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INSTALLATION INSTRUCTIONS
– 3-WAY System Air Conditioner –
for Refrigerant R410A

INSTRUCTIONS D'INSTALLATION
– Climatiseur Système 3 VOIES –
pour réfrigérant R410A

EINBAUANLEITUNG
– 3-WEG-System-Klimaanlage –
für Kühlmittel R410A

ISTRUZIONI DI INSTALLAZIONE
– Condizionatore d'aria a 3 vie con sistema –
per refrigerante R410A

INSTRUÇÕES DE INSTALAÇÃO
– Sistema de Ar Condicionado de 3 VIAS –
para Refrigerante R410A

ΟΔΗΓΙΕΣ ΕΓΚΑΤΑΣΤΑΣΗΣ
– Κλιματιστικό Σύστημα 3 Οδών –
για το Ψυκτικό μέσο R410A

INSTRUCCIONES DE INSTALACIÓN
– Acondicionador de aire con sistema de 3 vías –
para refrigerante R410A

Outdoor Units
U-8MF1E8, U-10MF1E8, U-12MF1E8, U-14MF1E8, U-16MF1E8 — Heat Pump Unit (3-phase)

Unités extérieures
U-8MF1E8, U-10MF1E8, U-12MF1E8, U-14MF1E8, U-16MF1E8 — Unité pompe à chaleur (Triphasée)

Außeneinheiten
U-8MF1E8, U-10MF1E8, U-12MF1E8, U-14MF1E8, U-16MF1E8 — Wärmepumpeneinheit (dreiphasig)

Unità esterne
U-8MF1E8, U-10MF1E8, U-12MF1E8, U-14MF1E8, U-16MF1E8 — Unità pompa di calore (trifase)

Unidades exteriores
U-8MF1E8, U-10MF1E8, U-12MF1E8, U-14MF1E8, U-16MF1E8 — Unidade de bomba de calor (trifásica)

Εξωτερικές Μονάδες
U-8MF1E8, U-10MF1E8, U-12MF1E8, U-14MF1E8, U-16MF1E8 — Μονάδα Αντλίας Θερμότητας (Τριφασική)

Unidades exteriores
U-8MF1E8, U-10MF1E8, U-12MF1E8, U-14MF1E8, U-16MF1E8 — Unidad de bomba de calor (trifásica)

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Panasonic®

INSTALLATION INSTRUCTIONS

– 3WAY System Air Conditioner –

for Refrigerant R410A

■ **R410A Models**

Model No.

Outdoor Units

Type	8hp	10hp	12hp	14hp	16hp
MF1	U-8MF1E8	U-10MF1E8	U-12MF1E8	U-14MF1E8	U-16MF1E8

* Refrigerant R410A is used in the outdoor units.

Indoor Units

	Indoor Unit Type	22	28	36	45	56
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
U1	4-Way Cassette	S-22MU1E5	S-28MU1E5	S-36MU1E5	S-45MU1E5	S-56MU1E5
Y1	4-Way Cassette 60 × 60	S-22MY1E5	S-28MY1E5	S-36MY1E5	S-45MY1E5	S-56MY1E5
K1	Wall-Mounted	S-22MK1E5	S-28MK1E5	S-36MK1E5	S-45MK1E5	S-56MK1E5
T1	Ceiling			S-36MT1E5	S-45MT1E5	S-56MT1E5
F1	Low Silhouette Ducted	S-22MF1E5	S-28MF1E5	S-36MF1E5	S-45MF1E5	S-56MF1E5
M1	Slim Low Static Ducted	S-22MM1E5	S-28MM1E5	S-36MM1E5	S-45MM1E5	S-56MM1E5
E1	High Static Pressure Ducted					
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

	Indoor Unit Type	73	90	106	140	160
D1	1-Way Cassette	S-73MD1E5				
L1	2-Way Cassette	S-73ML1E5				
U1	4-Way Cassette	S-73MU1E5		S-106MU1E5	S-140MU1E5	S-160MU1E5
Y1	4-Way Cassette 60 × 60					
K1	Wall-Mounted	S-73MK1E5		S-106MK1E5		
T1	Ceiling	S-73MT1E5		S-106MT1E5	S-140MT1E5	
F1	Low Silhouette Ducted	S-73MF1E5	S-90MF1E5	S-106MF1E5	S-140MF1E5	S-160MF1E5
M1	Slim Low Static Ducted					
E1	High Static Pressure Ducted	S-73ME1E5		S-106ME1E5	S-140ME1E5	
P1	Floor Standing	S-71MP1E5				
R1	Concealed Floor Standing	S-71MR1E5				

* S-224ME1E5 and S-280ME1E5 are available.

IMPORTANT!
Please Read Before Starting

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

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

- Carefully read this instruction booklet before beginning.
- Follow each installation or repair step exactly as shown.
- Observe all local, state, and national electrical codes.
- This equipment complies with EN/IEC 61000-3-12 provided that the short-circuit power Ssc is greater than or equals to the values corresponding to each model as shown in the table below 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 Ssc greater than or equals to the values corresponding to each model as shown in the table below.

	U-8MF1E8	U-10MF1E8	U-12MF1E8	U-14MF1E8	U-16MF1E8
Ssc	3840 kW	4710 kW	5340 kW	3580 kW	2870 kW

- This equipment complies with EN/IEC 61000-3-11 provided that the system impedance Zmax is less than or equal to the values corresponding to each model as shown in the table below at the interface point between the user's supply and the public system. Consult with the supply authority for the system impedance Zmax.

	U-8MF1E8	U-10MF1E8	U-12MF1E8	U-14MF1E8	U-16MF1E8
Zmax	0.079Ω	0.079Ω	0.079Ω	0.079Ω	0.079Ω

- 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.**
- **Ground the unit** following local electrical codes.
- 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, and a power supply disconnect, circuit breaker and earth leakage breaker for overcurrent protection should be provided in the exclusive line.
- Provide a power outlet exclusively for each unit, and full disconnection means having a contact separation 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. 

When Transporting

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

When Installing…

…In a 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

⚠ WARNING

- When performing piping work do not mix air except for specifled refrigerant (R410A) in refrigeration cycle. It causes capacity down, and risk of explosion and injury due to high tension inside the refrigerant cycle.
- Refrigerant gas leakage may cause fire.

- Ventilate the room well, 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 poisonous gas.
- Keep all tubing runs as short as possible.
- Use the flare method for connecting tubing.
- Apply refrigerant lubricant to the matching surfaces of the flare and union tubes before connecting them, then tighten the nut with a torque wrench for a leak-free connection.
- Check carefully for leaks before starting the test run.
- 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) before opening the unit to check or repair electrical parts and wiring.

- Keep your fingers and clothing away from any moving parts.
- Clean up the site after you finish, remembering to check that no metal scraps or bits of wiring have been left inside the unit being serviced.

⚠ WARNING

- 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 the sales dealer or service dealer for repair.

⚠ CAUTION

- Do not touch the air inlet or the sharp aluminum fins of the outdoor unit. You may get hurt.

- Ventilate any enclosed areas when installing or testing the refrigeration system. Escaped 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 poisonous gas.

Others

⚠ CAUTION

- Do not touch the air inlet or the sharp aluminum fins of the outdoor unit. You may hurt.

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

- Do not stick any object into the FAN CASE.
  You may be injured and the unit may be damaged.

NOTICE

The English text is the original instructions. Other languages are translations of the original instructions.

Check of Density Limit

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.

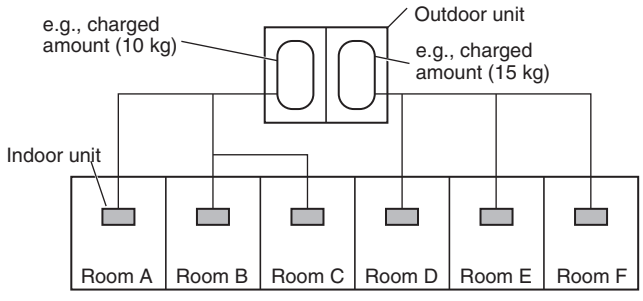
$$\frac{\textbf{Total amount of refrigerant (kg)}}{\textbf{Min. volume of the indoor unit installed room (m}^3\textbf{)}} \leq \textbf{Density limit (kg/m}^3\textbf{)}$$

The density limit of refrigerant which is used in multi air conditioners is 0.3 kg/m^3 (ISO 5149).

NOTE

1. If there are 2 or more refrigerating systems in a single refrigerating device, the amount of refrigerant should be as charged in each independent device.

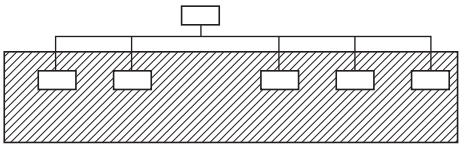
   For the amount of charge in this example:



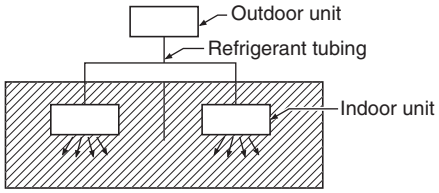
   The possible amount of leaked refrigerant gas in rooms A, B and C is 10 kg.
   The possible amount of leaked refrigerant gas in rooms D, E and F is 15 kg.

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

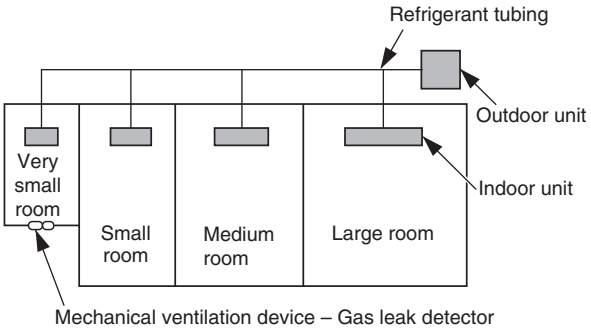
(1) No partition (shaded portion)



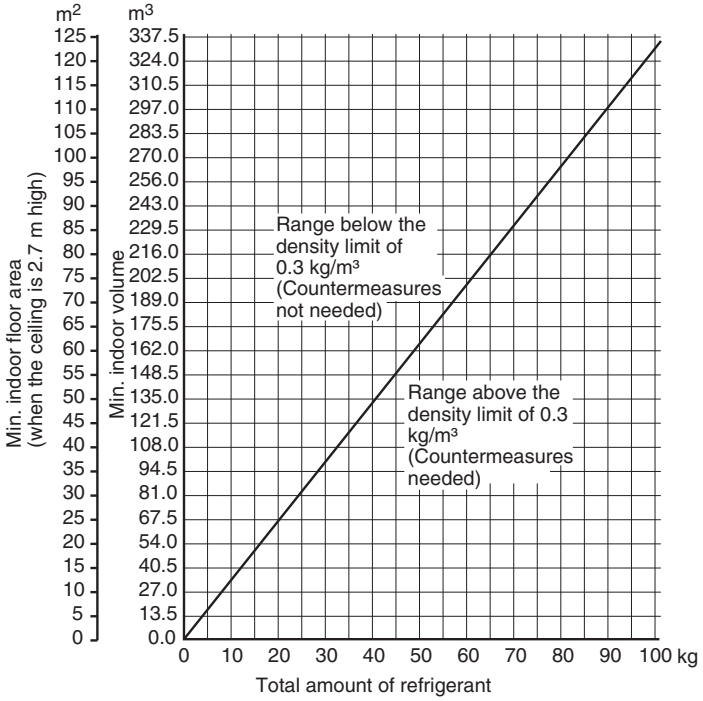
(2) When there is an effective opening with the adjacent room for ventilation of leaking refrigerant gas (opening without a door, or an opening 0.15% or larger than the respective floor spaces at the top or bottom of the door).



(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.



3. 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 C1220 phosphorous deoxidized copper specified in JIS H3300 “Copper and Copper Alloy Seamless Pipes and Tubes.” For tubes of ø25.4 or larger, use C1220 T-1/2H material or H material, and do not bend the tubes.
- **Tubing size: Be sure to use the sizes indicated in the table below.**
- 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		O					
Copper tube	Outer diameter	6.35	9.52	12.7	15.88	19.05	22.22
	Wall thickness	0.8	0.8	0.8	1.0	1.2	1.15

Unit: mm

Material		1/2 H, H				
Copper tube	Outer diameter	25.4	28.58	31.75	38.1	41.28
	Wall thickness	1.0	1.0	1.1	over 1.35	over 1.45

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.

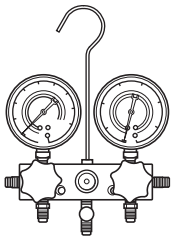
3. Different tools required

3-1. Tool specifications have been changed due to the characteristics of R410A.

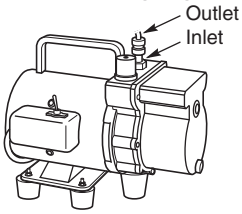
Some tools for R22- and R407C-type refrigerant systems cannot be used.

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



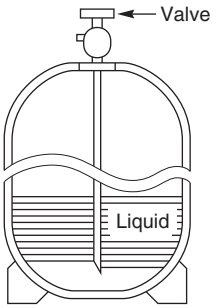
Vacuum pump



* 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.



CONTENTS

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 indoor and outdoor units and make sure all accessory parts listed are with the system before beginning.

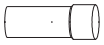
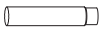
1-1. Tools Required for Installation (not supplied)

1. Flathead screwdriver
2. Phillips head screwdriver
3. Knife or wire stripper
4. Tape measure
5. Carpenter's level
6. Sabre saw or key hole 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)

1-2. Accessories Supplied with Outdoor Unit

Table 1-1 (Outdoor Unit)

Unit: pcs

Part name	Figure	Q'ty				
		8 hp	10 hp	12 hp	14 hp	16 hp
Connection tubing	Outer diameter ø28.58  Inner diameter ø25.4	0	0	0	0	1
	Outer diameter ø25.4  Inner diameter ø19.05	0	0	1	0	0
	Outer diameter ø22.22  Inner diameter ø19.05	0	1	0	1	1
	Outer diameter ø19.05  Inner diameter ø15.88	0	1	1	0	0
	Outer diameter ø12.7  Inner diameter ø9.52	0	0	1	0	0

hp = horsepower

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. Wall thickness of the insulation should be not less than 8 mm.
3. Use insulated copper wire for field wiring. Wire size varies with the total length of wiring. Refer to **4. ELECTRICAL WIRING** for details.

⚠ CAUTION

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

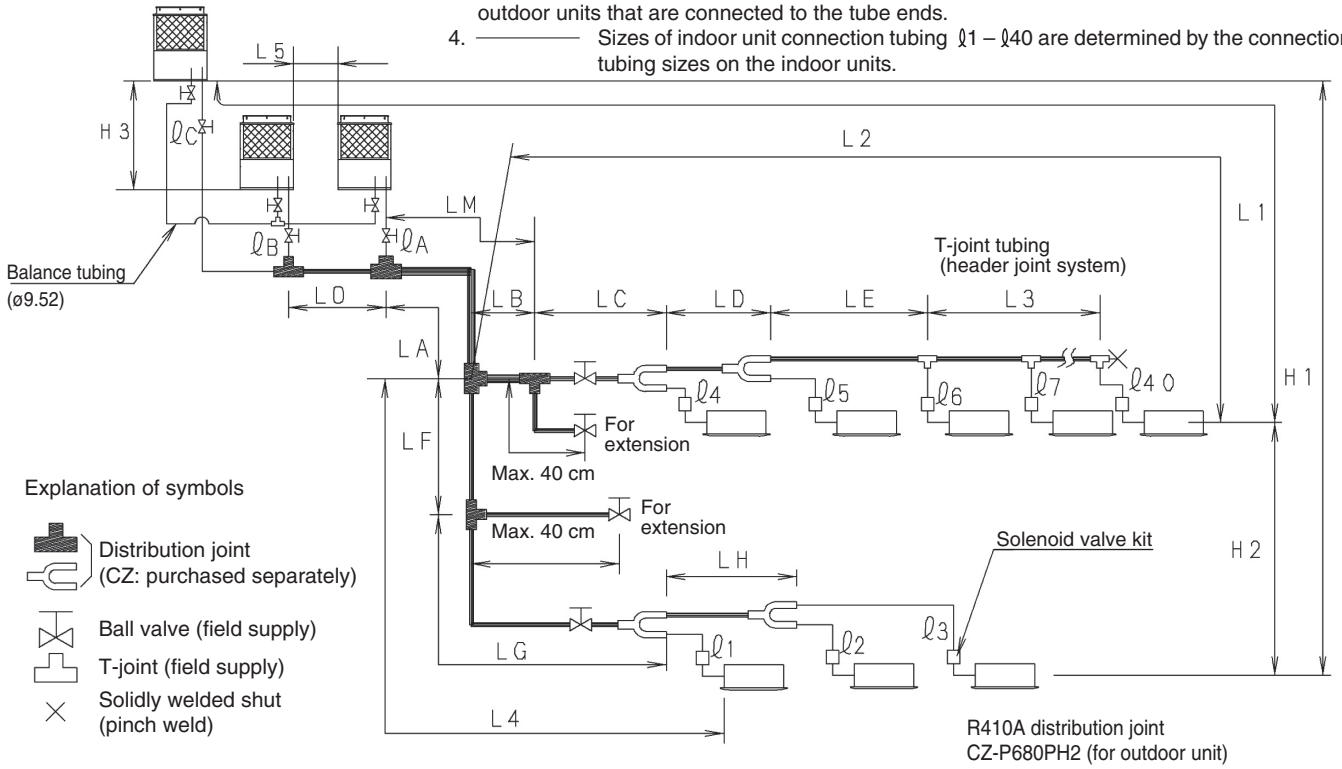
1-4. Additional Materials Required for Installation

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 LM = LA + LB … ≤ 80 m
2. ——— Main distribution tubes LC – LH are selected according to the capacity after the distribution joint.
3. The outdoor connection main tubing (LO portion) is determined by the total capacity of the outdoor units that are connected to the tube ends.
4. ——— Sizes of indoor unit connection tubing ℓ1 – ℓ40 are determined by the connection tubing sizes on the indoor units.



R410A distribution joint
CZ-P680PH2 (for outdoor unit)
CZ-P1350PH2 (for outdoor unit)
CZ-P224BH2 (for indoor unit)
CZ-P680BH2 (for indoor unit)
CZ-P1350BH2 (for indoor unit)

Note: Do not use commercially available T-joints for the liquid tubing and parts.

* Be sure to use special R410A distribution joints (CZ: purchased separately) for outdoor unit connections and tubing branches.

Table 1-2 Ranges that Apply to Refrigerant Tubing Lengths and to Differences in Installation Heights

Items	Marks	Contents		Length (m)
Allowable tubing length	L1	Max. tubing length	Actual length	≤ 150
			Equivalent length	≤ 175
	ΔL (L2 – L4)	Difference between max. length and min. length from the No. 1 distribution joint		≤ 40
	LM	Max. length of main tubing (at max. diameter)		≤ 80 *3
	ℓ1, ℓ2...ℓ40	Max. length of each distribution tube		≤ 30
	L1+ℓ1+ℓ2...ℓ39+ ℓA+ℓB+LF+LG+LH	Total max. tubing length including length of each distribution tube (only liquid tubing)		≤ 300
	L5	Distance between outdoor units		≤ 10
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
	H3	Max. difference between outdoor units		≤ 4
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. The outdoor connection main tubing (LO portion) is determined by the total capacity of the outdoor units that are connected to the tube ends.
2. If the longest tubing length (L1) exceeds 90 m (equivalent length), increase the sizes of the main tubes (LM) by 1 rank for the discharge tubes, suction tubes, and liquid tubes. (Use a field supply reducer.)
3. If the longest main tube length (LM) exceeds 50 m, increase the main tube size at the portion before 50 m by 1 rank for the suction tubes and discharge tubes. (Use a field supply reducer.)
   (For the portion that exceeds 50 m, set based on the main tube sizes (LA) listed in the table on the following page.)

1-6. Tubing Size

Table 1-3 Main Tubing Size (LA)

hp=horsepower

kW	22.4	28.0	33.5	40.0	45.0	50.4	56.0	61.5	68.0	73.0	78.5	85.0	90.0	96.0
Total system horsepower (hp)	8	10	12	14	16	18	20	22	24	26	28	30	32	34
Combined outdoor units (hp)	8	10	12	14	16	10 8	10 10	12 10	14 10	16 10	16 12	16 14	16 16	14 10 10
Suction tubing (mm)	ø19.05	ø22.22	ø25.40		ø28.58	ø28.58				ø31.75				
Discharge tubing (mm)	ø15.88	ø19.05		ø22.22				ø25.40			ø28.58			
Liquid tubing (mm)	ø9.52		ø12.70			ø15.88				ø19.05				

kW	101.0	106.5	113.0	118.0	123.5	130.0	135.0
Total system horsepower (hp)	36	38	40	42	44	46	48
Combined outdoor units (hp)	16 10 10	16 12 10	16 14 10	16 16 10	16 16 12	16 16 14	16 16 16
Suction tubing (mm)	ø38.10						
Discharge tubing (mm)	ø28.58	ø31.75					
Liquid tubing (mm)	ø19.05						

*1: If future extension is planned, select the tubing diameter based on the total horsepower after extension. However extension is not possible if the resulting tubing size is two ranks higher.

*2: The balance tube (outdoor unit tube) diameter is ø9.52.

*3: Type 1 tubing should be used for the refrigerant tubes.

*4: If the length of the longest tube (L1) exceeds 90 m (equivalent length), increase the main tube (LM) size by 1 rank for the suction, discharge, and liquid tubes. (Use field-supply reducers.) (Select from Table 1-3 and Table 1-8.)

*5: If the longest main tube length (LM) exceeds 50 m, increase the main tube size at the portion before 50 m by 1 rank for the suction tubes and discharge tubes.
(For the portion that exceeds 50 m, set based on the main tube sizes (LA) listed in the table above.)

■ Size of tubing (LO) between outdoor units

Select the size of tubing between outdoor units based on the main tubing size (LA) as given in the table above.

Table 1-4 Main Tubing Size After Distribution (LB, LC...)

hp = horsepower

Total capacity after distribution		7.1 (2.5 hp)	16.0 (6 hp)	25.0 (9 hp)	30.0 (11 hp)	36.4 (13 hp)	42.0 (15 hp)	47.6 (17 hp)	58.8 (21 hp)	70.0 (25 hp)
	Below kW									
	Over kW	–	7.1 (2.5 hp)	16.0 (6 hp)	25.0 (9 hp)	30.0 (11 hp)	36.4 (13 hp)	42.0 (15 hp)	47.6 (17 hp)	58.8 (21 hp)
Tubing size	Suction tubing (mm)	ø15.88	ø19.05	ø19.05	ø22.22	ø25.40	ø25.40	ø28.58	ø28.58	ø28.58
	Discharge tubing (mm)	ø12.70	ø15.88	ø15.88	ø19.05	ø19.05	ø22.22	ø22.22	ø22.22	ø25.40
	Liquid tubing (mm)	ø9.52	ø9.52	ø9.52	ø9.52	ø12.70	ø12.70	ø12.70	ø15.88	ø15.88

Total capacity after distribution		75.6 (27 hp)	98.0 (35 hp)	103.6 (37 hp)	–
	Below kW				
	Over kW	70.0 (25 hp)	75.6 (27 hp)	98.0 (6 hp)	103.6 (37 hp)
Tubing size	Suction tubing (mm)	ø31.75	ø31.75	ø38.10	ø38.10
	Discharge tubing (mm)	ø25.40	ø28.58	ø28.58	ø31.75
	Liquid tubing (mm)	ø19.05	ø19.05	ø19.05	ø19.05

*1: The outdoor unit connection tubing (LO) is determined by the total capacity of the outdoor units connected to the tube ends. The tubing size is selected based on the table of main tube sizes after the branch.

