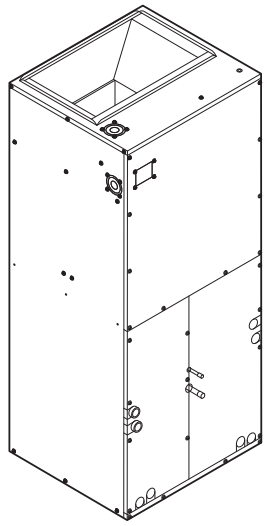
AIR CONDITIONER
INDOOR UNIT (Duct type)

INSTALLATION MANUAL

PART No. 9380243014-01

For authorized service personnel only.



Contents

NOTES: This manual describes how to install the air conditioner described above. Handling and installation shall only be done by professionals as outlined in this manual.

- Installation must be performed in accordance with the requirement of NEC (National Electrical Code) and CEC (Canadian Electrical Code) by authorized personnel only.
- This product is different from other Fujitsu General products and it is designed with United States customary unit. Metric units are provided for reference. When the exact dimensions and tolerances are required, refer to the United States customary units.

English

Français

Español

1. SAFETY PRECAUTIONS

1. 1. 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.

1. 2. 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 (earthing) can cause accidental injury or death.
- Ground (Earth) 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 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.

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 opening the refrigerant valves.

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 operation 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 10 minutes or more before touching electrical components.

- 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 operation manual, to the customer. Request the customer to keep them on hand for future use, such as for relocating or repairing the unit.

⚠ WARNING

- Installation of this product must be done by experienced service technicians or professional installers only in accordance with this manual. Installation by nonprofessional or improper installation of the product may cause serious accidents such as injury, water leakage, electric shock, or fire. If the product is installed in disregard of the instructions in this manual, it will void the manufacturer's warranty.
- 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.
- If refrigerant leaks when you are working, ventilate the area. If the leaking refrigerant is exposed to a direct flame it may produce a toxic gas.
- Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
- Do not use this equipment with air or any other unspecified refrigerant in the refrigerant lines. Excess pressure can cause a rupture.
- Installation must be performed in accordance with regulations, codes, or standards for electrical wiring and equipment in each country, region, or the installation place.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.
- To avoid danger of suffocation, keep the plastic bag or thin film used as the packaging material away from young children.
- The appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).
- Do not pierce or burn.
- Be aware that refrigerants may not contain an odour.
- Keep any required ventilation openings clear of obstruction.
- If the power cable or the connection cable is damaged, it must be replaced by the manufacturer, its service agent or similar qualified persons in order to avoid a safety hazard.
- After servicing, check for refrigerant leak before turning on the unit.
- Cancer and Reproductive Harm - www.P65Warnings.ca.gov.

⚠ CAUTION

- Read carefully all safety information written in this manual before you install or use the air conditioner.
- Do not attempt to install the air conditioner or a part of the air conditioner by yourself.
- This product must be installed by qualified personnel with a capacity certificate for handling refrigerant fluids. Refer to regulation and laws in use on installation place.
- Install the product by following local codes and regulations in force at the place of installation, and the instructions provided by the manufacturer.
- This product contains no user-serviceable parts. Always consult experienced service technicians for repairing.
- This product is part of a set constituting an air conditioner. The product must not be installed alone or be installed with non-authorized device by the manufacturer.
- Always use a separate power supply line protected by a circuit breaker operating on all wires with a distance between contact of 1/8 in (3 mm) for this product.
- To protect the persons, ground (earth) the product correctly, and use the power cable combined with an Earth Leakage Circuit Breaker (ELCB).
- This product is not explosion proof, and therefore should not be installed in explosive atmosphere.
- When moving or relocating the air conditioner, consult experienced service technicians for disconnection and reinstallation of the product.
- Do not touch the aluminum fins of heat exchanger built-in the indoor or outdoor unit to avoid personal injury when you install or maintain the unit.
- This product contains no user-serviceable parts. Always consult experienced service technicians for repairing.
- Do not place any other electrical products or household belongings under the product. Condensation dripping from the product might get them wet, and may cause damage or malfunction to the property.

- Be careful not to scratch the air conditioner when handling it.

2. PRODUCT SPECIFICATION

2. 1. Precautions for using R32 refrigerant

- The basic installation work procedures are the same as conventional refrigerant (R410, R22) 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. (Refer to the following table.)
  Especially, when replacing a conventional refrigerant (R22) model with a new refrigerant R32 model, always replace the conventional piping and flare nuts with the R32 and R410A piping and flare nuts.
- Models that use refrigerant R32 and 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 R32 and R410A is 1/2-20 UNF.]
- 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. (Handling of R32 is similar to R410A.)
- 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 where refrigerant composition is stable.

This manual includes requirements of clauses according to Table DD.1 (Installation, Maintenance and repair, Decommissioning)

⚠ WARNING

- Auxiliary devices which may be a potential ignition source shall not be installed in the duct work.
- Examples of such potential ignition sources are hot surfaces with a temperature exceeding 1292°F (700°C) and electric switching devices.
- Minimum room area is corrected by multiplying by an altitude adjustment factor (AF) based on for building site ground level altitude (H_{alt}) in meters.

Altitude Adjustment Factor

H_{alt}	0	200	400	600	800	1000	1200	1400	1600
AF	1.00	1.00	1.00	1.00	1.02	1.05	1.07	1.10	1.12
H_{alt}	1600	1800	2000	2200	2400	2600	2800	3000	3200
AF	1.12	1.15	1.18	1.21	1.25	1.28	1.32	1.36	1.40

- The appliance shall not be installed in an unventilated space, if that space is smaller than minimum installation area.
- When the safety measure is enabled, the safety measure-compatible installation area will be applied.
- For more information about safety measure settings, refer to "6. FUNCTION SETTING".

(UL60335-2-40) **Without safety measures**

Amount of refrigerant charge M [lbs (kg)]	**Minimum room area Y [ft² (m²)]**
	Installation height or Reaching height of airflow [ft (M)]
	1.96 (0.6) ≤ X
M ≤ 4.05 (1.836)	—
4.05 (1.836) < M ≤ 4.19 (1.90)	333.45 (30.98)
4.19 (1.90) < M ≤ 4.41 (2.00)	369.51 (34.33)
4.41 (2.00) < M ≤ 4.63 (2.10)	407.39 (37.85)
4.63 (2.10) < M ≤ 4.85 (2.20)	447.00 (41.53)
4.85 (2.20) < M ≤ 5.07 (2.30)	475.95 (44.22)
5.07 (2.30) < M ≤ 5.29 (2.40)	532.03 (49.43)
5.29 (2.40) < M ≤ 5.51 (2.50)	577.23 (53.63)
5.51 (2.50) < M ≤ 5.73 (2.60)	624.38 (58.01)
5.73 (2.60) < M ≤ 5.95 (2.70)	673.35 (62.56)
5.95 (2.70) < M ≤ 6.17 (2.80)	724.15 (67.28)
6.17 (2.80) < M ≤ 6.39 (2.90)	776.78 (72.17)
6.39 (2.90) < M ≤ 6.61 (3.00)	831.24 (77.23)
6.61 (3.00) < M ≤ 6.83 (3.10)	887.53 (82.46)
6.83 (3.10) < M ≤ 7.05 (3.20)	945.76 (87.87)
7.05 (3.20) < M ≤ 7.28 (3.30)	1005.82 (93.45)
7.28 (3.30) < M ≤ 7.50 (3.40)	1067.70 (99.20)
7.50 (3.40) < M ≤ 7.72 (3.50)	1131.42 (105.12)
7.72 (3.50) < M ≤ 7.94 (3.60)	1196.97 (111.21)
7.94 (3.60) < M ≤ 8.16 (3.70)	1264.34 (117.47)
8.16 (3.70) < M ≤ 8.38 (3.80)	1333.66 (123.91)
8.38 (3.80) < M ≤ 8.60 (3.90)	1404.69 (130.51)
8.60 (3.90) < M ≤ 8.82 (4.00)	1477.67 (137.29)

⚠ WARNING

(UL60335-2-40) **With safety measures**

Amount of refrigerant charge M [lbs (kg)]	Minimum room area Y [ft² (m²)]
M≤ 4.05 (1.836)	—
4.05 (1.836) < M≤ 4.19 (1.90)	222.81 (20.70)
4.19 (1.90) < M≤ 4.41 (2.00)	234.54 (21.79)
4.41 (2.00) < M≤ 4.63 (2.10)	246.27 (22.88)
4.63 (2.10) < M≤ 4.85 (2.20)	258.00 (23.97)
4.85 (2.20) < M≤ 5.07 (2.30)	266.18 (24.73)
5.07 (2.30) < M≤ 5.29 (2.40)	281.47 (26.15)
5.29 (2.40) < M≤ 5.51 (2.50)	293.20 (27.24)
5.51 (2.50) < M≤ 5.73 (2.60)	304.93 (28.33)
5.73 (2.60) < M≤ 5.95 (2.70)	316.66 (29.42)
5.95 (2.70) < M≤ 6.17 (2.80)	328.39 (30.51)
6.17 (2.80) < M≤ 6.39 (2.90)	340.12 (31.60)
6.39 (2.90) < M≤ 6.61 (3.00)	351.75 (32.68)
6.61 (3.00) < M≤ 6.83 (3.10)	363.48 (33.77)
6.83 (3.10) < M≤ 7.05 (3.20)	375.21 (34.86)
7.05 (3.20) < M≤ 7.28 (3.30)	386.94 (35.95)
7.28 (3.30) < M≤ 7.50 (3.40)	398.68 (37.04)
7.50 (3.40) < M≤ 7.72 (3.50)	410.41 (38.13)
7.72 (3.50) < M≤ 7.94 (3.60)	422.14 (39.22)
7.94 (3.60) < M≤ 8.16 (3.70)	433.87 (40.31)
8.16 (3.70) < M≤ 8.38 (3.80)	445.60 (41.40)
8.38 (3.80) < M≤ 8.60 (3.90)	457.33 (42.49)
8.60 (3.90) < M≤ 8.82 (4.00)	469.07 (43.58)

- Ducts connected to this product shall not contain a potential ignition source such as hot surfaces, flames or current carrying devices that can be the source of arcing or sparking.
- Where the indoor unit is connected via an air duct system to one or more rooms, the supply and return air shall be directly ducted to the space. Open areas such as false ceilings must not be used as a return air duct. And when using auxiliary devices, it shall be installed that is declared suitable with R32 refrigerant in connecting ductwork.

⚠ CAUTION

1 General

1-1 Installation

- That pipe work including piping material, pipe routing, and installation shall include protection from physical damage in operation and service, and be in compliance with national and local codes and standards, such as ASHRAE 15, ASHRAE 15.2, IAPMO Uniform Mechanical Code, ICC International Mechanical Code, or CSA B52. All field joints shall be accessible for inspection prior to being covered or enclosed.
- That after completion of field piping for split systems, the field pipework shall be pressure tested with an inert gas and then vacuum tested prior to refrigerant charging, according to the following requirements:
  The minimum test pressure for the low side of the system shall be the low side design pressure and the minimum test pressure for the high side of the system shall be the high side design pressure, unless the high side of the system, cannot be isolated from the low side of the system in which case the entire system shall be pressure tested to the low side design pressure.
- Field-made refrigerant joints indoors shall be tightness tested. The test method shall have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0.25 times the maximum allowable pressure. No leak shall be detected;

1-2 Unventilated areas

- When installing this product to an unventilated area, pay attention to prevent fire and explosion caused by the stagnated gas in case of refrigerant leakage. (For products which contain more than 4.05 libs (1.836 kg) refrigerant.)
- The appliance shall be stored so as to prevent mechanical damage from occurring.

1-3 Qualification of workers

- As this product uses flammable refrigerant, its installation, repair, maintenance, removal, and deposition must be performed by dedicated service personnel who completed trainings and obtained relevant certificates provided by the domestic training facilities or manufactures certified for obtaining relevant national certificate stipulated by the applicable law.

2 Information on servicing
(Checks to the area)

- Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimized.
- For repair to the refrigerating system, 2-1 to 2-5 shall be completed prior to conducting work on the system.

2-1 Work procedure

- Work shall be undertaken under a controlled procedure so as to minimize the risk of a flammable gas or vapor being present while the work is being performed.

2-2 General work area

- All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out.
- Work in confined spaces shall be avoided.

2-3 Checking for presence of refrigerant

- The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres.
- Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.

2-4 Presence of fire extinguisher

- If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand.
- Have a dry powder or CO2 fire extinguisher adjacent to the charging area.

2-5 No ignition sources

- No person carrying out work in relation to a refrigerating system which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion.
- All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.

2-6 Ventilated area

- Ensure that the area is in the open or that it is adequately ventilated before breaking into the system or conducting any hot work.
- A degree of ventilation shall continue during the period that the work is carried out.
- The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

2-7 Checks to the refrigerating equipment

- Where electrical components are being changed, they shall be fit for the purpose and to the correct specification.
- At all times the manufacturer’s maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer’s technical department for assistance.
- The following checks shall be applied to installations using flammable refrigerants :
  - the actual refrigerant charge is in accordance with the room size within which the refrigerant containing parts are installed;
  - the ventilation machinery and outlets are operating adequately and are not obstructed;
  - if an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant;
  - marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected;
  - refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

2-8 Checks to electrical devices

- Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures.
- If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with.
- If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used.
- This shall be reported to the owner of the equipment so all parties are advised.
- Initial safety checks shall include:
  - that capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;
  - that no live electrical components and wiring are exposed while charging, recovering or purging the system;
  - that there is continuity of earth bonding.

3 Sealed electrical components
Sealed electrical components shall be replaced.

4 Intrinsically safe components
Intrinsically safe components must be replaced.

5 Cabling

- Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects.
- The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

6 Detection of flammable refrigerants

- Under no circumstances shall potential sources of ignition be used in the searching for or detection of refrigerant leaks.
- A halide torch (or any other detector using a naked flame) shall not be used.

7 Leak detection methods

- The following leak detection methods are deemed acceptable for all refrigerant systems.
- Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, the sensitivity may not be adequate, or may need recalibration. (Detection equipment shall be calibrated in a refrigerant-free area.)
- Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used.
- Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed.
- Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

NOTE:

Examples of leak detection fluids are

- bubble method,
- fluorescent method agents.

- If a leak is suspected, all naked flames shall be removed / extinguished.
- If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak.

⚠ CAUTION

8 Removal and evacuation
- When breaking into the refrigerant circuit to make repairs – or for any other purpose – conventional procedures shall be used. However, for flammable refrigerants it is important that best practice is followed since flammability is a consideration. The following procedure shall be adhered to:
- Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.
  - safely remove refrigerant following local and national regulations;
  - evacuate;
  - purge the circuit with inert gas (optional for R32);
  - evacuate (optional for R32);
  - continuously flush or purge with inert gas when using flame to open circuit; and
  - open the circuit.
- The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes.
- For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants.
- This process might need to be repeated several times.
- Compressed air or oxygen shall not be used for purging refrigerant systems.
- For appliances containing flammable refrigerants, refrigerants purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum (optional for R32).
- This process shall be repeated until no refrigerant is within the system (optional for R32).
- When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.
- The outlet for the vacuum pump is not close to any potential ignition sources and that ventilation is available.

9 Charging procedures
- In addition to conventional charging procedures, the following requirements shall be followed.
  - Ensure that contamination of different refrigerants does not occur when using charging equipment.
  - Hoses or lines shall be as short as possible to minimize the amount of refrigerant contained in them.
  - Cylinders shall be kept in an appropriate position according to the instructions.
  - Ensure that the refrigerating system is earthed prior to charging the system with refrigerant.
  - Extreme care shall be taken not to overfill the refrigerating system.
- Prior to recharging the system, it shall be pressure tested with the appropriate purging gas.
- The system shall be leak tested on completion of charging but prior to commissioning.
- A follow up leak test shall be carried out prior to leaving the site.

