

# MITSUBISHI ELECTRIC CITY MULTI

## Air-Conditioners OUTDOOR UNIT

# PUHY-YSMC

### FOR INSTALLER 安装人员用

ENGLISH

中文

## INSTALLATION MANUAL

For safe and correct use, please read this installation manual thoroughly before installing the air-conditioner unit.

\* Remote controller (PAR-F25MA) is available as an optional remote controller.

## 安装手册

为了安全和正确地使用本空调器，请在安装前仔细阅读本安装手册。

\* 遥控器（PAR-F25MA）作为选购件提供。

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# 1. Safety precautions

## 1.1. Before installation and electric work

- ▶ **Before installing the unit, make sure you read all the “Safety precautions”.**
- ▶ **The “Safety precautions” provide very important points regarding safety. Make sure you follow them.**

### Symbols used in the text

#### **Warning:**

Describes precautions that should be observed to prevent danger of injury or death to the user.


#### **Caution:**


Describes precautions that should be observed to prevent damage to the unit.


### Symbols used in the illustrations


 : Indicates an action that must be avoided.


 : Indicates that important instructions must be followed.


 : Indicates a part which must be grounded.

 : Indicates that caution should be taken with rotating parts. (This symbol is displayed on the main unit label.) <Color: yellow>

 : Indicates that the main switch must be turned off before servicing. (This symbol is displayed on the main unit label.) <Color: blue>

 : Beware of electric shock (This symbol is displayed on the main unit label.) <Color: yellow>

 : Beware of hot surface (This symbol is displayed on the main unit label.) <Color: yellow>

 **ELV** : Please pay attention to electric shock fully because this is not Safety Extra Low-Voltage (SELV) circuit. And at servicing, please shut down the power supply for both of Indoor Unit and Outdoor Unit.

#### **Warning:**

**Carefully read the labels affixed to the main unit.**

#### **Warning:**

- **Ask the dealer or an authorized technician to install the air conditioner.**
  - Improper installation by the user may result in water leakage, electric shock, or fire.
- **Install the air unit at a place that can withstand its weight.**
  - Inadequate strength may cause the unit to fall down, resulting in injuries.
- **Use the specified cables for wiring. Make the connections securely so that the outside force of the cable is not applied to the terminals.**
  - Inadequate connection and fastening may generate heat and cause a fire.
- **Prepare for typhoons and other strong winds and earthquakes and install the unit at the specified place.**
  - Improper installation may cause the unit to topple and result in injury.
- **Always use an air cleaner, humidifier, electric heater, and other accessories specified by Mitsubishi Electric.**
  - Ask an authorized technician to install the accessories. Improper installation by the user may result in water leakage, electric shock, or fire.
- **Never repair the unit. If the air conditioner must be repaired, consult the dealer.**
  - If the unit is repaired improperly, water leakage, electric shock, or fire may result.

- **Do not touch the heat exchanger fins.**
  - Improper handling may result in injury.
- **If refrigerant gas leaks during installation work, ventilate the room.**
  - If the refrigerant gas comes into contact with a flame, poisonous gases will be released.
- **Install the air conditioner according to this Installation Manual.**
  - If the unit is installed improperly, water leakage, electric shock, or fire may result.
- **Have all electric work done by a licensed electrician according to “Electric Facility Engineering Standard” and “Interior Wire Regulations” and the instructions given in this manual and always use a special circuit.**
  - If the power source capacity is inadequate or electric work is performed improperly, electric shock and fire may result.
- **Securely install the cover of control box and the panel.**
  - If the cover and panel are not installed properly, dust or water may enter the outdoor unit and fire or electric shock may result.
- **When installing and moving the air conditioner to another site, do not charge the it with a refrigerant different from the refrigerant (R22) specified on the unit.**
  - If a different refrigerant or air is mixed with the original refrigerant, the refrigerant cycle may malfunction and the unit may be damaged.
- **If the air conditioner is installed in a small room, measures must be taken to prevent the refrigerant concentration from exceeding the safety limit even if the refrigerant should leak.**
  - Consult the dealer regarding the appropriate measures to prevent the safety limit from being exceeded. Should the refrigerant leak and cause the safety limit to be exceeded, hazards due to lack of oxygen in the room could result.
- **When moving and reinstalling the air conditioner, consult the dealer or an authorized technician.**
  - If the air conditioner is installed improperly, water leakage, electric shock, or fire may result.
- **After completing installation work, make sure that refrigerant gas is not leaking.**
  - If the refrigerant gas leaks and is exposed to a fan heater, stove, oven, or other heat source, it may generate noxious gases.
- **Do not reconstruct or change the settings of the protection devices.**
  - If the pressure switch, thermal switch, or other protection device is shorted and operated forcibly, or parts other than those specified by Mitsubishi Electric are used, fire or explosion may result.

## 1.2. Before getting installed

#### **Caution:**

- **Do not install the unit where combustible gas may leak.**
  - If the gas leaks and accumulates around the unit, an explosion may result.
- **Do not use the air conditioner where food, pets, plants, precision instruments, or artwork are kept.**
  - The quality of the food, etc. may deteriorate.
- **Do not use the air conditioner in special environments.**
  - Oil, steam, sulfuric smoke, etc. can significantly reduce the performance of the air conditioner or damage its parts.
- **When installing the unit in a hospital, communication station, or similar place, provide sufficient protection against noise.**
  - The inverter equipment, private power generator, high-frequency medical equipment, or radio communication equipment may cause the air conditioner to operate erroneously, or fail to operate. On the other hand, the air conditioner may affect such equipment by creating noise that disturbs medical treatment or image broadcasting.
- **Do not install the unit on a structure that may cause leakage.**
  - When the room humidity exceeds 80% or when the drain pipe is clogged, condensation may drip from the indoor unit. Perform collective drainage work together with the outdoor unit, as required.

### 1.3. Before getting installed (moved) - electrical work

#### Caution:

- **Ground the unit.**
  - Do not connect the ground wire to gas or water pipes, lightning rods, or telephone ground lines. Improper grounding may result in electric shock.
- **Install the power cable so that tension is not applied to the cable.**
  - Tension may cause the cable to break and generate heat and cause a fire.
- **Install an leak circuit breaker, as required.**
  - If an leak circuit breaker is not installed, electric shock may result.
- **Use power line cables of sufficient current carrying capacity and rating.**
  - Cables that are too small may leak, generate heat, and cause a fire.
- **Use only a circuit breaker and fuse of the specified capacity.**
  - A fuse or circuit breaker of a larger capacity or a steel or copper wire may result in a general unit failure or fire.
- **Do not wash the air conditioner units.**
  - Washing them may cause an electric shock.
- **Be careful that the installation base is not damaged by long use.**
  - If the damage is left uncorrected, the unit may fall and cause personal injury or property damage.
- **Install the drain piping according to this Installation Manual to ensure proper drainage. Wrap thermal insulation around the pipes to prevent condensation.**
  - Improper drain piping may cause water leakage and damage to furniture and other possessions.
- **Be very careful about product transportation.**
  - Only one person should not carry the product if it weighs more than 20 kg.
  - Some products use PP bands for packaging. Do not use any PP bands for a means of transportation. It is dangerous.
  - Do not touch the heat exchanger fins. Doing so may cut your fingers.
  - When transporting the outdoor unit, suspend it at the specified positions on the unit base. Also support the outdoor unit at four points so that it cannot slip sideways.
- **Safely dispose of the packing materials.**
  - Packing materials, such as nails and other metal or wooden parts, may cause stabs or other injuries.
  - Tear apart and throw away plastic packaging bags so that children will not play with them. If children play with a plastic bag which was not torn apart, they face the risk of suffocation.

### 1.4. Before starting the test run

#### Caution:

- **Turn on the power at least 12 hours before starting operation.**
  - Starting operation immediately after turning on the main power switch can result in severe damage to internal parts. Keep the power switch turned on during the operational season.
- **Do not touch the switches with wet fingers.**
  - Touching a switch with wet fingers can cause electric shock.
- **Do not touch the refrigerant pipes during and immediately after operation.**
  - During and immediately after operation, the refrigerant pipes are may be hot and may be cold, depending on the condition of the refrigerant flowing through the refrigerant piping, compressor, and other refrigerant cycle parts. Your hands may suffer burns or frost-bite if you touch the refrigerant pipes.
- **Do not operate the air conditioner with the panels and guards removed.**
  - Rotating, hot, or high-voltage parts can cause injuries.
- **Do not turn off the power immediately after stopping operation.**
  - Always wait at least five minutes before turning off the power. Otherwise, water leakage and trouble may occur.



## 2. Combination with indoor units

The indoor units connectable to this unit are shown below.

Outdoor unit model name	Total capacity of connected indoor unit models	Quantity of connectable indoor unit	Model name of connectable indoor unit
PUHY-600	300 to 780	3 to 32	PLFY- P32 · 40 · 50 · 63 · 80 · 100 · 125 VKM
PUHY-650	325 to 845		PLFY- P20 · 25 · 32 · 40 · 50 · 63 · 80 · 100 · 125 VLMD
PUHY-700	350 to 910		PEFY- P20 · 25 · 32 · 40 · 50 · 63 · 80 · 100 · 125 VM
PUHY-750	375 to 975		PDFY- P20 · 25 · 32 · 40 · 50 · 63 · 71 · 80 · 100 · 125 VM
			PCFY- P40 · 63 · 100 · 125 VGM
			PKFY- P20 · 25 VAM
			PKFY- P32 · 40 · 50 VGM
			PFFY- P25 · 32 · 40 · 50 · 63 VLEM
			PFFY- P25 · 32 · 40 · 50 · 63 VLRM

Note:

1. The total capacity of connected indoor unit models represents the total sum of the figures expressed in the indoor model name.
2. Combinations in which the total capacity of the connected indoor units exceeds the capacity of the outdoor unit will reduce the capacity of each indoor unit below the rated capacity during simultaneous operation. Therefore, if circumstances allows, combine indoor units within the capacity of the outdoor unit
3. A transmission booster (RP) is required when the number of connected indoor unit models in a cooling system exceeds the number of models specified in the chart below.

\* The maximum number of units that can be controlled is determined by the indoor unit model, the type of remote controller and their capabilities.

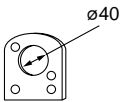
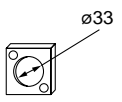
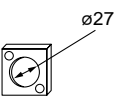

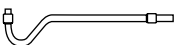

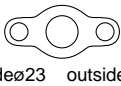
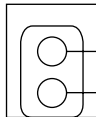
(*1) Capability of the connected indoor units	Number of connected indoor units that can be connected without a RP.	Remote controller PAR-F 25MA	
		Prior to Ver. E	After Ver. F
	200 or lower	16 (32)	20 (40)
	200 or higher	16 (32)	16 (32)

The number of indoor units and the total number of remote controllers is displayed within the parenthesis ( ).

\*1 If even one unit that is higher than 200 exists in the cooling system, the maximum capacity will be "200 or higher".

## 3. Confirmation of parts attached

This outdoor unit is attached with the parts below. Please check the quantity for each item.

Name		① Conduit mounting plate	② Conduit mounting plate	③ Conduit mounting plate	④ Tapping screw M4 × 12
Model name	Shape				
	PUHN-200YMC PUHN-250YMC	1	1	1	4
Name		⑤ Oil balance pipe	⑥ Connecting pipe	⑦ Packing	⑧ Seal
Model name	Shape				
	PUHN-200YMC PUHN-250YMC	1	1	1	2

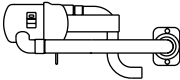

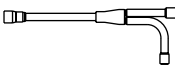
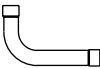
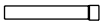



\*⑥ Connecting pipe is fixed with the unit.

## 4. Outdoor unit configuration

The unit (PUHY-600/650/700/750YSMC) consists of a combination of variable capacity units (PUHY-400/500YMC) and constant capacity units (PUHN-200/250YMC). **A CMC-30A (optional) is required when using a combination of these units.**

Super Y	Variable capacity unit	Constant capacity unit
PUHY-600YSMC	PUHY-400YMC	PUHN-200YMC
PUHY-650YSMC		PUHN-250YMC
PUHY-700YSMC	PUHY-500YMC	PUHN-200YMC
PUHY-750YSMC		PUHN-250YMC

CMC-30A (optional)

Model name	Name	① Distributer (gas)	② Oil balance pipe 2	③ Distributer (liquid)	④ Connecting pipe
	Shape				
CMC-30A		1	1	1	1
Model name	Name	⑤ Connecting pipe	⑥ Connecting pipe	⑦ Connecting pipe	⑧ Elbow
	Shape				
CMC-30A		1	1	1	2

## 5. Selection of installation site

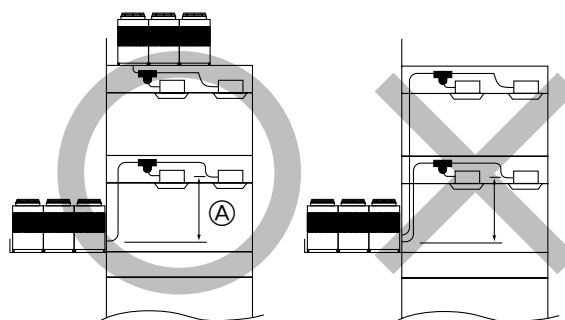
Select space for installing outdoor unit, which will meet the following conditions:

- no direct thermal radiation from other heat sources
- no possibility of annoying neighbors by noise from unit
- no exposition to strong wind
- with strength which bears weight of unit
- note that drain flows out of unit when heating
- with space for air passage and service work shown below

Because of the possibility of fire, do not install unit to the space where generation, inflow, stagnation, and leak of combustible gas is expected.

- Avoid unit installation in a place where acidic solution and spray (sulfur) are often used.
- When having cooling operation at an outside air temperature of below 10 °C, in order to obtain steady operation of unit, select an installation site not exposed directly to rain and snow, or install air outlet and inlet ducts. (Refer to Page 11.) Install the outdoor unit at the same position on the same floor, or above, the indoor unit. (See the figure at the right.)
- Do not use unit in any special environment where oil, steam and sulfuric gas exist.

Installation restriction on outdoor unit when cooling operation is performed when the outdoor air temperature is 10 °C or lower.



(Same floor as indoor unit, or floor above)

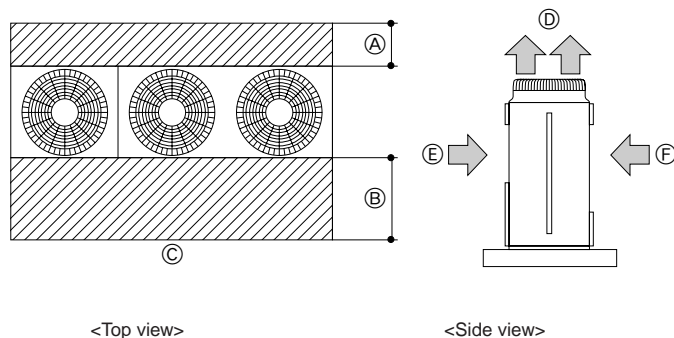
Ⓐ 4 m or less

## 6. Space required around unit

### 6.1. Individual installation

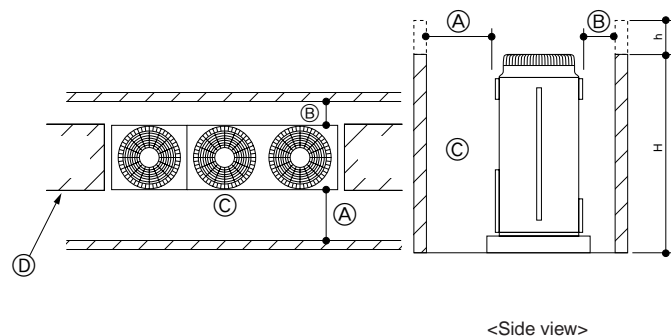
#### Basic space required

A space of at least 250 mm is necessary at the back for inlet air. Taking servicing, etc. from the rear into account, a space of about 450 mm should be provided, the same as at the front.



- (A) 250 mm or more
- (B) 450 mm or more
- (C) Front (outside of machine room)
- (D) Top discharge (open in principle)
- (E) Front inlet (open in principle)
- (F) Rear inlet (open in principle)

#### When inlet air enters from right and left sides of unit



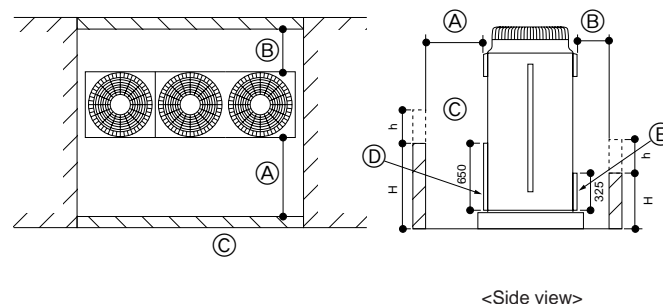
- (A) L1 or more
- (B) L2 or more
- (C) Front
- (D) No restrictions on wall height (left and right)

#### Note:

- Wall heights (H) of the front and the back sides shall be within overall height of unit.
- When the total height is exceeded, add the “h” dimension of the figure above to L1 and L2 in the table above.

Model	L1	L2
PUHY-400	450	250
PUHY-500		

#### When unit is surrounded by walls



- (A) L1 or more
- (B) L2 or more
- (C) Front
- (D) Front panel
- (E) Rear panel

#### Note:

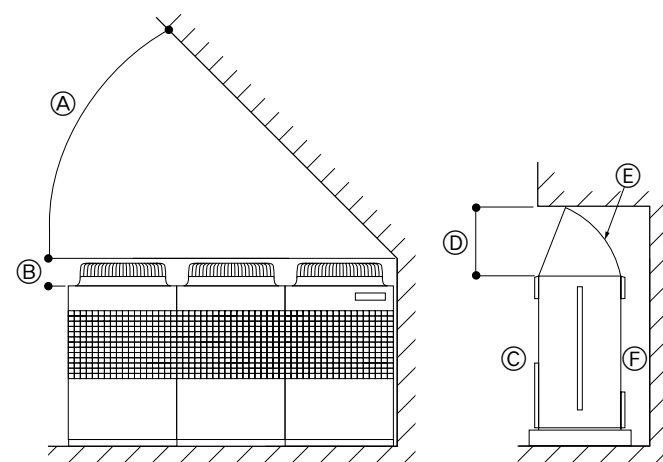
- Wall heights (H) of the front and the back sides shall be within height of front panel and rear panel.
- If the panel height is exceeded, add the “h” dimension of the figure above to L1 and L2 in the table above.

Model	L1	L2
PUHY-400	450	250
PUHY-500		

Example: When h is 100

The L1 dimension becomes 450+100 = 550 mm.

#### When there is an obstruction above the unit

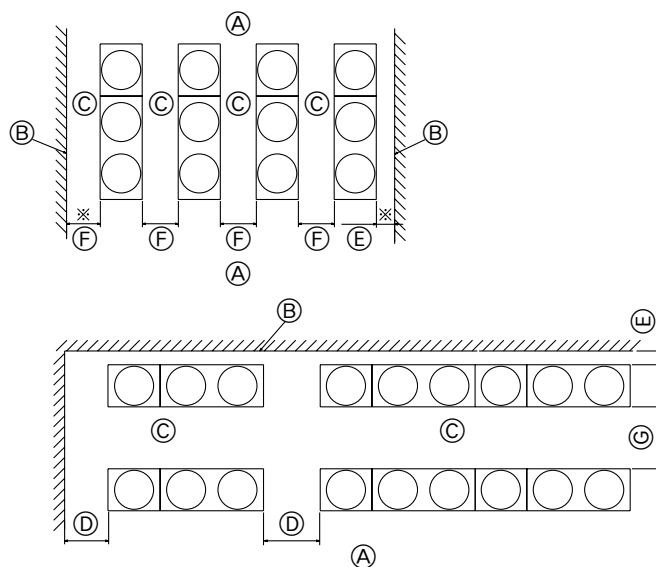
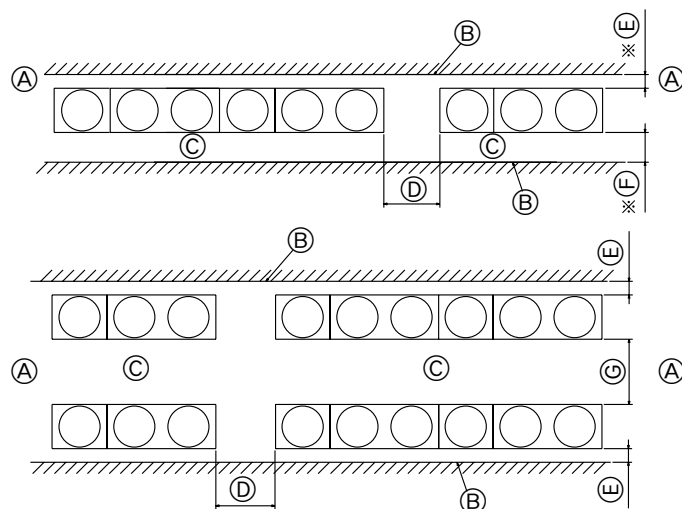


When there is little space up to an obstruction

- (A) 45° or more
- (B) 300 mm or more
- (C) Front
- (D) 1000 mm or more
- (E) Air outlet guide (procured at the site)
- (F) Rear

## 6.2. Collective installation and continuous installation

Space required for collective installation and continuous installation:  
When installing several units, leave the space between each block as shown below considering passage for air and people.



- (A) (Must be open)
- (B) Wall height (H)
- (C) Front
- (D) 1000 mm or more
- (E) 250 mm or more
- (F) 450 mm or more
- (G) 900 mm or more

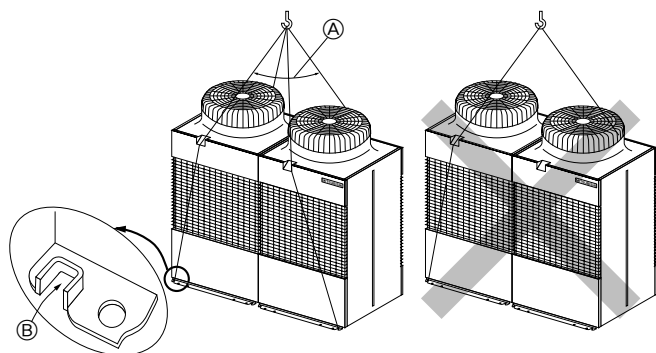
### Note:

- Open in the two directions
- In case wall height (H) exceeds overall height of unit, add "h" dimension (h = wall height <H> – overall height of unit) to \* marked dimension.
- If there is a wall at both the front and the rear of the unit, install up to three units consecutively in the side direction and provide a space of 1000 mm or more as inlet space/passage space for each three units.

## 7. Lifting method and weight of product

- When carrying the unit suspended, pass the ropes under the unit and use the two suspension points each at the front and rear.
- Always lift the unit with ropes attached at four points so that impact is not applied to the unit.
- Attach the ropes to the unit at an angle of 40° or less.
- Use two ropes at least A m long.

$$A = \begin{cases} 7 \dots \text{PUHN-200/250YMC} \\ 8 \dots \text{PUHY-400/500YMC} \end{cases}$$



**Dangerous!**

- (A) 40° or less
- (B) Rope suspension part

Weight of product:

PUHY-400	PUHY-500	PUHN-200	PUHN-250
430 kg	470 kg	240 kg	255 kg

### ⚠ Caution:

**Be very careful to carry product.**

- Do not have only one person to carry product if it is more than 20 kg.
- PP bands are used to pack some products. Do not use them as a mean for transportation because they are dangerous.
- Do not touch heat exchanger fins with your bare hands. Otherwise you may get a cut in your hands.
- Tear plastic packaging bag and scrap it so that children cannot play with it. Otherwise plastic packaging bag may suffocate children to death.
- When carrying in outdoor unit, be sure to support it at four points. Carrying in and lifting with 3-point support may make outdoor unit unstable, resulting in a fall of it.