*2: If the total capacity of the indoor units connected to the tube ends is different from the total capacity of the outdoor units, then the main tube size is selected based on the total capacity of the outdoor units.
(For LA, LB, and LF in particular)

Table 1-5 Outdoor Unit Tubing Connection Size (ℓA – ℓC)

kW	22.4	28.0	33.5	40.0	45.0
Suction tubing	ø19.05	ø22.22	ø25.4		ø28.58
	Brazing connection				
Discharge tubing	ø15.88	ø19.05		ø22.22	
	Brazing connection				
Liquid tubing	ø9.52		ø12.7		
	Brazing connection				
Balance tubing	ø9.52				
	Flare connection				

Unit: mm

Table 1-6 Indoor Unit Tubing Connection Size (ø1 – ø40)

Indoor unit type		22	28	36	45	56	73	90	106	140	160	224*1	280*1
Distribution joint – solenoid valve kit tubing	Suction tubing (mm)	ø15.88										ø19.05	ø22.22
	Discharge tubing (mm)	ø12.70										ø15.88	ø19.05
	Liquid tubing (mm)	ø9.52											
Solenoid valve kit – Indoor unit tubing connection	Gas tubing (mm)	ø12.70					ø15.88					ø19.05	ø22.22
	Liquid tubing (mm)	ø6.35					ø9.52						

*1: For the solenoid valve kits, use CZ-P160HR2 with parallel specifications. Branch the tubing before and after the solenoid valve kits.

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 1-7 Straight Equivalent Length of Joints

Gas tubing size (mm)	12.7	15.88	19.05	22.22	25.4	28.58	31.8	38.1
90° elbow	0.30	0.35	0.42	0.48	0.52	0.57	0.70	0.79
45° elbow	0.23	0.26	0.32	0.36	0.39	0.43	0.53	0.59
U-shape tube bent (R60 – 100 mm)	0.90	1.05	1.26	1.44	1.56	1.71	2.10	2.37
Trap bend	2.30	2.80	3.20	3.80	4.30	4.70	5.00	5.80
Y-branch distribution joint	Equivalent length conversion not needed.							
Ball valve for service	Equivalent length conversion not needed.							

Table 1-8 Refrigerant tubing (Existing tubing can be used.)

Tubing size (mm)			
Material O		Material 1/2H • H	
ø6.35	t0.8	ø25.40	t1.0
ø9.52	t0.8	ø28.58	t1.0
ø12.7	t0.8	ø31.75	t1.1
ø15.88	t1.0	ø38.10	t1.15
ø19.05	t1.0	ø41.28	t1.20
ø22.22	t1.15		

* 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 from the liquid tubing total length as follows.

Required amount of additional refrigerant charge = [(Amount of additional refrigerant charge per meter of each size of liquid tube × its tube length) + (...) + (...)] + [(Necessary amount of additional refrigerant charge per outdoor unit + (...) + (...)]

*Always charge accurately using a scale for weighing.

Table 1-9-1 Amount of Additional Refrigerant Charge Per Meter, According to Liquid Tubing Size

Liquid tubing size (mm)	6.35	9.52	12.7	15.88	19.05	22.22
Amount of additional refrigerant charge/m (g/m)	26	56	128	185	259	366

Table 1-9-2 Necessary Amount of Additional Refrigerant Charge Per Outdoor Unit

U-8MF1E8	U-10MF1E8	U-12MF1E8	U-14MF1E8	U-16MF1E8
——	——	——	3.2 kg	3.2 kg

Table 1-10 Refrigerant Charge Amount at Shipment (for Outdoor Unit)

U-8MF1E8	U-10MF1E8	U-12MF1E8	U-14MF1E8	U-16MF1E8
11.8 kg	11.8 kg	11.8 kg	11.8 kg	11.8 kg

1-9. System Limitations

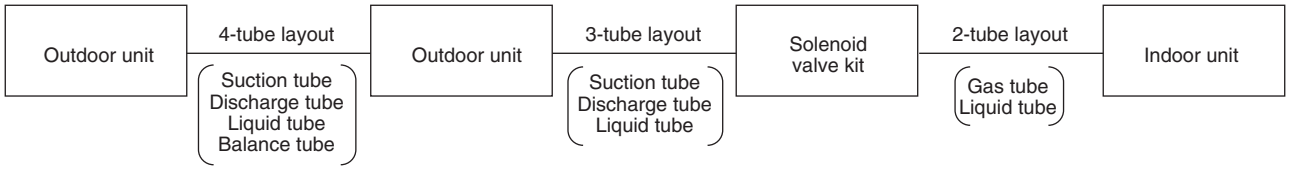
Table 1-11 System Limitations

Max. No. allowable connected outdoor units	3
Max. capacity allowable connected outdoor units	135 kW (48 hp)
Max. connectable indoor units	40 *1
Max. allowable indoor/outdoor capacity ratio	50 – 130%

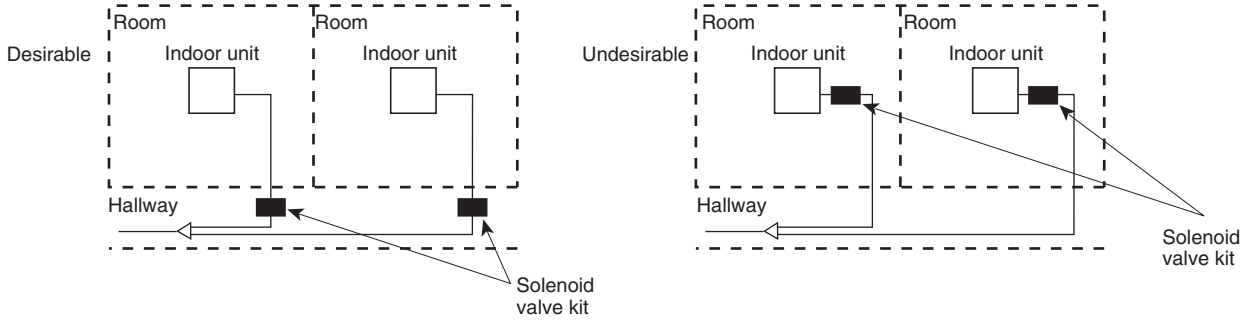
*1: In the case of 22 hp (type 61.5 kW) or smaller units, the number is limited by the total capacity of the connected indoor units.

1-10. Installation Standards

Relationship between A/C units and refrigerant tubing



- Install the solenoid valve kit 30 m or less from the indoor unit.
- In quiet locations such as hospitals, libraries, and hotel rooms, the refrigerant noise may be somewhat noticeable. It is recommended that the solenoid valve kit be installed inside the corridor ceiling, at a location outside the room.



Common solenoid valve kit

- Multiple indoor units under group control can utilize a solenoid valve kit in common.
- Categories of connected indoor unit capacities are determined by the solenoid valve kit.

Type of solenoid valve kit	Total capacity of indoor units (kW)
CZ-P160HR2	5.6 < Total capacity ≤ 16.0
CZ-P56HR2	2.2 ≤ Total capacity ≤ 5.6

- If the capacity range is exceeded, use 2 solenoid valves connected in parallel.

⚠ WARNING

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

1-11. 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 the leak detector.

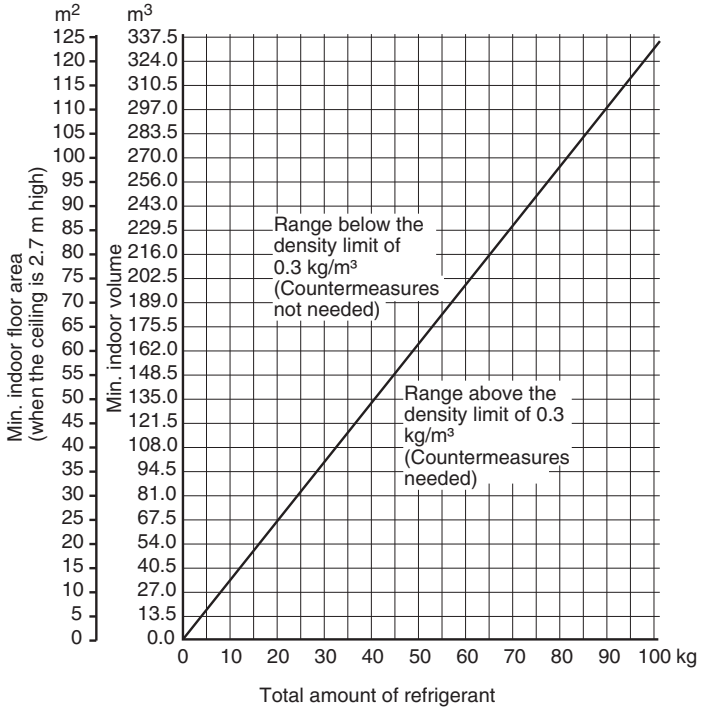
(Total refrigerant charged amount: kg)

(Min. indoor volume where indoor unit is installed: m^3) ≤ Limit density 0.3 (kg/m^3)

The limit density of refrigerant which is used in this unit is 0.3 kg/m^3 (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 at 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 table.



⚠ CAUTION

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

1-12. Installing Distribution Joint

(1) Refer to "HOW TO ATTACH DISTRIBUTION JOINT" enclosed with the optional distribution joint kit (CZ-P680PH2, P1350PH2, P224BH2, P680BH2, P1350BH2).

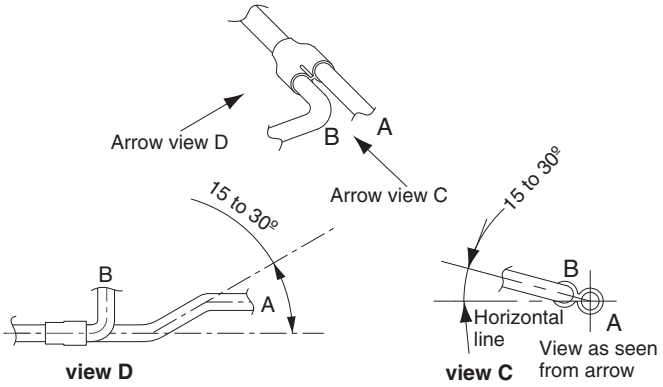
(2) When creating a branch using a commercially available T-joint (header joint system), orient the main tubing so that it is either horizontal (level) or vertical. In order to prevent accumulation of refrigerant oil in stopped units, if the main tubing is horizontal then each branch tubing length "B" should be at an angle that is greater than horizontal. If the main tubing is vertical, provide a raised starting portion for each branch. When only one indoor unit is connected to the side of "A", install part "A" at a positive angle (15-30º) for the field tubing as shown in the figure.

[Header joint system]

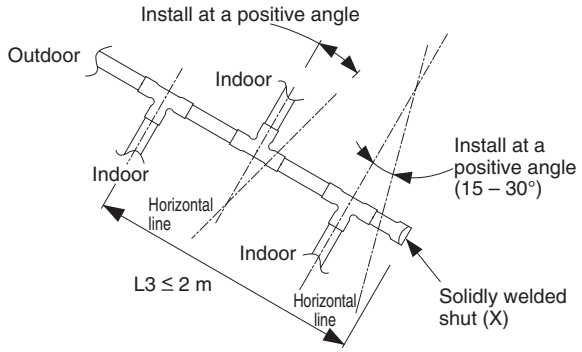
- Be sure to solidly weld shut the T-joint end (marked by "X" in the figure). In addition, pay attention to the insertion depth of each connected tube so that the flow of refrigerant within the T-joint is not impeded.
- When using the header joint system, do not make further branches in the tubing.
-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

(3) If there are height differences between indoor units or if branch tubing that follows a distribution joint is connected to only 1 unit, a trap or ball valve must be added to that distribution joint. (When adding the ball valve, locate it within 40 cm of the distribution joint.)
(Consult with the dealer separately concerning the ball valve.)
If a trap or ball valve is not added, do not operate the system before repairs to a malfunctioning unit are completed. (The refrigerant oil sent through the tubing to the malfunctioning unit will accumulate and may damage the compressor.)

Tube branching methods (horizontal use)

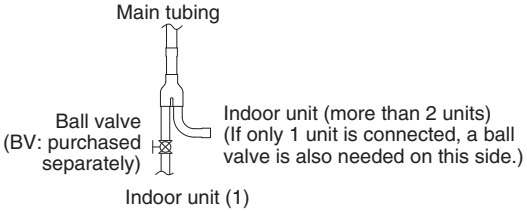


Header joint system (Indoor)

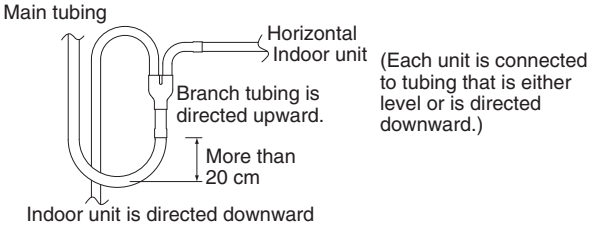


Types of vertical trap specifications

(When using ball valve)



(When not using ball valve)



1-13. Optional Distribution Joint Kit

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

Table 1-12

Model name	Cooling capacity after distribution	Remarks
CZ-P680PH2	68.0 kW or less	For outdoor unit
CZ-P1350PH2	135.0 kW or less	For outdoor unit
CZ-P224BH2	22.4 kW or less	For indoor unit
CZ-P680BH2	68.0 kW or less	For indoor unit
CZ-P1350BH2	135.0 kW or less	For indoor unit

■ Tubing size (with thermal insulation)

CZ-P680PH2

For outdoor unit (Capacity after distribution joint is 68.0 kW or less.)

Example: (C below indicates inner diameter. Ⓒ below indicates outer diameter.)

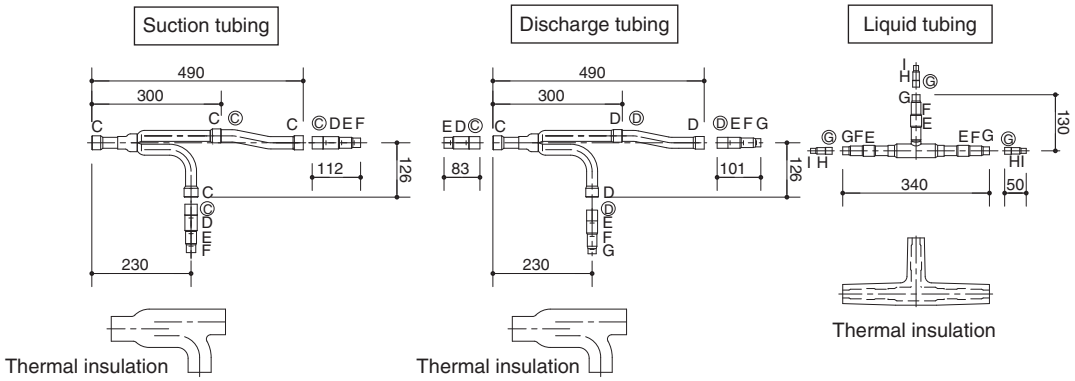


Table 1-13 Dimensions for connections of each part Unit: mm

Position	A	B	C	D	E	F	G	H	I	J
Dimension	–	–	ø28.58	ø25.4	ø22.22	ø19.05	ø15.88	ø12.7	ø9.52	–

CZ-P1350PH2

For outdoor unit (Capacity after distribution joint is greater than 68.0 kW and no more than 135.0 kW.)

Example: (C below indicates inner diameter. Ⓒ below indicates outer diameter.)

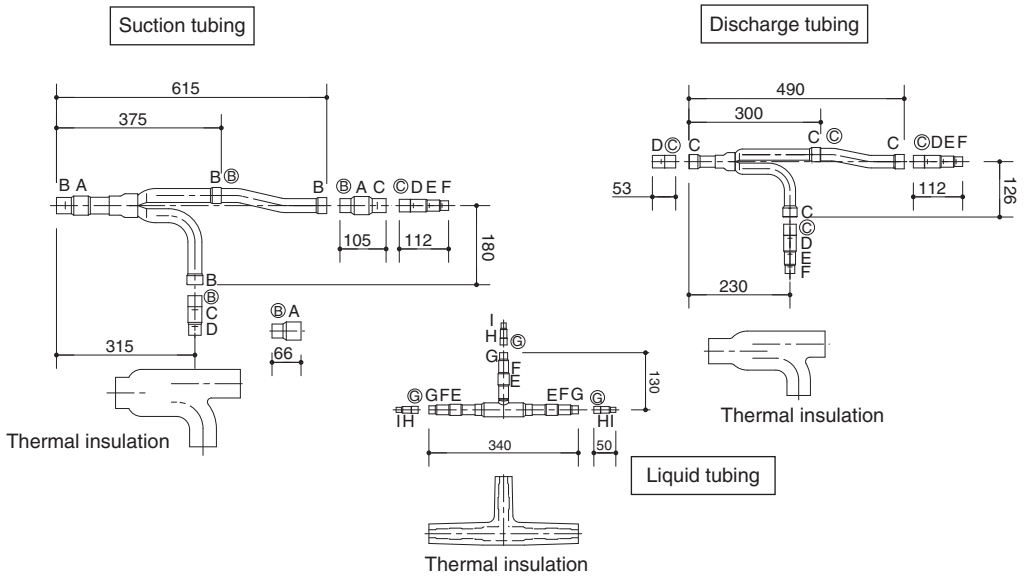


Table 1-14 Dimensions for connections of each part Unit: mm

Position	A	B	C	D	E	F	G	H	I	J
Dimension	ø38.1	ø31.75	ø28.58	ø25.4	ø22.22	ø19.05	ø15.88	ø12.7	ø9.52	–

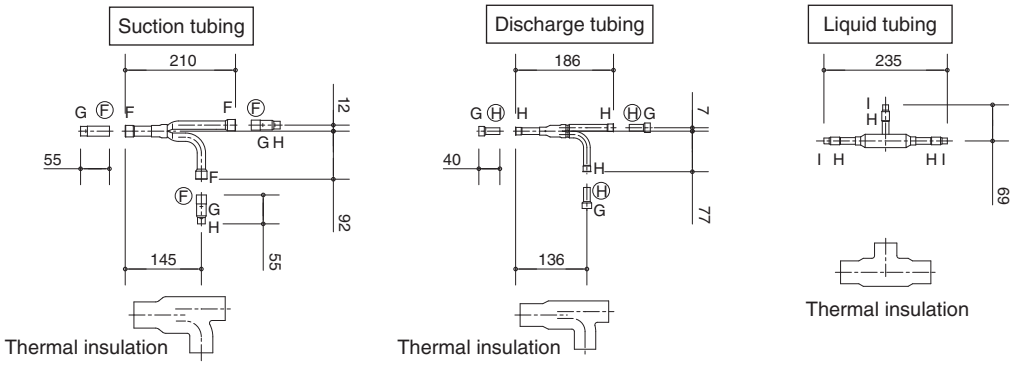
Table 1-15 Dimensions for connections of each part Unit: mm

Position	A	B	C	D	E	F	G	H	I	J
Dimension	ø38.1	ø31.75	ø28.58	ø25.4	ø22.22	ø19.05	ø15.88	ø12.7	ø9.52	–

CZ-P224BH2

Use: For indoor unit (Capacity after distribution joint is 22.4 kW or less.)

Example: (F below indicates inner diameter. Ⓕ below indicates outer diameter.)

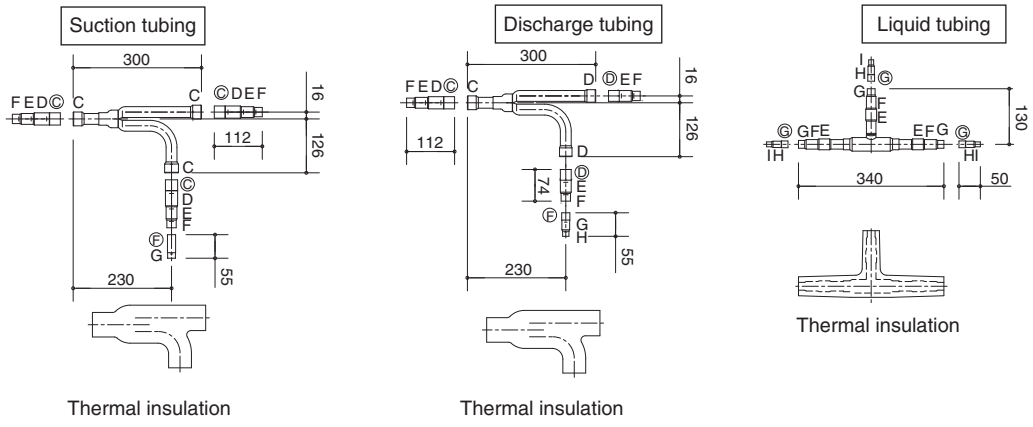


Unit: mm

CZ-P680BH2

Use: For indoor unit (Capacity after distribution joint is greater than 22.4 kW and no more than 68.0 kW.)

Example: (C below indicates inner diameter. Ⓒ below indicates outer diameter.)

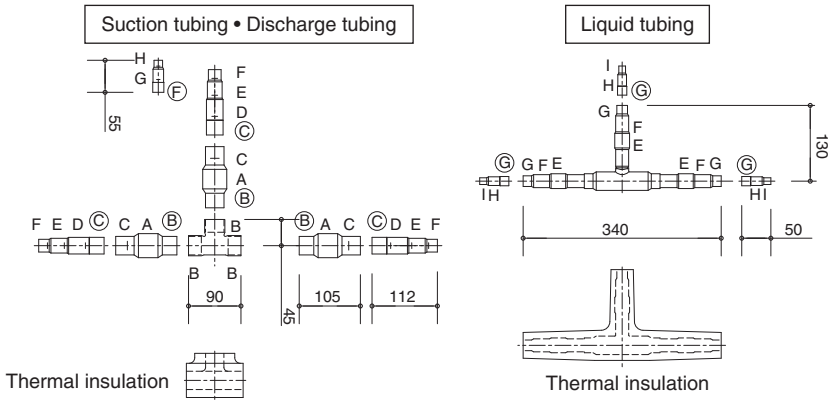


Unit: mm

CZ-P1350BH2

Use: For indoor unit (Capacity after distribution joint is greater than 68.0 kW and no more than 135.0 kW.)

