

INSTALLATION INSTRUCTIONS



Air Conditioner

This air conditioner uses the refrigerant R410A.

Model No.

| Outdoor Units | | Rated Capacity | | |
|---------------|-------------------|----------------|------------|------------|
| Type | Outdoor Unit Type | 4 HP | 5 HP | 6 HP |
| LE2 | mini VRF System | U-4LE2R5 | U-5LE2R5 | U-6LE2R5 |
| | | U-4LE2R5E* | U-5LE2R5E* | U-6LE2R5E* |

HP = horsepower

* High-Durable model

• To be connecting Indoor Unit

| Indoor Units | | Rated Capacity | | | | | |
|--------------|--------------------------|----------------|------------|------------|------------|------------|------------|
| Type | Indoor Unit Type | 22 | 28 | 36 | 45 | 56 | 60 |
| D1 | 1-Way Cassette | | S-28MD1E5 | S-36MD1E5 | S-45MD1E5 | S-56MD1E5 | |
| L1 | 2-Way Cassette | S-22ML1E5 | S-28ML1E5 | S-36ML1E5 | S-45ML1E5 | S-56ML1E5 | |
| U2 | 4-Way Cassette | S-22MU2E5A | S-28MU2E5A | S-36MU2E5A | S-45MU2E5A | S-56MU2E5A | S-60MU2E5A |
| Y2 | 4-Way Cassette 60 × 60 | S-22MY2E5A | S-28MY2E5A | S-36MY2E5A | S-45MY2E5A | S-56MY2E5A | |
| K1 | Wall-Mounted | | | | S-45MK1E5A | S-56MK1E5A | |
| K2 | Wall-Mounted | S-22MK2E5A | S-28MK2E5A | S-36MK2E5A | S-45MK2E5A | S-56MK2E5A | |
| T2 | Ceiling | | | S-36MT2E5A | S-45MT2E5A | S-56MT2E5A | |
| F2 | Low Silhouette Ducted | S-22MF2E5A | S-28MF2E5A | S-36MF2E5A | S-45MF2E5A | S-56MF2E5A | S-60MF2E5A |
| M1 | Slim Low Static Ducted | S-22MM1E5A | S-28MM1E5A | S-36MM1E5A | S-45MM1E5A | S-56MM1E5A | |
| P1 | Floor Standing | S-22MP1E5 | S-28MP1E5 | S-36MP1E5 | S-45MP1E5 | S-56MP1E5 | |
| R1 | Concealed Floor Standing | S-22MR1E5 | S-28MR1E5 | S-36MR1E5 | S-45MR1E5 | S-56MR1E5 | |
| Z1 | Slim Type Ducted | S-22MZ1H4A | S-28MZ1H4A | S-36MZ1H4A | S-45MZ1H4A | S-56MZ1H4A | S-60MZ1H4A |

| Type | Indoor Unit Type | Rated Capacity | | | | |
|------|-----------------------------|----------------|------------|-------------|-------------|-------------|
| | | 71 / 73 | 90 | 106 / 112 | 140 | 160 |
| D1 | 1-Way Cassette | S-73MD1E5 | | | | |
| L1 | 2-Way Cassette | S-73ML1E5 | | | | |
| U2 | 4-Way Cassette | S-73MU2E5A | S-90MU2E5A | S-106MU2E5A | S-140MU2E5A | S-160MU2E5A |
| K1 | Wall-Mounted | S-73MK1E5A | | S-106MK1E5A | | |
| K2 | Wall-Mounted | S-73MK2E5A | | S-106MK2E5A | | |
| T2 | Ceiling | S-73MT2E5A | | S-106MT2E5A | S-140MT2E5A | |
| F2 | Low Silhouette Ducted | S-73MF2E5A | S-90MF2E5A | S-106MF2E5A | S-140MF2E5A | S-160MF2E5A |
| E1 | High Static Pressure Ducted | S-73ME1E5 | | S-106ME1E5 | S-140ME1E5 | |
| | Ducted | | S-90ME1R5 | S-112ME1R5 | S-140ME1R5 | S-160ME1R5 |
| P1 | Floor Standing | S-71MP1E5 | | | | |
| R1 | Concealed Floor Standing | S-71MR1E5 | | | | |
| Z1 | Slim Type Ducted | S-73MZ1H4A | | | | |

Read through the Installation Instructions before you proceed with the installation. In particular, you will need to read under the "IMPORTANT!" section at the top of the page.

IMPORTANT!

Please Read Before Starting

This air conditioner must be installed by the sales dealer or installer.

This information is provided for use only by authorized persons.

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.
- This air conditioner shall be installed in accordance with National Wiring Regulations.
- This equipment complies with EN/IEC 61000-3-12 provided that the short-circuit power S_{sc} is greater than or equal to the following table at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to supply with a short-circuit power S_{sc} greater than or equal to the values in the table.

| | 4 HP | 5 HP | 6 HP |
|----------|-----------|-----------|-----------|
| S_{sc} | 2,850 kVA | 4,050 kVA | 4,700 kVA |

- The product meets the technical requirements of EN/IEC 61000-3-3.
- Pay close attention to all warning and caution notices given in this manual.



WARNING

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



CAUTION

This symbol refers to a hazard or unsafe practice which can result in personal injury or product or property damage.

If Necessary, Get Help

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

In Case of Improper Installation

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


SPECIAL PRECAUTIONS



WARNING When Wiring



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

- Do not supply power to the unit until all wiring and tubing are completed or reconnected and checked.
 - Highly dangerous electrical voltages are used in this system. Carefully refer to the wiring diagram and these instructions when wiring. Improper connections and inadequate grounding can cause **accidental injury or death**.
 - Connect all wiring tightly. Loose wiring may cause overheating at connection points and a possible fire hazard.
 - Provide a power outlet to be used exclusively for each unit.
 - ELCB must be incorporated in the fixed wiring. Circuit breaker must be incorporated in the fixed wiring in accordance with the wiring regulations.
- | | 4 HP | 5 HP | 6 HP |
|-----------------|------|------|------|
| Circuit breaker | 25 A | 30 A | 35 A |
- Provide a power outlet exclusively for each unit, and full disconnection means having a contact separation by 3 mm in all poles must be incorporated in the fixed wiring in accordance with the wiring rules.
 - To prevent possible hazards from insulation failure, the unit must be grounded. 
 - This equipment is strongly recommended to be installed with Earth Leakage Circuit Breaker (ELCB) or Residual Current Device (RCD). Otherwise, it may cause electrical shock and fire in case of equipment breakdown or insulation breakdown.

- When operating in emergency backup mode and switching from grid power to off-grid generator power or vice versa to provide power for the air conditioner, be sure to follow the guidelines below.

Otherwise, the air conditioner may malfunction due to damage to the PCBs or other causes.

- (1) The electrical waveform of the generator must be a distortion free sine wave that is within the frequency and voltage tolerances defined by the equipment specifications.
- (2) When switching from grid power to off-grid generator power or vice versa, first reduce the supply voltage to 0V and confirm that the air conditioner has completely stopped before switching the power source.

When Transporting

- It may need two or more people to carry out the installation work.
- 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...

Select an installation location which is rigid and strong enough to support or hold the unit, and select a location for easy maintenance.

...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.



CAUTION

Keep the fire alarm and the air outlet at least 1.5 m away from the unit.

...In Moist or Uneven Locations

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

...In an Area with High Winds

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

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

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

When Connecting Refrigerant Tubing

Pay particular attention to refrigerant leakages.




WARNING

- When performing piping work, do not mix air except for specified refrigerant (R410A) in refrigeration cycle. It causes capacity down, risk of explosion and injury due to high tension inside the refrigerant cycle.
- If the refrigerant comes in contact with a flame, it produces a toxic gas.
- Do not add or replace refrigerant other than specified type. It may cause product damage, burst and injury, etc.
- Ventilate the room immediately, in the event that is refrigerant gas leaks during the installation. Be careful not to allow contact of the refrigerant gas with a flame as this will cause the generation of toxic gas.
- Keep all tubing runs as short as possible.
- Apply refrigerant lubricant to the matching surfaces of the flare and union tubes before connecting them, then tighten the nut with a torque wrench for a leak-free connection.
- Check carefully for leaks before starting the test run.

- Do not leak refrigerant while piping work for an installation or re-installation, and while repairing refrigeration parts. Handle liquid refrigerant carefully as it may cause frostbite.

When Servicing

- Turn the power OFF at the main power box (mains), wait at least 10 minutes until it is discharged, then open 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.

WARNING


- This product must not be modified or disassembled under any circumstances. Modified or disassembled unit may cause fire, electric shock or injury.
- Do not clean inside the indoor and outdoor units by users. Engage authorized dealer or specialist for cleaning.
- In case of malfunction of this appliance, do not repair by yourself. Contact to the sales dealer or service dealer for a repair.

CAUTION




- Ventilate any enclosed areas when installing or testing the refrigeration system. Leaked refrigerant gas, on contact with fire or heat, can produce dangerously toxic gas.
- Confirm after installation that no refrigerant gas is leaking. If the gas comes in contact with a burning stove, gas water heater, electric room heater or other heat source, it can cause the generation of toxic gas.

Others

WARNING

- Do not sit or step on the unit. 
You may fall down accidentally.

CAUTION

- Do not touch the air inlet or the sharp aluminum fins of the outdoor unit. You may get injured. 
- Do not stick any object into the FAN CASE. 
You may be injured and the unit may be damaged. 

Check of Density Limit

Check the amount of refrigerant in the system and floor space of the room according to the legislation on refrigerant drainage. If there is no applicable legislation, follow the standards described below.

The room in which the air conditioner is to be installed requires a design that in the event of refrigerant gas leaking out, its density will not exceed a set limit.

The refrigerant (R410A), which is used in the air conditioner, is safe, without the toxicity or combustibility of ammonia, and is not restricted by laws imposed to protect the ozone layer. However, since it contains more than air, it poses the risk of suffocation if its density should rise excessively. Suffocation from leakage of refrigerant is almost non-existent. With the recent increase in the number of high density buildings, however, the installation of multi air conditioner systems is on the increase because of the need for effective use of floor space, individual control, energy conservation by curtailing heat and carrying power, etc.

Most importantly, the multi air conditioner system is able to replenish a large amount of refrigerant compared to conventional individual air conditioners. If a single unit of the multi air conditioner system is to be installed in a small room, select a suitable model and installation procedure so that if the refrigerant accidentally leaks out, its density does not reach the limit (and in the event of an emergency, measures can be made before injury can occur).

In a room where the density may exceed the limit, create an opening with adjacent rooms, or install mechanical ventilation combined with a gas leak detection device. The density is as given below.

Total amount of refrigerant (kg)

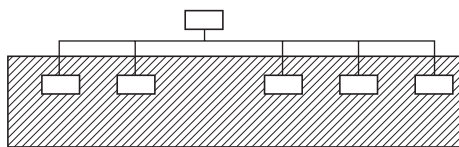
Min. volume of the indoor unit installed room (m³)
 \leq Density limit (kg/m³)

The density limit of refrigerant which is used in multi air conditioners is 0.44 kg/m³ (ISO 5149).

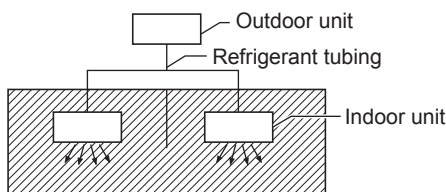
NOTE

1. The standards for minimum room volume are as follows.

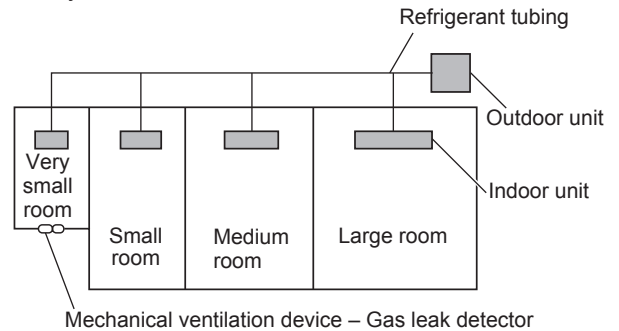
(1) No partition (shaded portion)



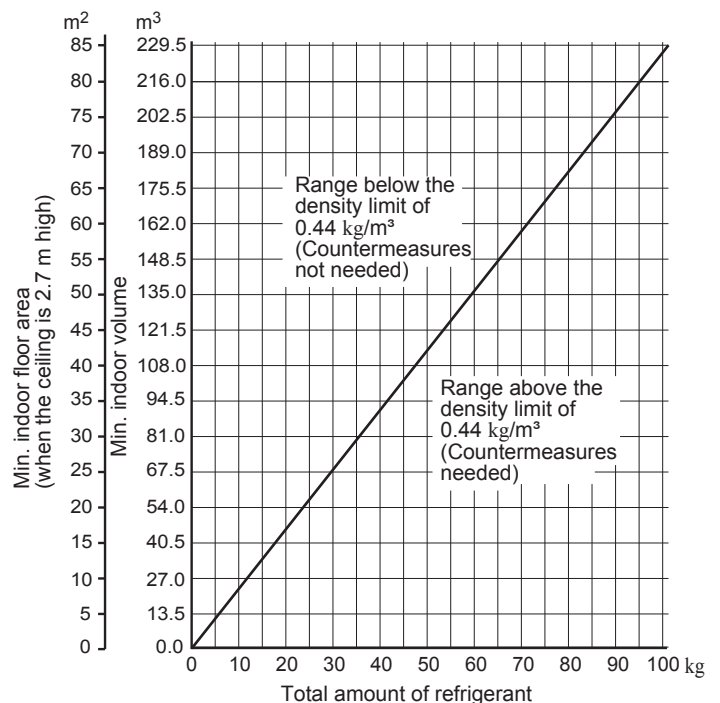
(2) When there is an effective opening with the adjacent room for ventilation of leaking refrigerant gas (opening without a door, or an opening 0.15% or larger than the respective floor spaces at the top or bottom of the door).



(3) If an indoor unit is installed in each partitioned room and the refrigerant tubing is interconnected, the smallest room of course becomes the object. But when mechanical ventilation is installed interlocked with a gas leakage detector in the smallest room where the density limit is exceeded, the volume of the next smallest room becomes the object.



2. The minimum indoor floor space compared with the amount of refrigerant is roughly as follows: (When the ceiling is 2.7 m high)




Precautions for Installation Using New Refrigerant

1. Care regarding tubing

1-1. Process tubing

- **Material:** Use seamless phosphorous deoxidized copper tube for refrigeration. Wall thickness shall comply with the applicable legislation. The minimal wall thickness must be in accordance with the table below.
- **Tubing size:** Be sure to use the sizes indicated in the table below.
For the renewal tubing size, refer to the Technical Data.
- Use a tube cutter when cutting the tubing, and be sure to remove any flash. This also applies to distribution joints (optional).
- When bending tubing, use a bending radius that is 4 times the outer diameter of the tubing or larger.

 **CAUTION** Use sufficient care in handling the tubing. Seal the tubing ends with caps or tape to prevent dirt, moisture, or other foreign substances from entering. These substances can result in system malfunction.

Unit: mm

| Material | | Temper - O (Soft copper tube) | | | | |
|-------------|----------------|-------------------------------|------|------|-------|-------|
| Copper tube | Outer diameter | 6.35 | 9.52 | 12.7 | 15.88 | 19.05 |
| | Wall thickness | 0.8 | 0.8 | 0.8 | 1.0 | 1.2 |

1-2. Prevent impurities including water, dust and oxide from entering the tubing. Impurities can cause R410A refrigerant deterioration and compressor defects. Due to the features of the refrigerant and refrigerating machine oil, the prevention of water and other impurities becomes more important than ever.

2. Be sure to recharge the refrigerant only in liquid form.

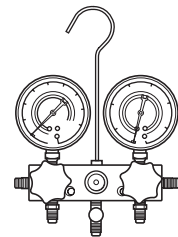
- 2-1. Since R410A is a non-azeotrope, recharging the refrigerant in gas form can lower performance and cause defects in the unit.
- 2-2. Since refrigerant composition changes and performance decreases when gas leaks, collect the remaining refrigerant and recharge the required total amount of new refrigerant after fixing the leak.

3. Different tools required

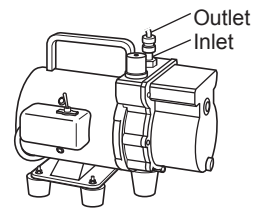
- 3-1. Tool specifications have been changed due to the characteristics of R410A.
Some tools for R22- and R407C-type refrigerant systems cannot be used.

| Item | New tool? | R407C tools compatible with R410A? | Remarks |
|----------------|-----------|------------------------------------|---|
| Manifold gauge | Yes | No | Types of refrigerant, refrigerating machine oil, and pressure gauge are different. |
| Charge hose | Yes | No | To resist higher pressure, material must be changed. |
| Vacuum pump | Yes | Yes | Use a conventional vacuum pump if it is equipped with a check valve. If it has no check valve, purchase and attach a vacuum pump adapter. |
| Leak detector | Yes | No | Leak detectors for CFC and HCFC that react to chlorine do not function because R410A contains no chlorine. Leak detectors for HFC134a can be used for R410A. |
| Flaring oil | Yes | No | For systems that use R22, apply mineral oil (Suniso oil) to the flare nuts on the tubing to prevent refrigerant leakage. For machines that use R407C or R410A, apply synthetic oil (ether oil) to the flare nuts. |

Manifold gauge



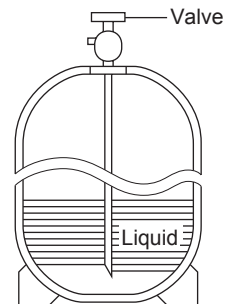
Vacuum pump



* Using tools for R22 and R407C and new tools for R410A together can cause defects.

- 3-2. Use R410A exclusive cylinder only.

Single-outlet valve
(with siphon tube)
Liquid refrigerant should be recharged with the cylinder standing on end as shown.



Important Information Regarding The Refrigerant Used

This product contains fluorinated greenhouse gases. Do not vent gases into the atmosphere.

Refrigerant type: R410A

GWP⁽¹⁾ value: 2088

⁽¹⁾GWP = global warming potential

Periodical inspections for refrigerant leaks may be required depending on European or local legislation. Please contact your local dealer for more information.

High-Durable model

Outdoor unit model name ended with the letter "E" indicates High-Durable specifications.

Certain parts of this product are dual painted and reinforced for the use in harsh conditions, but it does not mean this product is free from rusting and corrosion.

Precaution on installation

Observe the following instructions for installation and maintenance of this unit.

- 1) Avoid installing the unit at a place where the unit is exposed to sea-spray as much as possible.
- 2) Give special consideration to the layout so the salt particles adhering to the outer panel can be washed away by the rain. (For example, avoid installing a shade over the unit.)
- 3) Because water retention in the bottom plate of the outdoor unit will significantly accelerate corrosion, pay attention to its slope and other installation conditions of the unit so the water can drain out easily.
- 4) When installing the unit in a coastal area, wash the unit with fresh water periodically to remove adhering salt build-up.
- 5) Repair any damage or scratch made during installation and maintenance.
- 6) Inspect the unit and other related devices periodically. (Perform rustproof treatment and the part replacement as necessary.)
- 7) Conduct water drainage measures on the unit installation base.

CONTENTS

| | Page | Page |
|--|-----------|------|
| IMPORTANT! | 2 | |
| Please Read Before Starting | | |
| Check of Density Limit | | |
| Precautions for Installation Using New Refrigerant | | |
| Important Information Regarding The Refrigerant Used | | |
| High-Durable model | | |
| 1. GENERAL | 9 | |
| 1-1. Tools Required for Installation (not supplied) | | |
| 1-2. Accessories Supplied with Outdoor Unit | | |
| 1-3. Type of Copper Tube and Insulation Material | | |
| 1-4. Additional Materials Required for Installation | | |
| 1-5. Tubing Length | | |
| 1-6. Tubing Size | | |
| 1-7. Straight Equivalent Length of Joints | | |
| 1-8. Additional Refrigerant Charge | | |
| 1-9. System Limitations | | |
| 1-10. Check of Limit Density | | |
| 1-11. Installing Distribution Joint | | |
| 1-12. Optional Distribution Joint Kits | | |
| 1-13. Example of Tubing Size Selection and Refrigerant Charge Amount | | |
| 2. SELECTING THE INSTALLATION SITE | 18 | |
| 2-1. Outdoor Unit | | |
| 2-2. Air-Discharge Chamber for Top Discharge | | |
| 2-3. Installing the Outdoor Unit in Heavy Snow Areas | | |
| 2-4. Precautions for Installation in Heavy Snow Areas | | |
| 2-5. Dimensions of Air-Discharge Chamber | | |
| 2-6. Dimensions of Air-Discharge Chamber for Top Discharge | | |
| 2-7. Dimensions of Snow-Proof Vents | | |
| 3. HOW TO INSTALL THE OUTDOOR UNIT | 23 | |
| 3-1. Installing the Outdoor Unit | | |
| 3-2. Drainage Work | | |
| 3-3. Routing the Tubing and Wiring | | |
| 4. ELECTRICAL WIRING | 24 | |
| 4-1. General Precautions on Wiring | | |
| 4-2. Recommended Wire Length and Wire Diameter for Power Supply System | | |
| 4-3. Wiring System Diagram | | |
| 5. HOW TO PROCESS TUBING | 34 | |
| 5-1. Connecting the Refrigerant Tubing | | |
| 5-2. Connecting Tubing Between Indoor and Outdoor Units | | |
| 5-3. Insulating the Refrigerant Tubing | | |
| 5-4. Taping the Tubes | | |
| 5-5. Finishing the Installation | | |
| 6. AIR PURGING | 39 | |
| ■ Air Purging with a Vacuum Pump (for Test Run) Preparation | | |
| 7. TEST RUN | 42 | |
| 7-1. Preparing for Test Run | | |
| 7-2. Test Run Procedure | | |
| 7-3. Main Outdoor Unit P.C. Board Setting | | |
| 7-4. Auto Address Setting | | |
| 7-5. Setting Test Run Remote Controller | | |
| 7-6. Caution for Pump Down | | |
| 7-7. Self-Diagnosis Function Table and Contents of Alarm Display | | |

1. GENERAL




This booklet briefly outlines where and how to install the air conditioning system. Please read over the entire set of instructions for the outdoor unit and make sure all accessory parts listed are with the system before beginning. For the renewal installation, refer to the Technical Data.

1-1. Tools Required for Installation (not supplied)

1. Flathead screwdriver
2. Phillips head screwdriver
3. Knife or wire stripper
4. Tape measure
5. Carpenter's level
6. Sabre saw or keyhole saw
7. Hacksaw
8. Core bits
9. Hammer
10. Drill
11. Tube cutter
12. Tube flaring tool
13. Torque wrench
14. Adjustable wrench
15. Reamer (for deburring)
16. Hexagonal wrench (4 mm)
17. Pliers
18. Cutting pliers

1-2. Accessories Supplied with Outdoor Unit

Table 1 : Outdoor Unit

| Part Name | Figure | Q'ty |
|--------------------------------------|---|------|
| Protection bushing (See page 23.) |  | 2 |
| Operating Instructions |  | 1 |
| Installation Instructions |  | 1 |

1-3. Type of Copper Tube and Insulation Material

If you wish to purchase these materials separately from a local source, you will need:

1. Deoxidized annealed copper tube for refrigerant tubing.
2. Foamed polyethylene insulation for copper tubes as required to precise length of tubing. See the section "5-3. Insulating the Refrigerant Tubing" for details.
3. Use insulated copper wire for field wiring. Wire size varies with the total length of wiring. See the section "4. ELECTRICAL WIRING" for details.



CAUTION

Check local electrical codes and regulations before obtaining wire. Also, check any specified instructions or limitations.