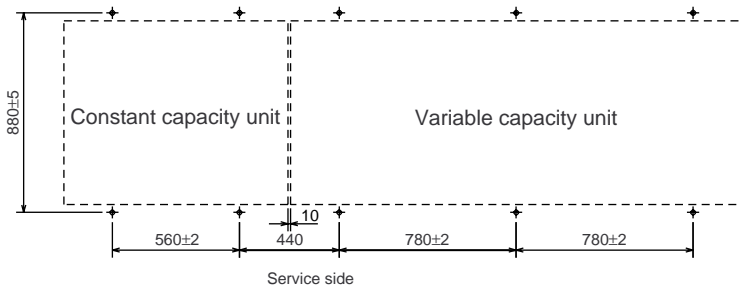
## 8. Installation of unit

### 8.1. Location of anchor bolt

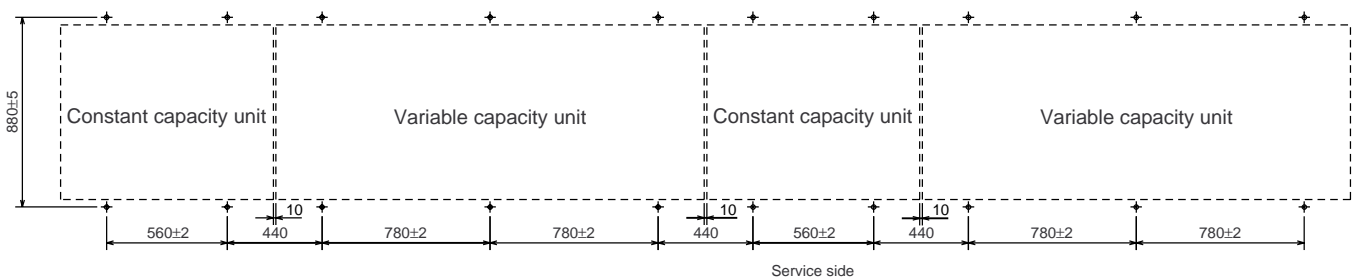
Mount the constant capacity unit on the left and variable capacity unit on the right of the same frame (as seen from the front of the unit). Allow 10 mm of clearance between the units.

- Individual installation

(Unit: mm)



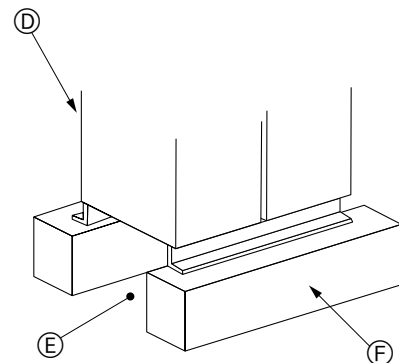
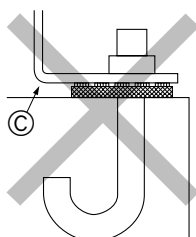
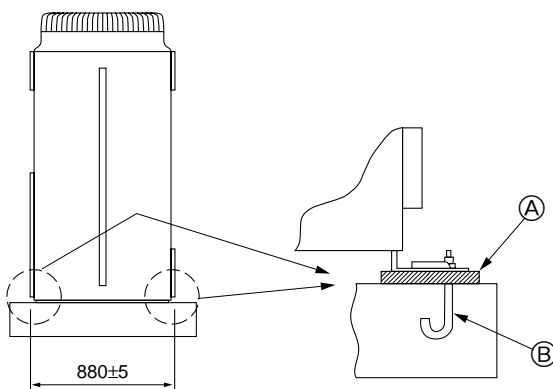
- Example of collective installation



For collective installation, provide a 10 mm gap between units.

### 8.2. Installation

- Fix unit tightly with bolts as shown below so that unit will not fall down due to earthquake or gust.
- Use concrete or angle for foundation of unit.
- Vibration may be transmitted to the installation section and noise and vibration may be generated from the floor and walls, depending on the installation conditions. Therefore, provide ample vibrationproofing (cushion pads, cushion frame, etc.).



- (A) Be sure that the corners are firmly seated. If the corners are not firmly seated, the installation feet may be bent.
- (B) M10 anchor bolt procured at the site.
- (C) Corner is not seated.
- (D) Unit  
(provide ample vibrationproofing between the unit and the foundation by using cushion pads, cushion frame, etc.)
- (E) Piping and wiring space (bottom piping, bottom wiring)
- (F) Concrete foundation

#### ⚠ Warning:

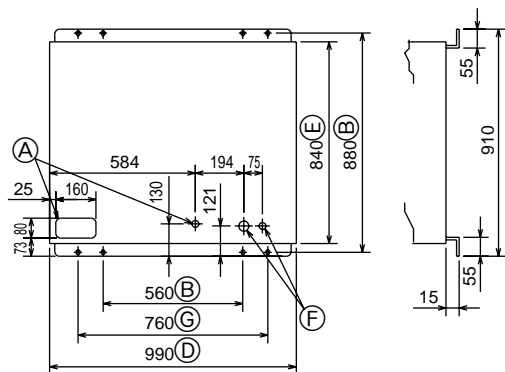
- Be sure to install unit in a place strong enough to withstand its weight.  
Any lack of strength may cause unit to fall down, resulting in a personal injury.
- Have installation work in order to protect against a strong wind and earthquake.  
Any installation deficiency may cause unit to fall down, resulting in a personal injury.

When building the foundation, give full attention to the floor strength, drain water disposal <during operation, drain water flows out of the unit>, and piping and wiring routes.

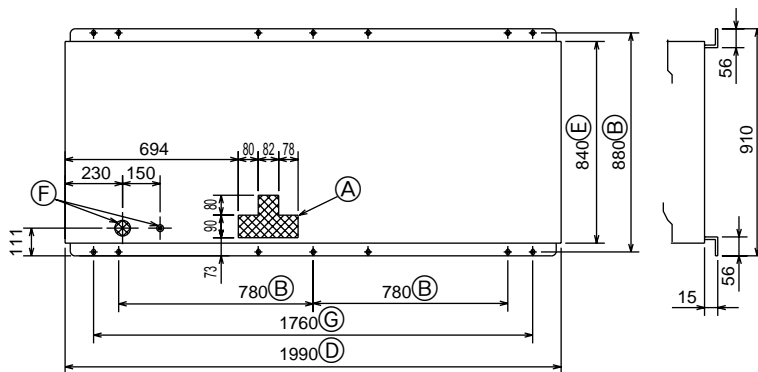
### Down piping and down wiring precautions

When down piping and down wiring are performed, be sure that foundation and base work does not block the base through holes. When down piping is performed, make the foundation at least 150 mm high so that the piping can pass under the bottom of the unit.

<For PUHN-200/250YMC>



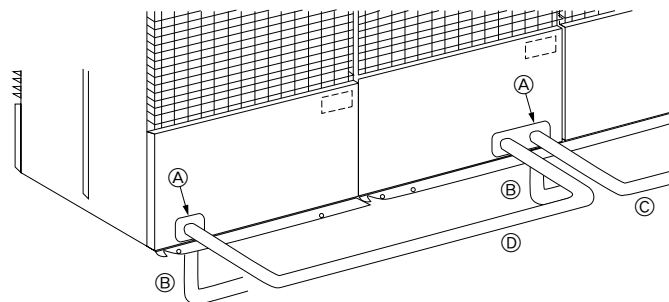
<For PUHY-400/500YMC>



- Ⓐ Bottom piping through hole
- Ⓑ (bolt hole)
- Ⓒ (bolt hole for old models)
- Ⓓ (unit width)
- Ⓔ (unit depth)
- Ⓕ Bottom wiring through hole
- Ⓖ (bolt hole for packing)

### 8.3. Connecting direction for refrigerant piping

Two connecting directions are available for refrigerant piping of the outdoor unit: bottom piping and front piping, as shown below:



- Ⓐ Knock-out hole
- Ⓑ Bottom piping
- Ⓒ Front piping
- Ⓓ Connect piping (to constant capacity unit)

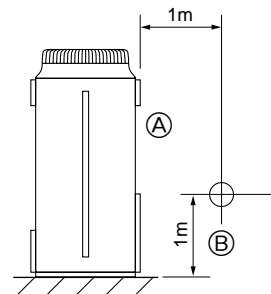
#### Note:

In the case of bottom piping, build a 100 mm or higher foundation so that piping will go through the bottom of the unit.

### 8.4. Noise level

(50/60Hz)

PUHY-400	PUHY-500	PUHN-200	PUHN-250
60/61 dB (A-weighted)	56 dB (A-weighted)	56 dB (A-weighted)	57 dB (A-weighted)



- Ⓐ Front
- Ⓑ Measuring point

Measuring location: a room free from echoes and reverberations

## 9. Caution for snow and seasonal wind

In cold and/or snowy areas, sufficient countermeasures to wind and snow damages should be taken for operating unit in normal and good condition in winter time. Even in the other areas, full consideration is required for installation of unit in order to prevent abnormal operations caused by seasonal wind or snow. **When rain and snow directly fall on unit in the case of air-conditioning operations in 10 or less degrees centigrade outdoor air, mount inlet and outlet ducts on unit for assuring stable operations.**

### 9.1. Snow and seasonal wind

#### ■ Prevention of wind and snow damages in cold or snowy areas:

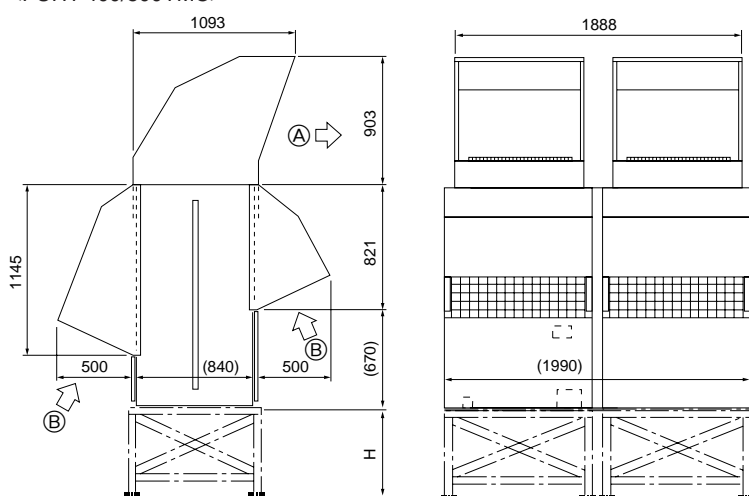
Refer to the figure of snow hood shown below:

- Snow hood

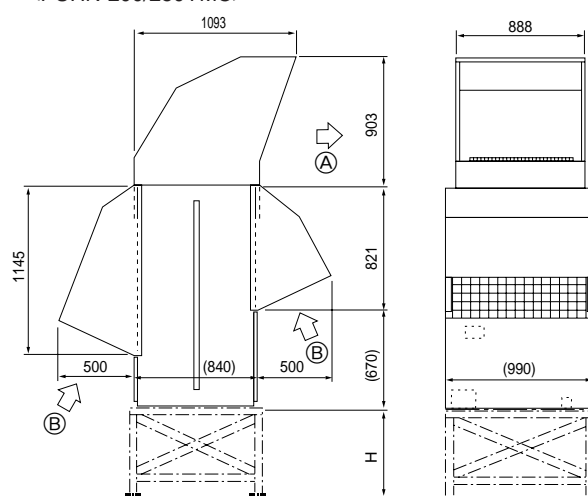
#### Note:

1. Height of frame base for snow damage prevention (H) shall be twice as high as expected snowfall. Width of frame base shall not exceed that of the unit. The frame base shall be made of angle steel, etc., and designed so that snow and wind slip through the structure. (If frame base is too wide, snow will be accumulated on it.)
2. Install unit so that seasonal wind will not directly lash against openings of inlet and outlet ducts.
3. Build frame base at customer referring to this figure.  
Material : Galvanized steel plate 1.2T  
Painting: Overall painting with polyester powder  
Color : Munsell 5Y8/1 (same as that of unit)
4. When the unit is used in a cold region and the heating operation is continuously performed for a long time when the outside air temperature is below freezing, install a heater to the unit base or take other appropriate measures to prevent water from freezing on the base.

<PUHY-400/500YMC>



<PUHN-200/250YMC>

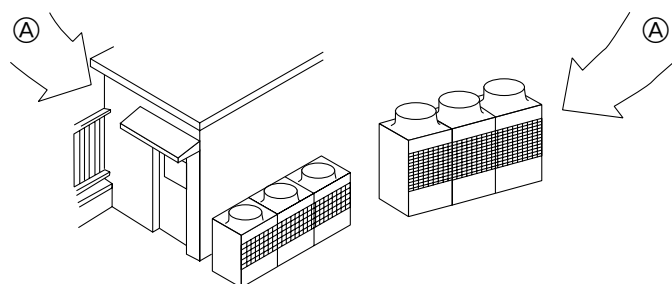


(A) Outlet

(B) Inlet

### 9.2. Countermeasure to seasonal wind

Referring to the figure shown below, take appropriate measures which will suit the actual situation of the place for installation.



(A) Seasonal wind



## 10. Refrigerant piping installation

Connecting the piping is a terminal-branch type in which refrigerant piping from the outdoor unit is branched at the terminal and connected to each of the indoor units.

The method of connection consists of flare connections at the indoor units, flange connections for the piping of the outdoor unit and flare connections for the liquid, oil balance piping. Note that the branched sections are brazed.

### ⚠ Warning:

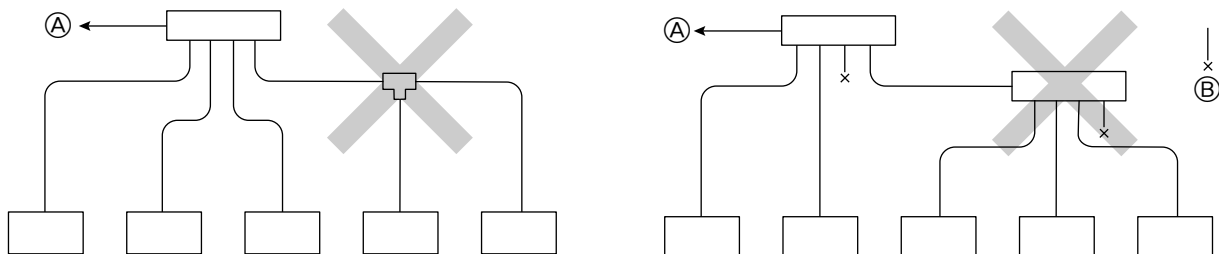
**Always use extreme care to prevent the refrigerant gas (R22) from leaking while using fire or flame. If the refrigerant gas comes in contact with the flame from any source, such as a gas stove, it breaks down and generates a poisonous gas which can cause gas poisoning. Never weld in an unventilated room. Always conduct an inspection for gas leakage after installation of the refrigerant piping has been completed.**

### 10.1. Areas of caution

- ① Use the following materials for refrigeration piping.
  - Material: Seamless phosphorous deoxidized copper pipe, C1220T-OL or C1220T-O (Note: C1220T-OL is preferred.)
  - Size: Refer to pages **13** to **14**.
- ② Commercially available piping often contains dust and other materials. Always blow it clean with a dry inert gas.
- ③ Use care to prevent dust, water or other contaminants from entering the piping during installation.
- ④ Reduce the number of bending portions as much as possible, and make bending radius as big as possible.
- ⑤ Always use the branch piping set shown below, which are sold separately. **This unit requires a CMC-30A (optional).**

Branch pipe set name						
Line branching				Header branching		
Total of units downstream less than 160	Total of units downstream 161 to 330	Total of units downstream more than 331 to 630	Total of units downstream more than 631	4 branching	7 branching	10 branching
CMY-Y102S-F	CMY-Y102L-F	CMY-Y202-F	CMY-Y302-F	CMY-Y104-E	CMY-Y107-E	CMY-Y1010-E

- ⑥ If the diameters of the branch piping of the designated refrigerant piping differs, use a pipe cutter to cut the connecting section and then use an adapter for connecting different diameters to connect the piping.
- ⑦ Always observe the restrictions on the refrigerant piping (such as rated length, the difference between high/low pressures, and piping diameter). Failure to do so can result in equipment failure or a decline in heating/cooling performance.
- ⑧ A second branch cannot be made after a header branch. (These are shown by X.)



- Ⓐ To outdoor unit  
Ⓑ Capped piping

- ⑨ Always use good-quality materials for brazing.
- ⑩ The City Multi Series Super Y will stop due an abnormality due to excessive or insufficient coolant. At such a time, always properly charge the unit. When servicing, always check the notes concerning pipe length and amount of additional refrigerant at both locations, the refrigerant volume calculation table on the back of the service panel and the additional refrigerant section on the labels for the combined number of indoor units. (Refer to pages **13** to **14**.)
- ⑪ **Never perform a pump down. This will damage the compressor.**
- ⑫ Never use refrigerant to perform an air purge. Always evacuate using a vacuum pump.
- ⑬ Always insulate the piping properly. Insufficient insulation will result in a decline in heating/cooling performance, water drops from condensation and other such problems. (Refer to pages **22** to **23**.)
- ⑭ When connecting the refrigerant piping, make sure the ball valve of the outdoor unit is completely closed (the factory setting) and do not operate it until the refrigerant piping for the outdoor and indoor units has been connected, a refrigerant leakage test has been performed and the evacuation process has been completed.
- ⑮ Always use a non-oxidizing brazing material for brazing the parts. If a non-oxidizing brazing material is not used, it could cause clogging or damage to the compressor unit. (Details of the piping connections and valve operation can be found on pages **15** to **19**.)

### ⚠ Warning:

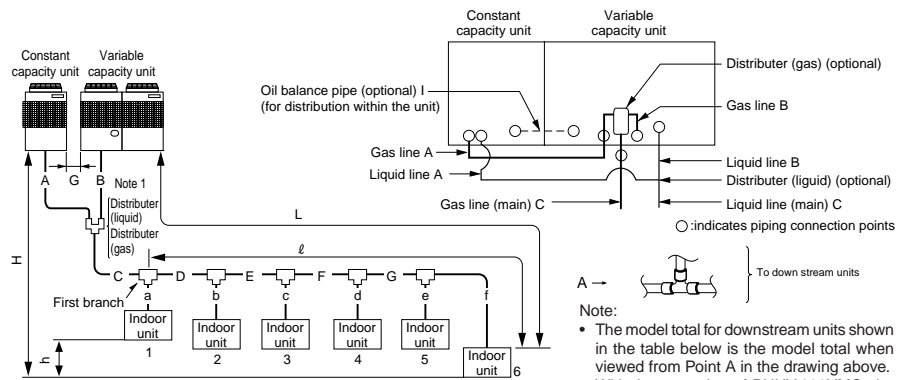
**When installing and moving the air conditioner to another site, do not charge the it with a refrigerant different from the refrigerant (R22) specified on the unit.**

- If a different refrigerant or air is mixed with the original refrigerant, the refrigerant cycle may malfunction and the unit may be damaged.

## 10.2. Refrigerant piping system

### Line-branch method

Connection examples  
(connecting to six indoor units)



Note 1: Because it is built into the variable capacity unit, B is used to carry liquid only. Set the constant capacity unit and variable capacity unit in accordance with the G dimension given in the figure above (G = 0.01 m).

	Item	Piping components	Tolerance
Permissible length	Indoor side	Total piping length A+B+C+D+E+F+G+a+b+c+d+e+f	220 m or less
		Farthest piping length (L)	100 m or less (Max. equivalent length 125 m)
		Farthest piping length after first branch (ℓ)	40 m or less
	Outdoor side	Oil balance pipe	The included oil balance pipe must be used. If any other piping is used, the length of the oil balance pipe must be no more than 3 m (max. equivalent length 4 m), and height from the bottom of the unit must be no more than 0.1 m.
Permissible high/Low difference	Indoor/Outdoor	Distributor (liquid)/Variable capacity unit, Constant capacity unit	4 m or less (Max. equivalent length 5 m)
		Distributor (gas)/Constant capacity unit	4 m or less (Max. equivalent length 5 m)
	Indoor/Indoor	Outdoor upper	50 m or less
		Outdoor lower	40 m or less
Permissible high/Low difference	Indoor/Indoor	Variable capacity unit/Constant capacity unit	15 m or less
		Variable capacity unit/Constant capacity unit	Must be installed on same frame, and there must be no high/low difference.

### Selecting the refrigerant branch kit

Use the table to the right to make the selection based on the model total of indoor units downstream from the branch section.

Select the branch kit, sold separately, from the table below. (Each kit contains a refrigerant and gas piping set.)

Downstream unit model total	Branch kit model
160 or less	CMY-Y102S-F
161 to 330	CMY-Y102L-F
331 to 630	CMY-Y202-F
631 or more	CMY-Y302-F

### Select each section of refrigerant piping

- Section from outdoor unit to first branch (C)
- Sections from branch to indoor unit (a, b, c, d, e, f)
- Section from branch to branch (D, E, F, G)

Each section of piping

Select the size from the table to the right.

- (1) Refrigerant piping diameter in section from outdoor unit to first branch (outdoor unit piping diameter)

Model	Piping diameter (mm)	
	Liquid line	Gas line
PUHY-600YSMC	ø19.05	ø38.1
PUHY-650YSMC	ø19.05	ø44.45
PUHY-700YSMC	ø19.05	ø44.45
PUHY-750YSMC	ø19.05	ø44.45

- (2) Refrigerant piping diameter in section from branch to indoor unit (indoor unit piping diameter)

Model number	Piping diameter (mm)	
	Liquid line	Gas line
20 · 25 · 32 · 40	ø6.35	ø12.7
50 · 63 · 71 · 80	Liquid line	ø9.52
	Gas line	ø15.88
100 · 125	Liquid line	ø9.52
	Gas line	ø19.05

- (3) Refrigerant piping diameter in section from branch to branch

Downstream unit model total	Liquid line (mm)	Gas line (mm)
80 or less	ø9.52	ø15.88
81 to 160	ø12.7	ø19.05
161 to 330	ø12.7	ø25.4
331 to 480	ø15.88	ø31.75
481 to 630	ø15.88	ø38.1
631 or more	ø19.05	ø44.45

(kg)			
Variable capacity unit	Constant capacity unit		
400	500	200	250
16	22	6.5	8.5

### Additional refrigerant charge

The outdoor unit is charged with refrigerant at the time of shipping according to the chart above. As this charge does not include the amount needed for extended piping, additional charging for each refrigerant line will be required on site. In order that future servicing may be properly provided, always keep a record of the size and length of each refrigerant line and the amount of additional charge by writing it in the space provided on the outdoor unit.

### Calculation of additional refrigerant charge

- Calculate the amount of additional charge based on the length of the piping extension and the size of the refrigerant line.
- Use the table to the right as guide to calculating the amount of additional charging and charge the system according.
- If the calculation results in a fraction of less than 0.1 kg, round up to the next 0.1 kg. For example, if the result of the calculation was 23.28 kg, round the result up to 23.3 kg.
- If the total amount of refrigerant including the amount of refrigerant sealed in the outdoor unit when shipped from the factor plus additional refrigerant for extension piping exceeds 73 kg, use 73 kg as the total amount of refrigerant.