Example: (B below indicates inner diameter. Ⓑ below indicates outer diameter.)

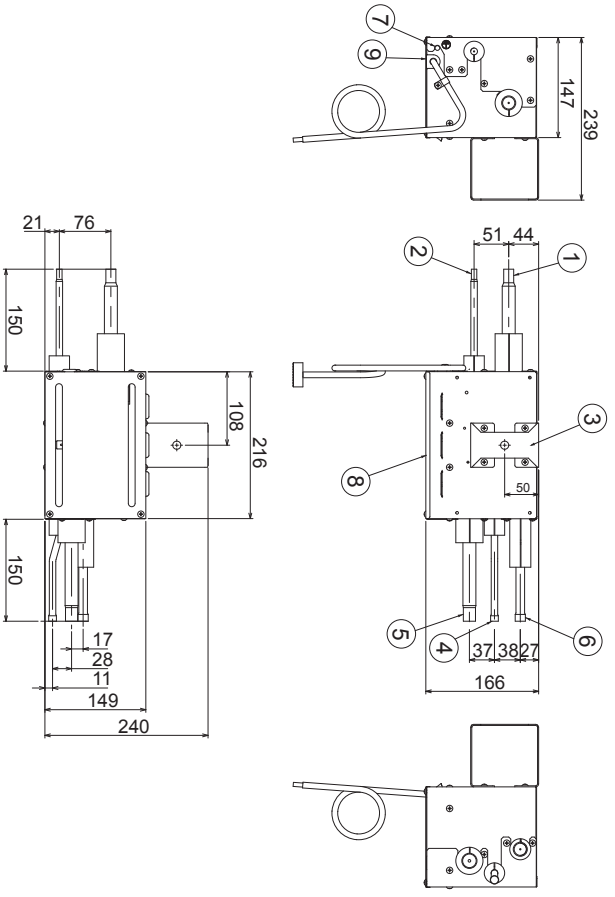


Unit: mm

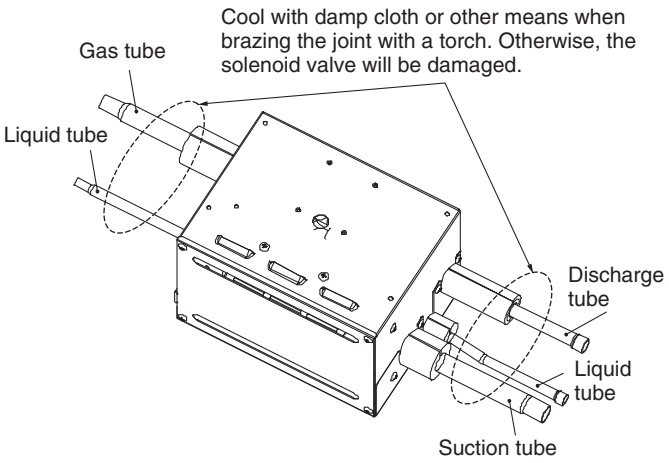
1-14. Optional Solenoid Valve Kit

CZ-P56HR2	
Part number	**Types and specifications of tubing connections**
①	Gas tube: ø12.7
②	Liquid tube: ø6.35
③	Suspension hook
④	Liquid tube: ø9.52
⑤	Suction tube: ø15.88
⑥	Discharge tube: ø12.7
⑦	Earth (M5 with washer)
⑧	Service panel
⑨	Power outlet (connected to a 5 m cabtyre cable with connector)

Unit: mm



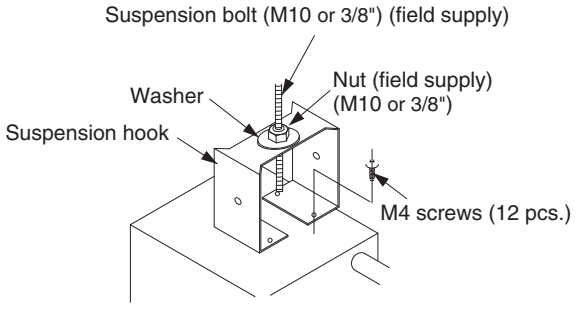
Unit: mm



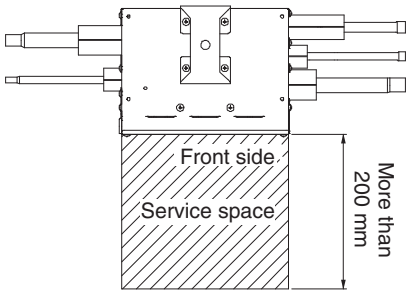
NOTE

Notes on Installation

- Be sure to secure the valve body by using its structure with the suspension bolt, etc.
- Install the valve body within a distance of 30 m from the indoor unit.
  Some refrigerant noise will be produced. Therefore in hospitals, libraries, hotel guest rooms, and other quiet locations, it is recommended that the solenoid valve kit be installed on the ceiling reverse side of a hallway or another location separated from the room.
- When installing the valve body, install with the top surface facing up. Secure 200 mm or more of space to the front so that the front service panel can be removed.
- If the supplied suspension hook will not be used, and other fastening devices will be attached in the field, use the 4 screw holes on the top surface. DO NOT use any long screws other than the supplied screws. Use of other screws may puncture the internal tubing, resulting in refrigerant leakage.
- Do not block the air holes.



How to use suspension hook

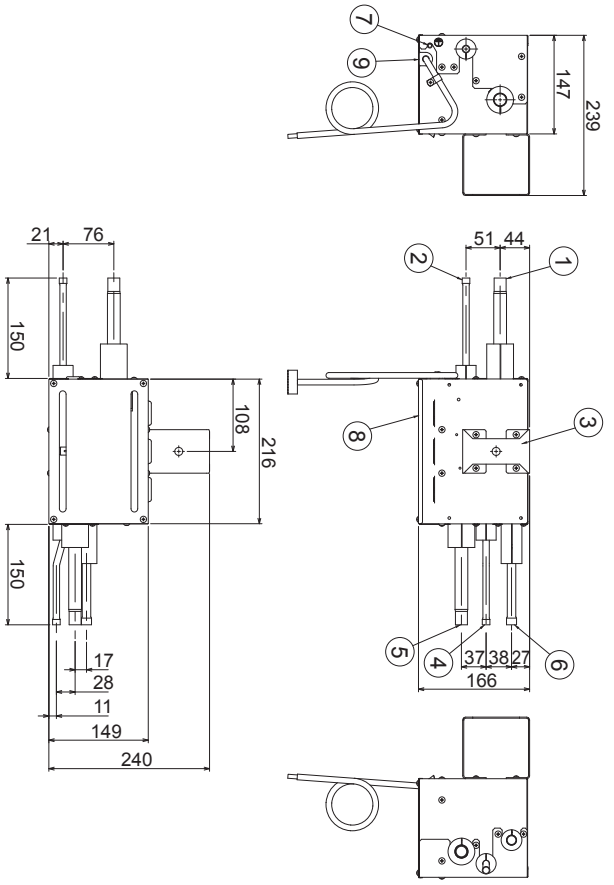


• Specifications

CZ-P56HR2	
Compatibility	2.2 ≤ Total capacity of indoor units (kW) ≤ 5.6
Power source	Single-phase 200V 50/60Hz (supplied by indoor units)
Power input	20 W
Net weight	4.3 kg
Accessories	Flat washer × 2 Insulating tape PCB connector × 1

CZ-P160HR2	
Part number	**Types and specifications of tubing connections**
①	Gas tube: ø15.88
②	Liquid tube: ø9.52
③	Suspension hook
④	Liquid tube: ø9.52
⑤	Suction tube: ø15.88
⑥	Discharge tube: ø12.7
⑦	Earth (M5 with washer)
⑧	Service panel
⑨	Power outlet (connected to a 5 m cabtyre cable with connector)

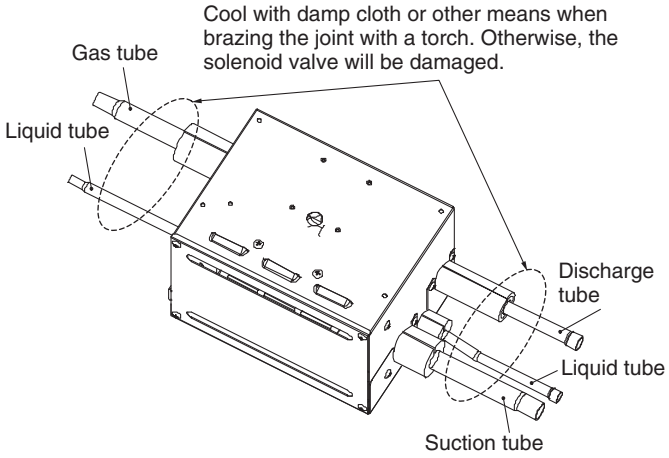
Unit: mm



Unit: mm

• Specifications

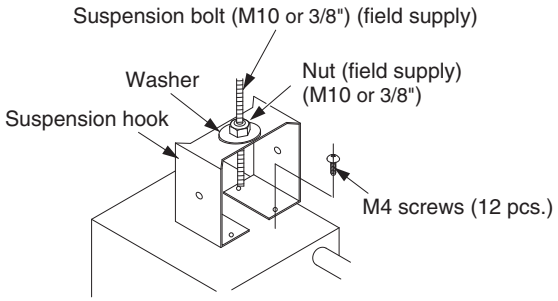
CZ-P160HR2	
Compatibility	5.6 < Total capacity of indoor units (kW) ≤ 16.0
Power source	Single-phase 200V 50/60Hz (supplied by indoor units)
Power input	25 W
Net weight	4.7 kg
Accessories	Washer × 2 Insulating tape PCB connector × 1



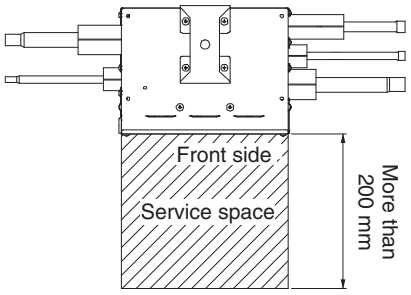
NOTE

Notes on Installation

- Be sure to secure the valve body by using its structure with the suspension bolt, etc.
- Install the valve body within a distance of 30 m from the indoor unit.
  Some refrigerant noise will be produced. Therefore in hospitals, libraries, hotel guest rooms, and other quiet locations, it is recommended that the solenoid valve kit be installed on the ceiling reverse side of a hallway or another location separated from the room.
- When installing the valve body, install with the top surface facing up. Secure 200 mm or more of space to the front so that the front service panel can be removed.
- If the supplied suspension hook will not be used, and other fastening devices will be attached in the field, use the 4 screw holes on the top surface. DO NOT use any long screws other than the supplied screws. Use of other screws may puncture the internal tubing, resulting in refrigerant leakage.
- Do not block the air holes.



How to use suspension hook



1-15. Example of Tubing Size Selection and Refrigerant Charge Amount

Additional refrigerant charging

Based on the values in Tables 1-3, 4, 5, 6, 9-1 and 9-2, use the liquid tubing size and length, and calculate the amount of additional refrigerant charge using the formula below.

Required additional refrigerant charge (kg)	$= [366 \times (a) + 259 \times (b) + 185 \times (c) + 128 \times (d) + 56 \times (e) + 26 \times (f)] \times 10^{-3}$ + Necessary amount of additional refrigerant charge per outdoor unit

(a): Liquid tubing Total length of ø22.22 (m)
(b): Liquid tubing Total length of ø19.05 (m)
(c): Liquid tubing Total length of ø15.88 (m)
(d): Liquid tubing Total length of ø12.7 (m)
(e): Liquid tubing Total length of ø9.52 (m)
(f) : Liquid tubing Total length of ø6.35 (m)

- Charging procedure

  Be sure to charge with R410A refrigerant **in liquid form**.

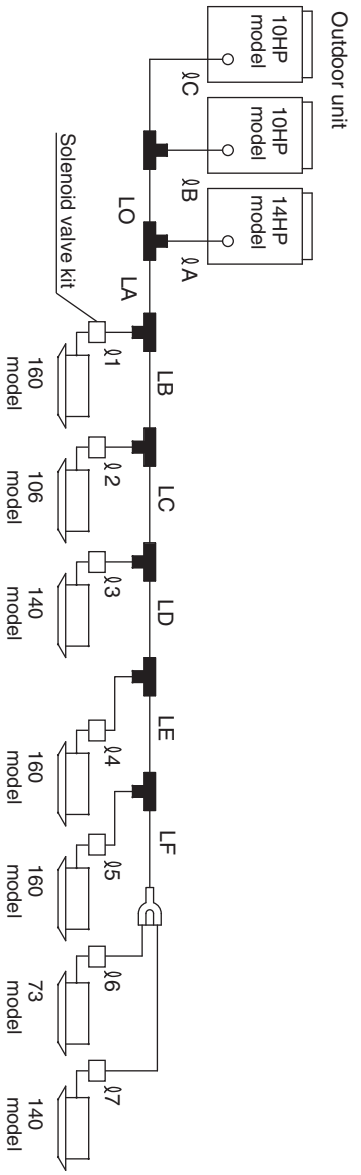
  1. After performing a vacuum, charge with refrigerant from the liquid tubing side. At this time, all valves must be in the "fully closed" position.
  2. If it was not possible to charge the designated amount, operate the system in Cooling mode while charging with refrigerant from the gas tubing side. (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.**

Example:



- Example of each tubing length

Main tubing		Distribution joint tubing		
LO = 2 m	LD = 15 m	Outdoor side	Indoor side	
LA = 40 m	LE = 10 m	ℓA = 2 m	ℓ1 = 30 m	ℓ5 = 2 m
LB = 5 m	LF = 10 m	ℓB = 2 m	ℓ2 = 5 m	ℓ6 = 6 m
LC = 5 m		ℓC = 3 m	ℓ3 = 5 m	ℓ7 = 5 m
			ℓ4 = 5 m	

- Obtain liquid tubing size from Tables 1-3, 4, 5, 6 and 9-1.

Main tubing

LO = ø15.88 m (Total capacity of outdoor unit is 56.0 kW)
LA = ø19.05 m (Total capacity of outdoor unit is 96.0 kW)
LB = ø19.05 m (Total capacity of indoor unit is 77.9 kW)
LC = ø15.88 m (Total capacity of indoor unit is 67.3 kW)
LD = ø15.88 m (Total capacity of indoor unit is 53.3 kW)
LE = ø12.7 m (Total capacity of indoor unit is 37.3 kW)
LF = ø9.52 m (Total capacity of indoor unit is 21.3 kW)

The longest main tubing length in this example
(LM = 40 + 5 = 45 m)

Distribution joint tubing

Outdoor side	ℓA: ø12.7 ℓB: ø9.52 ℓC: ø9.52 (from outdoor unit connection tubing)
Indoor side	ℓ1: ø9.52 ℓ2: ø9.52 ℓ3: ø9.52 ℓ4: ø9.52 ℓ5: ø9.52 ℓ6: ø9.52 ℓ7: ø9.52 (from indoor unit connection tubing)

- Obtain additional charge amount.

  Note 1:
  The charge amounts per 1 meter are different for each liquid tubing size.

ø19.05 → LA + LB	: 45 m × 0.259 kg/m = 11.655
ø15.88 → LO + LC + LD	: 22 m × 0.185 kg/m = 4.07
ø12.7 → LE +ℓA	: 12 m × 0.128 kg/m = 1.536
ø9.52 → LF +ℓB – C +ℓ1 – 7	: 73 m × 0.056 kg/m = 4.088
	Total 21.349 kg

  Additional refrigerant charge amount is 21.349 kg.

  Note 2:
  Necessary amount of additional refrigerant charge per outdoor unit (U-14MF1E8) is 3.2kg. (See the Table 1-9-2.)

Note 1) Amount of additional charge per tubing length	: 21.349kg
Note 2) Amount of additional charge per outdoor unit	: 3.2 kg
Total of additional refrigerant charge amount	: 24.549kg

  Therefore, the total of additional refrigerant charge amount reaches 24.549kg.

- Obtain overall refrigerant charge amount.

  Overall refrigerant charge amount of the system indicates the calculated value shown above the additional charge amount in addition to the total of the refrigerant charge amount (shown in the Table 1-10) at the shipment of each outdoor unit.

  Refrigerant charge amount at shipment:

U-10MF1E8	: 11.8 kg
U-10MF1E8	: 11.8 kg
U-14MF1E8	: 11.8 kg
Additional charge amount	: 24.549 kg
Grand total	: 59.949kg

  Therefore, overall refrigerant charge amount of the system reaches 59.949kg.

⚠ CAUTION

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

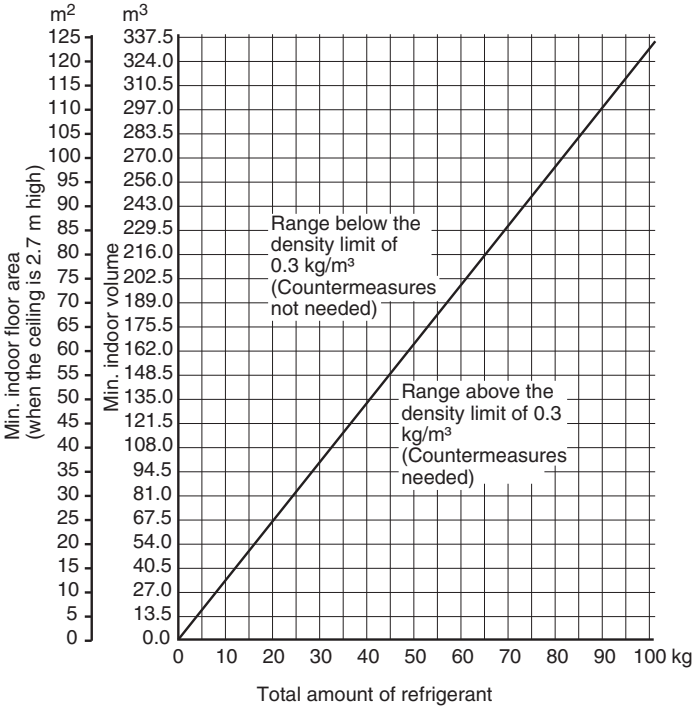
Checking of limit density

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 15 m^3 × ceiling height 2.7 m = room volume 40.5 m^3), the graph below shows that the minimum room volume should be 199.8 m^3 (floor area 74.0 m^2) for refrigerant of 59.949 kg. Accordingly, openings such as louvers are required for this room.

<Determination by calculation>

$$\frac{\text{Overall refrigerant charge amount for the air conditioner: kg}}{\text{(Minimum room volume for indoor unit: } m^3\text{)}} = \frac{59.949\ (kg)}{40.5\ (m^3)} = 1.48\ (kg/m^3) \geq 0.3\ (kg/m^3)$$

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. (Fig. 2-1)
- damp, humid or uneven locations
- indoors (no-ventilation location)

DO:

- choose a place as cool as possible.
- choose a place that is well ventilated.
- allow enough room around the unit for air intake/ exhaust and possible maintenance. (Fig. 2-2)

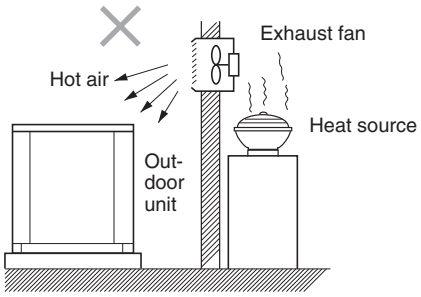
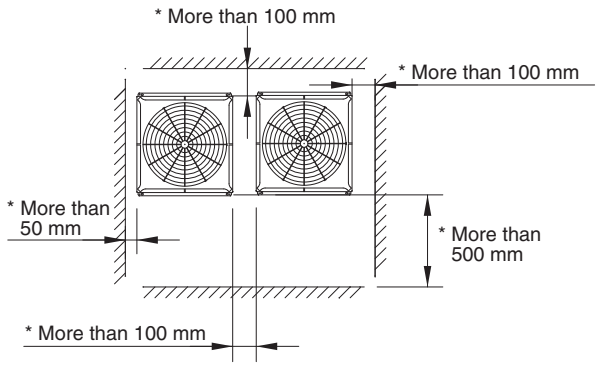


Fig. 2-1

Installation space

Install the outdoor unit where there is enough space for ventilation. Otherwise the unit may not operate properly. Fig. 2-2 shows the minimum space requirement around the outdoor units when 3 sides are open and only 1 side is shuttered, with open space above the unit. The mounting base should be concrete or a similar material that allows for adequate drainage. Make provisions for anchor bolts, platform height, and other site-specific installation requirements.

Example of installation of 2 units
(When wall height is below 1800 mm)

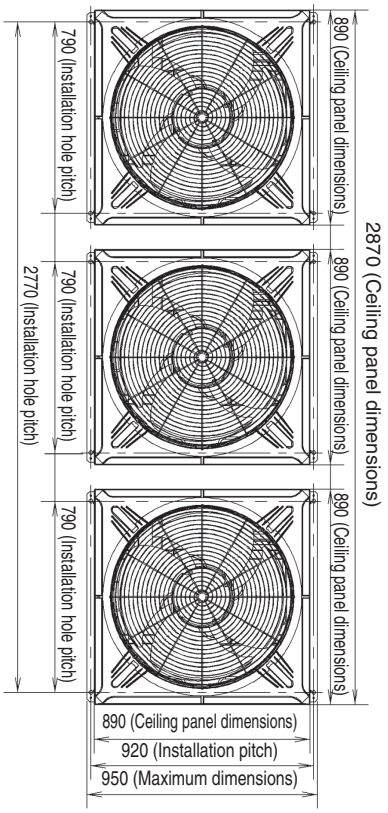


* However, be sure to ensure a space of 300 mm or more at either the right side or the rear of the unit.

Fig. 2-2

⚠ CAUTION

- **Leave space open above the unit.**
- **Construct louvers or other openings in the wall, if necessary, to ensure adequate ventilation.**



Top view

Fig. 2-3

NOTE

- Do not do any wiring or tubing within 300 mm of the front panel, because this space is needed as a servicing space for the compressor.
- Ensure a base height of 100 mm or more to ensure that drainage water does not accumulate and freeze around the bottom of the unit.
- If installing a drain pan, install the drain pan prior to installing the outdoor unit.

* Make sure there is at least 150 mm between the outdoor unit and the ground.
Also, the direction of the tubing and electrical wiring should be from the front of the outdoor unit.