10 Decommissioning
- Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail.
- It is recommended good practice that all refrigerants are recovered safely.
- Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of recovered refrigerant.
- It is essential that electrical power is available before the task is commenced.
  a) Become familiar with the equipment and its operation.
  b) Isolate system electrically.
  c) Before attempting the procedure, ensure that:
    - mechanical handling equipment is available, if required, for handling refrigerant cylinders;
    - all personal protective equipment is available and being used correctly;
    - the recovery process is supervised at all times by a competent person;
    - recovery equipment and cylinders conform to the appropriate standards.
  d) Pump down refrigerant system, if possible.
  e) If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
  f) Make sure that cylinder is situated on the scales before recovery takes place.
  g) Start the recovery machine and operate in accordance with instructions.
  h) Do not overfill cylinders (no more than 80 % volume liquid charge).
  i) Do not exceed the maximum working pressure of the cylinder, even temporarily.
  j) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
  k) Recovered refrigerant shall not be charged into another refrigerating system unless it has been cleaned and checked.

11 Labelling
- Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant.
- The label shall be dated and signed.
- For appliances containing flammable refrigerants, ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.

12 Recovery
- When removing refrigerant from a system, either for servicing or decommissioning, it is recommended good practice that all refrigerants are removed safely.
- When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed.
- Ensure that the correct number of cylinders for holding the total system charge is available.
- All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant).
- Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order.
- Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.
- The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of the flammable refrigerant. If in doubt, the manufacturer should be consulted. In addition, a set of calibrated weighing scales shall be available and in good working order.
- Hoses shall be complete with leak-free disconnect couplings and in good condition.
- The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant waste transfer note arranged.
- Do not mix refrigerants in recovery units and especially not in cylinders.
- If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant.
- The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process.
- When oil is drained from a system, it shall be carried out safely.

Explanation of symbols displayed on the indoor unit or outdoor unit.

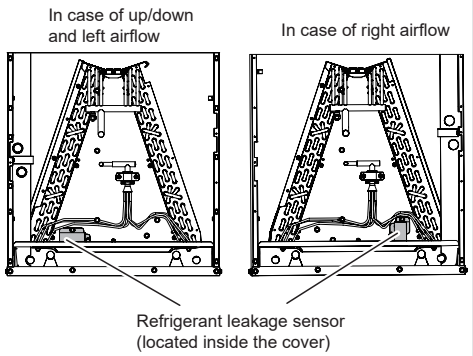
	**WARNING**	This symbol shows that this product uses a low burning velocity material. If the refrigerant is leaked and exposed to an external ignition source, there is a risk of fire.
	**CAUTION**	This symbol shows that the operation manual should be read carefully.
	**CAUTION**	This symbol shows that a service personnel should be handling this equipment with reference to the installation manual.
	**CAUTION**	This symbol shows that information is available such as the operation manual or installation manual.

2. 2. Refrigerant leakage sensor

⚠ CAUTION

- This product is equipped with a refrigerant leakage sensor. Do not install the product at a location filled with smoke, gases or chemicals.
- When connecting the pipes, be careful not to allow the refrigerant to be leaked. If the refrigerant is sprayed directly onto the sensor, the sensor may fail.
- After installation is complete, explain to the customer that the breaker must be always turned on to ensure the operation of the refrigerant leakage sensor.
- Do not use flammable substances (such as pesticides and hair sprays). Doing so may cause an electric shock, fire or wrong detection by the refrigerant sensor.
- Do not use silicone fillers or sprays. Otherwise, it may cause sensor failure.

- When installing or refrigerant piping or drain piping, do not subject the sensor to shock or expose it to refrigerant or water. Otherwise, it may cause sensor failure.



Refrigerant leakage sensor have an expiration date
- The expiration date is 10 years, provided the sensor element is not affected by substances that degrade it.
- If the expiry date of the sensor is approaching or has passed, an error code will be shown. Refer to “11. ERROR CODES”.
- Refrigerant leakage sensor that have passed their expiration date must be replaced.

Request replacement of the refrigerant leakage sensor to your dealer or authorized service personnel.

2. 3. Installation tools

Tool name	Contents of change
Gauge manifold	Pressure is high and cannot be measured with a R22 gauge. To prevent erroneous mixing of other refrigerants, the diameter of each port has been changed. It is recommended to use gauge with seals -30 inHg to 768 psi (-0.1 to 5.3 MPa) for high pressure. -30 inHg 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.(R32)
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 R32.

■ Copper pipes

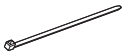
It is necessary to use seamless copper pipes and it is desirable that the amount of residual oil is less than 0.004 oz/100 ft (40 mg/10 m). Do not use copper pipes having a collapsed, deformed or discolored portion (especially on the interior surface). Otherwise, the expansion value or capillary tube may become blocked with contaminants.
As an air conditioner using R32 incurs pressure higher than when using R22, it is necessary to choose adequate materials.

⚠ WARNING

- 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 failure, injury, etc. (Use the special R32 materials.)
- Use (refill or replace with) specified refrigerant (R32) only. Use of unspecified refrigerant can cause product malfunction, burst, or injury.
- Do not mix any gas or impurities except specified refrigerant (R32). Inflow of air or application of unspecified material makes the internal pressure of the refrigerant cycle too high, and may cause product malfunction, burst of piping, or injury.
- 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 turn on the power until all work has been completed.

2. 4. Accessories

- The following installation parts are furnished. Use them as required.
- Keep the Installation Manual in a safe place and do not discard any other accessories until the installation work has been completed.

Name and Shape	Q'ty	Description
Operation manual 	1	
Installation manual 	1	(This book)
Cable tie (medium) 	2	For binding when rewiring for left to right airflow application.
Cable tie (small) 	6	

2. 5. Pipe requirt

⚠ CAUTION

- Do not use existing pipes from another refrigeration system or refrigerant.
- Use pipes that have clean external and internal sides without any contamination which may cause trouble during use, such as sulfur, oxide, dust, cutting waste, oil, or water.
- It is necessary to use seamless copper pipes.
  Material : Phosphor deoxidized seamless copper pipes
  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 that have a collapsed, deformed, or discolored portion (especially on the interior surface). Otherwise, the expansion valve or capillary tube may become blocked with contaminants.
- Improper pipe selection will degrade performance. As an air conditioner using R32 incurs pressure higher than when using conventional refrigerant, it is necessary to choose adequate materials.

- Thicknesses of copper pipes used with R32 are as shown in the table.
- Never use copper pipes thinner than those indicated in the table even if they are available on the market.

Thicknesses of Annealed Copper Pipes (R32)

Pipe outside diameter [in (mm)]	Thickness [in (mm)]
1/4 (6.35)	0.031 (0.80)
3/8 (9.52)	0.031 (0.80)
1/2 (12.70)	0.031 (0.80)
5/8 (15.88)	0.039 (1.00)
3/4 (19.05)	0.047 (1.20)

⚠ CAUTION

Refer to the installation manual of the outdoor unit for description of the length of connecting pipe or for difference of its elevation.

Model	Diameter [in (mm)]	
	Gas pipe	Liquid pipe
12,000 BTU	3/8 (9.52)	1/4 (6.35)
18,000/24,000 BTU	1/2 (12.70)	1/4 (6.35)
30,000/36,000/48,000 BTU	5/8 (15.88)	3/8 (9.52)

- Use pipe with water-resistant heat insulation.

⚠ 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 (120 °C). (Reverse cycle model only)
- If expected humidity of the installation location of refrigerant pipes is higher than 70 %, wrap the heat insulation around the refrigerant pipes.
  If the expected humidity is between 70 % and 80 %, use heat insulation that has a thickness of 9/16 in (15 mm) or more.
  If the expected humidity is higher than 80 %, use heat insulation that has a thickness of 13/16 in (20 mm) or more.
- The use of thinner heat insulation than specified above, may cause a condensation on the surface of the insulation.
- Use heat insulation with thermal conductivity of 0.045 W/(m·K) or less (at 68 °F (20 °C)).

2. 6. Electrical requirement

The indoor unit is powered from the outdoor unit. Do not power indoor unit from separate power source.

⚠ WARNING

Standard for electrical wiring and equipment differs in each country or region. Before you start electrical working, confirm related regulations, codes, or standards.

Cable	Conductor size (AWG)	Remarks
Connection cable	AWG 14	3Wire+Ground (Earth), 1Ø 208/230V

Cable Length: Limit voltage drop to less than 2%. Increase cable gauge if voltage drop is 2% or more.

*Refer to the installation manual of the wired remote controller for the conductor size of the remote control cable.

2. 7. Optional parts

Refer to each installation manual for the method of installing optional parts.

Parts name		Model No.	Application
Wired remote controller		UTY-RNRUZ∗	For air conditioner operation
		UTY-RVRU	
Simple remote controller		UTY-RSRY	For air conditioner operation
		UTY-RHRY	
IR receiver unit		UTY-LBTUM	For air conditioner operation
Remote sensor unit		UTY-XSZXZ∗	For measuring room temperature
Network convertor		UTY-VTGX	For air conditioner operation
Thermostat converter		UTY-TTRXZ∗	For air conditioner operation
Modbus converter		UTY-VMSX	Only one communication converter can be connected.
Modbus Gateway		FJ-RC-MBS-1	For air conditioner operation
BACnet Module		FJ-AC-BAC-1L	For air conditioner operation
WLAN interface		UTY-TFSXZ∗	For wireless LAN control
External input and output PCB/ wire/ box		UTY-XCSX/ UTY-XWZXZJ / UTZ-GXRA	For connecting external devices
External Connect kit		UTY-XWZXZG	For external output port
		UTY-XWZXZP	For external heaters
External switch controller		UTY-TERX	For control output port
Heater kit	Single stage	UTZ-EU02MSA	For 12,000 / 24,000 BTU
		UTZ-EU03MSA	For 18,000 BTU
		UTZ-EU04MSA	For 24,000 BTU
		UTZ-EU03MMA	For 30,000 / 36,000 BTU
		UTZ-EU05MMA	For 30,000 / 48,000 BTU
		UTZ-EU06MMA	For 36,000 BTU
		UTZ-EU08MMA	For 48,000 BTU
	Second stage	UTZ-EU04MSB2	For 12,000 BTU
		UTZ-EU06MSB2	For 18,000 BTU
		UTZ-EU08MSB2	For 24,000 BTU
		UTZ-EU10MMB2	For 30,000 BTU
		UTZ-EU12MMB2	For 36,000 BTU
		UTZ-EU16MMB2	For 48,000 BTU
Downflow kit		UTD-DFMSB1	For 12,000 / 18,000 / 24,000 BTU
		UTD-DFMMB1	For 30,000 / 36,000 / 48,000 BTU

• Optional parts are subject to change without notice.

3. INSTALLATION WORK

⚠ WARNING

- Do not turn on the power until all installation work is complete.
- Carrying and installation of the unit should be performed by a sufficient number of people and with sufficient equipment that is adequate for the weight of the unit. Performing such work with an insufficient number of people or with inadequate equipment could result in dropping of the unit or personal injury.

⚠ CAUTION

For installation details, refer to the technical data.

■ Important information about efficiency and indoor air quality

To maintain efficiency, comfort and good indoor air quality, it is important to have the proper balance between the air being supplied to each room and the air returning to the cooling and heating equipment.
Proper balance and sealing of the duct system improves the efficiency of the heating and air conditioning system and improves the indoor air quality of the home by reducing the amount of airborne pollutants that enter homes from spaces where the ductwork and/or equipment is located. The manufacturer and the U.S. Environmental Protection Agency's Energy Star Program recommend that duct systems be checked by a qualified contractor for proper balance and sealing.

■ Checking product received

Immediately upon receipt, all cartons and contents should be inspected for transit damage. Units with damaged cartons should be opened immediately. If damage is found, it should be noted on the delivery documents and a damage claim filed with the delivering carrier.
After unit has been delivered to the job site, remove the unit from the carton taking care not to damage the unit. Check the unit rating plate for unit model number, unit size, coil model, voltage, phase, etc. to assure the unit matches the job specifications.

3. 1. Selecting an installation location

Decide the mounting position together with the customer as follows.

⚠ WARNING

- Select installation locations that can properly support the weight of the indoor unit and which will not amplify sound or vibration. If the installation location is not strong enough, the indoor unit may fall and cause injuries.
- Install the units securely so that they do not topple or fall.

⚠ CAUTION

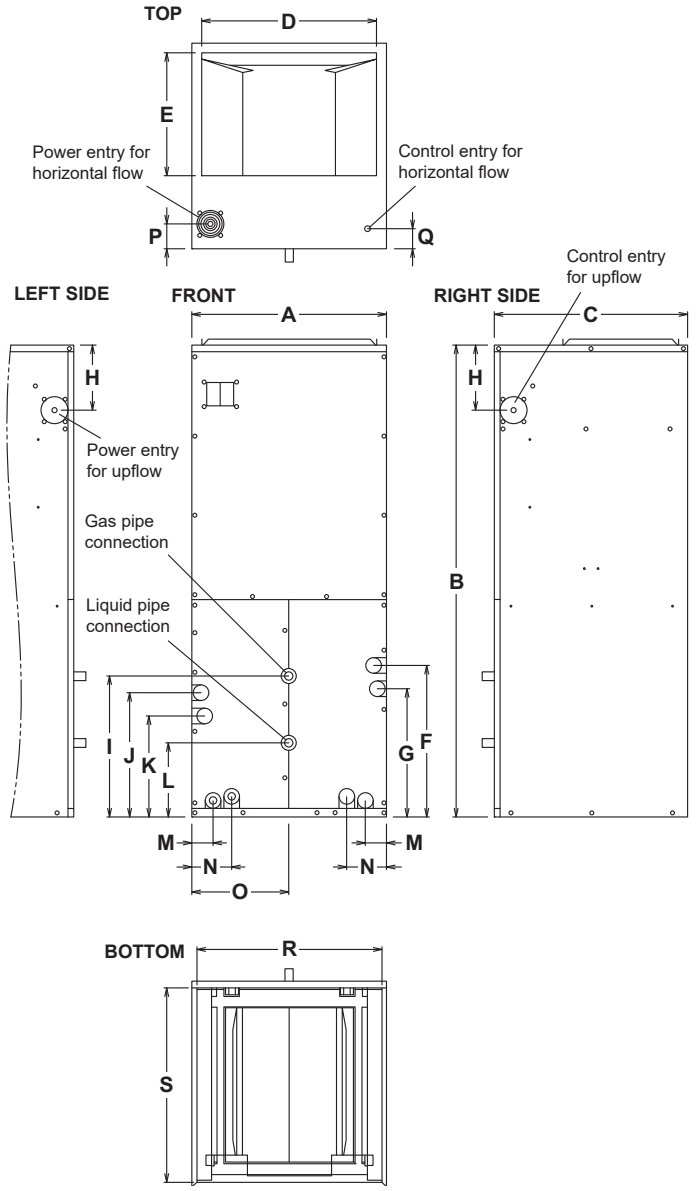
Do not install the unit in the following areas:
- Area with high salt content, such as at the seaside. It will deteriorate metal parts, causing the parts to fail or the unit to leak water.
- Area filled with mineral oil or containing a large amount of splashed oil or steam, such as a kitchen. It will deteriorate plastic parts, causing the parts to fail or the unit to leak water.
- Area where is close to heat sources.
- 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 that can cause combustible gas to leak, contains suspended carbon fibers or flammable dust, or volatile in flammables such as paint thinner or gasoline.
- If gas leaks and settles around the unit, it can cause a fire.
- Area where animals may urinate on the unit or ammonia may be generated.

• 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.
• Install the unit where drainage does not cause any trouble.
• Install the indoor unit, outdoor unit, power supply cable, transmission cable, and remote controller cable at least 40 in (1 m) 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 40 in (1 m) 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.
• Install the unit where ambient temperature does not reach 140 °F (60 °C) or more. Take a measure such as ventilation for an environment in which heat is retained.