Amount of refrigerant when shipped from factory + added refrigerant ≤ 73 kg

### <Additional charge>

Liquid pipe size total length of ø19.05 × 0.29	Liquid pipe size total length of ø15.88 × 0.25	Liquid pipe size total length of ø12.7 × 0.12	Liquid pipe size total length of ø9.52 × 0.06	Liquid pipe size total length of ø6.35 × 0.024	α
(m) × 0.29 (kg/m)	(m) × 0.25 (kg/m)	(m) × 0.12 (kg/m)	(m) × 0.06 (kg/m)	(m) × 0.024 (kg/m)	

<Example> Indoor 1 : 125	A : ø12.7	3 m	a : ø9.52	15 m	At the conditions below:
2 : 125	B : ø15.88	1 m	b : ø9.52	15 m	
3 : 125	C : ø19.05	40 m	c : ø9.52	10 m	
4 : 125	D : ø15.88	10 m	d : ø9.52	5 m	
5 : 100	E : ø15.88	5 m	e : ø9.52	5 m	
6 : 40	F : ø12.7	5 m	f : ø6.35	5 m	

The total length of each liquid line is as follows

ø19.05 : C = 40 m  
 ø15.88 : B + D + E = 1 + 10 + 5 = 16 m  
 ø12.7 : A + F + G = 3 + 5 + 5 = 13 m  
 ø9.52 : a + b + c + d + e = 50 m  
 ø6.35 : f = 5 m

Therefore,

<Calculation example>

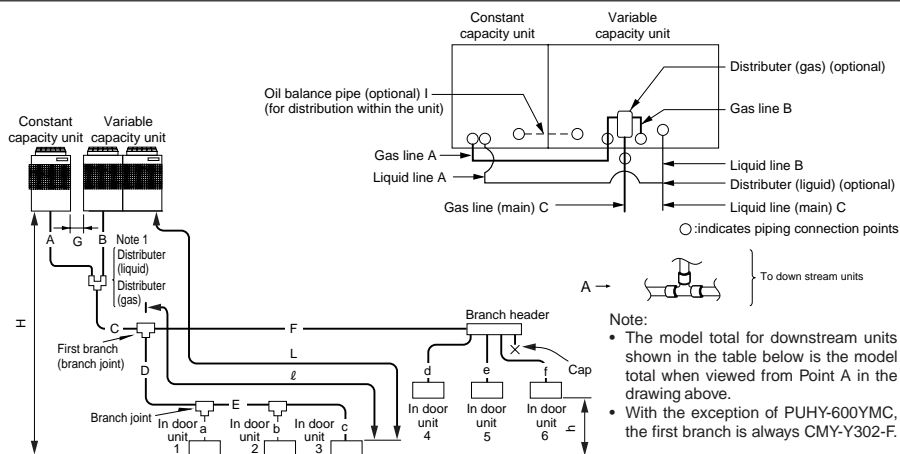
Additional refrigerant charge = 40 × 0.29 + 16 × 0.25 + 13 × 0.12 + 50 × 0.06 + 5 × 0.024 + 3.0 = 23.3 kg

Value of α

Total capacity of connecting indoor units	α
to Model 80	1.0 kg
Models 81 to 160	1.5 kg
Models 161 to 330	2.0 kg
Models 331 to 480	2.5 kg
Models 481 to 630	3.0 kg
Models 631 or more	4.0 kg

### Multiple line/header

Connection examples  
(connecting to six indoor units)



Note 1: Because it is built into the variable capacity unit, B is used to carry liquid only. Set the constant capacity unit and variable capacity unit in accordance with the G dimension given in the figure above (G = 0.01 m).

	Item	Piping components	Tolerance
Permissible length	Indoor side	Total piping length	220 m or less
		Farthest piping length (L)	100 m or less (Max. equivalent length 125 m)
		Farthest piping length after first branch (ℓ)	40 m or less
Permissible high/Low difference	Outdoor side	Oil balance pipe	The included oil balance pipe must be used. If any other piping is used, the length of the oil balance pipe must be no more than 3 m (max. equivalent length 4 m), and height from the bottom of the unit must be no more than 0.1 m.
		Distributor (liquid)/Variable capacity unit, Constant capacity unit	4 m or less (Max. equivalent length 5 m)
		Distributor (gas)/Constant capacity unit	4 m or less (Max. equivalent length 5 m)
Permissible high/Low difference	Indoor/Outdoor	Outdoor upper	50 m or less
		Outdoor lower	40 m or less
	Indoor/Indoor		15 m or less
	Variable capacity unit/Constant capacity unit	—	Must be installed on same frame, and there must be no high/low difference.

### Selecting the refrigerant branch kit

Use the table to the right to make the selection based on the model total of indoor units downstream from the branch section or on the number of indoor units to be connected on the header branch.

Select the branch kit, sold separately, from the table below. (Each kit contains a refrigerant and gas piping set.)

Line branching				Header branching		
Total of units downstream less than 180	Total of units downstream 181 to 370	Total of units downstream 371 to 710	Total of units downstream more than 711	4 branching header	7 branching header	10 branching header
CMY-Y102S-C	CMY-Y102L-C	CMY-Y202-C	CMY-Y302-C	CMY-Y104	CMY-Y107	CMY-Y1010

### Select each section of refrigerant piping

- (1) Section from outdoor unit to first branch (C)
- (2) Sections from branch to indoor unit (a, b, c, d, e, f)
- (3) Section from branch to branch (D, E, F)
- Each section of piping

Select the size from the table to the right.

(1) Refrigerant piping diameter in section from outdoor unit to first branch (outdoor unit piping diameter)

Model	Piping diameter (mm)	
	Liquid line	Gas line
PUHY-600YSMC	ø19.05	ø38.1
PUHY-650YSMC	ø19.05	ø44.45
PUHY-700YSMC	ø19.05	ø44.45
PUHY-750YSMC	ø19.05	ø44.45

(2) Refrigerant piping diameter in section from branch to indoor unit (indoor unit piping diameter)

Model number	Piping diameter (mm)	
	Liquid line	Gas line
22 · 28 · 36 · 45	ø6.35	ø12.7
56 to 90	ø9.52	ø15.88
112 · 140 · 160	ø9.52	ø19.05
224	ø12.7	ø25.4
280	ø12.7	ø28.6

(3) Refrigerant piping diameter in section from branch to branch

Downstream unit model total	Liquid line (mm)	Gas line (mm)
90 or less	ø9.52	ø15.88
91 to 180	ø12.7	ø19.05
181 to 370	ø12.7	ø25.4
371 to 540	ø15.88	ø31.75
541 to 710	ø15.88	ø38.1
711 or more	ø19.05	ø44.45

### Additional refrigerant charge

The outdoor unit is charged with refrigerant at the time of shipping according to the chart above. As this charge does not include the amount needed for extended piping, additional charging for each refrigerant line will be required on site. In order that future servicing may be properly provided, always keep a record of the size and length of each refrigerant line and the amount of additional charge by writing it in the space provided on the outdoor unit.

### Calculation of additional refrigerant charge

- Calculate the amount of additional charge based on the length of the piping extension and the size of the refrigerant line.
  - Use the table to the right as guide to calculating the amount of additional charging and charge the system according.
  - If the calculation results in a fraction of less than 0.1 kg, round up to the next 0.1 kg. For example, if the result of the calculation was 20.03 kg, round the result up to 20.1 kg.
  - If the total amount of refrigerant including the amount of refrigerant sealed in the outdoor unit when shipped from the factor plus additional refrigerant for extension piping exceeds 73 kg, use 73 kg as the total amount of refrigerant.
- Amount of refrigerant when shipped from factory + added refrigerant ≤ 73 kg

<Additional charge>

Liquid pipe size total length of ø19.05 × 0.29	Liquid pipe size total length of ø15.88 × 0.25	Liquid pipe size total length of ø12.7 × 0.12	Liquid pipe size total length of ø9.52 × 0.06	Liquid pipe size total length of ø6.35 × 0.024	α
(m) × 0.29 (kg/m)	(m) × 0.25 (kg/m)	(m) × 0.12 (kg/m)	(m) × 0.06 (kg/m)	(m) × 0.024 (kg/m)	

<Example> Indoor 1 : 125 A : ø12.7 3 m a : ø9.52 10 m  
 2 : 125 B : ø15.88 1 m b : ø9.52 5 m  
 3 : 125 C : ø19.05 30 m c : ø9.52 5 m  
 4 : 125 D : ø15.88 10 m d : ø9.52 10 m  
 5 : 100 E : ø12.7 5 m e : ø9.52 15 m  
 6 : 40 F : ø12.7 15 m f : ø6.35 5 m

The total length of each liquid line is as follows

ø19.05 : C = 30 m  
 ø15.88 : B + D = 1 + 10 = 11 m  
 ø12.7 : A + E + F = 3 + 5 + 15 = 23 m  
 ø9.52 : a + b + c + d + e = 10 + 5 + 5 + 10 + 15 = 45 m  
 ø6.35 : f = 5 m

Therefore,  
 <Calculation example>  
 Additional

refrigerant charge = 30 × 0.29 + 11 × 0.25 + 23 × 0.12 + 45 × 0.06 + 5 × 0.024 + 3.0 = 20.1 kg

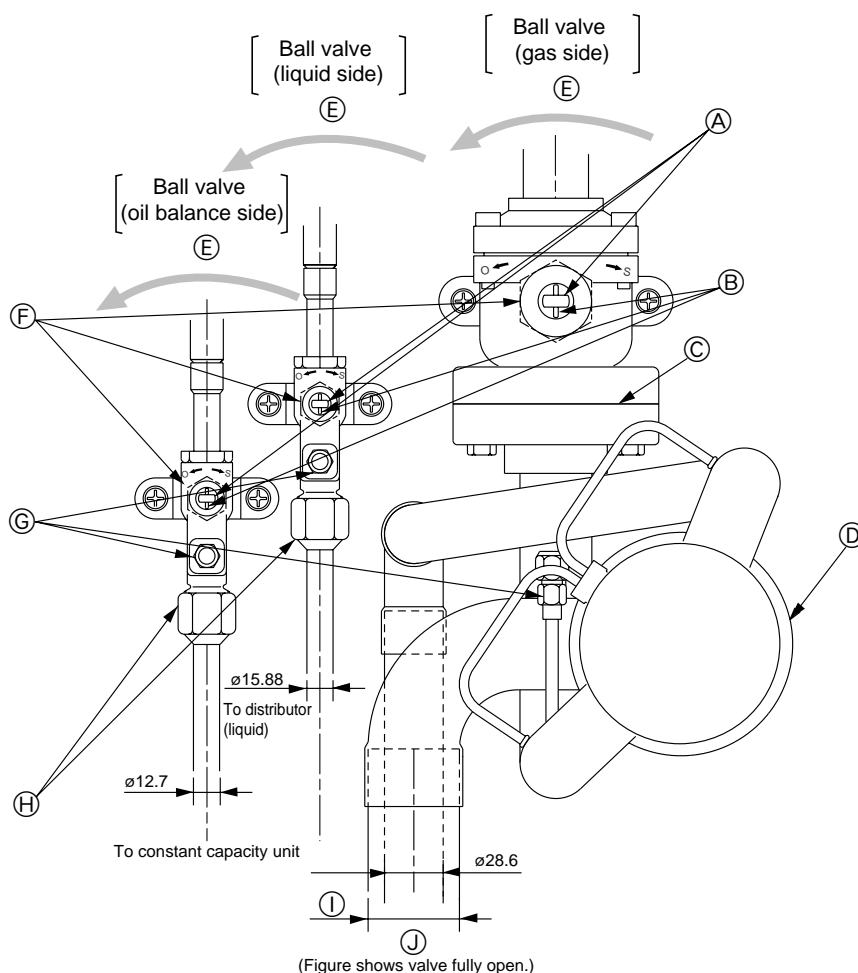
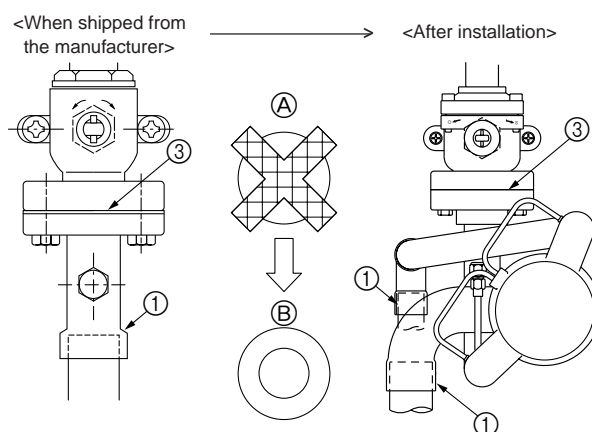
Value of α

Total capacity of connecting indoor units	α
to Model 80	1.0 kg
Models 81 to 160	1.5 kg
Models 161 to 330	2.0 kg
Models 331 to 480	2.5 kg
Models 481 or more	3.0 kg

## 10.3. Precautions concerning piping connection and valve operation

<For variable capacity unit>

- Connect piping and operate valves exactly as described in the figure below.
- After performing the following distributor (gas) connection, remove the connecting pipe included with the gas ball valve of the variable capacity unit, and mount the distributor (gas) (optional).
  - ① When brazing the distributor (gas), braze it outside of the unit before mounting on the variable capacity unit.
  - ② During the time when removing the connecting pipe with flange, remove the seal attached on the back side of this sheet and paste it onto the flange surface of the ball valve to prevent the entry of dust into the valve.
  - ③ The refrigerant circuit is closed with a round, close-packed packing at the shipment to prevent gas leak between flanges. As no operation can be done under this state, be sure replace the packing with the hollow packing attached at the piping connection.
  - ④ At the mounting of the hollow packing, wipe off dust attached on the flange sheet surface and the packing. Coat refrigerating machine oil onto both surfaces of the packing.
- After evacuation and refrigerant charge, ensure that the handle is fully open. If operating with the valve closed, abnormal pressure will be imparted to the high- or low-pressure side of the refrigerant circuit, or a shortage of oil in the compressor may occur due to lack of oil flow between units, giving damage to the compressor, four-way valve, etc.
- For evacuating, be sure to provide an oil balance pipe between the variable capacity and constant capacity units.
- Determine the amount of additional refrigerant charge by using the formula, and charge refrigerant additionally through the service port after completing piping connection work.
- After completing work, shut the service port and cap tightly so that gas leaking does not occur.
- Connect ball valve piping in the order of (oil balance) → (liquid side) → (gas side).



### ⚠ Warning:

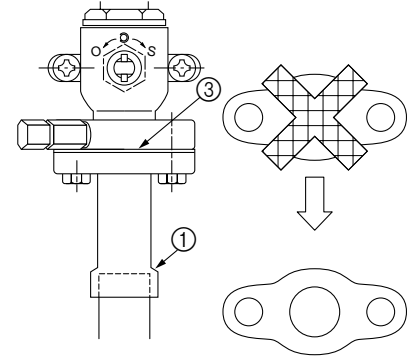
**Braze the distributor (gas) outside the unit, before mounting distributor (gas)\* to ball valve of the variable capacity unit.**

- If brazed while mounted, the ball valve is heated and could result in cracking or gas leaks. The wiring inside the unit could also be burned.

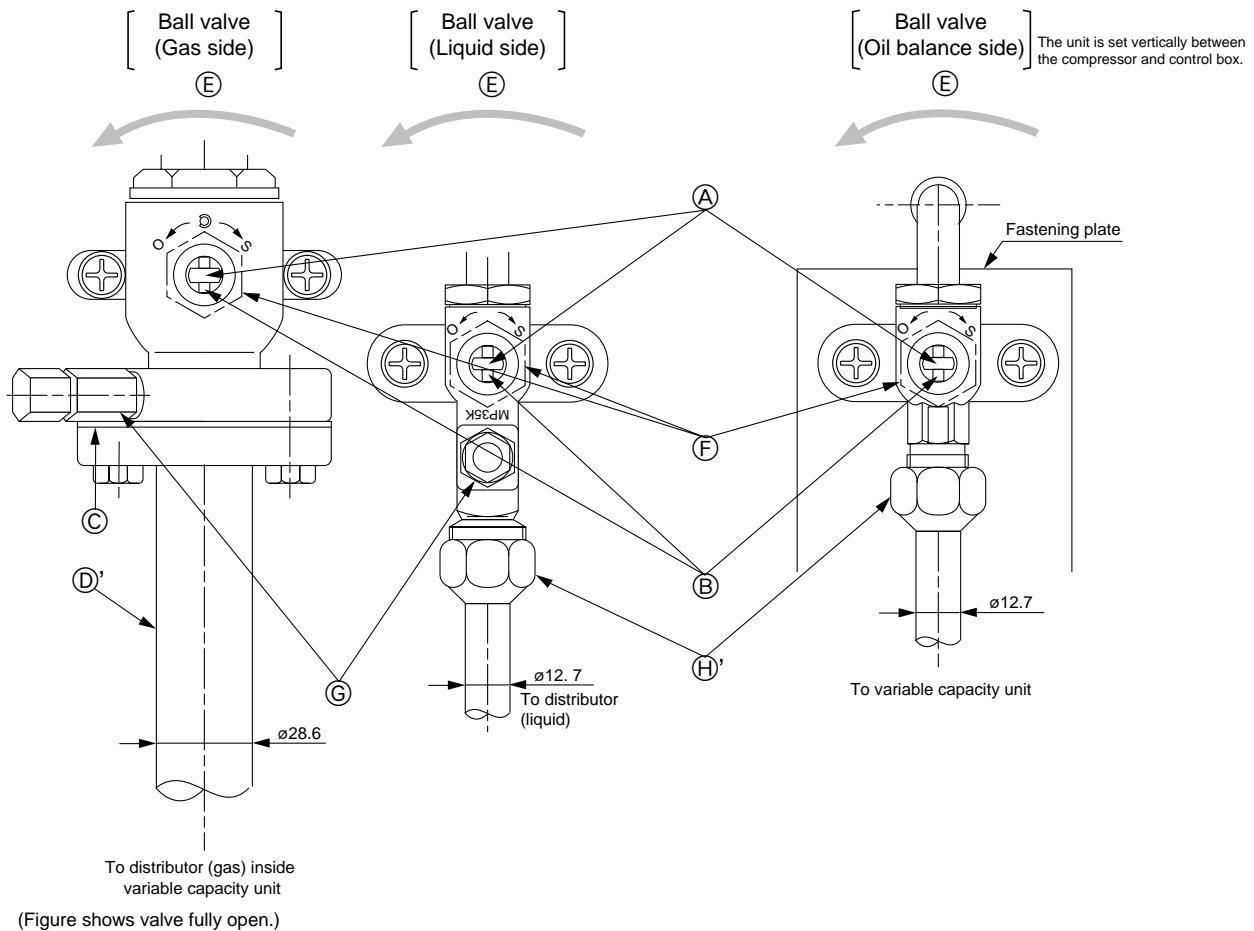
<For constant capacity unit>

- Connect piping and operate valves exactly as described in the figure below.
- Gas side connecting piping is already assembled when the equipment is shipped. (See figure on right.)

- ① When brazing to connecting pipe with flange, remove the connecting pipe with flange from the ball valve, and braise at the outside of the unit.
- ② During the time when removing the connecting pipe with flange, remove the seal attached on the back side of this sheet and paste it onto the flange surface of the ball valve to prevent the entry of dust into the valve.
- ③ The refrigerant circuit is closed with a round, close-packed packing at the shipment to prevent gas leak between flanges. As no operation can be done under this state, be sure to replace the packing with the hollow packing attached at the piping connection.
- ④ At the mounting of the hollow packing, wipe off dust attached on the flange sheet surface and the packing. Coat refrigerating machine oil onto both surfaces of the packing.



- After evacuation and refrigerant charge, ensure that the handle is fully open. If operating with the valve closed, abnormal pressure will be imparted to the high- or low-pressure side of the refrigerant circuit, or a shortage of oil in the compressor may occur due to lack of oil flow between units, giving damage to the compressor, four-way valve, etc.
- For evacuating, be sure to provide an oil balance pipe between the variable capacity and constant capacity units.
- Determine the amount of additional refrigerant charge by using the formula, and charge refrigerant additionally through the service port after completing piping connection work.
- After completing work, shut the service port and cap tightly so that gas leaking does not occur.



### ⚠ Warning:

**Be sure to remove the connecting pipe from the ball valve, and braise it outside the unit.**

- If brazed while mounted, the ball valve is heated and could result in cracking or gas leaks. The wiring inside the unit could also be burned.

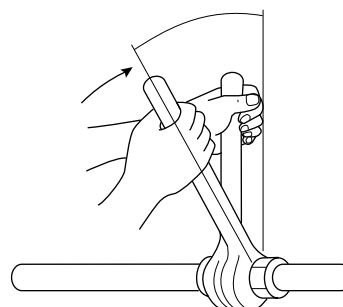
- Ⓐ Valve stem  
[Fully closed at the factory, when connecting the piping, when evacuating, and when charging additional refrigerant. Open fully after the operations above are completed.]
- Ⓑ Stopper pin [Prevents the valve stem from turning 90° or more.]
- Ⓒ Packing (accessory)  
Mount packing (accessory) securely to the valve flange so that gas does not leak. (screw tightening torque is 43 N·m (430 kg·cm). Apply a coat of refrigerating machine oil to both surfaces of the packing.
- Ⓓ Connecting pipe (accessory)  
[Use packing and securely install this pipe to the valve flange so that gas leakage will not occur. (tightening torque: 25 N·m (250 kg·cm)) Coat both surfaces of the packing with refrigerator oil.]
- Ⓔ Open (operate slowly)
- Ⓕ Cap, copper packing  
[Remove the cap and operate the valve stem. Always reinstall the cap after operation is completed. (valve stem cap tightening torque: 25 N·m (250 kg·cm) or more)]
- Ⓖ Service port  
[Use this port to evacuate the refrigerant piping and add an additional charge at the site.  
Open and close the port using a double-ended wrench.  
Always reinstall the cap after operation is completed. (service port cap tightening torque: 14 N·m (140 kg·cm) or more)]
- Ⓗ Flare nut  
[Tightening torque: 80 N·m (800 kg·cm) ... liquid, 55 N·m (550 kg·cm) ... oil blance  
Loosen and tighten this nut using a double-ended wrench.  
Coat the flare contact surface with refrigerator oil.]
- Ⓗ' Flare nut  
Tightening torque is 55 N·m (550 kg·cm). Use a double spanner to open and close. Apply a coat of refrigerating machine oil to the flare bonding surface.
- ① ø38.1 (PUHY-600YSMC)  
ø44.5 (PUHY-650/700/750YSMC)
- ② Field piping  
[Brazed to the connecting pipe. (when brazing, use unoxidized brazing.)]

Appropriate tightening torque by torque wrench

Copper pipe external dia. (mm)	Tightening torque (N·m) / (kg·cm)
ø6.35	14 to 18 / 140 to 180
ø9.52	35 to 42 / 350 to 420
ø12.7	50 to 57.5 / 500 to 575
ø15.88	75 to 80 / 750 to 800
ø19.05	100 to 140 / 1000 to 1400

Tightening angle standard

Pipe diameter (mm)	Tightening angle (°)
ø6.35, ø9.52	60 to 90
ø12.7, ø15.88	30 to 60
ø19.05	20 to 35



**Note:**

**If a torque wrench is not available, use the following method as a standard**

**When you tighten the flare nut with a wrench, you will reach a point where the tightening torque will abrupt increase. Turn the flare nut beyond this point by the angle shown in the table above.**

**⚠ Caution:**

**Always remove the connecting pipe from the ball valve and braze it outside the unit.**

- Brazing the connecting pipe while it is installed will heat the ball valve and cause trouble or gas leakage. The piping, etc. inside the unit may also be burned.