2-2. Shield for Horizontal Exhaust Discharge

It is necessary to install an air-discharge chamber (field supply) to direct exhaust from the fan horizontally if it is difficult to provide a minimum space of 2 m between the air-discharge outlet and a nearby obstacle. (Fig. 2-4)

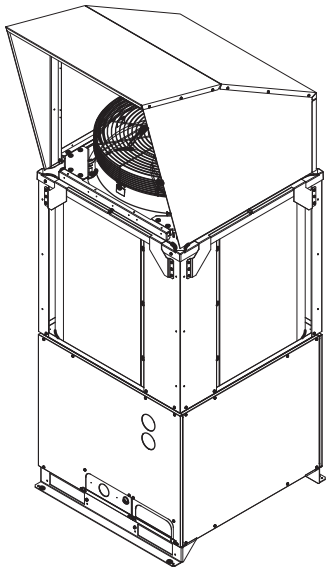


Fig. 2-4

⚠ CAUTION

In regions with heavy snowfall, the outdoor unit should be provided with a solid, raised platform and snow-proof vents. (Fig. 2-5)

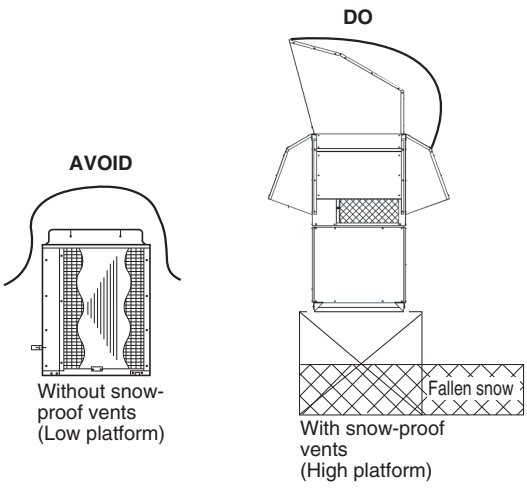


Fig. 2-5

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

In locations where wind-blown snow can be a problem, snow-proof vents should be fitted to the unit and direct exposure to the wind should be avoided as much as possible. (Fig. 2-6) The following problems may occur if proper countermeasures are not taken:

- The fan in the outdoor unit may stop running, causing the unit to be damaged.
- There may be no air flow.
- The tubing may freeze and burst.
- The condenser pressure may drop because of strong wind, and the indoor unit may freeze.

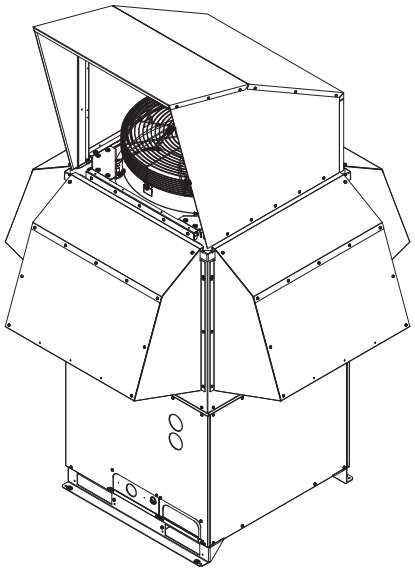


Fig. 2-6

2-4. Precautions for Installation in Heavy Snow Areas

a) The platform should be higher than the max. snow depth. (Fig. 2-5)

b) 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 the outdoor unit.

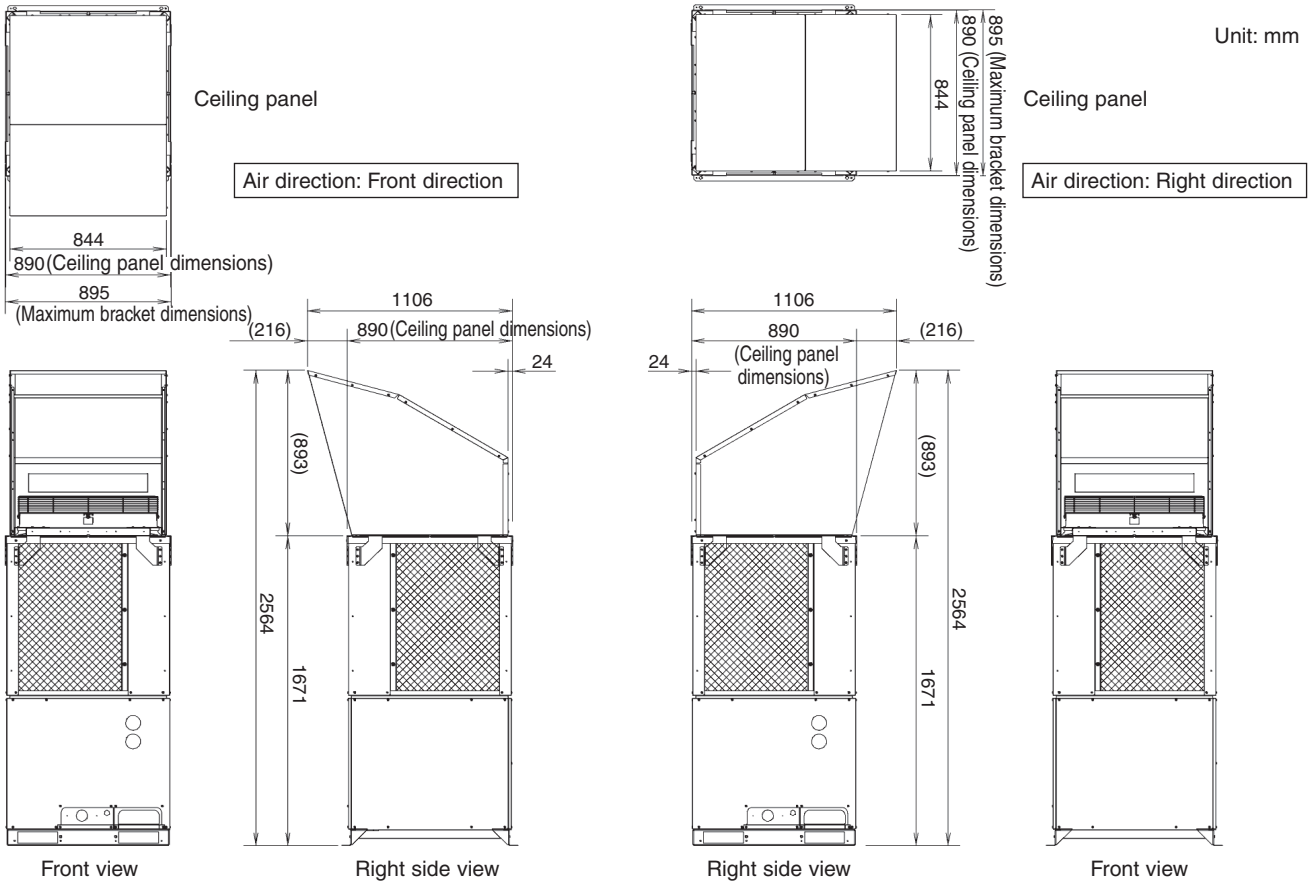
c) The platform foundation must be solid and the unit must be secured with anchor bolts.

d) When installing on a roof subject to strong wind, countermeasures must be taken to prevent the unit from being overturned.

2-5. Dimensions of Wind Ducting

Reference diagram for air-discharge chamber (field supply)

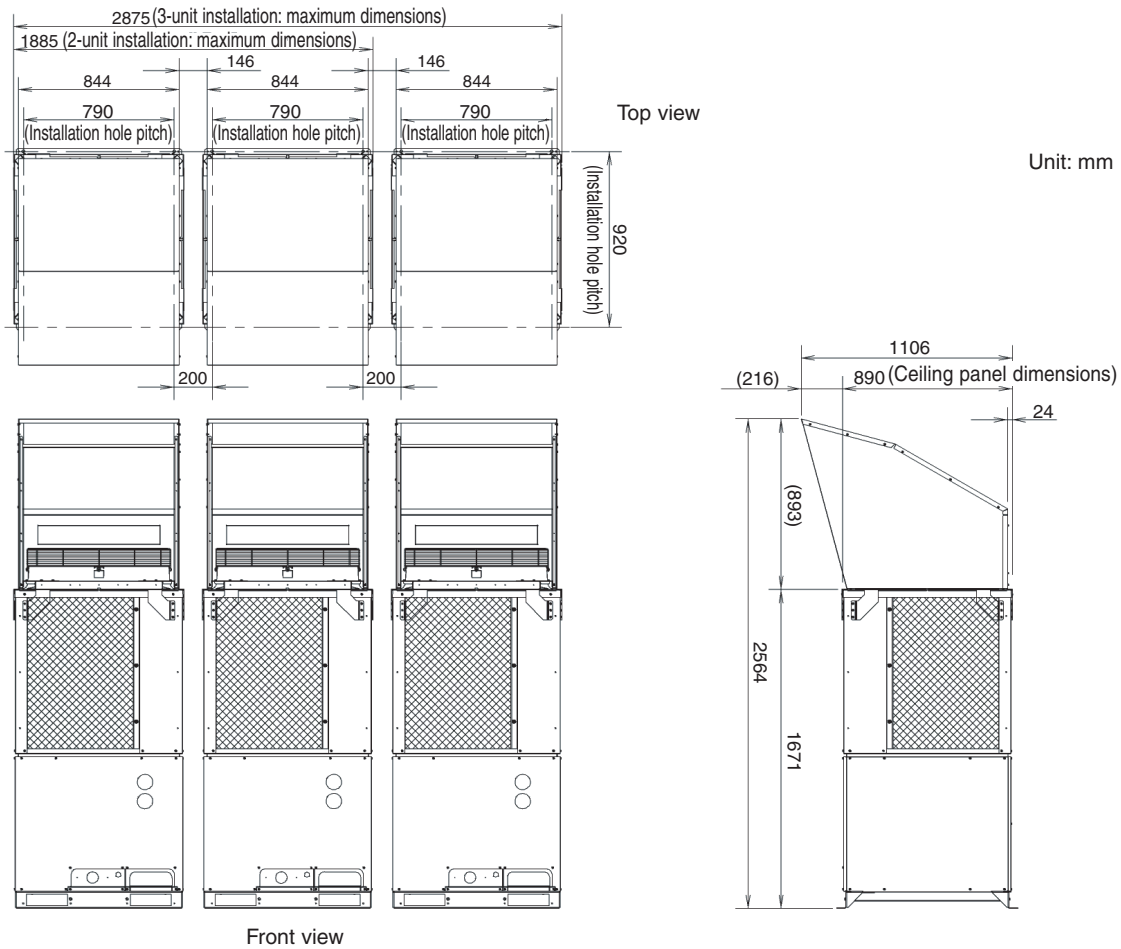
Unit: mm



Note: Can be installed so that the air direction is to the front, right, left or rear direction.

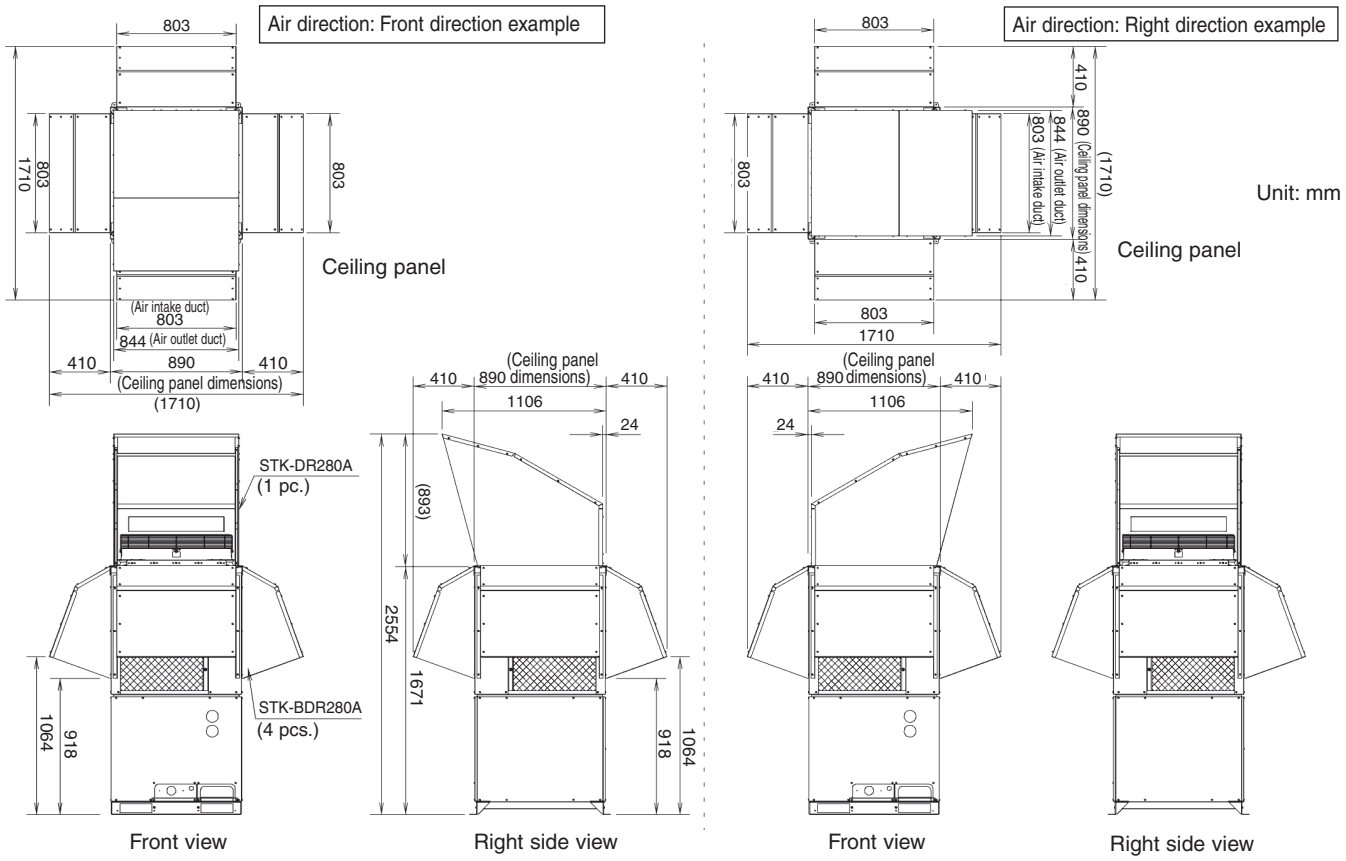
3-unit installation

Unit: mm



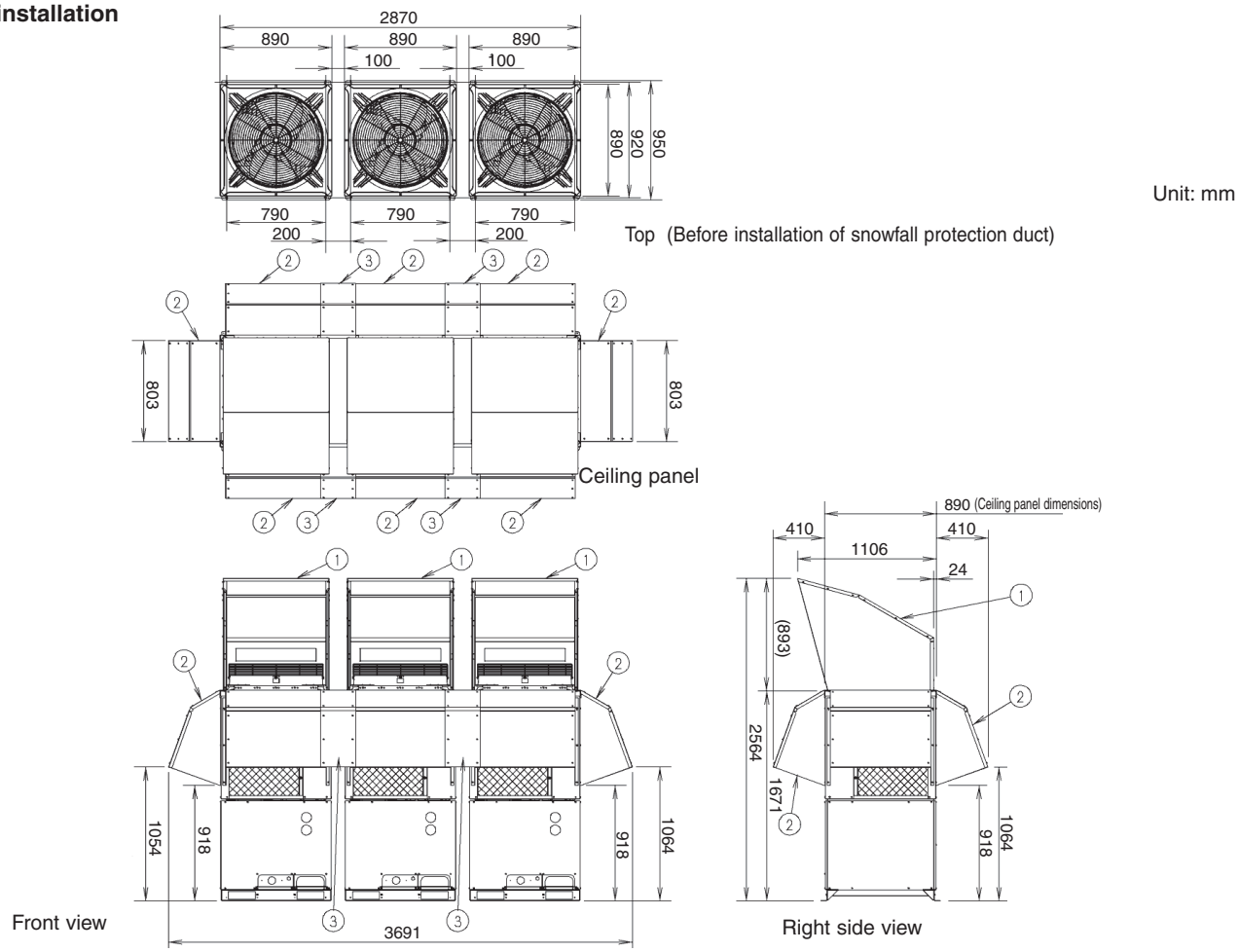
2-6. Dimensions of Snow Ducting

Reference diagram for snow-proof vents (field supply)



Note: Can be installed so that the air direction is to the front, right, left or rear direction.

3-unit installation



3. HOW TO INSTALL THE OUTDOOR UNIT

3-1. Transporting

When transporting the unit, have it delivered as close to the installation site as possible without unpacking.
Use a hook for suspending the unit. (Fig. 3-1)

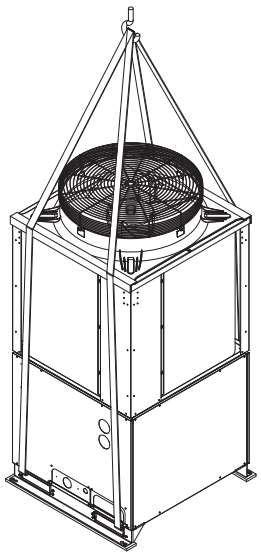


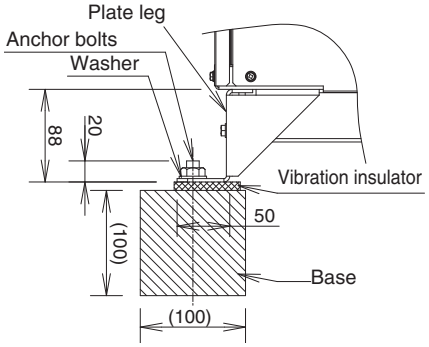
Fig. 3-1

⚠ CAUTION

- When hoisting the outdoor unit, pass ropes or straps under the bottom plate as shown in the figure above. When hoisting, the angle between the rope and top panel must be 70° or greater so that the rope does not come into contact with the fan guard. (Use 2 lengths of rope 7.5 meters long or longer.)
- When passing the ropes through the square holes of the bottom plate:
  Place the rope in the outer edge of the square holes.
- Use protective panels or padding at all locations where the rope contacts the outer casing or other parts to prevent scratching. In particular, use protective material (such as cloth or cardboard) to prevent the edges of the top panel from being scratched.
- Be careful of the fan.
  There is danger of injury if the fan starts to turn during inspection. Be sure to turn OFF the remote power switch before beginning inspection.

3-2. Installing the Outdoor Unit

(1) Use anchor bolts (M12) or similar to securely anchor the unit in place. (Fig. 3-2)

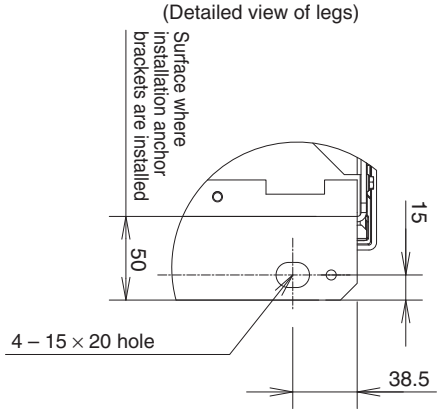


Unit: mm

The vibration insulator, base, or platform must be large enough to bear the full surface of the base plate legs.

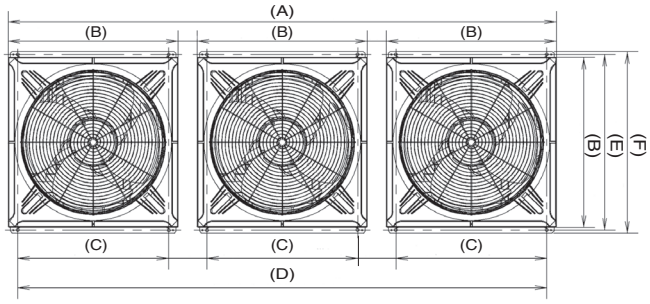
Fig. 3-2

(2) Be sure the rubber vibration insulator and platform extend to the inside of the legs. In addition, the washers used to anchor the unit from the top must be larger than the installation anchor holes. (Figs. 3-2 and 3-3)



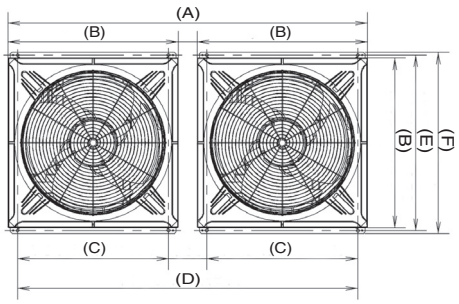
Unit: mm

Fig. 3-3



Top view

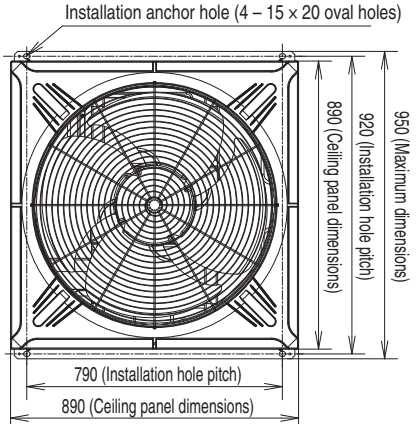
(A)	2870	(D)	2770 (Installation hole pitch)
(B)	890 (Ceiling panel dimensions)	(E)	920 (Installation pitch)
(C)	790 (Installation hole pitch)	(F)	950 (Maximum dimensions)



Top view

(A)	1880 (Ceiling panel dimensions)	(D)	1780 (Installation hole pitch)
(B)	890 (Ceiling panel dimensions)	(E)	920 (Installation pitch)
(C)	790 (Installation hole pitch)	(F)	950 (Maximum dimensions)

(Positions where anchor bolts are fastened)



Unit: mm

Fig. 3-4

3-3. Routing the Tubing

- The tubing can be routed out either from the front or from the bottom. (Fig. 3-5)
- The connecting valve is contained inside the unit. Therefore, remove the front panel. (Fig. 3-5)

(1) If the tubing is routed out from the front, use cutting pliers or a similar tool to cut out the tubing outlet slit (part indicated by ▨) from the tubing cover. (Figs. 3-5 and 3-6)

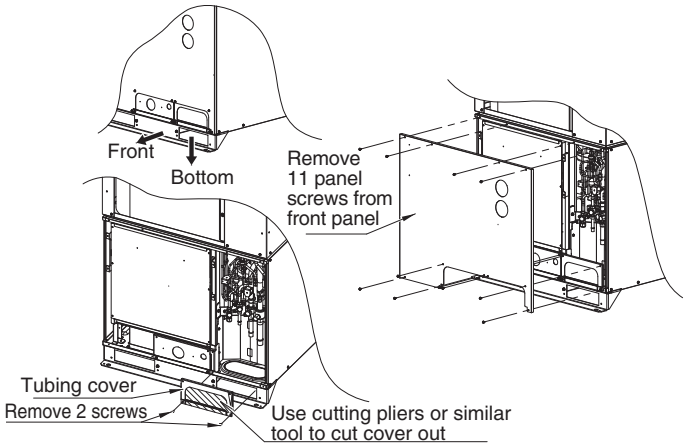


Fig. 3-5

(2) If the tubing is routed out from the bottom, remove the slit part (▨).

