

# HEAT PUMP

# INSTALLATION MANUAL

(PART No. 9322330000) 

English

## IMPORTANT!

### Please Read Before Starting

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

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

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

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

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

- Hazel 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 platform 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 refrigerant lubricant to the matching surfaces of the flare and union tubes before connecting them, then tighten the nut with a torque wrench for a leak-free connection.
- Check carefully for leaks before starting the test run.

#### 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.

## STANDARD ACCESSORIES

The following installation accessories are supplied. Use them as required.

Name and Shape	Q'ty	Name and Shape	Q'ty
Installation Manual (This manual)	1	Drain pipe	1

## ELECTRICAL REQUIREMENT

Always make the air conditioner power supply a special branch circuit and provide a special switch and receptacle. Do not extend the power cord. Always select the size that corresponds to the capacity of the breaker to the size of the power cord.

CAUTION		
	9000 BTU/h	12000 BTU/h
MINIMUM CIRCUIT AMPACITY	10 A	12 A
MAXIMUM OVERCURRENT PROTECTION (TIME DELAY FUSE OR HACR TYPE CIRCUIT BREAKER)	15 A	20 A

## This air conditioner uses new refrigerant HFC (R410A).

The basic installation work procedures are the same as conventional refrigerant (R22) models. However, pay careful attention to the following points:

- (1) 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.
- (2) 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 threads per inch.]
- (3) Be more careful that foreign matter (oil, water, etc.) does not enter the piping than with refrigerant (R22) models. Also, when storing the piping, securely seal the opening by pinching, taping, etc.
- (4) 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 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 30 in.Hg to 768 psi (-0.1 to 5.3 MPa) for high pressure. 30 in.Hg to 551 psi (-0.1 to 3.8 MPa) 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 0.004 oz / 100 ft. (40 mg / 10 m). 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 R22, it is necessary to choose adequate materials.

Thicknesses of copper pipes used with R410A are as shown in Table. Never use copper pipes thinner than 0.032 in. (0.8 mm) even when it is available on the market.

### Thicknesses of Annealed Copper Pipes

Nominal diameter (in.)	Outer diameter (mm)	Thickness [in. (mm)]	
		R410A	[ref.] R22
1/4	6.35	0.032 (0.80)	0.032 (0.80)
3/8	9.52	0.032 (0.80)	0.032 (0.80)

### WARNING

#### (1) Do not use the existing (for R22) piping and flare nuts.

- If the existing materials are used, the pressure inside the refrigerant cycle will rise and cause breakage, injury, etc. (Use the special R410A materials.)

#### (2) 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.

### CAUTION

When installing pipes shorter than 10 ft (3 m), sound of the outdoor unit will be transferred to the indoor unit, which will cause large operating sound or some abnormal sound.

## For authorized service personnel only.

### WARNING

#### (1) For the room air conditioner to operate satisfactory, install it as outlined in this installation manual.

#### (2) Connect the indoor unit and outdoor unit with the air conditioner piping and cords available standards parts. This installation manual describes the correct connections using the standard accessories and the parts specified in this installation manual.

#### (3) Have installation work done by authorized service personnel only.

#### (4) Do not use an extension cord.

#### (5) Do not turn on the power until all installation work is complete.

### CAUTION

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.

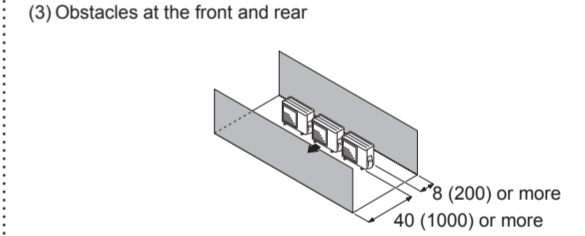
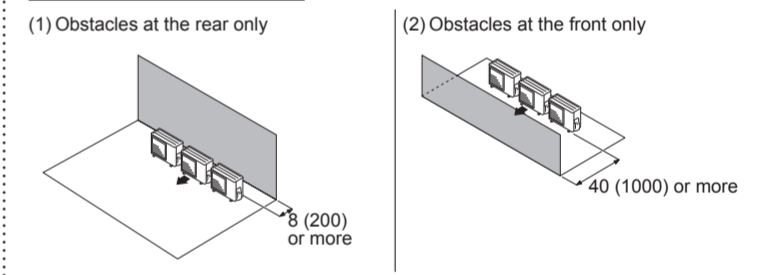
- Be careful not to scratch the air conditioner when handling it.
- After installation, explain correct operation to the customer, using the operating manual.
- Let the customer keep this installation manual because it is used when the air conditioner is serviced or moved.
- The maximum length of the piping is 66 ft (20 m). The maximum height difference of the piping is 49 ft (15 m), if the units are further apart than these, correct operation can not be guaranteed.