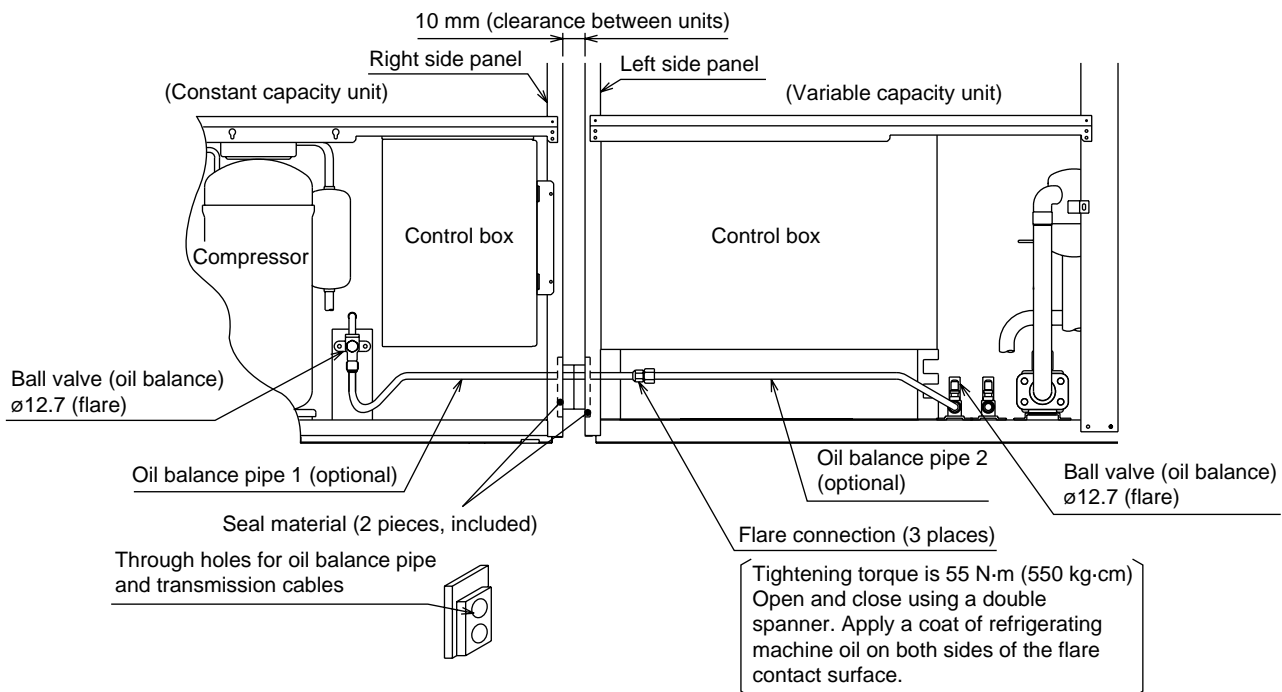
## 10.4. Oil balance pipe connection method

- Oil balance piping can be took out from the front, bottom or side of the unit (left side for the variable capacity unit, right side for the constant capacity unit).
- Connect piping and operate valves exactly as described below. (for details, see item 10.3.)
  - After connecting oil balance pipe, be sure to evacuate using the service port of the variable capacity unit side valve.
  - After evacuating, be sure to fully open each valve stem. If you operate with the valve closed, a shortage of oil in the compressor may occur due to lack of oil flow between units, which could result in damage to the compressor.
  - After completing work, shut the cap of the service port and handle section tightly so that gas leaking does not occur.

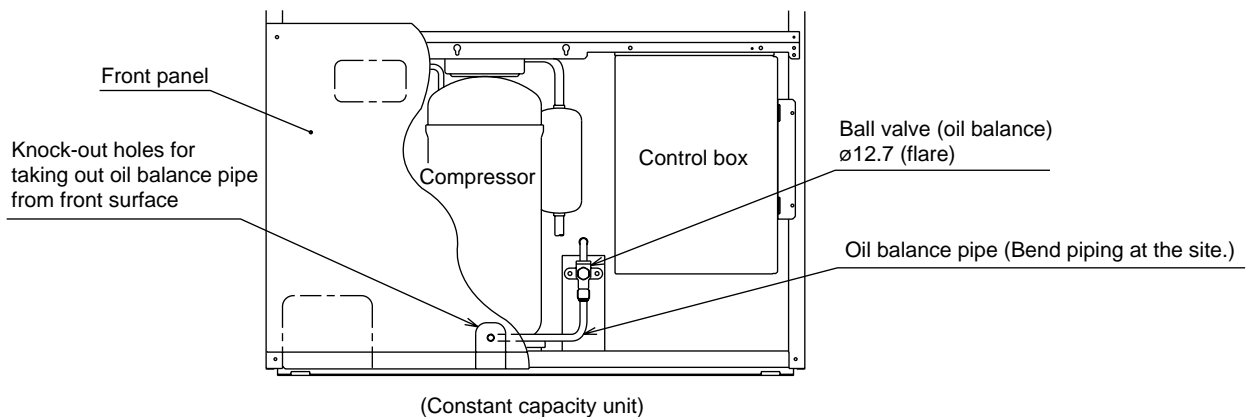
### **Warning:**

**Failure to connect the oil balance pipe will result in the compressor being damaged.**

- Provide 10 mm of clearance between the variable capacity and constant capacity units. Position the variable capacity unit so that its front is facing on the right side and the constant capacity unit so that its front is facing on the left. Connect the oil balance pipe for the optional CMC-30A according to the following procedure.
  - Open the knock-out holes of the left side panel for the variable capacity unit, and the right side panel for the constant capacity unit.
  - After installing the units, flare-connect the piping included with the unit ( $\varnothing 12.7$ ).
  - Block the clearance between units with the 2 seals included with the constant capacity unit.



- If the oil balance piping for the constant capacity unit from the front of the unit is took out, bend the piping as shown in the figure below. (When doing so, be careful not to the piping doesn't touch the compressor or other parts.)





## 10.5. Distributor (gas) connection method

### ■ Taking out piping from the front direction

- (1) Remove the copper cap and rubber packing attached to the piping and flange of the distributor (gas) (optional).
- (2) Assemble outside the unit with the elbow (⑧) in the specified shape and braze. (see Fig. 1.)  
For the 600 type, braze the connecting pipe (⑦) also.

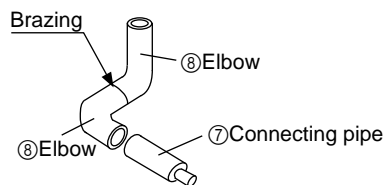


Fig. 1

- (3) Braze the connecting pipe (④) and piping assembled in step (2) to the distributor (gas) so that the connecting pipe is attached as shown in Fig. 2. For assembly procedure, see Fig. 3. When brazing piping, cool the brazed portion of the distributor side piping with a dampened waste cloth to prevent heating by brazing.

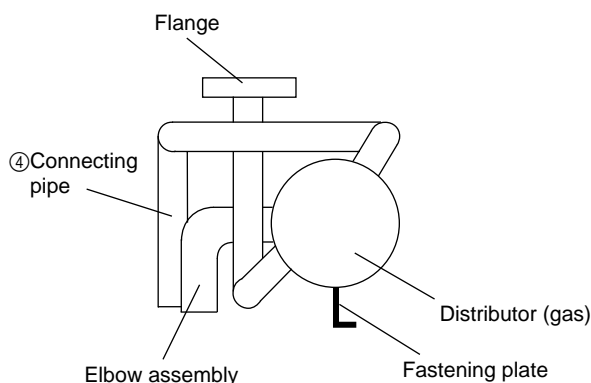


Fig. 2

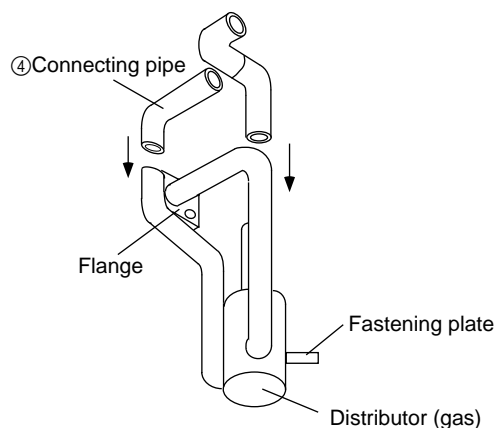


Fig. 3

- (4) Connect the  $\phi 12.7$  oil balance pipe to the ball valve of the variable capacity unit (oil balance) and constant capacity unit.
- (5) Connect the  $\phi 15.88$  piping branched by the distributor (liquid) to the ball valve of the variable capacity unit (liquid side).
- (6) Insert the distributor (gas) into the variable capacity unit and connect to the flange of the ball valve (gas side). (Use a socket wrench and socket wrench extension.) When doing so, be sure to mount the included packing between the ball valve (gas side) and flange of the distributor.
- (7) Fasten the plate of the distributor (gas) to the frame of the unit with screws.
- (8) Connect and braze the  $\phi 44.45$  ( $\phi 38.1$  for 600 type) gas piping (main pipe) and  $\phi 28.58$  gas pipe that connects the constant capacity unit with the distributor (gas).

### ■ Taking out piping in the downward direction

- (1) Remove the copper cap and rubber packing attached to the piping and flange of the distributor (gas) (optional).
- (2) Assemble outside the unit with the elbow (⑧), connecting pipe (⑦ for 600 type), or connecting pipe (⑥ for types other than 600) in the specified shape and braze. (see Fig. 4.)

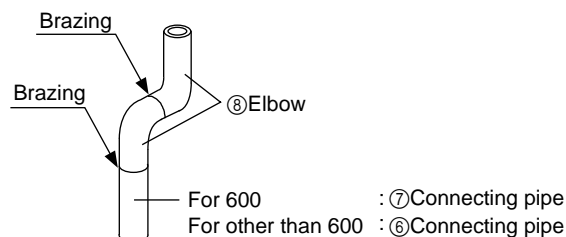


Fig. 4

- (3) Braze the connecting pipe (⑤) and connecting piping assembled in step (2) to the distributor (gas) outside the unit. For assembly procedure, see Fig. 5. When brazing piping, cool the brazed portion of the distributor side piping with a dampened waste cloth to prevent heating by brazing.

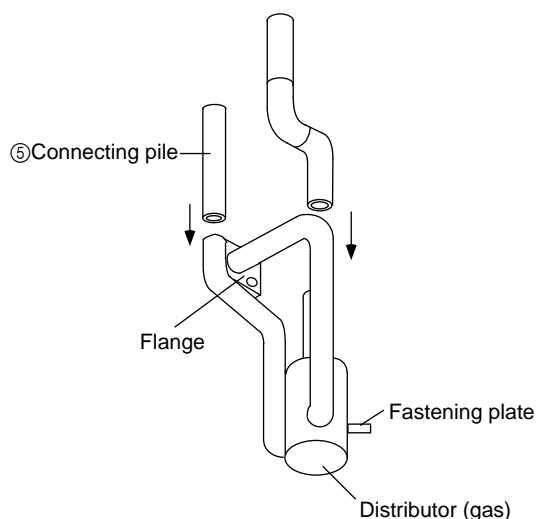


Fig. 5

The rest of the procedure is the same as for "Running piping from front direction".

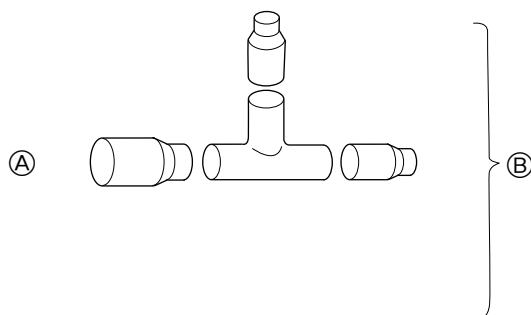
### ⚠ Caution:

**When brazing, cool with a waste cloth dampened with water so that the flange and ends of the distributor side piping don't get heated.**  
- Part could be damaged if not cooled sufficiently.

## 10.6. How to install branch pipe

For detail, please observe the instruction manual attached to the optional refrigerant branch kit.

### ■ Joint



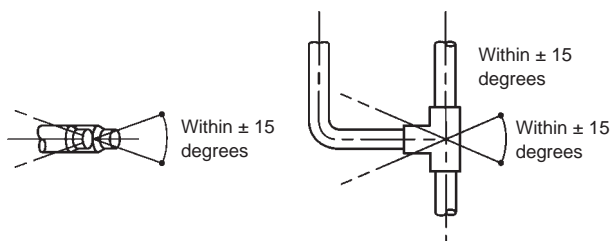
(A) To outdoor unit

(B) To branch piping or indoor unit

- Apart from the CMY-Y202-F and CMY-Y302-F gas side, there are no restrictions on the posture for attaching joints.
- Ensure that the branch pipes for the CMY-Y202-F and CMY-Y302-F gas side are attached horizontally or facing upwards (see the diagram below.)

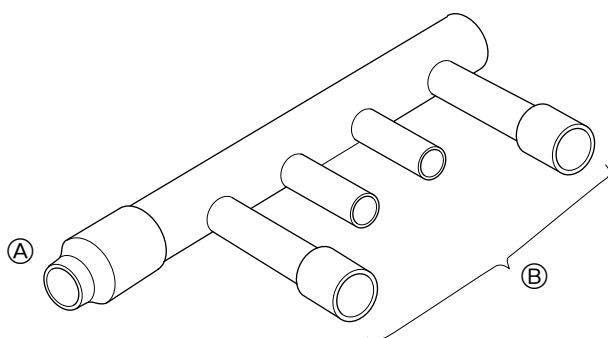
Horizontal

Facing upwards  
(Facing downwards is not possible)



- There is no limitation on the joint mounting configuration.
- If the diameter of the refrigerant piping selected by the procedures described on pages 13 to 14 is different from the size of the joint, match the sizes using a deformed joint. The deformed joint is included with the kit.

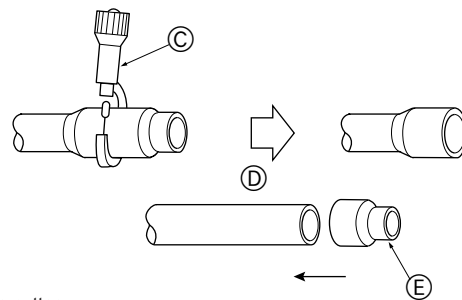
### ■ Header



(A) To outdoor unit

(B) To indoor unit

- No restriction is applied to the mounting posture of the header.
- If the diameter of the refrigerant piping selected using the procedures described on pages 14 and the size of the joint is different, match the sizes using a deformed joint. The deformed joint is included with the kit.



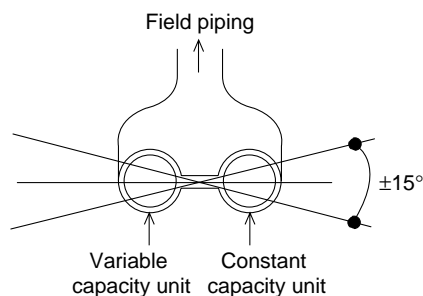
(C) Pipe cutter

(D) or

(E) Deformed joint

- When the number of pipes to be connected is smaller than the number of header branches, install a cap to the unconnected branches. The cap is included with the kit.

### ■ Distributer (liquid)



- Mount the distributor (liquid, optional CMC-30A) so that it is within  $\pm 15^\circ$  in relation to the horizontal plane (see figure above).

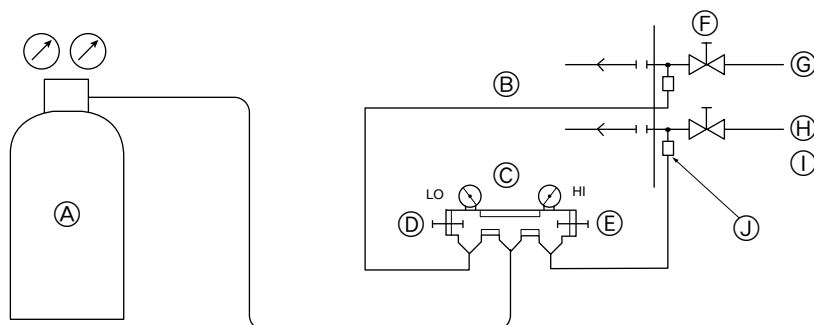
## 10.7. Airtight test and evacuation

### ① Airtight test

Airtight test should be made by pressurizing nitrogen gas to 3.0 MPa. For the test method, refer to the following figure. (Make a test with the ball valve closed. Be also sure to pressurize both liquid pipe and gas pipe.)

The test result can be judged good if the pressure has not been reduced after leaving for about one day after completion of nitrogen gas pressurization.

- Ⓐ Nitrogen gas
- Ⓑ To indoor unit
- Ⓒ System analyzer
- Ⓓ Lo knob
- Ⓔ Hi knob
- Ⓕ Ball valve
- Ⓖ Liquid pipe
- Ⓗ Gas pipe
- Ⓘ Outdoor unit
- ⓵ Service port

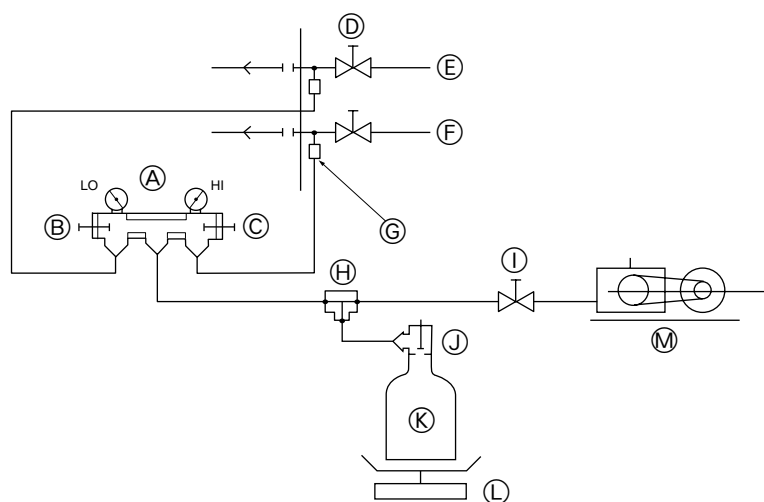


### ② Evacuation

Evacuation should be made from the service port provided on the outdoor unit's ball valve to the vacuum pump commonly used for both liquid pipe and gas pipe. (Make evacuation from both liquid pipe and gas pipe with the ball valve closed.)

Also evacuate the oil balance pipe that connects the variable capacity and constant capacity units with the oil balance ball valves of both units shut. Evacuate from the service port of the variable capacity unit ball valve with a vacuum pump.

\* Never perform air purging using refrigerant.



- Ⓐ System analyzer
- Ⓑ Lo Knob
- Ⓒ Hi Knob
- Ⓓ Ball valve
- Ⓔ Liquid pipe
- Ⓕ Gas pipe
- Ⓖ Service port
- Ⓗ Three-way joint
- Ⓘ Valve

- ⓵ Valve
- ⓶ Freon 22 cylinder
- ⓷ Scale
- Use a gravimeter. (One that can measure down to 0.1 kg.)  
If you are unable to prepare such a high-precision gravimeter,  
you may use a charge cylinder.
- ⓸ Vacuum pump
- ⓹ Constant capacity unit side
- ⓺ Oil balance pipe
- ⓻ Variable capacity unit side

#### Note:

**Always add an appropriate amount of refrigerant. (For the refrigerant additional charge, see pages 13 to 14.) Too much or too little refrigerant will cause trouble.**

**Note that it is not possible to determine if a correct amount is being used with the accumulator level (AL).**

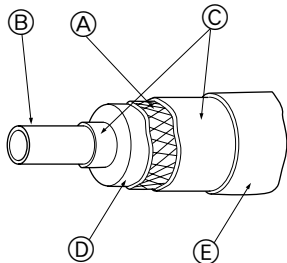
#### ⚠ Warning:

**When installing and moving the air conditioner to another site, do not charge it with a refrigerant different from the refrigerant (R22) specified on the unit.**

- If a different refrigerant or air is mixed with the original refrigerant, the refrigerant cycle may malfunction and the unit may be damaged.

# 10.8. Thermal insulation of refrigerant piping

Be sure to give insulation work to refrigerant piping by covering liquid pipe and gas pipe separately with enough thickness heat-resistant polyethylene, so that no gap is observed in the joint between indoor unit and insulating material, and insulating materials themselves. When insulation work is insufficient, there is a possibility of condensation drip, etc. Pay special attention to insulation work to ceiling plenum.



- (A) Steel wire
- (B) Piping
- (C) Asphaltic oily mastic or asphalt
- (D) Heat insulation material A
- (E) Outer covering B

Heat insulation material A	Glass fiber + Steel wire	
	Adhesive + Heat - resistant polyethylene foam + Adhesive tape	
Outer covering B	Indoor	Vinyl tape
	Floor exposed	Water-proof hemp cloth + Bronze asphalt
	Outdoor	Water-proof hemp cloth + Zinc plate + Oily paint

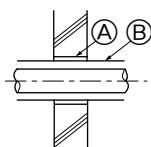
**Note:**  
When using polyethylene cover as covering material, asphalt roofing shall not be required.

Bad example	<ul style="list-style-type: none"> <li>Do not insulate gas or low pressure pipe and liquid or high pressure pipe together.</li> </ul> <ul style="list-style-type: none"> <li>(A) Liquid pipe</li> <li>(B) Gas pipe</li> <li>(C) Electric wire</li> <li>(D) Finishing tape</li> <li>(E) Insulating material</li> </ul>	<ul style="list-style-type: none"> <li>Be sure to fully insulate connecting portion.</li> </ul> <p>(A) These parts are not insulated.</p>
Good example	<ul style="list-style-type: none"> <li>(A) Liquid pipe</li> <li>(B) Gas pipe</li> <li>(D) Finishing tape</li> <li>(E) Insulating material</li> </ul>	

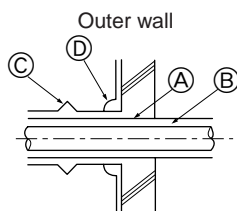
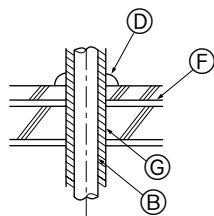
**Note:**  
No heat insulation must be provided for electric wires.

## Penetrations

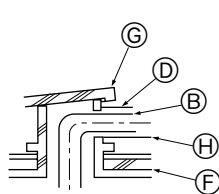
Inner wall (concealed)



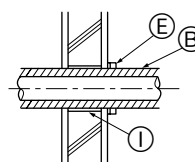
Floor (fireproofing)



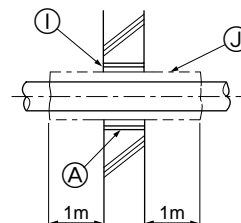
Roof pipe shaft



Outer wall (exposed)



Penetrating portion on fire limit and boundary wall

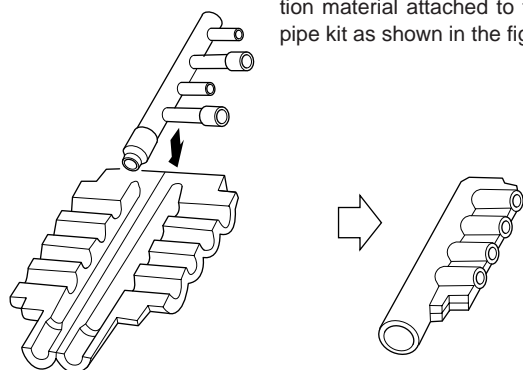


- (A) Sleeve
- (B) Heat insulating material
- (C) Lagging
- (D) Caulking material
- (E) Band
- (F) Waterproofing layer
- (G) Sleeve with edge
- (H) Lagging material

- (I) Mortar or other incombustible caulking
- (J) Incombustible heat insulation material

When filling a gap with mortar, cover the penetration part with steel plate so that the insulation material will not be caved in. For this part, use incombustible materials for both insulation and covering. (Vinyl covering should not be used.)

