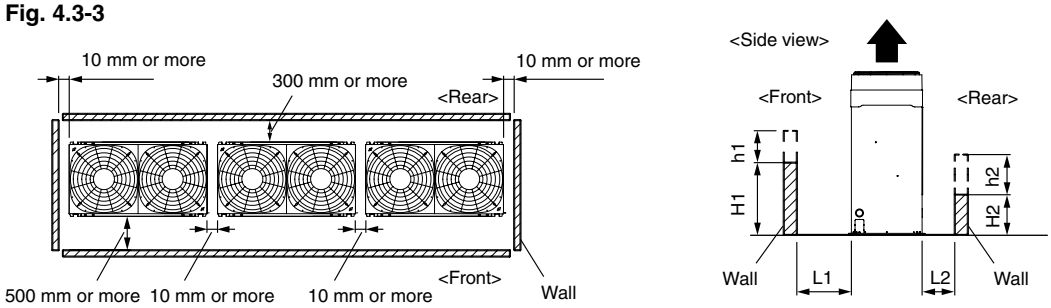
Multiple Connections

① Installation space must be satisfied for each wall (front, rear, sides) are shown below (Fig. 4.3-3):

- There must be no obstructions on the blowing side of the fan.
  If there are obstructions on the blowing side of the fan, a discharge duct must be used.
- The wall height on the front must be H1 (600 mm) or less.
- The wall height on the rear must be H2 (300 mm) or less.
- If the wall height on the front exceeds H1 = 600 mm, the distance h1 (the distance by which it exceeds H1) must be added to the L1 (500 mm) service space.
- If the wall height on the front exceeds H2 = 300 mm, the distance h2 (the distance by which it exceeds H2) must be added to the L2 (300 mm) service space.
- There is no limit to the wall height on the side.
- The side of the unit and the walls must be separated by a distance of 10 mm or more.
  If the distance from the sides of the unit to the walls is 150 mm or less, the 6 screws on the right side of the unit must be removed before installation.

- If H1 ≦ 600 mm, then L1 ≧ 500 mm
- If H2 ≦ 300 mm, then L2 ≧ 300 mm
- If H1 > 600 mm, then L1 ≧ 500 mm + h1
- If H2 > 300 mm, then L2 ≧ 300 mm + h2

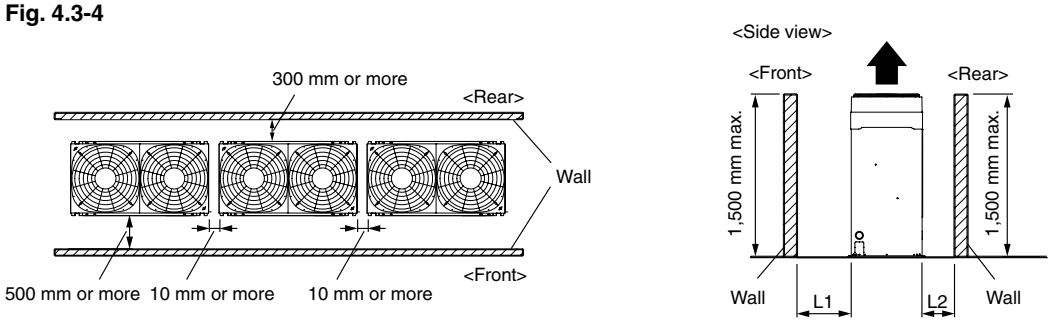
Fig. 4.3-3



② If unit needs to install at a high front and rear wall height because of a small installation space (Fig. 4.3-4):

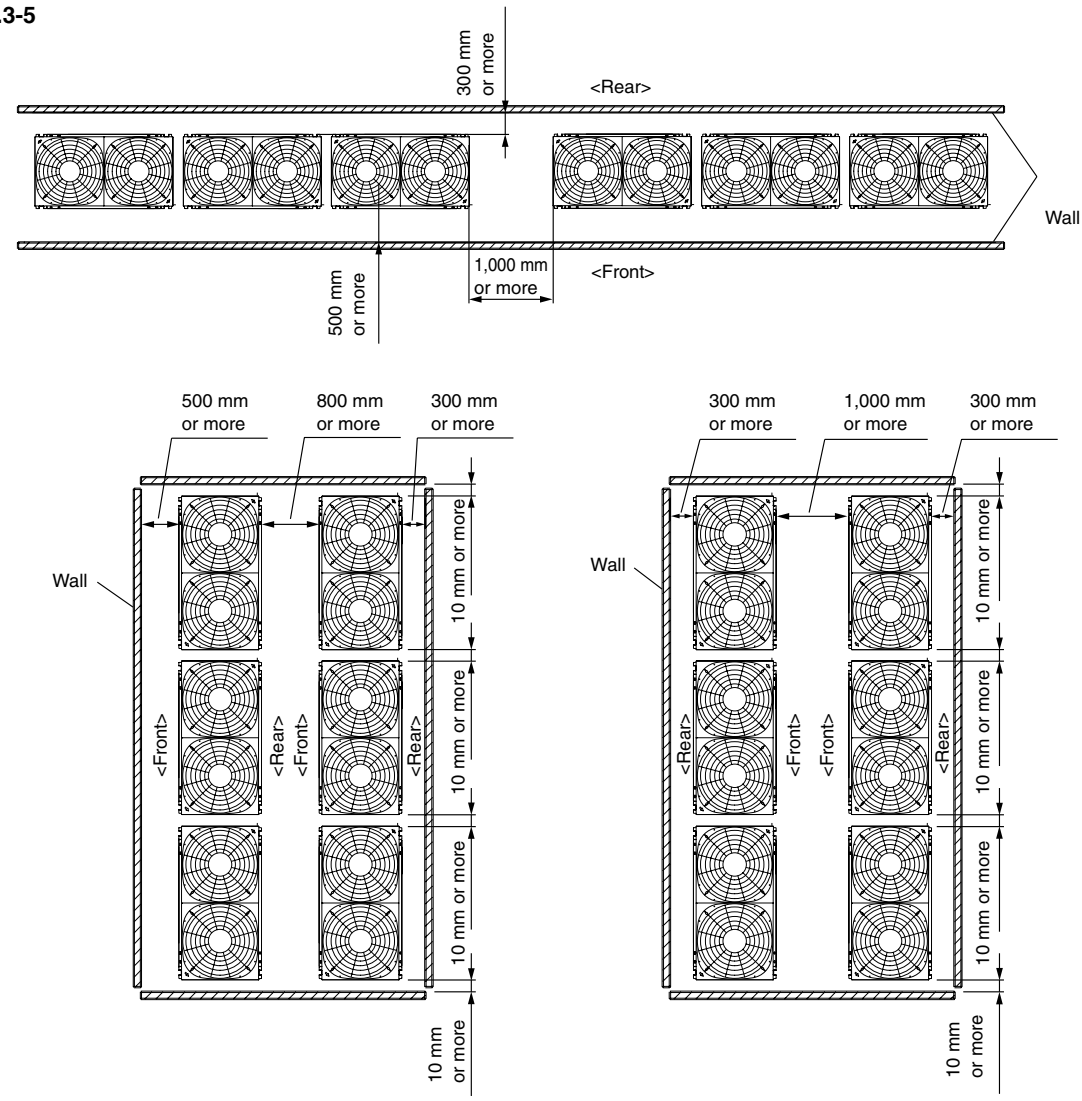
- There must be no obstructions on the blowing side of the fan.
  If there are obstructions on the blowing side of the fan, a discharge duct must be used.
- If space cannot be secured on the front and rear (L1 < 500 mm + h1, L2 < 300 mm + h2), do not install walls on the sides.
  If there is a high wall front or rear side, at least 2 sides must be opened.
- The wall height on the front and rear must be 1,500 mm or less.
- A service space must be secured of L1 ≧ 500 mm and L2 ≧ 300 mm.

Fig. 4.3-4



③ The number of outdoor units that may be connected is 1 system (3 units connected) (Fig. 4.3-5).
- To install more than 1 outdoor unit system, provide a distance between each refrigerant system.
- Do not install walls at the sides.

Fig. 4.3-5



4.4 INSTALLATION THE UNIT

- Install 4 or more anchor bolts at the 8 locations indicated by arrows. (Fig. 4.4-1)
- Keep the left and right anchor bolts 850 mm or more apart from each other.
  This does not apply when anchor bolts are installed in all 8 locations.
- To reduce vibration, do not install the unit directly on the ground.
  Instead, install it on a secure base (such as concrete blocks). (Fig. 4.4-2) Depending on the installation conditions, the unit may spread its vibration during operation, which may cause noise and vibration.
  Therefore, attach damping materials (such as damping pads) to the unit during installation.
- If you will be installing a foundation, be sure to take the routing of the pipe connections into account.
- Before securing the unit, make sure the anchor bolts are tightened securely.

Fig. 4.4-1

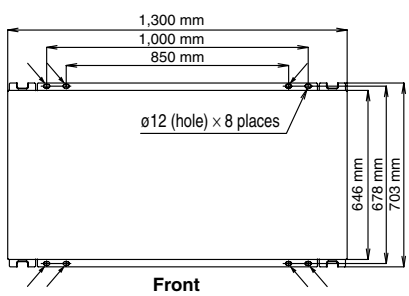
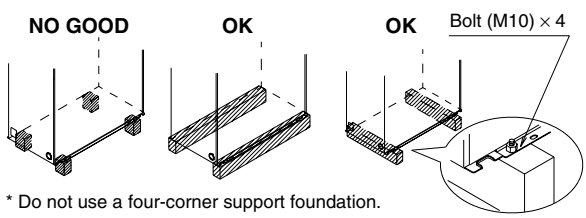


Fig. 4.4-2 Installation example



* Do not use a four-corner support foundation.

4.5. SYSTEM LAYOUT

⚠ CAUTION

If there are multiple outdoor units to be connected, make sure to install the master unit near the indoor unit. If 3 outdoor units are to be connected, install them in descending order, starting with the one with the largest capacity closest to the indoor unit.

A) In case of one outdoor unit connected
- From outdoor unit to the farthest indoor unit:
  e+f+g+i+k+m ≦ 150 m (actual pipe length),
  e+o+p+r+t ≦ 150 m (actual pipe length)
- From the first separation tube to the farthest indoor unit:
  o+p+r+t ≦ 60 m (actual pipe length)
- Difference in height between outdoor units and indoor units (H1)
  50 m: For the indoor unit stated below
  40 m: For the outdoor unit stated below
- Difference in height between indoor units and indoor units
  H2 ≦ 15 m, H3 ≦ 15 m
- e+f+g+h+i+j+k+l+m+n+o+p+q+r+s+t+u ≦ 300 m (total pipe length)

NOTE : If the outdoor temperature during cooling operation is expected to be –5 °C or less, do not install the outdoor unit lower than the indoor unit.

B) In case of two outdoor unit connected
- From outdoor unit to the farthest indoor unit:
  a+e+f+g+i+k+m ≦ 150 m (actual pipe length)
  a+e+o+p+r+t ≦ 150 m (actual pipe length)
- Difference in height between outdoor units and indoor units (H1)
  50 m: For the indoor unit stated below
  40 m: For the outdoor unit stated below
- From the first separation tube to the farthest indoor unit:
  o+p+r+t ≦ 60 m (actual pipe length)
- Difference in height between indoor units and indoor units (H2, H3)
  H2 ≦ 15 m, H3 ≦ 15 m
- Difference in height between outdoor unit and outdoor units: (H4)
  H4 ≦ 0.5 m
- From outdoor unit to outdoor unit branch kit
  a, d ≦ 3 m
- a+d+e+f+g+h+i+j+k+l+m+n+o+p+q+r+s+t+u ≦ 300 m (total pipe length)
- Outdoor capacity
  Master ≧ Slave

C) In case of three outdoor unit connected
- From outdoor unit to the farthest indoor unit:
  a+e+f+g+i+k+m ≦ 150 m (actual pipe length)
  a+e+o+p+r+t ≦ 150 m (actual pipe length)
- From the first separation tube to the farthest indoor unit:
  o+p+r+t ≦ 60 m (actual pipe length)
- Difference in height between outdoor units and indoor units (H1)
  50 m: For the indoor unit stated below
  40 m: For the outdoor unit stated below
- Difference in height between indoor units and indoor units (H2, H3)
  H2 ≦ 15 m, H3 ≦ 15 m
- Difference in height between outdoor unit and outdoor units: (H4)
  H4 ≦ 0.5 m
- From outdoor unit to outdoor unit branch kit
  a, b, c ≦ 3 m
- Piping length between the farthest outdoor unit to the first outdoor unit branch kit
  a, b, c ≦ 3 m, c+d, b+d ≦ 12 m
- a+b+c+d+e+f+g+h+i+j+k+l+m+n+o+p+q+r+s+t+u ≦ 300 m (total pipe length)
- Outdoor unit capacity
  Master ≧ Slave 1 ≧ Slave 2