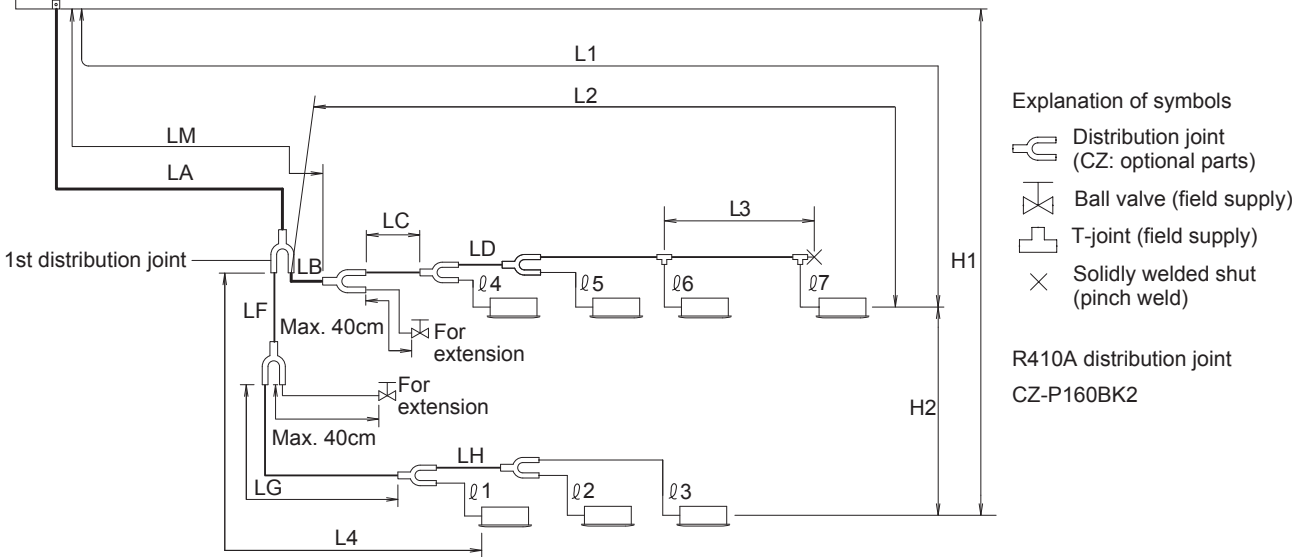
1-4. Additional Materials Required for Installation

1. Refrigeration (armored) tape
2. Insulated staples or clamps for connecting wire (See your local codes.)
3. Putty
4. Refrigeration tubing lubricant
5. Clamps or saddles to secure refrigerant tubing
6. Scale for weighing

1-5. Tubing Length

Select the installation location so that the length and size of refrigerant tubing are within the allowable range shown in the figure below.

1. — Main tubing length (maximum tubing size) $LM = LA + LB \dots$
2. — Main distribution tubes $LC - LH$ are selected according to the capacity after the distribution joint.
3. — Sizes of indoor unit connection tubing $\varnothing 1 - \varnothing 7$ are determined by the connection tubing sizes on the indoor units.



- Explanation of symbols
- Distribution joint (CZ: optional parts)
 - Ball valve (field supply)
 - T-joint (field supply)
 - Solidly welded shut (pinch weld)

R410A distribution joint
CZ-P160BK2

NOTE

* Be sure to use special R410A distribution joints (CZ: optional parts) for tubing branches.

Table 2 : Ranges that Apply to Refrigerant Tubing Lengths and to Differences in Installation Heights Unit: m

| Item | Mark | Contents | Length | |
|----------------------------------|---|---|-------------------|-------|
| | | | | |
| Allowable tubing length | L1 | Max. tubing length | Actual length | ≤ 150 |
| | | | Equivalent length | ≤ 175 |
| | $\Delta L (L2 - L4)$ | Difference between max. length and min. length from the 1st distribution joint | ≤ 50*1 | |
| | LM | Max. length of main tubing (at maximum size) * Even after 1st distribution joint, LM is allowed if at maximum tubing length. | — | |
| | $\varnothing 1, \varnothing 2 \sim \varnothing 7$ | Max. length of each distribution tube | ≤ 50*2 | |
| Allowable elevation difference | H1 | When outdoor unit is installed higher than indoor unit | ≤ 50 | |
| | | When outdoor unit is installed lower than indoor unit | ≤ 40 | |
| | H2 | Max. difference between indoor units | ≤ 15 | |
| Allowable length of joint tubing | L3 | T-joint tubing (field-supply); Max. tubing length between the first T-joint and solidly welded-shut end point | ≤ 2 | |

L = Length H = Height

NOTE

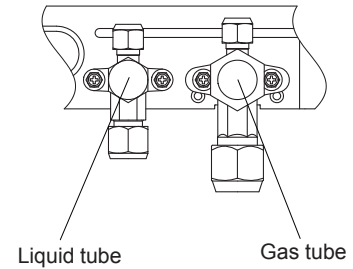
- *1: If the tubing length exceeds 40 m, some parts of both the liquid and gas tubes should be increased by 1 rank. There is the possibility that these sizes of tubes will be 1 rank larger than main tubes. Refer to the Technical Data for the details.
- *2: If any of the tubing length exceeds 30m, increase the size of both the liquid and gas tubes by 1 rank. If the size is larger than the main tubing size, it is not necessary to further increase the size.
- * If the total amount of refrigerant for the system exceeds 14.4 kg, change the length of the tubing to reduce the amount of refrigerant.

1-6. Tubing Size

■ Table 3 : Main Tubing Size (LA)

Unit: mm

| Outdoor unit horsepower | 4 HP | 5 HP | 6 HP |
|-------------------------|------------------|------|------|
| Gas tube | ø15.88 | | |
| | Flare connection | | |
| Liquid tube | ø9.52 | | |
| | Flare connection | | |



* The refrigerant tubing should be used with R410A refrigerant.

■ Table 4 : Main Tubing Size After Distribution (LB, LC...)

Unit: mm

| | | | |
|-----------------------------------|-------------|-----------------|-----------------|
| Total capacity after distribution | Below kW | 7.1 (2.5 HP) | — |
| | Over kW | — | 7.1 (2.5 HP) |
| Tubing size | Gas tube | ø12.7 | ø15.88 |
| | Liquid tube | ø9.52 | ø9.52 |

Note: In case the total capacity of indoor units connected after distribution exceeds the capacity of the outdoor unit, select the main tubing size for the capacity of the outdoor unit.

■ Table 5 : Indoor Unit Tubing Connection Size

| Indoor unit type | 22 | 28 | 36 | 45 | 56 | 60 | 71 73 | 90 | 106 112 | 140 | 160 |
|------------------|-------|----|----|----|----|----|----------|----|------------|-----|-----|
| Gas tube (mm) | ø12.7 | | | | | | ø15.88 | | | | |
| Liquid tube (mm) | ø6.35 | | | | | | ø9.52 | | | | |

1-7. Straight Equivalent Length of Joints

Design the tubing system by referring to the following table for the straight equivalent length of joints.

Table 6 : Straight Equivalent Length of Joints






| Gas tubing size (mm) | | 12.7 | 15.88 | 19.05 |
|--------------------------------|---|--|-------|-------|
| 90° elbow |  | 0.30 | 0.35 | 0.42 |
| 45° elbow |  | 0.23 | 0.26 | 0.32 |
| U-shape tube bent (R60-100 mm) |  | 0.90 | 1.05 | 1.26 |
| Trap bend |  | 2.30 | 2.80 | 3.20 |
| Y-branch distribution joint |  | Equivalent length conversion not needed. | | |
| Ball valve for service | | Equivalent length conversion not needed. | | |

Table 7 : Refrigerant Tubing Size

| Tubing size (mm) | |
|---------------------|------|
| Material Temper - O | |
| ø6.35 | t0.8 |
| ø9.52 | t0.8 |
| ø12.7 | t0.8 |
| ø15.88 | t1.0 |
| ø19.05 | t1.2 |

* When bending the tubes, use a bending radius that is at least 4 times the outer diameter of the tubes.
In addition, take sufficient care to avoid crushing or damaging the tubes when bending them.

1-8. Additional Refrigerant Charge

Additional refrigerant charge amount is calculated below.

- Total tubing length ≤ 50 m
No additional charge will be necessary.
- Total tubing length > 50 m
Required amount of additional refrigerant charge = [(Amount of additional refrigerant charge per meter of each size of liquid tube × its tube length) + (...) - 2,800]

In the case of the required amount of additional refrigerant charge < 0, the additional refrigerant charge should be 0 kg.

Table 8 : Amount of Additional Refrigerant Charge Per Meter, According to Liquid Tubing Size

| Liquid tubing size (mm) | 6.35 | 9.52 | 12.7 |
|---|------|------|------|
| Amount of additional refrigerant charge / m (g/m) | 26 | 56 | 128 |

Table 9 : Refrigerant Charge Amount at Shipment (for Outdoor Unit)

| | | |
|--------|------|------|
| 4 HP | 5 HP | 6 HP |
| 6.7 kg | | |

1-9. System Limitations

Table 10 : System Limitations

| Outdoor unit horsepower | 4 HP | 5 HP | 6 HP |
|--|---------|------|------|
| Number of max. connectable indoor units | 7 | 8 | 9 |
| Max. allowable indoor/outdoor capacity ratio | 50-130% | | |



WARNING

Always check the gas density limit for the room in which the unit is installed.

1-10. Check of Limit Density

When installing an air conditioner in a room, it is necessary to ensure that even if the refrigerant gas accidentally leaks out, its density does not exceed the limit level for that room.

If the density could exceed the limit level, it is necessary to provide an opening between the unit and the adjacent room, or to install mechanical ventilation which is interlocked with a leak detector.

(Total refrigerant charged amount: kg)

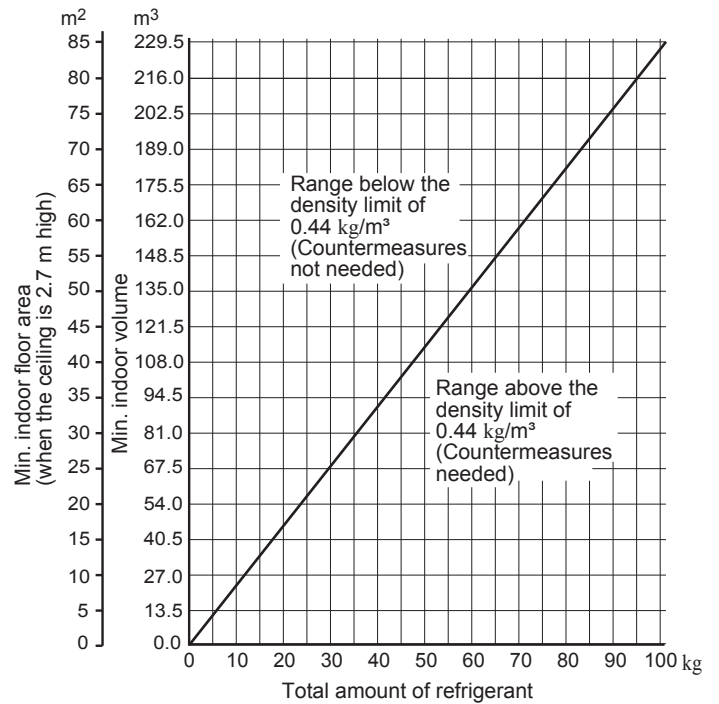
(Min. indoor volume where the indoor unit is installed: m³)

≤ Limit density 0.44 (kg/m³)

The limit density of refrigerant R410A which is used in this unit is 0.44 kg/m³ (ISO 5149).

The shipped outdoor unit comes charged with the amount of refrigerant fixed for each type, so add it to the amount that is charged in the field. (For the refrigerant charge amount at shipment, refer to the unit's nameplate.)

Minimum indoor volume & floor area as against the amount of refrigerant is roughly as given in the following figure.



CAUTION

Pay special attention to any location, such as a basement, etc., where leaking refrigerant can accumulate, since refrigerant gas is heavier than air.

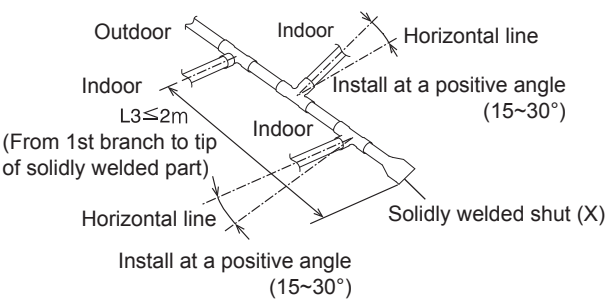
1-11. Installing Distribution Joint

(1) Refer to "HOW TO ATTACH DISTRIBUTION JOINT" enclosed with the optional distribution joint kit (CZ-P160BK2).

- When connecting a branch tubing to the indoor unit directly, it is necessary for each branch tubing to install at a positive angle with respect to horizontal in order to prevent accumulation of refrigerant oil in stopped units. See the below chart.

| How to install branch tubing | | When connecting branch tubing to indoor unit directly | | | When not connecting branch tubing to indoor unit directly |
|------------------------------|--|---|----------------------|-------------|---|
| | | Gas tube | | Liquid tube | |
| | | When connecting to A | When connecting to B | | |
| Horizontal | | | | | |
| | | | | | |
| Vertical | | Upward | | | |
| | | Downward | | | |

Header branch system (Main tubing is horizontal.)



- Be sure to solidly weld shut the T-joint end (marked by X in the figure). In addition, pay attention to the insertion depth of each connected tube so that the flow of refrigerant within the T-joint is not impeded.
Be sure to use a commercial available T-joint.
- When using the header joint system, do not make further branches in the tubing.

1-12. Optional Distribution Joint Kits

See the installation instructions packaged with the distribution joint kit for the installation procedure.

Table 11

| Model name | Cooling capacity after distribution | Remarks |
|---------------|-------------------------------------|-----------------|
| 1. CZ-P160BK2 | 22.4 kW or less * | For indoor unit |

*In case the total capacity of indoor units connected after distribution exceeds the capacity of the outdoor unit, select the distribution tubing size for the capacity of the outdoor unit.

■ Tubing size (with thermal insulation)

1. CZ-P160BK2

Use: Total capacity of indoor units after distribution joint is 22.4 kW or less.*

Example:

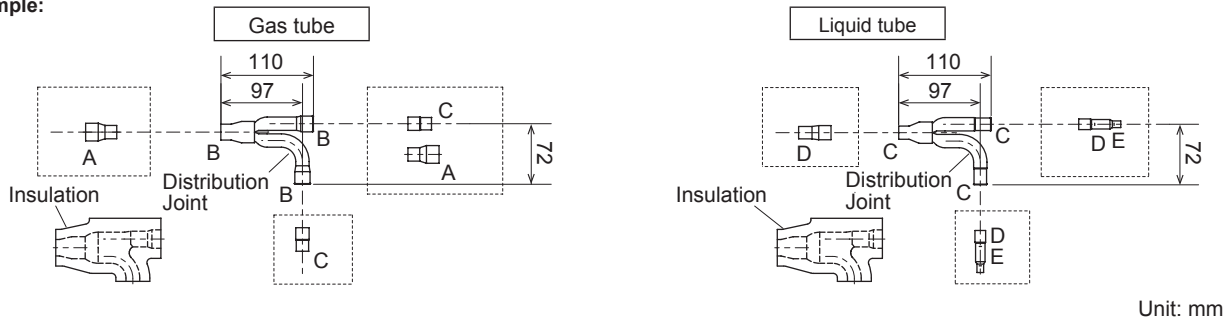


Table 12 : Size of connection point on each part (Shown are inside diameters of tubing)

| Size | Part A | Part B | Part C | Part D | Part E |
|------|--------|--------|--------|--------|--------|
| mm | ø19.05 | ø15.88 | ø12.7 | ø9.52 | ø6.35 |

*In case the total capacity of indoor units connected after distribution exceeds the capacity of the outdoor unit, select the distribution tubing size for the capacity of the outdoor unit.


1-13. Example of Tubing Size Selection and Refrigerant Charge Amount

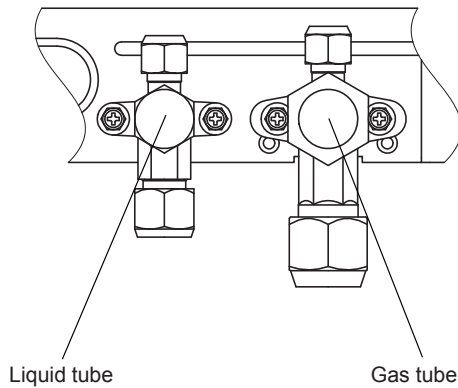
● Charging procedure

Be sure to charge with R410A refrigerant in liquid form.

1. After performing a vacuum, charge with refrigerant from the liquid tubing side. At this time, all valves must be in the “fully closed” position.
2. If it was not possible to charge the designated amount, operate the system in Cooling mode while charging with refrigerant from the gas tubing side. (This is performed at the time of the test run. For this, all valves must be in the “fully open” position.)
 Charge with R410A refrigerant in liquid form.
 With R410A refrigerant, charge while adjusting the amount being fed a little at a time in order to prevent liquid refrigerant from backing up.

- After charging is completed, turn all valves to the “fully open” position.
- Replace the tubing covers as they were before.

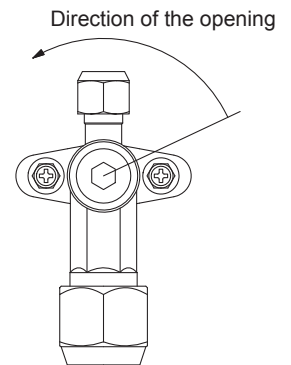
-  **CAUTION**
1. R410A additional charging absolutely must be done through liquid charging.
 2. The R410A refrigerant cylinder has a gray base color, and the top part is pink.
 3. The R410A refrigerant cylinder includes a siphon tube. Check that the siphon tube is present. (This is indicated on the label at the top of the cylinder.)
 4. Due to differences in the refrigerant, pressure, and refrigerant oil involved in installation, it is not possible in some cases to use the same tools for R22 and for R410A.



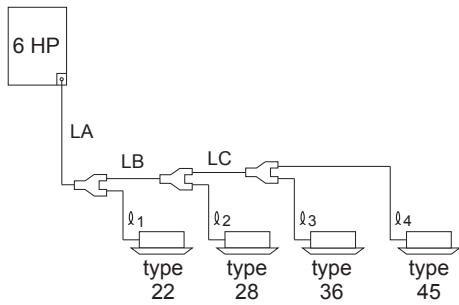
* Use a hexagonal wrench and turn to the left to open.

| | | Liquid tube | | Gas tube | |
|------------------------|------|-------------|-------------------------------|----------|---------------------------------|
| | | Size | Torque | Size | Torque |
| Hexagonal wrench width | 4 HP | 4 mm | 5 – 7 N·m {50 – 70 kgf·cm} | 4 mm | 8 – 10 N·m {80 – 100 kgf·cm} |
| | 5 HP | 4 mm | 5 – 7 N·m {50 – 70 kgf·cm} | 4 mm | 8 – 10 N·m {80 – 100 kgf·cm} |
| | 6 HP | 4 mm | 5 – 7 N·m {50 – 70 kgf·cm} | 4 mm | 8 – 10 N·m {80 – 100 kgf·cm} |

Open : Open the valve and rotate it counterclockwise with the hexagonal wrench until it stops.
 Close : Open the valve and rotate it clockwise with the hexagonal wrench until it stops.



Example:



- Example of each tubing length

At the time of shipment from the factory, this unit is charged with enough refrigerant for a tubing length of 50 m.

If the tubing length used will be 50 m or less, no additional charge will be necessary.

| Main tubing | Distribution joint tubing | |
|------------------------------------|---------------------------|------------|
| LA = 40 m | Indoor side | |
| LB = 15 m | l 1 = 25 m | l 3 = 20 m |
| LC = 10 m | l 2 = 15 m | l 4 = 30 m |
| Total tubing length = 155 m > 50 m | | |

- Obtain charge amount for each tubing size

Note that the charge amounts per 1 meter are different for each liquid tubing size.

ø9.52 → LA + LB + LC : 65 m × 0.056 kg/m = 3.64 kg
 ø6.35 → l1 + l2 + l3 + l4 : 90 m × 0.026 kg/m = 2.34 kg

Chargeless amount of outdoor unit -2.80 kg

Total 3.18 kg

Additional refrigerant charge amount is 3.18 kg.



Be sure to check the limit density for the room in which the indoor unit is installed.

Checking of limit density

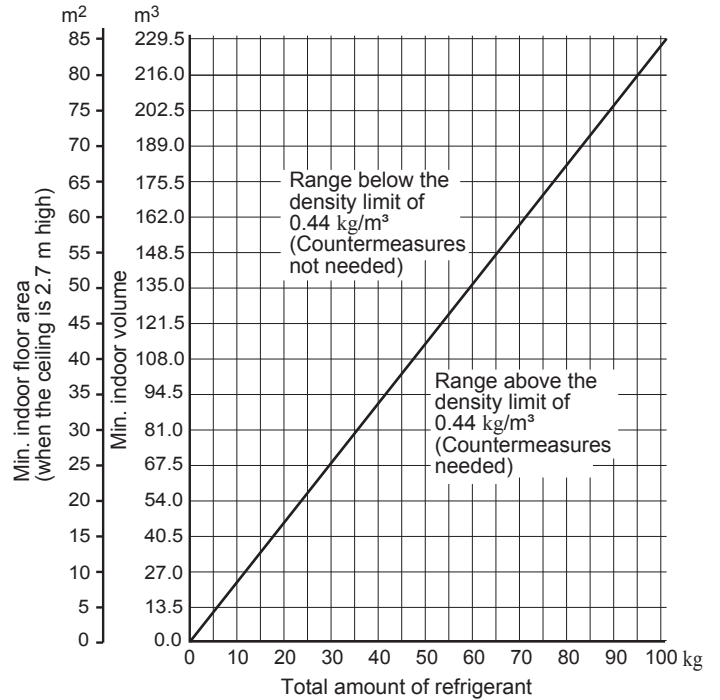
Density limit is determined on the basis of the size of a room using an indoor unit of minimum capacity. For instance, when an indoor unit is used in a room (floor area 8.00 m² × ceiling height 2.7 m = room volume 21.6 m³), the minimum room volume should be 22.5 m³ (9.88 kg ÷ 0.44 kg/m³) for refrigerant of 9.88 kg (3.18 kg + 6.7 kg). Accordingly, openings such as louvers are required for this room.

<Determination by calculation>

Overall refrigerant charge amount for the air conditioner: kg

$$= \frac{3.18 \text{ (kg)} + 6.7 \text{ (kg)}}{21.6 \text{ (m}^3\text{)}} = 0.46 \text{ (kg/m}^3\text{)} \geq 0.44 \text{ (kg/m}^3\text{)}$$

Therefore, openings such as louvers are required for this room.

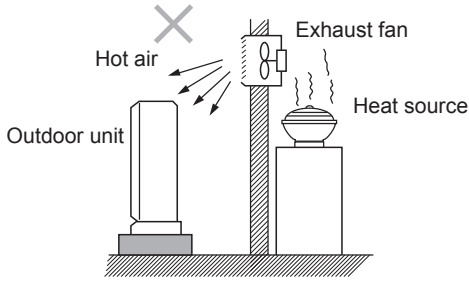


2. SELECTING THE INSTALLATION SITE

2-1. Outdoor Unit

AVOID:

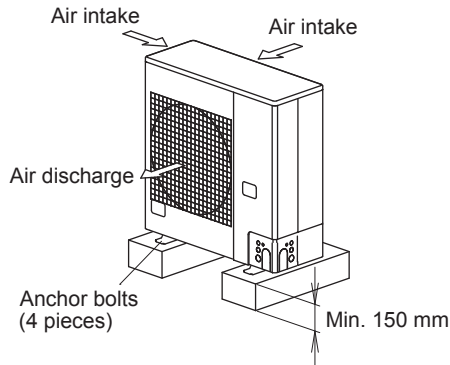
- heat sources, exhaust fans, etc.



- damp, humid or uneven locations
- indoors (no-ventilation location)

DO:

- choose a place as cool as possible.
- choose a place that is well ventilated and outside air temperature does not exceed maximum 46°C constantly.
- allow enough room around the unit for air intake/exhaust and possible maintenance. For the details, see the following installation examples (1) to (10).
- provide a solid base (concrete block, 100 × 450 mm beams or equal), a minimum of 150 mm above ground level to reduce humidity and protect the unit against possible water damage and decreased service life.



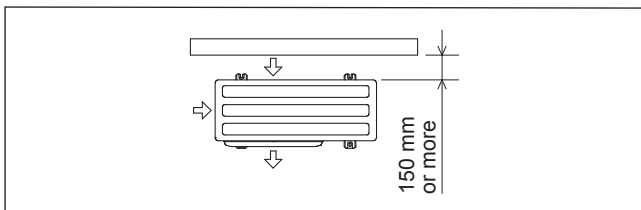
- use lug bolts or equal to bolt down unit, reducing vibration and noise.