## Branch piping section



Insulate the header using the insulation material attached to the branch pipe kit as shown in the figure.

## 11. Electrical work

### 11.1. Caution

- ① Follow ordinance of your governmental organization for technical standard related to electrical equipment, wiring regulations and guidance of each electric power company.

**⚠ Warning:**

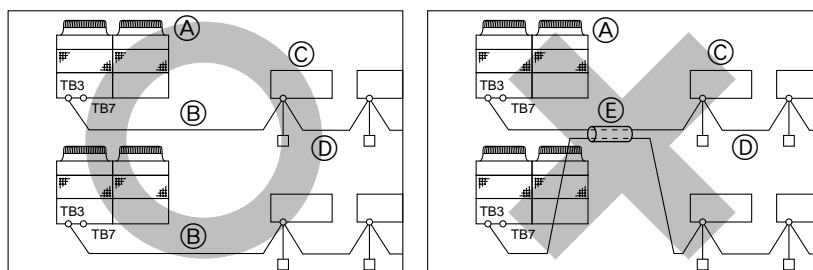
**Be sure to have authorized electric engineers do electric work using special circuits in accordance with regulations and this installation manual. If power supply circuit has a lack of capacity or electric work deficiency, it may cause an electric shock or fire.**

- ② Install the outdoor unit transmission line away from the power source wiring so that it is not affected by electric noise from the power source. (Do not run it through the same conduit.)
- ③ Be sure to provide designated grounding work to outdoor unit.

**⚠ Caution:**

**Be sure to put outdoor unit to earth. Do not connect earth line to any gas pipe, water pipe, lightning rod or telephone earth line. If earth is incomplete, it may cause an electric shock.**

- ④ Give some allowance to wiring for electrical part box of indoor and outdoor units, because the box is sometimes removed at the time of service work.
- ⑤ Never connect the main power source to terminal block of transmission line. If connected, electrical parts will be burnt out.
- ⑥ Use 2-core shield cable for transmission line. (○ mark in the figure below) If transmission lines of different systems are wired with the same multicore cable, the resultant poor transmitting and receiving will cause erroneous operations. (× mark in the figure below)
- ⑦ Only the transmission line specified should be connected to the terminal block for outdoor unit transmission.  
(Transmission line to be connected with indoor unit : Terminal block TB3 for transmission line, Other : Terminal block TB7 for centralized control)  
Erroneous connection does not allow the system to operate.
- ⑧ In case to connect with the upper class controller or to conduct group operation in different refrigerant systems, the control line for transmission is required between the outdoor units each other.  
Connect this control line between the terminal blocks for centralized control. (2-wire line with no polarity)  
When conducting group operation in different refrigerant systems without connecting to the upper class controller, replace the insertion of the short circuit connector from CN41 of one outdoor unit to CN40.
- ⑨ Group is set by operating the remote controller.
- ⑩ Caution! If the electrical wiring connections (L1, L2, L3, N ⊕) are made incorrectly, damage to the unit could result.



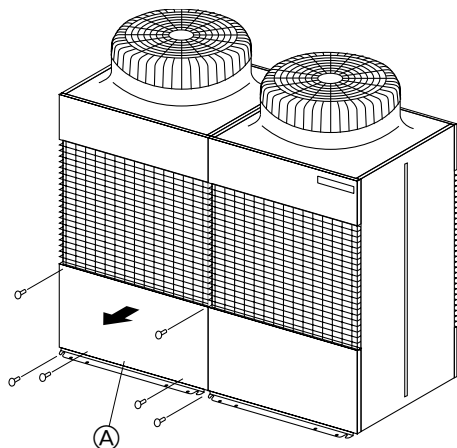
TB3: Transmission line terminal board, TB7: Central control line terminal board

- Ⓐ Outdoor unit  
Ⓑ 2-core cable  
Ⓒ Indoor unit  
Ⓓ Remote controller  
Ⓔ Multi-core cable

## 11.2. Control box and connecting position of wiring

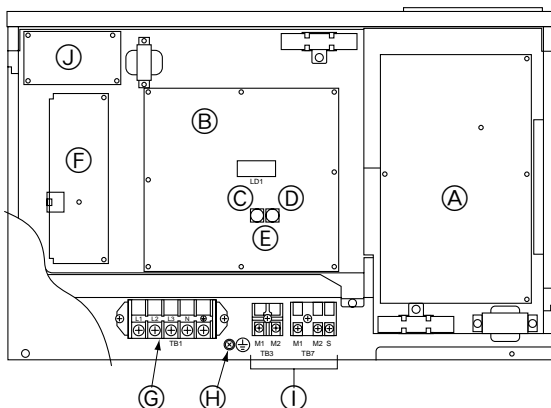
### a. Variable capacity unit

1. Remove the total of six screws at the top and bottom, and remove the service panel by pulling it forward. (see the figure below.)



(A) Service panel

2. Remove the two screws on the left and right-hand of the base of the control box and pull the overall cover downwards to detach it. (a diagram with the control box cover removed is shown below.)



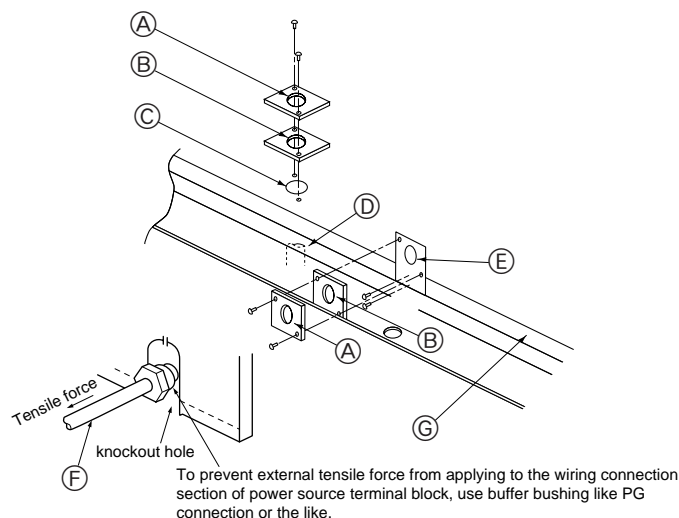
- (A) INV board
- (B) MAIN board
- (C) Ten position
- (D) One position
- (E) Address
- (F) FANCON board
- (G) Power source
- (H) Earth screw
- (I) Transmission line
- (J) RELAY board

3. Connect indoor and outdoor units through the terminal block for transmission lines (TB3). Outdoor units and connections to central control systems go through the terminal block for centralized control (TB7). When making an indoor/outdoor connection with shielded wiring, connect the shield ground to the earth screw ( $\oplus$ ). When making a central control system connection with shielded wiring, use the terminal block for centralized control (TB7).

When the CN41 power supply connector of an outdoor unit has been replaced with a CN40, the shield terminal (S) for centralized control (TB7) should also be connected to the earth screw ( $\oplus$ ).

4. How to use the conduit mounting plate

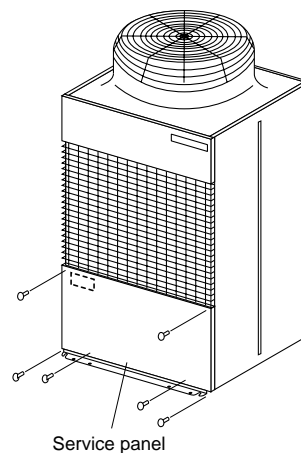
- (1) Conduit mounting plates ( $\phi 46$ ,  $\phi 53$ ,  $\phi 62$ ) are being provided. Select conduit mounting plate based on the outside diameter of conduit to be used and mount it as shown in the figure.
- (2) Fix power source wiring to control box by using buffer bushing for tensile force (PG connection or the like)



- (A)  $\phi 46$  mounting hole
- (B)  $\phi 53$  mounting hole
- (C)  $\phi 62$  knockout hole
- (D) For the connection of conduit at bottom
- (E)  $\phi 62$  mounting hole
- (F) For the connection of conduit at front
- (G) The front of outdoor unit

### b. Constant capacity unit

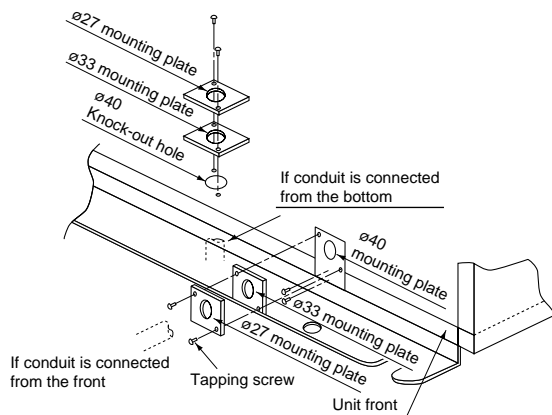
1. The service panel is removed by removing the six screws at the top and bottom and pulling it forward. (see figure below.)



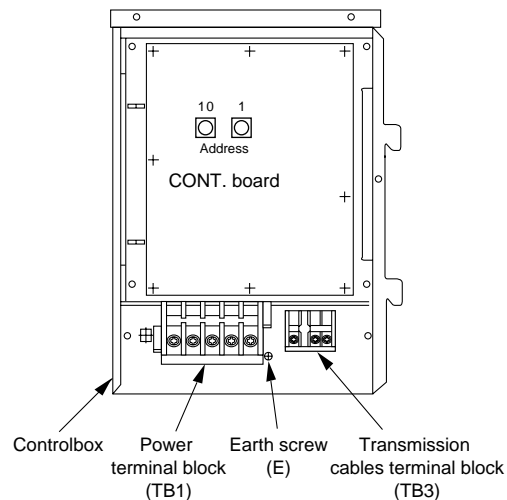
Service panel



2. The control box cover is removed by removing the 2 screws and pulling downward. (The control box with the cover removed is shown in the figure below.)
3. Method of using conduit mounting plate  
The equipment includes conduit mounting plates (ø27, ø33, ø40). Select the mounting plate according to the diameter of the conduit used, and mount as shown in the figure below.



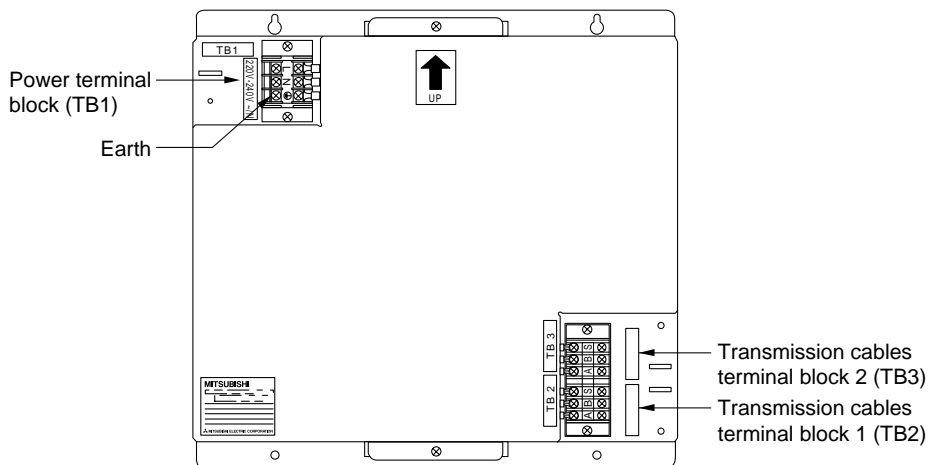
4. Piping connection  
Connect indoor unit crossover cables of the transmission cables terminal block (TB3) of the variable capacity unit to the transmission cables terminal block (TB3). When making an indoor/outdoor connection with shielded wiring, connect the shield ground to the earth screw (⊕).



### c. Transmission booster (optional)

(For details, see item 11.3. "Wiring transmission cables")

Connect 220/230/240 VAC to L/N of power terminal block (TB1).  
Connect the ground to the ⊕ terminal of power terminal block (TB1).  
Connect the outdoor unit side transmission cables to A/B of transmission cables terminal block 1 (TB2).  
Connect the outdoor unit side shield to S of transmission cables terminal block 1 (TB2).  
Connect additional indoor unit side transmission cables to A/B of transmission cables terminal block 2 (TB3).  
Connect additional indoor unit side shield to S of transmission cables terminal block 2 (TB3).



## 11.3. Wiring transmission cables

Wiring method, address setting method and permissible wiring length differ according to and whether or not you are using transmission booster. Check permissible wiring length before wiring.

A may be required depending on the number of indoor units.

Item ④ "Wiring examples" gives typical wiring examples (a-c).

- a. System using remote controller (1 outdoor unit)
- b. System using remote controller (system operated as a group among multiple refrigerant systems)
- c. System using power supply extension unit for transmission booster (combination of systems a-b)

### ① Connecting a transmission booster

A transmission booster (RP) is required when the number of connected indoor unit models in a cooling system exceeds the number of models specified in the chart below.

\* The maximum number of units that can be controlled is determined by the indoor unit model, the type of remote controller and their capabilities.

(*1) Capability of the connected indoor units	Remote controller type  Number of connected indoor units that can be connected without a RP.	Remote controller PAR-F 25MA	
		Prior to Ver. E	After Ver. F
	200 or lower	16 (32)	20 (40)
	200 or higher	16 (32)	16 (32)

The number of indoor units and the total number of remote controllers is displayed within the parenthesis ( ).

\*1 If even one unit that is higher than 200 exists in the cooling system, the maximum capacity will be "200 or higher".

### ② Name, code and possible unit connections

	Name	Code	Possible unit connections
Outdoor unit	Variable capacity unit controller	OC	—
	Constant capacity unit controller	OS	1 unit per 1 OC.
Indoor unit	Indoor unit controller	IC	2 to 32 units per 1 OC (*1).
Remote controller	Remote controller (*1)	RC	2 units maximum per group.
Other	Transmission booster unit	RP	0 to 1 unit per 1 OC (*1).

\*1 A transmission booster (RP) may be required depending on the number of connected indoor unit controllers.

### ③ Types of control cables

#### (1) Wiring transmission cables

- Types of transmission cables  
Shielding wire CVVS or CPEVS
- Cable diameter  
More than 1.25 mm<sup>2</sup>
- Maximum wiring length within 200 m

#### (2) Remote control cables

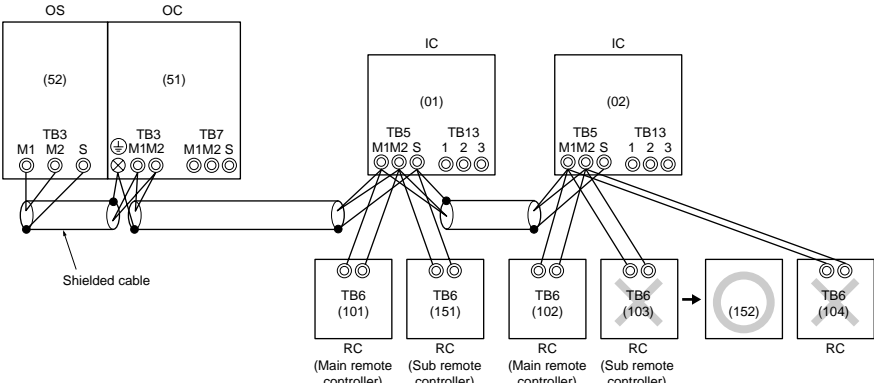
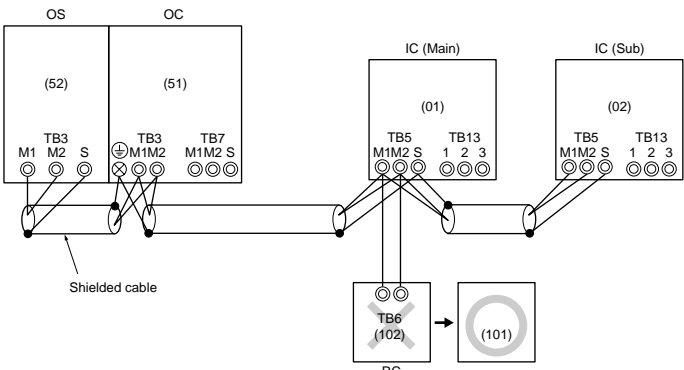
Kind of remote control cable	2-core cable (unshielded)
Cable diameter	0.5 to 0.75 mm <sup>2</sup>
Remarks	When 10 m is exceeded, use cable with the same specifications as (1) Transmission line wiring.

### ④ Wiring examples

Typical wiring examples are shown on pages 28 to 32. (Wiring examples A ~ C)

A. Example of the use of the shielded cable in a single coolant system (Setting of addresses is necessary)

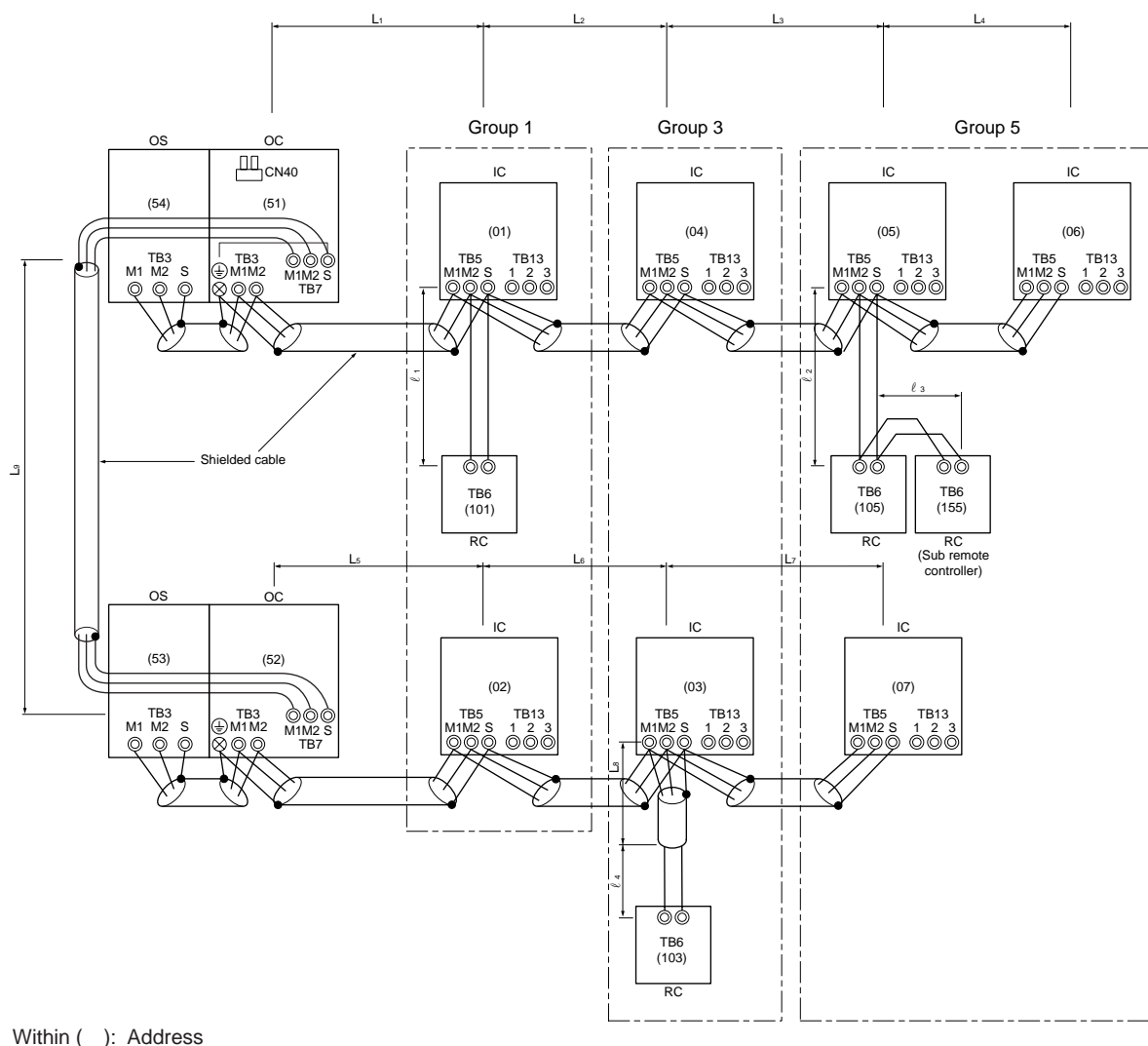
Example of control line wiring		Wiring method, address setting																					
1) Standard	<p>OS (52) (51) IC (01) IC (02) RC TB6 (101) TB6 (102)</p> <p>Shielded cable</p>	<p>a. Run the wire to terminals M1 and M2 the variable capacity unit (OC) transmission line terminal block (TB3) and to terminals M1 and M2 on the constant capacity unit (OS) transmission line terminal block (TB3) as well as to the terminals M1 and M2 of the transmission line terminal block (TB5) of each indoor unit (IC). (Two-wire, no polarity) Also, run the shielded ground wire to the ground terminal <math>\oplus</math> of the variable capacity unit, the S terminal of the constant capacity unit (TB3), and the S terminal of each indoor unit (TB5).</p> <p>b. Connect the wires to terminals M1 and M2 of the transmission line terminal block (TB5) in each indoor unit (IC) and connect them to the remote control (RC) terminal block (TB6).</p> <p>c. Set the address setting switch as shown in the following table.</p> <table><thead><tr><th>Unit</th><th>Range</th><th>Setting method</th></tr></thead><tbody><tr><td>Indoor unit</td><td>01 to 50</td><td>—</td></tr><tr><td>Remote control</td><td>101 to 150 <small>Note 2</small></td><td>Indoor unit address + 100</td></tr><tr><td>Variable capacity unit</td><td>51 to 100 <small>Note 1</small></td><td>The smallest address of the indoor units + 50</td></tr><tr><td>Constant capacity unit</td><td>51 to 100 <small>Note 1</small></td><td>Variable capacity unit address + 1</td></tr></tbody></table> <p><b>Note 1</b> If the address of the variable capacity unit or the constant capacity unit is set at 100, set one of the address switches at 01 ~ 50.</p> <p><b>Note 2</b> It is not necessary to set the 100's position in the remote control unit.</p>	Unit	Range	Setting method	Indoor unit	01 to 50	—	Remote control	101 to 150 <small>Note 2</small>	Indoor unit address + 100	Variable capacity unit	51 to 100 <small>Note 1</small>	The smallest address of the indoor units + 50	Constant capacity unit	51 to 100 <small>Note 1</small>	Variable capacity unit address + 1						
Unit	Range	Setting method																					
Indoor unit	01 to 50	—																					
Remote control	101 to 150 <small>Note 2</small>	Indoor unit address + 100																					
Variable capacity unit	51 to 100 <small>Note 1</small>	The smallest address of the indoor units + 50																					
Constant capacity unit	51 to 100 <small>Note 1</small>	Variable capacity unit address + 1																					
• One remote control unit for each indoor unit Within ( ): Address																							
2) 2 Remote control operation	<p>OS (52) (51) IC (01) IC (02) RC TB6 (101) TB6 (151) TB6 (102) TB6 (152)</p> <p>Shielded cable</p> <p>RC (Main remote controller) RC (Sub remote controller) RC (Main remote controller) RC (Sub remote controller)</p>	<p>a. Same as above.</p> <p>b. Same as above.</p> <p>c. Set the address setting switch as shown in the following table.</p> <table><thead><tr><th>Unit</th><th>Range</th><th>Setting method</th></tr></thead><tbody><tr><td>Indoor unit</td><td>01 to 50</td><td>—</td></tr><tr><td>Main remote controller</td><td>101 to 150 <small>Note 2</small></td><td>Indoor unit address + 100</td></tr><tr><td>Sub remote controller</td><td>151 to 200 <small>Note 2</small></td><td>Indoor unit address + 150</td></tr><tr><td>Variable capacity unit</td><td>51 to 100 <small>Note 1</small></td><td>The smallest address of the indoor units + 50</td></tr><tr><td>Constant capacity unit</td><td>51 to 100 <small>Note 1</small></td><td>Variable capacity unit address + 1</td></tr></tbody></table> <p><b>Notes 1, 2.</b> Same as above.</p>	Unit	Range	Setting method	Indoor unit	01 to 50	—	Main remote controller	101 to 150 <small>Note 2</small>	Indoor unit address + 100	Sub remote controller	151 to 200 <small>Note 2</small>	Indoor unit address + 150	Variable capacity unit	51 to 100 <small>Note 1</small>	The smallest address of the indoor units + 50	Constant capacity unit	51 to 100 <small>Note 1</small>	Variable capacity unit address + 1			
Unit	Range	Setting method																					
Indoor unit	01 to 50	—																					
Main remote controller	101 to 150 <small>Note 2</small>	Indoor unit address + 100																					
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Variable capacity unit	51 to 100 <small>Note 1</small>	The smallest address of the indoor units + 50																					
Constant capacity unit	51 to 100 <small>Note 1</small>	Variable capacity unit address + 1																					
• 2 remote control units for 1 indoor unit.																							
3) Group operation	<p>OS (52) (51) IC (Main) (01) IC (Sub) (02) RC TB6 (101)</p> <p>Shielded cable</p>	<p>a. Same as above.</p> <p>b. Connect terminals A and B (M1 and M2) of the transmission line terminal block (TB5) of the indoor unit (IC Main) with the lowest address of all the indoor units (IC) in the same group and the terminals on the remote control (RC) terminal block (TB6).</p> <p>c. Set the address setting switch as shown in the following table.</p> <p>d. Within the same group, let the indoor unit (IC) which functions the most be the IC (Main) unit.</p> <table><thead><tr><th>Unit</th><th>Range</th><th>Setting method</th></tr></thead><tbody><tr><td>IC (Main)</td><td>01 to 50</td><td>Address of the indoor unit with the smallest address of all the indoor units in the same group.</td></tr><tr><td>IC (Sub)</td><td>01 to 50</td><td>Address of any of the indoor units except the address of the IC (Main). Let the number be in sequence with that of the IC (Main)</td></tr><tr><td>Main remote controller</td><td>101 to 150 <small>Note 2</small></td><td>Address of the IC (Main) in the same group + 100</td></tr><tr><td>Sub remote controller</td><td>151 to 200 <small>Note 2</small></td><td>Address of the IC (Main) in the same group + 150</td></tr><tr><td>Variable capacity unit</td><td>51 to 100 <small>Note 1</small></td><td>The smallest address of the indoor units + 50</td></tr><tr><td>Constant capacity unit</td><td>51 to 100 <small>Note 1</small></td><td>Variable capacity unit address + 1</td></tr></tbody></table> <p><b>Notes 1, 2.</b> Same as above.</p>	Unit	Range	Setting method	IC (Main)	01 to 50	Address of the indoor unit with the smallest address of all the indoor units in the same group.	IC (Sub)	01 to 50	Address of any of the indoor units except the address of the IC (Main). Let the number be in sequence with that of the IC (Main)	Main remote controller	101 to 150 <small>Note 2</small>	Address of the IC (Main) in the same group + 100	Sub remote controller	151 to 200 <small>Note 2</small>	Address of the IC (Main) in the same group + 150	Variable capacity unit	51 to 100 <small>Note 1</small>	The smallest address of the indoor units + 50	Constant capacity unit	51 to 100 <small>Note 1</small>	Variable capacity unit address + 1
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Sub remote controller	151 to 200 <small>Note 2</small>	Address of the IC (Main) in the same group + 150																					
Variable capacity unit	51 to 100 <small>Note 1</small>	The smallest address of the indoor units + 50																					
Constant capacity unit	51 to 100 <small>Note 1</small>	Variable capacity unit address + 1																					
• Operation of multiple indoor units with 1 remote controller.																							
1) ~ 3) above can be combined.																							