## INSTALLATION DIMENSIONS

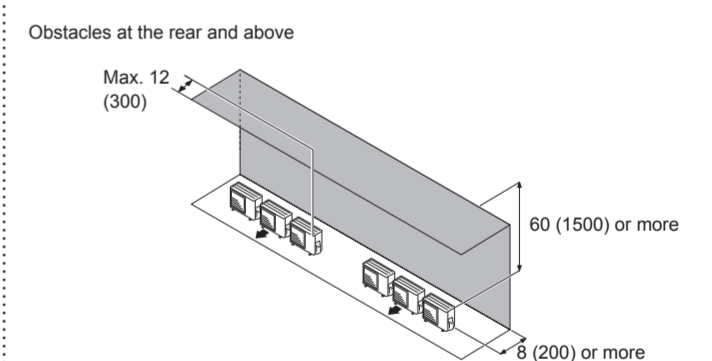
Decide the mounting position with the customer as follows:

- (1) 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 air flow.)
- (2) Do not install the unit where a strong wind blows or where it is very dusty.
- (3) Do not install the unit where people pass.
- (4) Take your neighbors into consideration so that they are not disturbed by air blowing into their windows or by noise.
- (5) Provide the space shown in the figure so that the air flow is not blocked. Also for efficient operation, leave open three of the four directions front, rear, and both sides.

When the upper space is open: [Unit: in. (mm)]

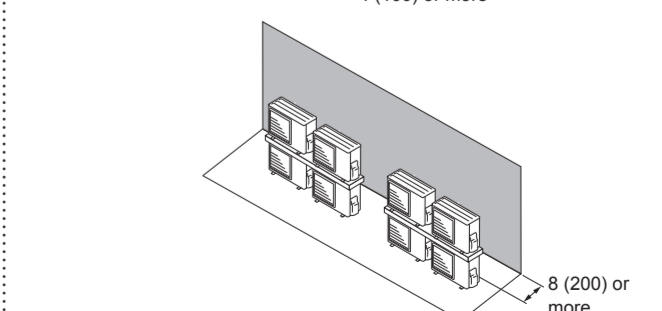
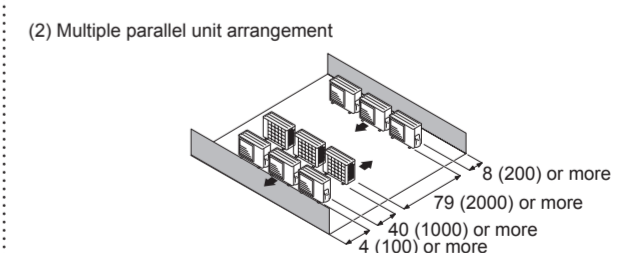
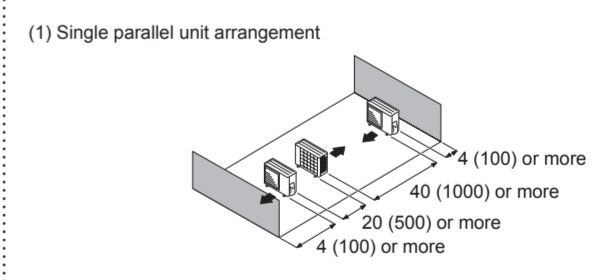


When an obstruction in the upper space: [Unit: in. (mm)]



## OUTDOOR UNITS INSTALLATION MULTI-ROW

[Unit: in. (mm)]



### NOTES:

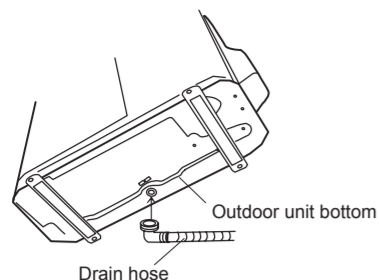
- If the space is larger than stated above, the condition will be the same as when there is no obstacle.
- Height above the floor level should be 2 in. (50 mm) or more.
- When installing the outdoor unit, be sure to open the front and left side to obtain better operation efficiency.

