

# AIR CONDITIONER OUTDOOR UNIT

## INSTALLATION MANUAL

For authorized personnel only.

English

## MANUEL D'INSTALLATION

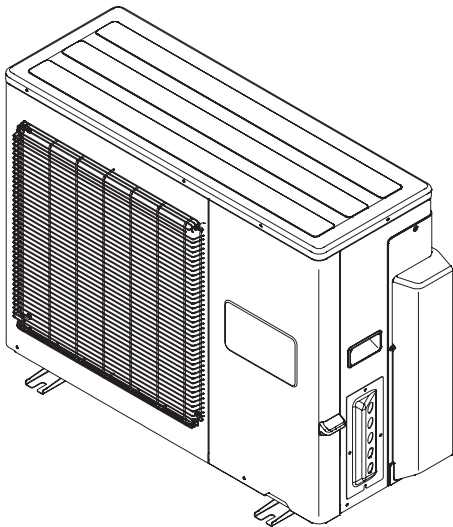
Pour le personnel agréé uniquement.

Français

## MANUAL DE INSTALACIÓN

Solo para personal autorizado.

Español



# AIR CONDITIONER INSTALLATION MANUAL

PART No. 9374747146

Outdoor Unit

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## 1. SAFETY PRECAUTIONS

This installation manual describes how to install the outdoor unit only. To install the indoor unit, refer to the installation manual included with the indoor unit.

### IMPORTANT!

#### Please Read Before Starting

This air conditioning system meets strict safety and operating standards.

As the installer or service person, it is an important part of your job to install or service the system so it operates safely and efficiently.

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

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

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

**CAUTION:** This symbol refers to a hazard or unsafe practice which can result in personal injury and the potential for product or property damage.

- Hazard alerting symbols



Electrical



Safety / alert

#### If Necessary, Get Help

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

#### In Case of Improper Installation

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

## SPECIAL PRECAUTIONS

### When Wiring

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

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

### When Transporting

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

### When Installing...

#### ...In a Ceiling or Wall

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

#### ...In a Room

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

#### ...In Moist or Uneven Locations

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

#### ...In an Area with High Winds

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

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

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

### When Connecting Refrigerant Tubing

- Keep all tubing runs as short as possible.
- Use the flare method for connecting tubing.
- Apply refrigeration compressor oil (or equivalent) used for the outdoor unit to the matching surfaces of the flare and union tubes before connecting them, then tighten the nut with a torque wrench for a leak-free connection.
- Check carefully for leaks before starting the test run.

### NOTE:

Depending on the system type, liquid and gas lines may be either narrow or wide.

Therefore, to avoid confusion the refrigerant tubing for your particular model is specified as either "small" or "large" rather than as "liquid" or "gas".

### When Servicing

- Turn the power OFF at the main circuit breaker panel before opening the unit to check or repair electrical parts and wiring.
- Keep your fingers and clothing away from any moving parts.
- Clean up the site after you finish, remembering to check that no metal scraps or bits of wiring have been left inside the unit being serviced.
- After installation, explain correct operation to the customer, using the operating manual.

- Be sure to read this Manual thoroughly before installation.
- The warnings and precautions indicated in this Manual contain important information pertaining to your safety. Be sure to observe them.
- Hand this Manual, 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.
- After installation, explain correct operation to the customer, using the operating manual.

### ⚠ WARNING

Never touch electrical components immediately after the power supply has been turned off. Electrical shock may occur. After turning off the power, always wait 5 minutes or more before touching electrical components.

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.

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.

When installing and relocating the air conditioner, do not mix gases other than the specified refrigerant (R410A) to enter the refrigerant cycle. If air or other gas enters the refrigerant cycle, the pressure inside the cycle will rise to an abnormally high value and cause breakage, injury, etc.

When installing this system in high humidity locations, install using ground fault equipment breakers (often referred to in other countries as an ELCB earth leakage current breaker) to reduce the risk of leaking current which may result in electric shock or potential fire.

### ⚠ CAUTION

For the air conditioner to operate satisfactorily, install it as outlined in this installation manual.

Connect the indoor unit and outdoor unit with the air conditioner piping and cables available standards parts. This installation manual describes the correct connections using the installation set available from our standard parts.

Installation work must be performed in accordance with national wiring standards by authorized personnel only.

Also, do not use an extension cable.

Do not turn on the power until all installation work is complete.

Do not purge the air with refrigerants but use a vacuum pump to vacuum the installation.

There is not extra refrigerant in the outdoor unit for air purging.

Use a vacuum pump for R410A exclusively.

Using the same vacuum pump for different refrigerants may damage the vacuum pump or the unit.

Use a clean gauge manifold and charging hose for R410A exclusively.

If refrigerant leaks while work is being carried out, ventilate the area. If the refrigerant comes in contact with a flame, it produces a toxic gas.

- Be careful not to scratch the air conditioner when handling it.
- After installation, explain correct operation to the customer, using the operating manual.
- Let the customer keep this installation manual because it is used when the air conditioner is serviced or moved.
- All Fujitsu General products are manufactured to metric units and tolerances. United States customary units are provided for reference only. In cases where exact dimensions and tolerances are required, always refer to metric units.

## 2. ABOUT THE PRODUCT

### 2.1. Precautions for using R410A refrigerant

#### ⚠ WARNING

The basic installation work procedures are the same as conventional refrigerant models.

However, pay careful attention to the following points:

Since the working pressure is 1.6 times higher than that of conventional refrigerant (R22) models, some of the piping and installation and service tools are special. (See the table below.)

Especially, when replacing a conventional refrigerant (R22) 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 conventional refrigerant (R22) and for safety. Therefore, check beforehand. [The charging port thread diameter for R410A is 1/2 UNF 20 threads per inch.]

Be careful that foreign matter (oil, water, etc.) does not enter the piping than with refrigerant models. 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.

## 2.2. Special tools for R410A

Tool name	Contents of change
Gauge manifold	Pressure is high 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 the gauge with seals –0.1 to 5.3 MPa (30 in. Hg to 769 psi) for high pressure. –0.1 to 3.8 MPa (30 in. Hg to 551 psi) for low pressure.
Charge 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.

### Copper pipes

It is necessary to use seamless copper pipes and it is desirable that the amount of residual oil is less than 40 mg/10 m (0.004oz/100ft). Do not use copper pipes having a collapsed, deformed or discolored portion (especially on the interior surface). Otherwise, the expansion valve or capillary tube may become blocked with contaminants.

As an air conditioner using R410A incurs pressure higher than when using conventional refrigerant, it is necessary to choose adequate materials.

Thicknesses of copper pipes used with R410A are as shown in the table. Never use copper pipes thinner than that in the table even when it is available on the market.

### Thicknesses of Annealed Copper Pipes (R410A)





Pipe outside diameter [mm (in.)]	Thickness [mm (in.)]
6.35 (1/4)	0.80 (1/32)
9.52 (3/8)	0.80 (1/32)
12.70 (1/2)	0.80 (1/32)
15.88 (5/8)	1.00 (5/128)
19.05 (3/4)	1.20 (3/64)

## 2.3. Accessories

#### ⚠ WARNING

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 falling, water leakage, electric shock, or fire.

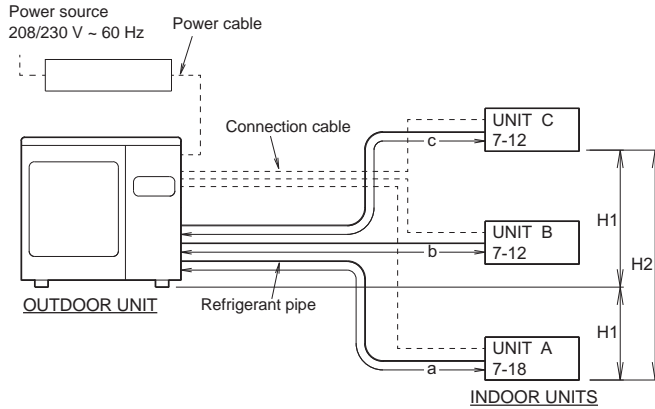
Do not throw away the connecting parts until the installation has been complete.