Installation space for outdoor unit

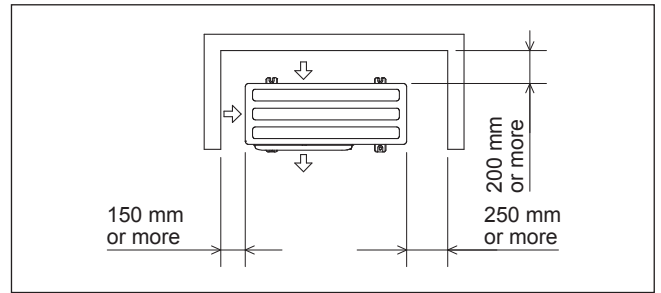
Install the outdoor unit at a place where there is enough space for ventilation. Otherwise the unit may not operate properly. Required space for installation shows in the descriptions (1) to (10). For other installation examples, refer to the Technical Data.

It is possible to reduce the space between the air discharge outlet and an obstacle by installing the field supplied air-discharge chamber for top discharge. See the note in the figure. When installing the air-discharge chamber for top discharge, keep the unit above free from obstruction.

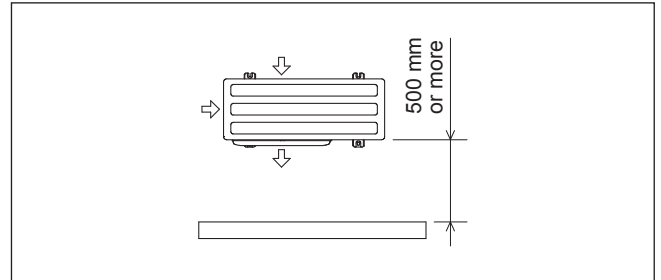
- (1) Obstructions on the rear side (Front side, left side, right side and above the unit are opened).



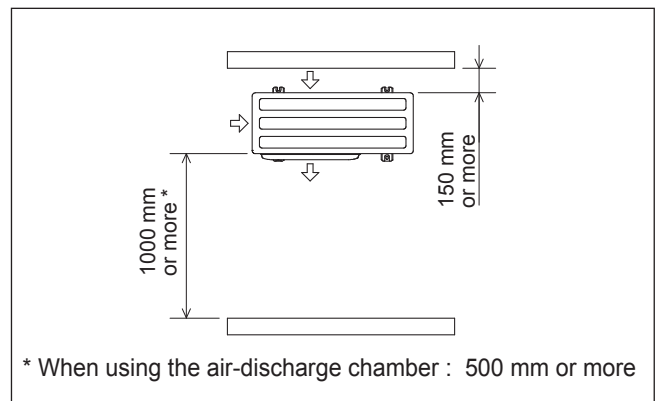
- (2) Obstructions on the left side, right side and rear side (Front side and above the unit are opened).



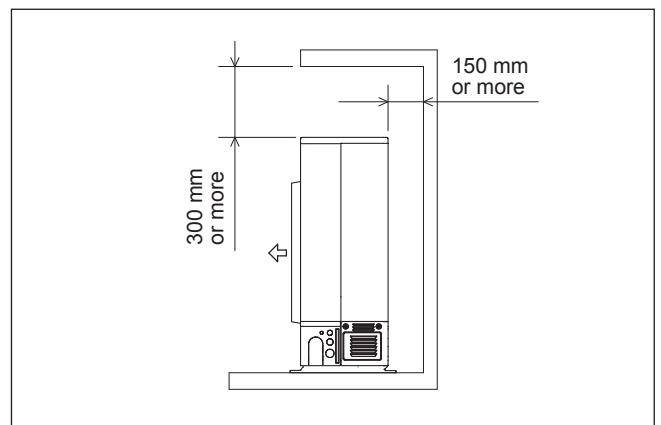
- (3) Obstructions on the front side (Rear side, left side, right side and above the unit are opened).



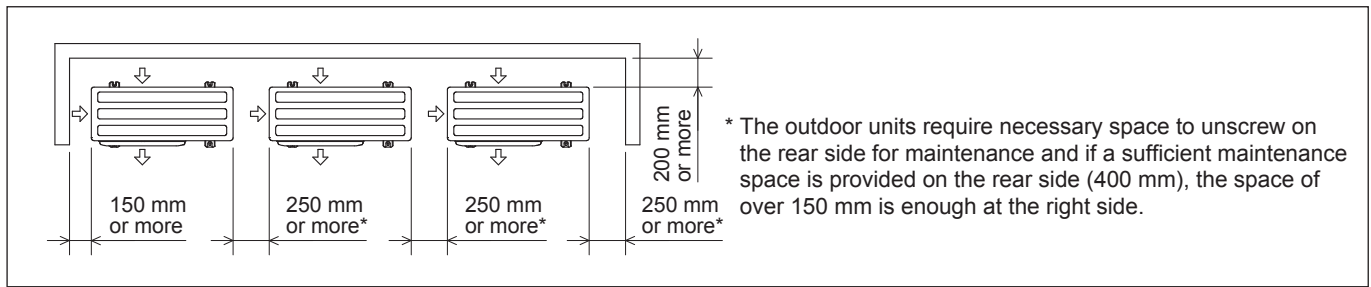
- (4) Obstructions on the front side and rear side (Left side, right side and above the unit are opened).



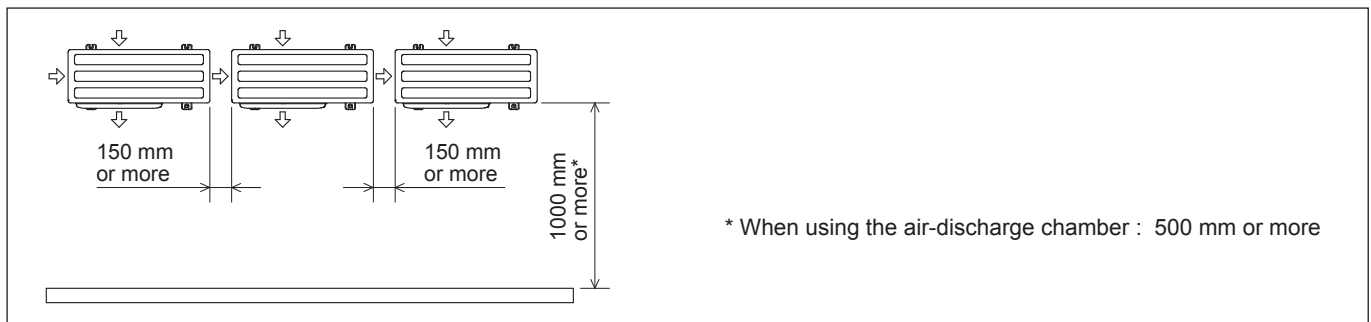
- (5) Obstructions on the rear side and above the unit (Left side, right side and front side are opened). The air-discharge chamber can not be used.



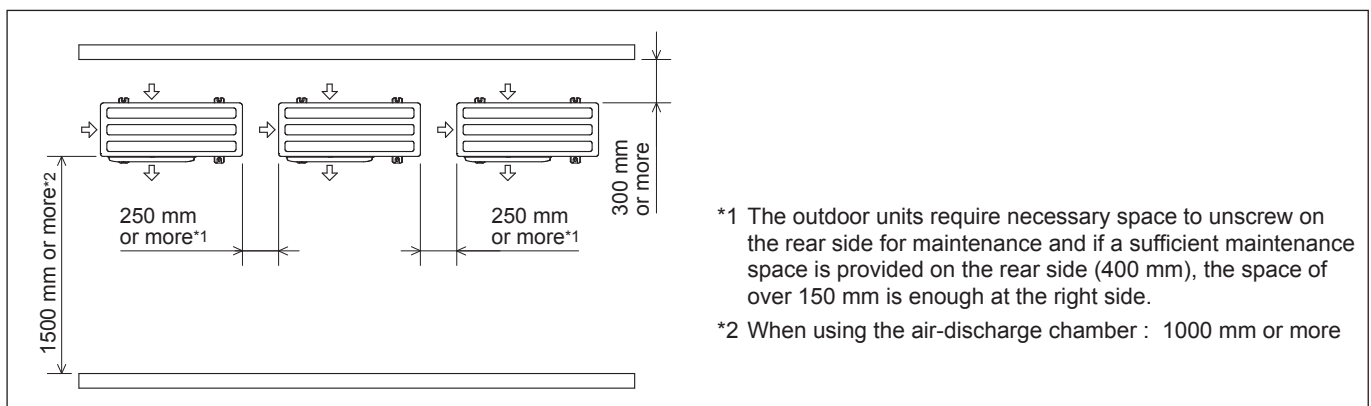
(6) Obstructions on the left side, right side and rear side (Front side and above the unit are opened).



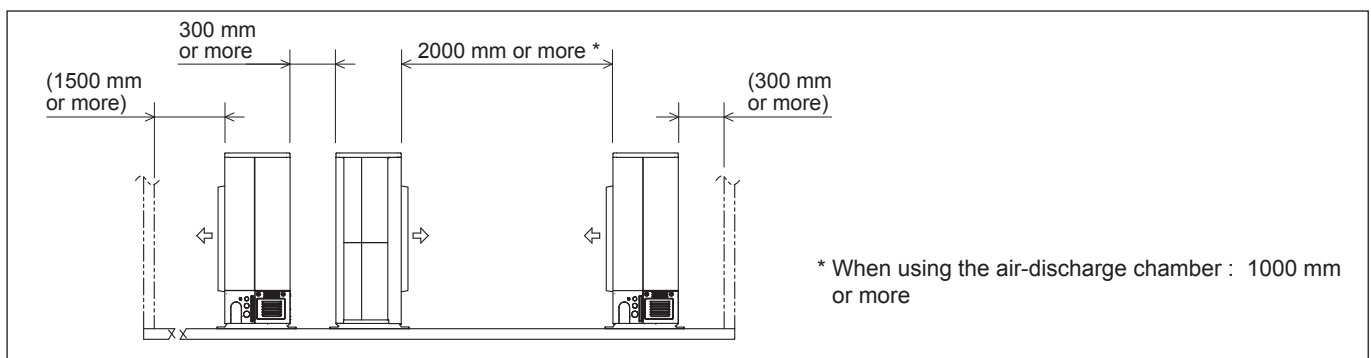
(7) Obstructions on the front side (Rear side, left side, right side and above the unit are opened).



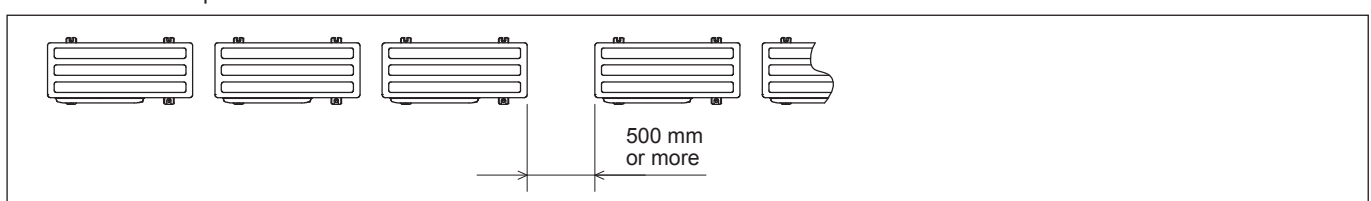
(8) Obstructions on the front side and rear side (Left side, right side and above the unit are opened).
One of the obstructions' height shall be not more than 2000 mm.



(9) Installation in front-rear rows
Installation with intakes facing intakes or outlets facing outlets (Left side, right side and above the unit are opened).
One of the obstructions' height shall be not more than 2000 mm.



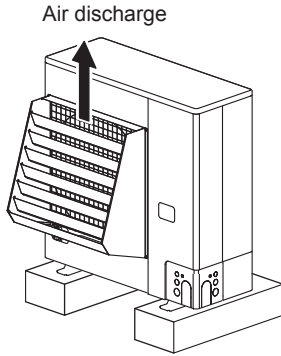
(10) In the case of continuous installation of the outdoor units, provide a space of 500 mm or more every three units for the maintenance space.



2-2. Air-Discharge Chamber for Top Discharge

Be sure to install an air-discharge chamber in the field when:

- it is difficult to keep a sufficient space between the air discharge outlet and an obstacle.
- the air discharge outlet is facing a sidewalk and discharged hot air may annoy passers-by.



In regions with significant snowfall, the outdoor unit should be provided with a platform and snow-proof duct.

2-3. Installing the Outdoor Unit in Heavy Snow Areas

In locations with strong wind, snow-proof ducting should be fitted and direct exposure to the wind should be avoided as much as possible.

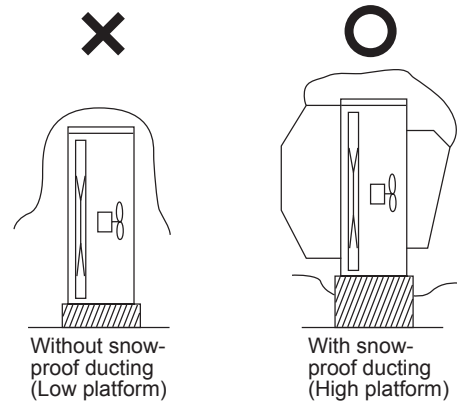
■ Countermeasures against snow and wind

In regions with snow and strong wind, the following problems may occur when the outdoor unit is not provided with a platform and snow-proof ducting:

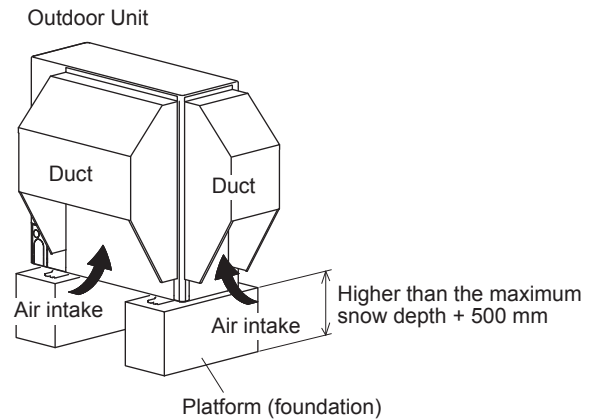
- a) The outdoor fan may not run and damage to the unit may occur.
- b) There may be no air flow.
- c) The tubing may freeze and burst.
- d) The condenser pressure may drop because of strong wind, and the indoor unit may freeze.

2-4. Precautions for Installation in Heavy Snow Areas

- (1) The platform should be higher than the maximum snow depth + 500 mm.



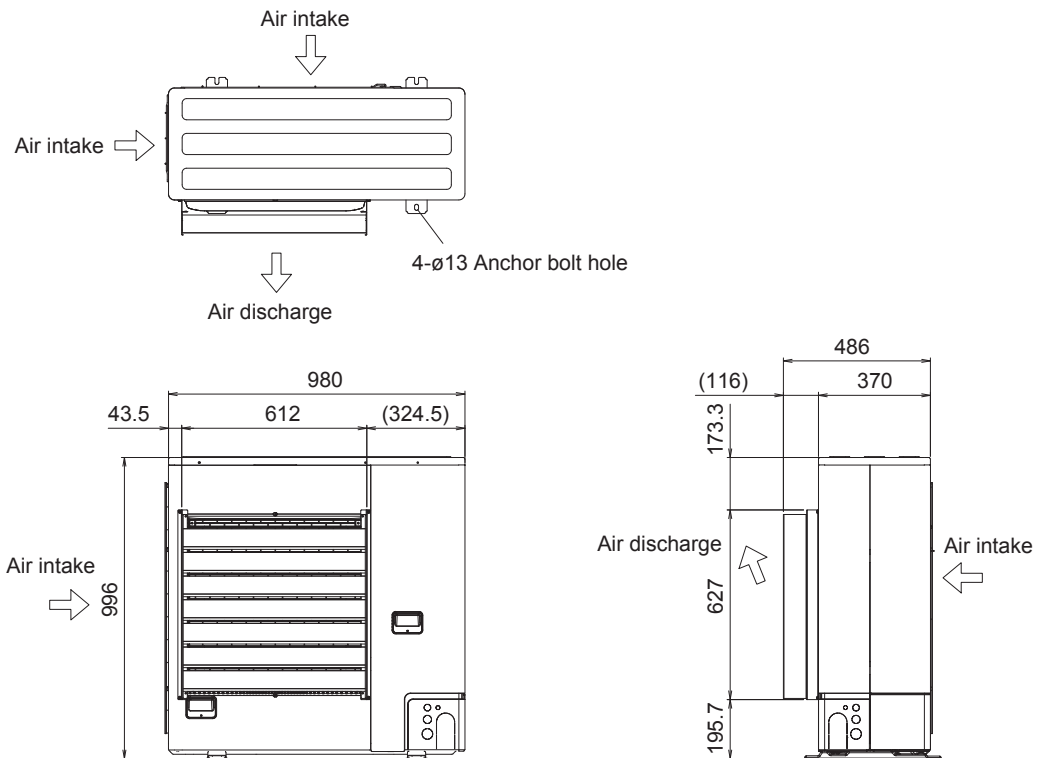
- (2) The 2 anchoring feet of the outdoor unit should be used for the platform, and the platform should be installed beneath the air intake side of outdoor unit.
- (3) The platform foundation must be firm and the unit must be secured with anchor bolts.
- (4) In case of installation on a roof subject to strong wind, countermeasures must be taken to prevent the unit from being blown over.



2-5. Dimensions of Air-Discharge Chamber

Reference diagram for air-discharge chamber (field supply)

Unit: mm

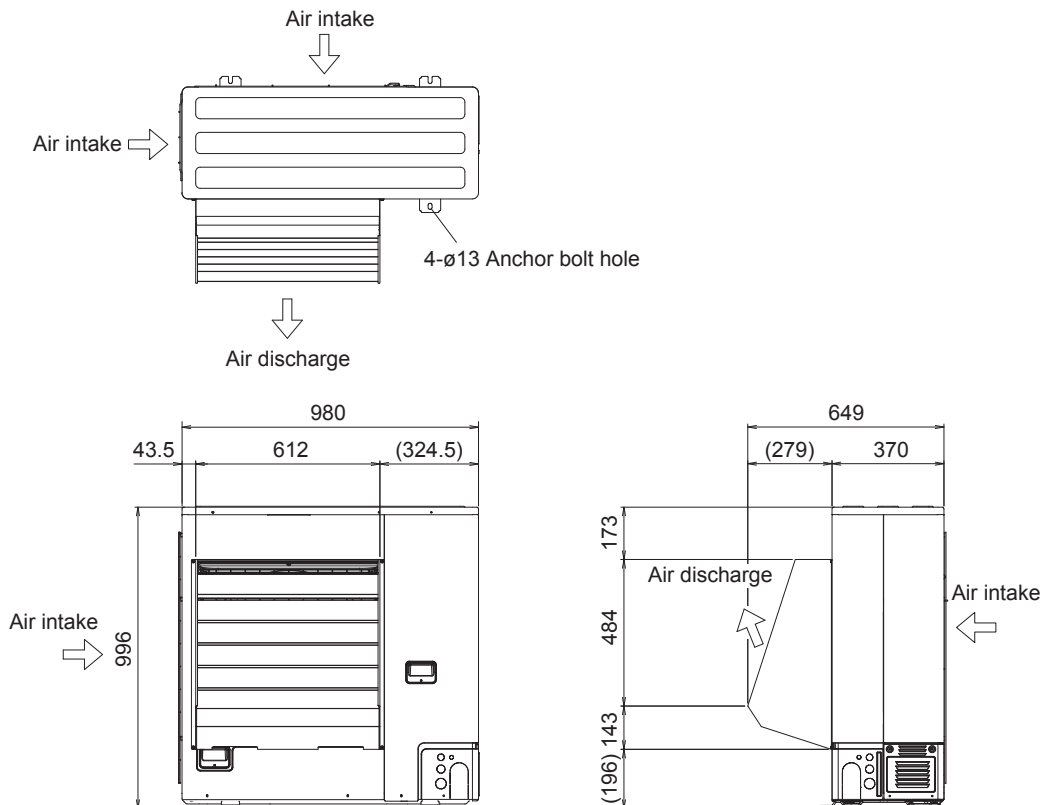


2-6. Dimensions of Air-Discharge Chamber for Top Discharge

Reference diagram for air-discharge chamber for top discharge (field supply)

* When setting the air-discharge direction further upward greater than that of the section 2-5. Dimensions of Air-Discharge Chamber, use this type of chamber as shown in the following illustration.

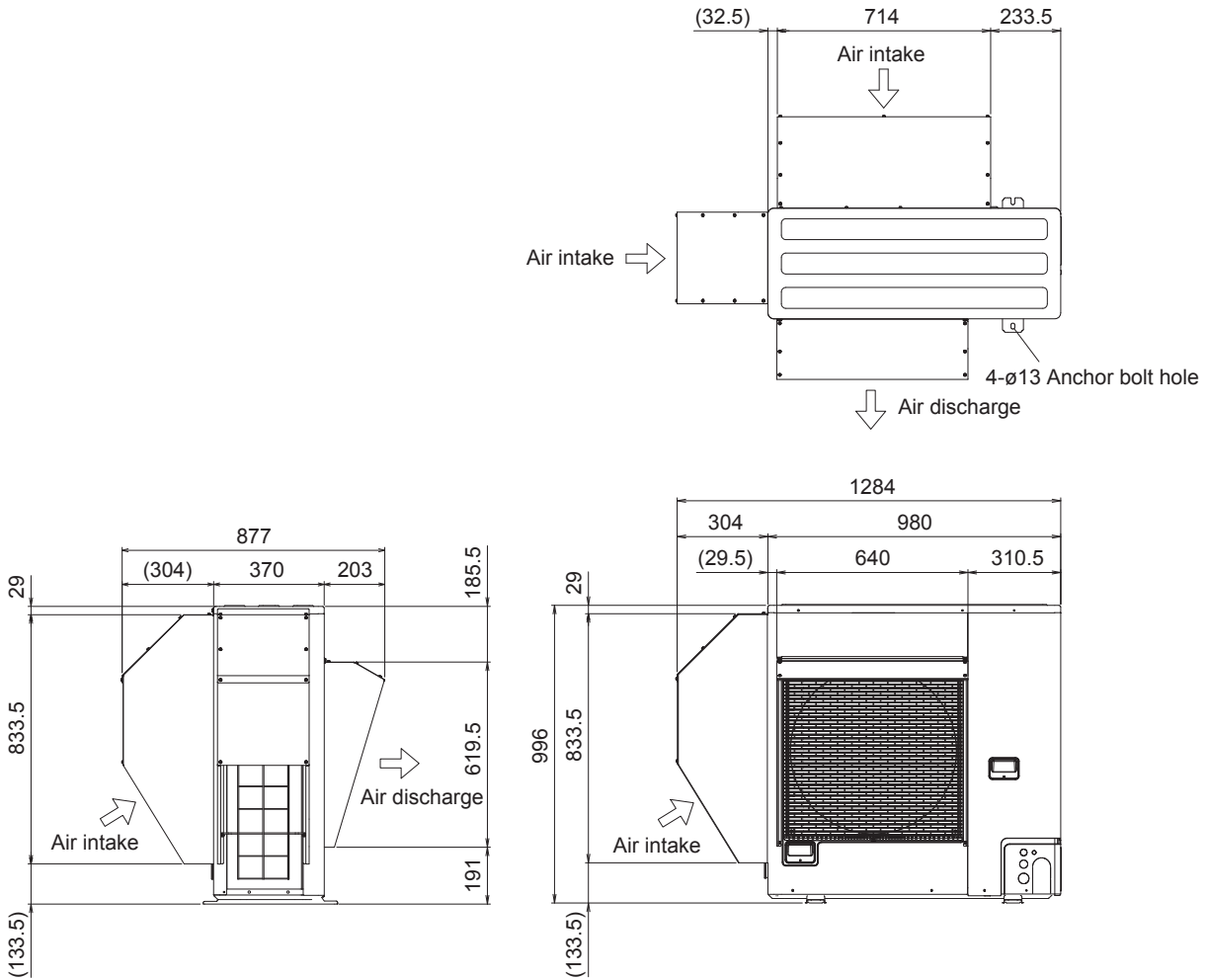
Unit: mm



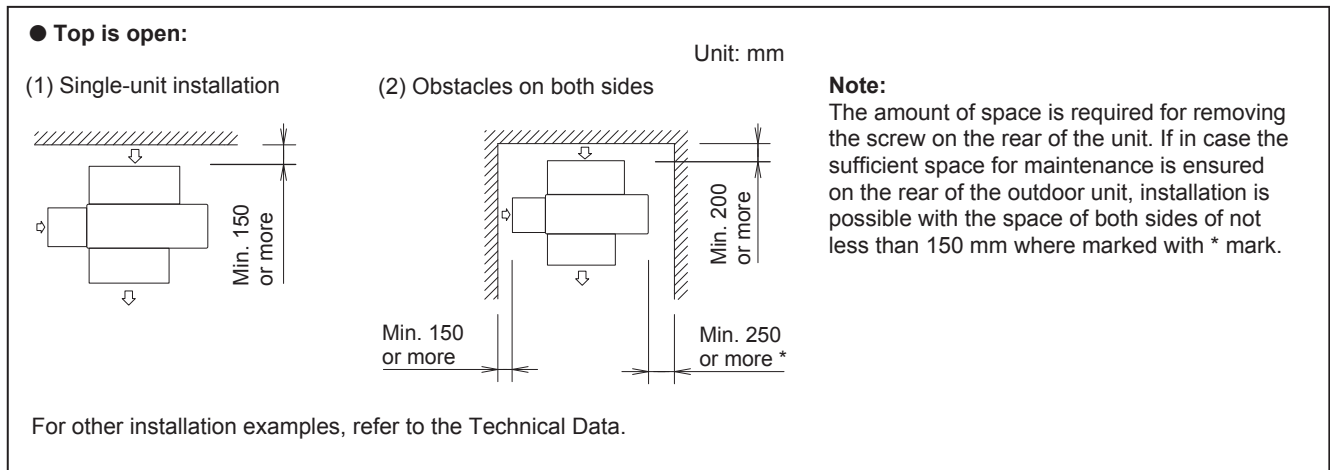
2-7. Dimensions of Snow-Proof Vents

Reference diagram for snow-proof vents (field supply)