(1) The inlet and outlet ports should not be obstructed; the air should be able to blow all over the room.
(2) Leave the space required to service the air conditioner.
(3) Install the unit where connection to the outdoor unit is easy.
(4) Install the unit where the connection pipe can be easily installed.
(5) Install the unit where the drain pipe can be easily installed.
(6) Install the unit where noise and vibrations are not amplified.
(7) Take servicing, etc., into consideration and leave the spaces. Also install the unit where the filter can be removed.
(8) Do not install the unit where it will be exposed to direct sunlight.

Correct initial installation location is important because it is difficult to move unit after it is installed.

3. 2. Indoor unit dimensions



Model	Unit dimensions [in (mm)]						
	A	B	C	D	E	F	G
12,000/18,000 /24,000 BTU	17.50 (444.5)	43.00 (1092.2)	21.00 (533.4)	15.63 (397.0)	12.50 (318.5)	13.50 (342.9)	11.00 (279.4)
30,000/36,000 /48,000 BTU	21.00 (533.4)	48.00 (1219.2)	21.00 (533.4)	19.00 (482.6)	12.50 (318.5)	15.39 (390.9)	13.00 (330.2)
	H	I	J	K	L	M	N
12,000/18,000 /24,000 BTU	6.75 (171.5)	10.74 (272.8)	11.00 (279.4)	10.75 (273.1)	7.74 (196.6)	1.50 (38.1)	2.00 (50.8)
30,000/36,000 /48,000 BTU	6.75 (171.5)	14.09 (357.9)	12.38 (314.5)	10.30 (261.6)	11.06 (280.9)	2.30 (58.42)	4.35 (110.5)
	O	P	Q	R	S		
12,000/18,000 /24,000 BTU	7.47 (189.7)	5.00 (127.0)	2.12 (53.8)	16.10 (408.9)	20.20 (513.1)		
30,000/36,000 /48,000 BTU	9.35 (237.5)	5.00 (127.0)	2.00 (50.8)	19.90 (505.5)	20.80 (528.3)		

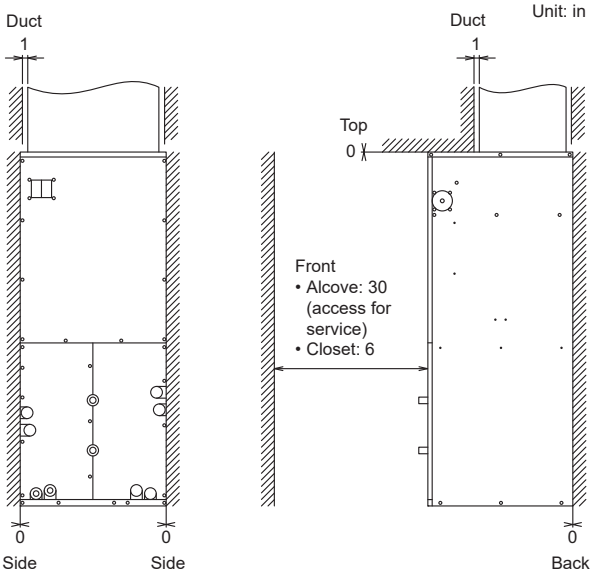
3. 3. Clearance and return air requirements

■ Location

Access for servicing is an important factor in the location of any indoor unit. Provide a minimum of 30 inches in front of the appliance for access to the control box, heating elements, fan unit and air filters. This access may be provided by a closet door or by locating the appliance so that a wall or partition is not less than 30 inches from the front access Panel Location is usually predetermined. Check with owner's or dealer's installation plans. If location has not been decided, consider the following in choosing a suitable location.

(1) Select a location with adequate structural support, space for service access, clearance for return and supply duct connections.
(2) Normal operating sound levels may be objectionable if the indoor unit is placed directly over or under some rooms such as bedrooms, study, etc.
(3) Caution should be taken to locate the unit so that supply and return air ducts are about the same length causing even air distribution of supply and return air to and from the living spaces.
(4) Locate appliance where electrical supply wiring can be easily routed to main electrical panel and where electrical wiring will not be damaged.
(5) Locate appliance where remote controller wiring can be easily routed to the remote controller and where the wiring will not be damaged.
(6) Locate appliance where refrigerant lines can be easily routed from the heat exchanger to the condenser.
(7) Locate the appliance where condensate lines can be easily routed to an available drain. Be sure to route condensate drain piping so as not to obstruct access to the air filter.
(8) When the heat exchanger is installed in a draw-thru application it will create a negative pressure situation in the condensate drain system. To prevent condensate from being drawn into the fan unit it is recommended to trap the primary (Main) and secondary (Overflow) drain line. If the secondary drain is not used, it must be capped.
(9) The draw-thru design will cause exterior surface of cabinet to sweat when units is installed in a non-conditioned space such as an attic or garage. Installer must provide protection such as full size auxiliary drain pan on all units installed in a non-conditioned space to prevent damage from condensation runoff.
Some states, cities and counties require additional insulation to be installed on the exterior casing of the indoor unit to prevent sweating. Refer to the state, city, county or local code for insulation requirement to be sure the installation is in compliance.
It is recommended that indoor units installed in non conditioned spaces be insulated on the exterior of the entire cabinet, including the front access panel with 1 inch thick fiberglass with the vapor barrier on the outside.

• Provide a service access for inspection purposes.
• Do not place any wiring or illumination in the service space, as they will impede service.



■ Return Air

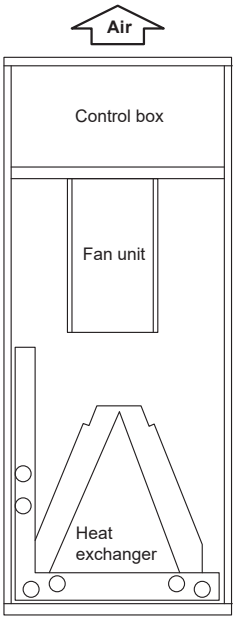
In order for the indoor unit to work properly, a closet or alcove must have a certain total free area opening for the return air.

Model	Return air requirements
12,000/18,000 /24,000 BTU	• Minimum 200 in² free area opening • Use return grille or heat exchanger cabinet
30,000/36,000 /48,000 BTU	• Minimum 250 in² free area opening • Use return grille, heat exchanger cabinet, or any return grille with a minimum 250 in² free area opening

3. 4. Airflow direction and preparation before installation

Arrangement:
Unit is shipped from the factory arranged to be installed in an upflow or horizontal right to left airflow position. Horizontal right to left means, when facing the front of the unit, when the unit is laid on its side, the supply air opening is to the left and the return opening is to the right. These models are field convertible to a horizontal left to right airflow position.

3. 4. 1. Upflow application



In an upflow installation the discharge outlet is at the top. Care should be taken to insure unit is level to permit proper condensate drainage. Normal upflow installation will be in a closet or basement. If installed in a closet, the closet should have a platform framed in, that with an opening at the top of the platform centered in the closet that measure at least 12 inches in height. A filter frame and filter can be used that covers the opening and is sealed to prevent air by-passing the filter. The minimum filter size is shown in the table below.

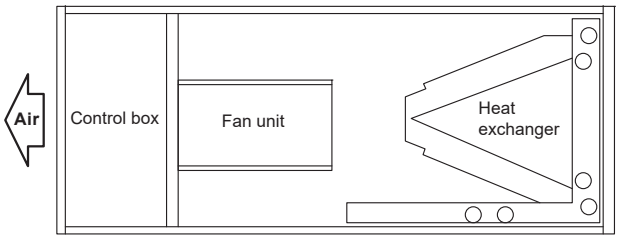
Standard Throw away Air Filter @ 300 ft/min or less
800 CFM = 20 x 20 x 1
1000 CFM = 20 x 25 x 1
1200 CFM = 20 x 30 x 1
1400 CFM = 25 x 30 x 1
1600 CFM = 25 x 30 x 1
1800 CFM = 30 x 30 x 1
2000 CFM = 30 x 40 x 1 or two 30 x 20 x 1
2400 CFM = 30 x 40 x 1 or two 30 x 20 x 1

Pleated Air Filter @ 500 ft/min or less
800 CFM = 16 x 16 x 1
1000 CFM = 18 x 20 x 1
1200 CFM = 20 x 20 x 1
1400 CFM = 20 x 20 x 1
1600 CFM = 20 x 25 x 1
1800 CFM = 20 x 30 x 1 or two 20 x 15 x 1
2000 CFM = 20 x 30 x 1 or two 20 x 15 x 1
2400 CFM = 25 x 30 x 1 or two 14 x 30 x 1

- Connect the supply air outlet to a plenum to the top of the unit and secure it with screws. Use a Non-tape sealant such as mastic or an aerosol sealant to seal duct leakage.
- If installed in a basement, run supply and return duct work in accordance with local codes.

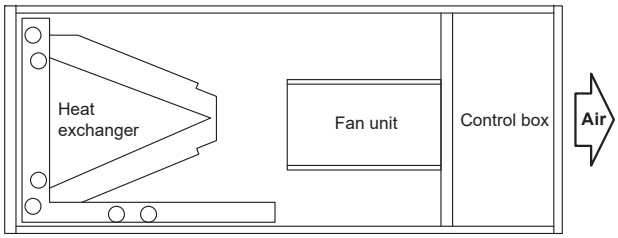
3. 4. 2. Right to left airflow application

- This product is shipped to be installed without modification in a right to left airflow configuration.



- Horizontal flow applications will normally be used in an attic or crawl space. This type of installation requires supply air plenum or duct to be connected to the supply collar and a return air plenum or duct be attached to the unit inlet collar. The supply ducts will be connected to the supply air plenum and routed thru the attic to a register in each room. Use a Non-tape sealant such as mastic or an aerosol sealant to prevent leaks in the ducts and the plenum.
- The opposite end of the return air duct is attached to a return filter grille housing. The filter grille is usually located in a wall, just below the ceiling or the ceiling in a hallway. Use a non-tape sealant such as mastic or an aerosol sealant to prevent leaks in the ducts and the plenum.

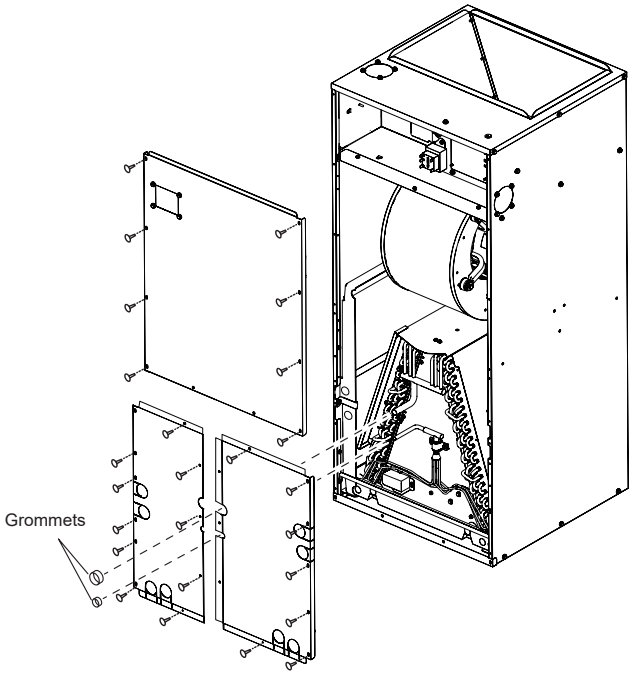
3. 4. 3. Left to right airflow application



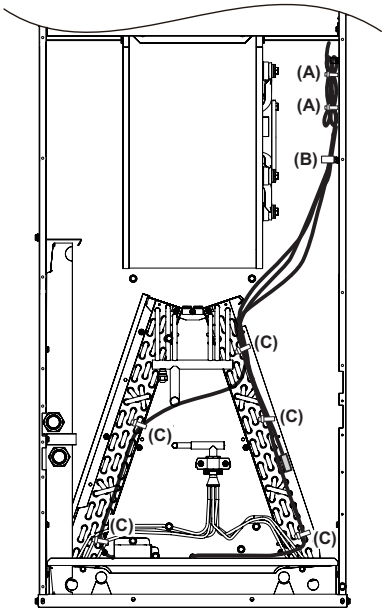
Left to right airflow application require internal configuration changes.

(1) Remove the panels.

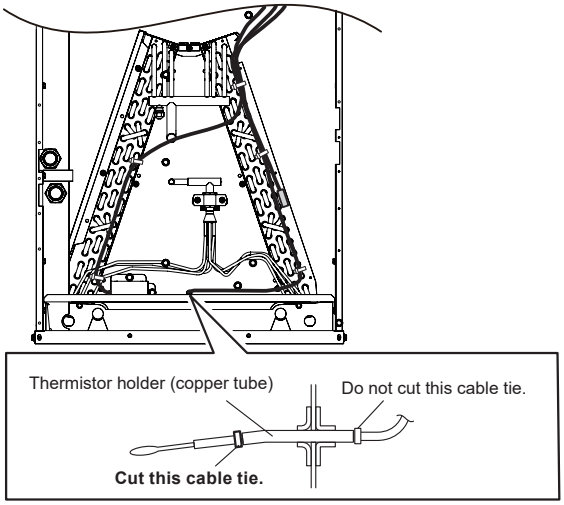
* Do not lose the grommets that protects the refrigerant pipes.



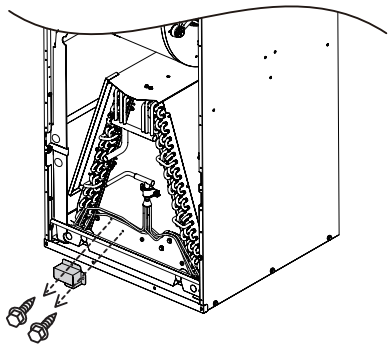
(2) Untie the cables.
- (A) Cut the cable tie (medium).
- (B) Remove the cable clamps and screws. 1 set will be reused in step (15).
- (C) Cut the cable ties (small) that binds the cable to the piping. Binding position and the number varies depending on the model.



(3) Cut the cable tie that holds the room temperature thermistor inside the heat exchanger (access from the intake port), and remove the room temperature thermistor from the heat exchanger.

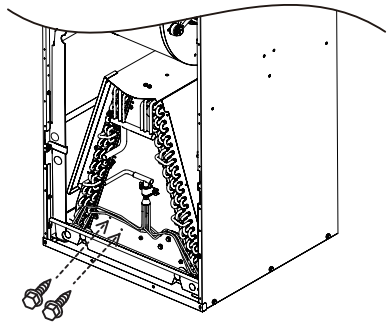


(4) Remove the refrigerant leakage sensor screws and remove the refrigerant leakage sensor.



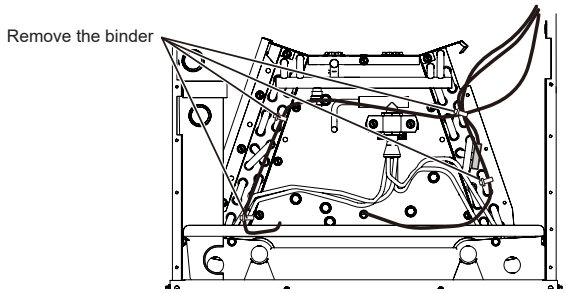
NOTE: If the gas sensing part of the refrigerant leakage sensor becomes dirty, leakage may not be detected correctly.

(5) Replace the removed screws in their original positions.

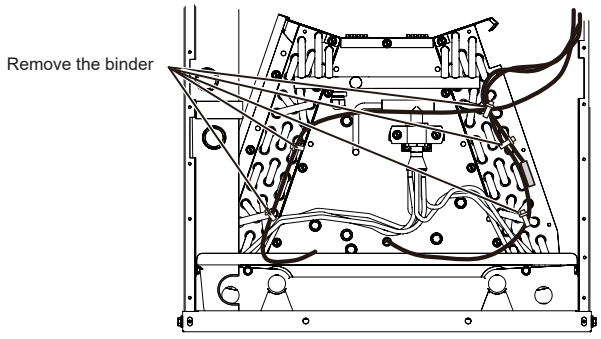


(6) Remove the binders that fix the sensor and thermistors wires.