Name and shape	Q'ty	Application
Installation manual 	1	(This book)
Drain cap 	5	For outdoor unit drain piping work
Drain pipe 	1	
Adapter assy 12.7 mm → 9.52 mm (1/2 in.) (3/8 in.) 	1	For use when connecting models 7–12 to outdoor port A [24 type only]

## 2. 4. System configuration

Layout example for the indoor units and outdoor unit

### OUTDOOR UNIT : 24 type



#### 2. 4. 1. Connectable indoor unit capacity type

##### CAUTION

The total capacity of the indoor units connected must be between 14,000 and 27,000 BTU. Connection patterns are restricted. Normal operation is not guaranteed if connected pattern in the combination not listed below. The product may be damaged. Surely connect in accordance with the combination in the following connection pattern.

- To install an indoor unit, refer to the installation instruction sheet included with the indoor unit.

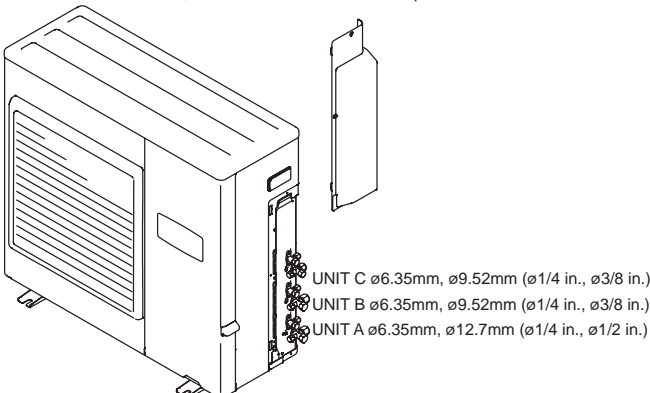
#### Indoor unit connection pattern

24 type

	Indoor unit		
	1	2	3
1	7,000	7,000	—
2	9,000	7,000	—
3	12,000	7,000	—
4	18,000	7,000	—
5	9,000	9,000	—
6	12,000	9,000	—
7	18,000	9,000	—
8	12,000	12,000	—
9	7,000	7,000	7,000
10	9,000	7,000	7,000
11	12,000	7,000	7,000
12	9,000	9,000	7,000
13	9,000	9,000	9,000

Outdoor port		Connectable model name
Standard port size [mm (in.)]		
C	6.35 (1/4) / 9.52 (3/8)	7 – 12
B	6.35 (1/4) / 9.52 (3/8)	7 – 12
A	6.35 (1/4) / 12.7 (1/2)	7 – 12*1)/18

\*1) When connecting models 7–12 to the outdoor unit, the included adapter is necessary. For more information, refer to “4.1.3. How to use adapter”.



#### 2. 4. 2. Limitation of refrigerant piping length

##### CAUTION

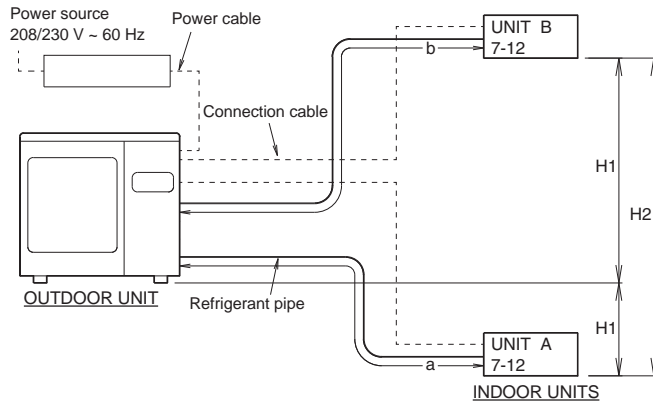
The total maximum pipe lengths and height difference of this product are shown in the table. If the units are further apart than this, correct operation cannot be guaranteed.

24 type

Total max. length (a+b+c)	50 m (164 ft)*1
Max. length for each indoor unit (a, b or c)	25 m (82 ft)
Max. height difference between outdoor unit and each indoor unit (H1)	15 m (49 ft)
Max. height difference between indoor units (H2)	10 m (33 ft)
Min. length for each indoor unit (a, b or c)	5 m (16 ft)
Total min. length (a+b+c)	15 m (49 ft)

\*1 If the total piping is longer than 30 m (98 ft), additional refrigerant charging is necessary. (For more information, refer to “6.2 Additional charging”.)

## OUTDOOR UNIT : 18 type



### 2. 4. 3. Connectable indoor unit capacity type

#### CAUTION

The total capacity of the indoor units connected must be between 14,000 and 21,000 BTU. Connection patterns are restricted. Normal operation is not guaranteed if connected pattern in the combination not listed below. The product may be damaged. Surely connect in accordance with the combination in the following connection pattern.

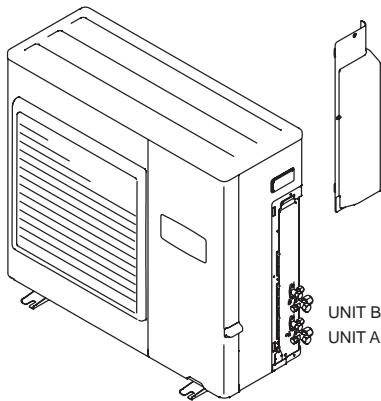
- To install an indoor unit, refer to the installation instruction sheet included with the indoor unit.

### Indoor unit connection pattern

18 type

	Indoor unit	
	1	2
1	7,000	7,000
2	9,000	7,000
3	12,000	7,000
4	9,000	9,000
5	12,000	9,000

Outdoor port		Connectable model name
Standard port size [mm (in.)]		
B	6.35 (1/4) / 9.52 (3/8)	7 – 12
A	6.35 (1/4) / 9.52 (3/8)	7 – 12



UNIT B ø6.35mm, ø9.52mm (ø1/4 in., ø3/8 in.)  
UNIT A ø6.35mm, ø9.52mm (ø1/4 in., ø3/8 in.)

### 2. 4. 4. Limitation of refrigerant piping length

#### CAUTION

The total maximum pipe lengths and height difference of this product are shown in the table. If the units are further apart than this, correct operation cannot be guaranteed.

18 type

Total max. length (a+b)	50 m (164 ft)*1
Max. length for each indoor unit (a or b)	25 m (82 ft)
Max. height difference between outdoor unit and each indoor unit (H1)	15 m (49 ft)
Max. height difference between indoor units (H2)	10 m (33 ft)
Min. length for each indoor unit (a or b)	5 m (16 ft)
Total min. length (a+b)	15 m (49 ft)

\*1 If the total piping is longer than 30 m (98 ft), additional refrigerant charging is necessary. (For more information, refer to "6.2 Additional charging".)

### 2. 4. 5. Selecting pipe sizes

The diameters of the connection pipes differ according to the capacity of the indoor unit. Refer to the following table for the proper diameters of the connection pipes between the indoor and outdoor units.

Capacity of indoor unit	Gas pipe size (thickness) [mm (in.)]	Liquid pipe size (thickness) [mm (in.)]
7 - 12	ø9.52 (0.8) (3/8 (1/32))	ø6.35 (0.8) (1/4 (1/32))
18	ø12.7 (0.8) (1/2 (1/32))	ø6.35 (0.8) (1/4 (1/32))

#### CAUTION

Operation cannot be guaranteed if the correct combination of pipes, valves, etc., is not used to connect the indoor and outdoor units.