Fig. 4.5-1

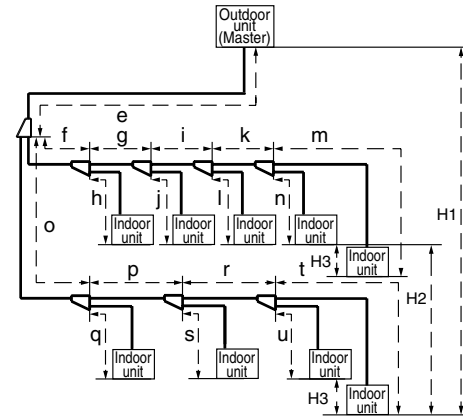


Fig. 4.5-2

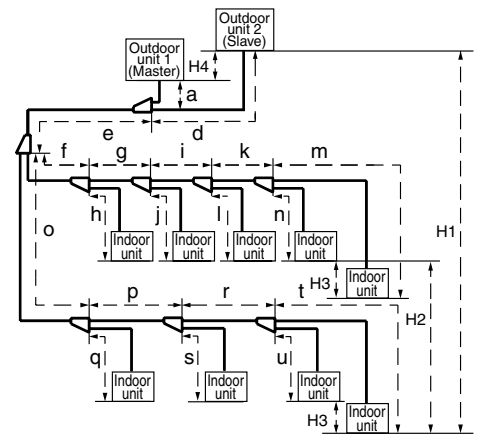
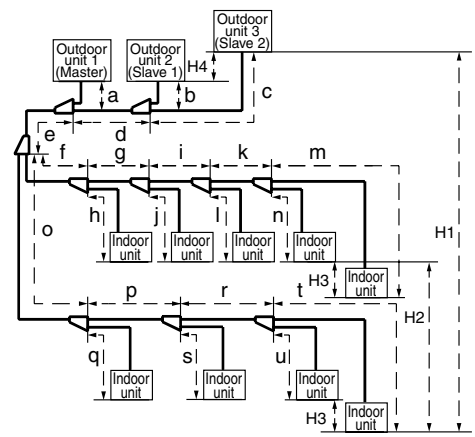


Fig. 4.5-3



4.6. PIPE SELECTION

⚠ CAUTION

- **This unit is designed specifically for use with the R410A refrigerant.**
- **Pipes for R407C or R22 may not be used with this unit.**
- **Do not use existing pipes.**
- **Improper pipe selection will degrade performance.**
- **Refer to Fig. 4.6-1 for the proper pipe selection.**

Fig. 4.6-1

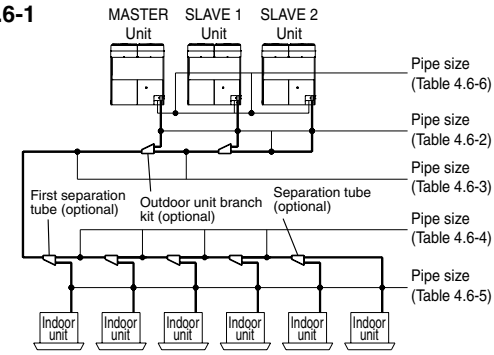


Table 4.6-1 Wall thickness and pipe material for each diameter

Outside Diameter	mm	6.35	9.52	12.70	15.88	19.05	22.22	28.58	34.92	41.27
Wall Thickness[3]	mm	0.8	0.8	0.8	1.0	1.2	1.0	1.0	1.2	1.43
Material		COPPER[1] JIS H3300 C1220T-O or equivalent					COPPER[2] JIS H 3300 C1220T-H or equivalent			

1) Allowable tensile stress ≧ 33 (N/mm²)
2) Allowable tensile stress ≧ 61 (N/mm²)
3) Design pressure 4.2 MPa

Table 4.6-2 Between outdoor unit to outdoor unit branch kit

HP	Outdoor unit model	Outside diameter (mm)		Outdoor unit[4] branch kit
		Liquid pipe	Gas pipe	
8	AJ □A72LBTF AJ □A72UBTF	12.70	22.22	UTR-CP567L
10	AJ □A90LBTF AJ □A90UBTF	12.70	22.22	UTR-CP567X
14	AJ □126LBTF AJ □126UBTF	12.70	28.58	UTR-CP567Q

4) Refer to "4.7.6 MULTIPLE CONNECTIONS" or the Installation Instruction Sheet of the outdoor unit branch kit for the connection methods.

Table 4.6-3 Between outdoor unit branch kits or outdoor unit branch kit to first separation tube

Total model code of outdoor unit	Outside diameter (mm)	
HP	Liquid pipe	Gas pipe
8, 10	12.70	22.22
14, 16	12.70	28.58
18, 20	15.88	28.58
22, 24, 26, 28	15.88	34.92
30, 32, 34	19.05	34.92
36, 38, 42	19.05	41.27

Table 4.6-4 Between separation tubes

Total model code of indoor unit	Outside diameter (mm)		Separation tube[5]	Header[5]
	Liquid pipe	Gas pipe		
14 to 35	9.52	15.88	UTR-BP090L	UTR-H0908L UTR-H0906L
36 to 53	9.52	19.05	UTR-BP090X	
54 to 90	12.70	22.22	UTR-BP090Q	
91 to 161	12.70	28.58	UTR-BP180L	UTR-H1808L UTR-H1806L
162 to 180	15.88	28.58	UTR-BP180X UTR-BP180Q	
181 to 269	15.88	34.92	UTR-BP567L	—
270 to 323	19.05	34.92	UTR-BP567X	
324 to 567	19.05	41.27	UTR-BP567Q	

5) Refer to "4.7.3 INDOOR UNIT PIPE CONNECTIONS" or the Installation Instruction Sheets of the separation tube and the header for the connection methods.

- If the pipe diameter between separation tubes (based on table 4.6-4) becomes larger than the pipe diameter between outdoor unit branch kit and the first separation tube (based on table 4.6-3), please select a pipe whose diameter is equal to the one between outdoor unit branch kit and the first separation tube.

Table 4.6-5 Between separation tube to indoor unit

Model code of indoor unit	Outside diameter (mm)	
	Liquid pipe	Gas pipe
7, 9, 12, 14	6.35	12.70
18, 20, 24, 25, 30	9.52	15.88
36, 45, 54, 60	9.52	19.05
90	12.70	22.22

Table 4.6-6 Between outdoor units

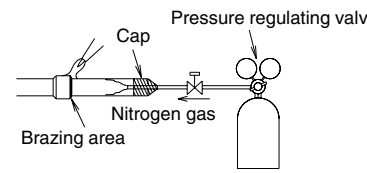
	Outside diameter (mm)
Oil equalization pipe	6.35

4.7. PIPE INSTALLATION

4.7.1. BRAZING

⚠ CAUTION

- **If air or another type of refrigerant enters the refrigeration cycle, the internal pressure in the refrigeration cycle will become abnormally high and prevent the unit from exerting its full performance.**



- **Apply nitrogen gas while brazing the pipes.**
  Nitrogen gas pressure: 0.02 MPa (= pressure felt sufficiently on the back of your hand)
- **If a pipe is brazed without applying nitrogen gas, it will create an oxidation film.**
  This can degrade performance or damage the parts in the unit (such as the compressor or valves).
- **Do not use flux to braze pipes. If the flux is the chlorine type, it will cause the pipes to corrode.**
  Furthermore, if the flux contains fluoride, it will adversely affect the refrigerant pipe system such as by degrading the refrigerant oil.
- **For brazing material, use phosphor copper that does not require flux.**

4.7.2. FLARE CONNECTION

⚠ CAUTION

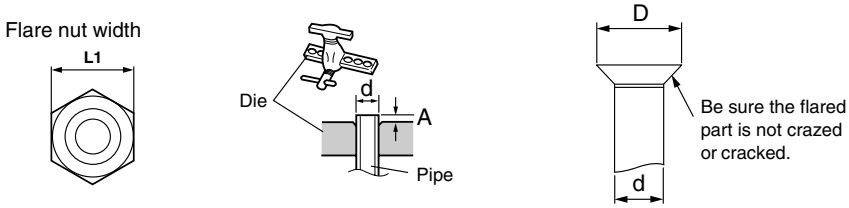
- **Make sure cutting chips do not enter the copper pipes during flaring. If cutting chips enter the pipes, they can cause the compressor or the valves to malfunction.**

1. To prevent pipes from deforming, use a pipe cutter to cut them.
2. Remove the burrs while holding the pipe downwards so that cuttings cannot enter the pipe.
3. Place a flare on the pipe and allow the pipe to extend out of the flare as shown in Table 4.7-1.
4. Use a flare tool to make a flare.
5. Make sure that the flare portion D (Fig. 4.7-1) spreads evenly without any cracks.

Table 4.7-1

Outer diameter of pipe d mm	Flare nut width L1 mm	Dimension A, mm		Dimension D, mm Tolerance (0.0 mm -0.4 mm)
		Flare tool for R410A (Clutch type)	Flare tool for R22 (Clutch type)	
ø 6.35	17	0 to 0.5	1.0 to 1.5	9.1
ø 9.52	22	0 to 0.5	1.0 to 1.5	13.2
ø 12.70	26	0 to 0.5	1.0 to 1.5	16.6
ø 15.88	29	0 to 0.5	1.0 to 1.5	19.7
ø 19.05	36	0 to 0.5	1.0 to 1.5	24.0

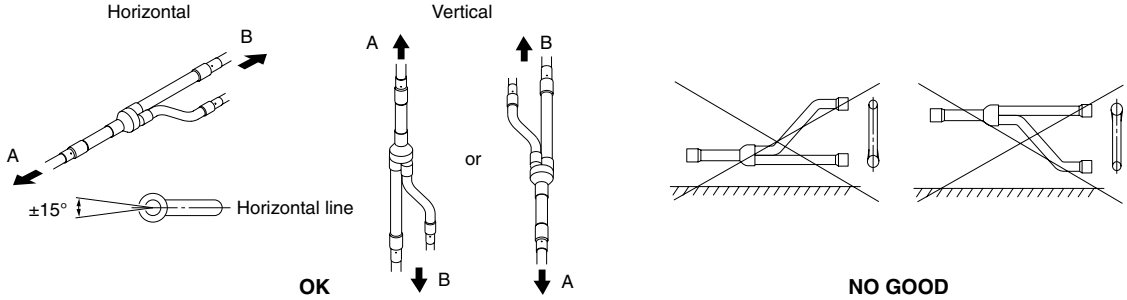
Fig. 4.7-1



4.7.3. INDOOR UNIT PIPE CONNECTIONS

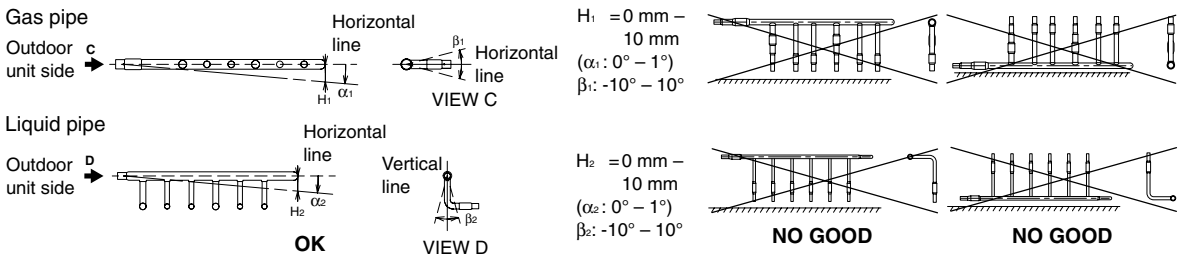
⚠ CAUTION

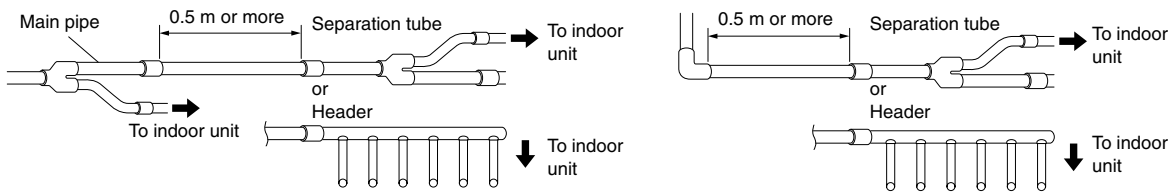
Separation tube



A : Outdoor unit or Refrigerant branch kit
B : Indoor unit or Refrigerant branch kit

Header





- **Do not connect a separation tube after a header.**
- **Leave the distance 0.5 m or more for straight part to branch tube and header.**

- **For details, refer to the Installation Instruction Sheet of each part.**

4.7.4. PIPE ROUTING DIRECTION

⚠ CAUTION

- **Be careful not to deform or scratch the panel while opening the knockout holes.**
- **After opening the knockout holes, deburr the edges to prevent them from cutting the wires.**

Pipes can be connected from 4 directions. (Figs. 4.7-2, 3, 4)
(Knockout holes are provided so that pipes can be connected from all 4 different directions.)