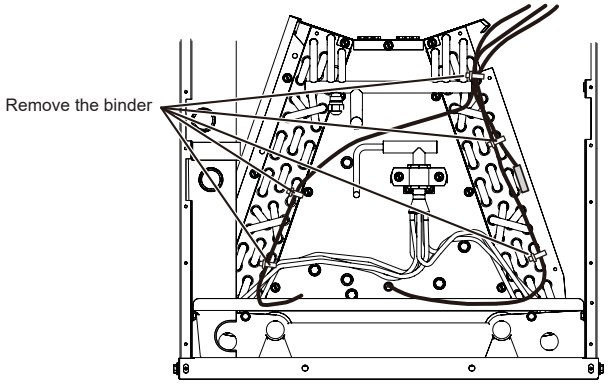
12,000 BTU model



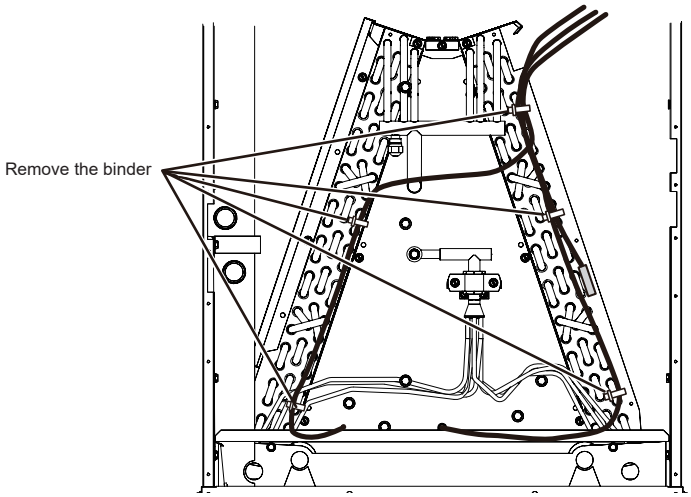
18,000 BTU model



24,000 BTU model

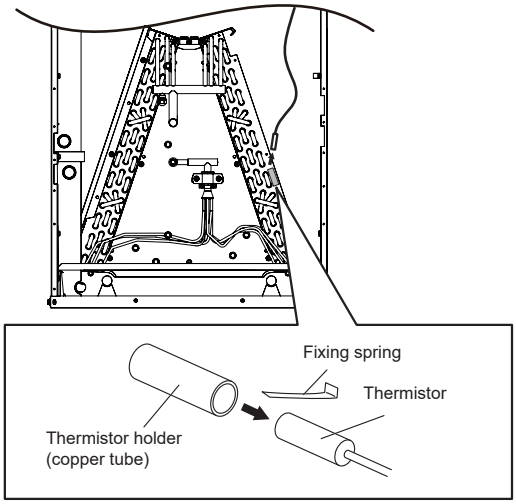


30,000/36,000/48,000 BTU model

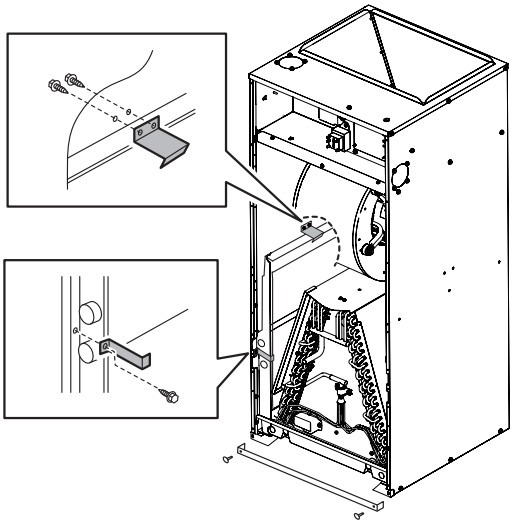


(7) Remove the thermistors for gas and liquid pipes. (2 places)

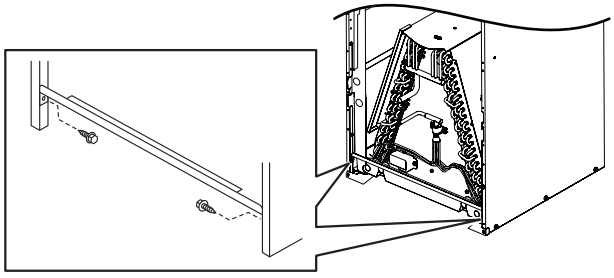
* Do not lose the fixing springs.



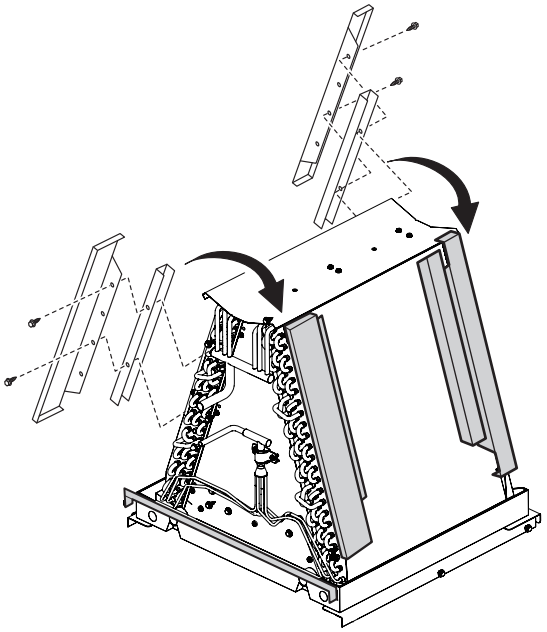
(8) Remove the fasteners on the drain pan for horizontal installation. (2 places)
Then, remove the frame on the suction side of the unit.



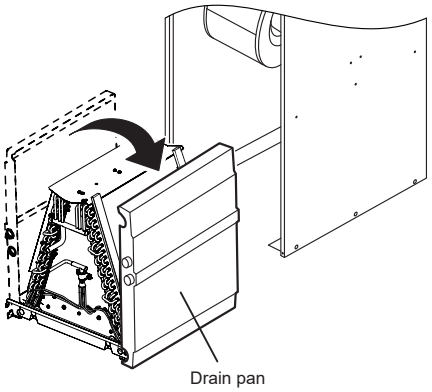
(9) Remove the fixing screw of the heat exchanger and pull out it.



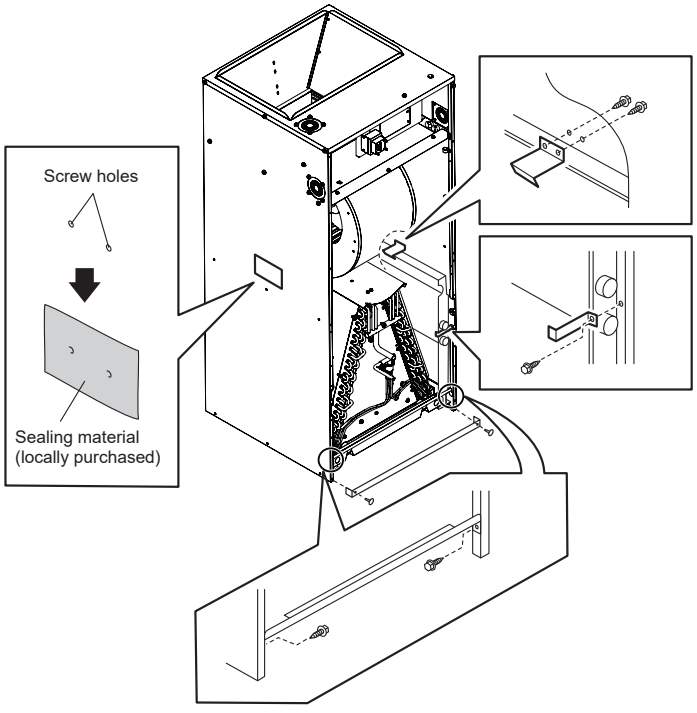
(10) Move the gutters and mounts on the heat exchanger to the right side. (2 places, for front side and back side)
Do not switch the gutter for the front side and the back side.



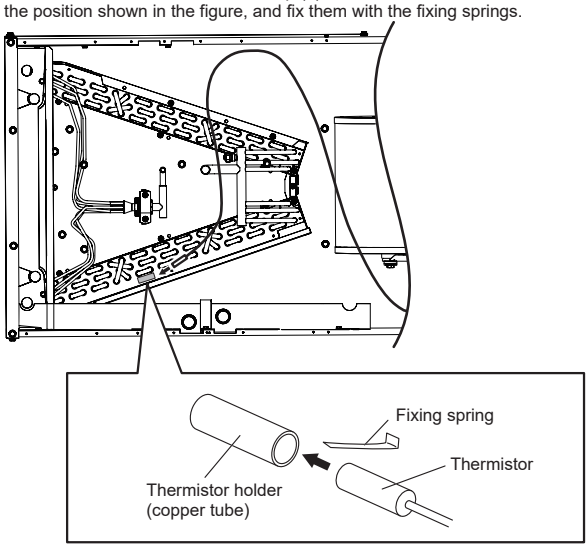
(11) Move the drain pan for horizontal installation to the right side of the heat exchanger. Then reinstall the heat exchanger.



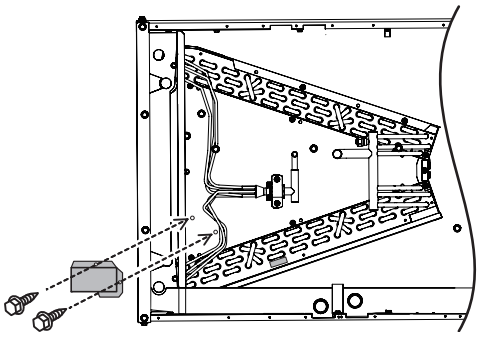
(12) Attach the fastener (2 places) for the drain pan removed in step (8) to the right side of the unit. And reinstall the frame removed in step (8) and fix it with screws.
Next, reinstall the screws removed in step (9).
Then, use a sealing material (locally purchased) to close the screw holes of the fastener removed in step (8).



(13) Insert the thermistors removed in step (7) into the thermistor holder at the position shown in the figure, and fix them with the fixing springs.

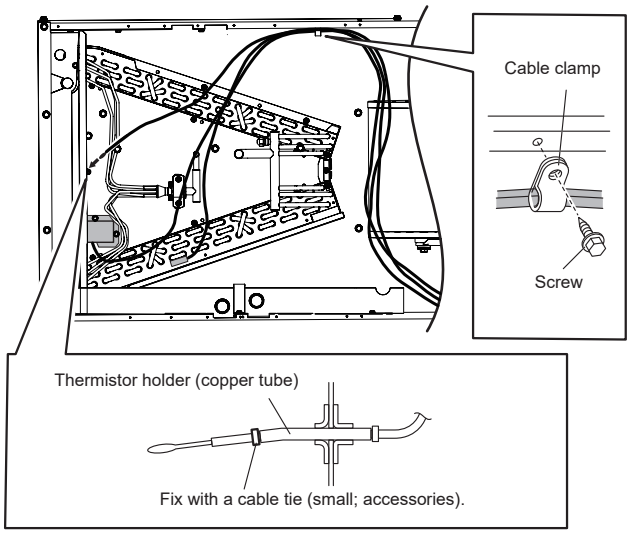


(14) Remove the screw with the washer and attach the refrigerant leakage sensor with the screw with the washer.



NOTE: If the gas sensing part of the refrigerant leakage sensor becomes dirty, leakage may not be detected correctly.
For right to left airflow application, the installation direction of the refrigerant leakage sensor cover will change.

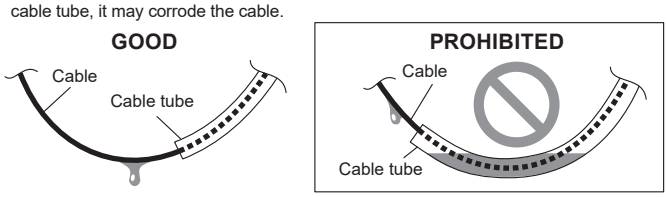
(15) Insert the room temperature thermistor removed in step (3) into the mount on the front of the heat exchanger, and fix it with a cable tie (small; accessories). (Access from the intake port.) And reinstall the refrigerant leakage sensor wiring removed in step (6). Cut off the excess of the cable tie. Then, clamp the three cables with the cable clamp and screw (use the 1 set removed in step (2)). Route the cable as shown in the figure.



(16) Bind the cables to the heat exchanger with the cable ties (small; accessories) as shown in the figure.
If the cables are not long enough or too long, loosen and adjust the cable clamp installed in step (14).

⚠ CAUTION

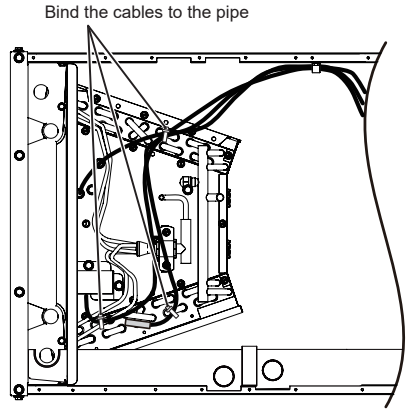
- Route the cables so that water does not collect in the cable tube. If water collects in the cable tube, it may corrode the cable.



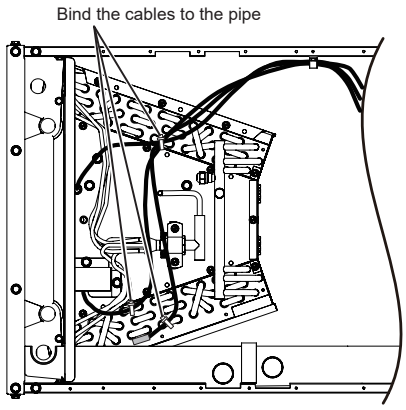
- Be sure to bind the cable from the top of the cable tube. If bind the cable directly, there is a risk of disconnection.

NOTE: Install the binder so that the refrigerant leakage sensor wiring does not come into contact with the refrigerant leakage sensor cover.

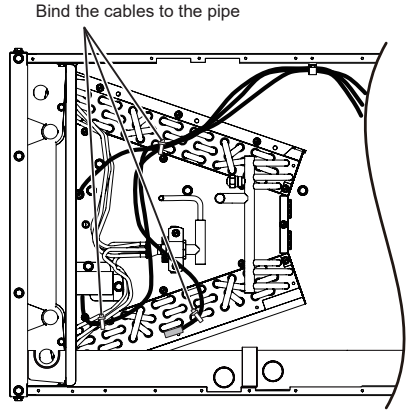
12,000 BTU model



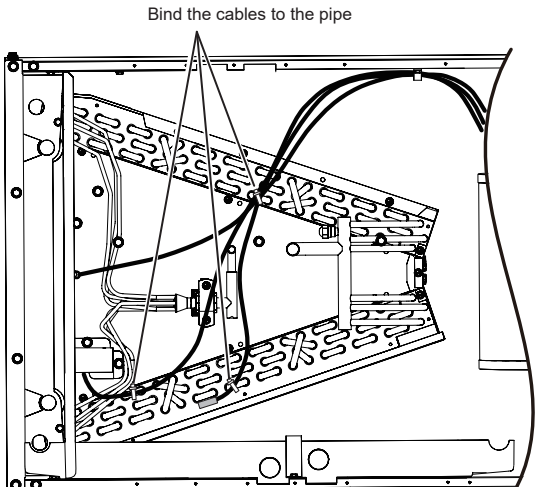
18,000 BTU model



24,000 BTU model



30,000/36,000/48,000 BTU model

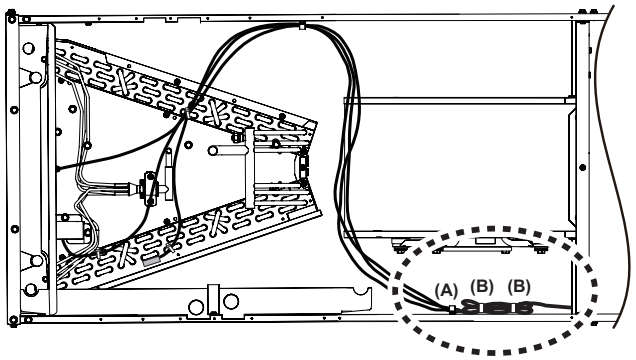


(17) Finish the cables.