### 2. 4. 6. Heat insulation around connection pipes requirements

#### CAUTION

Install heat insulation around both the gas and liquid pipes. Failure to do so may cause water leaks.

Use heat insulation with heat resistance above 248 °F. (Reverse cycle model only)  
In addition, if the humidity level at the installation location of the refrigerant piping is expected to exceed 70%, install heat insulation around the refrigerant piping. If the expected humidity level is 70-80%, use heat insulation that is 19/32 in. or thicker and if the expected humidity exceeds 80%, use heat insulation that is 25/32 in. or thicker. If heat insulation is used that is not as thick as specified, condensation may form on the surface of the insulation. In addition, use heat insulation with heat conductivity of 0.045 W/(m·K) or less (at 68 °F).

Connect the connection pipes according to "4.1. Flare connection" in this installation manual.

### 2. 4. 7. Operating range

	Temperature	Indoor air intake	Outdoor air intake
Cooling	Maximum	90 °F DB	115 °F DB
	Minimum	65 °F DB	14 °F DB
Heating	Maximum	88 °F DB or less	75 °F DB
	Minimum	60 °F DB or less	5 °F DB

Indoor humidity about 80% or less

### 3. INSTALLATION WORK

Please obtain the approval of the customer when selecting the location of installation and installing the unit.

#### 3. 1. Selecting an installation location

##### ⚠ WARNING

Securely install the outdoor unit at a location that can withstand the weight of the unit. Otherwise, the outdoor unit may fall and cause injury.

Be sure to install the outdoor 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.

Do not install the outdoor unit near the edge of a balcony. Otherwise, children may climb onto the outdoor unit and fall off of the balcony.

##### ⚠ CAUTION

Do not install the outdoor unit in the following areas:

- Area with high salt content, such as at the seaside. It will deteriorate metal parts, causing the parts to fail 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 fail 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.
- Area that has heat sources, vapors, or the risk of the leakage of flammable gas in the vicinity.
- Area where small animals may live. It may cause failure, smoke or fire if small animals enter and touch internal electrical parts.
- Area where animals may urinate on the unit or ammonia may be generated.

Please install the outdoor unit without slant.

Install the outdoor unit in a well-ventilated location away from rain or direct sunlight.

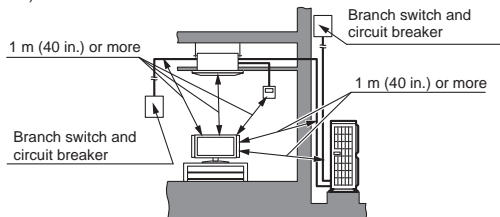
If the outdoor unit must be installed in an area within easy reach of the general public, install as necessary a protective fence or the like to prevent their access.

Install the outdoor unit in a location 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 outdoor 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 outdoor unit in a location that is away from exhaust or the vent ports that discharge vapor, soot, dust, or debris.

Install the indoor unit, outdoor unit, power supply cable, connection cable, and remote control cable at least 1 m (40 in.) away from a television or radio receivers. The purpose of this is to prevent TV reception interference or radio noise. (Even if they are installed more than 1 m (40 in.) apart, you could still receive noise under some signal conditions.)



If children under 10 years old may approach the unit, take preventive measures so that they cannot reach the unit.

Keep the length of the piping of the indoor and outdoor units within the allowable range.

For maintenance purposes, do not bury the piping.

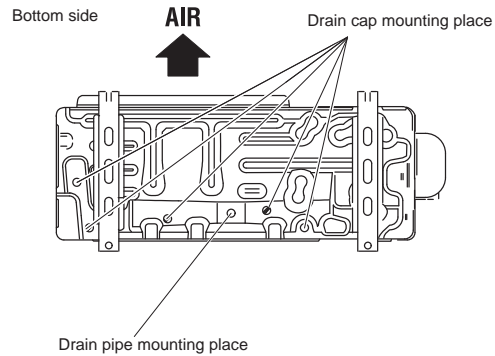
#### 3. 2. Drain installation

##### ⚠ CAUTION

Perform drain work in accordance with this Manual, and ensure that the drain water is properly drained. If the drain work is not carried out correctly, water may drip down from the unit, wetting the furniture.

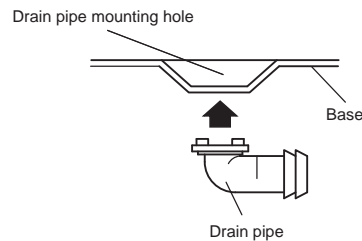
When the outdoor temperature is 32 °F or less, do not use the accessory drain pipe and drain cap. If the drain pipe and drain cap are used, the drain water in the pipe may freeze in extremely cold weather. (Reverse cycle model only)

Outdoor unit to be fasten with bolts at the four places indicated by the arrows without fail.



Since the drain water flows out of the outdoor unit during heating operation, install the drain pipe and connect it to a commercial 16 mm (5/8 in.) hose. (Reverse cycle model only)

When installing the drain pipe, plug all the holes other than the drain pipe mounting hole in the bottom of the outdoor unit with putty so there is no water leakage. (Reverse cycle model only)



#### 3. 3. Installation dimensions

##### ⚠ CAUTION

Install the unit where it will not be tilted by more than 3°. However, do not install the unit with it tilted towards the side containing the compressor.

When installing the outdoor unit where it may be exposed to strong wind, fasten it securely.

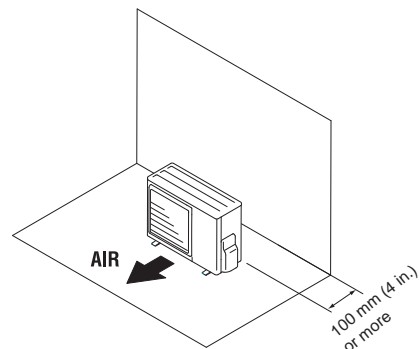
Decide the mounting position with the customer as follows:

- (1) Install the outdoor unit in a location which can withstand the weight of the unit and vibration, and which can install horizontally.
- (2) Provide the indicated space to ensure good airflow.
- (3) If possible, do not install the unit where it will be exposed to direct sunlight. (If necessary, install a blind that does not interfere with the airflow.)
- (4) Do not install the unit near a source of heat, steam, or flammable gas.
- (5) During heating operation, drain water flows from the outdoor unit. Therefore, install the outdoor unit in a place where the drain water flow will not be obstructed. (Reverse cycle model only)
- (6) Do not install the unit where strong wind blows or where it is very dusty.
- (7) Do not install the unit where people pass.
- (8) Install the outdoor unit in a place where it will be free from being dirty or getting wet by rain as much as possible.
- (9) Install the unit where connection to the indoor unit is easy.

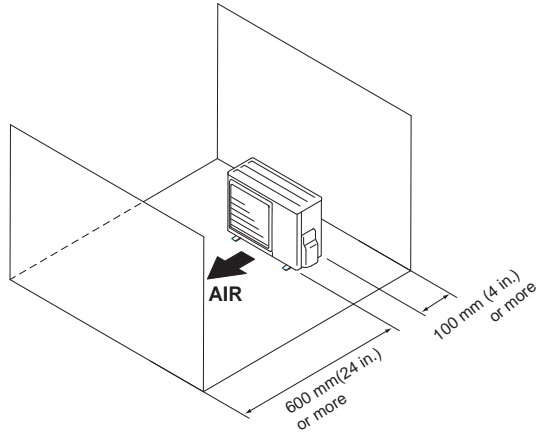
##### 3. 3. 1. Single outdoor unit installation

When the upward area is open

- When there are obstacles at the back side.