Fig. 4.7-2 Knockout position

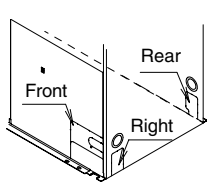


Fig. 4.7-3 Detail of knockout position (front/side/rear)

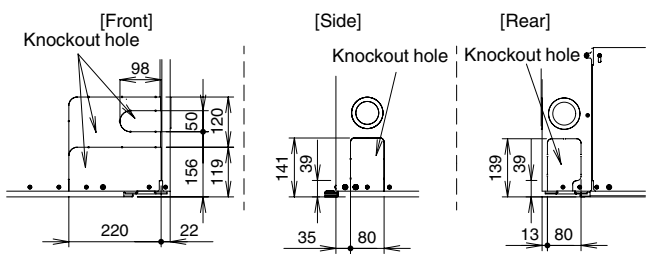
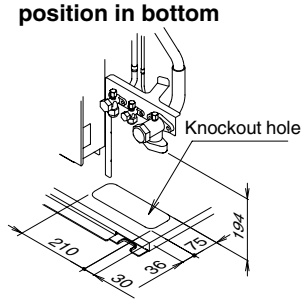


Fig. 4.7-4 Knockout position in bottom



4.7.5. PIPE CONNECTIONS

⚠ CAUTION
• **Seal the pipe routing holes with putty (supplied locally) so that there will be no gap. If small animals such as insects enter the outdoor unit, they can cause a short circuit in the electrical box.**
• **To prevent pipes from breaking, do not make sharp bends on them. The pipes may be bended with a curvature radius of 70 mm or more.**
• **A pipe is likely to break if it is bent many times at the same place.**
• **Do not make a flare connection on an indoor unit pipe until the connection pipes are connected.**
• **When connecting the pipe, keep it at the right angle so that the flare can be attached correctly to the 3-way valve. If the flare is not properly centered, the flare nut will not tighten smoothly. The thread may become damaged if you attempt to tighten the flare nut with excessive force.**
• **To weld the flange joint with the gas pipe, do so with the flange joint detached from the 3-way valve. Welding the flange joint with the 3-way valve attached will cause the 3-way valve to malfunction.**

- Weld the flange joint, joint pipe, and the main piping.
  * Apply nitrogen gas while welding the pipes.
- Tighten the flares of the connection pipes on the valves (3-way valve: oil, gas, and liquid pipes) of the outdoor unit.
  Refer to Table 4.7-2 for the tightening torque values.
  * For an single unit installation, do not connect the oil pipe.
- Make sure to use 2 spanners to tighten the flare nut (Fig. 4.7-5).
- Refer to Figs. 4.7-6, 7, and 8 before connecting the connection pipes to the outdoor unit.
- Use the gasket (accessory) to connect the flange joint.
  Do not use the gasket that comes with the product.
- Braze the joint pipe (accessory) to the flange joint assembly (accessory).
- Cut the joint pipe (accessory) appropriately in order to extend them from the front, side, and back of the unit.

Fig. 4.7-5

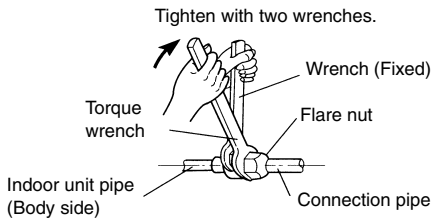


Fig. 4.7-6

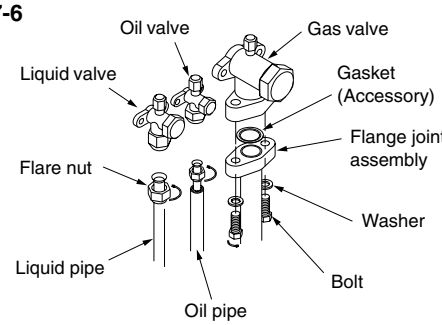


Fig. 4.7-7 Front piping

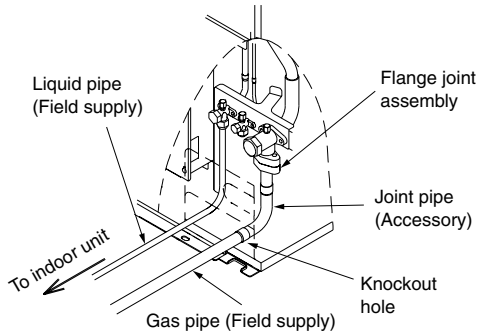


Fig. 4.7-8 Bottom piping

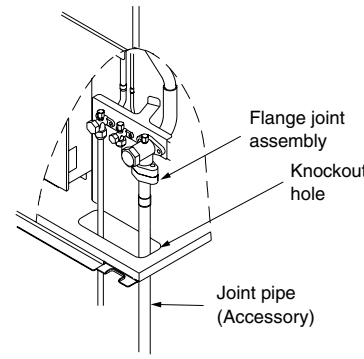


Table 4.7-2

	Flare nut	Bolt of Flange joint
Gas pipe (3-way valve)	—	34.3 to 39.2 N·m (350 to 400 kgf·cm)
Liquid pipe (3-way valve)	49.0 to 61.0 N·m (490 to 610 kgf·cm)	—
Oil pipe (3-way valve)	16.0 to 18.0 N·m (160 to 180 kgf·cm)	—

4.7.6. MULTIPLE CONNECTIONS

⚠ CAUTION

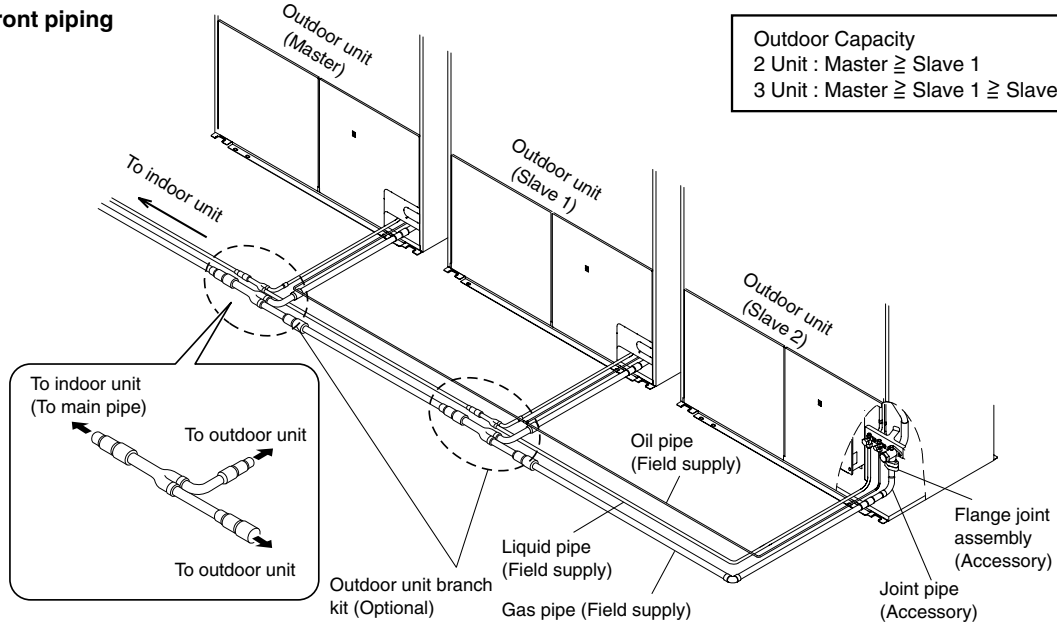
- **When connecting multiple units (3 units maximum), make sure the master unit has the maximum capacity in the system.**

Example:

	Master	+	Slave 1	+	Slave 2
OK	AJ ☐ 126LBTF	+	AJ ☐ 126UBTF		
	AJ ☐ A90LBTF	+	AJ ☐ A72UBTF		
	AJ ☐ 126LBTF	+	AJ ☐ 126UBTF	+	AJ ☐ A90UBTF
	AJ ☐ A72LBTF	+	AJ ☐ A72UBTF		
No Good	AJ ☐ A90LBTF	+	AJ ☐ 126UBTF		
	AJ ☐ A72LBTF	+	AJ ☐ A90UBTF	+	AJ ☐ A90UBTF

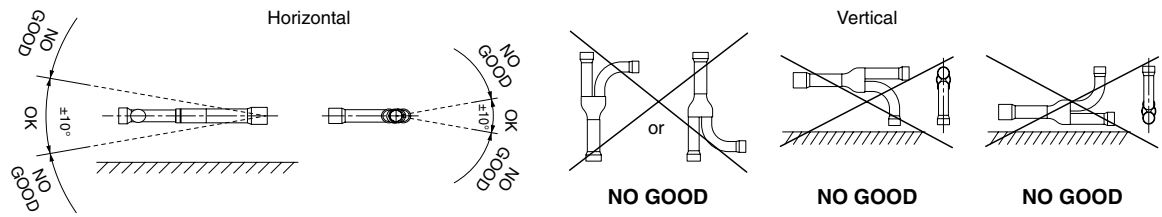
When connecting multiple outdoor units, designate one of them to be the master unit and others to be the slave units. It is not possible to connect master units in multiples. As shown in the diagram, arrange the outdoor units so that the master unit should be installed closest to the indoor unit. (Figs. 4.7-9, 10, 11, 12) Use outdoor unit branch kit (optional) to connect multiple units.

Fig. 4.7-9 Front piping

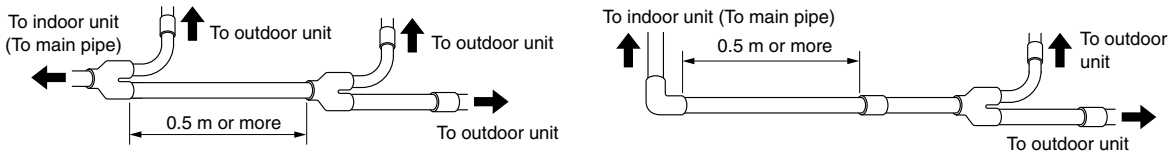


⚠ CAUTION

Outdoor unit branch kit



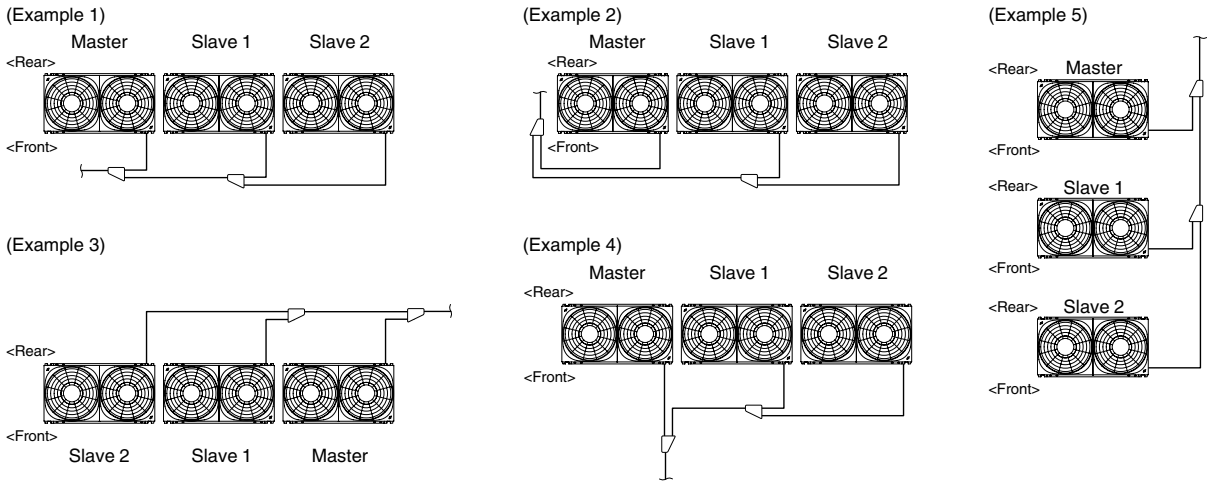
- **Be sure to follow the installation restrictions for the outdoor unit branch kit and install it according to the conditions at the installation location.**
- **Install the outdoor unit branch kit horizontally, within ±10°, so that the refrigerant separates evenly. Do not install the outdoor unit branch kit vertically.**



- **Leave the distance 0.5 m or more for straight part to outdoor unit branch kit.**

- **For details, refer to the Installation Instruction Sheet of the outdoor unit branch kit.**

Fig. 4.7-10 Examples of multiple unit installation

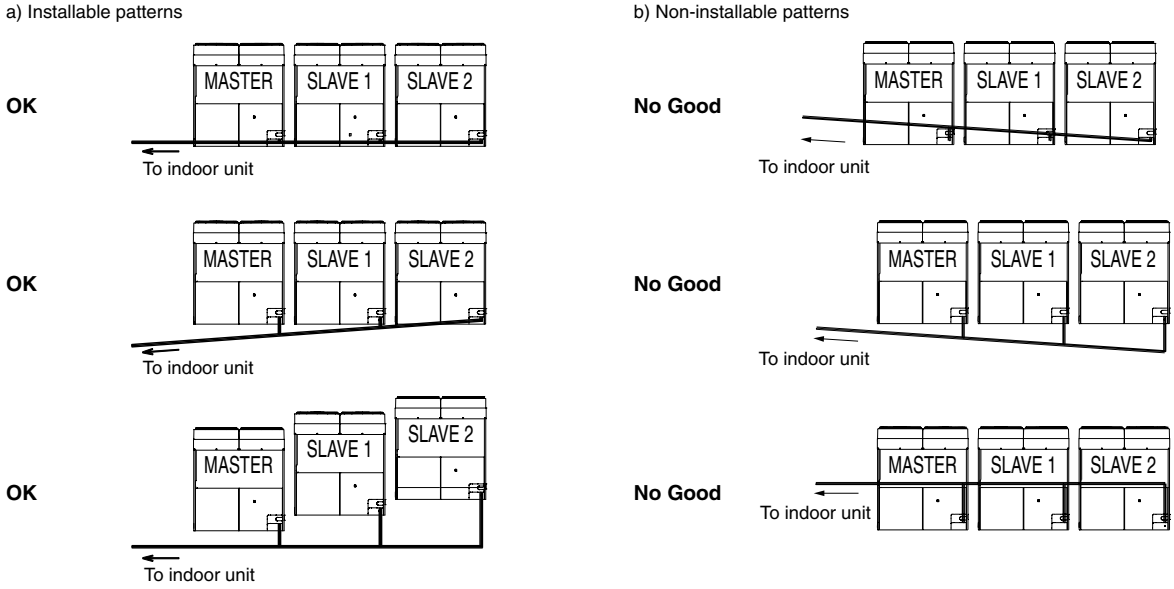


⚠ CAUTION

To prevent the oil from settling in the stopped unit, install the pipes between the outdoor units so that they are level or are tilted upward to the outdoor units.