⚠ CAUTION

- Make sure that the cables are not tensioned. If tension is applied to the cables, it may cause a malfunction such as disconnection.

(A) Remove excess cable slack and clamp with the cable clamp.
(B) Bind the excess cable slack with a cable tie (medium; accessories).



3. 5. Installing the unit

⚠ WARNING

- Install the air conditioner in a location which can withstand a load of at least 5 times the weight of the main unit and which will not amplify sound or vibration. If the installation location is not strong enough, the indoor unit may fall and cause injuries.

⚠ CAUTION

- Confirm the directions of the air intake and outlet before installing the unit.
- The unit takes in air from the evaporator side, and expels it from the fan side.

3. 5. 1. Installation in an unconditioned space

The exterior cabinet of this unit has a greater risk of sweating when installed in an unconditioned space than when it is installed in the conditioned space. This is primarily due to the temperature of the conditioned air moving through the indoor unit and the air circulating around the unit where it is installed. For this reason, the following is recommended for all indoor unit applications, but special attention should be paid to those installed in unconditioned spaces:

- Duct sizing and airflow are critical and must be based on the equipment selected.
- Supply and return duct attachment: If other than the factory flanges are used, the attachment of ducting must be insulated and tight to prevent sweating.
- No perimeter supply flanges are provided. If a full perimeter supply duct is used, it is the responsibility of the installer to provide duct flanges as needed, to secure and seal the supply duct to prevent air leakage and the sweating that will result.
- Apply caulking around all cabinet penetrations such as power wires, control wires, refrigerant tubing and condensate line where they enter the cabinet. Seal the power wires on the inside where they exit conduit opening. Sealing is required to prevent air leakage into the unit which can result in condensate forming inside the unit, control box, and on electrical controls. Take care not to damage, remove or compress insulation when applying the caulk.
- In some cases, the entire indoor unit can be wrapped with insulation. This can be done as long as the unit is completely enclosed in insulation, sealed and service access is provided to prevent accumulation of moisture inside the insulation wrap.

• An auxiliary overflow pan is recommended to protect the structure from excessive cabinet sweating or a restricted heat exchanger drain line.
• Apply caulking around all cabinet penetrations such as power wires, control wires, refrigerant tubing and condensate line where they enter the cabinet. Seal the power wires on the inside where they exit conduit opening. Sealing is required to prevent air leakage into the unit which can result in condensate forming inside the unit, control box, and on electrical controls. Take care not to damage, remove or compress insulation when applying the caulk.

3. 5. 2. Closet Installation

Prior to installing the indoor unit make sure the holes are cut into the floor for the refrigerant pipes, the drain line, the electrical wiring, the remote controller wiring.

(1) Remove the fan unit and control box access panel.
(2) Remove the heat exchanger access panel.
(3) Place the unit into position using one of the following choices:
  A) If the Combustible Floor Base is used you slide the unit on to the combustible floor base until the unit is touching the flanges on the back of the floor base.
  B) If the Combustible Floor Base is not used you slide the unit over the duct opening until the opening in the unit lines up with the duct opening in the floor.
(4) Secure the unit by one of the two choices:
  A) If the Combustible Floor Base is used you secure the furnace to the floor by drilling two holes through the furnace base and the floor base at the right and left front inside corners of the cabinet. Use two screws to secure the furnace to the floor.
  B) If the Combustible Floor Base is not used you secure the unit to the floor by drilling two holes through the furnace base at the left and right front inside corners of the cabinet. Use two screws to secure the unit to the floor.
(5) Use calking, sealers, and/or tape to seal between the combustible floor base and the opening on the unit or between the opening on the unit and the duct in the floor.

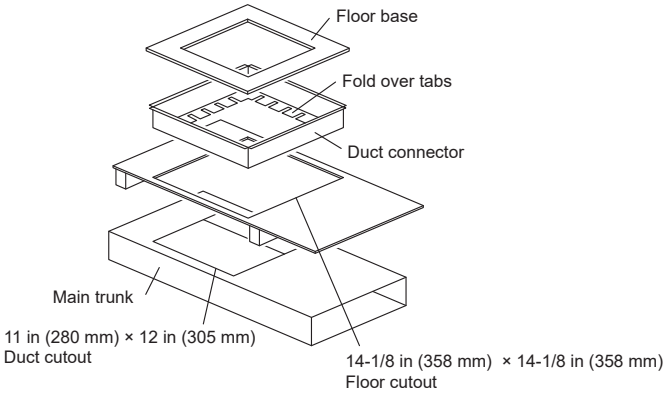
3. 5. 3. Installation on combustible flooring

⚠ WARNING

• Combustible Floor Base MUST BE USED when the unit is being installed on combustible flooring. The unit cannot be installed on carpeting.
• Failure to use the combustible floor base combustible flooring or installing the unit on carpeting could result in a fire causing personnel injury, property damage or loss of life.

Before installing the combustible floor base make sure that there is a minimum of R-2.1 insulation between the sheet metal and any wood or combustible flooring. Refer to following figure for typical combustible floor base installation.

Installation example (locally purchased)



3. 5. 4. Mounting the duct

⚠ CAUTION

• To prevent people from touching the parts inside the unit, be sure to install grilles on the inlet and outlet ports. The grilles must be designed in such a way that cannot be removed without tools.
• The external static pressure is as follows.
  12,000/18,000/24,000 BTU model: 0.08 to 0.80 in WG (20 to 200 Pa)
  30,000/36,000/48,000 BTU model: 0.20 to 0.80 in WG (50 to 200 Pa)
• If an intake duct is installed, take care not to damage the temperature sensor (the temperature sensor is attached to the intake port flange).
• Be sure to install the air filter in the air inlet. If the air filter is not installed, the heat exchanger may be clogged and its performance may decrease.

Placing unit in duct work

• Utilize flexible transitions on supply and return connections to reduce noise and vibration transmission to the structure.
• When the connecting return air duct is smaller than the heat exchanger inlet opening, construct the transition piece so that the vertical and horizontal dimensions of the transition piece do not increase more then one inch for every seven inches of length of the transition piece.
• Provide at least three feet of straight duct work preceding the unit inlet.

Duct insulation and vapor proofing:

• Properly select and install duct insulation as required by the application.
• All externally insulated duct work must have an adequate vapor seal for summer operation. This is particularly important where the duct is exposed to highly humid conditions in such places as attics, vented crawl spaces, unconditioned basements, and utility rooms. The vapor seal prevents condensation of moisture in the insulating material and subsequent loss of its insulating value.

3. 5. 5. Auxiliary overflow pan

In compliance with recognized codes, an auxiliary overflow pan must installed under all equipment containing heat exchanger that are located in any area of a structure where damage to the building or building contents may occur as a result of an overflow of the heat exchanger drain pan or a stoppage in the primary condensate drain piping.

3. 6. Pipe installation

⚠ WARNING

• 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.
• When installing and relocating the air conditioner, do not mix gases other than the specified refrigerant (R32) 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.
• 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.

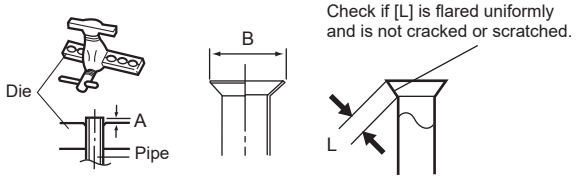
⚠ CAUTION

• Be more careful so that foreign matter (oil, water, etc.) does not enter the piping than with refrigerant R32 models. Also, when storing the piping, securely seal the openings by pinching, taping, etc.
• While brazing the pipes, be sure to blow dry nitrogen gas through them.

3. 6. 1. Pipe connection

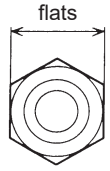
■ Flaring

Use special pipe cutter and flare tool designed for R32 pipework.
(1) Cut the connection pipe to the necessary length with a pipe cutter.
(2) Hold the pipe downward so that cuttings will not enter the pipe and remove any burrs.
(3) Insert the flare nut (always use the flare nut attached to the indoor unit(s) and outdoor unit or branch box respectively) onto the pipe and perform the flare processing with a flare tool. Use the special R32 flare tool, or the conventional flare tool. Leakage of refrigerant may result if other flare nuts are used.
(4) Protect the pipes by pinching them or with tape to prevent dust, dirt, or water from entering the pipes.



Pipe outside diameter [in (mm)]	Dimensions A [in (mm)]	Dimensions B $^{0\ (0)}_{-0.015\ (-0.4)}$ [in (mm)]
	Flare tool for R32, clutch type	
1/4 (6.35)	0 to 0.020 (0 to 0.5)	3/8 (9.1)
3/8 (9.52)		1/2 (13.2)
1/2 (12.70)		5/8 (16.6)
5/8 (15.88)		3/4 (19.7)
3/4 (19.05)		15/16 (24.0)

When using conventional (R22) flare tools to flare R32 pipes, the dimensions A should be approximately 0.020 in (0.5 mm) more than indicated in the table (for flaring with R32 flare tools) to achieve the specified flaring. Use a thickness gauge to measure the dimensions A. It is recommended that a R32 flaring tool is used.



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

NOTE: The flare nut specification is compliant with ISO14903.

■ Bending pipes

- If pipes are shaped by hand, be careful not to collapse them.
- Do not bend the pipes in an angle more than 90°.
- When pipes are repeatedly bend 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.

⚠ CAUTION

- To prevent breaking of the pipe, avoid sharp bends. Bend the pipe with a radius of curvature of 1- 15/16 in (50 mm) or over.
- If the pipe is bent repeatedly at the same place, it will break.

■ Flare connection

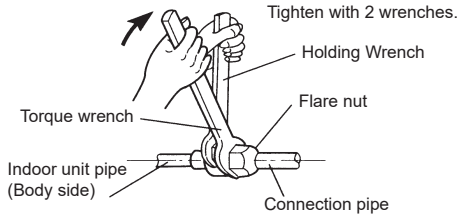
⚠ CAUTION

- Be sure to apply the pipe against the port on the indoor 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 indoor unit pipe until immediately before connecting the connection pipe.
- Do not use mineral oil on flared part. Prevent mineral oil from getting into the system as this would reduce the lifetime of the units.
- When flared joints are reused indoors, the flare part shall be re-fabricated.

(1) Detach the caps and plugs from the pipes.
(2) Centering the pipe against port on the indoor unit, turn the flare nut with your hand.
(3) When the flare nut is tightened properly by your hand, hold the body side coupling with a separate spanner, then tighten with a torque wrench. (See the table below for the flare nut tightening torques.)

⚠ CAUTION

- Hold the torque wrench at its grip, keeping it in the right angle with the pipe, in order to tighten the flare nut correctly.
- Tighten the flare nuts with a torque wrench using the specified tightening method. Otherwise, the flare nuts could break after a prolonged period, causing refrigerant to leak and generate a hazardous gas if the refrigerant comes into contact with a flame.

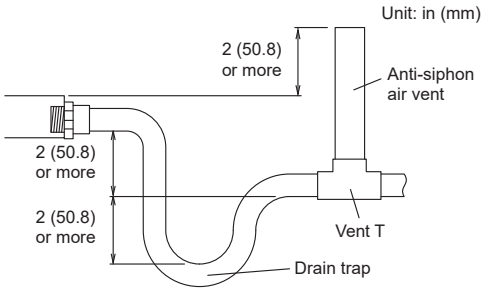


Flare nut [in (mm)]	Tightening torque [ft·lb (N·m)]
1/4 (6.35) dia.	12 to 13 (16 to 18)
3/8 (9.52) dia.	24 to 31 (32 to 42)
1/2 (12.70) dia.	36 to 45 (49 to 61)
5/8 (15.88) dia.	46 to 55 (63 to 75)
3/4 (19.05) dia.	66 to 81 (90 to 110)

3. 6. 2. Installing drain pipes

The drain pan has two 3/4 in NPT (National pipe thread) female primary and two secondary connections (left or right hand). Horizontal pan has two 3/4 in NPT female, one primary and one secondary. Piping from each fitting used is to have 2 in minimum trap and each run in such a manner as to provide enough slope for adequate drainage to a visible area. Do not pipe these two fittings together into a common drain. Cap unused connection.

Installation example (locally purchased)



⚠ CAUTION

- Be sure to properly insulate the drain pipes.
- Make sure the drain water is properly drained.

3. 7. Electrical wiring

⚠ WARNING

- Electrical work must be performed in accordance with this Manual 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.
- Before starting work, check that power is not being supplied to the indoor unit and outdoor unit.
- Use the included connection cables and power cables or ones specified by the manufacturer. Improper connections, insufficient insulation, or exceeding the allowable current can cause electric shock or fire.
- For wiring, use the prescribed type of cables, connect them securely, making sure that there are no external forces of the cables applied to the terminal connections. Improperly connected or secured cables can cause serious accidents such as overheating the terminals, electric shock, or fire.
- Do not modify the power cables, use extension cables, or use any branches in the wiring. Improper connections, insufficient insulation, or exceeding the allowable current can cause electric shock or fire.
- Match the terminal board numbers and connection cable colors with those of the outdoor unit. Erroneous wiring may cause burning of the electric parts.
- Securely connect the connection cables to the terminal board. In addition, secure the cables with wiring holders. Improper connections, either in the wiring or at the ends of the wiring, can cause a malfunction, electric shock, or fire.
- Always fasten the outside covering of the connection cable with the cable clamp. (If the insulator is chafed, electric leakage may occur.)
- 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.
- Install sleeves into any holes made in the walls for wiring. Otherwise, a short circuit could result.
- Install a ground leakage breaker. In addition, install the ground leakage breaker so that the entire AC main power supply is cut off at the same time. Otherwise, electric shock or fire could result.
- Always connect the ground (earth) cable.
  Improper grounding (earthing) work can cause electric shocks.
- Install the remote controller cables so as not to be touched directly with your hand.
- Perform wiring work in accordance with standards so that the air conditioner can be operated safely and positively.
- Connect the connection cable firmly to the terminal board. Imperfect installation may cause a fire.

⚠ CAUTION

- Ground the unit.
  Do not connect the ground (earth) cable to a gas pipe, water pipe, lightning rod, or a telephone ground (earth) cable.
  Improper grounding (earthing) may cause electric shocks.
- Do not connect power supply cables to the transmission or remote controller terminals, as this will damage the product.
- Never bundle the power supply cable and transmission cable together. Bundling these cables together will cause miss operation.
- When handling PCB, static electricity charged in the body may cause malfunction of the PCB. Follow the cautions below:
  – Establish a ground for the indoor and outdoor units and peripheral devices.
  – Cut power (breaker) off.
  – Touch metal part of the indoor and outdoor units for more than 10 seconds to discharge static electricity charged in the body.
  – Do not touch terminals of parts and patterns implemented on PCB.

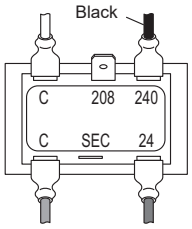
3. 7. 1. Matching to the power supply voltage

⚠ CAUTION

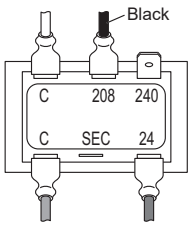
Be sure to perform this step. If the power supply voltage and wiring do not match, the product may not work.

- Check the wiring by referring to the figure below and change it according to the power supply voltage. The location and orientation of the power transformer varies depending on the model.