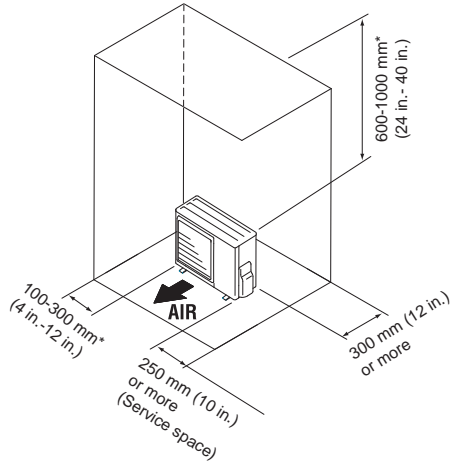


- When there are obstacles at the back and front sides.



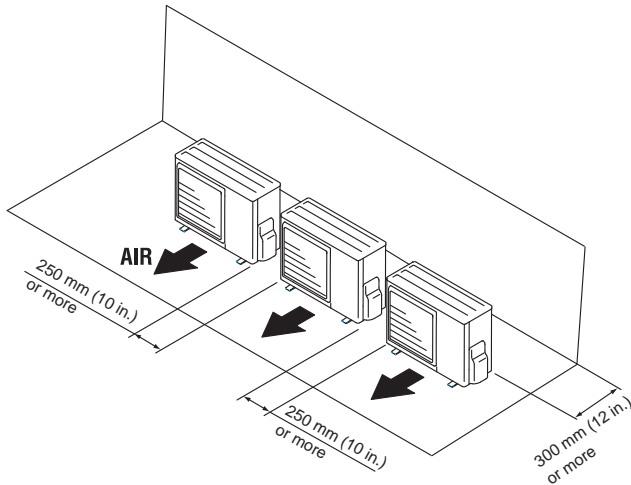
When an obstruction is present also in the upward area

- When there are obstacles at the back, side(s), and top.



\* If the space is larger than that is stated, the condition will be the same as that there are no obstacles.

- When there are obstacles at the back side with the installation of more than one unit.



- No more than 3 units must be installed side by side.  
When 3 units or more are arranged in a line, provide the space as shown in the following example when an obstruction is present also in the upward area.

### 3. 4. Transportation of the unit

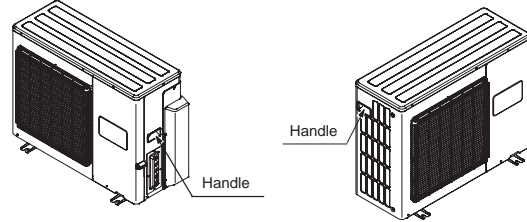
#### ⚠ WARNING

Do not touch the fins. Otherwise, personal injury could result.

#### ⚠ CAUTION

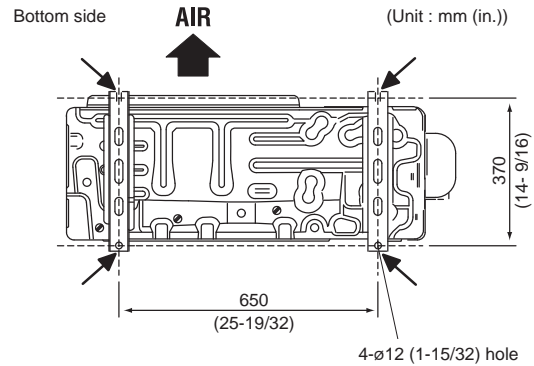
When carrying the unit, hold the handles on the right and left sides and be careful. If the outdoor unit is carried from the bottom, hands or fingers may be pinched.

- Be sure to hold the handles on the sides of the unit. Otherwise, holding the suction grille on the sides of the unit may cause deformation.

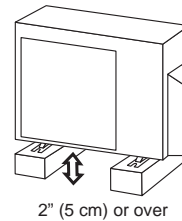
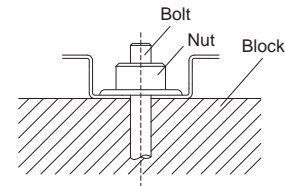


### 3. 5. Installation of the unit

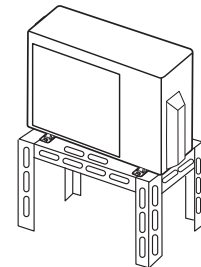
- Install 4 anchor bolts at the locations indicated with arrows in the figure.
- To reduce vibration, do not install the unit directly on the ground. Install it on a secure base (such as concrete blocks).
- The foundation shall support the legs of the unit and have a width of 50mm (2 in.) or more.
- Depending on the installation conditions, the outdoor unit may spread its vibration during operation, which may cause noise and vibration. Therefore, attach damping materials (such as damping pads) to the outdoor unit during installation.
- Install the foundation, making sure that there is enough space for installing the connection pipes.
- Secure the unit to a solid block using foundation bolts. (Use 4 sets of commercially available M10 bolts, nuts, and washers.)
- The bolts should protrude 20 mm (0.78 in.). (Refer to the figure.)
- If overturning prevention is required, purchase the necessary commercially available items.



Fix securely with bolts on a solid block. (Use 4 sets of commercially available M10 bolt, nut and washer.)



- Do not install directly on the ground, this may result in equipment failure.



#### ⚠ CAUTION

In areas with heavy snowfall, where intake and outlet of the outdoor unit can become blocked by snow. It is recommended that unit be installed under a canopy or elevated on a high stand. Failure to do so will result in poor heating performance and/or premature failure of equipment.

## 4. PIPE INSTALLATION - 1

### 4. 1. Flare connection (pipe connection)

#### ⚠ CAUTION

Do not use mineral oil on a flared part. Prevent mineral oil from getting into the system as this would reduce the lifetime of the units.

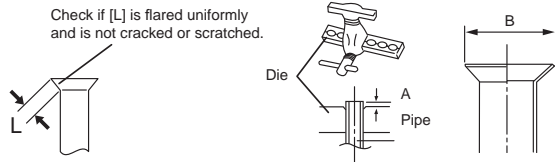
While welding the pipes, be sure to blow dry nitrogen gas through them.

The maximum lengths of this product are shown in the table. If the units are further apart than this, correct operation cannot be guaranteed.

#### Flaring

- Use special pipe cutter and flare tool exclusive for R410A.

- Cut the connection pipe to the necessary length with a pipe cutter.
- Hold the pipe downward so that the cuttings will not enter the pipe and remove any burrs.
- Insert the flare nut (always use the flare nut attached to the indoor and outdoor units respectively) onto the pipe and perform the flare processing with a flare tool. Leakage of refrigerant may result if other flare nuts are used.
- Protect the pipes by pinching them or with tape to prevent dust, dirt, or water from entering the pipes.



Pipe outside diameter [mm (in.)]	Dimension A [mm (in.)]	Dimension B <sup>0.4</sup> [mm (in.)]
	Flare tool for R410A, clutch type	
6.35 (1/4)	0 to 0.5 (0 to 1/32)	9.1 (3/8)
9.52 (3/8)		13.2 (17/32)
12.70 (1/2)		16.6 (21/32)
15.88 (5/8)		19.7 (25/32)
19.05 (3/4)		24.0 (15/16)

- When using conventional flare tools to flare R410A pipes, the dimension A should be approximately 1/32 in. more than indicated in the table (for flaring with R410A flare tools) to achieve the specified flaring. Use a thickness gauge to measure the dimension A.

Width across flats



Pipe outside diameter [mm (in.)]	Width across flats of Flare nut [mm (in.)]
6.35 (1/4)	17 (11/16)
9.52 (3/8)	22 (7/8)
12.70 (1/2)	26 (1-1/32)
15.88 (5/8)	29 (1-5/32)
19.05 (3/4)	36 (1-13/32)

#### 4. 1. 1. Bending pipes

#### ⚠ CAUTION

To prevent breaking of the pipe, avoid sharp bends. Bend the pipe with a radius of curvature of 100mm (4 in.) or more.