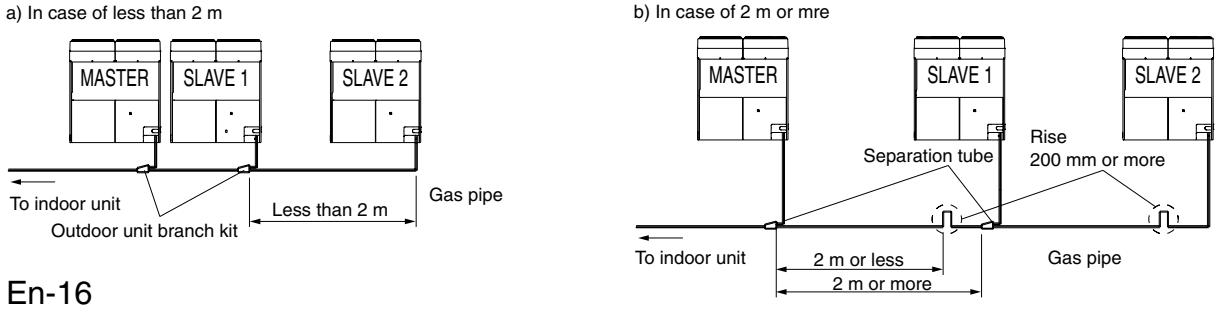
(1) Examples of multiple unit installation are shown below.

Fig. 4.7-11



(2) If the length of the pipe from the pipe joint to the outdoor unit exceeds 2 m, provide a trap of 200 mm more on the gas pipe. However, it is not necessary to provide a rise on the pipe that is connected to the master unit even if it exceeds 2 m.

Fig. 4.7-12



4.8. INSTALLING INSULATION

- Install a insulation after performing “5.1. SEALING TEST”.
- Use an insulation on the refrigerant pipes to prevent condensation and dripping. (Fig. 4.8-1)
- Determine the thickness of the insulation material by referring to Table 4.8-1.
- If the outdoor unit is installed at a level that is higher than the indoor unit, the water that has condensed in the 3-way valve of the outdoor unit could travel to the indoor unit. Therefore, use putty in the space between the pipe and the insulation to prevent the entry of water.

Fig. 4.8-1

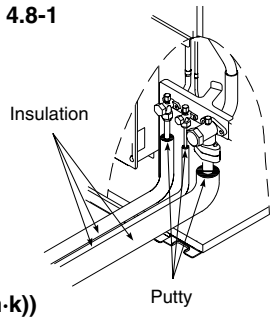


Table 4.8-1 Selection of insulation
(for using an insulation material with equal heat transmission rate or below 0.040 W/(m·k))

		Insulation material			
		Minimum thickness (mm)			
Relative humidity		≦ 70%	≦ 75%	≦ 80%	≦ 85%
Pipe diameter (mm)	6.35	8	10	13	17
	9.52	9	11	14	18
	12.70	10	12	15	19
	15.88	10	12	16	20
	19.05	10	13	16	21
	22.22	11	13	17	22
	28.58	11	14	18	23
	34.92	11	14	18	24
	41.27	12	15	19	25

* When an ambient temperature and relative humidity exceed 32 °C, please strengthen heat insulation of refrigerant pipe.

4.9. DRAIN PROCESSING

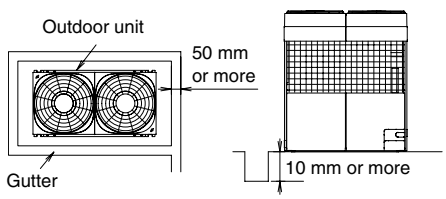
⚠ CAUTION

Drain processing:

Do not use a drain hose in a cold region, as it can cause the inside of the drain hose to freeze. If it is necessary to provide drainage, take appropriate measures to prevent the inside of the drain hose from freezing.

Drain water could leak from the outdoor unit during cooling or heating operation. Provide drain processing as necessary.

To prevent drain water from flowing around the unit, install a drainage channel as shown on the right.



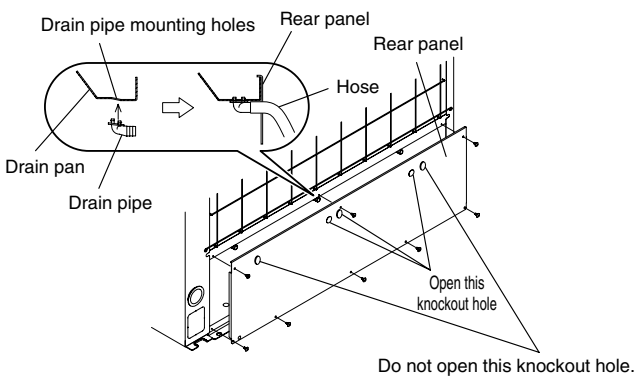
Knockout hole:

Be careful not to deform or scratch the panel while opening the knockout holes. After opening the knockout holes, deburr the edges to prevent them from cutting the wires.

Perform the following steps to provide drain processing.

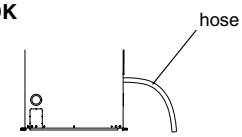
- Remove the rear panel.
- Open the 3 knockout holes shown in Fig. 4.9-1.
- Install the drain pipe (accessories) in the installation hole of the drain cover.
- Install a commercially available 16 mm drain hose on the drain pipe.
- Always provide drainage at the 3 locations.

Fig. 4.9-1

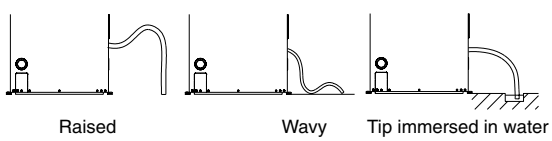


Drain hose processing

OK



No Good



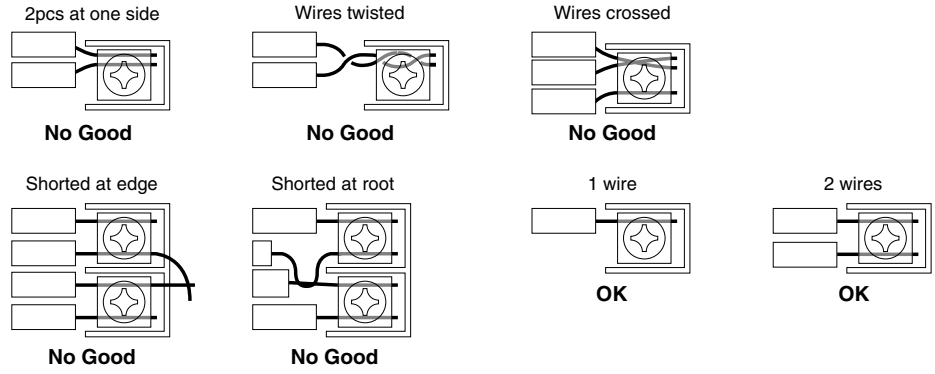
4.10. ELECTRICAL WIRING

⚠ WARNING
• Wiring connections must be performed by a qualified person in accordance with specifications. The voltage rating for this product is 400 V at 50 Hz. It should be operated within the range of 342 to 456 V.
• Before connecting the wires, make sure the power supply is OFF.
• Use a dedicated power supply circuit.
• Install a breaker at the power supply for each outdoor unit. Improper breaker selection can cause electric shock or fire.
• Install a leakage circuit breaker in accordance with the related laws and regulations.
• Connect the connector cord securely to the terminal. Faulty installation can cause a fire.
• Make sure to secure the insulation portion of the connector cable with the cord clamp. A damaged insulation can cause a short circuit.
• Never install a power factor improvement condenser. Instead of improving the power factor, the condenser may overheat.
• Before servicing the unit, turn the power supply switch OFF. Then, do not touch electric parts for 10 minutes due to the risk of electric shock.
• Make sure to perform grounding work. Improper grounding work can cause electric shocks.

⚠ CAUTION
• The primary power supply capacity is for the air conditioner itself, and does not include the concurrent use of other devices.
• Connect the power supply lines in the positive phase. The unit will display an error if the cords are connected in the negative phase. It will not operate properly if they are connected in the open phase.
• Do not connect AC power supply to the transmission line terminal board. Improper wiring can damage the entire system.
• Do not use crossover power supply wiring for the outdoor unit.
• If the electrical power is inadequate, contact your electric power company. Install a breaker in a location that is not exposed to high temperatures.
• If the temperature surrounding the breaker is too high, the amperage at which the breaker cuts out may decrease.
• If a control panel is installed outdoors, install a lock so that it cannot be accessed easily.
• To provide power supply lines for multiple outdoor units as shown in Fig. 4.10-1 (Example. 2), use the main breaker shown in Table 4.10-1.
• Do not fasten the power supply cable and transmission cable together.
• Keep the overall length of the transmission cable within 500 meters. The transmission cable can be extended up to 2,000 meters through the use of an optional signal amplifier.
• Countermeasure for the static electricity The static electricity that is charged to the human body can damage the control PC Board when handling the control PC Board for address setting, etc. Please keep caution to the following points. Provide the grounding of Indoor unit, Outdoor unit and Option equipment. Cut off the power supply (breaker). * except those units setting while power on, such as UTR-YLLA, UTR-YRPC, etc. Touch metal part of Indoor & Outdoor unit for more than 10 sec. (No painted portion such as control box), and discharge static electricity that was charged to human body. Never touch the component terminal or pattern on the PC Board.
• Caution when wiring cable When stripping off the coating of lead wire, always use the exclusive tool such as a wire stripper. If there is no exclusive tool available necessarily, carefully strip the coating by a cutter etc. so that the conductive wire is not damaged. If it is damaged, it may lead to an open circuit and a communication error.

⚠ CAUTION

- **Pay attention to the following points while attaching wires on the terminal board.**
  Do not attach 2 wires on one side.
  Do not twist wires.
  Do not cross the wires.
  Do not shorted at edge at root.



4.10.1. SELECTING WIRING AND BREAKER

Refer to Tables 4.10-1, 4.10-2, and 4.10-3 for the wiring and breaker specifications at each installation condition.

Table 4.10-1 Breaker and wiring specifications for each model

	Model name	Breaker capacity (A)	Breaker for leakage current	Power supply line (mm^2)	Ground wire (mm^2)	Critical wiring length (m) [1]
Master unit	AJ □A72LBTF	40	100 mA 0.1 sec or less	6	4	37
	AJ □A90LBTF	40		6	4	33
	AJ □126LBTF	63		10	6	39
Slave unit	AJ □A72UBTF	40		6	4	37
	AJ □A90UBTF	50		6	4	30
	AJ □126UBTF	63		10	6	37

1) Observe the following instructions pertaining to wire length.
Maximum wiring length: Keep the voltage drop within 2%.
If the wiring length is long, increase the wiring diameter.