Unit: mm



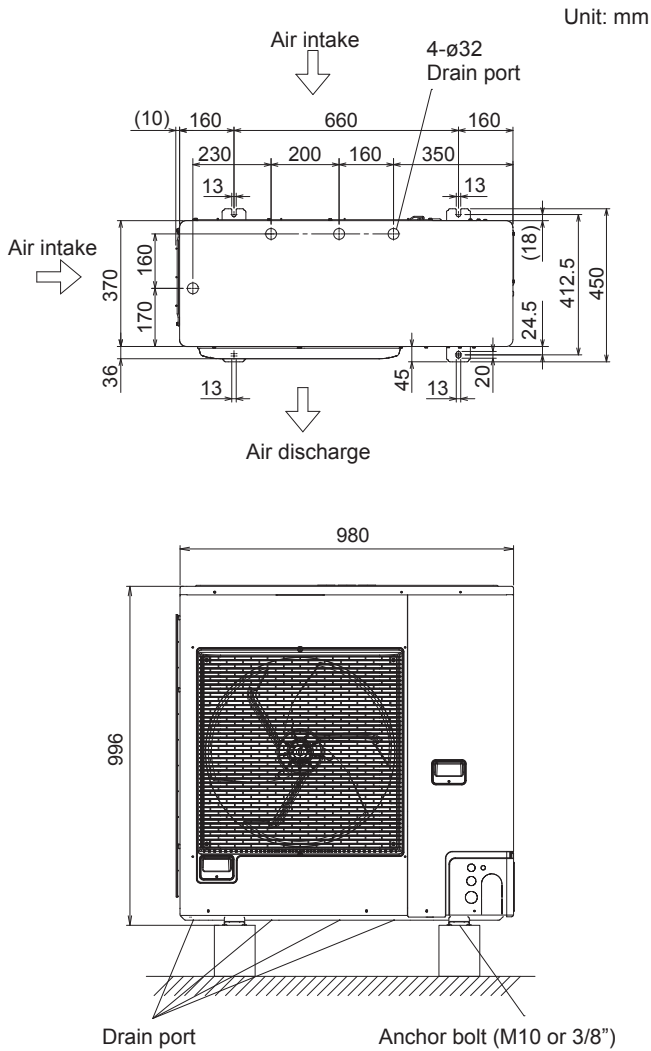
Required space around outdoor unit when using snow-proof vents [Obstacle to the rear of unit]



3. HOW TO INSTALL THE OUTDOOR UNIT

3-1. Installing the Outdoor Unit

- Use concrete or a similar material to create the base, and ensure good drainage.
- Ordinarily, ensure a base height of 5 cm or more. If a drain pipe is used, or for use in cold-weather regions, ensure a height of 15 cm or more at the feet on both sides of the unit. (In this case, leave clearance below the unit for the drain pipe, and to prevent freezing of drainage water in cold-weather regions.)
- See as illustrated below the anchor bolt dimensions.
- Be sure to anchor the feet with anchor bolts (M10 or 3/8"). In addition, use anchoring washers on the top side. (Use SUS washers with nominal diameter of 10 or 3/8".) (Field supply)



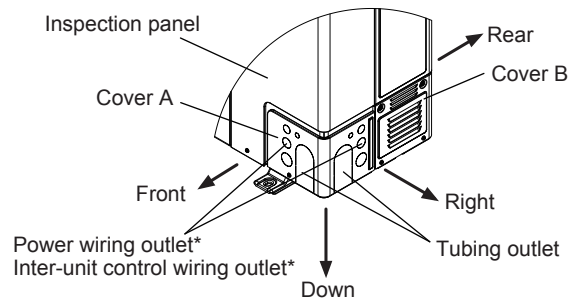
3-2. Drainage Work

Follow the procedure below to ensure adequate draining for the outdoor unit.

- For the drain port dimensions, see the section 3-1.
- Ensure a base height of 15 cm or more at the feet on both sides of the unit.
- When using a drain pipe, install the drain socket (field supply) onto the drain port. Seal the other drain port with the rubber cap (field supply).
- For details, refer to the instruction manual of the drain socket (field supply).
- After completing the installation work of the drain socket, make sure that the water does not leak from any part of connection.

3-3. Routing the Tubing and Wiring

- The tubing and wiring can be extended out in 4 directions (front, rear, right, and down):
 - The service valves are housed inside the unit. To access them, remove the inspection panel. (To remove the inspection panel, remove the 2 screws, then slide the panel downward and pull it toward you.)
- (1) If the routing direction is through the front, rear, or right, use a nipper or similar tool to cut out the knockout holes for the inter-unit control wiring outlet, power wiring outlet, and tubing outlet from the appropriate covers A and B. When routing the wiring, be sure to attach each supplied protection bushing to the edges around the wiring outlet holes in order to protect the wiring from scratches by the cutting burr.
 - (2) If the routing direction is down, use a nipper or similar tool to cut out the lower flange from cover A.



NOTE

- * Protect the outdoor unit wiring with a conduit material or supplied protection bushing to avoid damages by the edges of knockout hole.
- * Use sealing putty to seal off the hole to prevent the dust and insects from entering the wiring outlet holes and the tubing outlet.

CAUTION

- Route the tubing so that it does not contact the compressor, panel, or other parts inside the unit. Increased noise will result if the tubing contacts these parts.
- When routing the tubing, use a tube bender to bend the tubes.

4. ELECTRICAL WIRING

4-1. General Precautions on Wiring

- (1) Before wiring, confirm the rated voltage of the unit as shown on its nameplate, then carry out the wiring closely following the wiring diagram.



WARNING

- (2) This equipment is strongly recommended to be installed with Earth Leakage Circuit Breaker (ELCB) or Residual Current Device (RCD). Otherwise, it may cause electrical shock and fire in case of equipment breakdown or insulation breakdown.
Earth Leakage Circuit Breaker (ELCB) must be incorporated in the fixed wiring in accordance with the wiring regulations. The Earth Leakage Circuit Breaker (ELCB) must be an approved circuit capacity, having a contact separation in all poles.
- (3) To prevent possible hazards from insulation failure, the unit must be grounded.
- (4) Each wiring connection must be done in accordance with the wiring system diagram. Wrong wiring may cause the unit to misoperate or become damaged.
- (5) Do not allow wiring to touch the refrigerant tubing, compressor, or any moving parts of the fan.
- (6) Unauthorized changes in the internal wiring can be very dangerous. The manufacturer will accept no responsibility for any damage or misoperation that occurs as a result of such unauthorized changes.
- (7) Regulations on wire diameters differ from locality to locality. For field wiring rules, please refer to your LOCAL ELECTRICAL CODES before beginning. You must ensure that installation complies with all relevant rules and regulations.
- (8) To prevent malfunction of the air conditioner caused by electrical noise, care must be taken when wiring as follows:
 - The remote control wiring and the inter-unit control wiring should be wired apart from the inter-unit power wiring.
 - Use shielded wires for inter-unit control wiring between units and ground the shield on both sides.
- (9) If the power supply cord of this appliance is damaged, it must be replaced by a repair shop appointed by the manufacturer, because special purpose tools are required.
- (10) Using a waterproof conduit is recommended for outdoor unit wiring to avoid damaging the wire and to prevent accumulation of liquid inside the unit.
- (11) Protect the outdoor unit wiring with a conduit material or supplied protection bushing to avoid damages by the edges of knockout hole. If any openings occur between the protection bushing and wiring, seal the opening entirely.

4-2. Recommended Wire Length and Wire Diameter for Power Supply System

Outdoor unit

| | (A) Power supply | | Time delay fuse or circuit capacity | or | (A) Power supply | | Time delay fuse or circuit capacity |
|------|-------------------|-------------|-------------------------------------|----|-------------------|-------------|-------------------------------------|
| | Wire size | Max. length | | | Wire size | Max. length | |
| 4 HP | 4 mm ² | 24 m | 25 A | | 6 mm ² | 36 m | 25 A |
| 5 HP | 4 mm ² | 17 m | 30 A | | 6 mm ² | 25 m | 30 A |
| 6 HP | 4 mm ² | 15 m | 35 A | | 6 mm ² | 22 m | 35 A |

Indoor unit

| Type | (B) Power supply | Time delay fuse or circuit capacity |
|--|--|-------------------------------------|
| D1, L1, U2, Y2, K1, K2, T2, F2, M1, P1, R1, E1, Z1 | Refer to the Installation Instructions of the indoor unit. | |

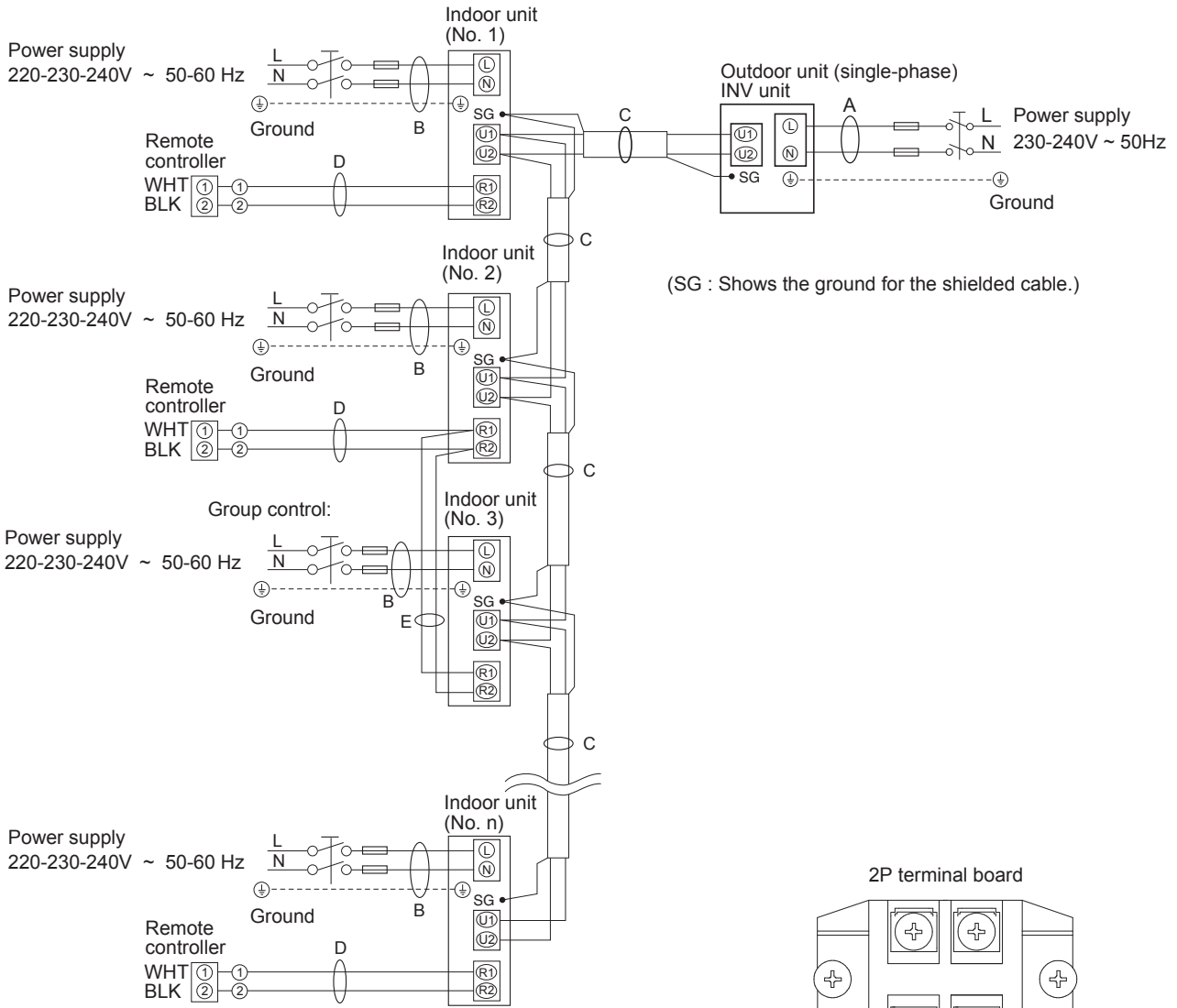
Control wiring

| (C) Inter-unit (between outdoor and indoor units) control wiring | | or | (D) Remote control wiring | |
|--|--------------|--------------|---|--------------------------------|
| 0.75 mm ² (AWG #18) Use shielded wiring* | Max. 1,000 m | | 2.0 mm ² (AWG #14) Use shielded wiring* | 0.75 mm ² (AWG #18) |
| | | Max. 2,000 m | | |

NOTE * With ring-type wire terminal

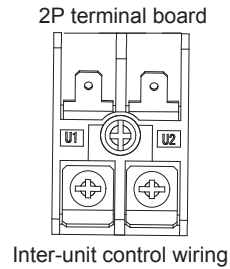
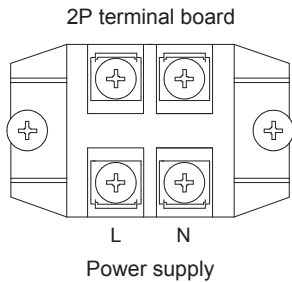
| (E) Control wiring for group control |
|--------------------------------------|
| 0.75 mm ² (AWG #18) |
| Max. 200 m (Total) |

4-3. Wiring System Diagram



NOTE

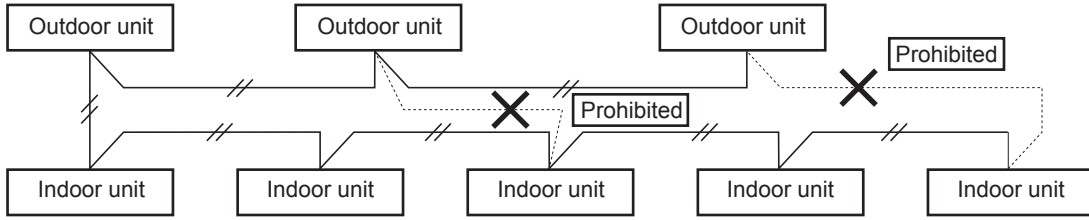
- (1) See the section "4-2. Recommended Wire Length and Wire Diameter for Power Supply System" for the explanation of "A", "B", "C", "D" and "E" in the above diagram.
- (2) The basic connection diagram of the indoor unit shows the 6P terminal board, so the terminal boards in your equipment may differ from the diagram.
- (3) Refrigerant Circuit (R.C.) address should be set before turning the power on.
- (4) Regarding the R.C. address setting, it can be executed by remote controller automatically. See the section "7-4. Auto Address Setting".



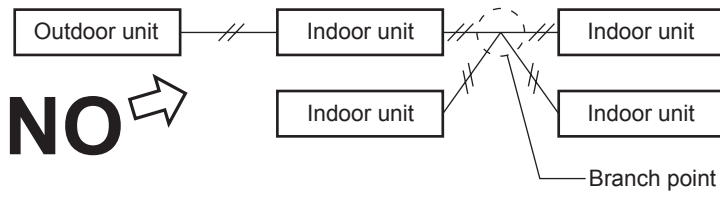
Outdoor unit

CAUTION

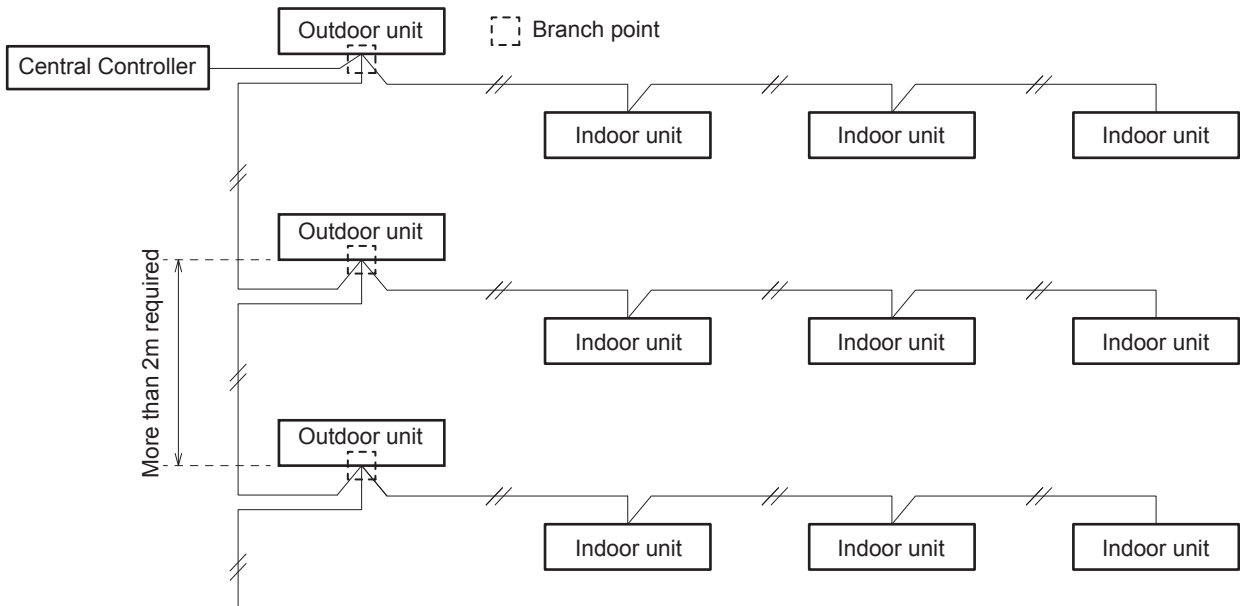
- (1) When linking outdoor units in a network, see the section “ATTENTION!”.
- (2) Do not install the inter-unit control wiring in a way that forms a loop.



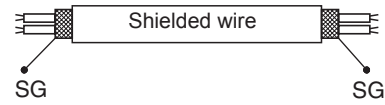
- (3) Do not install the inter-unit control wiring such as star branch wiring. Star branch wiring causes mis-address setting.



- (4) If branching the inter-unit control wiring, the number of branch points should be 16 or fewer.



(5) Use shielded wires for inter-unit control wiring (C) and ground the shield on both sides, otherwise misoperation from noise may occur. Connect wiring as shown in the section “4-3. Wiring System Diagram.”



- (6) • Connecting cable between indoor unit and outdoor unit shall be approved polychloroprene sheathed 5 or 3 *1.5 mm² flexible cord. Type designation 60245 IEC57 (H05RN-F, GP85PCP etc.) or heavier cord.
- Use the standard power supply cables for Europe (such as H05RN-F or H07RN-F which conform to CENELEC (HAR) rating specifications) or use the cables based on IEC standard. (60245 IEC57, 60245 IEC66)



WARNING

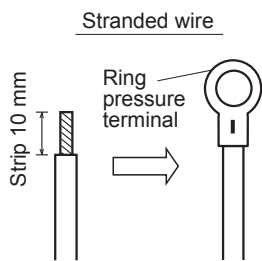
Loose wiring may cause the terminal to overheat or result in unit malfunction. A fire hazard may also exist. Therefore, ensure that all wiring is tightly connected.

When connecting each power wire to the terminal, follow the instructions on “How to Connect Wiring to Terminal” and fasten the wire securely with the fixing screw of the terminal board.

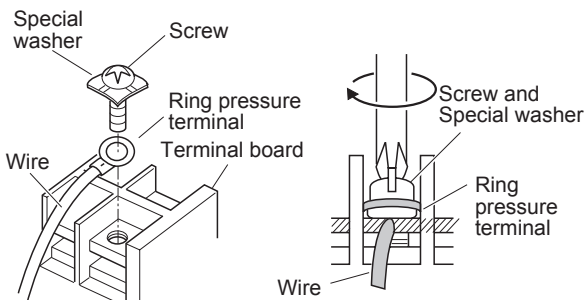
How to Connect Wiring to Terminal

■ For stranded wiring

- (1) Cut the wire end with cutting pliers, then strip the insulation to expose the stranded wiring about 10 mm and tightly twist the wire ends.



- (2) Using a Phillips head screwdriver, remove the terminal screw(s) on the terminal board.
- (3) Using a ring connector fastener or pliers, securely clamp each stripped wire end with a ring pressure terminal.
- (4) Place the ring pressure terminal, and replace and tighten the removed terminal screw using a screwdriver.

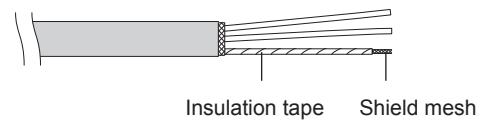


■ Examples of shield wires

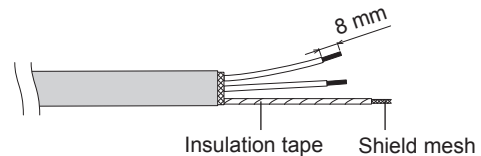
- (1) Remove cable coat not to scratch braided shield.



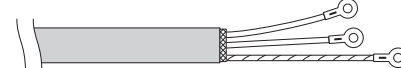
- (2) Unbraid the braided shield carefully and twist the unbraided shield wires tightly together. Insulate the shield wires by covering them with an insulation tube or wrapping insulation tape around them.



- (3) Remove coat of signal wire.



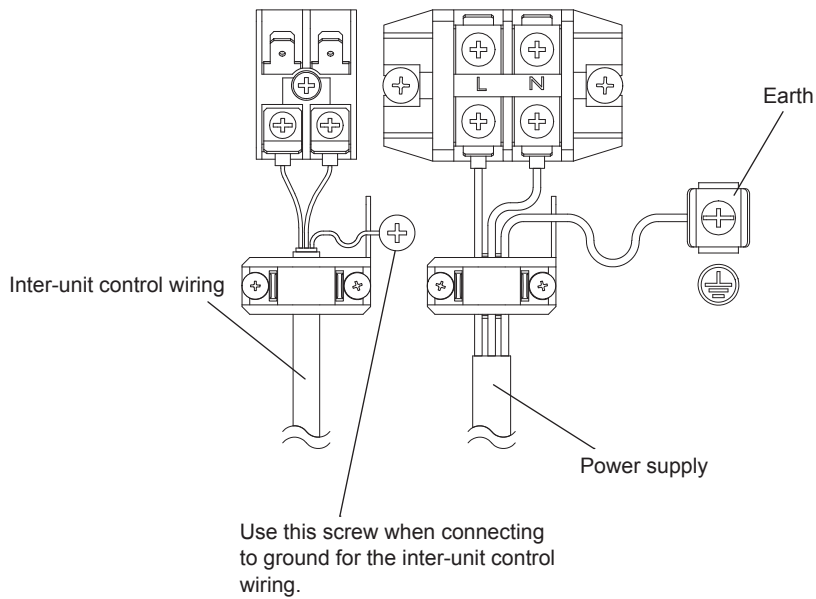
- (4) Attach ring pressure terminals to the signal wires and the shield wires insulated in Step (2).