If the pipe is bent repeatedly at the same place, it will break.

- If pipes are shaped by hand, be careful not to collapse them.
- Do not bend the pipes at an angle of more than 90°.
- When pipes are repeatedly bent or stretched, the material will harden, making it difficult to bend or stretch them any more.
- Do not bend or stretch the pipes more than 3 times.

#### 4. 1. 2. Pipe connection

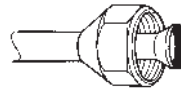
#### ⚠ CAUTION

Be sure to install the pipe against the port on the indoor unit and the outdoor unit correctly. If the centering is improper, the flare nut cannot be tightened smoothly. If the flare nut is forced to turn, the threads will be damaged.

Do not remove the flare nut from the outdoor unit pipe until immediately before connecting the connection pipe.

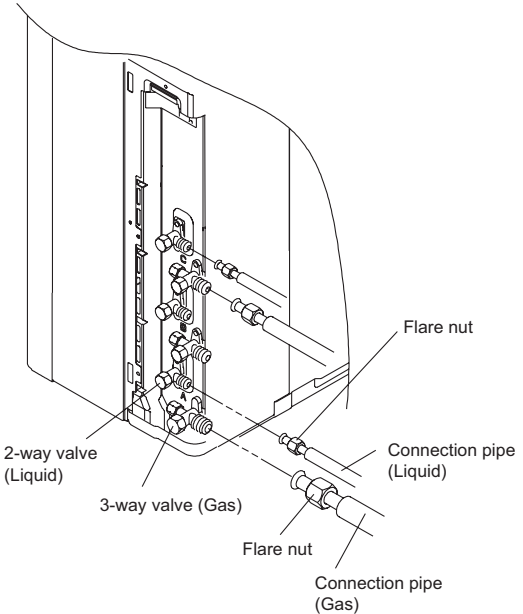
After installing the piping, make sure that the connection pipes do not touch the compressor or outer panel. If the pipes touch the compressor or outer panel, they will vibrate and produce noise.

- Detach the caps and plugs from the pipes.
- Center the pipe against the port on the outdoor unit, and then turn the flare nut by hand.

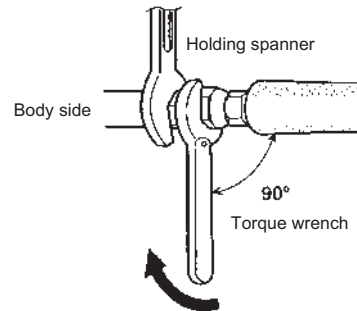


To prevent gas leakage, coat the flare surface with alkylbenzene oil (HAB). Do not use mineral oil.

- Attach the connection pipe.



- When the flare nut is tightened properly by your hand, use a torque wrench to finally tighten it.



#### ⚠ CAUTION

Hold the torque wrench at its grip, keeping it in a right angle with the pipe, in order to tighten the flare nut correctly.

- Outer panel may be distorted if fastened only with a wrench. Be sure to fix the elementary part with a holding wrench (spanner) and fasten with a torque wrench (refer to below diagram). Do not apply force to the blank cap of the valve or hang a wrench, etc., on the cap. If blank cap is broken, it may cause leakage of refrigerant.

Flare nut [mm (in.)]	Tightening torque [N-m (lbf-ft)]
6.35 (1/4) dia.	16 to 18 (11.8 to 13.3)
9.52 (3/8) dia.	32 to 42 (23.6 to 31.0)
12.70 (1/2) dia.	49 to 61 (36.1 to 45.0)
15.88 (5/8) dia.	63 to 75 (46.5 to 55.3)
19.05 (3/4) dia.	90 to 110 (66.4 to 81.1)

#### 4. 1. 3. How to use adapter (connection ports of outdoor unit)

- When using the ADAPTER, be careful not to overtighten the nut, or the smaller pipe may be damaged.
- Apply a coat of refrigeration oil to the threaded connection port of the outdoor unit where the flare nut comes in.
- Use appropriate wrenches to avoid damaging the connection thread by overtightening the flare nut.
- Apply wrenches on both of flare nut (local part), and ADAPTER to tighten them.

#### Adapter tightening torque

Adapter type [mm (in.)]	Tightening torque [N-m (lbf-ft)]
ø12.7 (1/2) → ø9.52 (3/8)	49 to 61 (36.1 to 45.0)

## 5. ELECTRICAL WIRING

### 5.1. The precautions of electrical wiring

#### ⚠ WARNING

Wiring connections must be performed by a qualified person in accordance with specifications.  
The rated supply of this product is 60Hz, 208/230V. Use a voltage within the range of 187-253V.

Before connecting the wires, make sure the power supply is OFF.

When installing this system in high humidity locations, install using ground fault equipment breakers (often referred to in other countries as an ELCB earth leakage current breaker) to reduce the risk of leaking current which may result in electric shock or potential fire.

Be sure to install a breaker of the specified capacity.  
When selecting breaker, please comply with the laws and the regulations of each country.  
One breaker must be installed on the power supply of the outdoor unit.  
Wrong selection and setup of the breaker will cause electric shock or fire.

Do not connect AC power supply to the transmission line terminal board.  
Improper wiring can damage the entire system.

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.

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.

We suggest installing GFEB breakers or follow local electrical code.  
This system uses an inverter, which means that when used with a ground fault breaker you must use breakers that can handle harmonics such as a (GFEB) Ground Fault Equipment Breaker (30 mA or greater) in order to prevent malfunctioning of ground fault device.

When the electrical switchboard is installed outdoors, place it under lock and key so that it is not easily accessible.

Do not fasten the power supply cable and connection cable together.

Always keep to the maximum length of the connection cable. Exceeding the maximum length may lead to erroneous operation.

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).  
Touch the metal section (such as the unpainted control box section) of the indoor or outdoor unit for more than 10 seconds. Discharge the static electricity in your body.  
Never touch the component terminal or pattern on the PC Board.

### 5.2. Electrical requirement

#### ⚠ CAUTION

Be sure to install a breaker of the specified capacity.

Regulation of cables and breaker differs from each locality, refer in accordance with local rules.

<b>Voltage rating</b>	1Φ 208/230V (60Hz)
<b>Operating range</b>	187-264V

Cable	Cable size *1)	Remarks
Power supply cable	18 type: 14AWG 24 type: 12AWG	2 cable + Ground, 1 Ø 208/230V
Connection cable	14AWG	3 cable + Ground, 1 Ø 208/230V

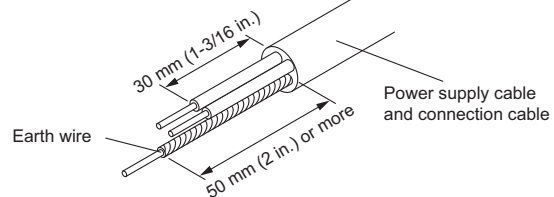
- 1) Selected sample: Select the correct cable type and size according to the country or region's regulations.  
Max. wire length: Set a length so that the voltage drop is less than 2%. Increase the wire diameter when the wire length is long.

Breaker	Specification *2)
Circuit breaker	18 type: 15(A) 24 type: 20(A)
Earth leakage breaker	Leakage current : 30mA 0.1sec or less *3)

- 2) Select the appropriate breaker of the described specification according to the national or regional standards.
- 3) Select the breaker that enough load current can pass through it.

### 5.3. Unit wiring

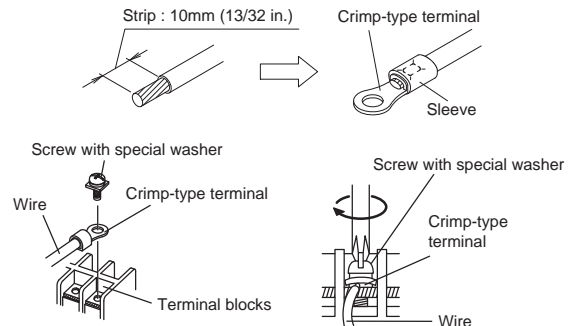
- When stripping off the coating of a lead wire, always use a special tool such as a wire stripper. If there is no special tool available, carefully strip the coating with a knife etc.