For 230 V (Factory setting)

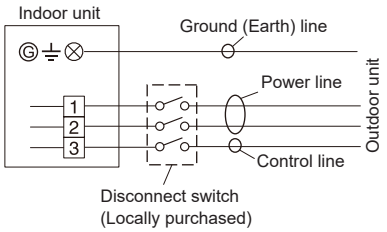


For 208 V



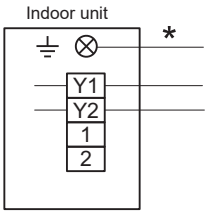
3. 7. 2. Wiring system diagram

■ Connection cable (to outdoor unit)



NOTES: Disconnect Switch - Field supplied if required by local code. Select the correct capacity of disconnect switch according to the load.

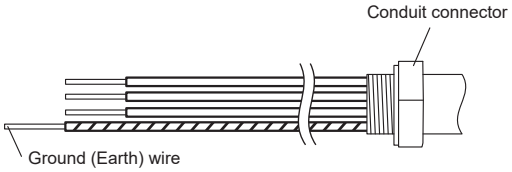
■ Wired remote controller cable



3. 7. 3. Connection cable preparation

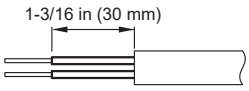
■ Connection cable

• Adjust the length of power supply cable to avoid excessive tension.
• Keep the earth (ground) wire longer than the other wires.



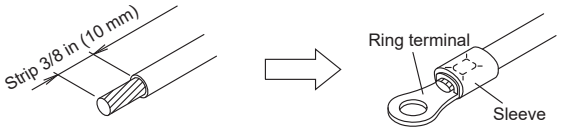
• Use a 4-core wire cable.

■ Remote controller cable



3. 7. 4. How to connect wiring to the terminals.

(1) Use ring terminals with insulating sleeves as shown in the figure below to connect to the terminal block.
(2) Securely crimp the ring terminals to the wires using an appropriate tool so that the wires do not come loose.

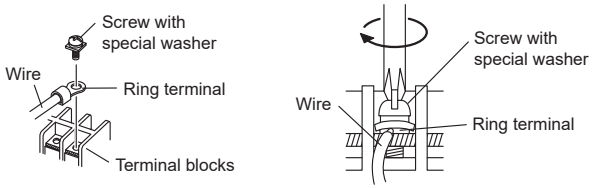


(3) Use the specified wires, connect them securely, and fasten them so that there is no stress placed on the terminals.
(4) Use an appropriate screwdriver to tighten the terminal screws.
Do not use a screwdriver that is too small, otherwise, the screw heads may be damaged and prevent the screws from being properly tightened.
(5) Do not tighten the terminal screws too much, otherwise, the screws may break.
(6) Refer to the table below for the terminal screw tightening torques.

⚠ WARNING

Use ring terminals and tighten the terminal screws to the specified torques, otherwise, abnormal overheating may be produced and possibly cause serious damage inside the unit.

Tightening torque [lbf·in (N·m)]	
M3.5 screw	7 to 9 (0.8 to 1.0)
M4 screw	11 to 16 (1.2 to 1.8)

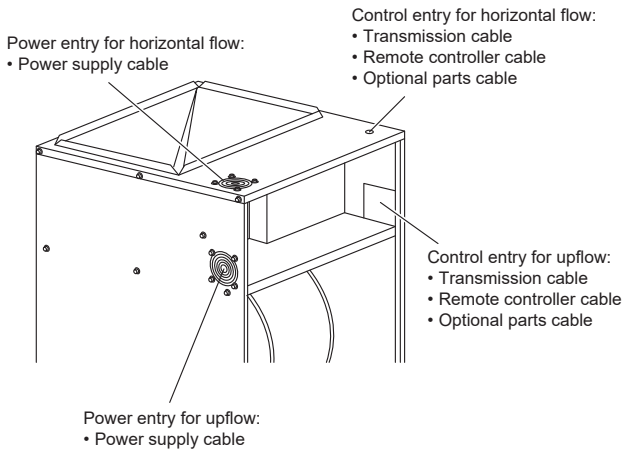


3. 7. 5. Connection wiring

⚠ CAUTION

• To protect the cable insulation after opening a knockout hole, remove any burrs from the edge of the hole.

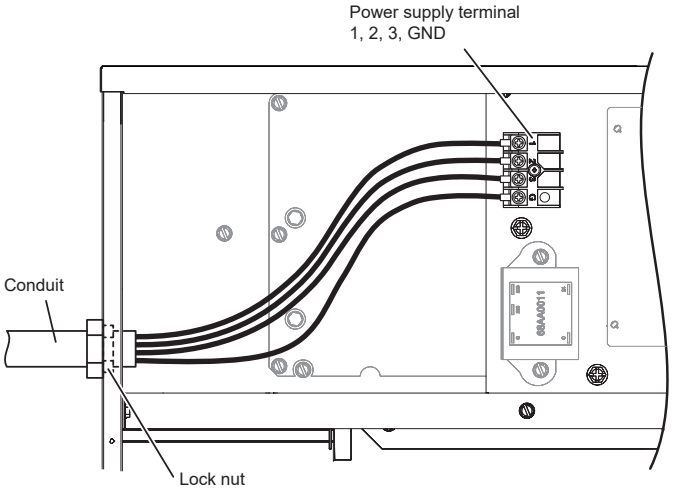
(1) Entries position



(2) Power entry connection

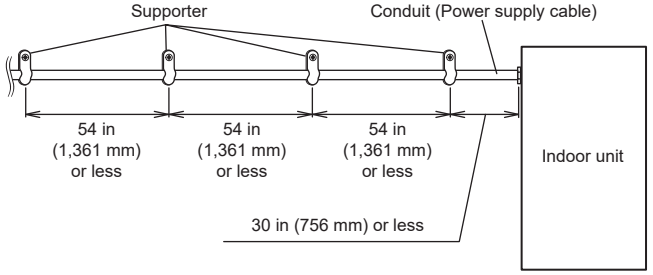
⚠ CAUTION

• Do not pass the transmission cable, remote control cable or optional parts cable through the power entry.



Do not bind the power supply cable and other cables together.

Fix the conduit with the supporters as shown below.

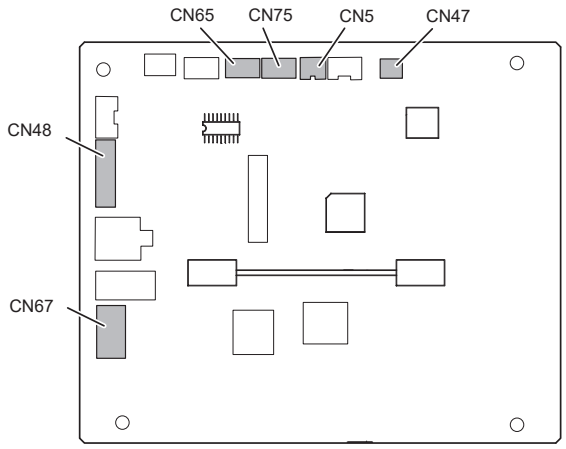


4. OPTIONAL INSTALLATION WORK

4. 1. Optional kit installation

⚠ WARNING

Regulation of cable differs from each locality, refer in accordance with local rules.



This air conditioner can be connected with the following optional kits.
For details on how to install optional parts, refer to the installation manual included in each item.

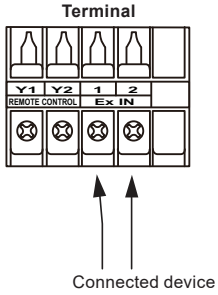
Connector No.	Option type
CN47*1	External output
CN5	Remote sensor
CN48	IR Receiver
CN67	Heater kit
CN65	Other optional parts (External input and output PCB, Modbus converter, KNX convertor, WLAN interface *2 etc.) may be connectable.
CN75	

*1: For external output terminal setting, refer to Function No.60 in "6. FUNCTION SETTING".
*2: Be sure to connect the WLAN interface to CN75 .

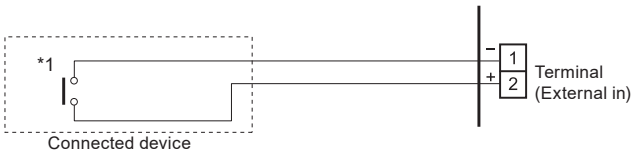
4. 2. External input and output

4. 2. 1. External input

- Indoor unit functions such as Operation/Stop or Forced stop can be done by using indoor unit terminals.
- "Operation/Stop" mode or "Forced stop" mode can be selected with function setting of indoor unit.
- A twisted pair cable (22 AWG) should be used. Maximum length of cable is 492 ft. (150 m).
- Use an external input and output cable with appropriate external dimensions, depending on the number of cables to be installed.
- The wire connection should be separated from the power cable.



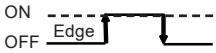
● Dry contact terminal
When a power supply is unnecessary at the input device you want to connect, use the Dry contact terminal.



*1: The switch can be used on the following condition: DC 12 V to 24 V, 1 mA to 15 mA.

■ Operation behavior

● Input signal type



When function setting is "Operation/Stop" mode 1.

Input signal	Command
OFF → ON	Operation
ON → OFF	Stop

When function setting is "Forced stop" mode.

Input signal	Command
OFF → ON	Forced stop
ON → OFF	Normal

* When the forced stop is triggered, indoor unit stops and Operation/Stop operation by a remote controller is restricted.

When function setting is "Operation/Stop" mode 2.

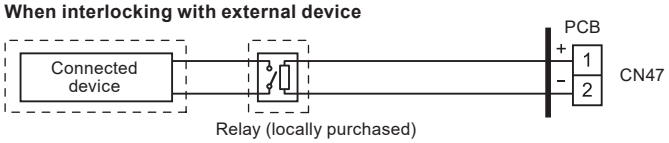
Input signal	Command
OFF → ON	Operation
ON → OFF	Stop (R.C. disabled)

4. 2. 2. External output

- A twisted pair cable (22AWG) should be used. Maximum length of cable is 82 ft (25 m).
- Use an external input and output cable with appropriate external dimensions, depending on the number of cables to be installed.
- Output voltage: Hi DC12V±2V, Lo 0V.
- Permissible current: 50mA

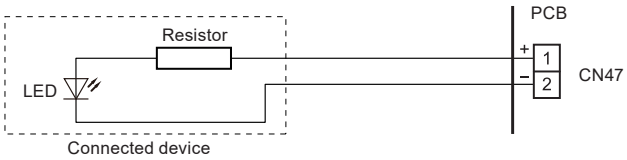
■ Output select

When interlocking with external device



or

When displaying "Operation/Stop"



■ Operation behavior

Functions of the external output terminal can be switched.

(♦... Factory setting)

Function setting		Status	Output voltage	
60	00	Stop	0 V	♦
		Operation	DC 12 V	
	01 - 04	OFF	0 V	
		Cooling thermostat ON	DC 12 V	
	05	OFF	0 V	
		Heating operation ON	DC 12 V	
	06	Stop	0 V	
		Operation	DC 12 V	
	07 - 08	OFF	0 V	
		Cooling thermostat ON	DC 12 V	
	09	Normal	0 V	
		Error	DC 12 V	
	10	Indoor unit fan stop	0 V	
		Indoor unit fan operation	DC 12 V	
	11	External heater OFF	0 V	
		External heater ON	DC 12 V	

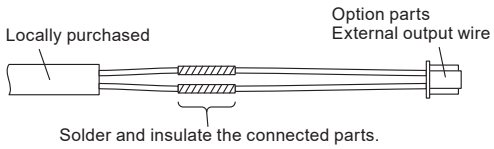
Refer to the Design & technical manual.

4. 2. 3. Connection methods

■ Wire modification

- Remove insulation from wire attached to wire kit connector.
- Remove insulation from locally purchased cable. Use crimp type insulated butt connector to join field cable and wire kit wire.
- Connect the wire with connecting wire with solder.

IMPORTANT: Be sure to insulate the connection between the wires.



• Connecting wires to the terminals.

Use ring terminals with insulating sleeves to connect to the terminal block.

4. 3. Heater connection

⚠ WARNING

- For personal safety be sure to turn the electrical power "OFF" at the main entrance (Home Circuit Breaker Box) and at the unit control box circuit breakers before attempting any service or maintenance operations. Homeowners should never attempt to perform any maintenance which requires opening the indoor unit control box panel.
- This indoor unit is not equipped with a shield that covers the line voltage electrical supply wires and the circuit breaker connections. Take precautions to prevent accidental electrical shock. Be sure to turn the electrical power "OFF" at the main entrance (Home Circuit Breaker Box) and at the control box circuit breakers before removing the front panel.

NOTE:
Cannot be used with remote sensor (optional).

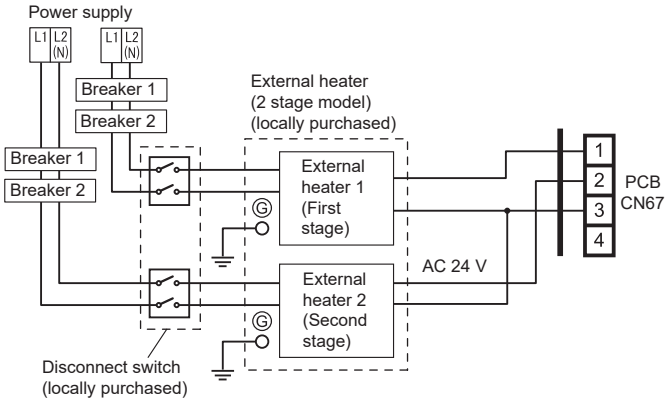
4. 3. 1. Wiring diagram of heaters

Breaker 1: Ground Fault Equipment Breaker (GFEB)
Breaker 2: Maximum Circuit Breaker (MAX. CKT. BKR)

NOTE:
For details of the connection terminal functions, refer to the Design & Technical manual.

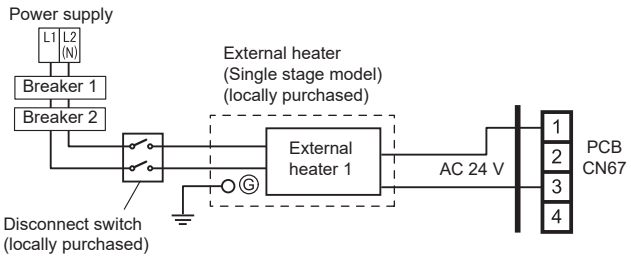
Example of external heater 2 stage model

NOTE:
If the external heater 2 stage model is in-line, set the "function setting 60" to "10" or "11". Refer to "6. FUNCTION SETTING".



For connection to each terminal, use the connector of the following optional parts.
• CN67: UTY-XWZXZP

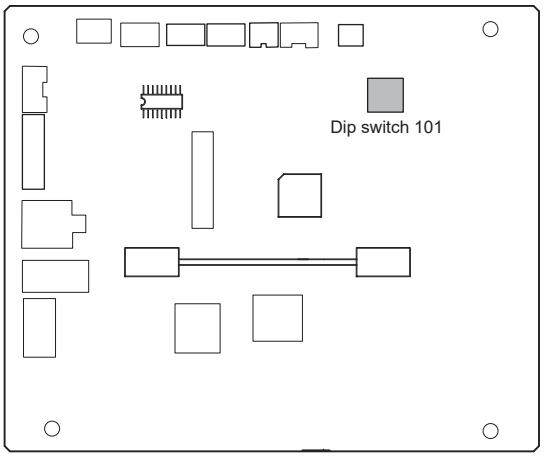
Example of external heater single stage model (AC 24 V controlled)



For connection to the terminal, use the connector of the following optional parts.
• CN67: UTY-XWZXZK

4. 3. 2. DIP switch 101 setting

Change the following settings by using the DIP switch.



(1) Set to Enable when using an AC24V heater (optional parts).
(2) The fan delay setting can be used when the auxiliary heater is mounted. When the operation is stopped when the indoor unit is operating with an auxiliary heater, the operation continues 1 minutes.