Table 4.10-2 Main breaker and wiring specifications if multiple power supply lines are integrated

Model name			Breaker capacity (A)	Power supply line (mm^2)	Ground wire (mm^2)	Critical wiring length (m) [1]
Master unit	Slave unit 1	Slave unit 2				
AJ □A72LBTF	AJ □A72UBTF	—	100	14	5.5	49
AJ □A90LBTF	AJ □A72UBTF	—	100	14	5.5	47
AJ □A90LBTF	AJ □A90UBTF	—	100	14	5.5	42
AJ □126LBTF	AJ □A72UBTF	—	125	22	8	55
AJ □126LBTF	AJ □A90UBTF	—	125	22	8	51
AJ □A90LBTF	AJ □A72UBTF	AJ □A72UBTF	150	22	8	50
AJ □126LBTF	AJ □126UBTF	—	150	38	8	72
AJ □A90LBTF	AJ □A90UBTF	AJ □A90UBTF	150	38	8	76
AJ □126LBTF	AJ □A90UBTF	AJ □A72UBTF	175	38	14	67
AJ □126LBTF	AJ □A90UBTF	AJ □A90UBTF	175	38	14	63
AJ □126LBTF	AJ □126UBTF	AJ □A72UBTF	200	60	14	90
AJ □126LBTF	AJ □126UBTF	AJ □A90UBTF	200	60	14	86
AJ □126LBTF	AJ □126UBTF	AJ □126UBTF	250	60	22	75

1) Observe the following instructions pertaining to wire length.
Maximum wiring length: Keep the voltage drop within 2%.
If the wiring length is long, increase the wiring diameter.

Table 4.10-3 Transmission cable

Use	Size	Wire type	Remarks
Transmission cable	0.33 (mm^2)	22AWG LEVEL 4 (NEMA) non-polar 2 core, twisted pair solid core diameter 0.65 mm	LONWORKS compatible cable

4.10.2. WIRING METHOD

Wiring example for the indoor unit and the outdoor unit are shown in Fig. 4.10-1 and Fig. 4.10-2.
Using a knife, cut the bushing in order to route the wiring to the outdoor unit. (Fig. 4.10-3)
Remove the electrical box cover and connect the wires to the terminal in accordance with the terminal nameplate.
After connecting the wires, use cable clips to secure the wires. (Fig. 4.10-4)
Connect the wires without applying excessive tension.

Fig. 4.10-1

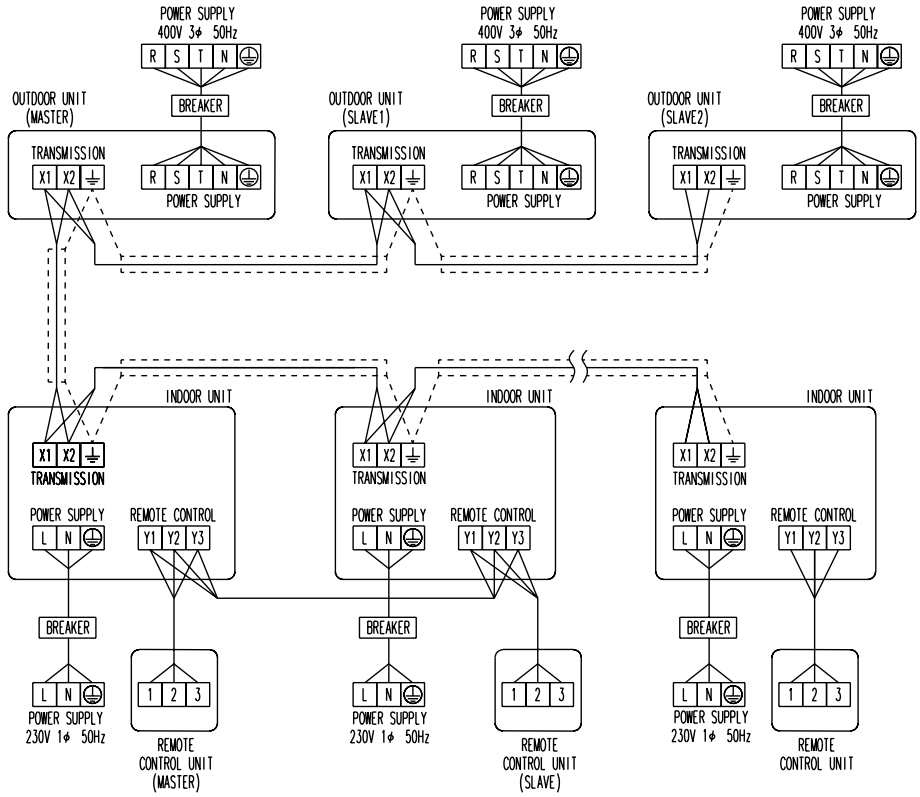
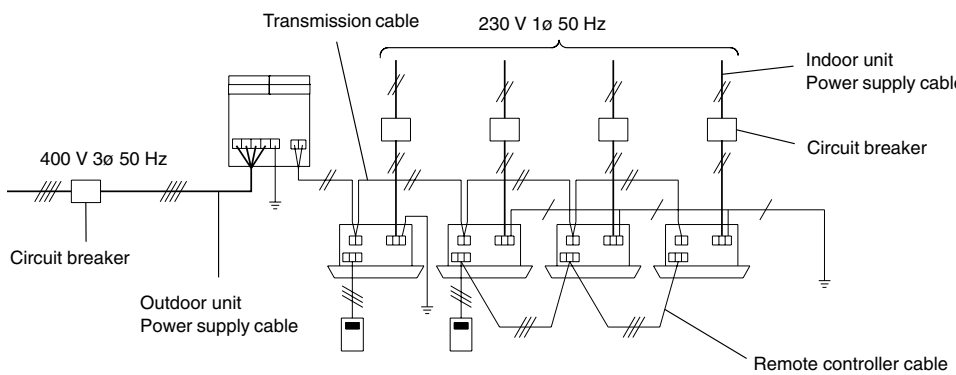


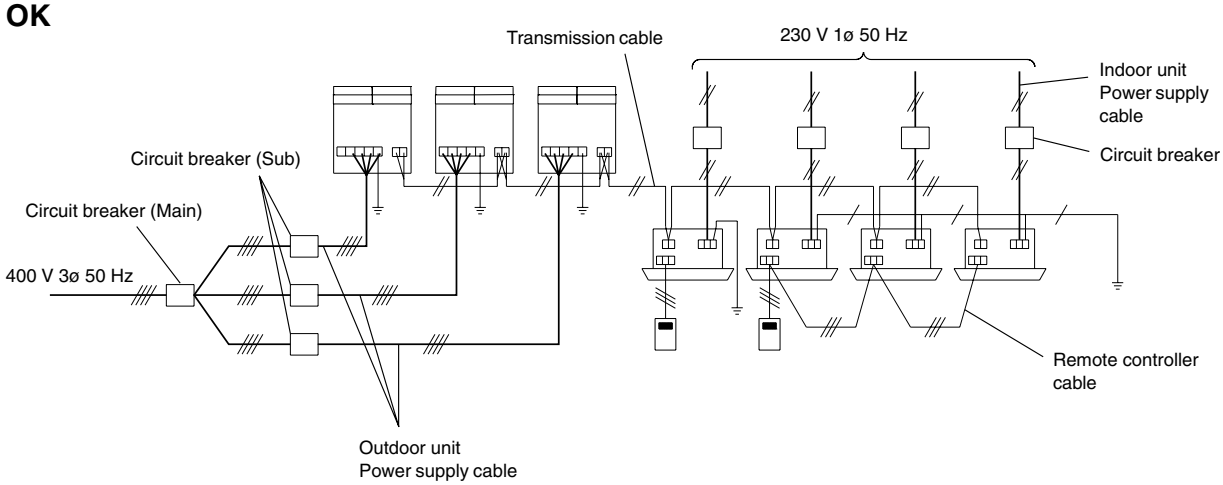
Fig. 4.10-2
(Example. 1)
In case of connected outdoor unit

OK



(Example. 2)
In case of connected three outdoor unit

OK



(Example. 3)
In case of connected three outdoor unit

No Good

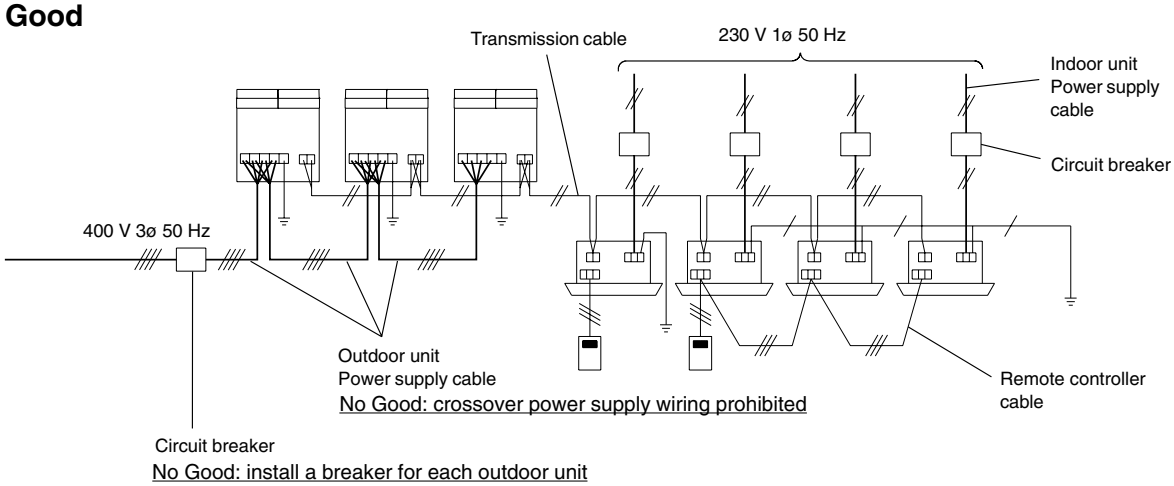


Fig. 4.10-3

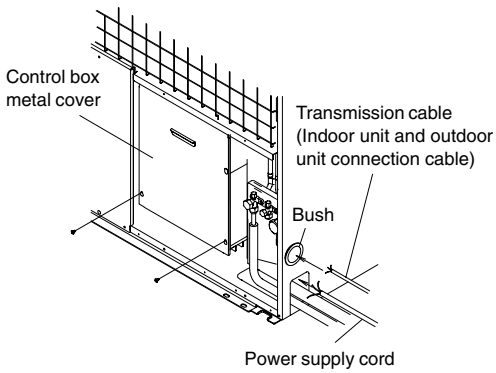
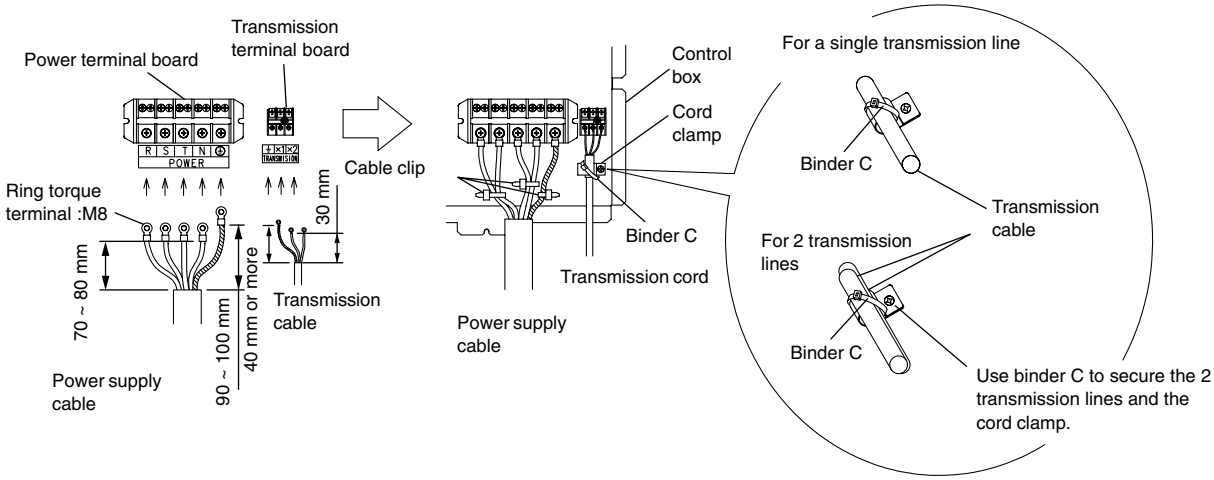


Fig. 4.10-4



* Use a ring torque terminals to connect the wires to the power terminal board.

Resistance measurement of transmission line (Measure with breaker OFF)
Upon completion of transmission cable wiring, measure the resistance of both end of transmission cable of the unit.
This resistance (refer to"4.11.4.") shows Table 4.10-4 value depending on the distance from the unit (Outdoor unit or Signal amplifier) on which the terminal resistor was installed. Please note that these values are approximate.
Do not turn on the power if the resistance value is abnormal.
It may break Transmission PCB.

Shielding process of transmission line
Shield wires at the both end of transmission line shall be secured to each unit's frame ground with screw. Be careful not to tighten the screw too much. If it is tightened excessively, an open circuit or breakage of terminal block may occur.

Table. 4.10-4

Approximate resistance (Ω)	Distance from termination resistor (m)				
	0 ~100	~ 200	~ 300	~400	~500
0 ~ 50	A short circuit somewhere or 2 or more termination resistors are connected				
50					
60					
70					
80					
90					
100					
110					
120					
130					
140					
150					
160					
170					
180					
190 ~	Faulty contact or wiring length over 500 m				
1K ~∞	Faulty contact, open circuit, or no termination resistor				

4.11. FIELD SETTING

⚠ CAUTION

Discharge the static electricity from your body before setting up the DIP switches.
Never touch the terminals or the patterns on the parts that are mounted on the board.