#### How to connect wiring to the terminal

##### Caution when wiring cable

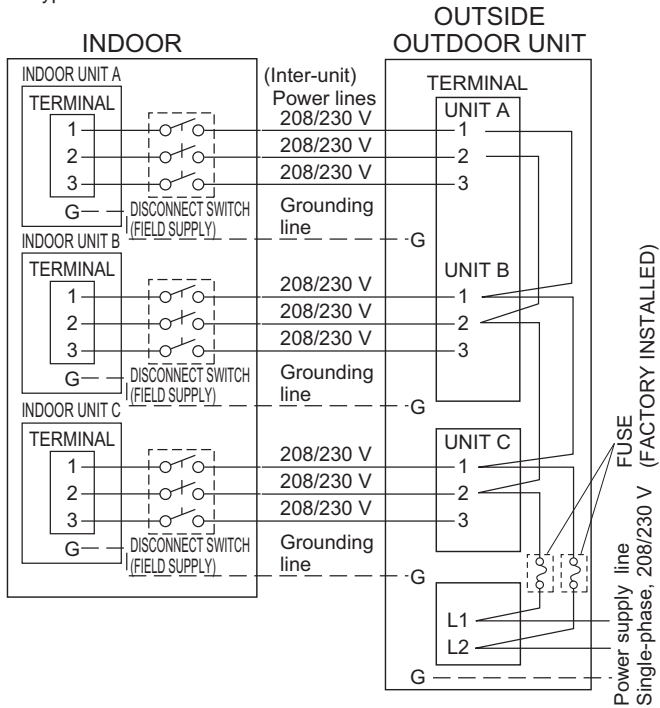
- (1) Use crimp-type terminals with insulating sleeves as shown in the figure to connect to the terminal block.
- (2) Securely clamp the crimp-type terminals to the wires using an appropriate tool so that the wires do not come loose.
- (3) Use the specified wires, connect them securely, and fasten them so that there is no stress placed on the terminals.
- (4) Use an appropriate screwdriver to tighten the terminal screws. Do not use a screwdriver that is too small, otherwise, the screw heads may be damaged and prevent the screws from being properly tightened.
- (5) Do not tighten the terminal screws too much, otherwise, the screws may break.
- (6) See the table below for the terminal screw tightening torques.



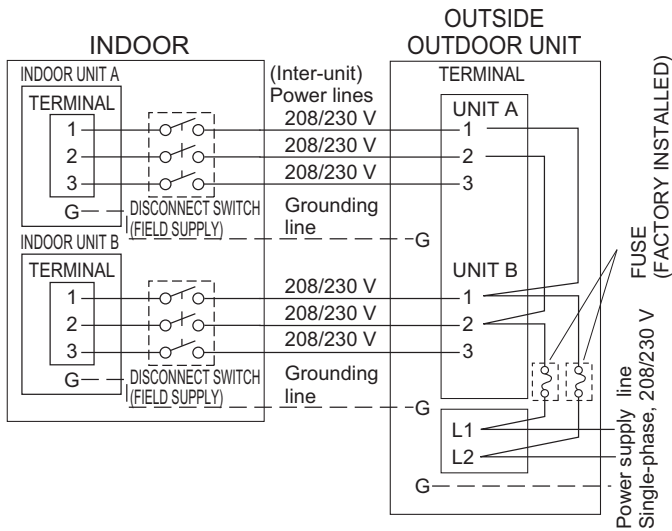
Tightening torque [N·m (lbf·in.)]	
M4 screw	1.2 to 1.8 (10.6 to 15.9)

## 5. 4. Connection diagrams

24 type



18 type



### ⚠ WARNING

Disconnect switch and for over current protection given in the table below is to be installed between the indoor unit and the outdoor unit.

#### Disconnect switch

15A

### ⚠ CAUTION

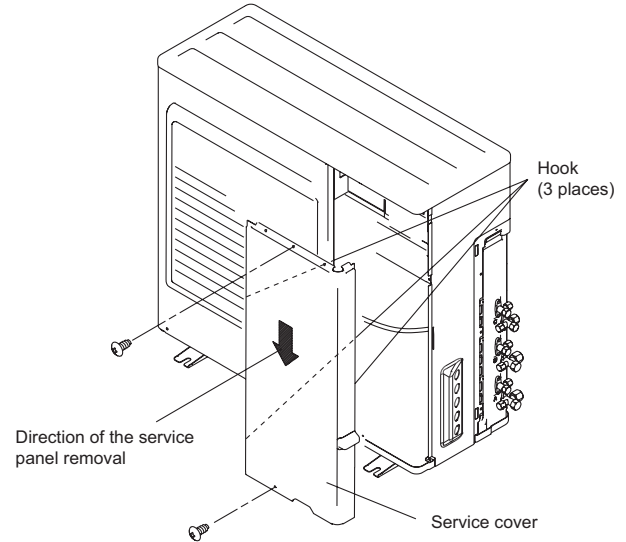
Be sure to refer the above diagram and do correct field wiring. Wrong wiring causes malfunction of the unit.

Check local electrical codes and also any specific wiring instructions or limitation.

## 5. 5. Outdoor unit

(1) Service cover removal

- Remove the two mounting screws.
- Remove the service cover by pushing downwards.

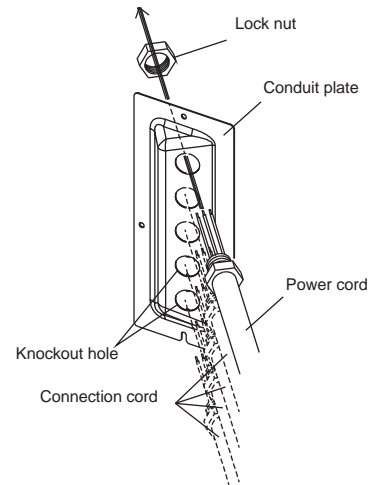


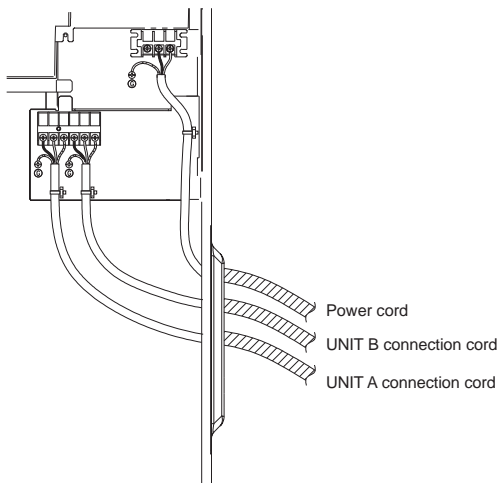
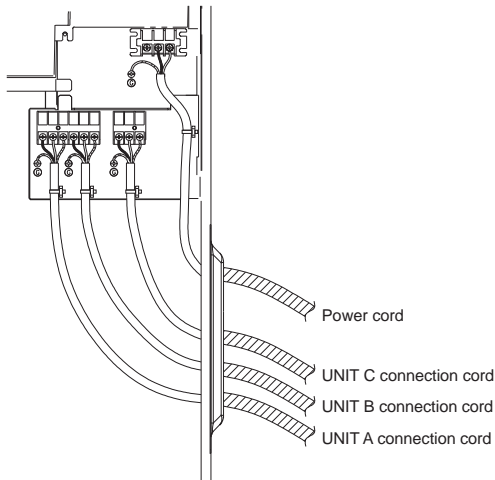
(2) Fasten the power supply cord and the connection cord to the conduit holder using the lock nut.