Installation instruction on the back.

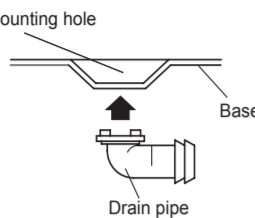


## DRAIN INSTALLATION

- 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") hose. (Reverse cycle model only)

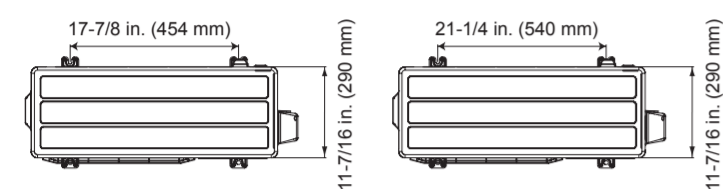


- When installing the drain pipe, plug all the holes other than the drain pipe mounting hole in the bottom of the outdoor unit with putty so there is no water leakage. (Reverse cycle model only)

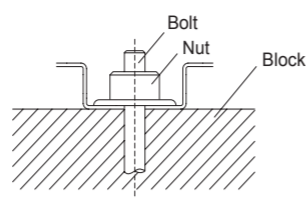


## SECURE THE UNIT

- Outdoor unit to be fasten with bolts at the four places without fail.



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



- Set the unit on a strong stand such as thing made of concrete blocks to minimize shock and vibration.
- Do not directly install it on the ground, otherwise it will cause failure.
- To obtain better operation efficiency, when the outdoor unit is installed, be sure to open the front and left side.

### CAUTION

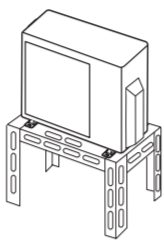
Do not install the outdoor unit in two-stage where the drain water could freeze.

Otherwise the drainage from the upper unit may form ice and cause a malfunction of the lower unit.

When the outdoor temperature is 32 °F (0 °C) 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 climate. (For reverse cycle model only.)

In area with heavy snowfall, if the inlet and outlet of the outdoor unit is blocked with snow, it might become difficult to get warm, and it is likely to cause product malfunction. Construct a canopy and a pedestal, or place the unit on a high stand that is locally installed.



## POWER

### WARNING

- The rated voltage of this product is 208/230 V AC 60 Hz.
- Before turning on the power, check if the voltage is within the 208 V -10 % to 230 V +10 % range.
- Always use a special branch circuit and install a special disconnect switch to supply power to the room air conditioner.
- Use a circuit breaker and disconnect switch matched to the capacity of the air conditioner.
- Do not extend the power cable.
- Perform wiring work in accordance with standards so that the air conditioner can be operated safely and positively.
- Install a leakage 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.

## OUTDOOR UNIT INSTALLATION

- Set the unit on a strong stand, such as one made of concrete blocks to minimize shock and vibration.
- Do not set the unit directly on the ground because it will cause trouble.

### Connector cover removal

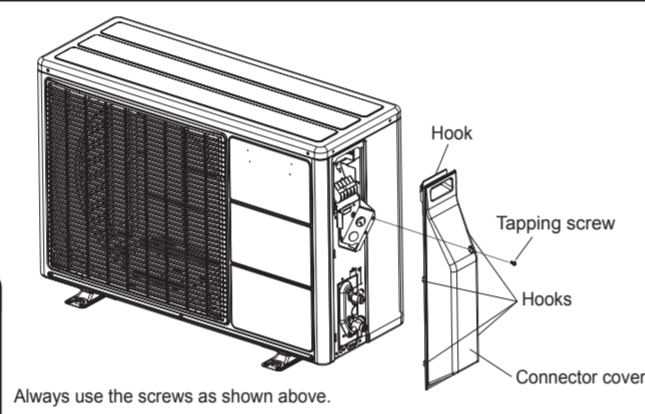
- Remove the tapping screw.