Permissible length	Prohibited items
<p>Length of the wire to the most remote indoor unit in the system (1.25 mm<sup>2</sup>)  <math>L_1 + L_2, L_2 + L_3, L_3 + L_1 \leq 200</math> m            Remote control wire length            1 In the case of 0.5 - 0.75 mm<sup>2</sup> wire,  <math>\ell_1, \ell_2 \leq 10</math> m            2 If the length exceeds 10 m, use 1.25 mm<sup>2</sup> wire and let the length be within the length of the wire to the most remote indoor unit in the system. (L<sub>3</sub>).</p>	
<p>Same as above.</p>	 <ul style="list-style-type: none"> <li>Let the address of the sub remote controller be the indoor unit (IC) address + 150. In this case, the address would be 152.</li> <li>More than 3 remote control (RC) units cannot be connected to one indoor unit.</li> </ul>
<p>Same as above.</p>	 <ul style="list-style-type: none"> <li>The remote controller address is the indoor unit main address + 100. In this case, it is 101.</li> </ul>

**Note:**

- If there is one or more 200 or higher indoor units within the same cooling system, and the number of indoor units exceeds 16 units, a transmission booster is necessary. (When a "PAR-F25MA Ver. F or subsequent version of remote control is used)
- If there is not even one 200 or higher indoor unit within the same cooling system, and the number of indoor units exceeds 20 units, a transmission booster is necessary. (When a "PAR-F25MA Ver. F or subsequent version of remote control is used)

\* For details, see wire connection example C.



Example of transmission line wiring

Wiring method, address setting method

- Be sure to use shielded cable for wiring between the outdoor units (OC and OS) and indoor units (IC), between OC and OC and between IC and IC.
- Terminals M1 and M2 and the ground terminal  $\oplus$  of the transmission line terminal block (TB3) of each variable capacity unit (OC), terminals M1, M2 and S of the transmission line terminal block (TB3)  $\oplus$  of the constant capacity unit (OS) and terminals M1, M2 and S of the transmission line terminal block (TB5) of each indoor unit (IC) should be cross wired.
- Connect the M1 and M2 terminals of the transmission line terminal block (TB5) of the indoor unit IC (Main) with the smallest address within the same group to the remote control (RC) terminal block (TB6).
- Connect terminals M1, M2 and S of the centralized control terminal block (TB7) of the variable capacity unit (OC) and the terminals M1, M2 and S of the centralized control terminal block (TB7) of the variable capacity unit (OC) of the other cooling systems.
- The power supply connector on the main board can be changed from CN41 to CN40 for only one variable capacity unit (OC).
- Connect the S terminal of the centralized control terminal block (TB7) of the variable capacity unit (OC) which had its power supply connector connected to CN40 in e to the ground terminal  $\oplus$  in the electrical equipment panel.
- Group settings between multiple cooling systems should be performed after the power is turned on using the remote control (RC) units. For the setting method, refer to the installation manual for the remote control unit.

Unit	Range	Setting method
IC (Main)	01 to 50	Smallest address of all the indoor units (IC) in the same group
IC (Sub)	01 to 50	Address other than the IC (Main) of the indoor units in the same group. Use a number which is in sequence with that of the IC (Main)
Main remote controller	101 to 150 Note 2	IC (Main) + 100
Sub remote controller	151 to 200 Note 2	IC (Main) + 150
Variable capacity unit	51 to 100 Note 1	The smallest address of the indoor units in the same cooling system + 50
Constant capacity unit	51 to 100 Notes 1, 3	Variable capacity unit address + 1

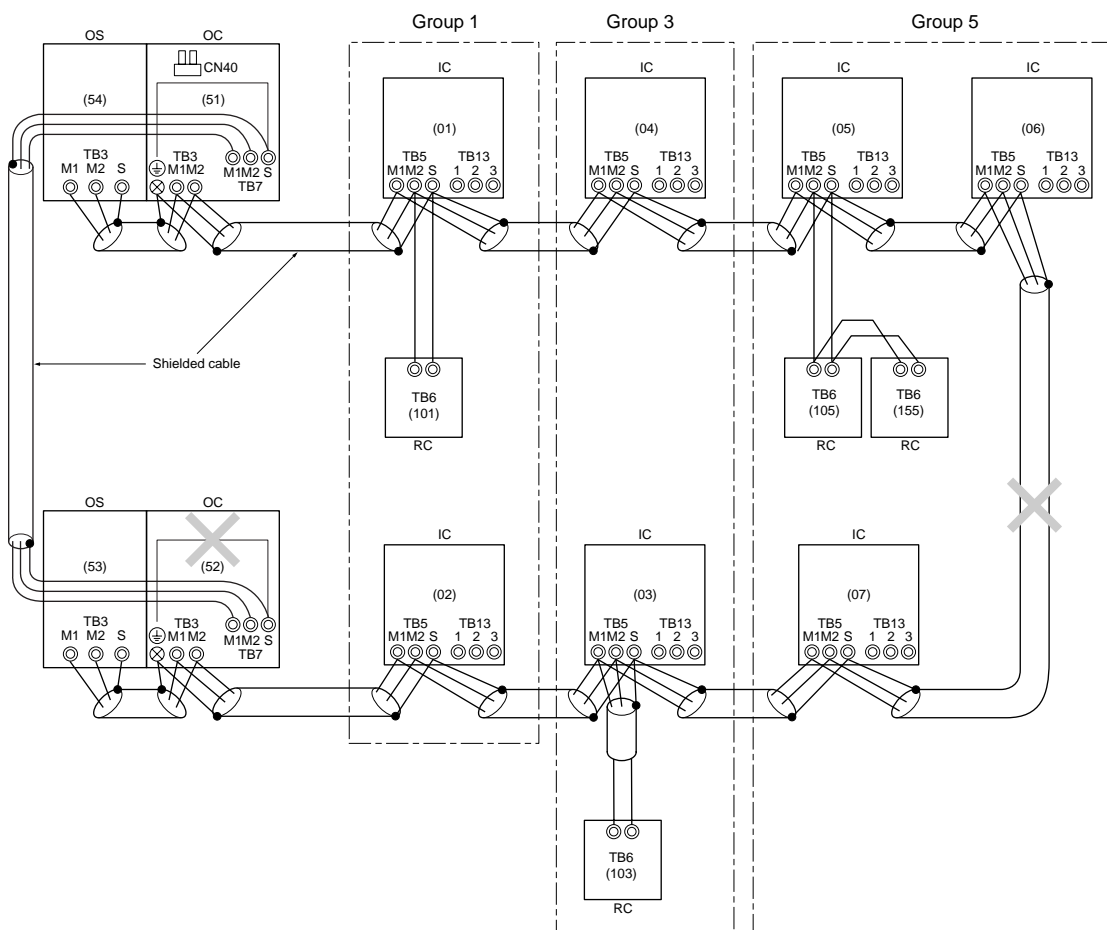
**Note:**

- If the address of the variable capacity unit or the constant capacity unit is set at 100, set the address setting switch at either 01 or 50.
- It is not necessary to set the 100's position on the remote control unit.
- If the addresses overlap with the variable capacity unit of other cooling systems, select a different unused address.

Permissible length

- Length of wire to the most remote unit via the outdoor unit :  $L_1+L_2+L_3+L_4+L_5+L_6+L_7+L_9$ ,  
 $L_1+L_2+L_3+L_4+L_5+L_6+L_8+L_9 \leq 500 \text{ m (1.25 mm}^2\text{)}$
- Length of wire to the most remote unit via the indoor system :  $L_1+L_2+L_3+L_4$ ,  $L_5+L_6+L_7$ ,  $L_5+L_6+L_8$ ,  $L_7+L_8 \leq 200 \text{ m (1.25 mm}^2\text{)}$
- Remote control wire length :  $\ell_1, \ell_2, \ell_3, \ell_4 \leq 10 \text{ m (0.5 to 0.75 mm}^2\text{)}$   
 If the length exceeds 10 m, use 1.25 mm<sup>2</sup> wire and calculate the length of that portion (L<sub>8</sub>) as within the total extended length and the length to the most remote unit.

Prohibited items



- Connect the S terminal of the centralized control terminal block (TB7) of one variable capacity unit only to the ground (⊕) of the electrical equipment panel.
- The transmission line terminal blocks (TB5) of indoor units (IC) connected to different cooling systems should not be connected together.

**Note:**

- If there is one or more 200 or higher indoor units within the same cooling system, and the number of indoor units exceeds 16 units, a transmission booster is necessary. (When a "PAR-F25MA Ver. F or subsequent version of remote control is used)
- If there is not even one 200 or higher indoor unit within the same cooling system, and the number of indoor units exceeds 20 units, a transmission booster is necessary. (When a "PAR-F25MA Ver. F or subsequent version of remote control is used)

\* For details, see wire connection example C.

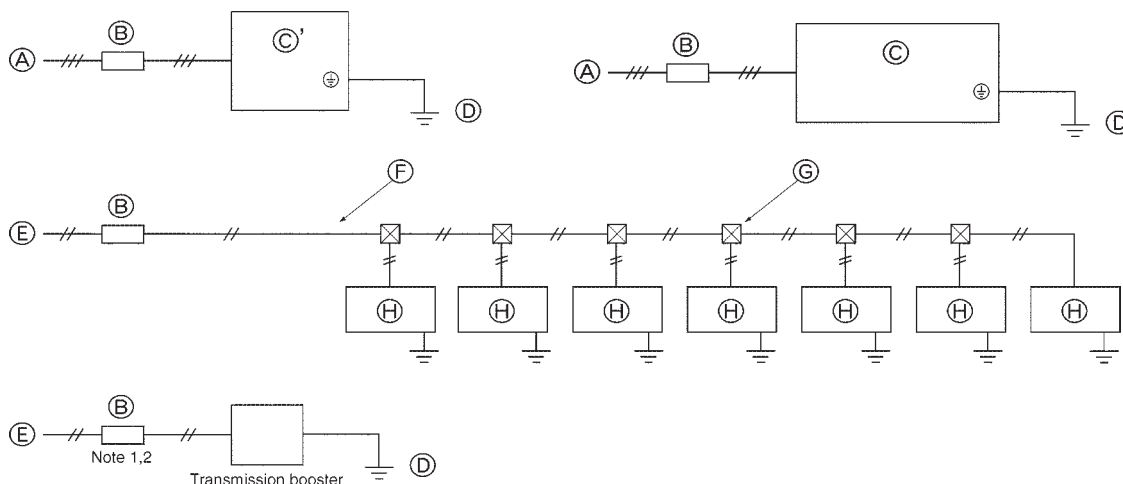
## C. Example of a system using the transmission booster (Combination of systems A - C)

Example of transmission line wiring															
Wiring method, address setting method	<p>a. Address settings are the same as for wiring connection examples A and B.</p> <p>b. Let the number of indoor units and remote control units connected be within the limit for the number of units shown in the following table for the total of the number of units connected between the variable capacity unit (OC) and the transmission booster (RP) N<sub>1</sub> and the number of units connected after the transmission booster (RP) N<sub>2</sub>.</p> <p>c. Connect the power supply ground to the transmission booster (RP) securely. Connect the transmission lines of the outdoor unit side to terminals A and B of transmission line terminal block 1 (TB2) of the transmission booster (RP). Connect the transmission lines of the expansion indoor unit side to terminals A and B of the of transmission line terminal block 2 (TB3) of the transmission booster (RP).</p> <table><tr><th rowspan="2">(*1) Capability of the connected indoor units</th><th rowspan="2">Number of connected indoor units that can be connected without a RP.</th><th colspan="2">Remote controller PAR-F 25MA</th></tr><tr><th>Prior to Ver. E</th><th>After Ver. F</th></tr><tr><td>200 or lower</td><td></td><td>16 (32)</td><td>20 (40)</td></tr><tr><td>200 or higher</td><td></td><td>16 (32)</td><td>16 (32)</td></tr></table> <p>The number of indoor units and the total number of remote controllers is displayed within the parenthesis ( ).</p> <p>*1 If even one unit that is higher than 200 exists in the cooling system, the maximum capacity will be "200 or higher".</p>	(*1) Capability of the connected indoor units	Number of connected indoor units that can be connected without a RP.	Remote controller PAR-F 25MA		Prior to Ver. E	After Ver. F	200 or lower		16 (32)	20 (40)	200 or higher		16 (32)	16 (32)
(*1) Capability of the connected indoor units	Number of connected indoor units that can be connected without a RP.			Remote controller PAR-F 25MA											
		Prior to Ver. E	After Ver. F												
200 or lower		16 (32)	20 (40)												
200 or higher		16 (32)	16 (32)												
Permissible length	<ul style="list-style-type: none"><li>Indoor system maximum remote wiring length: ① <math>L_1 + L_2 + L_3 + L_5 + L_6 \leq 200 \text{ m}</math> (1.25 mm<sup>2</sup>) ② <math>L_1 + L_2 + L_3 + L_5 + L_7 \leq 200 \text{ m}</math> (1.25 mm<sup>2</sup>) ③ <math>L_1 + L_2 + L_4 \leq 200 \text{ m}</math> (1.25 mm<sup>2</sup>) ④ <math>L_6 + L_5 + L_3 + L_4, L_4 + L_3 + L_5 + L_7 \leq 200 \text{ m}</math> (1.25 mm<sup>2</sup>)</li><li>Remote control wiring length : <math>\ell_1, \ell_2 \leq 10 \text{ m}</math> (0.5 to 0.75 mm<sup>2</sup>) If the length exceeds 10 m, use 1.25 mm<sup>2</sup> shielded cable and calculate the length of that portion (L<sub>4</sub> and L<sub>7</sub>) as within the total extended length and the longest remote length.</li></ul>														
Prohibited items	<ul style="list-style-type: none"><li>Do not mistake the connection locations of transmission booster (RP) transmission line terminal block 1 (TB2) and transmission line terminal block 2 (TB3). (Operation will not be normal in such a case.)</li><li>Do not connect the S terminals of transmission line terminal block 1 (TB2) and transmission line terminal block 2 (TB3) of the transmission booster (RP) together.</li></ul>														



## 11.4. Wiring of main power supply and equipment capacity

Schematic drawing of wiring (example)



**Note:**

1. The transmission booster may be required according to the number of indoor units connected. (For details, see item 11.3. "Wiring transmission cables")
2. For switch capacity, see the installation manual for transmission booster.

- |   |  |
|---|--|
| (A) Power supply (3-phase, 4-wire) 380/400/415 volt | (E) Power supply (single-phase) 220/230/240 volt |
| (B) Switch  | (F) 1.5 mm <sup>2</sup> or more                  |
| (C) Variable capacity unit                          | (G) Pull box                                     |
| (C') Constant capacity unit                         | (H) Indoor unit                                  |
| (D) Ground  |  |

Thickness of wire for main power supply and on/off capacities (example)

Model		Minimum wire thickness (mm <sup>2</sup> )			Switch (A)		Breaker for wiring (NFB)	Breaker for current leakage
		Main cable	Branch	Ground	Capacity	Fuse		
Outdoor unit	PUHY-400	10.0	—	10.0	63	63	75A	75A 100mA 0.1 sec or less
	PUHY-500	16.0	—	16.0	63	63		
	PUHN-200	4.0	—	4.0	32	32	40	30A 100mA 0.1 sec or less
	PUHN-250	6.0	—	6.0	40	40		40A 100mA 0.1 sec or less

Model		Wire Thickness (mm <sup>2</sup> )			Switch (A)		Breaker for Wiring (NFB)	Breaker for Current Leakage
		Main Cable	Branch	Ground	Capacity	Fuse		
Indoor Unit	All Models	1.5	1.5	1.5	16	16	20A	20A 30mA 0.1 s. or less

1. Use a separate power supply for the outdoor unit and indoor unit.
2. Bear in mind ambient conditions (ambient temperature, direct sunlight, rain water, etc.) when proceeding with the wiring and connections.
3. The wire size is the minimum value for metal conduit wiring. The power cord size should be 1 rank thicker consideration of voltage drops. Make sure the power-supply voltage does not drop more than 10 %.
4. Specific wiring requirements should adhere to the wiring regulations of the region.
5. Power supply cords of parts of appliances for outdoor use shall not be lighter than polychloroprene sheathed flexible cord (design 245 IEC57). For example, use wiring such as YZW.

**Warning:**

- Be sure to use specified wires to connect so that no external force is imparted to terminal connections. If connections are not fixed firmly, it may cause heating or fire.
- Be sure to use the appropriate type of overcurrent protection switch. Note that generated overcurrent may include some amount of direct current.

**Caution:**

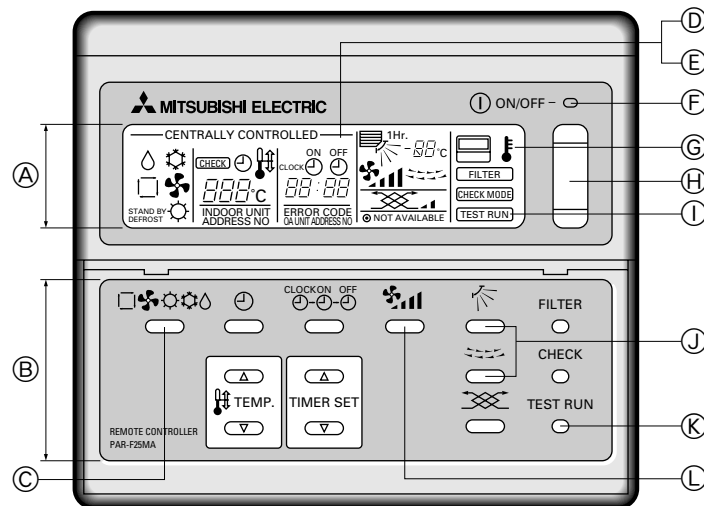
- Some installation site may require attachment of an earth leakage breaker. If no earth leakage breaker is installed, it may cause an electric shock.
- Do not use anything other than breaker and fuse with correct capacity. Using fuse and wire or copper wire with too large capacity may cause a malfunction of unit or fire.
- If the electrical wiring connections (L1, L2, L3, N ⊕) are made incorrectly, damage to the unit could result.

## 12. Test run

### 12.1. Checking before getting test run

1	Check to see whether there are refrigerant leakage, and slack of power or transmission cable.
2	Confirm that 500 V megger shows 1.0 MΩ or more between power supply terminal block and ground. Do not operate in the case of 1.0 MΩ or less. NOTE: Never carry out megohm check over terminal control board. Otherwise the control board would be broken. Immediately after mounting the unit or after leaving it turned off for an extended length of time, the resistance of the insulation between the power supply terminal board and the ground may decrease to approx. 1.0 MΩ as a result of refrigerant accumulating in the internal compressor. If the insulation resistance is more than 1.0 MΩ, turning on the main power supply and energizing the crankcase heater for more than 12 hours will cause the refrigerant to evaporate, increasing the insulation resistance.
3	Check to see whether both gas and liquid valves are fully open. NOTE: Be sure to tighten caps.
4	Check the phase sequence and the voltage between phases. NOTE: If the phase sequence is reversed, an error (4103) may occur when a test run is made, causing the unit to stop.
5	If a transmission booster is connected: Turn transmission booster power on the before turning the outdoor unit's power on. NOTE 1: If the outdoor unit's power is turned on first, refrigerant system connection data may not be recognized normally. NOTE 2: If the outdoor unit's power is turned on first, reset the outdoor unit's power after turning the transmission booster power on.
6	Turn on universal power supply at least 12 hours before getting test run in order to carry current to crank case heater. If current-carrying hours are too short, it may result in a malfunction of compressor.