(Open the knock out holes with the tool so as not to transform conduit plate if necessary.)

(3) Connect the power supply cord and the connection cord to terminal.

(4) Fasten the power supply cord and connection cord with cord clamp.

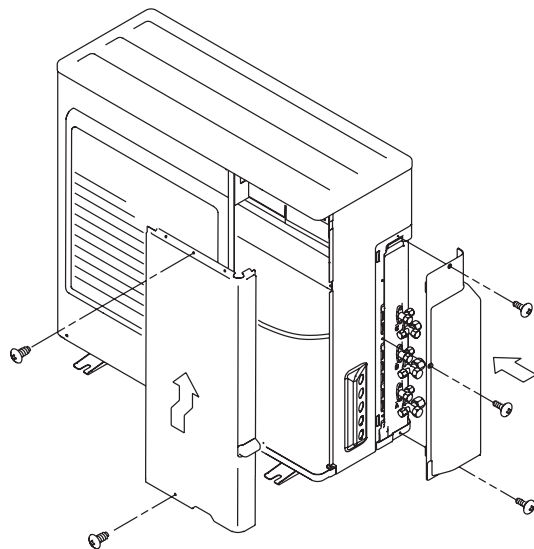




(5) Be sure to seal the holes when applying the putty.

Place the cords side by side. (Do not overlap the cords.)

(6) Put the service cover and valve cover back after completion of the work.



## 6. PIPE INSTALLATION - 2

### 6. 1. Vacuum

#### CAUTION

Always use a vacuum pump to purge the air.

Refrigerant for purging the air is not charged in the outdoor unit at the factory.

Refrigerant must not be discharged into atmosphere.

Use a vacuum pump, gauge manifold and charge hose for R410A exclusively. Using the same vacuum for different refrigerants may damage the vacuum pump or the unit.

After connecting the piping, check the joints for gas leakage with gas leak detector or soapy water.

#### 6. 1. 1. Checking gas leakage and purging air

Gas leak checks are performed using either vacuum or nitrogen gas, so select the proper one depending on the situation.

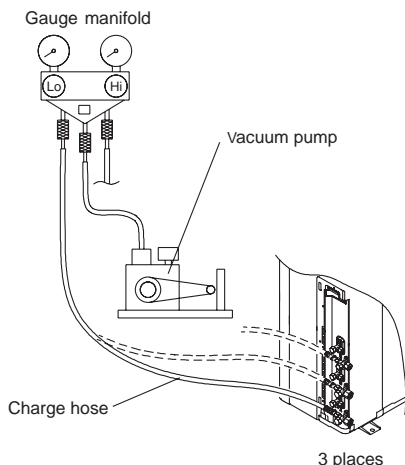
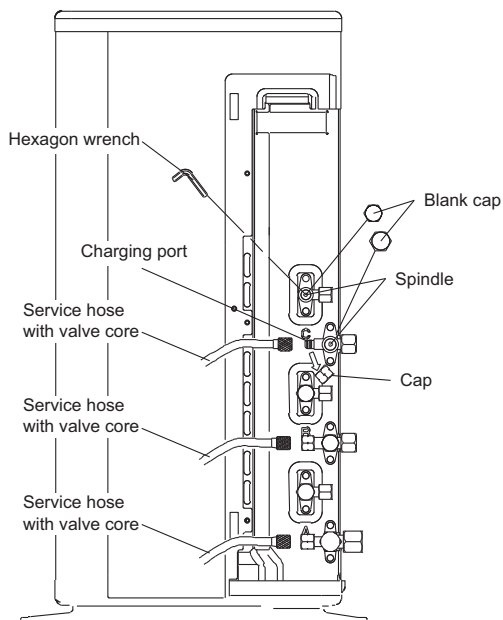
Checking gas leaks with vacuum:

- (1) Check if the piping connections are secure.
- (2) Remove the cap of 3-way valve, and connect the gauge manifold charge hoses to the charging port of the 3-way valve.
- (3) Open the valve of the gauge manifold fully.
- (4) Operate the vacuum pump and start pump down.
- (5) Check that the compound pressure gauge reads  $-0.1$  MPa (500 microns), operate the vacuum pump for 30 minutes or more in each valve.
- (6) At the end of pump down, close the valve of the gauge manifold fully and stop the vacuum pump.  
(It checks that leave as it is for about 10 minutes, and a needle does not return.)
- (7) Disconnect the charge hose from the 3-way valve charging port.
- (8) Remove the blank caps, and fully open the spindles of the 2-way and 3-way valves with a hexagon wrench.  
[torque: 6 to 7 N·m (4.4 to 5.2 lbf·ft)].
- (9) Tighten the blank caps and charging port cap of the 2-way valve and 3-way valve to the specified torque.

Checking gas leaks with nitrogen gas:

- (1) Check if the piping connections are secure.
- (2) Remove the cap of 3-way valve, and connect the gauge manifold charge hoses to the charging port of the 3-way valve.
- (3) Pressurize with nitrogen gas using the 3-way valve charging port.
- (4) Do not pressurize up to the specified pressure all at once but do so gradually.
  - ① Increase the pressure up to 0.5 MPa (73 psi), let it sit for about 5 minutes and then check for any decrease in pressure.
  - ② Increase the pressure up to 1.5 MPa (218 psi), let it sit for about 5 minutes and then check for any decrease in pressure.
  - ③ Increase the pressure up to the specified pressure (the pressure designed for the product) and then make a note of it.
- (5) Let it sit at the specified pressure and if there is no decrease in pressure then it is satisfactory. If a pressure decrease is confirmed, there is a leak, so it is necessary to specify the leak location and make minor adjustments.
- (6) Discharge the nitrogen gas and starting removing the gas with a vacuum pump.
- (7) Open the valve of the gauge manifold fully.
- (8) Operate the vacuum pump and start pump down.
- (9) Check that the compound pressure gauge reads  $-0.1$  MPa (500 microns), operate the vacuum pump for 30 minutes or more in each valve.
- (10) At the end of pump down, close the valve of the gauge manifold fully and stop the vacuum pump.
- (11) Disconnect the charge hose from the 3-way valve charging port.
- (12) Remove the blank caps, and fully open the spindles of the 2-way and 3-way valves with a hexagon wrench.  
[torque: 6 to 7 N·m (4.4 to 5.2 lbf·ft)].
- (13) Tighten the blank caps and charging port cap of the 2-way valve and 3-way valve to the specified torque.

Flare nut [mm (in.)]		Tightening torque [N·m (lbf·ft)]
Blank cap	6.35 (1/4)	20 to 25 (14.8 to 18.4)
	9.52 (3/8)	20 to 25 (14.8 to 18.4)
	12.70 (1/2)	25 to 30 (18.4 to 22.1)
	15.88 (5/8)	30 to 35 (22.1 to 25.8)
	19.05 (3/4)	35 to 40 (25.8 to 29.5)
Charging port cap		10 to 12 (7.4 to 8.8)



#### ⚠ CAUTION

Do not purge the air with refrigerants, but use a vacuum pump to vacuum the installation! There is no extra refrigerant in the outdoor unit for air purging!

Use a vacuum pump and gauge manifold and charging hose for R410A exclusively. Using the same vacuum for different refrigerants may damage the vacuum pump or the unit.

## 6. 2. Additional charging

Refrigerant suitable for a total piping length of 98 ft is charged in the outdoor unit at the factory.

When the piping is longer than 98 ft, additional charging is necessary.

For the additional amount, see the table below.