Fig. 4.11-1, Fig. 4.11-2 shows the positions of the switches on the board of the outdoor unit.

Fig. 4.11-1

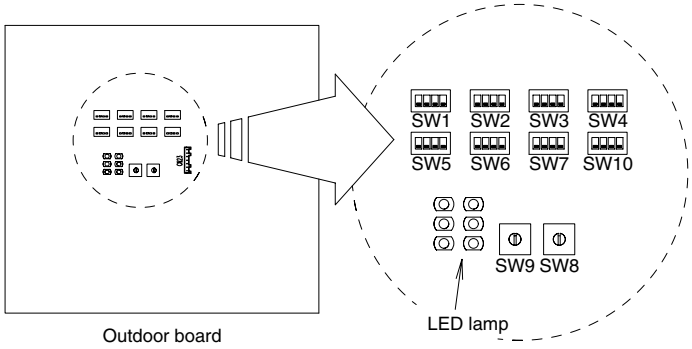


Fig. 4.11-2 Detail of switch

DIP switch	Rotary switch
ON 1 2 3 4 OFF	Position shown in "0"

4.11.1. SWITCH SETTING

Table 4.11-1 DIP Switch Setup

DIP switch		Function
SW1	1	Test run (cooling)
	2	Test run (heating)
	3	Pump down operation
	4	Forbidden
SW2	1	Silent operation mode
	2	Falling protection fan mode
	3	Sequential start shift switch 1
	4	Sequential start shift switch 2
SW3	1	Outdoor unit capacity switch 1
	2	Outdoor unit capacity switch 2
	3	Outdoor unit address switch 1
	4	Outdoor unit address switch 2
SW4	1	Slave unit connection number switch 1
	2	Slave unit connection number switch 2
	3	Forbidden
	4	Error reset
SW5	1	Cooling ability shift switch 1
	2	Cooling ability shift switch 2
	3	Heating ability shift switch 1
	4	Heating ability shift switch 2
SW6	1	Piping length switch 1
	2	Piping length switch 2
	3	Forbidden
	4	Forbidden
SW7	1	Model information switch 1
	2	Forbidden
	3	Indoor unit small capacity switch
	4	Forbidden
SW10	1	Forbidden
	2	Forbidden
	3	Forbidden
	4	Forbidden

4.11.2. FIELD SETTING

The following describes the switch functions and setups that are required for installing an outdoor unit.

1. SW1 Setting
   SW1-1, 1-2 (Test run)
   The setting SW1 is only performed on the master unit.
   There is no need to make this setting on the slave unit.
   * For details on the master and slave units, refer to page 1.

Table 4.11-2 DIP SW1-1, 1-2 setting

SW1-1	SW1-2	Control mode	Remarks
OFF	OFF	Normal (Factory setting)	Refer to Chapter "6" for the test run methods.
ON	OFF	Test run (Cooling)	
OFF	ON	Test run (Heating)	
ON	ON	Normal	

   SW1-3 (Pump down)
   For the pump down method, refer to "8. PUMP DOWN" .

Table 4.11-3 DIP SW1-3 setting

SW1-3	Pump Down Setting (reference)	Remarks
OFF (Factory setting)	Release	ON → OFF
ON	Operate	OFF → ON

2. SW2 Setting
   SW2-1 (Silent operation mode)
   The operating mode can be switched to this mode for reduced noise during operation of the outdoor unit, such as at night.
   The setting of SW2-1 must be done on both master and slave units.

Table 4.11-4 DIP SW2-1 setting

SW2-1	Silent operation mode
OFF (Factory setting)	Release
ON	Operate

   SW2-2 (Snow fall protection fan mode)
   When this is set, the fan for the outdoor unit is operated periodically even when the compressor is stopped to prevent the unit from becoming covered with snow.
   The setting of SW2-2 must be done on both master and slave units.

Table 4.11-5 DIP SW2-2 setting

SW2-2	Snow fall protection fan mode
OFF	Release (Factory setting)
ON	Operate

   SW2-3, 2-4 (Sequential start shift timing)
   The timing of the start-up of the outdoor unit can be delayed by several seconds with this setting.
   The setting SW2-3, 2-4 is only performed on the master unit.
   There is no need to make this setting on the slave unit.
   * This feature is useful for limiting the start-up current when multiple outdoor units are installed and started at the same time.

Table 4.11-6 DIP SW2-3, 2-4 setting

SW2-3	SW2-4	Sequential start mode
OFF	OFF	Normal (Factory setting)
OFF	ON	21 second delay
ON	OFF	42 second delay
ON	ON	63 second delay

3. SW3 Setting
   SW3-1, 3-2 (Outdoor model)
   Never change the DIP SW3-1, 3-2 which are set up at factory.

Table 4.11-7 DIP SW3-1, 3-2 setting

SW3-1	SW3-2	Outdoor Unit Model
OFF	OFF	AJ □ A72
OFF	ON	AJ □ A90
ON	OFF	AJ □ 126
ON	ON	Forbidden

   SW3-3, 3-4 (Outdoor unit address)
   The setting of SW3-3, 3-4 is to be done when installing Slave 2.
   There is no need to make this setting on the master unit.
   * This setting is only enabled when the power is turned on.

Table 4.11-8 DIP SW3-3, 3-4 setting

SW3-3	SW3-4	Outdoor unit address	Remarks
OFF	OFF	0 (Factory setting)	Master unit
OFF	ON	1 (Factory setting)	Slave unit 1
ON	OFF	2	Slave unit 2
ON	ON	Forbidden	

4. SW4 Setting
SW4-1, 4-2 (Number of connectable outdoor units)
This DIP switch setting sets the number of outdoor units.
There is no need to make this setting on the slave unit.

Table 4.11-9 DIP SW4-1, 4-2 setting

SW4-1	SW4-2	Number of connectable outdoor units	Remarks
OFF	OFF	0 (Factory setting)	Master unit only
OFF	ON	1	1 slave unit connected
ON	OFF	2	2 slave units connected
ON	ON	Forbidden	

SW4-4 Error reset (Setting for master and slave unit)
In the event of compressor failure etc., error information is stored in PCB.
After repairing the parts and turn ON the power, set the DIP-SW for reset the error.
(Note : without above setting, error information can't be released and continue to Error display.)

SW4-4	Error reset
OFF→ON ON→OFF	Error reset

5. SW5 Setting
SW5-1, 5-2 (Cooling ability shift switch setting)
Set them as necessary.
There is no need to make this setting on the slave unit.

Table 4.11-10 SW5-1, 5-2 setting

SW5-1	SW5-2	Ability Shift
OFF	OFF	Normal (Factory setting)
OFF	ON	Save energy mode
ON	OFF	High power mode 1
ON	ON	High power mode 2

SW5-3, 5-4 (Heating ability shift switch setting)
Set them as necessary.
There is no need to make this setting on the slave unit.

Table 4.11-11 SW5-3, 5-4 setting

SW5-3	SW5-4	Ability Shift
OFF	OFF	Normal (Factory setting)
OFF	ON	Save energy mode
ON	OFF	High power mode 1
ON	ON	High power mode 2

6. SW6 Setting
SW6-1, 6-2 (Pipe Length)
This SW setting can be used to provide operation to supplement the loss created by the pipe length.
There is no need to make this setting on the slave unit.

Table 4.11-12 DIP SW6-1, 6-2 setting

SW6-1	SW6-2	Pipe Length (m)	Remarks
OFF	OFF	40 < Pipe Length ≦ 80	(Factory setting)
OFF	ON	Pipe Length ≦ 40	
ON	OFF	80 < Pipe Length < 120	
ON	ON	120 < Pipe Length ≦ 150	

7. SW7 Setting
SW7-1 (Model Type)

Table 4.11-13 DIP SW7-1 setting

SW7-1	Model Type	Remarks
OFF	Heat Pump	Factory setting
ON	Cooling Only	

SW7-3 (Indoor unit small capacity setting)
If the total capacity of the connected indoor units is less than 90% of the outdoor unit capacity, set this switch to ON.
There is no need to make this setting on the slave unit.

Table 4.11-14 DIP SW7-3 setting

SW7-3	Indoor unit installation capacity	Remarks
OFF	90% or more	Factory setting
ON	less than 90%	

4.11.3. ROTARY SWITCH SETTING

Rotary switch setting
The rotary switch is for setting the refrigerant circuit address.

Rotary switch (SW8) - - - Factory setting “0”
Rotary switch (SW9) - - - Factory setting “0”
In the case of multiple refrigerant circuits, set SW8 and SW9 as shown in the Table 4.11-15 for each refrigerant circuit.
Do not use a nonexistent switch setting combination. (Table 4.11-15)
Example: When SW8 is set to “4” and SW9 is set to “1”, the refrigerant circuit address will be “20”.

Table 4.11-15

Refrigerant circuit address	Rotary Switch Setting		Refrigerant circuit address	Rotary Switch Setting		Refrigerant circuit address	Rotary Switch Setting		Refrigerant circuit address	Rotary Switch Setting		Refrigerant circuit address	Rotary Switch Setting	
	OUTDOOR UNIT			OUTDOOR UNIT			OUTDOOR UNIT			OUTDOOR UNIT			OUTDOOR UNIT	
	SW9	SW8		SW9	SW8		SW9	SW8		SW9	SW8		SW9	SW8
0	0	0	20	1	4	40	2	8	60	3	C	80	5	0
1	0	1	21	1	5	41	2	9	61	3	D	81	5	1
2	0	2	22	1	6	42	2	A	62	3	E	82	5	2
3	0	3	23	1	7	43	2	B	63	3	F	83	5	3
4	0	4	24	1	8	44	2	C	64	4	0	84	5	4
5	0	5	25	1	9	45	2	D	65	4	1	85	5	5
6	0	6	26	1	A	46	2	E	66	4	2	86	5	6
7	0	7	27	1	B	47	2	F	67	4	3	87	5	7
8	0	8	28	1	C	48	3	0	68	4	4	88	5	8
9	0	9	29	1	D	49	3	1	69	4	5	89	5	9
10	0	A	30	1	E	50	3	2	70	4	6	90	5	A
11	0	B	31	1	F	51	3	3	71	4	7	91	5	B
12	0	C	32	2	0	52	3	4	72	4	8	92	5	C
13	0	D	33	2	1	53	3	5	73	4	9	93	5	D
14	0	E	34	2	2	54	3	6	74	4	A	94	5	E
15	0	F	35	2	3	55	3	7	75	4	B	95	5	F
16	1	0	36	2	4	56	3	8	76	4	C	96	6	0
17	1	1	37	2	5	57	3	9	77	4	D	97	6	1
18	1	2	38	2	6	58	3	A	78	4	E	98	6	2
19	1	3	39	2	7	59	3	B	79	4	F	99	6	3

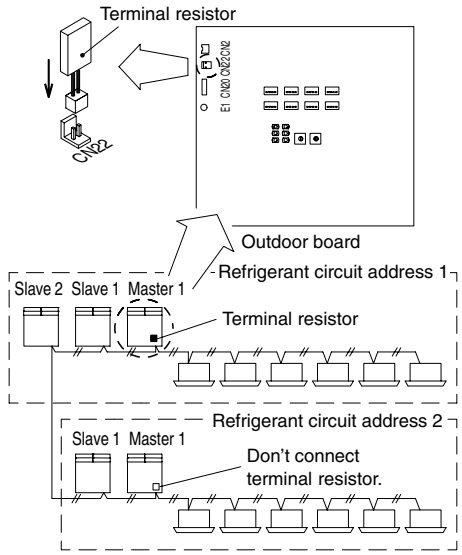
4.11.4. TERMINAL RESISTOR SETTING

⚠ CAUTION
Make sure to install a termination resistor as specified. Install 1 termination resistor within 500 meters of the overall length of the transmission line. Install the termination resistor as shown in Fig. 4.11-3.
• If multiple terminal resistors are installed, the entire transmission system may break.
• If no resistor is installed, a transmission failure may occur.

The terminal resistor is provided with the master unit.
When there are multiple master units connected by a communication cable, attach the terminal resistor to CN22 on only one of those master units.

* Refer to the installation instruction sheet provided with the signal amplifier when mounting a signal amplifier.