(♦... Factory setting)

DIP switch 101	DIP SW state		Details
	ON	OFF	
1	-	- ♦	Cannot be used (Do not change)
2	Enable ♦	Disable	External AC 24V heater
3	Enable ♦	Disable	Fan delay setting

⚠ WARNING! ⚠

WHEN ELECTRIC AUXILLARY HEAT IS ADDED, INSTALLER MUST VERIFY DIP SWITCH SW101-3 IS IN THE ON POSITION!

5. REMOTE CONTROL INSTALLATION

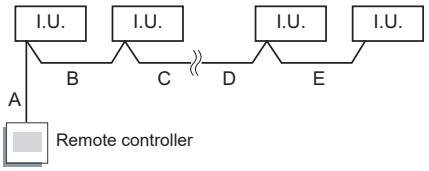
⚠ CAUTION

- Be sure to turn off the electrical breaker before making settings.
- When setting DIP switches, do not touch any other parts on the circuit board directly with your bare hands.
- Use an insulated screwdriver to set the DIP switches.

5. 1. Group control

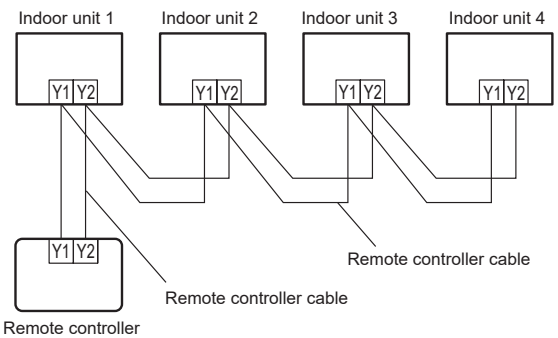
A number of indoor units can be operated at the same time using a single remote controller.
*When different types of indoor units (such as wall mounted type and cassette type, cassette type and duct type, or other combinations) are connected using group control system, some functions may no longer be available.

Connect up to 16 indoor units in a system.



A, B, C, D, E : Remote controller cable.
A+B+C+D+E ≤ 1,640 ft (500 m).

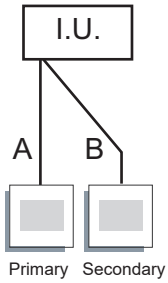
Example of wiring method



5. 2. Multiple remote control

Up to 2 remote controllers can be used to operate one indoor unit

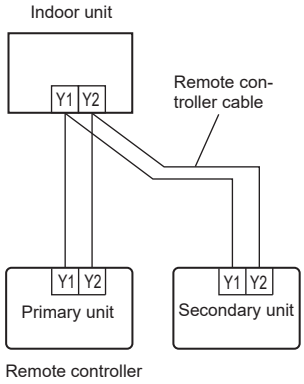
NOTE: Depending on the remote controller, this function may not be available.



A, B : Remote controller cable. (Refer to “2. 6. Electrical requirement”)
A+B ≤ 1,640 ft (500 m)

- The timer and self-diagnosis functions cannot be used on the secondary units.

(1) Wiring method (indoor unit to remote controller)



6. FUNCTION SETTING

To change the function settings, refer to the procedures described in the installation manual of the remote controller (wired type).
The function settings are as follows.

6. 1. Function details

■ Filter sign

Select appropriate intervals for displaying the filter sign on the indoor unit according to the estimated amount of dust in the air of the room.
If the indication is not required, select "No indication" (03).

(♦... Factory setting)

Function Number	Setting Value	Setting Description	
11	00	Standard (2500 hours)	
	01	Long interval (4400 hours)	
	02	Short interval (1250 hours)	
	03	No indication	♦

■ Room temperature control for indoor unit sensor

Depending on the installed environment, correction of the room temperature sensor may be required.
Select the appropriate control setting according to the installed environment.
The temperature correction values show the difference from the Standard setting “00” (manufacturer’s recommended value).

(♦... Factory setting)

Function Number		Setting Value	Setting Description	
30 (For cooling)	31 (For heating)	00	Standard setting	♦
		01	No correction 0 °F (0.0 °C)	
		02	-1 °F (-0.5 °C)	More Cooling Less Heating
		03	-2 °F (-1.0 °C)	
		04	-3 °F (-1.5 °C)	
		05	-4 °F (-2.0 °C)	
		06	-5 °F (-2.5 °C)	
		07	-6 °F (-3.0 °C)	
		08	-7 °F (-3.5 °C)	
		09	-8 °F (-4.0 °C)	
		10	+1 °F (+0.5 °C)	Less Cooling More Heating
		11	+2 °F (+1.0 °C)	
		12	+3 °F (+1.5 °C)	
		13	+4 °F (+2.0 °C)	
		14	+5 °F (+2.5 °C)	
		15	+6 °F (+3.0 °C)	
		16	+7 °F (+3.5 °C)	
		17	+8 °F (+4.0 °C)	

■ Room temperature control for wired remote controller sensor

Depending on the installed environment, correction of the wire remote temperature sensor may be required.
Select the appropriate control setting according to the installed environment.
To change this setting, set Function 42 to Both “01”.
Ensure that the Thermo Sensor icon is displayed on the remote controller screen.

(♦... Factory setting)

Function number		Setting value	Setting description	
35 (For cooling)	36 (For heating)	00	No correction	♦
		01	No correction 0 °F (0.0 °C)	
		02	-1 °F (-0.5 °C)	More Cooling Less Heating
		03	-2 °F (-1.0 °C)	
		04	-3 °F (-1.5 °C)	
		05	-4 °F (-2.0 °C)	
		06	-5 °F (-2.5 °C)	
		07	-6 °F (-3.0 °C)	
		08	-7 °F (-3.5 °C)	
		09	-8 °F (-4.0 °C)	
		10	+1 °F (+0.5 °C)	Less Cooling More Heating
		11	+2 °F (+1.0 °C)	
		12	+3 °F (+1.5 °C)	
		13	+4 °F (+2.0 °C)	
		14	+5 °F (+2.5 °C)	
		15	+6 °F (+3.0 °C)	
		16	+7 °F (+3.5 °C)	
		17	+8 °F (+4.0 °C)	

■ Auto restart

Enable or disable automatic restart after a power interruption.

(♦... Factory setting)

Function Number	Setting Value	Setting Description	
40	00	Enable	♦
	01	Disable	

* Auto restart is an emergency function such as for power outage etc. Do not attempt to use this function in normal operation. Be sure to operate the unit by remote controller or external device.

■ Room temperature sensor switching

(Only for wired remote controller)
When using the Wired remote controller temperature sensor, change the setting to "Both" (01).

(♦... Factory setting)

Function Number	Setting Value	Setting Description	
42	00	Indoor unit	♦
	01	Both	

00: Sensor on the indoor unit is active.
01: Sensors on both indoor unit and wired remote controller are active.
* Remote controller sensor must be turned on by using the remote controller

■ Cold air prevention

*This setting is to disable the cold air prevention function during heating operation. When disabled, the fan setting will always follow the setting on the remote controller. (Excluding defrost mode).

(♦... Factory setting)

Function Number	Setting Value	Setting Description	
43	00	Enable	♦
	01	Disable	

■ External input control

"Operation/Stop" mode or "Forced stop" mode can be selected.

(♦... Factory setting)

Function Number	Setting Value	Setting Description	
46	00	Operation/Stop mode 1	♦
	01	(Setting prohibited)	
	02	Forced stop mode	
	03	Operation/Stop mode 2	

■ Room temperature sensor switching (Aux.)

To use the temperature sensor on the wired remote controller only, change the setting to "Wired remote controller" (01). This function will only work if the function setting 42 is set at "Both" (01)

(♦... Factory setting)

Function Number	Setting Value	Setting Description	
48	00	Both	
	01	Wired remote controller	♦

■ Indoor unit fan control for energy saving for cooling

Enables or disables the power-saving function by controlling the indoor unit fan rotation when the outdoor unit is stopped during cooling operation.

(♦... Factory setting)

Function Number	Setting Value	Setting description	
49	00	Disable	
	01	Enable	
	02	Remote controller	♦

00: When the outdoor unit is stopped, the indoor unit fan operates continuously following the setting on the remote controller.
01: When the outdoor unit is stopped, the indoor unit fan operates intermittently at a very low speed.
02: Enable or disable this function by remote controller setting.

*When using a wired remote controller without Indoor unit fan control for energy saving for cooling function, or when connecting a single split converter, the setting cannot be made by using the remote controller. Set to "00" or "01".
To confirm if the remote controller has this function, refer to the operation manual of each remote controller.

■ Switching functions for external output terminal

Functions of the external output terminal can be switched.

(♦... Factory setting)

Function number	Setting value	Setting description	
60	00	Operation status	♦
	01-04	Cooling thermostat status	
	05	Heating operation status	
	06	Operation status	
	07-08	Cooling thermostat status	
	09	Error status	
	10	Fresh air control	
	11	Auxiliary heater	

Refer to the Design & technical manual.

■ Control switching of external heaters

Sets the control method for the external heater being used.
For details of the control method, see the Design & Technical Manual.

(♦... Factory setting)

Function number	Setting value	Setting description	
61	00	Auxiliary heater control 1	♦
	01	Auxiliary heater control 2	
	02	Heat pump prohibition control	
	03	Heater selection control using outdoor temperature 1	
	04	Heater selection control using outdoor temperature 2	
	05	Auxiliary heater control by outdoor temperature 3	
	06	Auxiliary heat pump control	
	07	Auxiliary heat pump control by outdoor temperature 1	
	08	Auxiliary heat pump control by outdoor temperature 2	
	09	Auxiliary heat pump control by outdoor temperature 3	
	10	Heater selection control using outdoor temperature 4	

■ Operating temperature switching of external heaters

- Sets the temperature conditions when the external heater is ON.
- For the temperature conditions, see “Temperature conditions when the external heater is ON”. For a more detailed explanation, see the Design & Technical Manual.

(♦... Factory setting)

Function number	Setting value	Setting description	
62	00	Setting 0	♦
	01	Setting 1	
	02	Setting 2	
	03	Setting 3	
	04	Setting 4	
	05	Setting 5	
	06	Setting 6	
	07	Setting 7	
	08	Setting 8	
	09	Setting 9	
	10	Setting 10	
	11	Setting 11	
	12	Setting 12	
	13	Setting 13	
	14	Setting 14	
	15	Setting 15	
	16	Setting 16	
	17	Setting 17	

Temperature conditions when the external heater is ON/OFF
Temperature (t) = Room temperature - set temperature

		Set value of function: 61			
		00		01 to 10	
		ON	OFF	ON	OFF
Set value of function: 62	00	t < -5.4°F (-3°C)	t ≥ -1.8°F (-1°C)	t ≤ -0.9°F (-0.5°C)	t ≥ +0.9°F (+0.5°C)
	01	t < -3.6°F (-2°C)	t ≥ -1.8°F (-1°C)	t ≤ -1.8°F (-1°C)	t ≥ +0.9°F (+0.5°C)
	02	t < -3.6°F (-2°C)	t ≥ -1.8°F (-1°C)	t ≤ -3.6°F (-2°C)	t ≥ +0.9°F (+0.5°C)
	03	t < -5.4°F (-3°C)	t ≥ -1.8°F (-1°C)	t ≤ -5.4°F (-3°C)	t ≥ +0.9°F (+0.5°C)
	04	t < -7.2°F (-4°C)	t ≥ -1.8°F (-1°C)	t ≤ -7.2°F (-4°C)	t ≥ +0.9°F (+0.5°C)
	05	t < -9.0°F (-5°C)	t ≥ -1.8°F (-1°C)	t ≤ -9.0°F (-5°C)	t ≥ +0.9°F (+0.5°C)
	06	t < -5.4°F (-3°C)	t ≥ -0.9°F (-0.5°C)	t ≤ -0.9°F (-0.5°C)	t ≥ 0°F (0°C)
	07	t < -3.6°F (-2°C)	t ≥ -0.9°F (-0.5°C)	t ≤ -1.8°F (-1°C)	t ≥ 0°F (0°C)
	08	t < -3.6°F (-2°C)	t ≥ -0.9°F (-0.5°C)	t ≤ -3.6°F (-2°C)	t ≥ 0°F (0°C)
	09	t < -5.4°F (-3°C)	t ≥ -0.9°F (-0.5°C)	t ≤ -5.4°F (-3°C)	t ≥ 0°F (0°C)
	10	t < -7.2°F (-4°C)	t ≥ -0.9°F (-0.5°C)	t ≤ -7.2°F (-4°C)	t ≥ 0°F (0°C)
	11	t < -9.0°F (-5°C)	t ≥ -0.9°F (-0.5°C)	t ≤ -9.0°F (-5°C)	t ≥ 0°F (0°C)
	12	t < -5.4°F (-3°C)	t ≥ 0°F (0°C)	t ≤ -0.9°F (-0.5°C)	t ≥ -0.9°F (-0.5°C)
	13	t < -3.6°F (-2°C)	t ≥ 0°F (0°C)	t ≤ -1.8°F (-1°C)	t ≥ -0.9°F (-0.5°C)
	14	t < -3.6°F (-2°C)	t ≥ 0°F (0°C)	t ≤ -3.6°F (-2°C)	t ≥ -0.9°F (-0.5°C)
	15	t < -5.4°F (-3°C)	t ≥ 0°F (0°C)	t ≤ -5.4°F (-3°C)	t ≥ -0.9°F (-0.5°C)
	16	t < -7.2°F (-4°C)	t ≥ 0°F (0°C)	t ≤ -7.2°F (-4°C)	t ≥ -0.9°F (-0.5°C)
	17	t < -9.0°F (-5°C)	t ≥ 0°F (0°C)	t ≤ -9.0°F (-5°C)	t ≥ -0.9°F (-0.5°C)

■ Outdoor temperature zone boundary temperature A

Setting required if changing of the outdoor temperature setting for heat pump prohibition zone is required when auxiliary heater control by outdoor temperature 1 and 2 are performed on the indoor unit.

For details of the control method, see the Design & Technical Manual.

(♦... Factory setting)

Function number	Setting value	Setting description	
66	00	-4.0 °F (-20 °C)	♦
	01	-0.4 °F (-18 °C)	
	02	3.2 °F (-16 °C)	
	03	6.8 °F (-14 °C)	
	04	10.4 °F (-12 °C)	
	05	14.0°F (-10 °C)	
	06	17.6 °F (-8 °C)	
	07	21.2 °F (-6 °C)	
	08	24.8 °F (-4 °C)	

■ Outdoor temperature zone boundary temperature B

Setting required if changing of the outdoor temperature setting for heat pump only zone is required when auxiliary heater control by outdoor temperature 1 is performed on the indoor unit.

For details of the control method, see the Design & Technical Manual.

(♦... Factory setting)

Function number	Setting value	Setting description	
67	00	42.8 °F (6 °C)	♦
	01	14.0 °F (-10 °C)	
	02	17.6 °F (-8 °C)	
	03	21.2 °F (-6 °C)	
	04	24.8 °F (-4 °C)	
	05	28.4 °F (-2 °C)	
	06	32.0 °F (0 °C)	
	07	35.6 °F (2 °C)	
	08	39.2 °F (4 °C)	
	09	42.8 °F (6 °C)	
	10	46.4 °F (8 °C)	
	11	50.0 °F (10 °C)	
	12	53.6 °F (12 °C)	
	13	57.2 °F (14 °C)	
	14	60.8 °F (16 °C)	
	15	64.4 °F (18 °C)	

■ Auto mode type

Switches the setting method of the auto mode between single or dual (cooling and heating.)

Set the primary indoor unit using a wired remote controller for heat pump systems.

(♦... Factory setting)

Function number	Setting value	Setting description	
68	00	Single setpoint auto mode	♦
	01	Dual setpoint auto mode	

NOTE

The auto mode type setting is available only if a compatible operating device is connected.

■ Deadband value

Sets the minimum temperature of the deadband in the dual setpoint auto mode (the setting value 01 of the function setting number 68: Auto mode type.)