■ Earth wire for power supply

The earth wire should be longer than the other lead wires for electrical safety.

■ Wiring sample



Torque value of power supply terminal board: $2.0 \text{ N}\cdot\text{m} \pm 0.05 \text{ N}\cdot\text{m}$ { $20 \text{ kgf}\cdot\text{cm} \pm 0.5 \text{ kgf}\cdot\text{cm}$ }

Torque value of communication terminal board: $1.3 \text{ N}\cdot\text{m} \pm 0.1 \text{ N}\cdot\text{m}$ { $13 \text{ kgf}\cdot\text{cm} \pm 1 \text{ kgf}\cdot\text{cm}$ }

ATTENTION: Comply with the torque values.

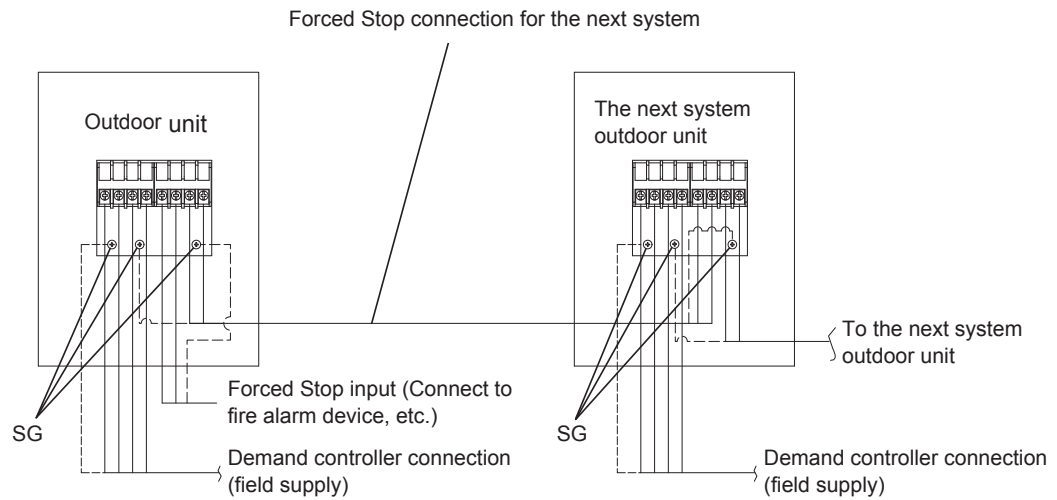
If tightening over torque values, the screw will be damaged.

ATTENTION: Apply an adjustable wrench to the valve vertically not to damage the P.C. board.

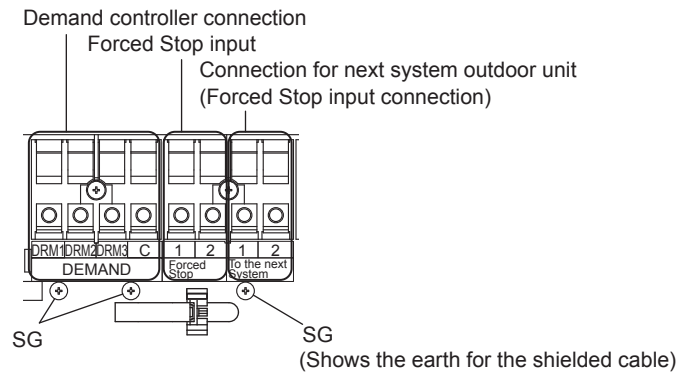
Connection for demand and forced stop

■ Connection procedure

Be sure to always turn the power off first when setting up the wire and cable connections.
Failure to do so may lead to electric shock or unit failure.

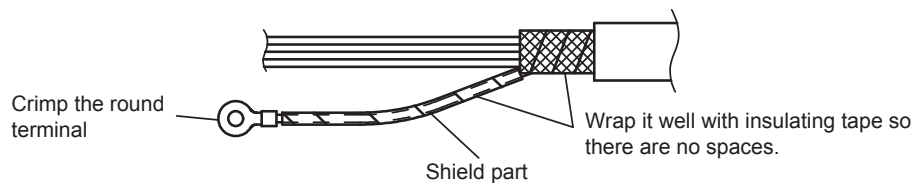


The demand terminal set up is shown in the following illustration.



- Use a shielded cable for the cable connection.

For the shield part of the shielded cable twist the end out, crimp it with a round terminal, and connect it to the SG screw. After crimping it with a round terminal, wrap it with insulating tape so there are no spaces and adjust it so the shield part does not touch any live parts.



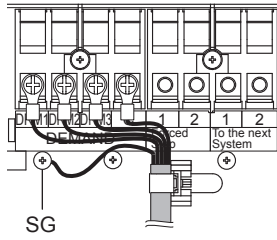
CAUTION

**Be sure that the shield part of the shielded cable does not touch the terminal block or any live parts.
Failure to do so may lead to electric shock or fire.**

When connecting the demand controller input

It is possible to choose the desired demand level.
See the table shown on the right.

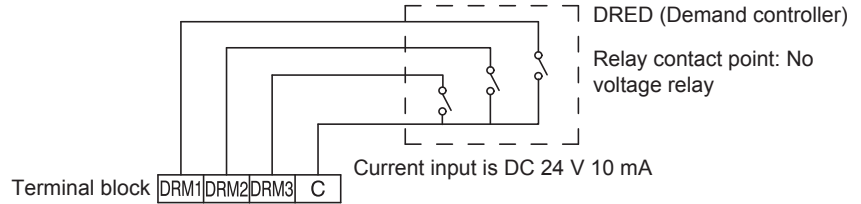
| Termrial no. for demand section | Description |
|---------------------------------|----------------------------------|
| DRM3 | Approx. 75% of rated power input |
| DRM2 | Approx. 50% of rated power input |
| DRM1 | Compressor off |



Connect the wiring (4-wire) to the Demand section (DRM1, DRM2, DRM3, C) on the terminal block.

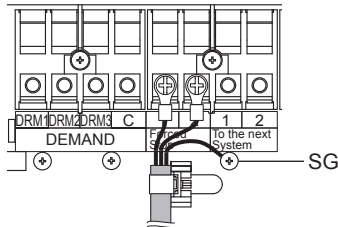
The shield part of the shielded cable is connected with SG under the terminal block.

Secure the wiring with the cord clamp located on the lower part of the terminal block.



When connection to the forced stop input

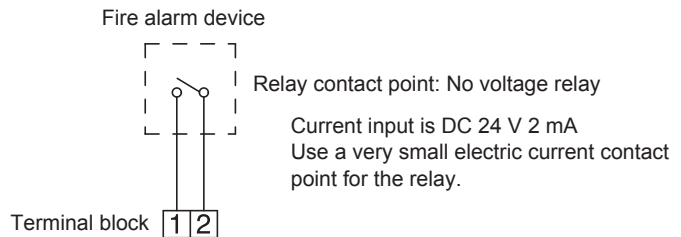
With the Forced Stop input, it is possible to override the air conditioning operation to force a stop if a signal is received from a fire alarm device, etc.



Connect the wiring (2-wire) to points 1 and 2 on the left side of the terminal block.

The shield part of the shielded cable is connected with SG under the terminal block.

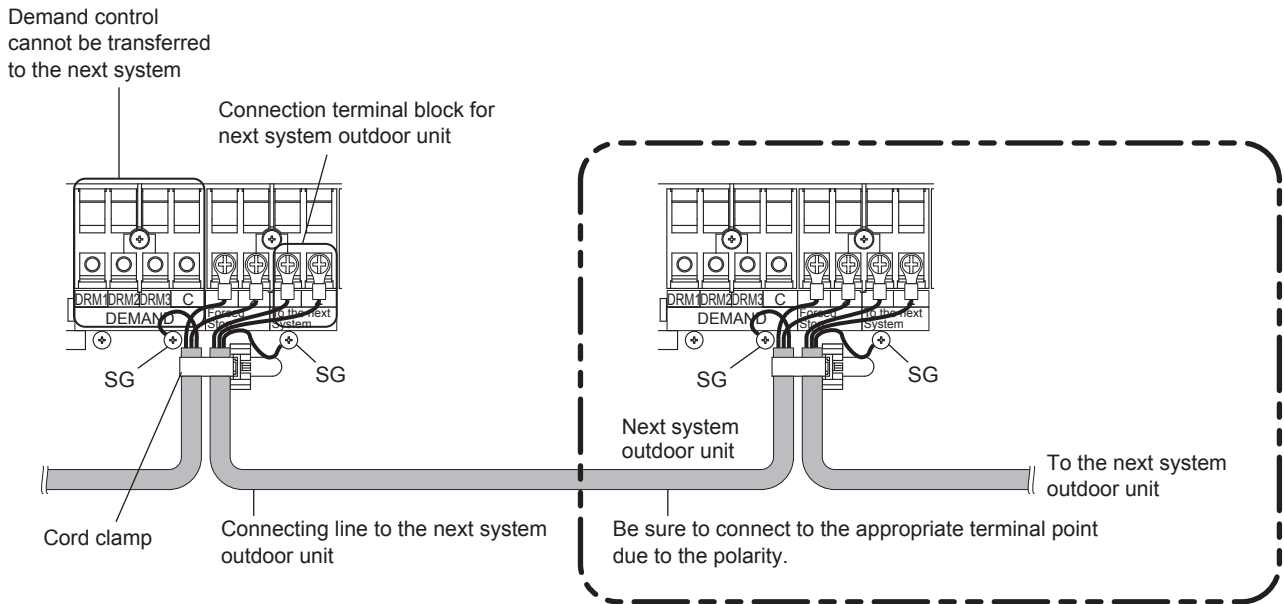
Secure the wiring with the cord clamp located on the lower part of the terminal block.



When connecting to the next system unit

- Forced Stop input can be transferred to the next system unit.
- When using the Forced Stop input, connect the wiring to the terminal points 1 and 2 on the right side of the lower part of the terminal block.
- The maximum wire/cable length is 100 m.
- The demand control cannot be transferred to the next system unit.
- When transferring to the next system, the maximum number of connecting units is 30.

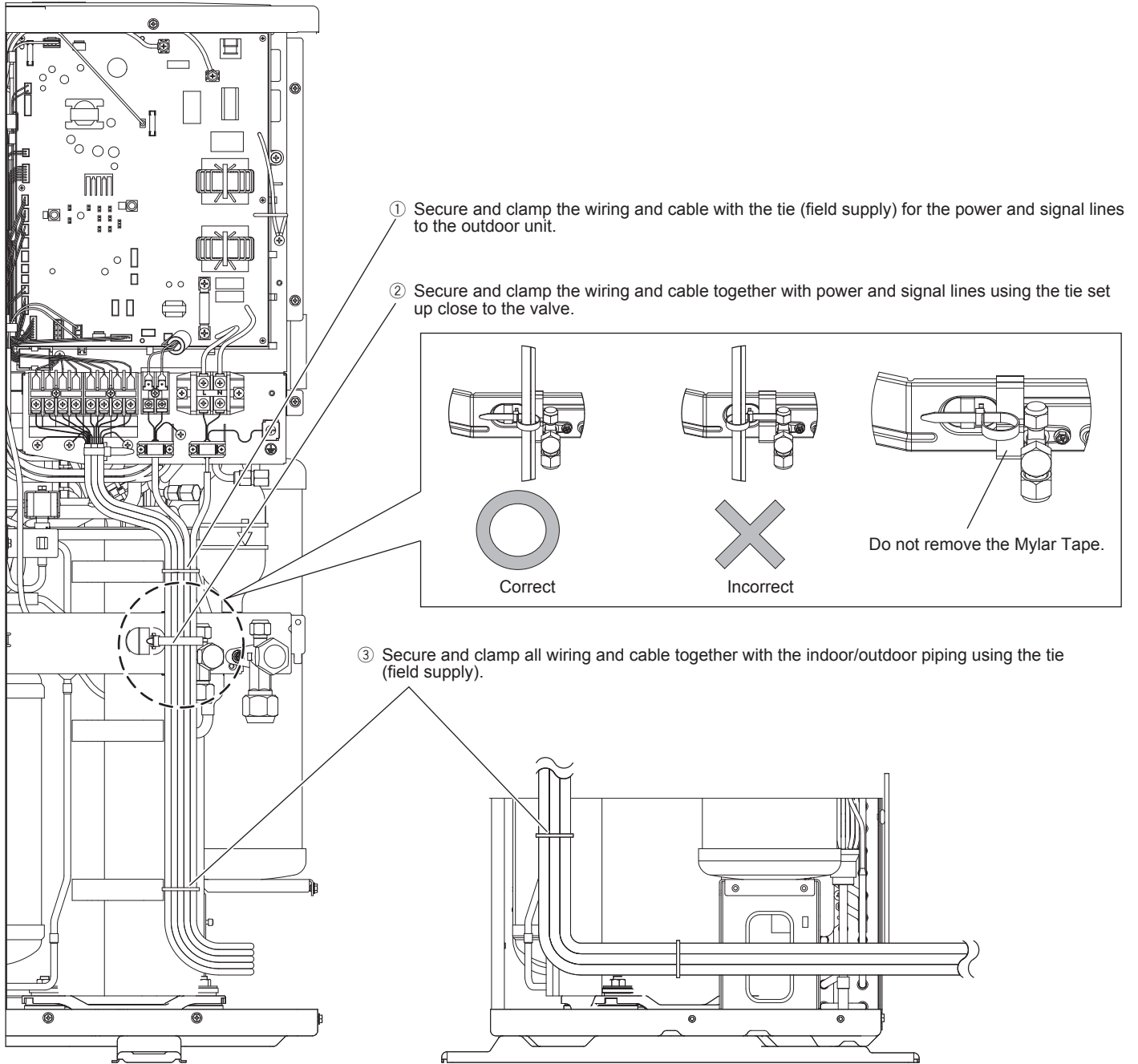
1. Connecting the wiring to the lower part of the terminal block.
 When transferring the Forced Stop input to the next system connect the wiring (2-wire) to the terminal points 1 and 2 at the lower right side of the terminal block.
 The shield part of the shielded cable is connected with SG under the terminal block.
 Secure the wiring with the cord clamp located on the lower part of the terminal block.
2. Connecting the shielded cable to the terminal block for the next system.
 For the Forced Stop input, connect the wiring to the terminal points 1 and 2 at the lower right side of the terminal block.
 When connecting to the next system be sure to connect to the appropriate terminal point due to the polarity.



■ Wiring procedure

Follow the wiring procedure below for terminal connection.

- (1) Set the wiring and cables for the power and signal lines to the outdoor unit together, and secure each wire and cable with the tie.
- (2) Secure and clamp the power and signal lines with the tie, set up close to the valve.
- (3) Set up the wiring and cable for the outdoor unit piping and secure with a tie.



5. HOW TO PROCESS TUBING

The liquid tubing side is connected by a flare nut, and the gas tubing side is connected by brazing.

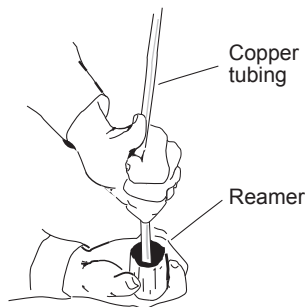
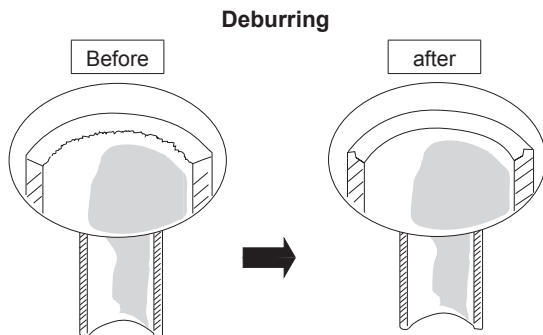
5-1. Connecting the Refrigerant Tubing

Use of the Flaring Method

Many of conventional split system air conditioners employ the flaring method to connect refrigerant tubes which run between indoor and outdoor units. In this method, the copper tubes are flared at each end and connected with flare nuts.

Flaring Procedure with a Flare Tool

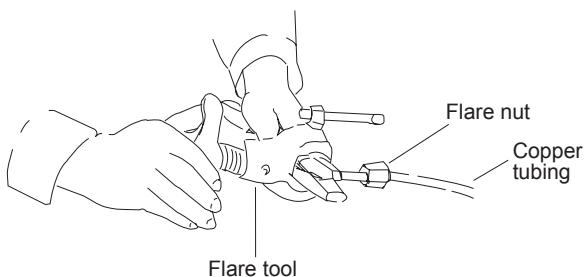
- (1) Cut the copper tube to the required length with a tube cutter. It is recommended to cut approx. 30 – 50 cm longer than the tubing length you estimate.
- (2) Remove burrs at the end of the copper tube with a tube reamer or a similar tool. This process is important and should be done carefully to make a good flare. Be sure to keep any contaminants (moisture, dirt, metal filings, etc.) from entering the tubing.



NOTE

When reaming, hold the tube end downward and be sure that no copper scraps fall into the tube.

- (3) Remove the flare nut from the unit and be sure to mount it on the copper tube.
- (4) Make a flare at the end of copper tube with a flare tool.



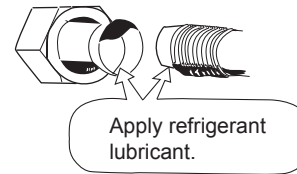
NOTE

A good flare should have the following characteristics:

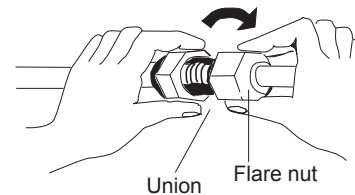
- Inside surface is glossy and smooth
- Edge is smooth
- Tapered sides are of uniform length

Caution Before Connecting Tubes Tightly

- (1) Apply a sealing cap or water-proof tape to prevent dust or water from entering the tubes before they are used.
- (2) Be sure to apply refrigerant lubricant (ether oil) to the inside of the flare nut before making piping connections. This is effective for reducing gas leaks.



- (3) For proper connection, align the union tube and flare tube straight with each other, then screw in the flare nut lightly at first to obtain a smooth match.

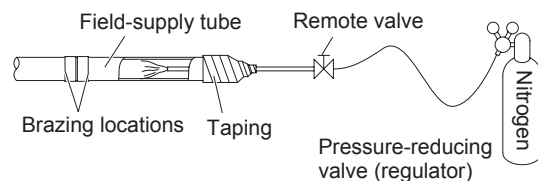


- Adjust the shape of the liquid tube using a tube bender at the installation site and connect it to the liquid tubing side valve using a flare.

Cautions During Brazing

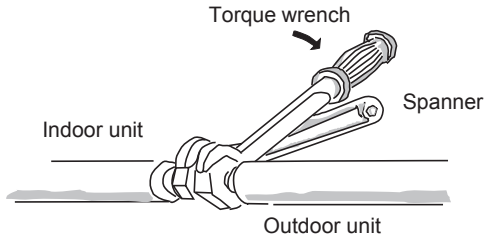
- Replace air inside the tube with nitrogen gas to prevent copper oxide film from forming during the brazing process. (Oxygen, carbon dioxide and Freon are not acceptable.)
- Do not allow the tubing to get too hot during brazing. The nitrogen gas inside the tubing may overheat, causing refrigerant system valves to become damaged. Therefore allow the tubing to cool when brazing.
- Use a reducing valve for the nitrogen cylinder.
- Do not use agents intended to prevent the formation of oxide film. These agents adversely affect the refrigerant and refrigerant oil, and may cause damage or malfunctions.

Work method



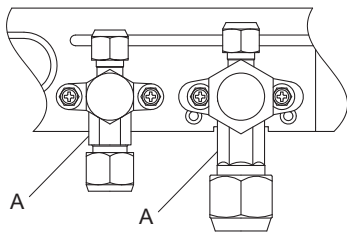
5-2. Connecting Tubing Between Indoor and Outdoor Units

- (1) Tightly connect the indoor-side refrigerant tubing extended from the wall with the outdoor-side tubing.
- (2) To fasten the flare nuts, apply specified torque.
 - When removing the flare nuts from the tubing connections, or when tightening them after connecting the tubing, be sure to use a torque wrench and a spanner.



If the flare nuts are over-tightened, the flare may be damaged, which could result in refrigerant leakage and cause injury or asphyxiation to room occupants.

- When removing or tightening the flare nut, use 2 adjustable wrenches together: one at the flare nut, and the other at part A.



- For the flare nuts at tubing connections, be sure to use the flare nuts that were supplied with the unit, or else flare nuts for R410A (type 2). The refrigerant tubing that is used must be of the correct wall thickness as shown in the following table.

| Tube diameter | Tightening torque, approximate | Tube thickness |
|---------------|---|----------------|
| ø6.35 (1/4") | 14 – 18 N · m {140 – 180 kgf · cm} | 0.8 mm |
| ø9.52 (3/8") | 34 – 42 N · m {340 – 420 kgf · cm} | 0.8 mm |
| ø12.7 (1/2") | 49 – 61 N · m {490 – 610 kgf · cm} | 0.8 mm |
| ø15.88 (5/8") | 68 – 82 N · m {680 – 820 kgf · cm} | 1.0 mm |
| ø19.05 (3/4") | 100 – 120 N · m {1000 – 1200 kgf · cm} | 1.2 mm |

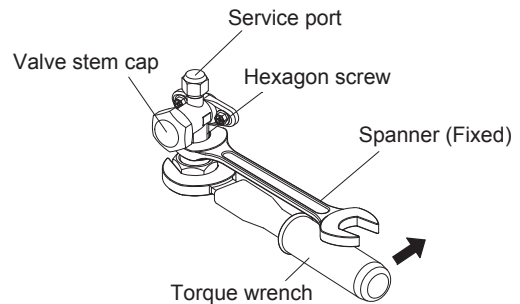
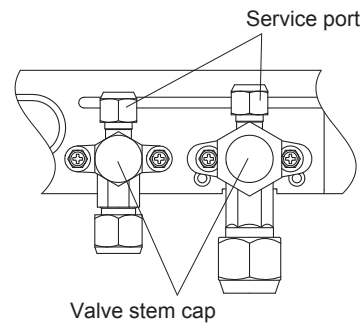
Because the pressure is approximately 1.6 times higher than conventional refrigerant pressure, the use of ordinary flare nuts (type 1) or thin-walled tubes may result in tube rupture, injury, or asphyxiation caused by refrigerant leakage.

- In order to prevent damage to the flare caused by over-tightening of the flare nuts, see the table as a guide when tightening.
- When tightening the flare nut on the liquid tube, use an adjustable wrench with a nominal handle length of 200 mm.
- Do not use a spanner to tighten the valve stem caps. Doing so may damage the valves.
- Depending on the installation conditions, applying excessive torque may cause the nuts to crack.

Precautions for Packed Valve Operation

- If the packed valve is left for a long time with the valve stem cap removed, refrigerant will leak from the valve. Therefore, do not leave the valve stem cap removed.