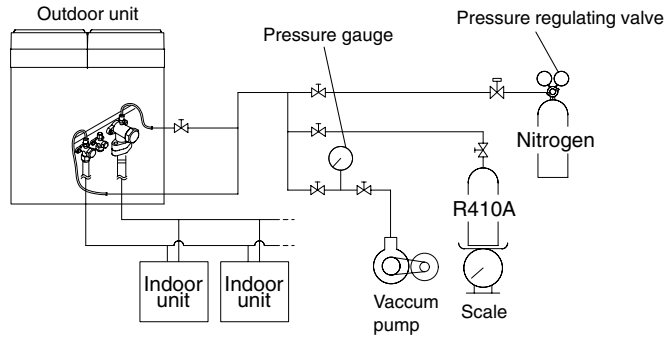
Fig. 4.11-3



5. CHARGING WITH REFRIGERANT

Fig. 5-1 Connection system

A) In case of connected one out door unit



B) In case of connected many outdoor units

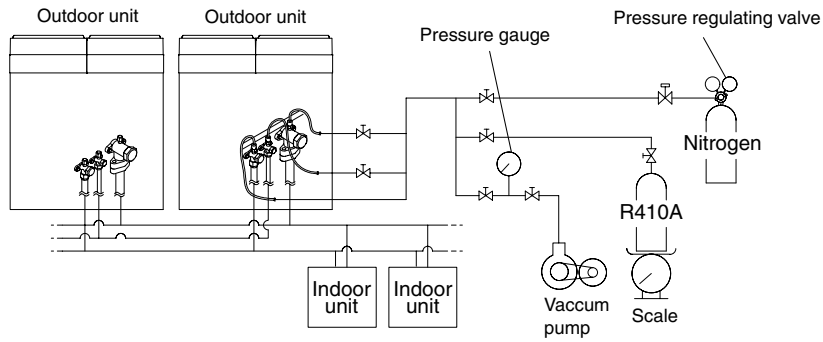


Fig. 5-2

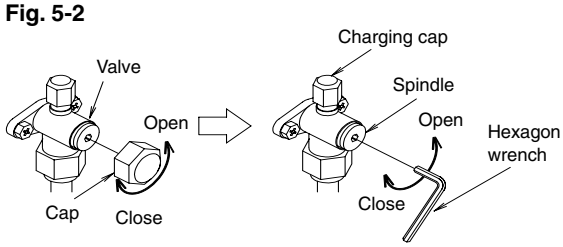


Table 5-1

Pipe	Spindle	Cap	Charging cap
Liquid valve	—	28.0 to 32.0 N·m (280 to 320 kgf·cm)	12.5 to 16.0 N·m (125 to 160 kgf·cm)
Gas valve	27.0 to 30.0 N·m (270 to 300 kgf·cm)	60.0 to 65.0 N·m (600 to 650 kgf·cm)	12.5 to 16.0 N·m (125 to 160 kgf·cm)
Oil valve	—	20.0 to 25.0 N·m (200 to 250 kgf·cm)	12.5 to 16.0 N·m (125 to 160 kgf·cm)

5.1. SEALING TEST

⚠ CAUTION

- **Do not apply shock during sealing test.**
  It can rupture the pipes and cause serious injury.
- **Do not block the walls and the ceiling until the sealing test and the charging of the refrigerant gas have been completed.**

After connecting the pipes, perform an sealing test.
Pressurize nitrogen gas to 4.15 MPa to perform the sealing test.
Recheck that the spindle of the 3-way valve are closed before performing a sealing test. (Fig. 5-2)
Pour nitrogen gas through both the liquid pipe and the gas pipe.
* When connecting multiple units, pour nitrogen through 3 locations: liquid pipe, gas pipe, and oil pipe.
Check all flare connections and welds.
Then, check that the pressure has not decreased.
Compare the pressures after pressurizing and letting it stand for 24 hours, and check that the pressure has not decreased.
* When the outdoor temperature changes 5 °C, the test pressure changes 0.05 MPa.
  If the pressure has dropped, the pipe joints may be leaking.

Find and repair the area that is leaking.
If a leakage is found, immediately repair it and perform a sealing test again.
After completing the sealing test, release the nitrogen gas from both valves.
Release the nitrogen gas slowly.

5.2. VACCUM PROCESS

⚠ CAUTION
• **If the system is not evacuated sufficiently, its performance will drop.**
• **The location from which to evacuate the system differs whether 1 outdoor unit or multiple outdoor units are connected.**

Evacuation procedure

• One outdoor unit connected:

1. Remove the flares at the gas pipe and liquid pipe, and make sure the valves are closed.
2. Remove the charging cap.
3. Connect a vacuum pump and a pressure gauge to a charging hose and connect it to the charging port.
4. Evacuate the indoor unit and the pipe joint until the pressure gauge reads –76 cmHg.
   Evacuate from both the gas pipe and the liquid pipe.
5. Continue evacuating the system for 1 hour after the pressure gauge reads –76 cmHg.
6. Remove the charging hose and install the charging cap.

• Multiple outdoor units connected:

1. Remove the flares at the gas pipe, liquid pipe, and oil pipe, and make sure the valves are closed.
2. Remove the charging cap.
3. Connect a vacuum pump and a pressure gauge to a charging hose and connect it to the charging port.
4. Evacuate the indoor unit and the pipe joint until the pressure gauge reads –76 cmHg.
   Evacuate from 3 locations: the gas pipe, liquid pipe, and oil pipe.
5. Continue evacuating the system for 1 hour after the pressure gauge reads –76 cmHg.
6. Remove the charging hose and install the charging cap.

5.3. ADDITIONAL CHARGING

⚠ CAUTION
• **After evacuating the system, add refrigerant.**
• **Do not charge the system with a refrigerant other than R410A.**
• **Do not reuse recovered refrigerant.**
• **Use an electronic scale to measure the charging amount of refrigerant. Adding more refrigerant than the specified amount will cause a malfunction.**
• **Charge refrigerant using the liquid pipe. Adding refrigerant through the gas pipe will cause a malfunction.**
• **Add refrigerant by charging the system with the refrigerant in the liquid state. If the refrigerant cylinder is equipped with a siphon, it is not necessary to place the cylinder upright.**

Procedure for charging the system with refrigerant

1. Remove the charging cap from the liquid pipe.
2. Attach a charging hose to the refrigerant cylinder, and connect it to the charging port.
3. Add refrigerant by calculating the additional refrigerant volume in accordance with the calculation formula indicated below.
4. Remove the charging hose and install the charging cap.
5. Remove the body caps (gas pipe, liquid pipe, and oil pipe {if multiple units are installed}), and open the valves.
6. Close the body caps.
7. After adding refrigerant, indicate the added charging volume on the unit.
   * Tighten the body caps and charging caps to the torque values specified in the Table 4.7-2.
     To open and close the valves,
     Use an M4 hexagon wrench for liquid and oil pipes.
     Use an M10 hexagon wrench for gas pipes.

Additional charge calculation formula

- Additional refrigerant charge amount is calculated according to calculated value from its pipe length of liquid pipe and additional amount for outdoor unit.
- Round up the calculated result to two decimal places.

Calculation of additional charge refrigerant

Model	Factory charged amount (kg)	A Additional amount for outdoor unit (kg)
AJ □ A72LBTF	11.8	2.2
AJ □ A90LBTF	11.8	2.2
AJ □ 126LBTF	11.8	3.7
AJ □ A72UBTF	11.8	2.2
AJ □ A90UBTF	11.8	2.2
AJ □ 126UBTF	11.8	3.7

Diameter of liquid pipe (mm)	B Additional amount for pipe length (kg/m)
6.35	0.021
9.52	0.058
12.70	0.114
15.88	0.178
19.05	0.268

1. Calculation of additional amount for outdoor unit

A =	Outdoor unit 1 additional amount for outdoor unit	+	Outdoor unit 2 additional amount for outdoor unit	+	Outdoor unit 3 additional amount for outdoor unit
	kg		kg		kg

2. Calculation of additional amount for pipe length

B =	Total length of ø19.05 mm liquid pipe	× 0.268 kg/m	+	Total length of ø15.88 mm liquid pipe	× 0.178 kg/m	+	Total length of ø12.70 mm liquid pipe	× 0.114 kg/m	+
	m			m			m		
	kg			kg			kg		

	Total length of ø9.52 mm liquid pipe	× 0.058 kg/m	+	Total length of ø6.35 mm liquid pipe	× 0.021 kg/m
	m			m	
	kg			kg	

3. Calculation of additional charge refrigerant
   C = A + B

Calculation example) Where 3 outdoor units (AJ □ 126LBTF, AJ □ A90UBTF and AJ □ A72UBTF) are connected in a system.

1. Calculation of additional amount for outdoor unit:
   A = 3.70 (kg) + 2.20 (kg) + 2.20 (kg)
   = 8.10 (kg)
2. Calculation of additional amount for pipe length:
   In case refrigerant piping lengths are as below
   ø19.05: 50 m, ø15.88: 25 m, ø12.70: 0 m, ø9.53: 20 m, ø6.35: 15 m
   Additional amount for pipe length:
   B = 50 (m) × 0.268 (kg/m) + 25 (m) × 0.178 (kg/m) + 0 (m) × 0.114 (kg/m) + 20 (m) × 0.058 (kg/m) + 15 (m) × 0.021 (kg/m)
   = 19.325 (kg)

3. Calculation of additional charge refrigerant:
   C = A + B = 8.10 (kg) + 19.33 (kg)
   = 27.43 (kg)

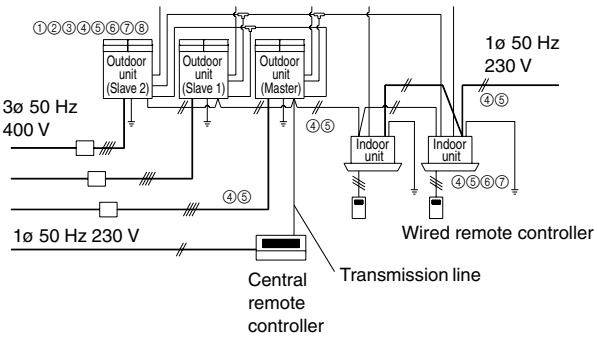
6. TEST RUN

6.1. PRE-TEST RUN CHECK ITEMS

Before performing a test run, check the following items by referring to the Fig. 6-1.

① Is there a gas leakage? (At pipe connections {flange connections and brazed areas})
② Is the system charged with the specified volume of refrigerant?
③ Is the refrigerant circuit address correct?
④ Is a breaker installed at the power supply cable of every outdoor unit?
⑤ Are the wires connected to the terminals without looseness, and in accordance with the specifications?
⑥ Are the DIP switches set up properly for the outdoor and indoor units?
(Outdoor unit: silent operation mode, pipe length, etc.
Indoor unit: flow rate setup, temperature correction, etc.)
⑦ Is the 3-way valve of the outdoor unit open?
(Single unit installation: gas and liquid pipe
Multiple connections: gas, liquid and oil pipe)
⑧ Is power supplied to the crankcase heater for at least 12 hours (during winter)?

Fig. 6-1



After checking the above, if there are no problems, perform a test run by referring to "6-2. TEST RUN METHOD". If there is any problem, correct it immediately and check it again.

6.2. TEST RUN METHOD

Perform a test run in accordance with the following procedure. The test run method consists of the following 2 patterns. Use one or the other depending on the conditions. If an error is displayed, see "7. ERROR DISPLAY".

1. To test run and check all the units of the refrigerant system:
Set up the DIP switches on the outdoor unit board in accordance with the specifications shown below. Check the outdoor and indoor units to make sure they are operating normally.
DIP switch setup:
Cooling run: DIP SW 1-1: OFF → ON
(Heating run: DIP SW 1-2: OFF → ON)
* This setup is unnecessary on the slave units.
After completing the test run, restore the DIP switch to the original setup. (ON → OFF)

FOR YOUR INFORMATION
If multiple refrigerant systems are connected together, perform a test run by operating the DIP switch of the outdoor unit board for every refrigerant system.
- Check that all indoor and outdoor units, which are connected by piping to the same refrigerant system, run properly.
- If there is an indoor or outdoor unit that does not run, or if an indoor or outdoor unit of some other refrigerant system runs, the indoor or outdoor unit address or the DIP switch for the slave unit connection number is set up improperly.
- If you continue to run the system with the improper DIP switch setup, the system will malfunction. Therefore, immediately stop the system and recheck the DIP switch setup.

2. To test run the indoor units individually:
The control method varies by remote controller. Therefore, refer to the installation instruction sheet for the respective remote controller.

6.3. CHECKLIST

	Check description	Check method	Criteria
1	High and low pressure values are normal.	Check it with a pressure gauge.	Cooling: low pressure approx. 0.8 MPa Heating: high pressure approx. 3.0 MPa
2	Drain water is discharged smoothly through the drain hose.	Check it by pouring water.	—
3	Indoor and outdoor unit fans are operating.	Check them visually.	—
4	Compressor operates after the indoor unit operates.	Check the operating sound and the LED on the outdoor unit board.	LED 3 of outdoor unit board: blinking
5	Difference between inlet and outlet temperatures is normal.	Measure the inlet and outlet temperatures.	Temperature difference 10 degrees
6	No error is displayed.	Check the LED lamp.	No error LED flashes.

7. ERROR DISPLAY

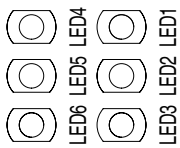
Operation can be checked by the lighting and flashing of the LED lamps.
Perform judgment in accordance with the following.