(♦... Factory setting)

Function Number	Setting Value	Setting Description	
69	00	0 °F (0 °C)	♦
	01	1 °F (0.5 °C)	
	02	2 °F (1.0 °C)	
	03	3 °F (1.5 °C)	
	04	4 °F (2.0 °C)	
	05	5 °F (2.5 °C)	
	06	6 °F (3.0 °C)	
	07	7 °F (3.5 °C)	
	08	8 °F (4.0 °C)	
	09	9 °F (4.5 °C)	

NOTE

The deadband setting is available only if a compatible operating device is connected.

■ Standby time for auxiliary equipment operation

Sets the standby time until the auxiliary equipment operation starts during primary equipment operation.

(♦... Factory setting)

Function number	Setting value	Setting description	
71	00	Disable	♦
	01	1 minutes	
	02	2 minutes	
	⋮	⋮	
	98	98 minutes	
	99	99 minutes	

■ Heat pump backup setting

Enables or disables the heat pump backup operation.

Please refer to the Design & technical manual.

(♦... Factory setting)

Function number	Setting value	Setting description	
72	00	Disable	♦
	01	Enable	

■ Emergency heat for external output terminal

Enables or disables emergency heat input.

To use this function, select “External heater output” after entering “Function Number 60”. For more information, please refer to the Design & technical manual.

(♦... Factory setting)

Function number	Setting value	Setting description	
73	00	Disable	♦
	01	Enable	

■ Fan delay time

Sets the fan delay time when the heater is turned off.

(♦... Factory setting)

Function number	Setting value	Setting description	
74	00	1 minutes	♦
	01	50 seconds	
	02	40 seconds	
	03	30 seconds	

■ External heater use in defrosting

Enables or disables the external heater use in defrosting.

When using function, inappropriate heater selection may cause cold air in defrosting.

(♦... Factory setting)

Function number	Setting value	Setting description	
75	00	Disable	♦
	01	Enable	

■ Operating temperature switching of external heaters (external heater 2)

Sets the temperature conditions when the external heater is ON.

For the temperature conditions, see “Heater 2 ON/OFF temperature”. For a more detailed explanation, see the Design & Technical manual.

(♦... Factory setting)

Function number	Setting value	Setting description	
77	00	Setting 0	♦
	01	Setting 1	
	02	Setting 2	
	03	Setting 3	
	04	Setting 4	

Heater 2 ON/OFF temperature

		Set value of function: 61	
		00	01 to 10
Set value of function: 77	00	0 °F (0 °C)	0 °F (0 °C)
	01		1 °F (0.5 °C)
	02		2 °F (1.0 °C)
	03		3 °F (1.5 °C)
	04		4 °F (2.0 °C)

■ Standby time for auxiliary equipment operation (external heater 2)

Sets the standby time until the auxiliary equipment operation starts during primary equipment operation.

(♦... Factory setting)

Function number	Setting value	Setting description	
78	00	Disable	♦
	01	1 minute	
	02	2 minutes	
	⋮	⋮	
	98	98 minutes	
	99	99 minutes	

■ Safety measures setting for refrigerant leakage

Sets the safety measures operation in case of refrigerant leakage.

(♦... Factory setting)

Function number	Setting value	Setting description	
81	00	No safety measures	♦
	01	Air circulation	

To activate the safety measures operation for the indoor unit in case of refrigerant leakage, set the setting value to “01” (Air circulation).
When the indoor unit detects refrigerant leakage or the refrigerant leakage sensor failure, the indoor unit operates as follows.

- The indoor unit operates the fan at high speed to diff use the refrigerant, according to UL60335-2-40.

NOTE: Remote controller cannot stop this fan operation for safety reasons.

- The indoor unit stops cooling or heating operation. Also, Forced cooling operation is not allowed.
- The indoor unit or remote controller indicates error code 45 or A8.

■ Airflow adjustment function setting for down flow installation

This function corrects the airflow volume during down flow installation.

(♦... Factory setting)

Function number	Setting value	Setting description	
91	00	Up, left or right flow	♦
	01	Down flow	

NOTE

- Ensure this setting is properly configured for downflow installations. Improper setup will reduce airflow volume, leading to decreased performance and condensation water leakage.

■ Setting record

Record any changes to the settings in the following table.

No.	Setting description		Setting value
11	Filter sign		
26	Static pressure		
30	Room temperature control for indoor unit sensor	Cooling	
31		Heating	
35	Room temperature control for wired remote controller sensor	Cooling	
36		Heating	
40	Auto restart		
42	Room temperature sensor switching		
43	Cold air prevention		
46	External input control		
48	Room temperature sensor switching (Aux.)		
49	Indoor unit fan control for energy saving for cooling		
60	Switching functions for external output terminal		
61	Control switching of external heaters		
62	Operating temperature switching of external heaters		
66	Outdoor temperature zone boundary temperature A		
67	Outdoor temperature zone boundary temperature B		
71	Standby time for auxiliary equipment operation		
72	Heat pump backup setting		
73	Emergency heat for external output terminal		
74	Fan delay time		
75	External heater use in defrosting		
77	Operating temperature switching of external heaters (external heater 2)		
78	Standby time for auxiliary equipment operation (external heater 2)		
81	Safety measures setting for refrigerant leakage		
91	Airflow adjustment setting for down flow		

After completing the Function Setting, be sure to turn off the power and turn it on again

6. 2. Static pressure

The static pressure can be set by the following 2 methods. Choose accordingly.

■ Manual setting (Function setting)

Select the appropriate static pressure according to the installation conditions.

(♦... Factory setting)

Function Number	Setting Value	Setting Description	
26	02	0.08 in. WG (20 Pa)	
	03	0.12 in. WG (30 Pa)	
	04	0.16 in. WG (40 Pa)	
	05	0.20 in. WG (50 Pa)	
	06	0.24 in. WG (60 Pa)	
	07	0.28 in. WG (70 Pa)	
	08	0.32 in. WG (80 Pa)	
	09	0.36 in. WG (90 Pa)	
	10	0.40 in. WG (100 Pa)	
	11	0.44 in. WG (110 Pa)	
	12	0.48 in. WG (120 Pa)	
	13	0.52 in. WG (130 Pa)	
	14	0.56 in. WG (140 Pa)	
	15	0.60 in. WG (150 Pa)	
	16	0.64 in. WG (160 Pa)	
	17	0.68 in. WG (170 Pa)	
	18	0.72 in. WG (180 Pa)	
	19	0.76 in. WG (190 Pa)	
	20	0.80 in. WG (200 Pa)	
	31	Standard 0.58 in. WG (145 Pa): 12,000/18,000/24,000/30,000/ 36,000/48,000 BTU model	♦

* The range of static pressure is different by model.
For details, see the Fan performance curve of the technical data.

Model name	Range of static pressure
12,000/18,000/24,000 BTU model	0.08 to 0.80 in. WG (20 to 200 Pa)
30,000/36,000/48,000 BTU model	0.20 to 0.80 in. WG (50 to 200 Pa)

Record the setting value of Function 26 in the Setting record table in “6. 1. Function details”.

7. CHECK LIST

Pay special attention to the check items below when installing the indoor unit(s). After installation is complete, be sure to check the following check items again.

Check items	Check box
Has the indoor unit been installed correctly?	
Has there been a check for gas leaks (refrigerant pipes)?	
Has heat insulation work been completed?	
Does water drain easily from the indoor units?	
Is the voltage of the power source the same as that indicated on the label on the indoor unit?	
Are the wires and pipes all connected completely?	
Is the indoor unit grounded?	
Is the connection cable the specified thickness?	
Are the inlets and outlets free of any obstacles?	
After installation is completed, has the proper operation and handling been explained to the user?	
Operate the unit according to the operation manual provided, and check that it is operating normally.	
If you are installing in down flow, have you set Function number 91?	

8. TEST RUN

8. 1. Check items

☐ Is operation of each button on the remote controller normal?
☐ Does each lamp light normally?
☐ Is the drain normal?
☐ Do not have an abnormal noise and vibration during operation?

Do not operate the air conditioner in test run for a long time.

8. 2. Operation method

Depending on your installation, choose from the following:

■ By the wireless remote controller (with [TEST RUN] button)

- To start test run, press the [START/STOP] button and the [TEST RUN] button on the remote controller.
- To end test run, press the remote controller [START/STOP] button.

■ By the IR receiver unit

- To start test run, press the [MANUAL AUTO] button of the IR receiver for more than 10 seconds (forced cooling).
- To end test run, press the [MANUAL AUTO] button for more than 3 seconds or press the remote controller [START/STOP] button.
- The Operation indicator lamp and Timer indicator lamp will simultaneously flash during the test run mode.

■ By the wired remote controller

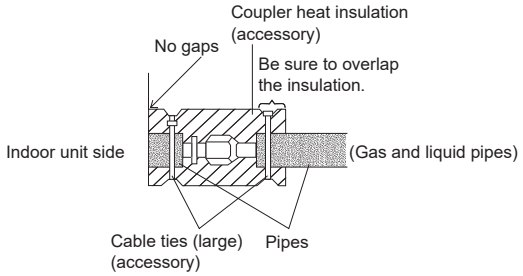
- For the operation method, refer to the installation manual and the operation manual of the wired remote controller.

Heating test run will begin in a few minutes when HEAT is selected by the remote controller [reverse cycle model only].

9. FINISHING

Install the heat insulation material after performing a refrigerant leak check (see the installation manual for the outdoor unit for details).

Coupler heat insulation



⚠ CAUTION

There should be no gaps between the insulation and the product.

⚠ CAUTION

- After connecting the piping, check the all joints for gas leakage with gas leak detector.
- Once the pressure checking has been completed using nitrogen, please refer to the outdoor unit installation manual to complete the evacuation process.
- Install heat insulation around both the large (gas) and small (liquid) pipes. Failure to do so may cause water leaks.

10. CUSTOMER GUIDANCE

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

(1) Starting and stopping method, operation switching, temperature adjustment, timer, and other remote controller operations.
(2) Cleaning and maintenance of the product, and other items such as air filters and air louvers if applicable.
(3) Give the operating and installation manuals to the customer.
(4) If the indoor unit custom code is changed, and the installation includes a wireless remote controller, inform the customer the changed code. (On some wireless remote controllers, the custom code may return to A when batteries are replaced.)

11. ERROR CODES

If you use a wired type remote controller, error codes will appear on the remote controller display. If you use a wireless remote controller, the lamps on the IR receiver unit will output error codes by way of blinking patterns. See the lamp blinking patterns and error codes in the table below. An error display is displayed only during operation.
For more details, refer to the installation manual of the remote controller.
The error code table contains errors irrelevant to this product as well.

Error display			Wired remote controller Error code	Description
OPERATION lamp (green)	TIMER lamp (orange)	ECONOMY lamp (green)		
●(1)	●(1)	◇	**11**	Serial communication error
●(1)	●(2)	◇	**12**	Wired remote controller communication error
●(1)	●(5)	◇	**15**	Check run unfinished Automatic airflow adjustment error
●(1)	●(6)	◇	**16**	Peripheral unit transmission PCB connection error
●(1)	●(8)	◇	**18**	External communication error
●(2)	●(1)	◇	**21**	Unit number or Refrigerant circuit address setting error [Simultaneous multi-split type]
●(2)	●(2)	◇	**22**	Indoor unit capacity error
●(2)	●(3)	◇	**23**	Combination error
●(2)	●(4)	◇	**24**	• Connection unit number error (indoor secondary unit) [Simultaneous multi-split type] • Connection unit number error (indoor unit or branch unit) [Flexible multi-split type]
●(2)	●(6)	◇	**26**	Indoor unit address setting error
●(2)	●(7)	◇	**27**	Primary unit, secondary unit setup error [Simultaneous multi-split type]
●(2)	●(9)	◇	**29**	Connection unit number error in wired remote controller system
●(3)	●(1)	◇	**31**	Power supply interruption error
●(3)	●(2)	◇	**32**	Indoor unit PCB model information error
●(3)	●(3)	◇	**33**	Indoor unit motor electricity consumption detection error
●(3)	●(5)	◇	**35**	Manual auto switch error
●(3)	●(9)	◇	**39**	Indoor unit power supply error for fan motor
●(3)	●(10)	◇	**3A**	Indoor unit communication circuit (wired remote controller) error
●(4)	●(1)	◇	**41**	Room temp. sensor error
●(4)	●(2)	◇	**42**	Indoor unit heat ex. middle temp. sensor error
●(4)	●(4)	◇	**44**	Occupancy sensor error
●(4)	●(5)	◇	**45**	Refrigerant leakage sensor error. Sensor error, and harness disconnection/connection failure may have occurred.
●(5)	●(1)	◇	**51**	Indoor unit fan motor error
●(5)	●(3)	◇	**53**	Drain pump error
●(5)	●(4)	◇	**54**	Electric air cleaner reverse VDD error
●(5)	●(5)	◇	**55**	Filter set error
●(5)	●(7)	◇	**57**	Damper error
●(5)	●(8)	◇	**58**	Intake grille error
●(5)	●(9)	◇	**59**	Indoor unit fan motor 2 error (Left side fan)
●(5)	●(10)	◇	**5A**	Indoor unit fan motor 3 error (Right side fan)
●(5)	●(15)	◇	**5U**	Indoor unit error
●(6)	●(1)	◇	**61**	Outdoor unit reverse/missing phase and wiring error
●(6)	●(2)	◇	**62**	Outdoor unit main PCB model information error or communication error
●(6)	●(3)	◇	**63**	Inverter error
●(6)	●(4)	◇	**64**	Active filter error, PFC circuit error
●(6)	●(5)	◇	**65**	• Trip terminal L error • IPM temp error
●(6)	●(8)	◇	**68**	Outdoor unit rush current limiting resister temp. rise error
●(6)	●(10)	◇	**6A**	Display PCB microcomputers communication error
●(7)	●(1)	◇	**71**	Discharge temp. sensor error
●(7)	●(2)	◇	**72**	Compressor temp. sensor error
●(7)	●(3)	◇	**73**	Outdoor unit Heat Ex. liquid temp. sensor error
●(7)	●(4)	◇	**74**	Outdoor temp. sensor error
●(7)	●(5)	◇	**75**	Suction Gas temp. sensor error
●(7)	●(6)	◇	**76**	• 2-way valve temp. sensor error • 3-way valve temp. sensor error
●(7)	●(7)	◇	**77**	Heat sink temp. sensor error
●(8)	●(2)	◇	**82**	• Sub-cool Heat Ex. gas inlet temp. sensor error • Sub-cool Heat Ex. gas outlet temp. sensor error
●(8)	●(3)	◇	**83**	Liquid pipe temp. sensor error
●(8)	●(4)	◇	**84**	Current sensor error
●(8)	●(6)	◇	**86**	• Discharge pressure sensor error • Suction pressure sensor error • High pressure switch error
●(9)	●(4)	◇	**94**	Trip detection
●(9)	●(5)	◇	**95**	Compressor rotor position detection error (permanent stop)
●(9)	●(7)	◇	**97**	Outdoor unit fan motor 1 error
●(9)	●(8)	◇	**98**	Outdoor unit fan motor 2 error
●(9)	●(9)	◇	**99**	4-way valve error
●(9)	●(10)	◇	**9A**	Coil (expansion valve) error
●(10)	●(1)	◇	**A1**	Discharge temp. error
●(10)	●(3)	◇	**A3**	Compressor temp. error
●(10)	●(4)	◇	**A4**	High pressure error
●(10)	●(5)	◇	**A5**	Low pressure error
●(10)	●(8)	◇	**A8**	Refrigerant leakage suspicion
●(10)	●(11)	◇	**AC**	Heat sink temp error
●(13)	●(2)	◇	**J2**	Branch boxes error [Flexible multi-split type]

Display mode ● : 0.5s ON / 0.5s OFF
◇ : 0.1s ON / 0.1s OFF
( ) : Number of flashing