### Installing the connector cover

- After inserting the four hooks, then push upward.
- Tighten the tapping screw.

### WARNING

- Install the unit where it will not be tilted by more than 5°.
- When installing the outdoor unit where it may be exposed to strong wind, fasten it securely.



Always use the screws as shown above.

### CAUTION

- Match the terminal block numbers and connection cord colors with those of the indoor unit. Erroneous wiring may cause burning of the electric parts.
- Connect the connection cords firmly to the terminal block. Imperfect installation may cause a fire.
- Always fasten the outside covering of the connection cord with the cord clamp. (If the insulator is chafed, electric leakage may occur.)
- Securely earth the power cord.
- Do not use the earth screw for an external connector. Only use for interconnection between two units.

## PUMP DOWN OPERATION (FORCED COOLING 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.)

- Do the air purging of the charge hose by connecting the charging hose of gauge manifold to the charging port of 3 way valve and opening the low-pressure valve slightly.
- Close the valve stem of 2 way valve completely.
- Start the cooling operation or following forced cooling operation. Keep on pressing the MANUAL AUTO button of the indoor unit for more than 10 seconds. The operation indicator lamp and timer indicator lamp will begin to flash simultaneously during test run. (The forced cooling operation cannot start if the MANUAL AUTO button is not kept on pressing for more than 10 seconds.)
- Close the valve stem of 3 way valve when the reading on the compound pressure gauge becomes 0.05~0 MPa (7.25~0 psi).
- Stop the operation.
  - 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 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.

## OPERATING RANGE

	Cooling/Dry Mode	Heating Mode
Outdoor temperature	About 14 to 115 °F	About 5 to 75 °F

## CONNECTING THE PIPING

### CONNECTION

- Install the outdoor unit wall cap (supplied with the optional installation set or procured at the site) to the wall pipe.
- Connect the outdoor unit and indoor unit piping.
- After matching the center of the flare surface and tightening the nut hand tight, tighten the nut to the specified tightening torque with a torque wrench. (Table 1)

### FLARING

- Cut the connection pipe to the necessary length with a pipe cutter. Check if (L) is flared uniformly and is not cracked or scratched.
- Hold the pipe downward so that cuttings will not enter the pipe and remove the burrs.
- Insert the flare nut onto the pipe and flare the pipe with a flaring tool.

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.

Use the special R410A flare tool, or the conventional (for R22) flare tool.

When using the conventional flare tool, always use an allowance adjustment gauge and secure the A dimension shown in table 2.

### BENDING PIPES

- When bending the pipe, be careful not to crush it.
- To prevent breaking of the pipe, avoid sharp bends. Bend the pipe with a radius of curvature of 2-13/16" (70mm) or over.
- If the copper pipe is bent the pipe or pulled to often, it will become stiff. Do not bend the pipes more than three times at one place.

Table 1 Flare nut tightening torque

Flare nut	Tightening torque [lbf·ft. (N·m)]
1/4" (6.35 mm) dia.	11.8 to 13.3 (16 to 18)
3/8" (9.52 mm) dia.	23.6 to 31.0 (32 to 42)

Table 2 Pipe outside diameter

Pipe outside diameter	A [in (mm)]		
	Flare tool for R410A, clutch type	Conventional (R22) flare tool	
	Clutch type	Wing nut type	
1/4" (6.35 mm)	0 to 1/32 (0 to 0.5)	1/32 to 2/32 (0.5 to 1.5)	2/32 to 3/32 (1.5 to 2.0)
3/8" (9.52 mm)	0 to 1/32 (0 to 0.5)	1/32 to 2/32 (0.5 to 1.5)	2/32 to 3/32 (1.5 to 2.0)

### CAUTION

- Fasten a flare nut with a torque wrench as instructed in this manual. If fastened too tight, the flare nut may be broken after a long period of time and cause a leakage of refrigerant.
- 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.

## HOW TO CONNECT THE WIRE TO THE TERMINALS

### CAUTION

Match the terminal block numbers and connection cable colors with those of the outdoor unit or branch box. Incorrect wiring may cause a fire.