### 12.2. Test run method



- ① Display panel
- ② Control panel
- ③ Cooling/Heating select button ③, ④
- ④ Check code indicator (see note 1)
- ⑤ Test run remaining time indicator (see note 3)
- ⑥ ON/OFF LED (lights up in operation)
- ⑦ Indoor unit liquid pipe temperature indicator (see note 4)
- ⑧ ON/OFF button ⑧
- ⑨ Test run indicator
- ⑩ Wind adjust button ⑩
- ⑪ Test run button ②
- ⑫ Air blow adjust button ⑫

Operation procedure	
①	Turn on universal power supply at least 12 hours before getting started → displaying "HO" on display panel for about two minutes. The universal power supply must be left on for at least 12 hours (with the crank case heater turned on). If a transmission booster is connected, turn transmission booster power on the before turning the outdoor unit's power on.
②	Press [TEST RUN] button twice → displaying "TEST RUN" on display panel.
③	Press [Cooling/Heating] select button → make sure that air is blowing out.
④	Press [Cooling/Heating] select button to change from cooling to heating operation, and vice versa → make sure that warm or cold air is blowing out.
⑤	Press [Wind] adjust button → make sure that air blow is changed.
⑥	Press [Up/Down Wind] or [Louver] button to change wind → Make sure that horizontal or downward blow is adjustable.
⑦	→ Make sure that indoor unit fans operate normally.
⑧	Make sure that interlocking devices such as ventilator operate normally if any.
⑨	Press [ON/OFF] button to cancel test run → Stop operation.
NOTE 1: If check code is displayed on remote controller or remote controller does not operate normally, see page 35 or further.	
NOTE 2: Test run automatically stops operating after two hours by activation of timer set to two hours.	
NOTE 3: During test run, test run remaining time is displayed on time display section.	
NOTE 4: During test run, temperature of liquid pipe in indoor unit is displayed on remote controller room temp. display section.	
NOTE 5: When pressing [Wind] adjust button, depending on the model, "This function is not available" may be displayed on remote controller. However, it is not a malfunction.	
NOTE 6: If the outdoor temperature is low, the unit may not operate for up to 4 hours.	

## 12.3. How to cope with test run abnormality

① A 4-digit check code is displayed on remote controller display panel if unit is stopped due to an abnormality. Check to see causes of that abnormality.

### 1. Indoor unit

Check code	Abnormality	Check code	Abnormality
2500	Water leakage abnormality	6603	Transmission error (Transmission route BUSY)
2502	Drain pump error	6606	Transmission and reception error (Communication trouble with transmission processor)
2503	Drain sensor error, Float switch on	6607	Transmission and reception error (No ACK error)
5101	Air inlet sensor error	6608	Transmission and reception error (No responsive frame error)
5102	Piping sensor error	7101	Capacity code error
5103	Piping sensor error in the gas side	7111	Remote controller sensor error
6600	Duplicated unit address setting		
6602	Transmission error (Transmission processor hardware error)		

### 2. Outdoor unit

#### a. Variable capacity unit

Check code	Abnormality	Check code	Abnormality
0403	Serial transmission malfunction	5105	Piping temperature sensor error (TH5)
1102	Discharge temperature abnormality	5106	Outdoor temperature sensor error (TH6)
1111	Low pressure saturated temperature abnormality (Detected by saturated temperature sensor)	5107	Subcool coil liquid outlet temperature sensor error (TH7)
1112	Low pressure saturated temperature abnormality (Detected by liquid level detecting temperature sensor)	5108	Subcool coil bypass outlet temperature sensor error (TH8)
1113	Low pressure saturated temperature abnormality (Detected by liquid level detecting temperature sensor)	5109	Sub cool coil bypass inlet temperature sensor error (TH9)
1301	Low pressure abnormality	5110	Inverter cooling plate temperature sensor error (THHS)
1302	High pressure abnormality	5112	Gas pipe sensor error (TH10a)
1500	Excessive refrigerant replenishment	5113	Gas pipe sensor error (TH10b)
1501	Lacked refrigerant abnormality	5201	High-pressure sensor (HPS) error
1505	Low pressure abnormality	5301	IDC sensor circuit error
4103	Reverse phase	6600	Duplicated unit address setting
4108	Overload protection (Comp overcurrent)	6602	Transmission error (Transmission processor hardware error)
4115	Power supply simultaneous signal abnormality	6603	Transmission error (Transmission route BUSY)
4116	Fan speed abnormality (motor abnormality)	6606	Transmission and reception error (Communication trouble with transmission processor)
4200	VDC detection circuit error	6607	Transmission and reception error (No ACK error)
4210	Overcurrent interruption	6608	Transmission and reception error (No responsive frame error)
4220	Inverter bus line voltage low	7100	Total capacity error
4230	Overheat protection of radiator panel	7101	Capacity code error
4240	Overcurrent protection	7102	Connecting unit number error
4260	Cooling fan abnormality	7105	Address set error
5101	Discharge temperature sensor error (TH1)	7109	Incorrect connection
5102	Low pressure saturated temperature error (TH2)	7130	Incorrect setup
5103	Liquid surface detecting temperature sensor error (TH3)		
5104	Liquid surface detecting temperature sensor error (TH4)		

#### b. Constand capacity unit

Check code	Abnormality	Check code	Abnormality
1102	Discharge temperature abnormality	5106	Outdoor temperature sensor error (TH6)
1112	Low pressure saturated temperature abnormality (Detected by liquid level detecting temperature sensor)	5107	Subcool coil liquid outlet temperature sensor error (TH7)
1113	Low pressure saturated temperature abnormality (Detected by liquid level detecting temperature sensor)	5108	Subcool coil bypass outlet temperature sensor error (TH8)
1302	High pressure abnormality	5109	Sub cool coil bypass inlet temperature sensor error (TH9)
1500	Excessive refrigerant replenishment	5112	Gas pipe sensor error (TH10a)
1505	Low pressure abnormality	5113	Gas pipe sensor error (TH10b)
1559	Faulty oil balance circuit	6600	Duplicated unit address setting
4103	Reverse phase error	6602	Transmission error (Transmission processor hardware error)
4106	Power failure error	6603	Transmission error (Transmission route BUSY)
4108	Overload protection (Comp overcurrent)	6606	Transmission and reception error (Communication trouble with transmission processor)
4115	Power supply simultaneous signal abnormality	6607	Transmission and reception error (No ACK error)
5101	Discharge temperature sensor error (TH1)	6608	Transmission and reception error (No responsive frame error)
5103	Liquid surface detecting temperature sensor error (TH3)		
5104	Liquid surface detecting temperature sensor error (TH4)		
5105	Piping temperature sensor error (TH5)		

### 3. Remote controller

Check code	Abnormality	Check code	Abnormality
6101	Unreadable response receiving error	6606	Transmission and reception error (Communication trouble with transmission processor)
6600	Duplicated unit address setting	6607	Transmission and reception error (No ACK error)
6602	Transmission error (Transmission processor hardware error)	6608	Transmission and reception error (No responsive frame error)
6603	Transmission error (Transmission route BUSY)		

### ② Diagnostic switch (SW1) and the service LED on multi-controller board of the variable capacity unit can be used to judge a malfunction of outdoor unit.

<Operation of self-diagnosis switch (SW1) and the service LED display>

Self-diagnosing item		SW1 setting	Display at LED lighting (blinking)								Remarks
			Flag 1	Flag 2	Flag 3	Flag 4	Flag 5	Flag 6	Flag 7	Flag 8	
㉑	Relay output display 1 (Lighting)	<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	During compressor run	Compressor 1 operations	Compressor 2 operations	21S4	SV1		SV22/32 (Note:1)	Always lighting	Flag 8 always lights at microcomputer power ON
	Check display 1 (Blinking)	<div><div>Ⓒ</div></div>	0000 to 9999 (Alternate display of address and error code)							(Note:1) Type 500 only	
	Relay output display 2	<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	SV4	21S4b	SV5b	SV6	CH2, 3	52F			SV5A and 5B are closed with flag 1
㉒	Check indoor unit	<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	No.1 unit	No.2 unit	No.3 unit	No.4 unit	No.5 unit	No.6 unit	No.7 unit	No.8 unit	Lights at emergency stop in IC Turns off by resetting
		<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	No.9 unit	No.10 unit	No.11 unit	No.12 unit	No.13 unit	No.14 unit	No.15 unit	No.16 unit	
		<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	No.17 unit	No.18 unit	No.19 unit	No.20 unit	No.21 unit	No.22 unit	No.23 unit	No.24 unit	
		<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	No.25 unit	No.26 unit	No.27 unit	No.28 unit	No.29 unit	No.30 unit	No.31 unit	No.32 unit	
	Indoor unit mode	<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	No.1 unit	No.2 unit	No.3 unit	No.4 unit	No.5 unit	No.6 unit	No.7 unit	No.8 unit	Lights at cooling Blinks at heating Turns off at stop/fan
		<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	No.9 unit	No.10 unit	No.11 unit	No.12 unit	No.13 unit	No.14 unit	No.15 unit	No.16 unit	
		<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	No.17 unit	No.18 unit	No.19 unit	No.20 unit	No.21 unit	No.22 unit	No.23 unit	No.24 unit	
		<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	No.25 unit	No.26 unit	No.27 unit	No.28 unit	No.29 unit	No.30 unit	No.31 unit	No.32 unit	
	Indoor unit thermostat	<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	No.1 unit	No.2 unit	No.3 unit	No.4 unit	No.5 unit	No.6 unit	No.7 unit	No.8 unit	Lights at thermostat on Turns off at thermostat off
		<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	No.9 unit	No.10 unit	No.11 unit	No.12 unit	No.13 unit	No.14 unit	No.15 unit	No.16 unit	
		<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	No.17 unit	No.18 unit	No.19 unit	No.20 unit	No.21 unit	No.22 unit	No.23 unit	No.24 unit	
		<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	No.25 unit	No.26 unit	No.27 unit	No.28 unit	No.29 unit	No.30 unit	No.31 unit	No.32 unit	
	Indoor unit address		<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	Displays in order the addresses (1 through 50) of all indoor units connected to the outdoor unit.							

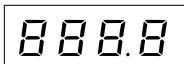
① Outdoor unit  
② Indoor unit

Ⓐ ON  
Ⓑ OFF  
Ⓒ At factory shipment

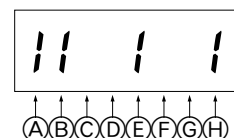
\* Turn SW4-2 of variable capacity unit off. If SW4-2 is on, constant capacity unit data will be displayed.

## Displaying the service LED

Service LED (LD1)

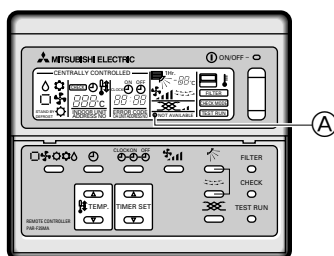


- Error code display  
Alternate display of error generating address and error code  
Example At outdoor unit address 51, abnormal discharge temperature (Code 1102)
- Flag display  
Example SV1 ON under only compressor 1 operated



- |          |          |
|----------|----------|
| Ⓐ Flag 1 | Ⓔ Flag 5 |
| Ⓑ Flag 2 | ⓕ Flag 6 |
| Ⓒ Flag 3 | ⓖ Flag 7 |
| Ⓓ Flag 4 | ⓓ Flag 8 |

## 12.4. Coping with remote controller abnormality



Ⓐ Display: Appears when current is carried

	Phenomenon	Cause	How to cope with abnormality
1	Unit does not operate and display stays off even after pressing remote controller ON switch. (Current-carrying indicator does not light up)	(1) Outdoor unit power was not turned on. (2) Transmission or remote controller cable was shorted or connection failure. (3) Power cable contact failure (4) Remote controller was erroneously connected to unit remote controller terminal block. (5) Too many remote controllers or indoor units were connected.	(a) Check voltage between remote controller terminals. (i) Remote controller fails when voltage is 17 to 30 V. (ii) If there is no voltage <ul style="list-style-type: none"> <li>• Check the number of remote controllers and indoor units connected</li> <li>• Remove wire from transmission cable terminal block (TB3) on outdoor unit, and check voltage between terminals.               <ul style="list-style-type: none"> <li>• If voltage is 17 to 30 V, check (2) and (4) at left.</li> <li>• If there is no voltage, check (1) and (3) at left.</li> </ul> </li> </ul>
2	"HO" indicator does not disappear. Unit does not operate even if the switch is pressed.	(1) No transmission cable was connected to transmission cable terminal block on the indoor unit. (2) Outdoor unit address was erroneously set (3) Indoor unit address was erroneously set.	<ul style="list-style-type: none"> <li>• Check all items at left.</li> </ul>
3	Display comes on once but disappears immediately after a press of the switch.	(1) Indoor unit power was not turned on.	<ul style="list-style-type: none"> <li>• Check item at left.</li> </ul>

## 12.5. The following phenomena do not represent abnormality (emergency)

Phenomenon	Display of remote controller	Cause
Indoor unit does not the perform cooling (heating) operation.	"Cooling (heating)" flashes	When another indoor unit is performing the heating (cooling) operation, the cooling (heating) operation is not performed.
The auto vane runs freely.	Normal display	Because of the control operation of auto vane, it may change over to horizontal blow automatically from the downward blow in cooling in case the downward blow operation has been continued for 1 hour. At defrosting in heating, hot adjusting and thermostat OFF, it automatically changes over to horizontal blow.
Fan setting changes during heating.	Normal display	Ultra-low speed operation is commenced at thermostat OFF. Light air automatically changes over to set value by time or piping temperature at thermostat ON.
Fan stops during heating operation.	Defrost display	The fan is to stop during defrosting.
Fan does not stop while operation has been stopped.	No lighting	Fan is to run for 1 minute after stopping to exhaust residual heat (only in heating).
No setting of fan while start SW has been turned on.	Heat ready	Ultra low-speed operation for 5 minutes after SW ON or until piping temperature becomes 35°C, low speed operation for 2 minutes thereafter, and then set notch is commenced. (Hot adjust control)
Outdoor unit does not operate by turning switch on.	Normal display	When the outdoor unit is being cooled and the refrigerant is resting, warming up operation is performed for at least 35 minutes to warm the compressor. During this time, only the fan operates.
Indoor unit remote controller shows "HO" indicator for about two minutes when turning ON universal power supply.	"HO" flashes	System is being driven. Operate remote controller again after "HO" disappear.
Drain pump does not stop while unit has been stopped.	Light out	After a stop of cooling operation, unit continues to operate drain pump for three minutes and then stops it.
Drain pump continues to operate while unit has been stopped.		Unit continues to operate drain pump if drainage is generated, even during a stop.
When the variable capacity unit is running, the fan of the constant capacity unit runs even though the constant capacity unit isn't running.	Normal display	The fan of constant capacity unit is run automatically in order not to accumulate the refrigerant.

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目录

# 1. 安全注意事项

## 1.1. 安装和电气工程之前

- ▶ 安装机组之前, 务需阅读全部“安全注意事项”。
- ▶ “安全注意事项”列举各种与安全有关的重要事项, 务请遵守。

本手册正文中所用的符号:

### ⚠ 警告:

说明应遵守的注意事项, 以防止使用人受到伤害或死亡的危险。

### ⚠ 注意:

说明应遵守的注意事项, 以防止损坏机组。

本手册插图中所用的符号:

⊘ : 表示切勿尝试的举动。

❗ : 表示必须遵守的重要说明。

⚡ : 表示必须接地的部件。

⚠ : 表示必须留意的运动件 (此符号表示在机组本体标签上) (颜色: 黄)

⚡ : 表示在维修之前必须关断主开关。(此符号表示在机组本体标签上) (颜色: 蓝)

⚠ : 当心触电 (此符号表示在机组本体标签上) (颜色: 黄)

⚠ : 当心热的表面 (此符号表示在机组本体标签上) (颜色: 黄)

⚡ ELV: 表示务请提防触电, 因为这不是安全超低压 (SELV) 电路。  
在检修时, 务请断开室内机组和室外机组的电源。

### ⚠ 警告:

请仔细阅读贴在机组本体上的各种标签。

### ⚠ 警告:

- 应该请经销店或有资格的技工安装空调器。  
— 如用户自行安装且安装得不正确, 则可能会导致漏水、触电或火灾。
- 将本机组安装在一个经受得起其重量的结构物上。  
— 强度不够会使空调器坠落到地上, 从而造成伤害。
- 布线时请使用规定的电缆。接头务必牢固, 以使电缆的外力不作用在端子上。  
— 连接和固定不当会产生热量, 从而引起火灾。
- 将本机组安装在规定的地方, 作好防台风、强风和地震的准备。  
— 安装不当会使机组摇摆而坠落到地上, 从而造成伤害。
- 务请使用三菱电机公司规定的空气滤网、增湿器、电加热器和其他附件。  
— 应该请有资格的技工安装上述附件。如用户自行安装且装得不正确, 则可能会导致漏水、触电或火灾。
- 切勿自行修理本机组。如必须修理, 则应请教经销店。  
— 如修理不当, 则会导致漏水、触电或火灾。

- 请勿触摸热交换器散热片。  
— 摆弄不当会导致人身伤害。
- 安装施工时, 如果制冷剂气体泄漏, 则请将房间通风。  
— 如果制冷剂气体与火焰接触, 则会释放出有毒气体。
- 请按照本手册的说明安装空调器。  
— 如安装不当, 则会导致漏水、触电或火灾。
- 所有电工作业应由一名有执照的电工按照“电气设备工程标准”、“室内布线规范”以及本手册的说明进行, 并应使用一专用电路。  
— 如果电源容量不足或电气工程施工不当, 则可能会导致触电和火灾。
- 控制器盖和面板必须安装牢固。  
— 如果盖和面板安装不当, 则灰尘或水可能会进入室外机组, 从而导致火灾或触电。
- 在安装空调器或将空调器转移到另一地方时, 不可向其注入不同于本空调器规定的制冷剂 (R22)。  
— 如将不同的制冷剂或空气与原来的制冷剂混合, 则制冷剂的循环会不正常, 导致空调器损坏。
- 如果空调器安装在一小房间里, 则必须采取措施, 以使万一制冷剂泄漏时制冷剂的浓度也不超过安全极限。  
— 可向经销店咨询适当的防止超过安全极限的措施。如果制冷剂泄漏并超过极限, 其结果可能会产生房间内因缺氧而导致人员室息的危险。
- 空调器拆移和重装时, 应向经销店或有资格的技工咨询。  
— 如空调器安装不当, 则可能会导致漏水、触电或火灾。
- 安装完毕后, 检查一下制冷剂气体是否泄漏。  
— 如制冷剂气体泄漏且接触到风扇式取暖器、电炉、烤箱或其他热源, 则会产生有毒气体。
- 请勿改装或改变保护装置的设定值。  
— 如果压力开关、热控开关或其他保护装置发生短路或强制动作, 或者使用非三菱电机公司规定的零部件, 则可能会导致火灾或爆炸。

## 1.2. 进行安装之前

### ⚠ 注意:

- 不得将机组安装在可能会漏出可燃气体的地方。  
— 如果气体泄漏并积聚在机组四周, 则可能会导致爆炸。
- 不要在保存食物、饲养宠物、栽种植物、放置精密仪器或艺术品的地方使用空调器。  
— 否则, 食物等的品质可能会变坏。
- 不可在特殊的环境中使用空调器。  
— 油、蒸汽、含硫气体等会大大降低空调器的性能或损坏其零部件。
- 当将空调器安装在医院、电信通讯站或诸如此类的地方, 要采取适当的防噪声措施。  
— 变频器、自备发电机、高频医疗设备、无线电通信设备均会导致空调器工作不正常, 或甚至不能工作。另一方面, 空调器产生的噪声也会影响上述设备, 干扰正常的诊疗程序或图像传送。
- 不得将空调器装在可能会产生泄漏的结构物上。  
— 当房间内湿度超过80% 或排水管阻塞时, 冷凝水会从室内机组滴下。必要时, 室内机组与室外机组的排水装置集中在一起。



## 1.3. 进行安装（移动）－电气工程之前

### △ 注意：

- **机组接地：**
  - －不可将接地导线连接在煤气管、自来水管、避雷装置或电话接地线上。接地不正确会导致触电。
- **电源线不可拉得太紧，其不可有张力。**
  - －一张得过紧会使电缆断裂并产生热量，从而导致火灾。
- **必要时应安装一个漏电断路器。**
  - －如果不安装漏电断路器，则可能会导致触电。
- **应使用电流容量和额定功率足够的电源线。**
  - －电缆太细可能会漏电，产生热量并导致火灾。
- **只可采用一个断路器和规定容量的保险丝。**
  - －如果保险丝或断路器的容量太大，或者采用钢丝或铜丝，则可能会导致机组失灵或造成火灾。
- **不可冲洗空调器。**
  - －冲洗可能会导致触电。
- **空调器安装基础长期使用后可能会损坏。**
  - －如果损坏了而不加以修理，则机组可能会掉下，造成人身伤害或财产损失。
- **排水管道必须按照本安装手册所述进行安装，以保证正常排水。**
  - 将管子用隔热材料包绕起来，以防止产生冷凝水。
  - －排水管安装不当会导致漏水，从而损坏家具和其他财物。
- **产品的搬运务必十分小心。**
  - －如果产品重量超过20kg，则不能只由一个人搬运。
  - －有些产品附有包装用扎带。切莫用这种扎带提拿或搬运该产品，这样很危险。
  - －不要触摸热交换器的散热片，否则可能会割伤手指。
  - －搬运室外机组时，将其吊在机组底座上规定的位置，并在四个点上将其支住，这样就不会横向移动。
- **请妥善处理包装材料。**
  - －包装材料诸如钉、金属或木质部件可能会造成戳伤或其他伤害。
  - －将塑料包装袋撕破丢掉，莫让小孩玩弄。小孩玩弄未撕破的塑料袋有窒息的危险。

## 1.4. 进行试运行之前

### △ 注意：

- **至少在开始运行前12小时先接通主电源开关。**
  - －如果一接通主电源开关就立即开始运行，则可能会导致内部机件严重损坏。在使用季节，可将电源开关一直开着。
- **切勿用湿手触摸开关。**
  - －用湿手触摸可能会导致触电。
- **在运行中或刚运行结束后，不要触摸制冷剂管道。**
  - －在运行中或刚运行结束后，管子可能很热或很冷，这取决于制冷剂流过制冷剂管道、压缩机和其他制冷剂循环部件的条件。
  - 用手触摸制冷剂管道可能会烫伤或冻伤。
- **切勿在面板和护罩拆下的情况下开动空调器。**
  - －运动件、高温零件或高电压部件均会造成人身伤害。
- **在停止运行后不要立即关闭电源。**
  - －至少等待5分钟后才可切断电源，否则会发生漏水和其他故障。