- Use a drill bit approximately 5 mm dia. to create holes at the 4 slit hole indentations (openings).
- Punch out the slit part (▨).
- Be careful not to damage the base plate.

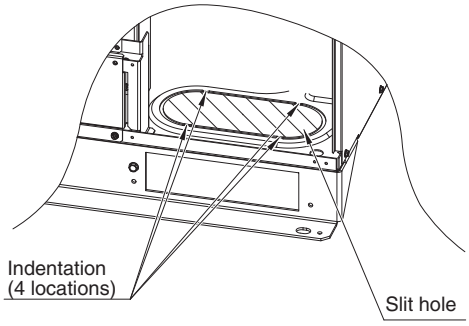


Fig. 3-6

3-4. Prepare the Tubing

- Material: Use C1220 phosphorous deoxidized copper as described in JIS H3300, “Copper and Copper Alloy Seamless Pipes and Tubes.”
  (For tubes that are ø25.4 or larger, use 1/2H material or H material. For all others use O material.)
- Tubing size
  Use the tubing size indicated in the following table.

Refrigerant tubing (Existing tubing can be used.)

Tubing size (mm)			
Outer dia.	**Thickness**	**Outer dia.**	**Thickness**
ø6.35	t0.8	ø25.4	t1.0
ø9.52	t0.8	ø28.58	t1.0
ø12.7	t0.8	ø31.8	t1.1
ø15.88	t1.0	ø38.1	t1.15
ø19.05	t1.0	ø41.28	t1.2
ø22.22	t1.15		

- When cutting the tubing, use a tube cutter, and be sure to remove any burrs.
  (The same applies to distribution tubing (optional).)
- When bending the tubes, bend each tube using a radius that is at least 4 times the outer diameter of the tube.
  When bending, use sufficient care to avoid crushing or damaging the tube.
- For flaring, use a flare tool, and be sure that flaring is performed correctly.

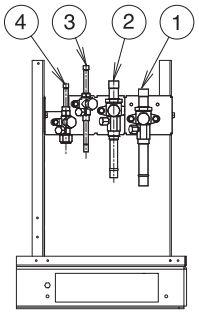
⚠ CAUTION

- **Use sufficient caution during preparation of the tubing. Seal the tube ends by means of caps or taping to prevent dust, moisture, or other foreign substances from entering the tubes.**

3-5. Connect the Tubing

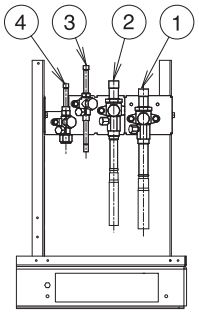
- Except for 8HP type, use the supplied connector tubing. (See figure below.)

8HP type



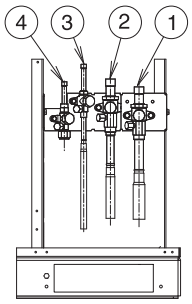
	Refrigerant tubing	Connection method	Use supplied connector tube?
①	Suction tube	Brazed connection	No
②	Discharge tube	Brazed connection	No
③	Liquid tube	Brazed connection	No
④	Balance tube	Flared connection	No

10HP type



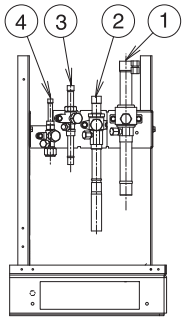
	Refrigerant tubing	Connection method	Use supplied connector tube?
①	Suction tube	Brazed connection	Yes (ø19.05→ø22.22)
②	Discharge tube	Brazed connection	Yes (ø15.88→ø19.05)
③	Liquid tube	Brazed connection	No
④	Balance tube	Flared connection	No

12HP type



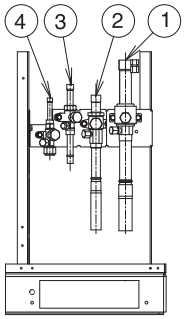
	Refrigerant tubing	Connection method	Use supplied connector tube?
①	Suction tube	Brazed connection	Yes (ø19.05→ø25.4)
②	Discharge tube	Brazed connection	Yes (ø15.88→ø19.05)
③	Liquid tube	Brazed connection	Yes (ø9.52→ø12.7)
④	Balance tube	Flared connection	No

14HP type



	Refrigerant tubing	Connection method	Use supplied connector tube?
①	Suction tube	Brazed connection	No
②	Discharge tube	Brazed connection	Yes (ø19.05→ø22.22)
③	Liquid tube	Brazed connection	No
④	Balance tube	Flared connection	No

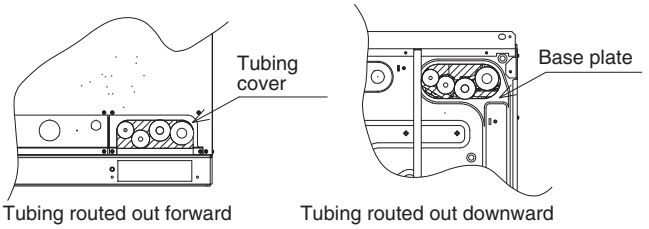
16HP type

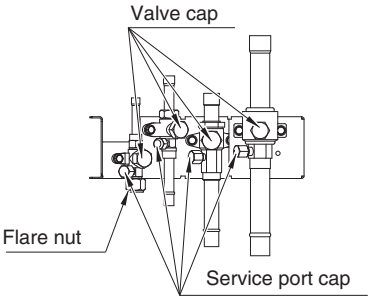


	Refrigerant tubing	Connection method	Use supplied connector tube?
①	Suction tube	Brazed connection	Yes (ø25.4→ø28.58)
②	Discharge tube	Brazed connection	Yes (ø19.05→ø22.22)
③	Liquid tube	Brazed connection	No
④	Balance tube	Flared connection	No

Refrigerant tube port:

- Use caulking, putty, or a similar material to fill any gaps at the refrigerant tube port (▨) in order to prevent rainwater, dust or foreign substances from entering the unit.
  * Perform this work even if the tubing is routed out in a downward direction.





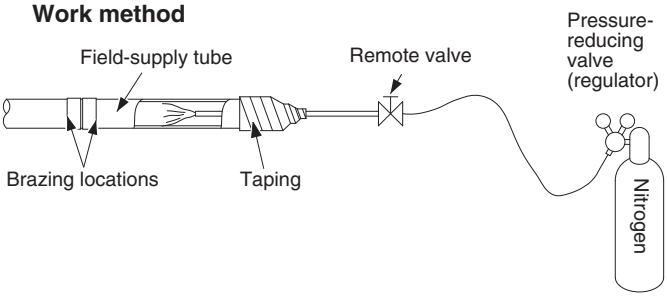
- Tighten each cap as specified below.

Tightening torque for each cap

Service port cap (width 15 mm)	7 – 12 N · m (70 – 120 kgf · cm)
Valve cap (width 22 mm)	20 – 25 N · m (200 – 250 kgf · cm)
Flare nut (valve dia. ø9.52)	34 – 42 N · m (340 – 420 kgf · cm)

- Precautions for brazing
  Be sure to replace the air inside the tube with nitrogen to prevent oxide film from forming during the brazing process. Be sure to use a damp cloth or other means to cool the valve unit during brazing.

Work method



⚠ CAUTION

1. Be sure to use nitrogen. (Oxygen, CO_2, and CFC must not be used.)
2. Use a pressure-reducing valve on the nitrogen tank.
3. Do not use agents intended to prevent the formation of oxide film. They will adversely affect the refrigeration oil, and may cause equipment failure.
4. The balance tube is not used if only 1 outdoor unit is installed.
   Use the unit in the same conditions as when it was shipped from the factory.

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.

(2) Provide a power outlet to be used exclusively for each unit, and a power supply disconnect and circuit breaker for overcurrent protection should be provided in the exclusive line.

(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.

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

Outdoor unit

	(A) Power supply		Time delay fuse or circuit capacity
	Wire size	Max. length	
U-8MF1E8	6 mm^2	92 m	30 A
U-10MF1E8	6 mm^2	70 m	35 A
U-12MF1E8	6 mm^2	57 m	40 A
U-14MF1E8	10 mm^2	79 m	40 A
U-16MF1E8	10 mm^2	68 m	50 A

or

	(A) Power supply		Time delay fuse or circuit capacity
	Wire size	Max. length	
U-8MF1E8	6 mm^2	92 m	35 A
U-10MF1E8	6 mm^2	70 m	35 A
U-12MF1E8	10 mm^2	95 m	50 A
U-14MF1E8	10 mm^2	79 m	50 A
U-16MF1E8	10 mm^2	68 m	50 A

Indoor unit

Type	(B) Power supply	Time delay fuse or circuit capacity
	2.5 mm^2	
K1	Max. 150 m	10 – 16 A
D1, L1, U1, Y1, T1, F1, M1, P1, R1	Max. 130 m	10 – 16 A
E1 (73, 106, 140)	Max. 60 m	10 – 16 A
E1 (224)	Max. 50 m	10 – 16 A
E1 (280)	Max. 30 m	10 – 16 A

Control wiring

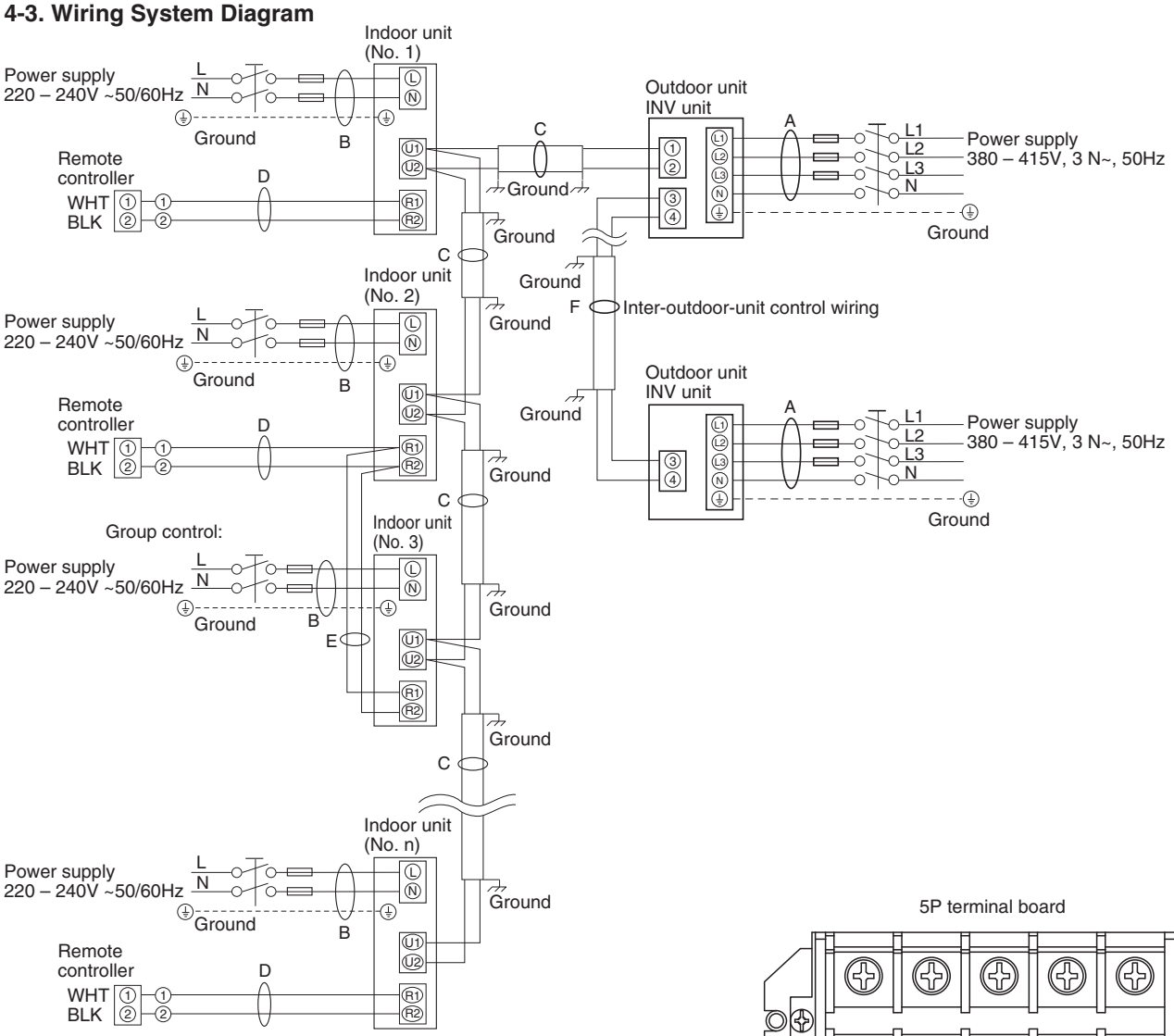
(C) Inter-unit (between outdoor and indoor units) control wiring	(D) Remote control wiring
0.75 mm^2 (AWG #18) **Use shielded wiring*1**	0.75 mm^2 (AWG #18)
Max. 1,000 m	Max. 500 m

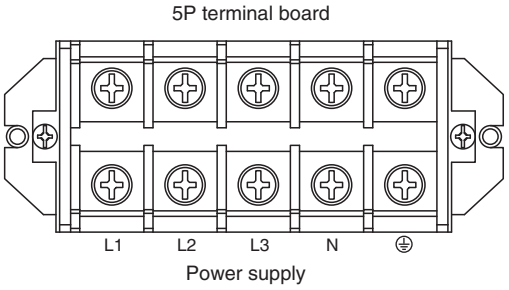
(E) Control wiring for group control	(F) Inter-outdoor unit control wiring
0.75 mm^2 (AWG #18)	0.75 mm^2 (AWG #18) **Use shielded wiring**
Max. 200 m (Total)	Max. 300 m

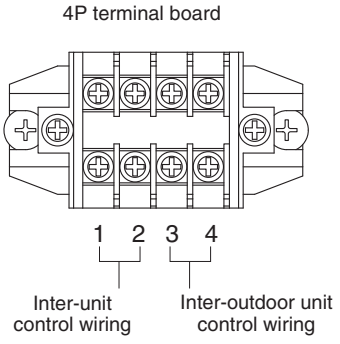
NOTE

*1 With ring-type wire terminal.

4-3. Wiring System Diagram







MF1 Type

NOTE

(1) Refer to Section 4-2. “Recommended Wire Length and Wire Diameter for Power Supply System” for the explanation of “A”, “B”, “C”, “D”, “E” and “F” in the above diagrams.

(2) The basic connection diagram of the indoor unit shows the 7P 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, refer to page 41. Address setting can be executed by remote controller automatically.
Refer to Section 7-4. “Auto Address Setting”.

⚠ CAUTION

(1) When linking outdoor units in a network, disconnect the terminal extended from the short plug (CN003, 2P Black, location: right bottom on the outdoor main control PCB) from all outdoor units except any one of the outdoor units. (When shipping: In shorted condition)
For a system without link (no connection wiring between outdoor units), do not remove the short plug.

(2) Do not install the inter-unit control wiring in a way that forms a loop. (Fig. 4-1)

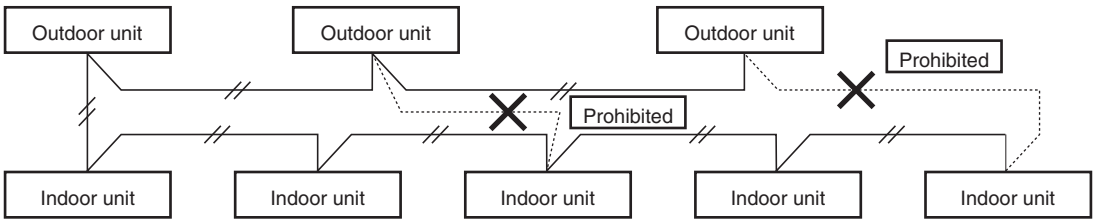


Fig. 4-1

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

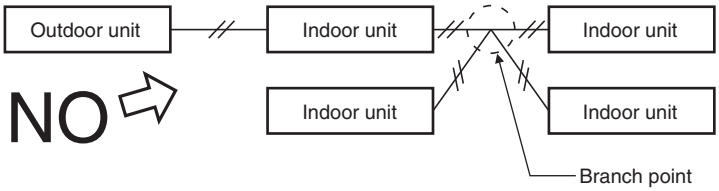


Fig. 4-2

(4) If branching the inter-unit control wiring, the number of branch points should be 16 or fewer.
(Branches less than 1 m are not included in the total branch number.) (Fig. 4-3)

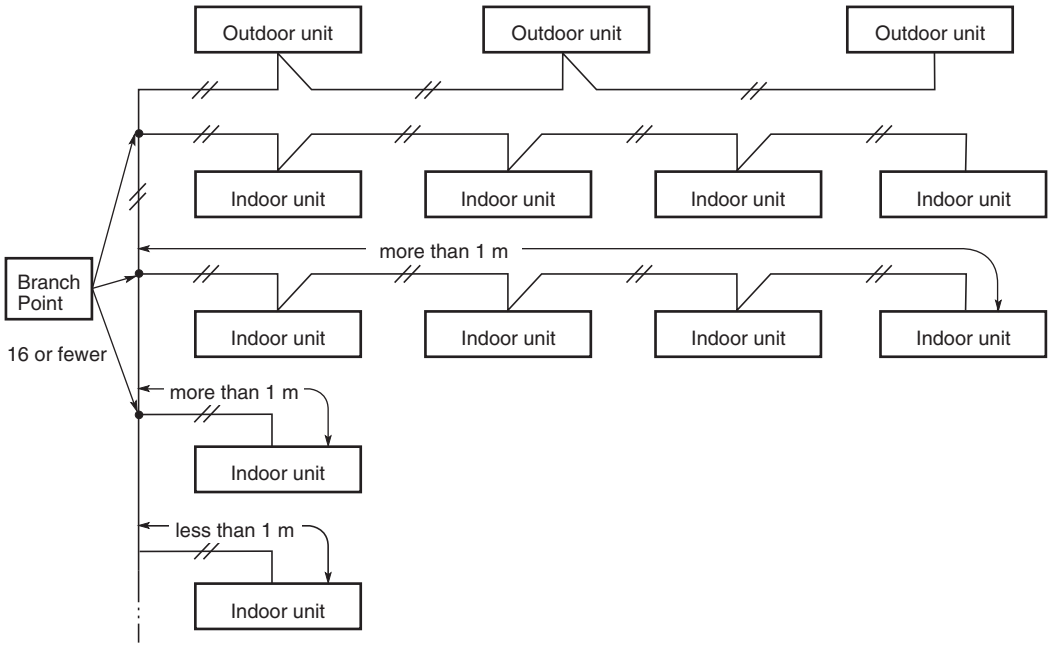


Fig. 4-3

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

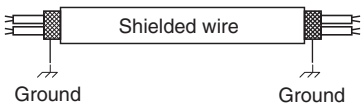


Fig. 4-4

(6) 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. (245 IEC57, 245 IEC66)

⚠ WARNING

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

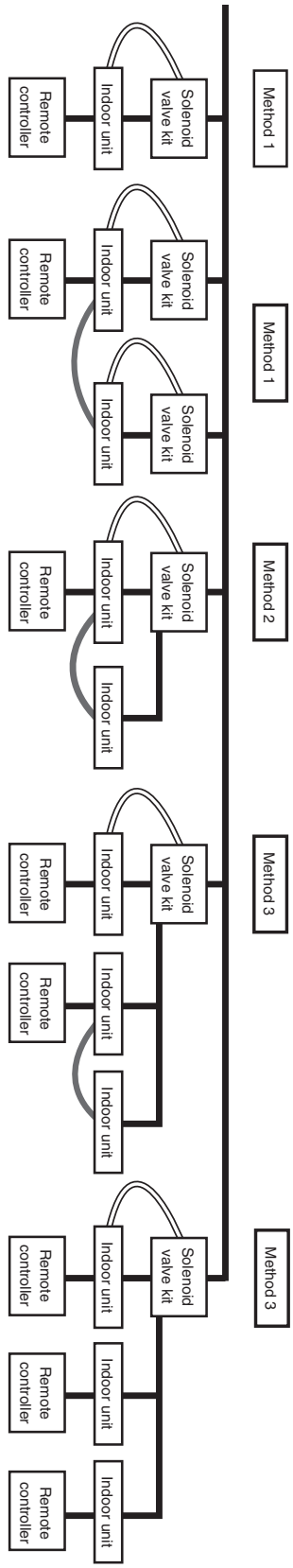
When connecting each power wire to the terminal, follow the instructions on "How to connect wiring to the terminal" and fasten the wire securely with the fixing screw of the terminal plate.

4-4. Connecting multiple indoor units to a single solenoid valve kit

- It is possible to connect plural number of indoor units to one solenoid valve kit. The indoor units can be controlled individually or be operated as a group.
- It is possible to adopt plural number of units with a common use of the solenoid valve kit per piece of refrigerant.
- Categories of connected indoor unit capacities are determined by the solenoid valve kit.

Type of solenoid valve kit	Total capacity of indoor units (kW)
CZ-P160HR2	5.6 < Total capacity ≤ 16.0
CZ-P56HR2	2.2 ≤ Total capacity ≤ 5.6

* If the capacity range is exceeded, use two solenoid valves connected in parallel.