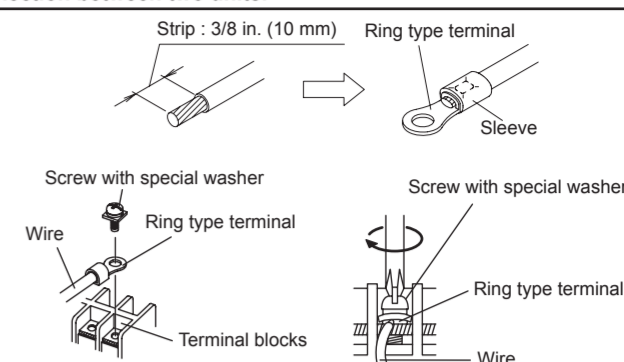
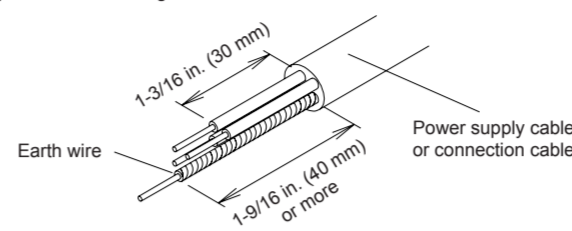
Connect the connection cables firmly to the terminal block. Imperfect installation may cause a fire.

When fixing the connection cable with the cable clamp, always fasten the cable at the plastic jacket portion, but not at the insulator portion. If the insulator is chafed, electric leakage may occur.

Do not use an earth screw for an external connector. Only use for interconnection between two units.

- 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.

Keep the earth wire longer than the other wires.



- Use ring terminals with insulating sleeves as shown in the figure below to connect to the wire.
- Securely crimp the ring terminals to the wires using an appropriate tool so that the wires do not come loose.
- Use the specified wires, connect them securely, and fasten them so that there is no stress placed on the terminals.
- 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.
- Do not tighten the terminal screws too much, otherwise, the screws may break.
- See the table below for the terminal screw tightening torques.

	Tightening torque [lbf·in. (N·m)]
M3.5 screw	7.1 to 8.9 (0.8 to 1.0)
M4 screw	10.6 to 15.9 (1.2 to 1.8)
M5 screw	17.7 to 26.5 (2.0 to 3.0)

## ELECTRICAL WIRING

- Remove the screws, then remove the control box cover.
- Fasten the inter-unit wire harness and power supply to the conduit holder using the lock nut.
- Connect inter-unit wire harness and power supply to the terminal.
- Use the screws to install the control box cover.

### WARNING

Be sure to comply with local codes while running the wire from the indoor unit to the outdoor unit (size of wire and wiring method, etc.).

Every wire must be connected firmly.

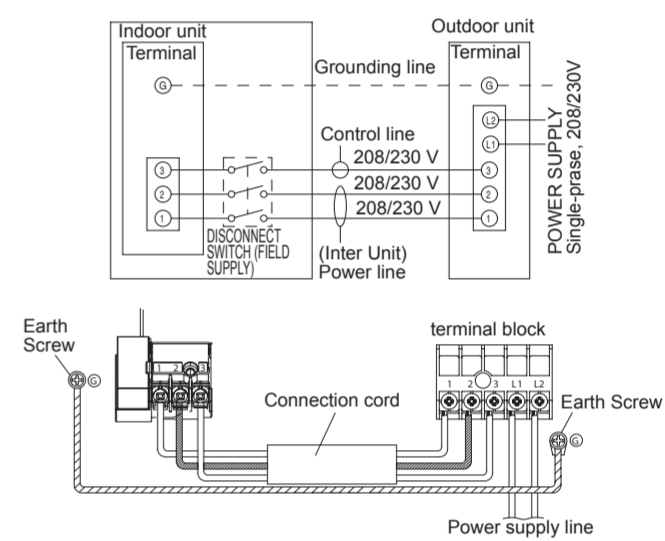
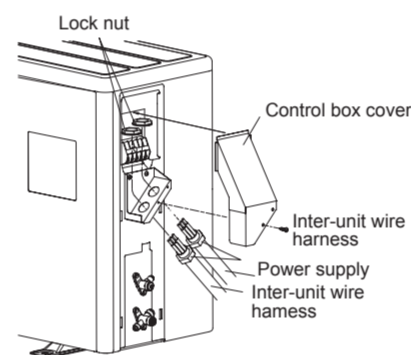
No wire should be allowed to touch refrigerant tubing, the compressor or any moving part.