7.1. NORMAL OPERATION MODE

Display	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6
Idling (stopped)	◎					
Cooling operation	◎	○ (1)				
Heating operation	◎	○ (2)				
Compressor 1 output	◎		○ (1)			
Compressor 2 output	◎		○ (2)			
Compressor 3 output	◎		○ (3)			
Compressors 1, 2 output	◎		○ (4)			
Compressors 1, 3 output	◎		○ (5)			
Compressors 2, 3 output	◎		○ (6)			
Compressors 1, 2, 3 output	◎		○ (7)			
Equalizing pressure	◎			◎		
Oil recovery operation	◎				○ (1)	
Defrosting operation	◎				○ (2)	
Test operation	◎				○ (3)	
Oil level balance operation	◎				○ (4)	
Pump down completed	◎	○ (2)	○ (2)	○ (2)	○ (2)	○ (2)
Discharge temperature protection stopped	◎					○ (1)
High pressure protection stopped	◎					○ (2)
Low pressure protection stopped	◎					○ (3)

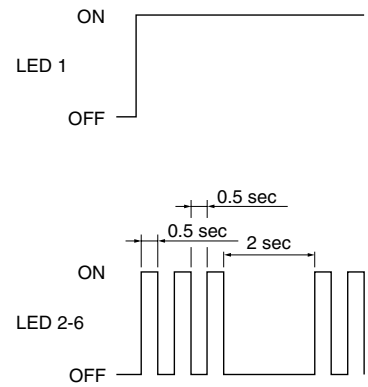
Display Method
- ◎ : Lighted continuously
- ○ : 0.5 sec ON/0.5 sec OFF flashing
- ( ) : Flashing times

Fig. 7.1-1 Details of the LED lamps



* Refer to Fig. 4.11-1 for positions on the LED circuit board.

Operation display



7.2. ERROR OPERATION MODE

Display	LED 1	LED 2	LED 3	LED 4	LED 5	LED 6
Compressor 1 error	◇	● (1)				
Compressor 2 error	◇	● (2)				
Compressor 3 error	◇	● (3)				
Discharge temperature 1 error	◇	● (4)				
Discharge temperature 2 error	◇	● (5)				
Discharge temperature 3 error	◇	● (6)				
High pressure error	◇	● (7)				
Low pressure error	◇	● (8)				
Pump down error	◇	● (9)				
4-way valve error	◇	● (10)				
Failure of all compressors running in same outdoor unit	◇	● (11)				
Discharge temperature thermistor 1 error	◇		● (1)			
Discharge temperature thermistor 2 error	◇		● (2)			
Discharge temperature thermistor 3 error	◇		● (3)			
Heat exchanger liquid temperature sensor error	◇		● (4)			
RCV liquid level detection thermistor (lower limit) error	◇		● (5)			
RCV liquid level detection thermistor (intermediate) error	◇		● (6)			
RCV liquid level detection thermistor (upper limit) error	◇		● (7)			
SC heat exchanger gas outlet temperature thermistor error	◇		● (8)			
Liquid pipe temperature thermistor 1 error	◇		● (9)			
Liquid pipe temperature thermistor 2 error	◇		● (10)			
Suction temperature thermistor error	◇		● (11)			
Outdoor temperature thermistor error	◇		● (12)			
SC heat exchanger gas inlet port temperature thermistor error	◇		● (13)			
Discharge pressure sensor error	◇			● (1)		
Suction pressure sensor error	◇			● (3)		
Current sensor error	◇			● (4)		
Reverse phase or open phase wiring error	◇				● (1)	
Inverter error	◇				● (2)	
EEPROM access error	◇				● (3)	
Inverter starting current error	◇				● (4)	
Inverter normal operation current error	◇				● (5)	
Inverter transmission error	◇				● (6)	
Parallel communication error	◇				● (7)	
Outdoor unit transmission error	◇				● (8)	
Network transmission error	◇				● (9)	
Master and slave unit setting switch error	◇				● (10)	
Indoor unit error	◇					● (1)
Slave unit error	◇					● (2)
Initial setting error	◇	◎	◎	◎	◎	◎

Display Method
- ◎ : Lighted continuously
- ◇ : 0.1 sec ON/0.1 sec OFF flashing
- ● : 0.3 sec ON/0.3 sec OFF flashing
- ( ) : Flashing times

8. PUMP DOWN

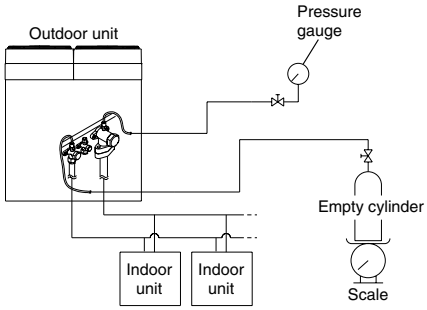
⚠ CAUTION

Do not reuse the refrigerant that has been recovered by the recovery pump.

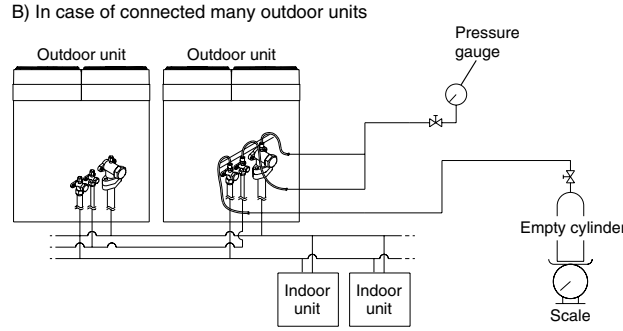
To prevent the discharge of the refrigerant into the atmosphere, follow the procedure indicated below to recover the refrigerant from an outdoor unit before moving or discarding the unit. Up to approximately 20 kg can be recovered per outdoor unit. If the volume of the refrigerant to be recovered is large, recover it into a refrigerant recovery cylinder while measuring the weight of the refrigerant.

Fig. 8-1 Connecting system

A) In case of connected outdoor unit



B) In case of connected many outdoor units



Single unit Installation

Pump down method 1 (DIP switch method)

1. Fully close the 3-way valve at the liquid pipe.
2. Set the DIP switch 1-3 on the outdoor unit board "OFF → ON". The unit will start automatically in the cooling mode.
3. When the pump down is completed, the LED lamps will flash at LED 2 to 6.
4. After the LED lamps flash, fully close the 3-way valve at the gas pipe within 2 minutes, otherwise the compressor may be damaged.
5. Restore the DIP switch to the original setup. (ON → OFF)

Pump down method 2 (manual method)

1. Connect the charge hose of the manifold gauge to the charge port of the 3-way valve at the gas pipe. Open the pressure reduction valve slightly to purge the air from the charge hose.
2. Fully close the 3-way valve at the liquid pipe.
3. Perform a test run in the cooling mode.
   * Set the DIP switch SW1-1 to "OFF → ON".
4. When the pressure gauge reads between 0.05 and 0 MPa, fully close the 3-way valve at the gas pipe and stop the run promptly.
   Set the DIP switch SW1-1 to "ON → OFF".
   If the unit continues to run with the pressure at 0 MPa, the compressor may be damaged.

In case there is too much refrigerant

1. Connect a gas cylinder to the charge port at the liquid pipe.
2. Perform a test run in the cooling mode.
   * Set the DIP switch SW1-1 to "OFF → ON".
   * If the refrigerant is difficult to recover, fully close the 3-way valve at the liquid pipe.
3. After recovering the refrigerant using the gas cylinder, stop the run.
   Set the DIP switch SW1-1 to "ON → OFF".
4. Perform the pump down operation according to the method describe above.

Multiple connections

Pump down method 1 (DIP switch method)

1. Fully close the 3-way valves at the liquid pipes.
   Fully close the 3-way valves at the oil pipes of the slave units.
   * Leave only the 3-way valve at the oil pipe of the master unit fully open.
2. Set the DIP switch 1-3 on the outdoor unit board "OFF → ON". (the master unit board)
   The unit will start automatically in the cooling mode.
3. When the pump down is completed, the LED lamps will flash at LED 2 to 6.
4. After the LED lamps flash, fully close the 3-way valve at the gas pipes and the 3-way valve at the oil pipe on the master unit within 2 minutes.
   Restore the DIP switch to the original setup. (ON → OFF)
   If the 3-way valves are open for more than 2 minutes, the compressor may be damaged.
   * If it will be difficult to close the 3-way valves for all units during the 2 minutes while the LED lamps are flashing, close the valves a little before performing the pump down operation.

Pump down method 2 (manual method)

1. Connect the charge hose of the manifold gauge to the charge port of the 3-way valve at the gas pipe. Open the pressure reduction valve slightly to purge the air from the charge hose.
2. Fully close the 3-way valves at the liquid pipes.
   Fully close the 3-way valves at the oil pipes of the slave units.
   * Leave only the 3-way valve at the oil pipe of the master unit fully open.
3. Perform a test run in the cooling mode. (the master unit board)
   * Set the DIP switch SW1-1 to "OFF → ON".
4. When the pressure gauge reads between 0.05 and 0 MPa, fully close the 3-way valves at the gas pipes and the 3-way valves at the oil pipes on all units and stop the run promptly.
   Set the DIP switch SW1-1 to "ON → OFF".
   If the unit continues to run with the pressure at 0 MPa, the compressor may be damaged.

In case there is too much refrigerant

1. Connect a gas cylinder to the charge port at the liquid pipe.
2. Perform a test run in the cooling mode. (the master unit board)
   * Set the DIP switch SW1-1 to "OFF → ON".
   * If the refrigerant is difficult to recover, fully close the 3-way valve at the liquid pipe.
3. After recovering the refrigerant using the gas cylinder, stop the run.
   Set the DIP switch SW1-1 to "ON → OFF".
4. Perform the pump down operation according to the method describe above.

9. OPTION PARTS

⚠ CAUTION

Listed below are option parts used exclusively with the R410A refrigerant.
Do not use parts other than those listed below.

1. SEPARATION TUBE KIT
   Table 9-1 shows a outdoor unit branch kit that is used for installing multiple outdoor units. Table 9-2 shows separation tubes used for connection between outdoor and indoor units. Refer to the installation instruction sheet for the outdoor unit branch kit and the separation tubes for installation specifications.

Table 9-1 Outdoor unit branch kit for installing multiple outdoor units

Outdoor unit branch kit	Total model code of outdoor unit
UTR-CP567L UTR-CP567X UTR-CP567Q	ALL

Table 9-2 Separation tube selection

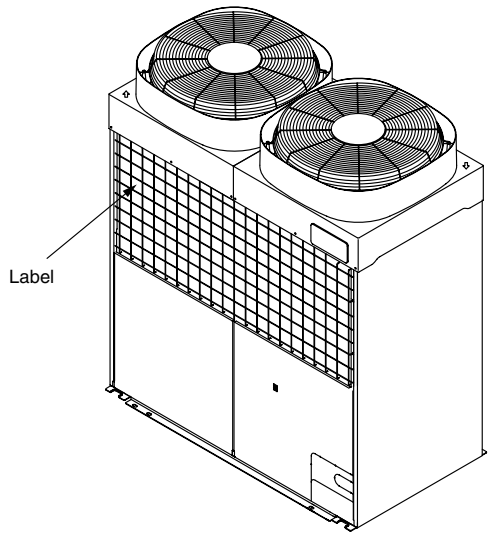
Separation tube	Total model code of indoor unit
UTR-BP090L UTR-BP090X UTR-BP090Q	90 or less
UTR-BP180L UTR-BP180X UTR-BP180Q	91 to 180
UTR-BP567L UTR-BP567X UTR-BP567Q	181 or more

2. HEADER
   A header is used for connecting the indoor units. Refer to the installation instruction sheet for the header for installation specifications.

Table 9-3 Header selection

Header		Total model code of outdoor unit
6 Branches	8 Branches	
UTR-H0906L	UTR-H0908L	90 or less
UTR-H1806L	UTR-H1808L	91 to 180

10.INFORMATION



Main contents of label

Item	Detail
1. Model name	Model name
2. Serial number	Serial number
3. Electric characteristics	Phase, rated voltage, and frequency
4. Capacity	Cooling/heating capacity under cooling/heating condition (refer to item 17)
5. Current	Electric current during cooling/heating operation under cooling/heating condition (refer to item 17)
6. Input power	Input during cooling/heating operation under cooling/heating condition (refer to item 17)
7. Max. Over Current	Maximum electric current (temperature condition is max. cooling condition [refer to item 18])
8. Max. Input power	Maximum input (temperature condition is max. cooling condition [refer to item 18])
9. Max. pressure (HP/LP)	Means pressure of High Pressure side/Low Pressure side
10. Noise Level	Noise level
11. Refrigerant	Refrigerant type and initial charging amount
12. Weight	Product weight
13. Protection	Protection level against dust and water
14. Manufacture year	Manufacture year
15. Manufacturer	Manufacturer FUJITSU GENERAL LIMITED Address : 1116, Suenaga, Takatsu-ku, Kawasaki 213-8502, Japan
16. Origin	Origin country
17. Condition of cooling/heating	Dry-bulb temperature and wet-bulb temperature under standard cooling/heating condition
18. Condition of max. cooling	Dry-bulb temperature and wet-bulb temperature at maximum electric current and input