Each Method (General) and Conditions

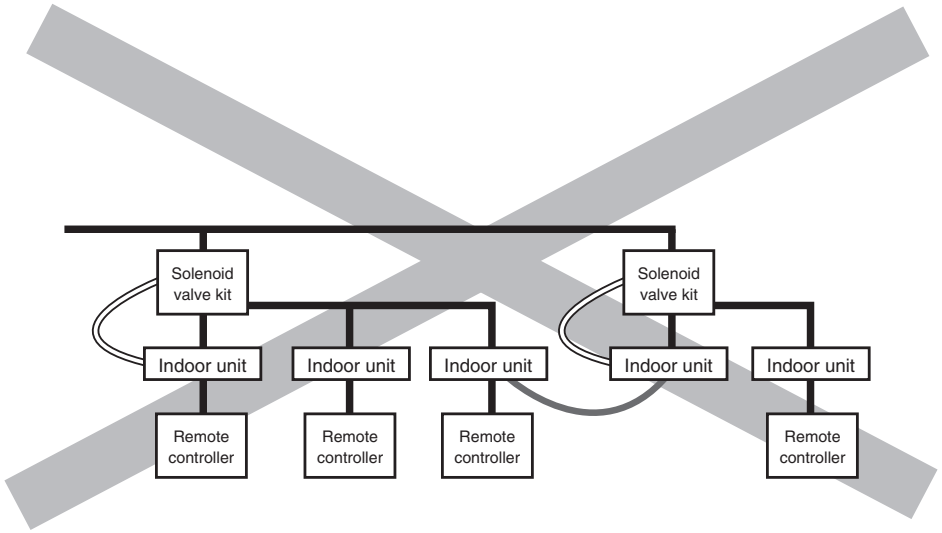
	Method 1	Method 2	Method 3
Method	Connecting one indoor unit with one solenoid valve kit	Group control is possible by connecting plural number of indoor units to one solenoid valve kit.	Indoor units can operate individually by connecting plural number of indoor units to one solenoid valve kit.
Connectable number of remote controls	1 piece	1 piece	Over 2 pieces
Possible operating functions	Individual control	Group control * Thermostat On/Off function is only individual control (when selecting the body thermostat).	Individual control available * Mixed group control available
Possible operating modes	Cool, Dry, Heating, Auto, Fan	Cool, Dry, Heating, Auto, Fan	Cooling, Dry, Heating, Fan * Auto selection is impossible.
Condition	–	• Mixed cooling and heating is impossible.	• Mixed cooling and heating is impossible. • Auto selection is impossible.

Necessity of setting changes by combination of each method

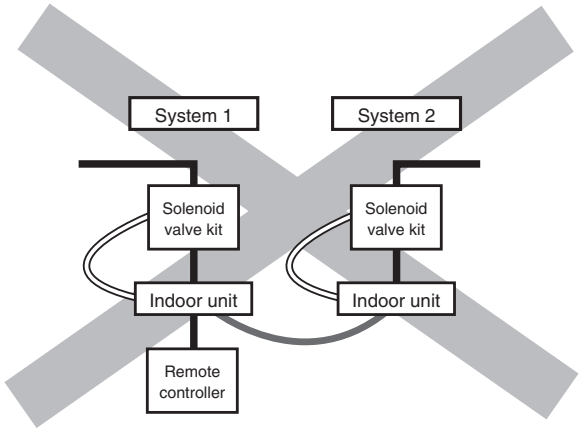
Type of combination: Necessity of setting
Method 1 only: Setting is unnecessary.
Method 2 included: Setting up in common use of a solenoid valve kit from “Remote Control” is necessary. *1 * Method 2 only is set. * Method 3 excluded
Method 3 included: Setting up in common use of a solenoid valve kit from “Remote Control” is necessary. *1 * Setting all connected indoor units

*1: Refer to “Test Run” for setting instructions.

Please note the following system example is prohibited and avoid the following connection.



Method 3 individual control is possible and group wiring should be made by other solenoid valve kit.



Group wiring should be made by different type of refrigerant.

How to connect wiring to the 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. (Fig. 4-5)

(2) Using a Phillips head screwdriver, remove the terminal screw(s) on the terminal plate.

(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. (Fig. 4-6)

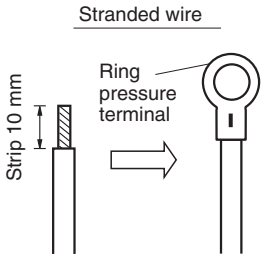


Fig. 4-5

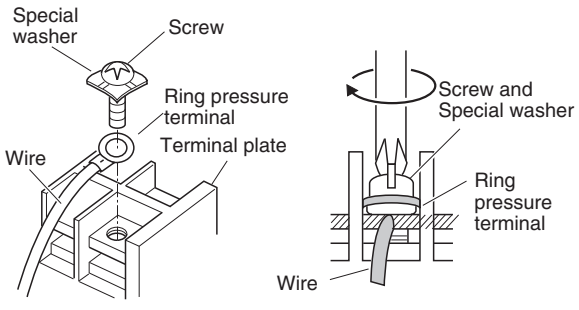


Fig. 4-6

■ Examples of shield wires

(1) Remove cable coat not to scratch braided shield. (Fig. 4-7)

(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. (Fig. 4-8)

(3) Remove coat of signal wire. (Fig. 4-9)

(4) Attach ring pressure terminals to the signal wires and the shield wires insulated in Step (2). (Fig. 4-10)

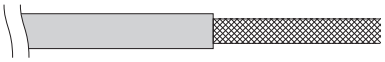


Fig. 4-7

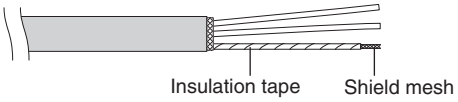


Fig. 4-8

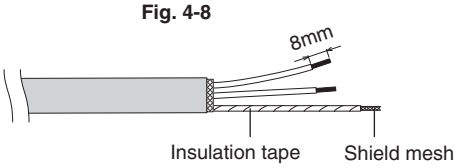


Fig. 4-9

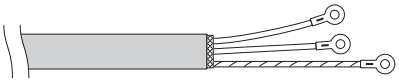
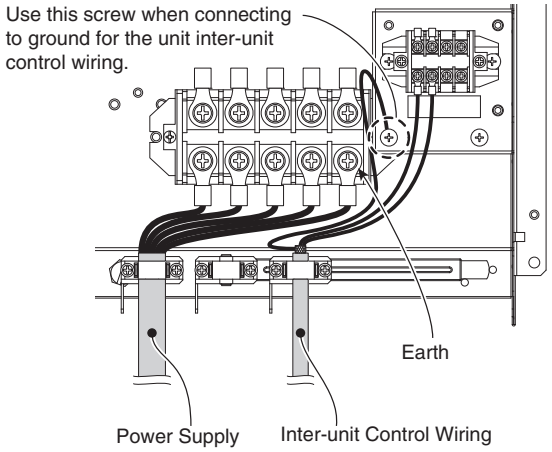


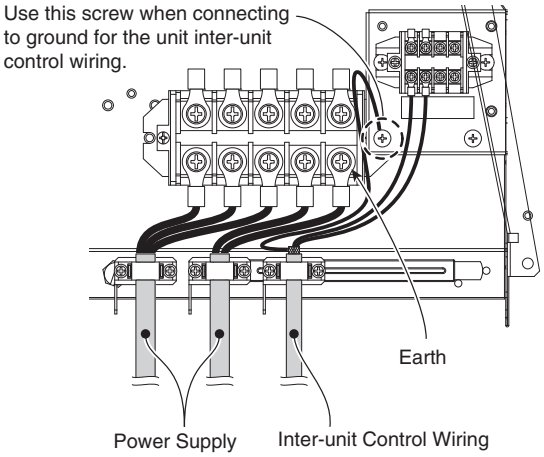
Fig. 4-10

■ Wiring sample

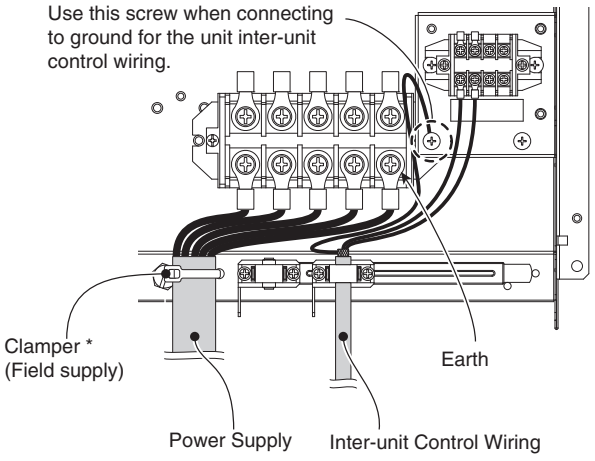
1.



2.

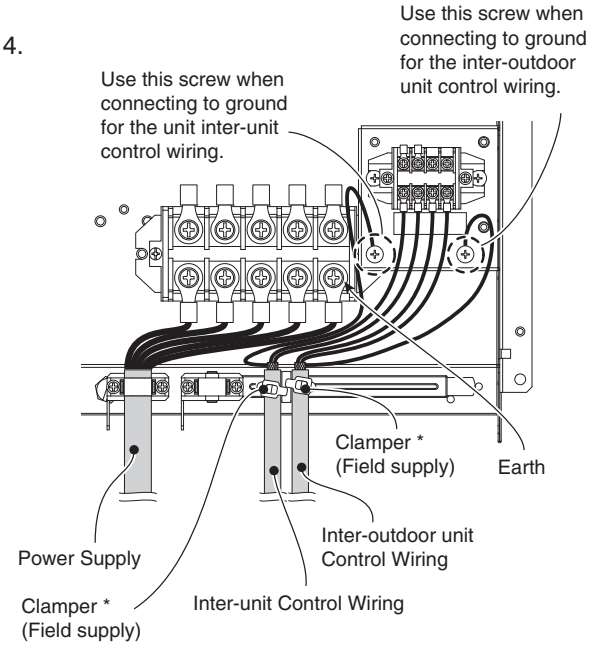


3.



* Remove the attached resin fixture.
Then lead the clamper (field supply) through the screw hole and fix the power supply wire.

4.



* First remove the attached resin fixture.
Then lead the clamper (field supply) through the screw hole and square hole from top to bottom or vice versa.

Finally fix each inter-outdoor unit control wire and the inter-unit control wire separately with the clamper (field supply).

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 file. 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. (Figs. 5-1 and 5-2)

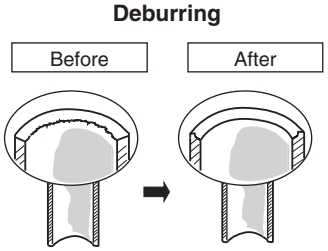


Fig. 5-1

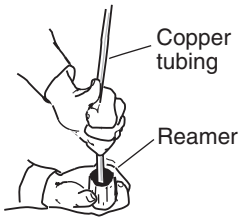


Fig. 5-2

NOTE

When reaming, hold the tube end downward and be sure that no copper scraps fall into the tube. (Fig. 5-2)

(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 the copper tube with a flare tool. (Fig. 5-3)

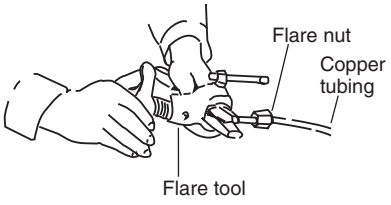


Fig. 5-3

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. (Fig. 5-4)

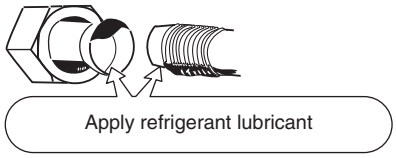


Fig. 5-4

(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. (Fig. 5-5)

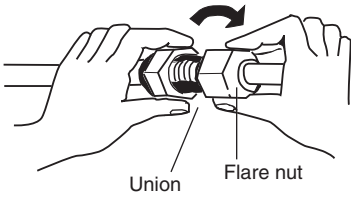


Fig. 5-5

- 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.**

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 (Fig. 5-6).

- When removing the flare nuts from the tubing connections, or when tightening them after connecting the tubing, be sure to use 2 adjustable wrenches or spanners. (Fig. 5-6)
  If the flare nuts are over-tightened, the flare may be damaged, which could result refrigerant leakage and cause injury or asphyxiation to room occupants.

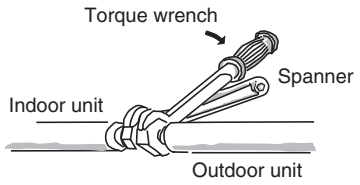


Fig. 5-6

- 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 table below.

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)	1.0 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, use the table above as a guide when tightening.
- When tightening the flare nut on the narrow tube, use an adjustable wrench with a nominal handle length of 200 mm.

5-3. Insulating the Refrigerant Tubing

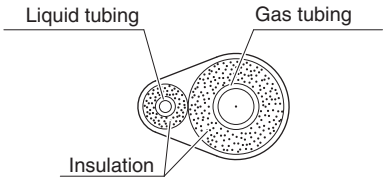
Tubing Insulation

- Thermal insulation must be applied to all units tubing, including distribution joint (purchased separately).
  * For gas tubing, the insulation material must be heat resistant to 120°C or above. For other tubing, it must be heat resistant to 80°C or above.

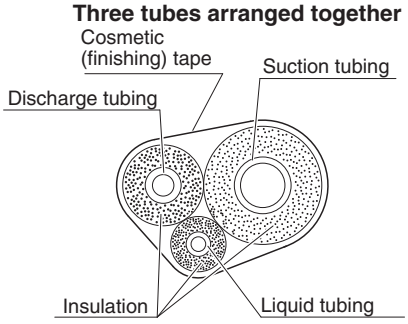
  Insulation material thickness must be 10 mm or greater.

  If the conditions inside the ceiling exceed DB 30°C and RH 70%, increase the thickness of the suction and gas tubing insulation material by 1 step.

Two tubes arranged together



Three tubes arranged together



Four tubes arranged together

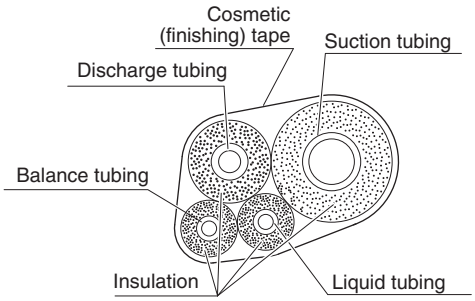


Fig. 5-7

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. (Fig. 5-8)

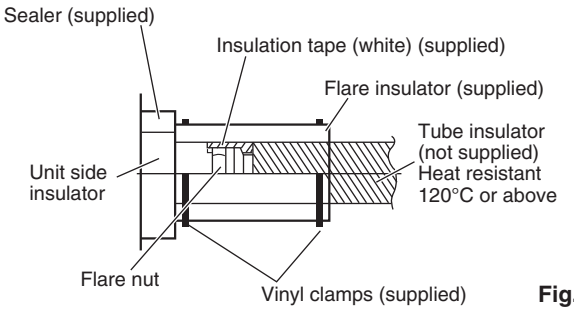


Fig. 5-8

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.

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

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 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. (Fig. 5-9)

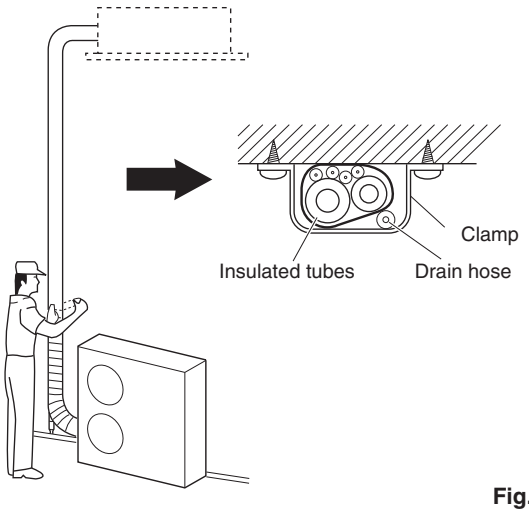


Fig. 5-9

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. (Fig. 5-10)

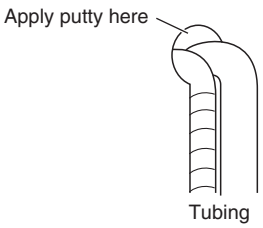


Fig. 5-10

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. (Figs. 6-1a and 6-1b)

Manifold gauge

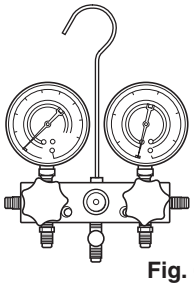


Fig. 6-1a

Vacuum pump

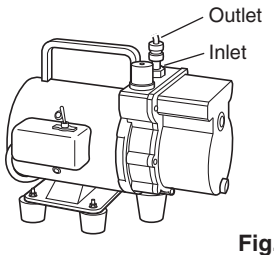


Fig. 6-1b

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

Preparation

Check that each tube between the indoor and outdoor units has been properly connected and all wiring for the test run has been completed. Remove the valve caps from all service ports on the outdoor unit (Fig. 6-2). Note that all service valves on the outdoor unit are kept closed at this stage (Fig. 6-3).

The balance tube leak test is not necessary if only 1 outdoor unit is installed.

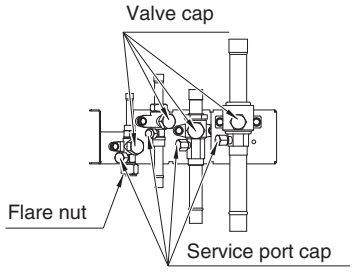


Fig. 6-2

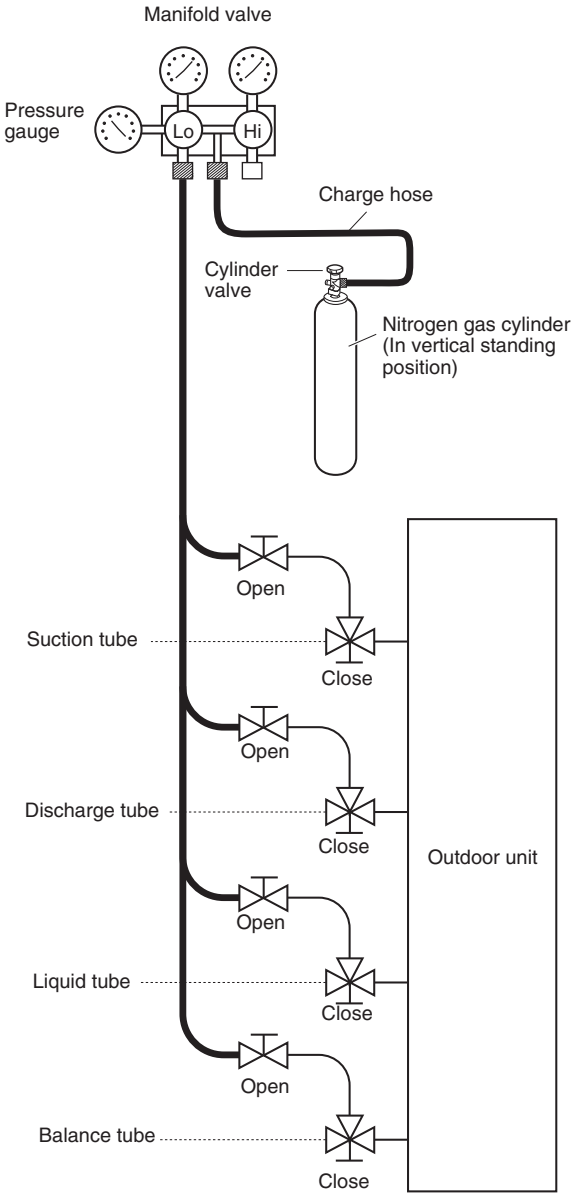


Fig. 6-3

Leak test

(1) Attach a manifold valve (with pressure gauges) and dry nitrogen gas cylinder to all service ports with charge hoses.

The balance tube leak test is not necessary if only 1 outdoor unit is installed.

⚠ CAUTION

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

(2) Pressurize the system to no more than 33 kgf/cm^{2}G with dry nitrogen gas and close the cylinder valve when the gauge reading reaches 33 kgf/cm^{2}G. 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.

(3) Do a leak test of all joints of the tubing (both indoor and outdoor) and all service valves. Bubbles indicate a leak. Wipe off the soap with a clean cloth after the leak test.

(4) 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/h 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**

Evacuation is not necessary for the balance tube if only 1 outdoor unit is installed.

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. Confirm that the gauge pressure is under –101 kPa (–755 mmHg, 5 Torr) after 4 to 5 minutes of vacuum pump operation. (Fig. 6-4)

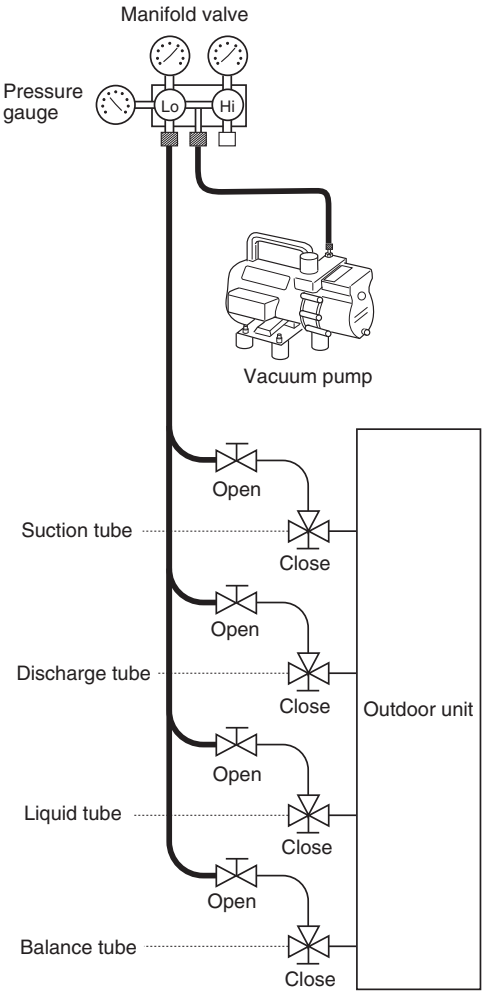


Fig. 6-4

⚠ CAUTION

Use a cylinder designed for use with R410A.

Charging additional refrigerant

- Charging additional refrigerant (calculated from the liquid tube length as shown in Section 1-8 "Additional Refrigerant Charge") using the liquid tube service valve. (Fig. 6-5)
- Use a balance or scale 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 suction tube service valve with the system in Cooling mode at the time of test run. (Fig. 6-6)
- Close the valve on the cylinder containing R410A.