Loose wiring may cause the terminal to overheat or result in unit malfunction. A fire hazard may also exist. Therefore, be sure all wiring is tightly connected.

Connect wires to the matching numbers of terminals.

### NOTE:

- Connector trade size for this unit is 1/2" (12.7 mm). The connector can be bought at a hard ware store. Refer to "How to connect wiring to the terminals" for instructions on connecting depending on the wire type you are using.
- The fuse located in the outdoor unit provides power supply protection and may blow when power is applied if the system has been in correctly wired.



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## AIR PURGE

Always use a vacuum pump to purge the air. Refrigerant for purging the air is not charged in the outdoor unit at the factory.

Close the high pressure side valve of the gauge manifold fully and do not operate it during the following work.

- Check if the piping connections are secure.
- Check that the stems of 2-way valve and 3-way valve are closed fully.
- Connect the gauge manifold charge hose to the charging port of the 3-way valve (side with the projection for pushing in the valve core).
- Open the low pressure side valve of the gauge manifold fully.
- Operate the vacuum pump and start pump down.
- Slowly loosen the flare nut of the 3-way valve and check if air enters, then retighten the flare nut. (When the flare nut is loosened the operating sound of the vacuum pump changes and the reading of the compound pressure gauge goes from minus to zero.)
- Pump down the system for at least 15 minutes, then check if the compound pressure gauge reads -0.1 MPa (30 in.Hg).
- At the end of pump down, close the low pressure side gauge of the gauge manifold fully and stop the vacuum pump.
- Slowly loosen the valve stem of the 3-way valve. When the compound pressure gauge reading reaches 0.1~0.2 MPa (14.5~28.9 psi), retighten the valve stem and disconnect the charge hose from the 3-way valve charging port. (If the stem of the 3-way valve is opened fully before the charge hose is disconnected, it may be difficult to disconnect the charge hose.)

### Additional charge

Refrigerant suitable for a piping length of 49 ft (15 m) is charged in the outdoor unit at the factory.

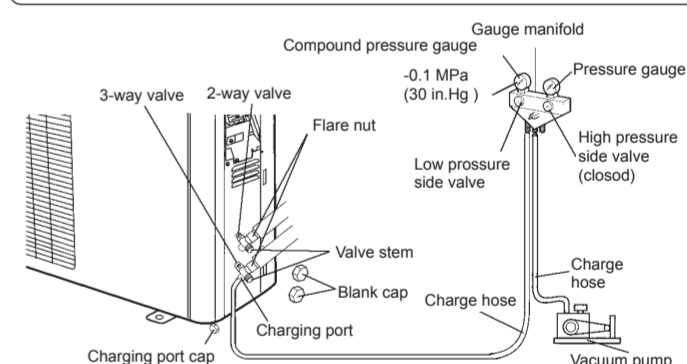
When the piping is longer than 49 ft (15 m), additional charging is necessary. For the additional amount, see the table below.

Pipe length	49 ft (15 m)	66 ft (20 m)	Rate
Additional refrigerant	None	+3.5 oz (+100 g)	0.2 oz/ft (20 g/m)

### CAUTION

- Refrigerant must not be discharged into atmosphere.
- After connecting the piping, check the joints for gas leakage with gas leak detector.

- Fully open the valve stems of the 2-way valve and 3-way valve using a hexagon wrench. (After the valve stem begins to turn, turn it with a torque of less than 2.9 N·m (30 kgf·cm) until it stops turning.)
- Firmly tighten the 2-way valve and 3-way valve blank cap and the charging port cap.



	Tightening torque [lbf·ft. (N·m)]
Blank cap	14.8 to 18.4 (20 to 25)
Charging port cap	7.4 to 8.8 (10 to 12)

### CAUTION

- When adding refrigerant, add the refrigerant from the charging port at the completion of work.
- The maximum length of the piping is 66 ft (20 m). If the units are further apart than this, correct operation can not be guaranteed.

Between 49 ft (15 m) and 66 ft (20 m), when using a connection pipe other than that in the table, charge additional refrigerant with 0.2 oz/ft (20 g/m) as the criteria.

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