Packed valve



- Use a torque wrench to securely tighten the valve stem cap.
- Tightening torque:

| | | |
|----------------|----------------|---|
| Service port | ø9.52 (liquid) | 8 – 10 N · m {80 – 100 kgf · cm} |
| | ø15.88 (gas) | 6.9 – 11.8 N · m {69 – 118 kgf · cm} |
| Valve stem cap | ø9.52 (liquid) | 19 – 21 N · m {190 – 210 kgf · cm} |
| | ø15.88 (gas) | 13 – 14 N · m {130 – 140 kgf · cm} |
| Flare nut | ø9.52 (liquid) | 34 – 42 N · m {340 – 420 kgf · cm} |
| | ø15.88 (gas) | 68 – 82 N · m {680 – 820 kgf · cm} |

5-3. Insulating the Refrigerant Tubing

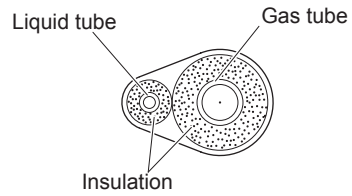
Two tubes arranged together

Tubing Insulation

● Standard Selection of Insulation Material

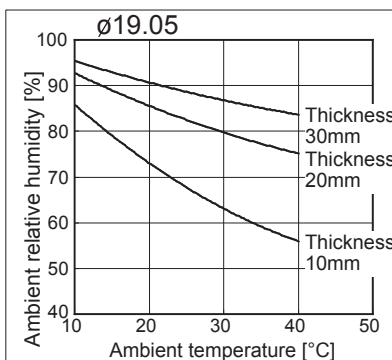
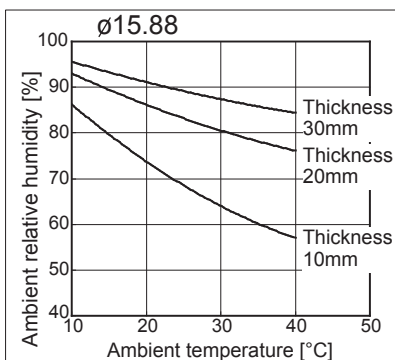
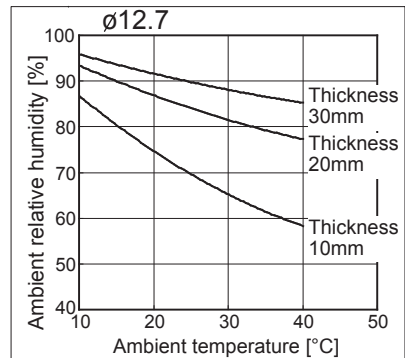
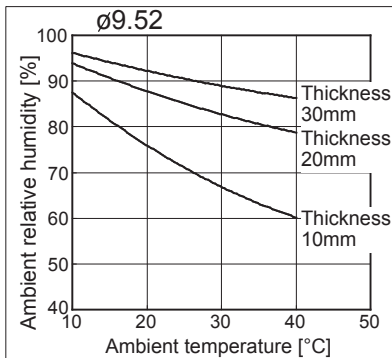
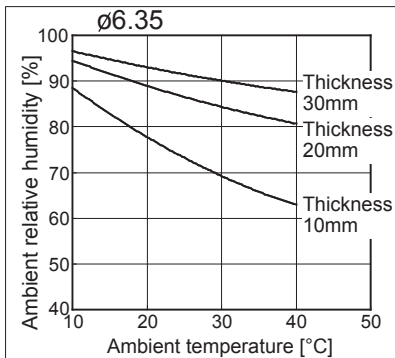
Under the environment of the high temperature and high humidity, the surface of the insulation material is easy to become condensation. This will result in leakage and dew drop. See the chart shown below when selecting the insulation material. In case that the ambient temperature and relative humidity are placed above the line of the insulation thickness, the condensation may occasionally make a dew drop on the surface of the insulation material. In this case, select the better insulation efficiency.

* However, since the condition will be different due to the sort of the insulation material and the environmental condition of the installation place, see the chart shown below as a reference when making a selection.



Standard Selection of Tubing Insulation

| | |
|---|---|
| Sort of insulation material | Polyethylene heat resisting material |
| Upper limits of usage temperature | Gas tubing : 120 °C or above Other tubing : 80 °C or above |
| Calculating condition | |
| Thermal conductivity of insulation material | 0.043 W/(m · K) (Average temperature 23 °C) |
| Refrigerant temperature | 2 °C |



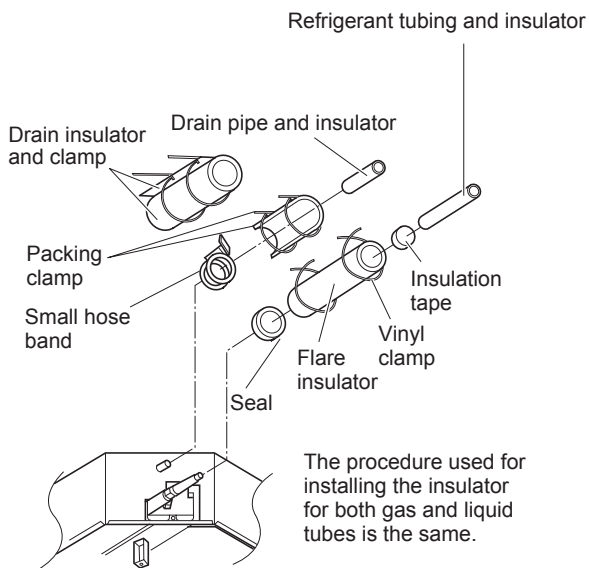
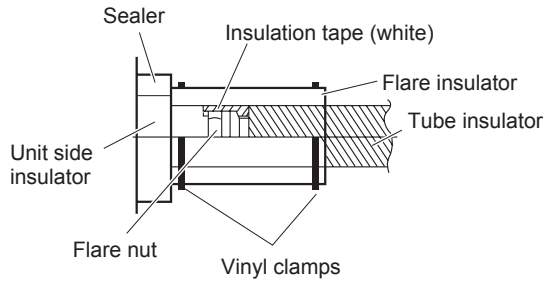


CAUTION

If the exterior of the outdoor unit valves has been finished with a square duct covering, make sure you allow sufficient space to use the valves and to allow the panels to be attached and removed.

Taping the flare nuts

Wind the white insulation tape around the flare nuts at the gas tube connections. Then cover up the tubing connections with the flare insulator, and fill the gap at the union with the supplied black insulation tape. Finally, fasten the insulator at both ends with the supplied vinyl clamps.



Never grasp the drain or refrigerant connecting outlets when moving the unit.

Insulation material

The material used for insulation must have good insulation characteristics, be easy to use, be age resistant, and must not easily absorb moisture.

Be sure to use the heat-resistant insulator corresponding to the gas tube of 120 °C or above and other tubes of 80 °C or above.

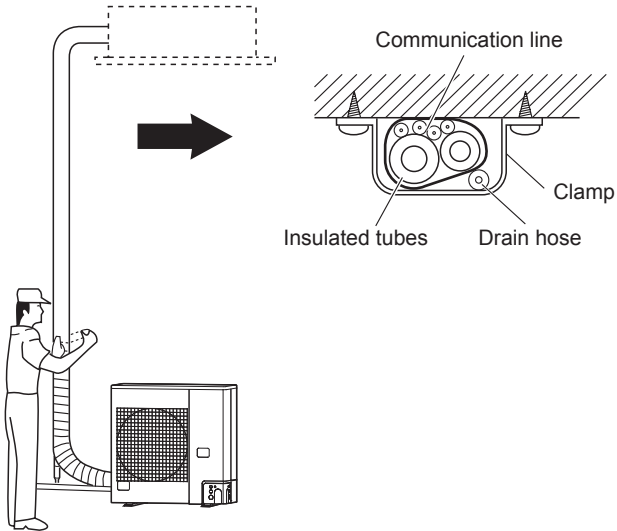


CAUTION

After a tube has been insulated, never try to bend it into a narrow curve because it can cause the tube to break or crack.

5-4. Taping the Tubes

- (1) At this time, the refrigerant tubes (and electrical wiring if local codes permit) should be taped together with armoring tape in 1 bundle. To prevent the condensation from overflowing the drain pan, keep the drain hose separate from the refrigerant tubing.
- (2) Wrap the armoring tape from the bottom of the outdoor unit to the top of the tubing where it enters the wall. As you wrap the tubing, overlap half of each previous tape turn.
- (3) Clamp the tubing bundle to the wall, using 1 clamp approx. each meter.

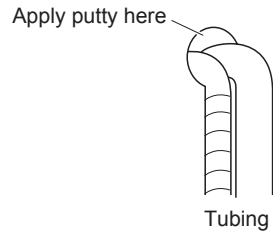


NOTE

Do not wind the armoring tape too tightly since this will decrease the heat insulation effect. Also ensure that the condensation drain hose splits away from the bundle and drips clear of the unit and the tubing.

5-5. Finishing the Installation

After finishing insulating and taping over the tubing, use sealing putty to seal off the hole in the wall to prevent rain and draft from entering.



6. AIR PURGING

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

- pressure in the system rises
- operating current rises
- cooling (or heating) efficiency drops
- moisture in the refrigerant circuit may freeze and block capillary tubing
- water may lead to corrosion of parts in the refrigerant system

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

■ Air Purging with a Vacuum Pump (for Test Run) Preparation

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

Leak test

- (1) With the service valves on the outdoor unit closed, remove the 1/4 in. flare nut and its bonnet on the gas tube service valve. (Save for reuse.)
- (2) Attach a manifold valve (with pressure gauges) and dry nitrogen gas cylinder to this service port with charge hoses.



CAUTION

Use a manifold valve for air purging. If it is not available, use a stop valve for this purpose. The “Lo” knob of the manifold valve must always be kept closed.

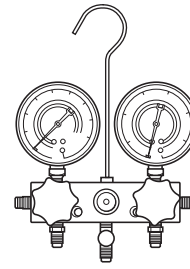
- (3) Pressurize the system to no more than 3.80 MPa with dry nitrogen gas and close the cylinder valve when the gauge reading reaches 3.80 MPa. Then, test for leaks with liquid soap.



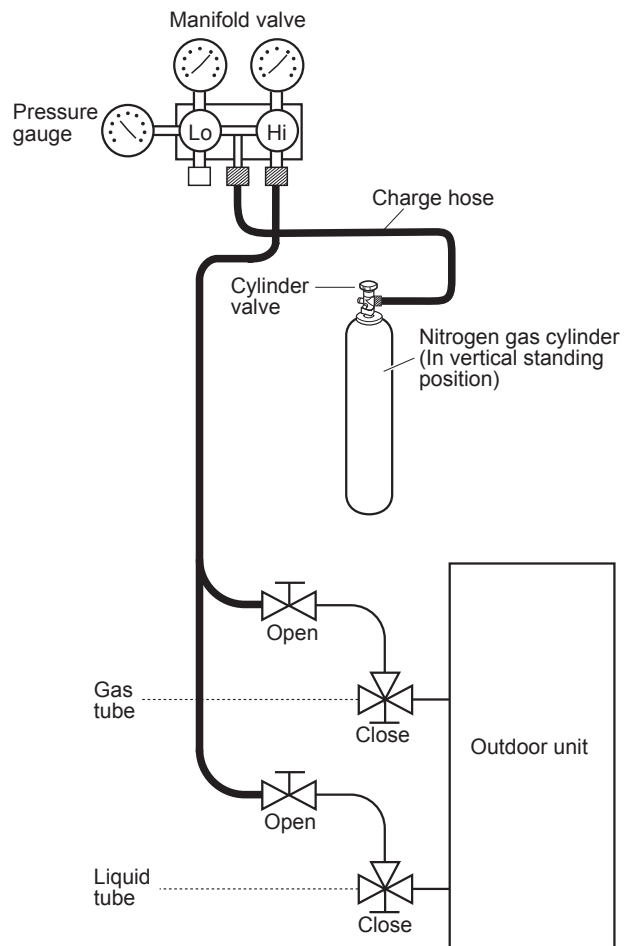
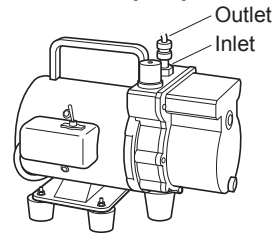
CAUTION

To avoid nitrogen entering the refrigerant system in a liquid state, the top of the cylinder must be higher than the bottom when you pressurize the system. Usually, the cylinder is used in a vertical standing position.

Manifold gauge



Vacuum pump



- (4) Do a leak test of all joints of the tubing (both indoor and outdoor) and both gas and liquid service valves. Bubbles indicate a leak. Wipe off the soap with a clean cloth after a leak test.
- (5) After the system is found to be free of leaks, relieve the nitrogen pressure by loosening the charge hose connector at the nitrogen cylinder. When the system pressure is reduced to normal, disconnect the hose from the cylinder.

Evacuation

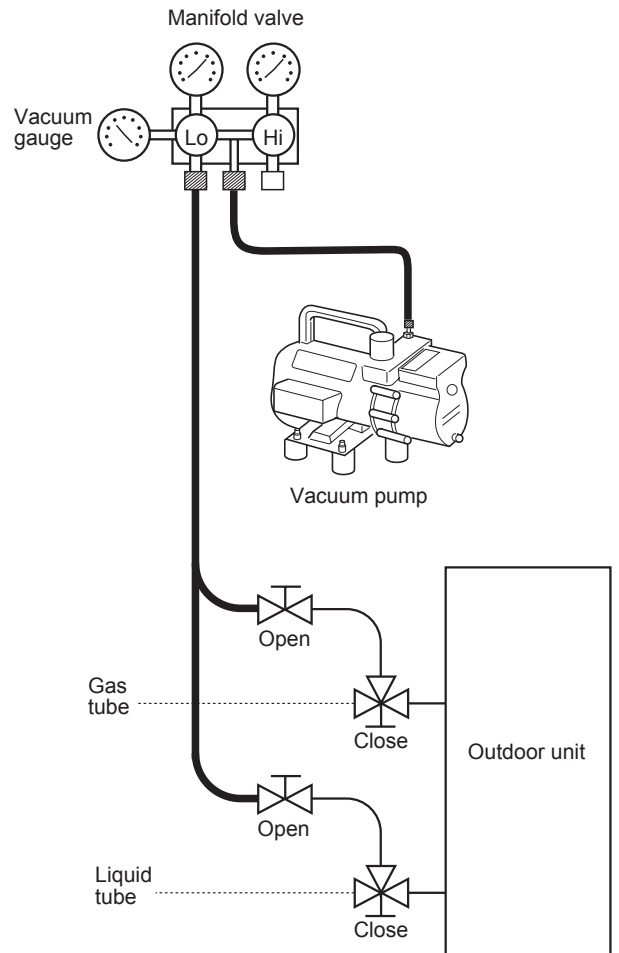
- (1) Attach the charge hose end described in the preceding steps to the vacuum pump to evacuate the tubing and indoor unit. Confirm that the “Lo” knob of the manifold valve is open. Then, run the vacuum pump. The operation time for evacuation varies with the tubing length and capacity of the pump. The following table shows the amount of time for evacuation:

| Required time for evacuation when 30 gal/min. vacuum pump is used | |
|--|--------------------------------------|
| If tubing length is less than 15 m | If tubing length is longer than 15 m |
| 45 min. or more | 90 min. or more |

NOTE

The required time in the above table is calculated based on the assumption that the ideal (or target) vacuum condition is less than -101 kPa {-755 mmHg, 5 Torr}.

- (2) When the desired vacuum is reached, close the “Lo” knob of the manifold valve and turn off the vacuum pump. Please confirm that the gauge pressure is under -101 kPa {-755 mmHg, 5 Torr} after 4 to 5 minutes of vacuum pump operation.





CAUTION Use a cylinder designed for use with R410A respectively.

Charging additional refrigerant

- Charging additional refrigerant (calculated from the liquid tube length as shown in the section “1-8. Additional Refrigerant Charge”) using the liquid tube service valve.
- Use a balance to measure the refrigerant accurately.
- If the additional refrigerant charge amount cannot be charged at once, charge the remaining refrigerant in liquid form by using the gas tube service valve with the system in cooling operation mode at the time of test run.

Finishing the job

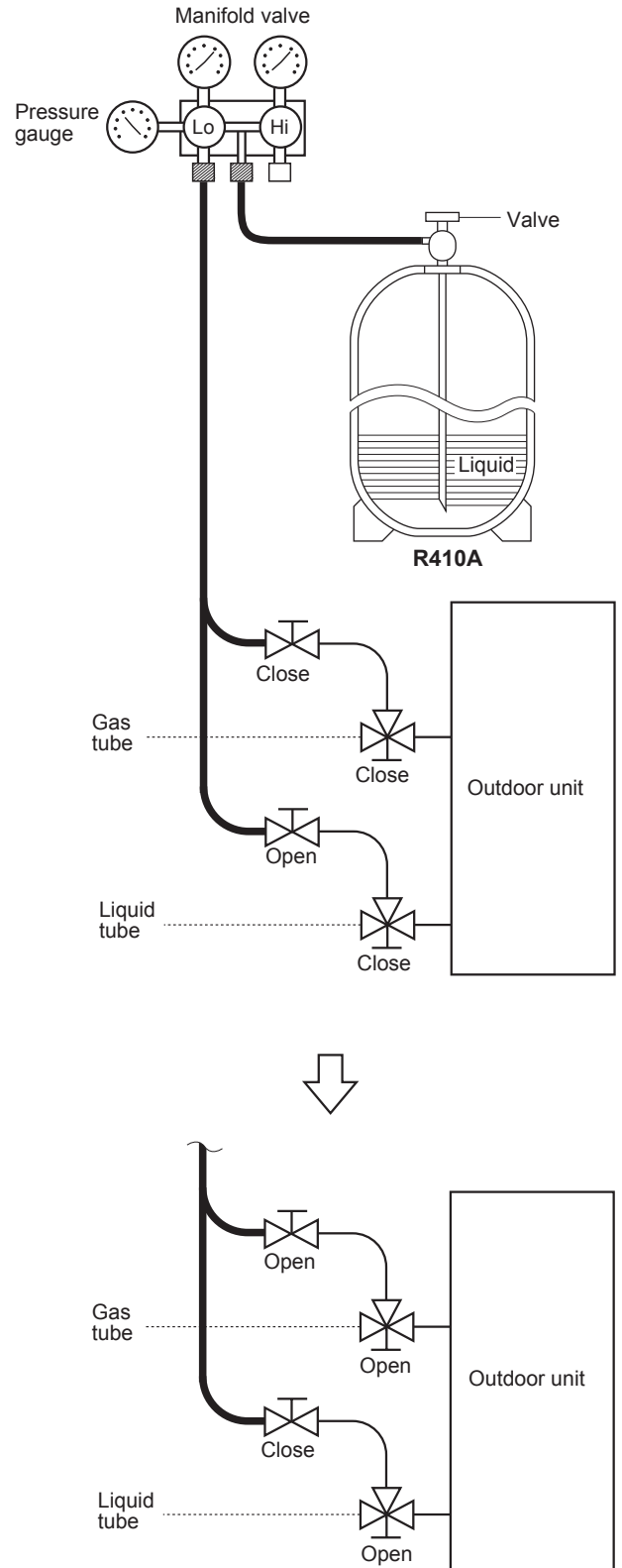
- (1) With a hexagonal wrench, turn the liquid tube service valve stem counter-clockwise to fully open the valve.
- (2) With a hexagonal wrench, turn the gas tube service valve stem counter-clockwise to fully open the valve.



CAUTION To avoid gas from leaking when removing the charge hose, make sure the stem of the gas tube is turned all the way out (“BACK SEAT” position).

- (3) Loosen the charge hose connected to the gas tube service port (1/4 in.) slightly to release the pressure, then remove the hose.
- (4) Replace the 1/4 in. flare nut and its bonnet on the gas tube service port and fasten the flare nut securely with an adjustable wrench or box wrench. This process is very important to prevent gas from leaking from the system.
- (5) Replace the valve caps at both gas and liquid service valves and fasten them securely.

This completes air purging with a vacuum pump. The air conditioner is now ready for a test run.

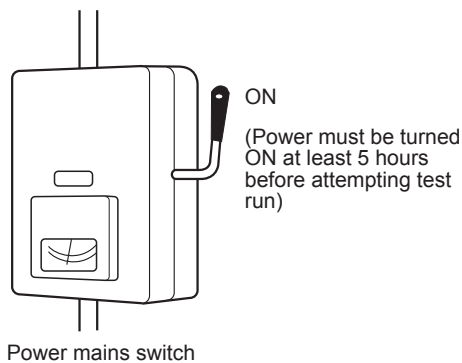


7. TEST RUN

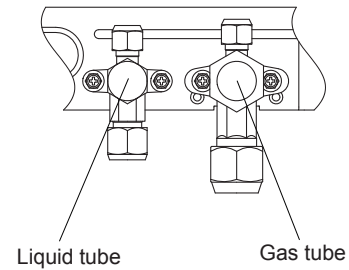
7-1. Preparing for Test Run

● Before attempting to start the air conditioner, check the following.

- (1) All loose matter is removed from the cabinet especially steel filings, bits of wire, and clips.
- (2) The control wiring is correctly connected and all electrical connections are tight.
- (3) The protective spacers for the compressor used for transportation have been removed. If not, remove them now.
- (4) The transportation pads for the indoor fan have been removed. If not, remove them now.
- (5) The power has been connected to the unit for at least 5 hours before starting the compressor. The bottom of the compressor should be warm to the touch and the crankcase heater around the feet of the compressor should be hot to the touch.

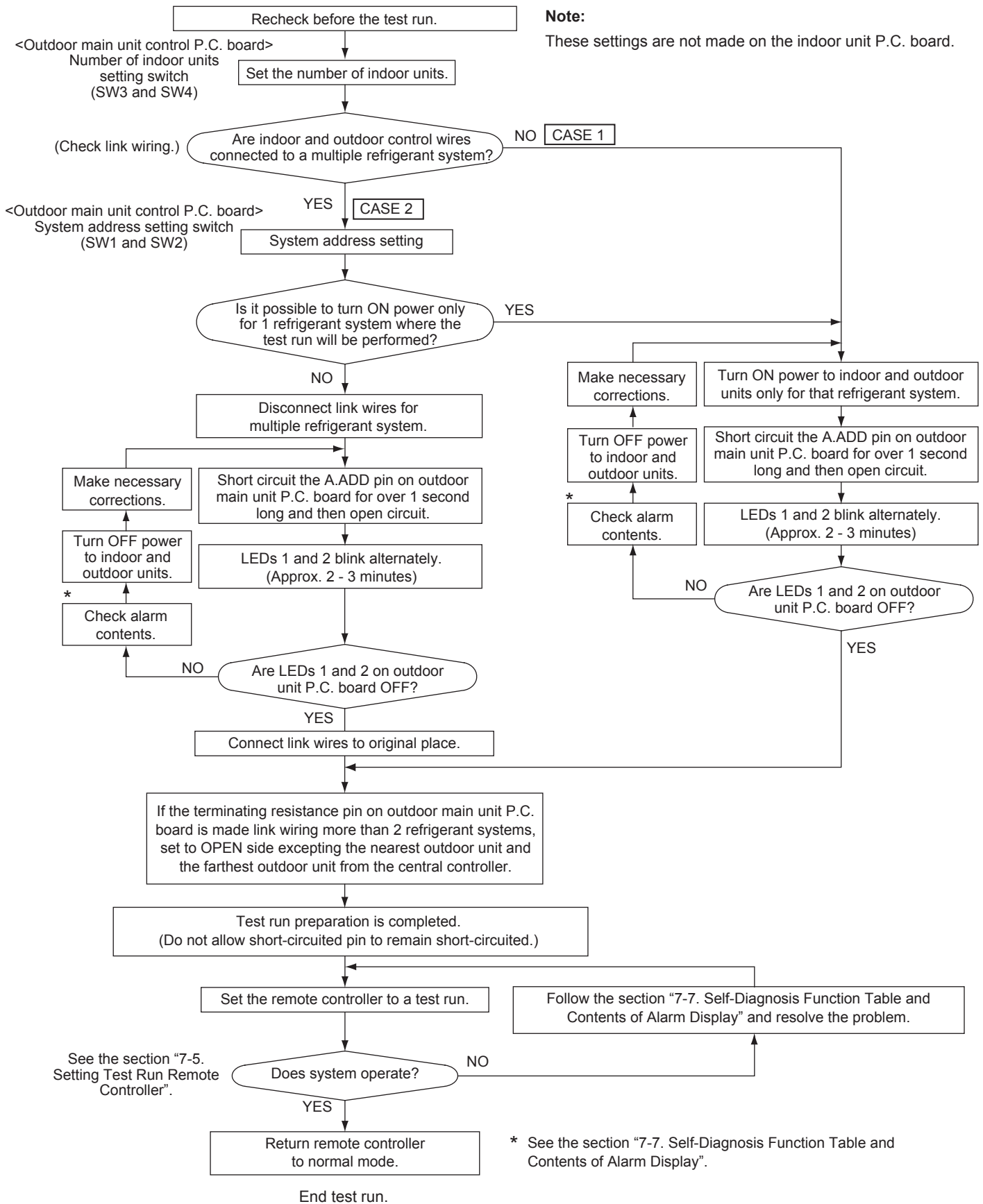


- (6) Both the gas and liquid tube service valves are open. If not, open them now.