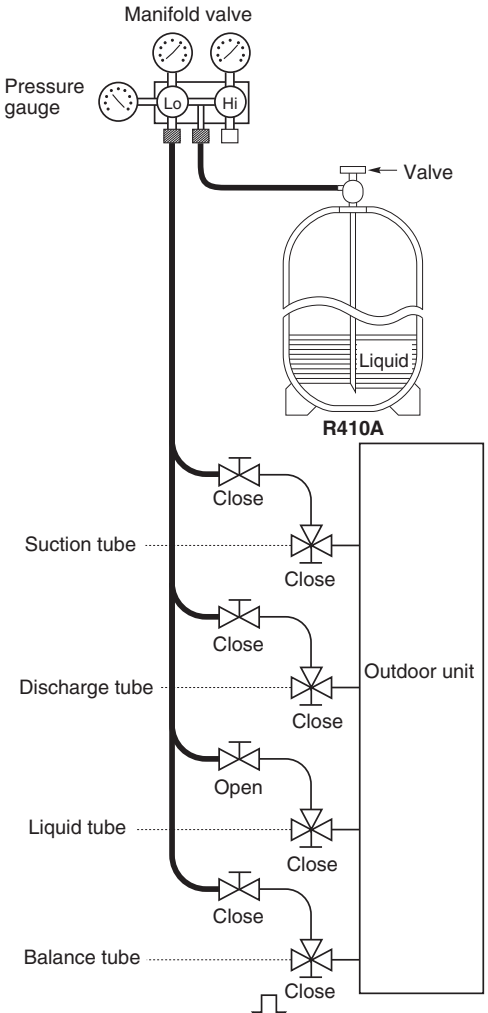


Fig. 6-5

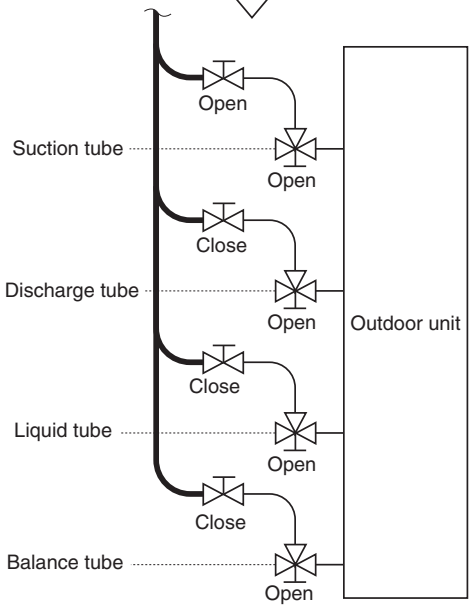


Fig. 6-6

Finishing the job

(1) With a flathead screwdriver, turn the liquid tube service valve counterclockwise to fully open the valve.

(2) Turn the all service valve counterclockwise to fully open the valve.

(3) Close all stop valves and loosen the “LO” knob of the manifold valve.

(4) Loosen the charge hose connected to all service port, then remove the hose.

(5) Replace all valve caps at all service ports 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) The control wiring is correctly connected and all electrical connections are tight.

(2) The transportation pads for the indoor fan have been removed. If not, remove them now.

(3) The power has been supplied 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. (Fig. 7-1)

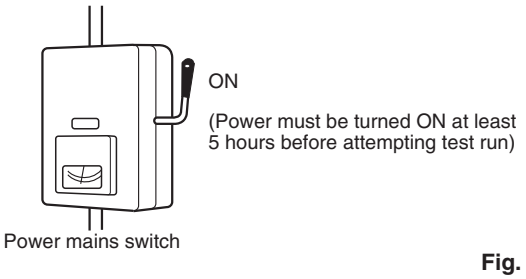


Fig. 7-1

(4) If only 1 outdoor unit is installed, close the service valve on the balance tubes, and open the service valve on the other 3 tubes (suction, discharge, and liquid tubes).
If 2 or 3 outdoor units are installed, open the service valves on all 4 tubes (suction, discharge, liquid, and balance tubes).

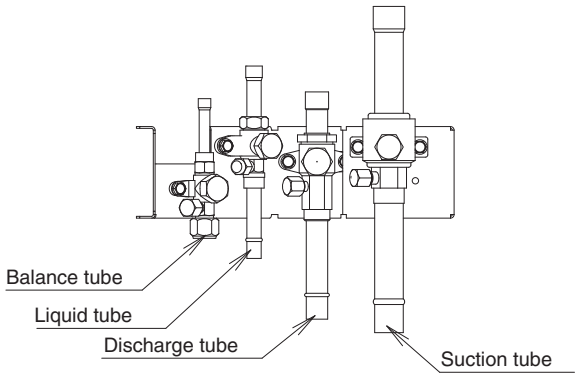


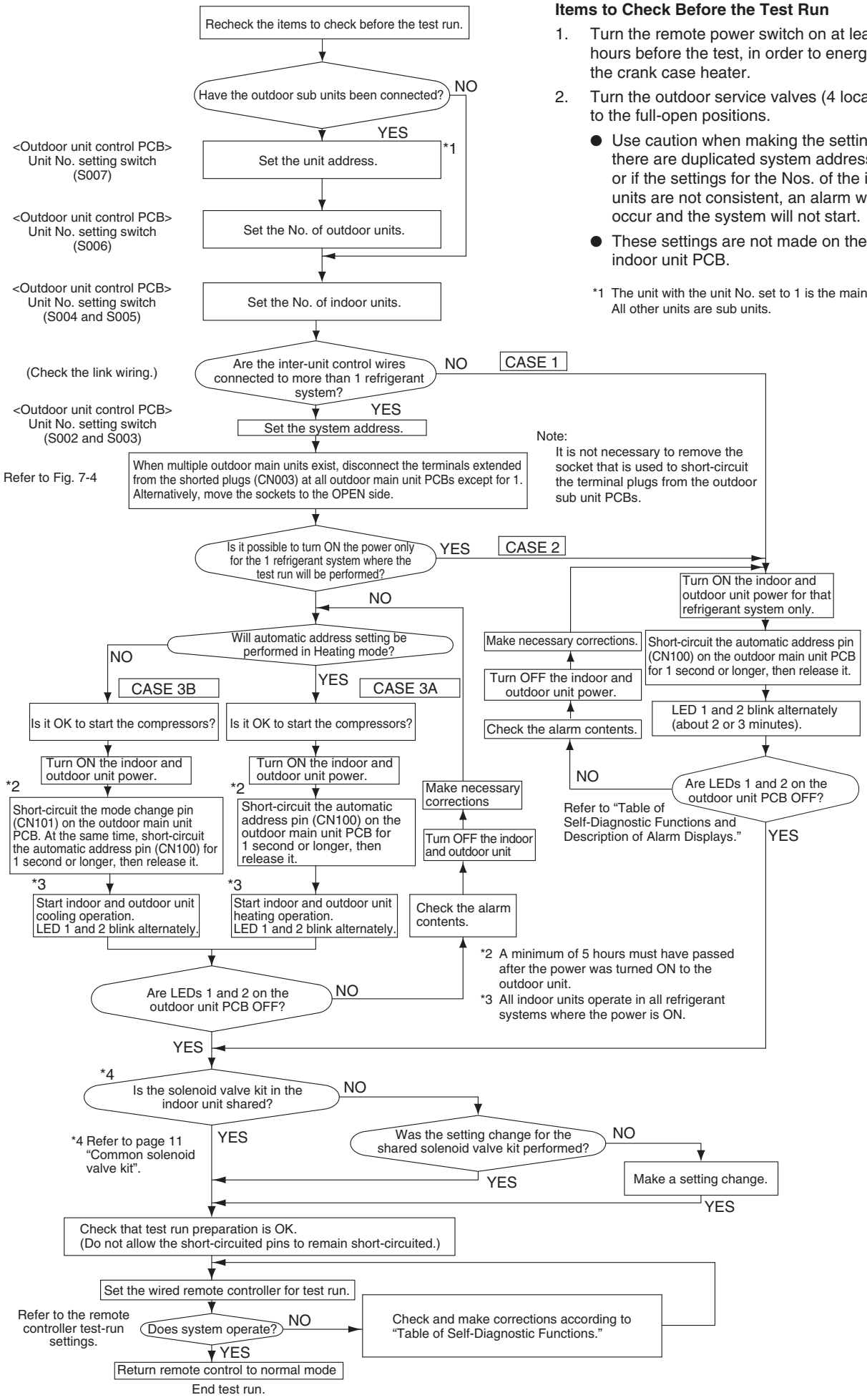
Fig. 7-2

(5) Request that the customer be present for the test run. Explain the contents of the instruction manual, and then have the customer actually operate the system.

(6) Be sure to give the instruction manual and warranty certificate to the customer.

(7) When replacing the control PCB, be sure to make all the same settings on the new PCB as were in use before replacement.
The existing EEPROM is not changed, and is connected to the new control PCB.

7-2. Test Run Procedure



Items to Check Before the Test Run

1. Turn the remote power switch on at least 5 hours before the test, in order to energize the crank case heater.
2. Turn the outdoor service valves (4 locations) to the full-open positions.
   - Use caution when making the settings. If there are duplicated system addresses, or if the settings for the Nos. of the indoor units are not consistent, an alarm will occur and the system will not start.
   - These settings are not made on the indoor unit PCB.

*1 The unit with the unit No. set to 1 is the main unit. All other units are sub units.

Fig. 7-3

7-3. Main Outdoor Unit PCB Setting

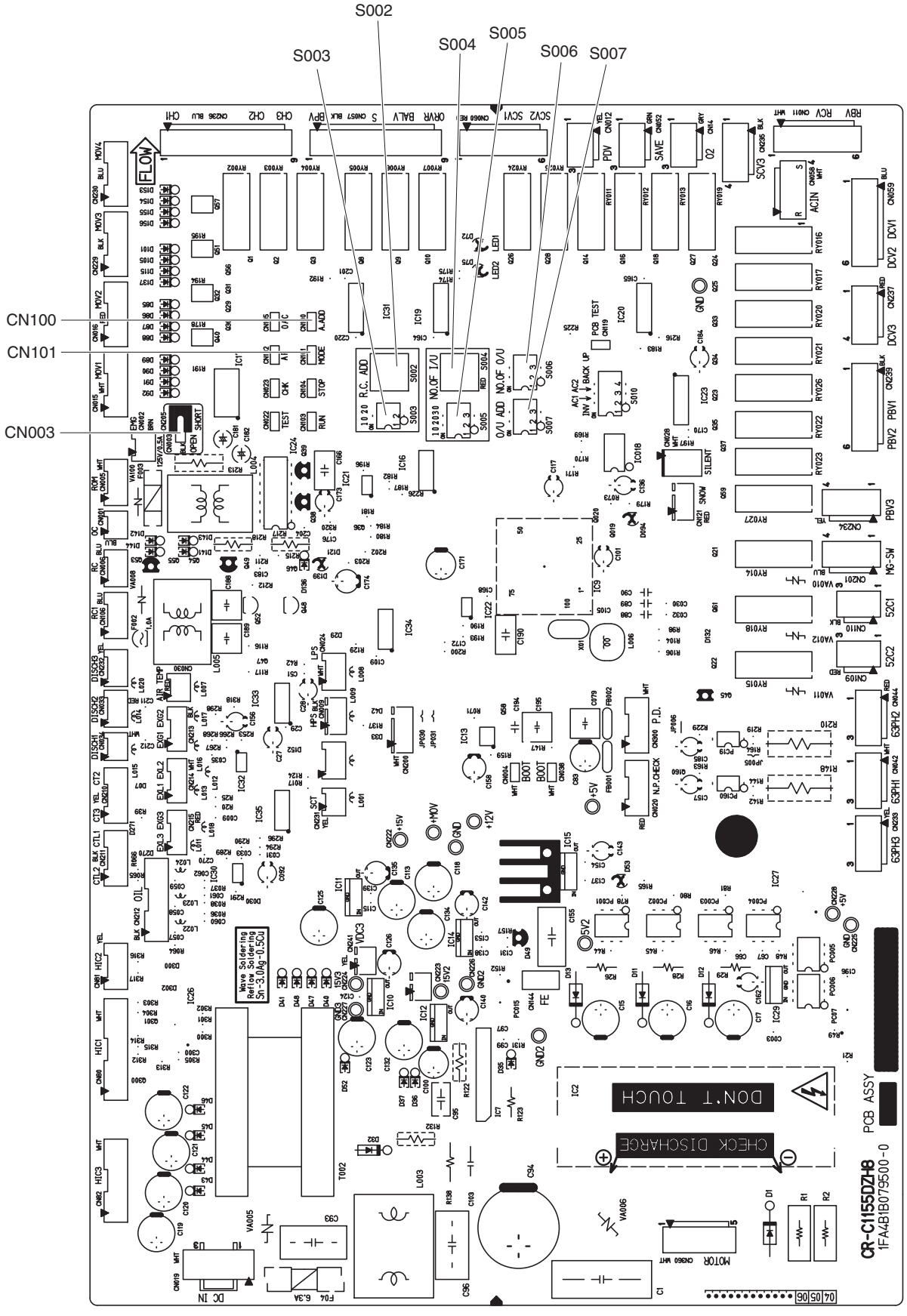


Fig. 7-4

● **Examples of the No. of indoor units settings (S005, S004)**

No. of indoor units	Indoor unit setting (S005) (3P DIP switch, blue) 10 20 30	Indoor unit setting (S004) (Rotary switch, red)
1 unit (factory setting)	All OFF 	 Set to 1
11 units	1 ON 	 Set to 1
21 units	2 ON 	 Set to 1
31 units	3 ON 	 Set to 1
40 units	1 & 3 ON 	 Set to 0

● **Examples of refrigerant circuit (R.C.) address settings (required when link wiring is used) (S003, S002)**

System address No.	System address (S003) (2P DIP switch, blue) 10 20	System address (S002) (Rotary switch, black)
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	1 & 2 ON 	 Set to 0

● **Examples of the No. of outdoor units settings (S006)**

No. of outdoor units	Outdoor unit setting (S006) (3P DIP switch, blue)
1 unit (factory setting)	1 ON 
2 units	2 ON 
3 units	1 & 2 ON 
4 units	3 ON 

● **Address setting of main outdoor unit (S007)**

Unit No. setting	Address setting of outdoor unit (S007) (3P DIP switch, blue)
Unit No. 1 (main unit) (factory setting)	1 ON 

● **Address setting of sub outdoor unit**

Unit No. setting	Address setting of outdoor unit (S007) (3P DIP switch, blue)
Unit No. 2 (sub unit) (factory setting)	2 ON 
Unit No. 3 (sub unit)	1 & 2 ON 
Unit No. 4 (sub unit)	3 ON 

The sub unit control PCB contains the same switches as the main unit control PCB for No. of indoor units, No. of outdoor units, and system address. However it is not necessary to set these switches.

7-4. Auto Address Setting

Basic wiring diagram: Example (1)

- **If link wiring is not used**
  (The inter-unit control wires are not connected to multiple refrigerant systems.)
  Indoor unit addresses can be set without operating the compressors.

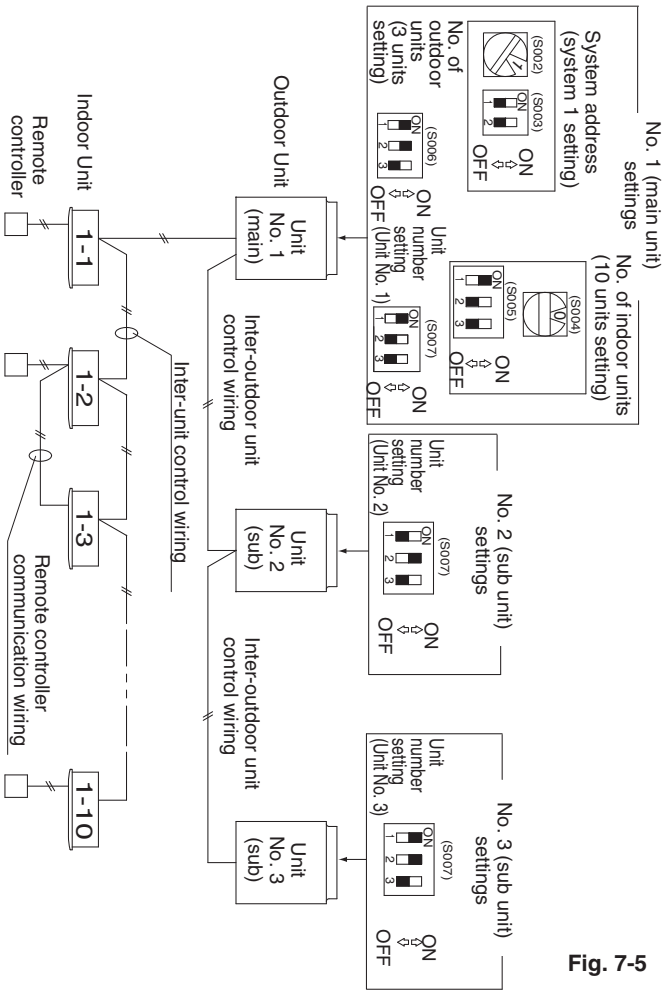


Fig. 7-5

(1) Automatic Address Setting from the Outdoor Unit

1 On the outdoor main unit control PCB, check that the system address rotary switch (S002) is set to "1" and that the DIP switch (S003) is set to  ON "0."

(These are the settings at the time of factory shipment.)

2 To set the number of indoor units that are connected to the outdoor unit to 10, on the outdoor main unit control PCB set the No. of indoor units DIP switch (S005) to  "1," and set the rotary switch (S004) to "0."

3 To set the number of outdoor units, on the outdoor main unit control PCB set the No. of outdoor units DIP switch (S006) to  (3 units), and set the unit No. DIP switch (S007) to  (unit No. 1 – main).

4 On the No. 2 (sub) unit control PCB, set the unit No. switch (S007) to  (unit No. 2).

On the No. 3 (sub) unit control PCB, set the unit No. switch (S007) to  (unit No. 3).

5 Turn ON the power to the indoor and outdoor units.

6 On the outdoor main unit control PCB, short-circuit the automatic address pin (CN100) for 1 second or longer, then release it.

↓

(Communication for automatic address setting begins.)

↓

* To cancel, again short-circuit the automatic address pin (CN100) for 1 second or longer, then release it.
The LED that indicates that automatic address setting is in progress turns OFF and the process is stopped. Be sure to perform automatic address setting again.

(Automatic address setting is completed when LEDs 1 and 2 on the outdoor main unit control PCB turn OFF.)

↓

7 Operation from the remote controllers is now possible.

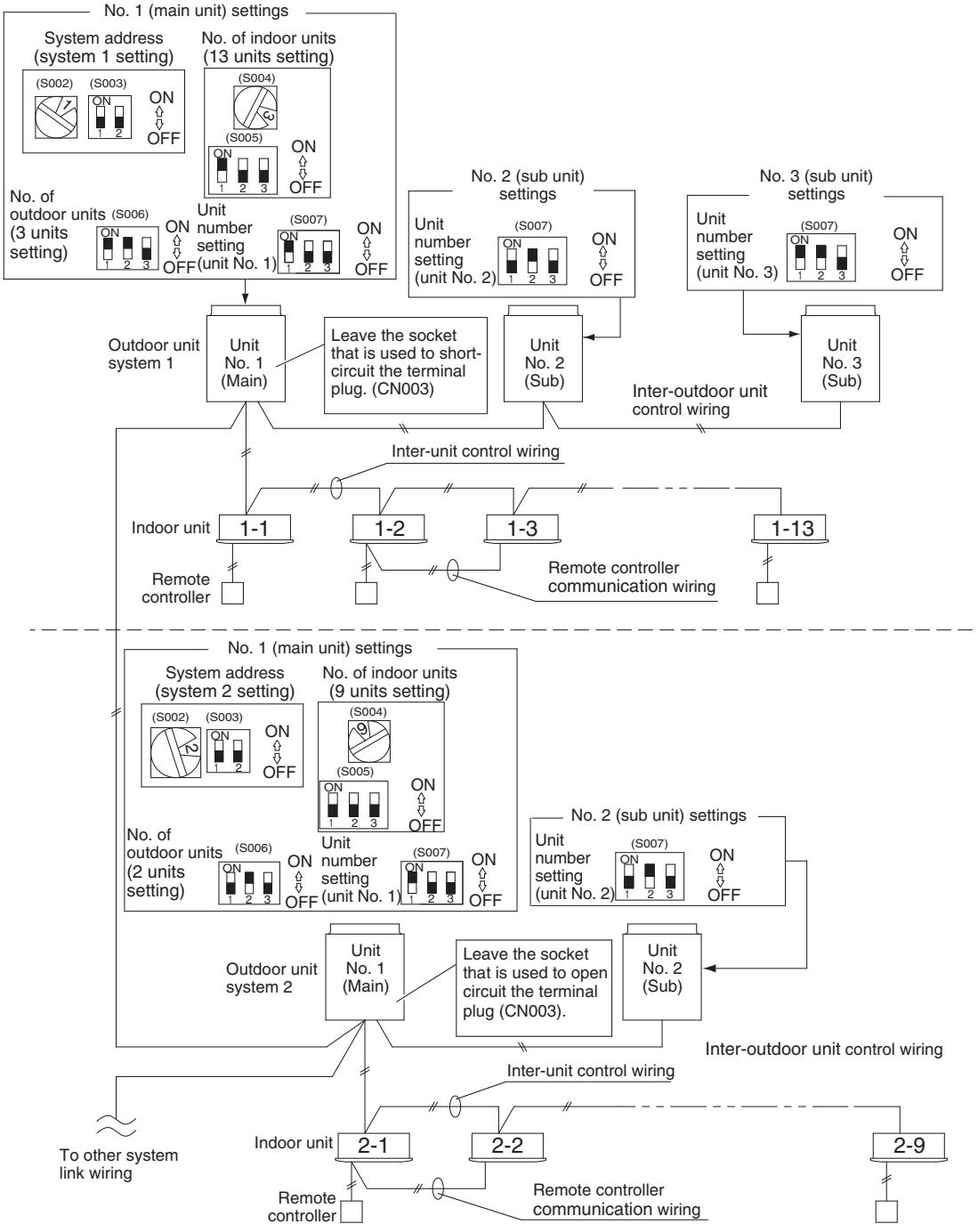
* To perform automatic address setting from the remote controller, perform steps 1 to 5, then use the remote controller and complete automatic address setting.

- Refer to "Automatic Address Setting from the Remote Controller."

Basic wiring diagram: Example (2)

- **If link wiring is used**

* When multiple outdoor main units exist, remove the socket that is used to short-circuit the terminal plug (CN003) from all outdoor unit PCBs except for 1. Alternatively, move the sockets to the “OPEN” side.



Make settings as appropriate for the cases listed below.

Indoor and outdoor unit power can be turned ON for each system separately. ——► **<Case 1>**

Indoor and outdoor unit power cannot be turned ON for each system separately.

Automatic address setting in Heating mode ——► **<Case 2>**

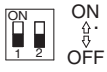
Automatic address setting in Cooling mode ——► **<Case 3>**

Fig. 7-6

<Case 1> Automatic Address Setting (no compressor operation)

- Indoor and outdoor unit power can be turned ON for each system separately.
  Indoor unit addresses can be set without operating the compressors.