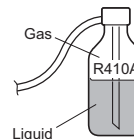
Total piping length	30m (98 ft)	40m (131 ft)	50m (164 ft)	
Additional refrigerant	None	200g (7.1 oz)	400g (14.1 oz)	20g/m (0.21 oz/ft)

#### ⚠ CAUTION

When moving and installing the air conditioner, do not mix gas other than the specified refrigerant (R410A) inside the refrigerant cycle.

When charging the refrigerant R410A, always use an electronic balance for refrigerant charging (to measure the refrigerant by weight).

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.



Add refrigerant from the charging valve after the completion of the work.

If the units are further apart than the maximum pipe length, correct operation cannot be guaranteed.

## 7. POWER

#### ⚠ WARNING

The rated voltage of this product is 208/230 V A.C. 60 Hz.

Before turning on verify that the voltage is within the 187 V to 253 V range.

Always use a special branch circuit and install a special receptacle to supply power to the air conditioner.

Use a special branch circuit breaker and receptacle matched to the capacity of the air conditioner. (Install in accordance with standard.)

Perform wiring work in accordance with standards so that the air conditioner can be operated safely and positively.

Install a leakage special branch circuit breaker in accordance with the related laws and regulations and electric company standards.

#### ⚠ CAUTION

The power source capacity must be the sum of the air conditioner current and the current of other electrical appliances. When the current contracted capacity is insufficient, change the contracted capacity.

When the voltage is low and the air conditioner is difficult to start, contact the power company the voltage raised.

## 8. TEST RUN

The test run method may be different for each indoor unit that is connected. Refer to the installation instruction sheet included with each indoor unit.

### CAUTION

Always turn on the power 12 hours prior to the start of the operation in order to ensure compressor protection.

### 8. 1. Make a test run in accordance with the installation Manual for the indoor unit

#### (1) Indoor unit

- ① Is operation of each button on the remote control unit normal?
- ② Does each lamp light normally?
- ③ Do the airflow direction louver operate normally?
- ④ Is the drain normal?
- ⑤ Is there any abnormal noise and vibration during operation?

#### (2) Outdoor unit

- ① Is there any abnormal noise and vibration during operation?
- ② Will noise, wind, or drain water from the unit disturb the neighbors?
- ③ Is there any gas leakage?
- Do not operate the air conditioner in the test running state for a long time.
- For the operation method, refer to the operating manual and perform operation check.

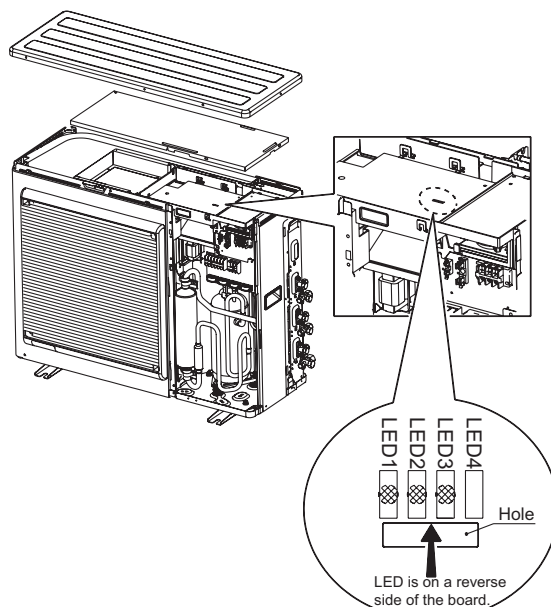
### 8. 2. Outdoor unit LED

When a malfunction occurs in the outdoor unit, the LED on the circuit board lights to indicate the error. Refer to the following table for the description of each error according to the LED.

Error contents	LED1	LED2	LED3
Serial Communication error (Outdoor unit to Indoor unit A)	● 1 time	—	—
Serial Communication error (Outdoor unit to Indoor unit B)	—	● 1 time	—
Serial Communication error (Outdoor unit to Indoor unit C) <sup>*1</sup>	—	—	● 1 time
Discharge temp. sensor error	● 2 times	—	—
Outdoor unit Heat Ex. middle temp. sensor error	● 3 times	—	—
Outdoor temp. sensor error	● 4 times	—	—
2-way valve temp. sensor error (for Indoor unit A)	● 5 times	—	—
2-way valve temp. sensor error (for Indoor unit B)	—	● 5 times	—
2-way valve temp. sensor error (for Indoor unit C) <sup>*1</sup>	—	—	● 5 times
3-way valve temp. sensor error (for Indoor unit A)	● 6 times	—	—
3-way valve temp. sensor error (for Indoor unit B)	—	● 6 times	—
3-way valve temp. sensor error (for Indoor unit C) <sup>*1</sup>	—	—	● 6 times
Compressor temp. sensor error	● 7 times	—	—
Heat sink temp. sensor error	● 8 times	—	—
High pressure switch 1 error	● 9 times	—	—
High pressure switch 2 error	● 10 times	—	—
Indoor unit capacity error	● 11 times	—	—
Trip detection	● 12 times	—	—
Compressor rotor position detection error	● 13 times	—	—
Trip terminal L error	● 14 times	—	—
Outdoor unit fan motor error	● 15 times	—	—
Outdoor unit PCB microcomputer communication error	● 17 times	—	—
Discharge temperature error	● 18 times	—	—
Compressor temperature error	● 19 times	—	—
4-way valve error	● 20 times	—	—
Outdoor unit PCB model information error	● 21 times	—	—
Active filter error, PFC circuit error	● 22 times	—	—

● : flashing    — : Off

\*1: 24 type only



### 8. 3. Confirming the operation of indoor unit

Run the unit in a normal way, and confirm its operation. (Please end the test run first before confirmation)

- (1) Cold air (or warm air) must be discharged from the indoor unit.
- (2) The indoor unit operates normally when air direction or air volume adjustment buttons pressed.

## 9. PUMP DOWN

### PUMP DOWN OPERATION

To avoid discharging refrigerant into the atmosphere at the time of relocation or disposal, recover refrigerant by doing the cooling operation or forced cooling operation according to the following procedure. (When the cooling operation cannot start in winter, and so on, start the forced cooling operation.)

- (1) Do the air purging of the charge hose by connecting the charging hose of gauge manifold to the charging port of 3 way valve (At least one unit of connected units) and opening the low pressure valve slightly.
- (2) Close the valve stem of 2 way valve (All connected units) completely.
- (3) Start the cooling operation or following forced cooling operation. (All connected units) When using the remote control unit Press the TEST RUN button after starting the cooling operation by the remote control unit. The operation indicator lamp and timer indicator lamp will begin to flash simultaneously during test run. When using the MANUAL AUTO button of the indoor unit (The remote control unit is lost, and so on.) Keep on pressing the MANUAL AUTO button of the indoor unit for more than 10 seconds. (The forced cooling operation cannot start if the MANUAL AUTO button is not kept on pressing for more than 10 seconds.)
- (4) Close the valve stem of 3 way valve (All connected units) when the reading on the compound pressure gauge becomes 0.05 ~ 0 MPa (7.3 ~ 0 psi).
- (5) Stop the operation. (All connected units) Press the START/STOP button of the remote control unit to stop the operation. Press the MANUAL AUTO button when stopping the operation from indoor unit side. (It is not necessary to press on keeping for more than 10 seconds.)

### CAUTION

During the pump-down operation, make sure that compressor is off before you remove the refrigerant piping. Do not remove the connection pipe while the compressor is in operation with 2 or 3 way valve open. This may cause abnormal pressure in the refrigeration cycle that breakage and injury.

## 10. CUSTOMER GUIDANCE

Explain the following to the customer in accordance with the operating manual:

- (1) Starting and stopping method, operation switching, temperature adjustment, timer, air flow adjustment, and other remote control unit operations.
- (2) Air filter removal and cleaning.
- (3) Give the operating manual and installation instruction sheet to the customer.