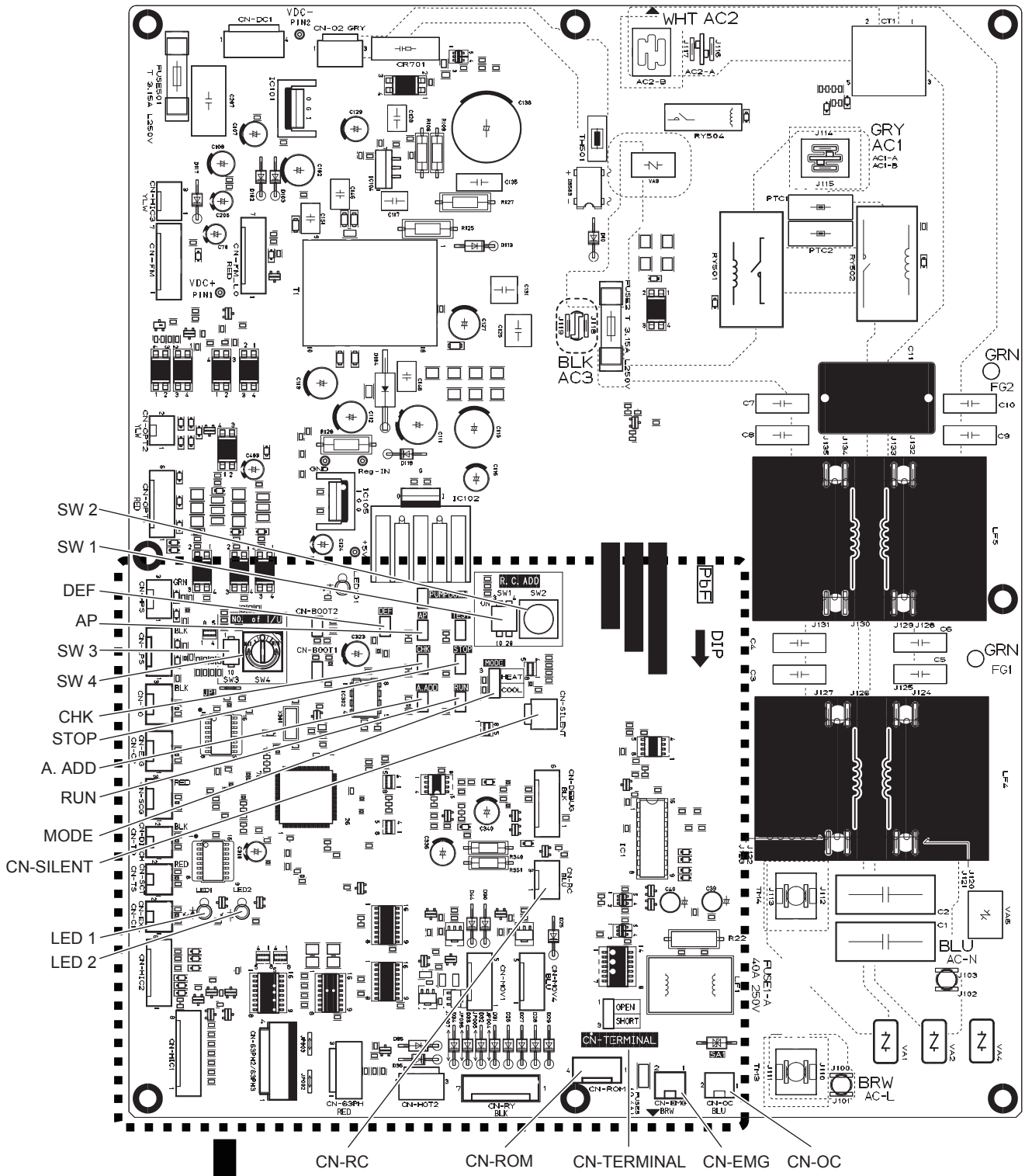


- (7) Request that the customer be present for the trial run. Explain the contents of the operating instructions, then have the customer actually operate the system.
- (8) Be sure to give the operating instructions and installation instructions to the customer.
- (9) When replacing the control P.C. board, be sure to make all the same settings on the new P.C. board as were in use before replacement.
The existing EEPROM is not changed, and is connected to the new control P.C. board.

7-2. Test Run Procedure





7-3. Main Outdoor Unit P.C. Board Setting



For detailed drawing, see the page 46.

● Examples of the number of indoor units settings (SW3, SW4)









| Number of indoor units | Indoor unit setting (SW3) (1P DIP switch) 10 | Indoor unit setting (SW4) (Rotary switch) |
|---|---|--|
| 1 - 9 unit (factory setting : 1 unit) | OFF  |  Set to 1 - 9 |

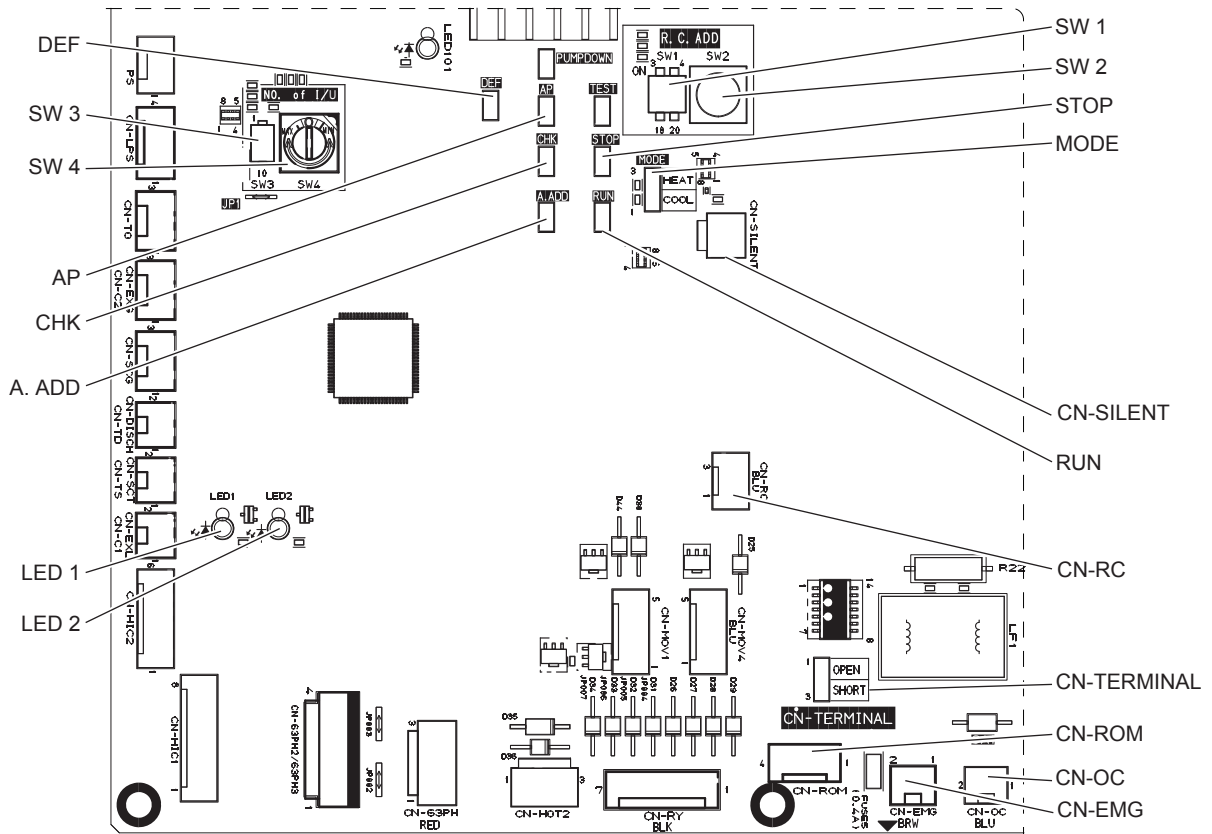
DO NOT exceed the maximum number of indoor units when making connections.

The indoor unit address setting should also be set less than "9".

In the event of setting more than "10", the communication cannot be made between the outdoor and indoor units.

● Examples of refrigerant circuit (R.C.) address settings (required when link wiring is used) (SW1, SW2)

| System address No. | System address (SW1) (2P DIP switch) 10 20 | System address (SW2) (Rotary switch) |
|----------------------------|--|--|
| System 1 (factory setting) | Both OFF  |  Set to 1 |
| System 11 | 1 ON  |  Set to 1 |
| System 21 | 2 ON  |  Set to 1 |
| System 30 | Both ON  |  Set to 0 |



● Name and Function of Each Switch on Outdoor Unit Control P.C. Board

| Function Switch | Remarks |
|-----------------------|--|
| MODE pin (3P, BLK) | Changes to cooling/heating mode. When in normal operation: When short circuited the COOL side, indoor unit operation in the same refrigerant system changes to all cooling mode. When short circuited the HEAT side, indoor unit operation in the same refrigerant system changes to all heating mode. When in auto address setting: Changes to heating mode with open-circuit. |
| A.ADD pin (2P, BLK) | Short circuited for over 1 second long → Auto address setting starts with open-circuit. If short circuit lasts for over 1 second long during auto address setting, the setting is interrupted. |
| CHK pin (2P, BLK) | When short circuited, test run begins. (If the remote controller is connected in test run mode, it is automatically cancelled after 1 hour.) Also, if short-circuit is cancelled, test run mode is cancelled. |
| RC plug (3P, BLU) | Connects to outdoor unit maintenance remote controller and content of alarm message will be checked. |
| RUN pin (2P, BLK) | When short circuited and pulse signal is given, all indoor units operate in the same refrigerant system. |
| STOP pin (2P, BLK) | When short circuited and pulse signal is given, all indoor units stop in the same refrigerant system. (When short circuited, operation cannot be performed by the indoor unit's remote controller.) |
| DEF pin (2P, BLK) | When the pin of the main unit is short-circuit in heating mode, defrosting operation is started. Even if short circuited, defrosting will not be activated immediately. |
| AP pin (2P, BLK) | Can be used when vacuuming the outdoor unit. |
| SILENT plug (2P, WHT) | Can be used when setting the outdoor unit fan in sound absorbing mode. |

For details, refer to the Test Run Service Manual.

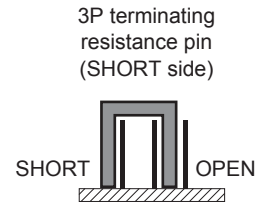
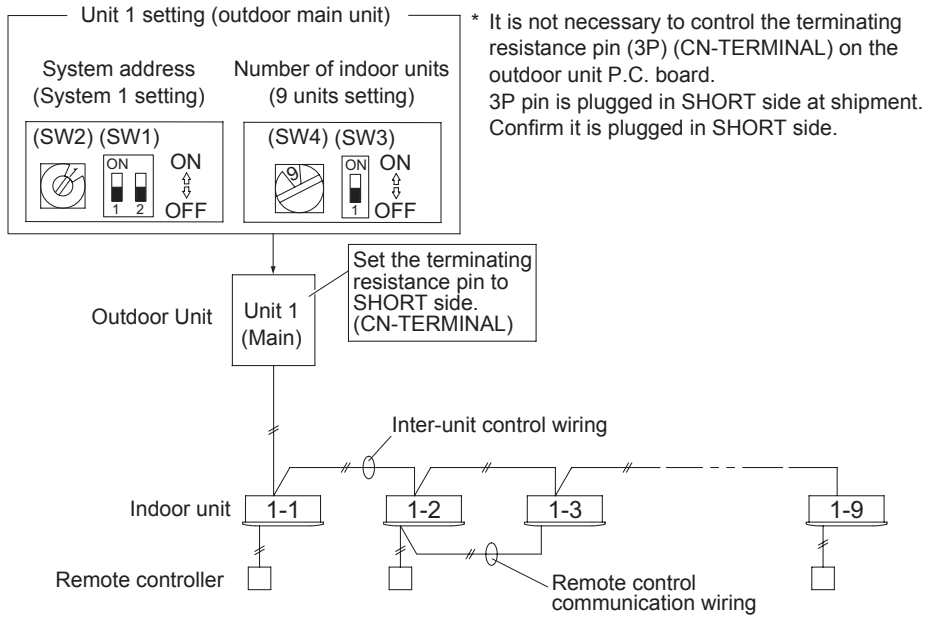
7-4. Auto Address Setting

Example: Basic Wiring Diagram (1)

- **Case of no link wiring**

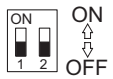

(Inter-unit control wiring is not connected to a multiple system.)

Indoor unit address setting is possible without starting the compressor.



Case 1

Auto Address Control for One Refrigerant System

1. Check the refrigerant system's Address Setting Rotary switch (SW2) on outdoor main unit control P.C. board to "1" and the Dip switch (SW1) to "0" (at shipment).
 
2. Regarding the setting of the number of indoor units connected to the outdoor unit, set the Dip switch (SW3) for setting the number of indoor units on outdoor main unit control P.C. board connected to the outdoor unit to "0" and set the Rotary switch (SW4) to "9".
 

3. Turn on power to indoor and outdoor units.

4. Short circuit the A.ADD pin on outdoor main unit control P.C. board for over 1 second long and open circuit. Communication for auto address setting begins.



* To cancel, short circuit the A.ADD pin again for over 1 second long and then open circuit. The LED that indicates auto address setting goes out and the process is stopped. Be sure to perform auto address setting again.

Auto address setting is completed when LEDs 1 and 2 on outdoor main unit control P.C. board go out.



5. Remote control operation is now available.

* When auto address setting is controlled by the remote controller, perform auto address setting by the remote controller after step 3 described above.

Example: Basic Wiring Diagram (2)

• Case of link wiring

* See the section "ATTENTION!"

Setting of terminal pin (CN-TERMINAL)

No. 1 refrigerant system

Refrigerant circuit No. 1

Unit No. 1 (Main) : short-circuit (at shipment)

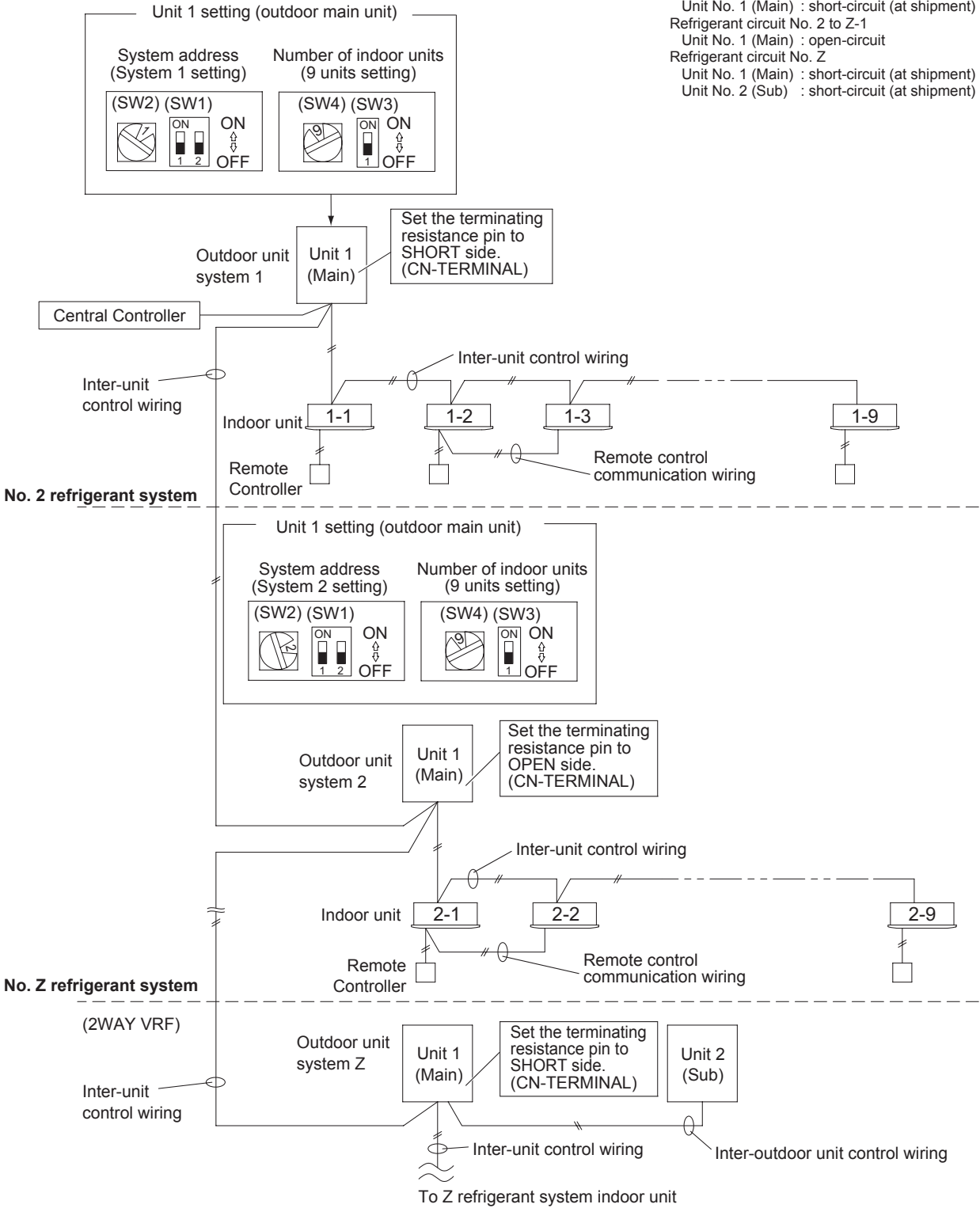
Refrigerant circuit No. 2 to Z-1

Unit No. 1 (Main) : open-circuit

Refrigerant circuit No. Z

Unit No. 1 (Main) : short-circuit (at shipment)

Unit No. 2 (Sub) : short-circuit (at shipment)



● **Final check before operation**

Final check must be done under the conditions of inter-outdoor unit control wiring connected to the centralized control system and the resistor between conductors must be measured by a Megger. Check if it is showing between 30Ω and 120Ω.

If the resistance value is out of range, check adjustment of the termination resistor again. Even if it is out of range, the problem is caused by wiring.

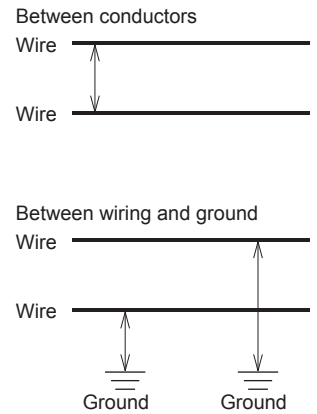
- Is the wiring connection properly completed?
- Are there any scratches or deterioration on the coverage?
- Measure between conductors and also between wiring and ground by 500V Megger insulation resistance tester.

Make sure the Megger is showing more than 100MΩ.

When measuring, remove both ends of the wiring from the terminal board.

If not removed, it will be damaged.

If it is less than 100MΩ, a new wiring connection should be made.



Case 2 Auto Address Control for Multiple Linked Refrigerant System

How to Control Auto Address Setting from Outdoor Unit

1. Check that the refrigerant system address Rotary switch (SW2) on outdoor main unit control P.C. board in 1 refrigerant system is set to "1" and the Dip switch (SW1) is set to "0" (at shipment).



2. Regarding the number of indoor units connected to the outdoor unit, set the Dip switch (SW3) for setting the number of indoor units on outdoor main unit control P.C. board to "0" and set the Rotary switch (SW4) to "9".



Total of 9 units installation is made.

3. Turn ON power to all indoor and outdoor units only for one refrigerant system or disconnect link wires for multiple refrigerant system.
4. Short circuit the A.ADD pin of outdoor main unit for over 1 second long and then open circuit. Communication for auto address setting begins.

* To cancel, again short circuit the A.ADD pin for over 1 second long and then open circuit.

LEDs 1 and 2 that indicate auto address setting is in progress go out and that process is stopped.

Be sure to perform auto address setting again.

Auto address setting is completed when the compressor stops and LEDs 1 and 2 on outdoor main unit control P.C. board go out.

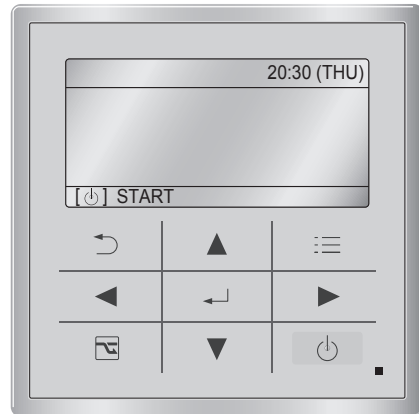
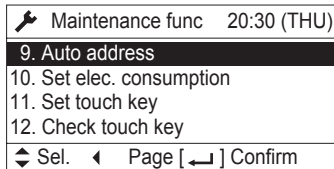
5. Remote control operation is now available.

* When performing auto address setting by the remote controller, perform auto address setting by the remote controller after step 3.

- See the section "Auto Address Setting from Remote Controller".

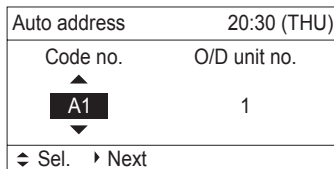
Auto Address Setting from the High-spec Wired Remote Controller (CZ-RTC5A)

- Keep pressing the , and buttons simultaneously for 4 or more seconds.
The "Maintenance func" screen appears on the LCD display.
- Press the or button to see each menu.
If you wish to see the next screen instantly, press the or button.
Select "9. Auto address" on the LCD display and press the button.



CZ-RTC5A

- The "Auto address" screen appears on the LCD display.
Change the "Code no." to "A1" by pressing the or button.



- Select the "O/D unit no." by pressing the or button.
Select one of the "O/D unit no." for auto address by pressing the or button.
Approximately about 10 minutes are required.
When auto address setting is completed, the units return to normal stopped status.

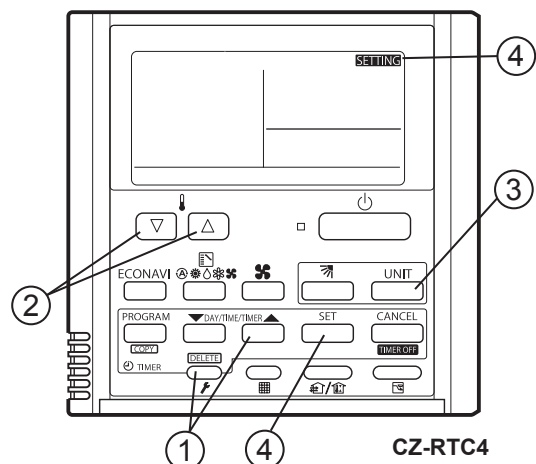
Auto Address Setting* from the Remote Controller (CZ-RTC4)

* Auto address setting in Cooling mode cannot be done from the remote controller.

NOTE

- Selecting each refrigerant system individually for auto address setting
- Auto address setting for each system
: Item code "A1"

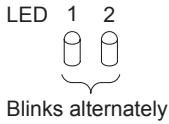
- Press the remote controller timer time button and button at the same time.
(Press and hold for 4 seconds or longer.)
- Next, press either the temperature setting / button. (Check that the item code is "A1".)
- Use either the button to set the system No. to perform auto address setting.
- Then press the button.
(Auto address setting for one refrigerant system begins.) (When auto address setting for one system is completed, the system returns to normal stopped status.)
<Approximately 4 – 5 minutes is required.>
(During auto address setting, " **SETTING** " is displayed on the remote controller.
This message disappears when auto address setting is completed.)
- Repeat the same steps to perform auto address setting for each successive system.



CZ-RTC4

Display During Auto Address Setting

- On the surface of outdoor unit control P.C. board



- * Do not short circuit the A.ADD pin again during auto address setting. LEDs 1 and 2 go out and address setting is interrupted.
- * When auto address setting is normally completed, both LEDs 1 and 2 go out. In other cases, correct settings by referring to the following table and perform auto address setting again.