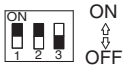
Automatic Address Setting from Outdoor Unit

1 On the outdoor main unit control PCB, check that the system address rotary switch (S002) is set to "1" and that the DIP switch (S003) is set to "0." 

(These are the settings at the time of factory shipment.)

2 To set the number of indoor units that are connected to the outdoor unit to 13, on the outdoor main unit control PCB set the No. of indoor units DIP switch (S005) to "1" 

, and set the rotary switch (S004) to "3."

3 To set the number of outdoor units, on the outdoor main unit control PCB set the No. of outdoor units DIP switch (S006) to 

(3 units).

4 On the No. 1 (main) unit control PCB, set the unit No. switch (S007) to 

(unit No. 1).

On the No. 2 (sub) unit control PCB, set the unit No. switch (S007) to 

(unit No. 2).

On the No. 3 (sub) unit control PCB, set the unit No. switch (S007) to 

(unit No. 3).

5 At the outdoor main unit where all indoor and outdoor unit power has been turned ON, short-circuit the automatic address pin (CN100) for 1 second or longer, then release it.

↓

(Communication for automatic address setting begins.)

↓ * To cancel, again short-circuit the automatic address pin (CN100) for 1 second or longer, then release it.
The LED that indicates automatic address setting is in progress turns OFF and the process is stopped. Be sure to perform automatic address setting again.

(Automatic address setting is completed when LEDs 1 and 2 on the outdoor main unit control PCB turn OFF.)

↓

6 Next turn the power ON only for the indoor and outdoor units of the next (different) system. Repeat steps 1 – 5 in the same way to complete automatic address settings for all systems.

↓

7 Operation from the remote controllers is now possible.
* To perform automatic address setting from the remote controller, perform steps 1 – 4, then use the remote controller and complete automatic address setting.

- Refer to "Automatic Address Setting from the Remote Controller."

<Case 2> Automatic Address Setting in Heating Mode

- Indoor and outdoor unit power cannot be turned ON for each system separately.
  In the following, automatic setting of indoor unit addresses is not possible if the compressors are not operating. Therefore perform this process only after completing all refrigerant tubing work.

Automatic Address Setting from Outdoor Unit

1 Perform steps 1 – 4 in the same way as for **<Case 1>**.

2 Turn the indoor and outdoor unit power ON at all systems.

↓

3 To perform automatic address setting in **<Heating mode>**, on the outdoor main unit control PCB in the refrigerant system where you wish to set the addresses, short-circuit the automatic address pin (CN100) for 1 second or longer, then release it.
(Be sure to perform this process for one system at a time. Automatic address settings cannot be performed for more than one system at the same time.)

↓

(Communication for automatic address setting begins, **the compressors turn ON, and automatic address setting in Heating mode begins.**)
(All indoor units operate.)

↓ * To cancel, again short-circuit the automatic address pin (CN100) for 1 second or longer, then release it.
The LED that indicates automatic address setting is in progress turns OFF and the process is stopped. Be sure to perform automatic address setting again.

(Automatic address setting is completed when the compressors stop and LEDs 1 and 2 on the outdoor main unit control PCB turn OFF.)

↓

4 At the outdoor main unit in the next (different) system, short-circuit the automatic address pin (CN100) for 1 second or longer, then release it.

↓

(Repeat the same steps to complete automatic address setting for all units.)

↓

5 Operation from the remote controllers is now possible.
* To perform automatic address setting from the remote controller, perform steps 1 and 2, then use the remote controller and complete automatic address setting.

- Refer to "Automatic Address Setting from the Remote Controller."

<Case 3> Automatic Address Setting in Cooling Mode

- Indoor and outdoor unit power cannot be turned ON for each system separately.
  In the following, automatic setting of indoor unit addresses is not possible if the compressors are not operating. Therefore perform this process only after completing all refrigerant tubing work.
  Automatic address setting can be performed during Cooling operation.

Automatic Address Setting from Outdoor Unit

1 Perform steps 1 – 4 in the same way as for **<Case 1>**.

2 Turn the indoor and outdoor unit power ON at all systems.

↓

3 To perform automatic address setting in **<Cooling mode>**, on the outdoor main unit control PCB in the refrigerant system where you wish to set the addresses, short-circuit the mode change 2P pin (CN101). At the same time, short-circuit the automatic address pin (CN100) for 1 second or longer, then release it. (Be sure to perform this process for one system at a time. Automatic address settings cannot be performed for more than one system at the same time.)

↓

(Communication for automatic address setting begins, **the compressors turn ON, and automatic address setting in Cooling mode begins.**)

(All indoor units operate.)

↓ * To cancel, again short-circuit the automatic address pin (CN100) for 1 second or longer, then release it.
The LED that indicates automatic address setting is in progress turns OFF and the process is stopped. Be sure to perform automatic address setting again.

(Automatic address setting is completed when the compressors stop and LEDs 1 and 2 on the outdoor main unit control PCB turn OFF.)

↓

4 At the outdoor main unit in the next (different) system, short-circuit the automatic address pin (CN100) for 1 second or longer, then release it.

↓

(Repeat the same steps to complete automatic address setting for all units.)

↓

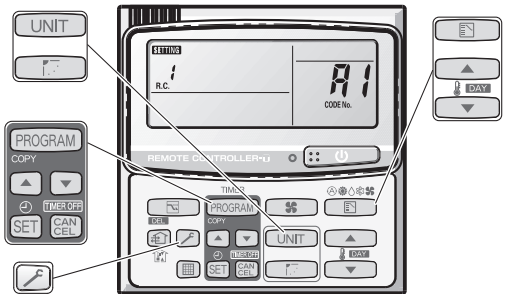
5 Operation from the remote controllers is now possible.

Automatic Address Setting* from the Remote Controller

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

Selecting each refrigerant system individually for automatic address setting
---Automatic 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 ▲ or ▼ button.
  (Check that the item code is “A1.”)
- Use either the UNIT or ⊞ button to set the system No. to perform automatic address setting.
- Then press the SET button.
  (Automatic address setting for one refrigerant system begins.)
  (When automatic address setting for one system is completed, the system returns to normal stopped status.)
  <Approximately 4 – 5 minutes is required.>
  (During automatic address setting, “SETTING” is displayed on the remote controller. This message disappears when automatic address setting is completed.)
- Repeat the same steps to perform automatic address setting for each successive system.



Display during automatic address setting

- On outdoor unit PCB

LED 2 1

Blink alternately

* Do not short-circuit the automatic address setting pin (CN100) again while automatic address setting is in progress. Doing so will cancel the setting operation and will cause LEDs 1 and 2 to turn OFF.
* When automatic address setting has been successfully completed, both LEDs 1 and 2 turn OFF.
* LED 1 is D72. LED 2 is D75.
* If automatic address setting is not completed successfully, refer to the table below and correct the problem. Then perform automatic address setting again.

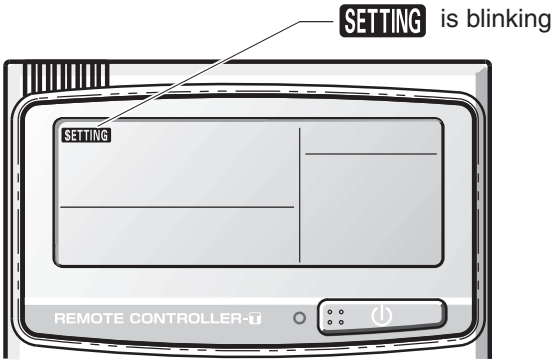
- Display details of LEDs 1 and 2 on the outdoor unit control PCB

(☼ : ON ✷ : Blinking ● : OFF)

LED 1	LED 2	Display meaning
☼	☼	After the power is turned ON (and automatic address setting is not in progress), no communication with the indoor units in that system is possible.
●	☼	After the power is turned ON (and automatic address setting is not in progress), 1 or more indoor units are confirmed in that system; however, the number of indoor units does not match the number that was set.
✷	✷	Automatic address setting is in progress.
Alternating		
●	●	Automatic address setting completed.
✷	✷	At time of automatic address setting, the number of indoor units did not match the number that was set. "⚠" (when indoor units are operating) indication appears on the display.
Simultaneous		
✷	✷	Refer to "Table of Self-Diagnostic Functions and Description of Alarm Displays."
Alternating		

Note: "⚠" indicates that the solenoid is fused or that there is a CT detection current failure (current is detected when the compressor is OFF).

- Remote controller display



Request concerning recording the indoor/outdoor unit combination Nos.

After automatic 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 removed 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.

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

1 Press and hold the button and button for 4 seconds or longer (simple settings mode).
2 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.)
3 Press the button again to return to normal remote controller mode.

Individual Control of Solenoid Valve kit

How to change the setting for utilizing the solenoid valve kit in the indoor unit in common.

Setting change may be necessary due to the type of connection of the solenoid valve kit and indoor unit as shown below. Be sure to change according to the following method.

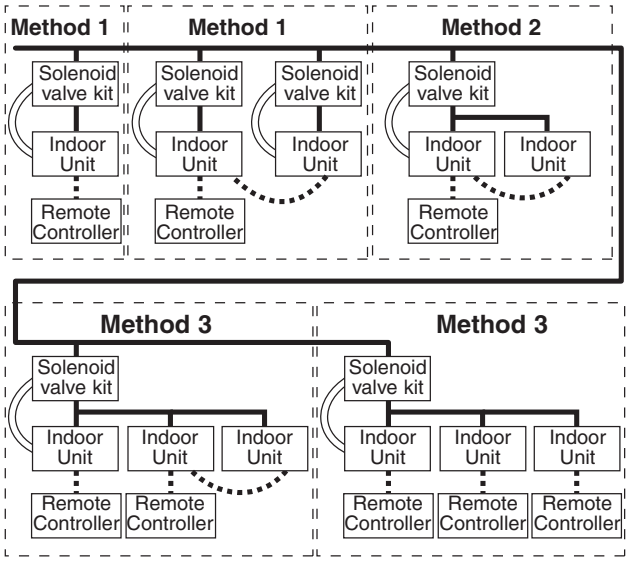


Chart of setting change according to each method

* An alarm will occur or the air conditioner will not operate properly unless proper setting changes are performed. Be sure to change the setting as follows.

Combination	Shared solenoid valve kit YES/NO	Change necesasry YES/NO	Change of indoor unit	How to change
Method 1 only	NO	NO	—	—
Method 2 included *method 3 excluded	YES	YES	Method 2 only	From indoor unit *1
Method 3 included	YES	YES	All indoor units	From PC *2

* 1 How to change the setting from the remote controller
Be sure to make a setting when utilizing the shared solenoid valve kit by Method 2.

- When only utilizing the solenoid valve kit in common, make a setting from the remote controller as described below.
- Be sure to make a setting after auto address setting as described below.

1 Press and hold the button and button for 4 seconds or longer (simple settings mode).

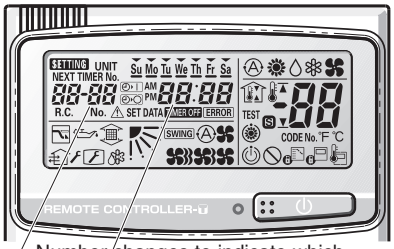
2 “ALL” is displayed on the remote controller.

3 Next, press the UNIT button.

4 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.

5 Press the UNIT button again and check the address of each indoor unit in sequence.

6 Press the button again to return to normal remote controller mode.



Number changes to indicate which indoor unit is currently selected.

Indoor unit address

* 2 How to change the setting from PC

Be sure to make a setting from a personal computer when utilizing the shared solenoid valve kit by Method 3.

- Setting change must be necessary at all indoor units of same refrigerant system.
- Consult how to change the setting.

Remote Controller Test Run Settings

1 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.)

2 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.

3 If correct operation is not possible, a code is displayed on the remote controller display.
(Refer to “Table of Self-Diagnostic Functions” and correct the problem.)

4 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.)

7-5. 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.**

7-6. Meaning of Alarm Messages

Table of Self-Diagnostics Functions and Description of Alarm Displays

Alarm messages are indicated by the blinking of LED 1 and 2 (D72, D75) on the outdoor unit PCB. They are also displayed on the wired remote controller.

- Viewing the LED 1 and 2 (D72 and D75) alarm displays

LED 1	LED 2	Alarm contents
☼	☼	Alarm display LED 1 blinks M times, then LED 2 blinks N times. The cycle then repeats. M = 2: P alarm 3: H alarm 4: E alarm 5: F alarm 6: L alarm N = Alarm No. Example: LED 1 blinks 2 times, then LED 2 blinks 17 times. The cycle then repeats. Alarm is “P17.”
Alternating		

(☼ : Blinking)

Possible cause of malfunction			Alarm message
Serial communication errors Mis-setting	Remote controller is detecting error signal from indoor unit.	Error in receiving serial communication signal. (Signal from main indoor unit in case of group control) Ex: Auto address is not completed.	<E01>
		Error in transmitting serial communication signal.	<E02>
	Indoor unit is detecting error signal from remote controller (and system controller).		<<E03>>
	Indoor unit is detecting error signal from main outdoor unit.	Error in receiving serial communication signal. When turning on the power supply, the number of connected indoor units does not correspond to the number set. (Except R.C. address is “0.”)	E04
		Error of the main outdoor unit in receiving serial communication signal from the indoor unit.	<E06>
	Improper setting of indoor unit or remote controller.	Indoor unit address setting is duplicated.	E08
		Remote controller address connector (RCU. ADR) is duplicated. (Duplication of main remote controller)	<<E09>>
	During auto. address setting, number of connected units does not correspond to number set. When turning on the power supply, number of connected units does not correspond to number set. (Except R.C. address is “0.”)	Starting auto. address setting is prohibited. This alarm message shows that the auto address connector CN100 is shorted while other RC line is executing auto address operation.	E12
		Error in auto. address setting. (Number of connected indoor units is less than the number set)	E15
		Error in auto. address setting. (Number of connected indoor units is more than the number set)	E16
		No indoor unit is connected during auto. address setting.	E20
		Main outdoor unit is detecting error signal from sub outdoor unit.	E24
		Error of outdoor unit address setting.	E25
		The number of connected main and sub outdoor units do not correspond to the number set at main outdoor unit PCB.	E26
		Error of sub outdoor unit in receiving serial communication signal from main outdoor unit.	E29
	Indoor unit communication error of group control wiring.	Error of main indoor unit in receiving serial communication signal from sub indoor units.	E18

Possible cause of malfunction			Alarm message
Serial communication errors Mis-setting	Improper setting.	This alarm message shows when the indoor unit for multiple-use is not connected to the outdoor unit.	L02
		Duplication of main indoor unit address setting in group control.	<L03>
		Duplication of outdoor R.C. address setting.	L04
		Group control wiring is connected to individual control indoor unit.	L07
		Indoor unit address is not set.	L08
		Capacity code of indoor unit is not set.	<<L09>>
		Capacity code of outdoor unit is not set.	L10
		Incorrect wiring of remote group control wiring (in case of shared solenoid valve kit)	L11
		Mis-matched connection of outdoor units which have different kinds of refrigerant.	L17
		4-way valve operation failure	L18
Activation of protective device	Protective device in indoor unit is activated.	Thermal protector in indoor unit fan motor is activated.	<<P01>>
		Improper wiring connections of ceiling panel.	<<P09>>
		Float switch is activated.	<<P10>>
	Protective device in outdoor unit is activated.	Compressor thermal protector is activated. Power supply voltage is unusual. (The voltage is more than 260 V or less than 160 V between L and N phase.)	P02
		Incorrect discharge temperature. (Comp. No. 1)	P03
		High pressure switch is activated.	P04
		Negative (defective) phase.	P05
		O_2 sensor (detects low oxygen level) activated	P14
		Compressor running failure resulting from missing phase in the compressor wiring, etc. (Start failure not caused by IPM or no gas.)	P16
		Incorrect discharge temperature. (Comp. No. 2)	P17
		Compressor 3 discharge temp. failure	P18
		Outdoor unit fan motor is unusual.	P22
		Overcurrent at time of compressor runs more than 80Hz (DCCT secondary current or ACCT primary current is detected at a time other than when IPM has tripped.)	P26
		IPM trip (IPM current or temperature)	H31
		Inverter for compressor is unusual. (DC compressor does not operate.)	P29

Possible cause of malfunction			Alarm message
Thermistor fault	Indoor thermistor is either open or damaged.	Indoor coil temp. sensor (E1)	<<F01>>
		Indoor coil temp. sensor (E2)	<<F02>>
		Indoor coil temp. sensor (E3)	<<F03>>
		Indoor suction air (room) temp. sensor (TA)	<<F10>>
		Indoor discharge air temp. sensor (BL)	<<F11>>
	Outdoor thermistor is either open or damaged.	Comp. No. 1 discharge gas temp. sensor (DISCH1)	F04
		Comp. No. 2 discharge gas temp. sensor (DISCH2)	F05
		Outdoor No. 1 coil gas temp. sensor (EXG1)	F06
		Outdoor No. 1 coil liquid temp. sensor (EXL1)	F07
		Outdoor air temp. sensor (AIR TEMP)	F08
		Compressor intake port temperature sensor (RDT)	F12
		High pressure sensor. Negative (defective) N phase.	F16
		Low-pressure sensor failure	F17
		Compressor 3 discharge temp. sensor failure (DISCH3)	F22
		Outdoor No. 2 coil gas temp. sensor (EXG2)	F23
		Outdoor No. 2 coil liquid temp. sensor (EXL2)	F24
		Outdoor heat exchanger 3 gas (inlet) temp. sensor failure (EXG3)	F25
		Outdoor heat exchanger 3 liquid (outlet) temp. sensor failure (EXL3)	F26
EEPROM on indoor unit PCB failure			F29
Protective device for compressor is activated	Protective device for compressor No. 1 is activated.	EEPROM on the main or sub outdoor unit PCB has failed.	F31
		Overload current is detected.	H01
		Lock current is detected.	H02
		Current is not detected when comp. No. 1 is ON.	H03
		Discharge gas temperature of the comp. No. 1 is not detected. Temp. sensor is not seated at the sensor holder.	H05
	Protective device for compressor No. 2 is activated.	Compressor No. 2 current trouble (overcurrent)	H11
		Compressor No. 2 current trouble (locked)	H12
		Compressor No. 2 CT sensor disconnected or short circuit	H13
		Compressor No. 2 discharge temp. sensor disconnected	H15
	Protective device for compressor No. 3 is activated.	Compressor No. 3 current trouble (overcurrent)	H21
		Compressor No. 3 current trouble (locked)	H22
		Compressor No. 3 CT sensor disconnected or short circuit	H23
		Compressor No. 3 discharge temp. sensor disconnected	H25
		Low pressure switch is activated.	H06
	Low oil level.		H07
	Oil sensor fault. (Disconnection, etc.)	Comp. No. 1 oil sensor	H08
		Comp. No. 2 oil sensor	H27
		Oil sensor (connection) failure	H28

Alarm messages displayed on system controller			Alarm message
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.

8. MARKINGS FOR DIRECTIVE 97/23/EC (PED)

Rating nameplate figure

Tabulation of Various data

A	U-8MF1E8	U-10MF1E8	U-12MF1E8	U-14MF1E8	U-16MF1E8
B	380 – 415 V 3 N ~ 50 Hz				
C	9.53 kW, 16.1 A	12.7 kW, 21.4 A	15.4 kW, 25.9 A	18.1 kW, 31.2 A	20.7 kW, 35.9 A
D	30 A	35 A	40 A	40 A	50 A
E	3.6 MPa				
F	2.21 MPa				
G	11.8 kg			11.8 kg	

Compliance with regulation 842/EC/2006 Article 7(1) requirements

EN DO NOT VENT R410A INTO THE ATMOSPHERE: R410A IS A FLUORINATED GREENHOUSE GAS, COVERED BY THE KYOTO PROTOCOL, WITH A GLOBAL WARMING POTENTIAL (GWP) = 1975.

Conformité aux exigences de l'article 7 (1) de la réglementation 842/EC/2006

FR NE PAS METTRE LE R410A À L'AIR LIBRE: LE R410A EST UN GAZ À EFFET DE SERRE FLUORÉ, RÉGULÉ PAR LE PROTOCOLE DE KYOTO AVEC UN POTENTIEL DE RÉCHAUFFEMENT DE LA PLANÈTE (GWP) = 1975.

Kompatibilität mit den Anforderungen der Vorschrift 842/EC/2006, Artikel 7 (1)

DE R410A NICHT IN DIE AUSSENLUFT ABLASSEN: R410A IST EIN FLUORIERTES TREIBHAUSGAS, DAS IM KYOTO-PROTOKOLL ENTHALTEN IST UND EIN ERDERWÄRMUNGSPOTENTIAL (GWP) VON 1975 AUFWEIST.

Osservanza delle richieste dell'Articolo 7(1) delle regolamentazioni 842/EC/2006

IT NON DISPERDERE R410A NELL'ATMOSFERA: L'R410A È UN GAS FLUORATO CAUSA DI EFFETTO SERRA E COPERTO DAL PROTOCOLLO DI KYOTO CON UN POTENZIALE DI RISCALDAMENTO GLOBALE (GWP) = 1975.

Conformidade com o regulamento 842/EC/2006 Requisitos do Artigo 7(1)

PT NÃO DEIXE O R410A ESCAPAR PARA A ATMOSFERA: O R410A É UM GÁS FLUORADO COM EFEITO DE ESTUFA, REGULADO PELO PROTOCOLO DE QUIOTO, COM UM POTENCIAL DE AQUECIMENTO GLOBAL (GWP) = 1975.

Συμμόρφωση με τις απαιτήσεις του κανονισμού 842/EC/2006 Άρθρο 7(1)

GR ΜΗΝ ΑΠΕΛΕΥΘΕΡΩΣΕΤΕ ΤΟ R410A ΣΤΗΝ ΑΤΜΟΣΦΑΙΡΑ: ΤΟ R410A ΕΙΝΑΙ ΦΘΟΡΙΟΥΧΟ ΑΕΡΙΟ ΘΕΡΜΟΚΗΠΙΟΥ ΠΟΥ ΚΑΛΥΠΤΕΤΑΙ ΑΠΟ ΤΟ ΠΡΩΤΟΚΟΛΛΟ ΤΟΥ Κ?ΟΤΟ, ΜΕ ΔΥΝΑΜΙΚΟ ΠΛΑΝΗΤΙΚΗΣ ΑΥΞΗΣΗΣ ΤΗΣ ΘΕΡΜΟΚΡΑΣΙΑΣ (GWP) = 1975.

Cumplimiento de los requisitos del Artículo 7 (1) de la Directiva 842/EC/2006

ES NO LIBERAR R410A AL AIRE LIBRE: EL R410A ES UN GAS FLUORIZADO DE EFECTOS DE INVERNADERO, INCLUIDO EN EL PROTOCOLO DE KYOTO, CON UN POTENCIAL DE CALENTAMIENTO GLOBAL (GWP) = 1975.

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