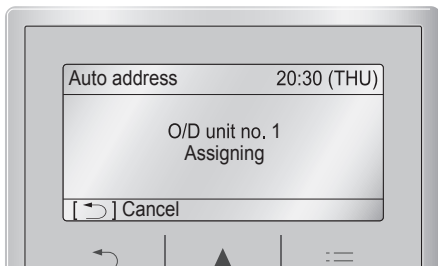
- Contents of LEDs 1 and 2 on outdoor unit control P.C. board

- ☀ : Illuminating
- ⚡ : Blinking
- : Go out

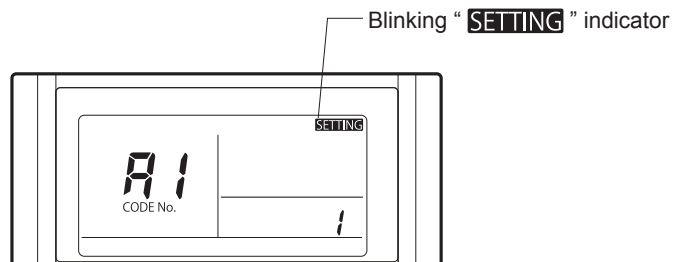
| LED 1 | LED 2 | Contents of display |
|----------------|-------|--|
| ☀ | ☀ | After turned ON power (not during auto address setting), it is entirely impossible to communicate with the indoor unit in the system. |
| ● | ☀ | After power is turned ON (and auto address setting is not in progress), one or more indoor units are confirmed in that system; however, the number of indoor units does not match the number that was set. This status remains even if the indoor unit address (indoor EEPROM item code : 13) is set more than 13 indoor units. In this case, be sure to set the indoor unit address less than 12. |
| ⚡ | ⚡ | Under auto address setting |
| Alternately | | |
| ● | ● | Auto address setting completed |
| ⚡ | ⚡ | There are inconsistencies between the number of indoor units and setting number of indoor units. (at the time of auto address setting) |
| Simultaneously | | |
| ⚡ | ⚡ | See the section "7-7. Self-Diagnosis Function Table and Contents of Alarm Display". |
| Alternating | | |

- Display of remote controller

CZ-RTC5A



CZ-RTC4



Request concerning recording the indoor/outdoor unit combination Nos.

After auto address setting has been completed, be sure to record them for future reference.

List the outdoor main unit system address and the addresses of the indoor units in that system in an easily visible location (next to the nameplate), using a permanent marking pen or similar means that cannot be abraded easily.

Example: (Outdoor) 1 - (Indoor) 1-1, 1-2, 1-3... (Outdoor) 2 - (Indoor) 2-1, 2-2, 2-3...

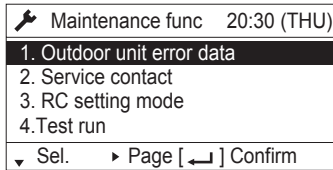
These numbers are necessary for later maintenance. Please be sure to indicate them.

Checking the indoor unit addresses

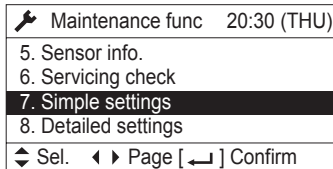
Use the remote controller to check the indoor unit address.

CZ-RTC5A (High-spec wired remote controller)

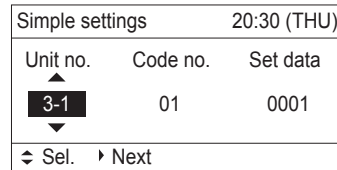
- Keep pressing the , and buttons simultaneously for 4 or more seconds.
The "Maintenance func" screen appears on the LCD display.



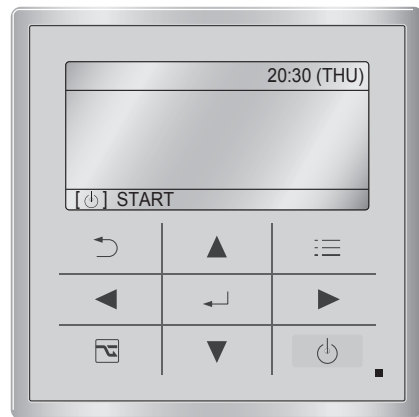
- Press the or button to see each menu.
If you wish to see the next screen instantly, press the or button.
Select "7. Simple settings" on the LCD display and press the button.



- The "Simple settings" screen appears on the LCD display.
Select the "Unit no." by pressing the or button for changes.



The indoor unit fan operates only at the selected indoor unit.

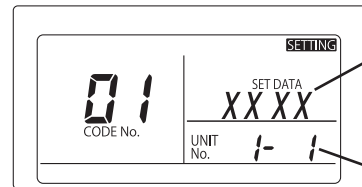


CZ-RTC5A

CZ-RTC4 (Timer remote controller)

<If 1 indoor unit is connected to 1 remote controller>

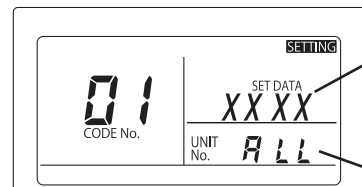
- Press and hold the button and button for 4 seconds or longer (simple settings mode).
- The address is displayed for the indoor unit that is connected to the remote controller.
(Only the address of the indoor unit that is connected to the remote controller can be checked.)
- Press the button again to return to normal remote controller mode.



Number changes to indicate which indoor unit is currently selected.
Indoor unit address

<If multiple indoor units are connected to 1 remote controller (group control)>




- Press and hold the button and button for 4 seconds or longer (simple settings mode).
- "ALL" is displayed on the remote controller.
- Next, press the button.
- The address is displayed for 1 of the indoor units which is connected to the remote controller. Check that the fan of that indoor unit starts and that air is discharged.
- Press the button again and check the address of each indoor unit in sequence.
- Press the button again to return to normal remote controller mode.

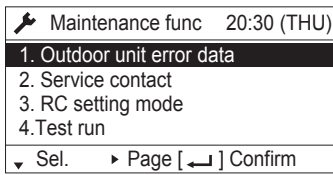






Number changes to indicate which indoor unit is currently selected.
Indoor unit address


7-5. Setting Test Run Remote Controller

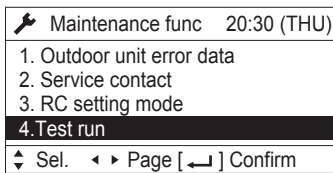
CZ-RTC5A (High-spec wired remote controller)




- Keep pressing the , , and  buttons simultaneously for 4 or more seconds. The "Maintenance func" screen appears on the LCD display.

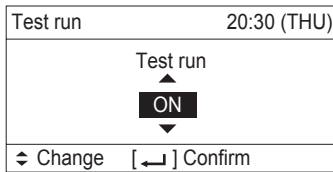


- Press the  or  button to see each menu. If you wish to see the next screen instantly, press the  or  button.


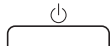
Select "4. Test run" on the LCD display and press the  button.



Change the display from OFF to ON by pressing the  or  button. Then press the  button.




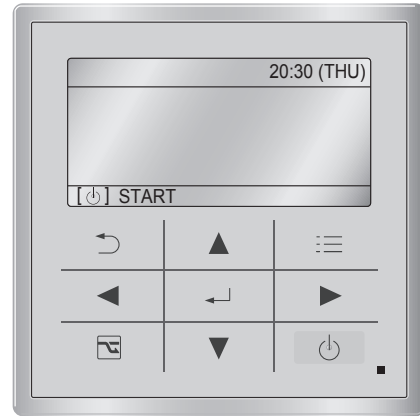
CZ-RTC4 (Timer remote controller)

- Press the remote controller  button for 4 seconds or longer. Then press the  button.
 - "TEST" appears on the LCD display while the test run is in progress.
 - The temperature cannot be adjusted when in Test Run mode. (This mode places a heavy load on the machines. Therefore use it only when performing the test run.)
- The test run can be performed using the HEAT, COOL, or FAN operation modes.


NOTE

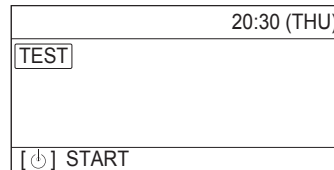
The outdoor units will not operate for approximately 3 minutes after the power is turned ON and after operation is stopped.


- If correct operation is not possible, a code is displayed on the remote controller LCD display. (See the section "7-7. Self-Diagnostic Function Table and Contents of Alarm Display" and correct the problem.)
 - After the test run is completed, press the  button again. Check that "TEST" disappears from the LCD display. (To prevent continuous test runs, this remote controller includes a timer function that cancels the test run after 60 minutes.)
- * If the test run is performed using the wired remote controller, operation is possible even if the cassette-type ceiling panel has not been installed. ("P09" display does not occur.)

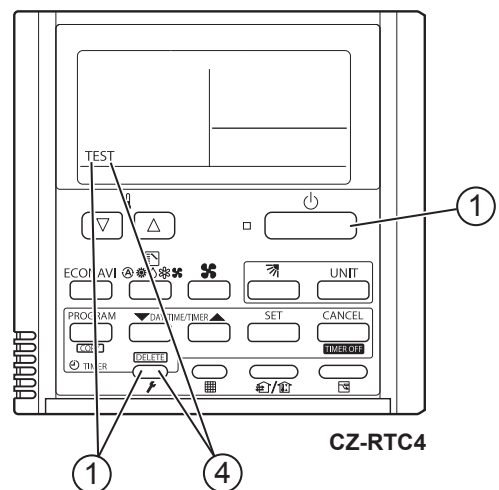
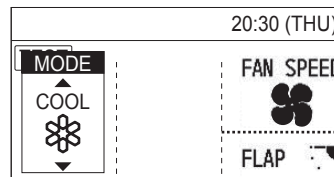


CZ-RTC5A

- Press the  button. "TEST" will be displayed on the LCD display.



- Press the  button. Test run will be started. Test run setting mode screen appears on the LCD display.



7-6. Caution for Pump Down

Pump down means refrigerant gas in the system is returned to the outdoor unit.

Pump down is used when the unit is to be moved, or before servicing the refrigerant circuit.

(Refer to the Service Manual)



CAUTION

- This outdoor unit cannot collect more than the rated refrigerant amount as shown by the nameplate on the back.
- If the amount of refrigerant is more than that recommended, do not conduct pump down. In this case use another refrigerant collecting system.

7-7. Self-Diagnosis Function Table and Contents of Alarm Display

How to know LEDs 1 and 2 alarm display on outdoor unit control P.C. board

| LED 1 | LED 2 | Contents of Alarm Display | |
|-------------|-------|--|-------------------------|
| ✱ | ✱ | Alarm display | |
| Alternating | | After LED1 blinks M times, LED2 blinks N times. This will be repeated. | |
| | | M | N = number of alarm No. |
| | | | |
| | | 2 | Alarm P |
| | | 3 | Alarm H |
| | | 4 | Alarm E |
| | | 5 | Alarm F |
| | | 6 | Alarm L |
| | | For example: After LED1 blinks twice, LED2 blinks 17 times. This will be repeated. The alarm shows "P17". | |

(✱ : Blink) Connect the outdoor unit maintenance remote controller to the RC plug (3P, BLU) on outdoor main unit control P.C. board and make confirmation.

■ Self-Diagnosis Function Table

- Cause and countermeasure against the symptom of auto address failure

| Symptom | Cause and countermeasure |
|--|--|
| <ul style="list-style-type: none"> ● When turning ON power to the outdoor main unit, LEDs 1 and 2 illuminate or blink excluding going out. Auto address setting is not available. | See "Contents of Alarm Display" and make corrections. |
| <ul style="list-style-type: none"> ● When auto address setting by the remote controller begins, the alarm display appears immediately. | |
| <ul style="list-style-type: none"> ● When auto address setting by the remote controller begins, no display appears. | Are remote control wiring and inter-unit control wiring connected properly? Is indoor unit turned ON power? |

- Auto address setting begins but finishes improperly.

| Symptom | Cause and countermeasure |
|--|--|
| <ul style="list-style-type: none"> ● Soon after a few seconds or after a few minutes, the alarm content is displayed on the remote controller. | See "Contents of Alarm Display" and make a correction. |
| <ul style="list-style-type: none"> ● After a few minutes when auto address setting begins, the compressor may occasionally start and stop several times. LEDs 1 and 2 on outdoor unit control P.C. board show the display of auto address setting with blinking alternately but LEDs 1 and 2 do not indicate the completion of auto address setting (go out). | Are remote control wiring and inter-unit control wiring connected properly? Is indoor unit turned ON power? |

- If the alarm display “E15”, “E16” and “E20” appear after auto address setting began, check the following items.

| Alarm display | Alarm contents |
|---------------|---|
| E15 | Recognized number of indoor units at the time of auto address setting are fewer than that of indoor units set by SW3 and SW4 on outdoor main unit P.C. board. |
| E16 | Recognized number of indoor units at the time of auto address setting are more than that of indoor units set by SW3 and SW4 on outdoor main unit P.C. board. |
| E20 | Outdoor unit could not entirely receive serial communication signal from the indoor unit within 90 seconds after auto address setting began. |

| Check | E15 | E16 | E20 |
|--|-----------------------|-----------------------|-----------------------|
| Have you forgotten to turn ON power to indoor unit? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Are indoor and outdoor control wiring connected properly? (Check for incorrect wiring to open & short-circuit, terminal pin and remote control terminal.) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Is remote control wiring connected properly? (Check for open & short-circuit, wrong connection to indoor/outdoor unit control wiring terminal, inter-unit control wiring.) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Are the number of the connecting indoor units set by SW3 and SW4 of outdoor main unit control P.C. board connected properly? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Is additional appropriate amount of refrigerant charge? (Compressor ON at the time of auto address setting) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Is the refrigerant tubing connected properly? (Compressor ON at the time of auto address setting) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Are E1 and E3 sensors of indoor unit normal? (Compressor ON at the time of auto address setting) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Are there any wrong system address installed in indoor units caused by manual or incorrect auto address control? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

- 1) When auto address setting from outdoor main unit control P.C. board or remote controller begins, “Under Setting” appears on the remote controller as for normal indoor units under the inter-unit control wirings and remote control wirings. LEDs 1 and 2 indicators on outdoor main unit control P.C. board blink alternately.
 - 2) If there is an error at the inter-unit control wiring of the remote controller when in the indoor unit group control, address setting may not occasionally be made although “under setting” is displayed.
 - 3) Although the alarm “E15” and “E16” are displayed, addresses will be installed in the recognized indoor units. The installed addresses can be checked by the remote controller. See the section “Checking the indoor unit address”.
- When operating the remote controller after auto address setting completed (LEDs 1 and 2 indicators on outdoor main unit control P.C. board go out), correct the symptom if the following alarms appear on the remote controller.

| Remote control display | Cause |
|------------------------|--|
| No display | Remote controller is not connected properly. (Power failure) When auto address setting was completed, the power of indoor unit was turned off. |
| E01 | Remote controller is not connected properly. (Receiving failure from remote control) Indoor unit address was mistakenly controlled by undesired indoor unit remote controller. (Impossible to communicate with outdoor unit) |
| E02 | Remote controller is not connected properly. (Impossible to communicate with indoor unit by remote controller) |
| P09 | Connector of indoor unit ceiling panel is not connected properly. |

If any other alarm appears on the display, refer to the Test Run Service Manual.

- Alarm display can be checked by the outdoor maintenance remote controller. When operating, refer to the Test Run Service Manual. Alarm display can also be checked by number of blinking of LEDs 1 and 2 on outdoor unit control P.C. board. (See the section “How to know LEDs 1 and 2 alarm display on outdoor unit control P.C. board” under the section “7-7. Self-Diagnosis Function Table and Contents of Alarm Display”.

| Remote control display | Alarm contents |
|------------------------|---|
| C17 | Indoor unit does not respond to central control equipment. |
| E01 | Indoor unit does not respond to remote controller. |
| E02 | Remote controller is having error in sending serial communication signal. |
| E03 | Remote controller does not respond to indoor unit. |
| E04 | Outdoor unit does not respond to indoor unit. |
| E06 | Some indoor units do not respond to outdoor unit. |
| E08 | Indoor unit address is duplicating. |
| E09 | Two or more remote controllers are set as main on R1-R2 link. |
| E12 | Auto Address failed to start. |

| Remote control display | Alarm contents |
|------------------------|---|
| E14 | Two or more indoor units are set as main, in the group controlled indoor units. |
| E15 | Fewer indoor units are found in Auto Addressing than the setting on outdoor PCB. |
| E16 | More indoor units are found in Auto Addressing than the setting on outdoor PCB. |
| E18 | No response from sub indoor to the main indoor unit in group control wiring. |
| E20 | No indoor unit responded in Auto Addressing. |
| E31 | Error in communication inside outdoor unit control box. |
| F01 | Indoor unit heat exchanger liquid temperature sensor has failure. (E1) |
| F02 | Indoor unit heat exchanger temperature sensor has failure. (E2) |
| F03 | Indoor unit heat exchanger gas temperature sensor has failure. (E3) |
| F04 | Compressor 1 discharge temperature sensor has failure. (DISCH1) |
| F06 | Outdoor unit heat exchanger 1 gas temperature sensor has failure. (EXG1) |
| F07 | Outdoor unit heat exchanger 1 liquid temperature sensor has failure. (EXL1) |
| F08 | Outdoor temperature sensor has failure. (TO) |
| F10 | Indoor suction air (room) temperature sensor has failure. (TA) |
| F11 | Indoor discharge air temperature sensor has failure. (BL) |
| F12 | Compressor inlet temperature sensor has failure. (SCT) |
| F14 | Subcooling heat exchanger temperature sensor has failure. (SCG) |
| F16 | High pressure sensor has failure. (HPS) |
| F17 | Low pressure sensor has failure. (LPS) |
| F29 | EEPROM on indoor unit PCB has failure. |
| F31 | EEPROM on outdoor unit PCB has failure. |
| H01 | Compressor 1 primary current is overcurrent. |
| H02 | PFC is overcurrent or VDC is overvoltage. |
| H03 | Compressor 1 current sensor is disconnected or shorted. |
| H05 | Compressor 1 discharge temperature sensor is disconnected, shorted or misplaced. (DISCH1) |
| H06 | Low pressure sensor value is too low. |
| H31 | Compressor 1 HIC has failure. HIC is overcurrent or overheat. VDC is undervoltage or overvoltage. |
| L01 | Indoor unit address setting has error. (No main indoor unit in group control.) |
| L02 | Indoor unit model does not match with the outdoor unit model. (Multi-split/mini-split) |
| L03 | Two or more indoor units are set as main in group control. |
| L04 | Duplicate system address setting on outdoor units. |
| L05 | Two or more indoor units are set as priority indoor unit (priority indoor unit). |
| L06 | Two or more indoor units are set as priority indoor unit (non-priority indoor unit). |
| L07 | Group control wiring is detected for indoor unit set as individual control. |
| L08 | Indoor unit address is not set. |
| L09 | Capacity setting of indoor unit is not correct. |
| L10 | Capacity setting of outdoor unit is not correct. |
| L13 | Indoor unit model does not match with outdoor unit. |
| L17 | Model mismatch between outdoor units. |
| L18 | 4-way valve has failure. |
| P01 | Thermal protector for Indoor unit fan motor is activated. |
| P03 | Compressor 1 discharge temperature is too high. |
| P04 | High pressure switch is activated. |
| P05 | AC power supply has abnormal. |
| P09 | Connection to the panel of indoor unit is not good. |
| P10 | Float switch of drain pan safety is activated. |
| P11 | Drain pump failure or locked rotor. |
| P12 | Indoor unit fan inverter protection control is activated. |
| P14 | O ₂ sensor has activated. |
| P16 | Compressor 1 secondary current is overcurrent. |
| P20 | Too high load in refrigerant circuit. |
| P22 | Outdoor unit fan 1 motor has failure. |
| P29 | Compressor start failure. Compressor is missing phase or reverse phase. |
| P31 | Other indoor unit in group control has an alarm. |

- Contents of alarm display on remote controller

For the remote controller, there are other alarm contents listed on the following table besides the alarm display on outdoor main unit control P.C. board.

| Wired remote control display | Detected contents | |
|------------------------------|--|--|
| <E01> | Remote controller is detecting error signal from indoor unit. | Indoor unit does not respond to remote controller. |
| <E02> | | Remote controller is having error in sending serial communication signal. |
| <<E03>> | Remote controller does not respond to indoor unit. | |
| E04 | Remote controller is detecting error signal from outdoor unit. | Outdoor unit does not respond to indoor unit. |
| E08 | Improper setting | Indoor unit address is duplicating. |
| <<E09>> | | Two or more remote controllers are set as main on R1-R2 link. |
| E18 | Indoor unit communication error in group control wiring | No response from sub indoor to the main indoor unit in group control wiring. |
| <<L02>> | Improper setting | Indoor unit model does not match with the outdoor unit model. (Multi-split/mini-split) |
| <L03> | | Two or more indoor units are set as main in group control. |
| L07 | | Group control wiring is detected for indoor unit set as individual control. |
| L08 | | Indoor unit address is not set. |
| <<L09>> | | Capacity setting of indoor unit is not correct. |
| <<F01>> | Indoor unit sensor has failure | Indoor unit heat exchanger liquid temperature sensor has failure. (E1) |
| <<F03>> | | Indoor unit heat exchanger gas temperature sensor has failure. (E3) |
| <<F10>> | | Indoor suction air (room) temperature sensor has failure. (TA) |
| <<F11>> | | Indoor discharge air temperature sensor has failure. (BL) |
| <<P09>> | Connection to the panel of indoor unit is not good. | |
| <<P01>> | Activation of protective device for Indoor unit | Thermal protector for Indoor unit fan motor is activated. |
| <<P10>> | | Float switch of drain pan safety is activated. |
| <<P11>> | | Drain pump failure or locked rotor. |
| <<P12>> | | Indoor unit fan inverter protection control is activated. |
| F29 | EEPROM on indoor unit PCB has failure. | |

- The parentheses of << >> used in the table of alarm display does not affect anything the operation of other indoor units.
- The parentheses of < > used in the table of alarm display implies that there are two cases : according to the content of the symptom, some affect the operation of other indoor units and others do not affect anything.

| Alarm messages displayed on system controller | | | |
|---|---|---|-----|
| Serial communication errors Mis-setting | Error in transmitting serial communication signal | Indoor or main outdoor unit is not operating correctly. Mis-wiring of control wiring between indoor unit, main outdoor unit and system controller. | C05 |
| | Error in receiving serial communication signal | Indoor or main outdoor unit is not operating correctly. Mis-wiring of control wiring between indoor unit, main outdoor unit and system controller. CN1 is not connected properly. | C06 |
| Activation of protective device | Protective device of sub indoor unit in group control is activated. | When using wireless remote controller or system controller, in order to check the alarm message in detail, connect wired remote controller to indoor unit temporarily. | P30 |

NOTE

1. Alarm messages in << >> do not affect other indoor unit operations.
2. Alarm messages in < > sometimes affect other indoor unit operations depending on the fault.

ATTENTION!

Adjustment of terminating resistance (pin) is necessary.

Communication failure will occur unless adjustment is made correctly.

- Terminating resistance (pin) is mounted on outdoor unit control P.C. board.
- When connecting central controller, interface or peripheral equipment, adjustment of terminating resistance (pin) is necessary. Although the connection is not made, confirmation is necessary for VRF systems.
- In the case of a refrigerant system, the terminating resistance (pin) for this inter-unit control wiring (S-LINK wiring) is one location (See the section “7-4. Auto Address Setting”).
For 2 or more refrigerant systems, 2 locations should be valid (“SHORT” for VRF systems at shipment). See the section “7-4. Auto Address Setting”.
In order to make 2 locations valid, let the terminating resistance (pin) of the nearest outdoor unit and the farthest outdoor unit be valid (SHORT side) from the location of central controller.
In other refrigerant systems excepting 2 locations described above, make them invalid (OPEN side).
It is prohibited making more than 3 locations of terminating resistance valid.
- Since the use of linking the sub outdoor units of VRF systems is not connected to the inter-unit control wiring, it is not necessary to make the terminating resistance invalid “OPEN side”.

Make final confirmation regarding the central controller or interface & inter-unit control wiring (S-LINK wiring) connected to the peripheral equipment.
Measure the line resistance with a tester and check whether the values are in the range of 30Ω - 120Ω.
If the resistance values are out of range, check again the terminating resistance.
Nevertheless, if the values are out of range, the problem comes from wiring.

- Is the connection properly made?
- Are there any scratches or damages on the coated surface?
- Measure the line, between wires and ground with the 500V megger (insulation resistance meter) and check the values are over 100MΩ.
- When measuring, be sure to remove both edges of the wire from the terminal board. If not removed, it will be damaged.
- If the line resistance is within 100MΩ, newly carry out the wiring work.

Megger

Line

(Wire) ————
 ↑
(Wire) ————
 ↓

Between wires and ground

(Wire) ————
 ↑
(Wire) ————
 ↓
(Ground) ⏚ ⏚

— NOTE —