2. 与室内机组的组合

可与本机组连接的室内机组列示如下：

室外机组型号	连接的室内机组机型的总容量	可连接的室内机组数量	可连接的室内机组型号	
PUHY-600	300~780	3~32	PLFY- P32、40、50、63、80、100、125	VKM
PUHY-650	325~845		PLFY- P20、25、32、40、50、63、80、100、125	VLMD
PUHY-700	350~910		PEFY- P20、25、32、40、50、63、80、100、125	VM
PUHY-750	375~975		PDFY- P20、25、32、40、50、63、71、80、100、125	VM
			PCFY- P40、63、100、125	VGM
			PKFY- P20、25	VAM
			PKFY- P32、40、50	VGM
			PFFY- P25、32、40、50、63	VLEM
			PFFY- P25、32、40、50、63	VLRM

- 备注：
- 1. 连接的室内机组机型的总容量是室内机组型号所表示的数字总和。
  - 2. 如果连接的室内机组总容量超过室外机组的容量，则在同时运行时这种组合会使各室内机组的容量降低低于其额定容量。因此，如果环境允许，在组合时应将室内机组的总容量限制在室外机组的容量内。
  - 3. 当制冷系统中连接的室内机组型号的数量超过下表中指定的型号的数量时需要配备一个传输放大器 (RP)。
- \* 可以控制的机组的最大数量取决于室内机组的型号、遥控器的类型和它们的容量。

(*1) 连接的室内 机组的容量	未连接RP时可连接的室内机组数量	遥控器PAR-F25MA	
		遥控器类型	
		早于E版本	晚于F版本
	200或更低	16 (32)	20 (40)
	200或更高	16 (32)	16 (32)

在圆括号 ( ) 中显示室内机组的数量和遥控器的全部数量。

\*1 在制冷系统中即使只有一个机组超过200，则最大容量将是“200或更高”。

3. 随带附件的确认

室外机组随带下列零部件，请检查其数量。

型 号	名 称	①导管安装板	②导管安装板	③导管安装板	④自攻螺丝 M4×12
	形 状				
PUHN-200YMC PUHN-250YMC		1	1	1	4
型 号	名 称	⑤油平衡管	⑥连接管	⑦密封垫	⑧密封材料
	形 状				
PUHN-200YMC PUHN-250YMC		1	1	1	2

\*⑥连接管固定在机组上。

4. 室外机组配置

机组 (PUHY-600/650/700/750YSMC) 包含可变容量机组 (PUHY-400/500YMC) 以及固定容量机组 (PUHN-200/250YMC)。当使用这些机组的组合时需配备一个CMC-30A (选购件)。

Super Y	可变容量机组	固定容量机组
PUHY-600YSMC	PUHY-400YMC	PUHN-200YMC
PUHY-650YSMC		PUHN-250YMC
PUHY-700YSMC	PUHY-500YMC	PUHN-200YMC
PUHY-750YSMC		PUHN-250YMC

CMC-30A (选购件)

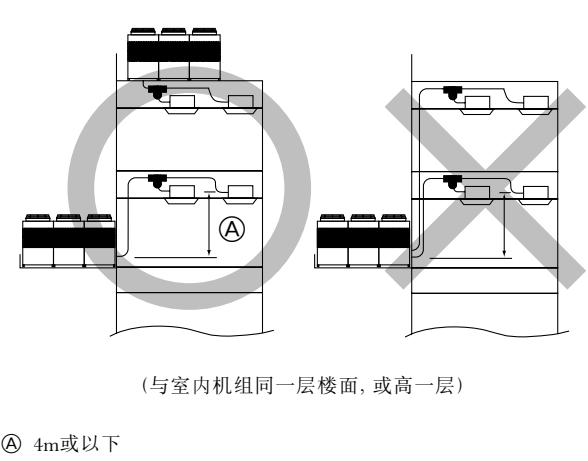
名称		①分配器 (气体)	②油平衡管2	③分配器 (液体)	④连接管
形状					
号	CMC-30A	1	1	1	1
	名称	⑤连接管	⑥连接管	⑦连接管	⑧弯管
形状					
号	CMC-30A	1	1	1	2

5. 安装位置的选择

选择室外机组的安装位置时, 必须满足下列条件:

- 没有来自其他热源的直接热辐射。
- 本机组发出的噪声不会打扰左邻右舍。
- 不暴露于强风下。
- 强度能承受得住本机组的重量。
- 在暖气运行时冷凝水能流出本机组。
- 空气通路和检修作业空间如下所示  
由于可能会发生火灾, 不可将本机组安装在预期会产生、流入、滞留或泄漏可燃气的位置。
- 避免将本机组安装在常常使用酸性溶液或喷雾 (含硫物) 的位置。
- 如在室外气温低于10° 时进行冷气运行, 为了确保机组能稳定运行, 请选择一个不会直接受到雨淋、积雪的安装位置, 或者安装出气和进气管道 (参照第49页)。将室外机组安装在室内机组同一层楼的同一位置或其上面 (见右图)。
- 不要在有油、蒸汽和含硫气体的特殊环境中使用本机组。

在室外气温低于10° 环境下进行冷气运行时的室外机组安装限制。

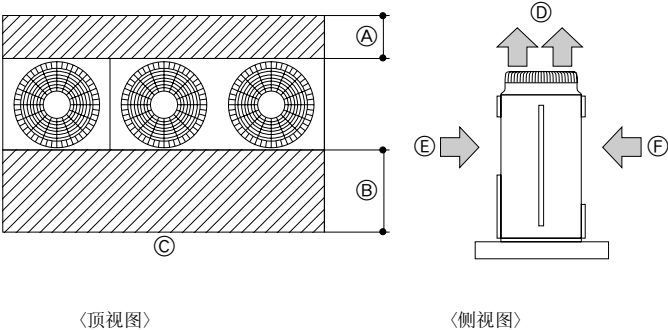


6. 机组周围所需的空間

6.1. 各別安裝

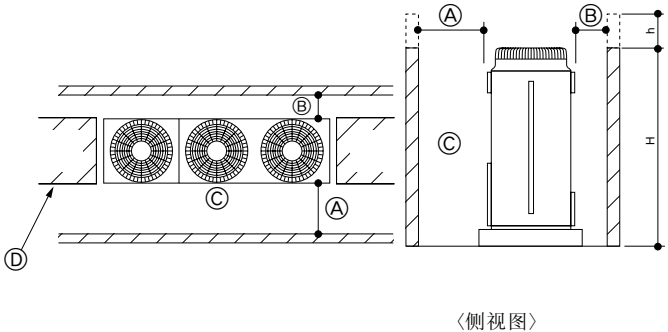
所需的基本空間

背面进气口至少需要250mm的空间。考虑到从后面进行检修等, 应具备有450mm左右的空间。正面也一样。



- ① 250mm或以上
- ② 450mm或以上
- ③ 正面 (机房外面)
- ④ 顶部排气口 (原则上开放)
- ⑤ 正面进气口 (原则上开放)
- ⑥ 背面进气口 (原则上开放)

当空气从机组左右两侧进入时



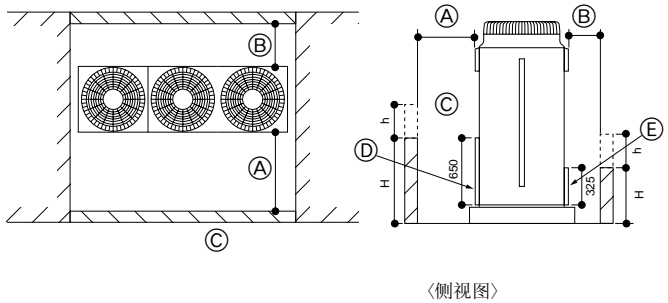
- ①  $L_1$ 或以上
- ②  $L_2$ 或以上
- ③ 正面
- ④ 墙壁高度不限 (左面和右面)

备注:

- 正面和背面墙壁的高度 (H) 应在机组的总高度之内。
- 当超过总高度时, 将上列数字的“h”尺寸加在下表内的 $L_1$ 和 $L_2$ 中。

型号	$L_1$	$L_2$
PUHY-400 PUHY-500	450	250

当机组被墙包围时



- ①  $L_1$ 或以上
- ②  $L_2$ 或以上
- ③ 正面
- ④ 正面面板
- ⑤ 后面板

备注:

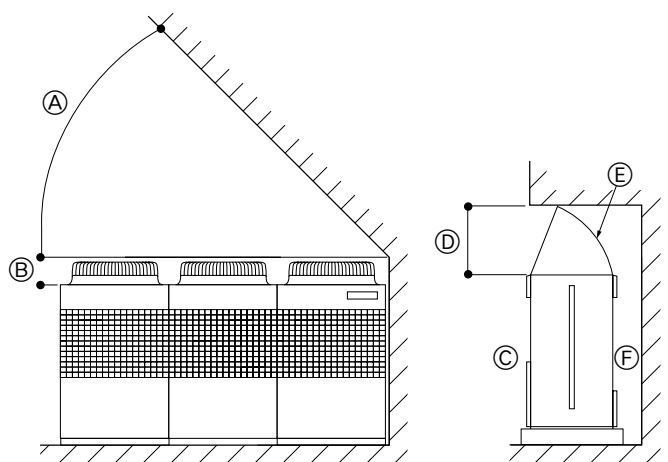
- 前面和后面的墙高 (H) 应在前面板和后面板的高度范围内。
- 如果面板的高度超过, 则将上列数字的“h”尺寸加在下表内的 $L_1$ 和 $L_2$ 中。

型号	$L_1$	$L_2$
PUHY-400 PUHY-500	450	250

例子: 当h为100时

$L_1$ 的尺寸变成 $450 + 100 = 550$  mm

当机组上方有一障碍物时

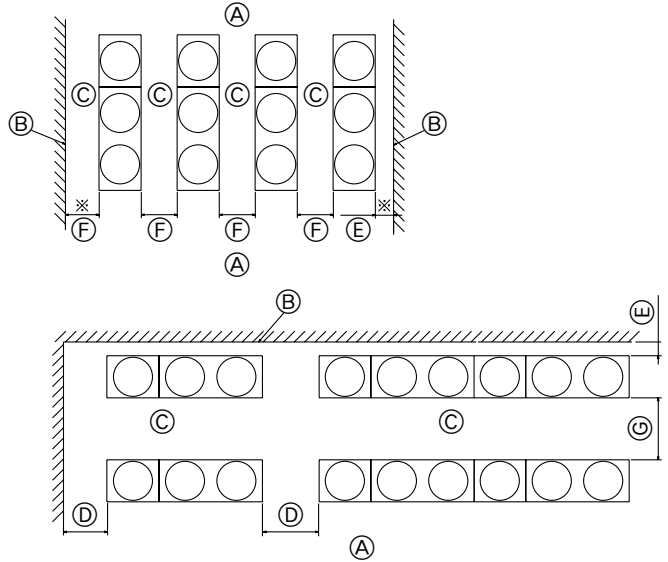
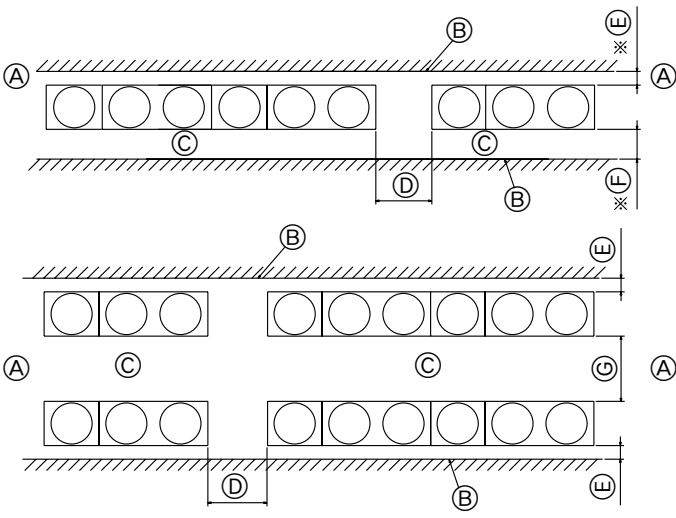


与障碍物几乎没有间隔

- ①  $45^\circ$  或以上
- ② 300mm或以上
- ③ 正面
- ④ 1000mm或以上
- ⑤ 空气出口导管 (现场准备)
- ⑥ 背面

6.2. 集中安装和连续安装

集中安装和连续安装所需的空间：  
当安装数台机组时，为顾及空气和人的通路，应在各排机组之间留下间隔，如下图所示。



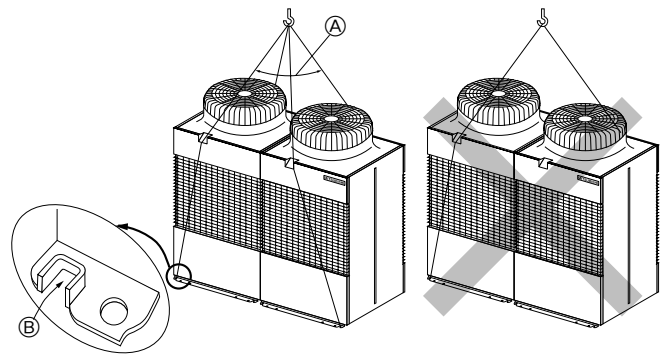
- Ⓐ (必须开放)
- Ⓑ 墙壁高度 (H)
- Ⓒ 正面
- Ⓓ 1000mm或以上
- Ⓔ 250mm或以上
- Ⓕ 450mm或以上
- Ⓖ 900mm或以上

- 备注：
- 在两个方向开放。
  - 如果墙壁高度 (H) 超过机组的总高度，则将“h”尺寸 (h=墙壁高度 (H) - 机组总高度) 加在带※记号的尺寸上。
  - 如果机组的正面和背面都有墙壁，则在侧向最多连续安装3台机组，留出1000mm以上的间隔作为3台机组的进气/通路的空间。

7. 吊运方法和产品重量

- 将机组悬吊时，应将绳索从其下面穿过，并利用分别位于正面和背面的2个悬吊点。
- 吊运时务必将绳索系在4个点上，以免受到碰撞冲击。
- 用绳索系于机组的角度要小于40°。
- 至少要用2根Am长的绳索。

$$A = \begin{cases} 7 \cdots \text{PUHN-200/250YMC} \\ 8 \cdots \text{PUHY-400/500YMC} \end{cases}$$



- Ⓐ 40° 或以下
- Ⓑ 绳索悬吊部

产品重量：

PUHY-400	PUHY-500	PUHN-200	PUHN-250
430 kg	470 kg	240 kg	255 kg

- ⚠ 注意：
- 产品的搬运务必十分小心。
- 如果产品重量超过20kg，则不能只由一个人搬运。
  - 有些产品附有包装用扎带。切莫用这种扎带提拿或搬运该产品，这样很危险。
  - 不要赤手触摸换热器的散热片，否则可能会割伤手指。
  - 将塑料包装袋撕破丢掉，莫让小孩玩弄。小孩玩弄未撕破的塑料袋有窒息的危险。
  - 搬运室外机组时，应在四个点上将其支住。用3点支承来搬入和吊起可能会导致室外机组不稳定，从而引起掉落。

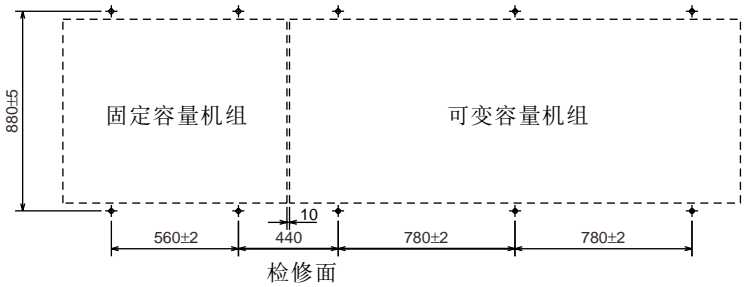
## 8. 机组的安装

### 8.1. 地脚螺栓的位置

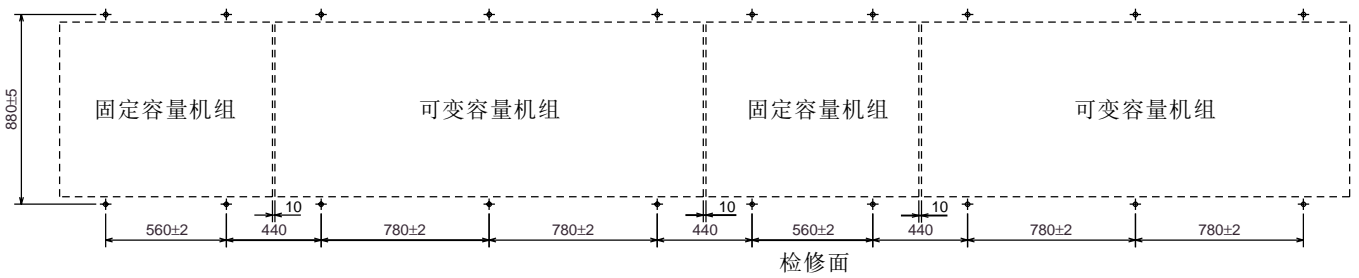
在相同支架的左侧安装固定容量机组，在右侧安装可变量容量机组（从前面看）。在机组之间应保留10mm间隔。

（单位：mm）

#### • 各别安装



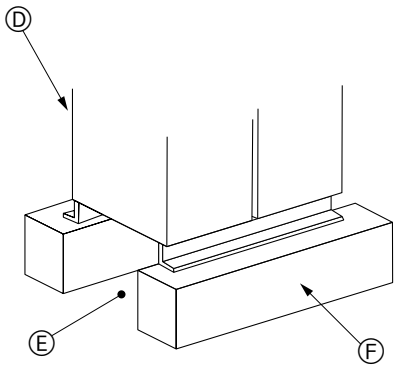
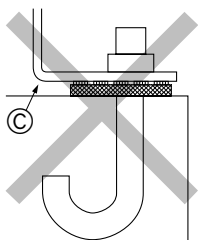
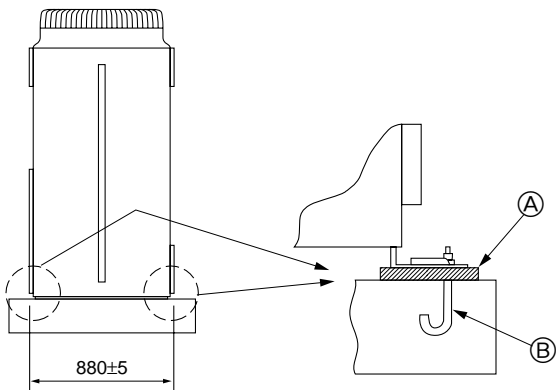
#### • 集中安装例子



集中安装时各台机组之间留出10mm的间隙。

### 8.2. 安装

- 如下图所示将机组用螺栓紧紧固定，以使其不会因地震或阵风而掉落。
- 用混凝土或角钢作为机组基础。
- 振动会传递到安装部分，底板和墙壁可能会产生噪声和振动，这取决于安装条件。因此，应采取简单的防振措施（如使用减振垫、缓冲架等）。



- ① 边角部必须稳定就位，如就位不稳，则安装脚将会弯曲。
- ② 安装现场准备的M10地脚螺栓。
- ③ 边角部未就位。
- ④ 机组  
(在机组和基础之间放些简单的防振物，如减振垫、缓冲架等)
- ⑤ 管道和布线空间(底部管道、底部布线)
- ⑥ 混凝土基础

#### ⚠ 警告：

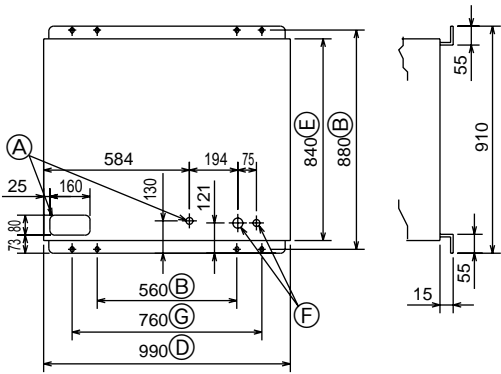
- 必须将本机组安装在其强度足以承受本机组重量的地方。强度不够会导致机组坠落，从而造成人身伤害。
- 为了预防强风和地震，机组必须妥善安装。任何安装不当都会使机组掉落，造成人身伤害。

在建造基础时，必须充分注意地板强度、排水处理（机组运行时，排水从机组流出）以及管道和布线路径。

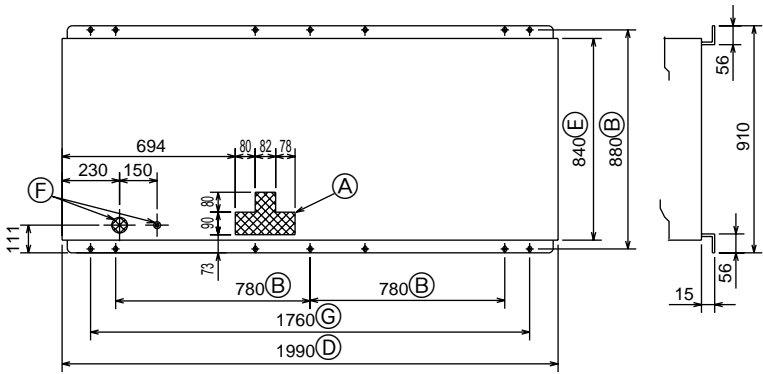
下行管道和下行布线注意事项

敷设下行管道和下行布线时，基础和底座结构不可堵塞底座贯通孔。敷设下行管道时，基础高度至少为150mm，以使管道能穿过机组的底部。

<适用于PUHN-200/250YMC>



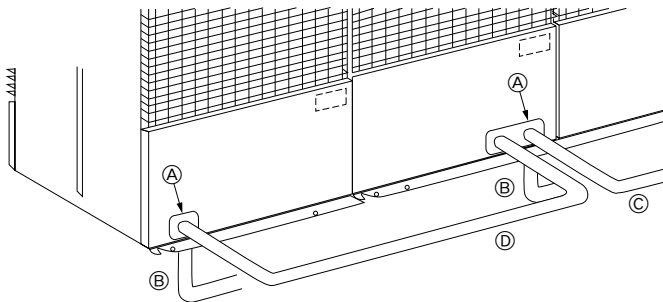
<适用于PUHY-400/500YMC>



- Ⓐ 底部管道贯通孔
- Ⓑ (螺栓孔)
- Ⓒ (适用于老型号的螺栓孔)
- Ⓓ (机组宽度)
- Ⓔ (机组深度)
- Ⓕ 底部布线贯通孔
- Ⓖ (用于包装的螺栓孔)

8.3. 制冷剂管道的连接方向

室外机组制冷剂管道的连接方向有2个：底部管道和正面管道。



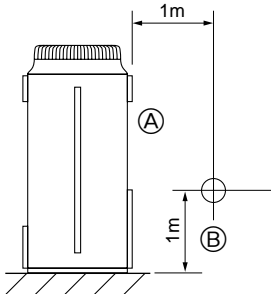
- Ⓐ 敲出孔
- Ⓑ 底部管道
- Ⓒ 正面管道
- Ⓓ 连接管 (至固定容量机组)

备注：

在使用底部管道的情况下，须制作一个高100mm以上的基础，以便管道穿过机组的底部。

8.4. 噪声级

(50/60Hz)			
PUHY-400	PUHY-500	PUHN-200	PUHN-250
60/61 dB (A-受力)		56 dB (A-受力)	57 dB (A-受力)



- Ⓐ 正面
- Ⓑ 测量点

测量场所：没有回声和混响的房间

## 9. 雪和季风的注意事项

在寒冷和/或多雪地区，为使机组在冬天能以正常和良好的状态工作，应采取适当的措施来防止风雪损害。即使在其他地区，对于机组的安装也必须充分考虑，以防止机组因季风或雪而工作失常。当雨雪直接落在机组上且室外气温在10° 以下时，应在机组上设置入口和出口导管，以保证机组稳定运行。

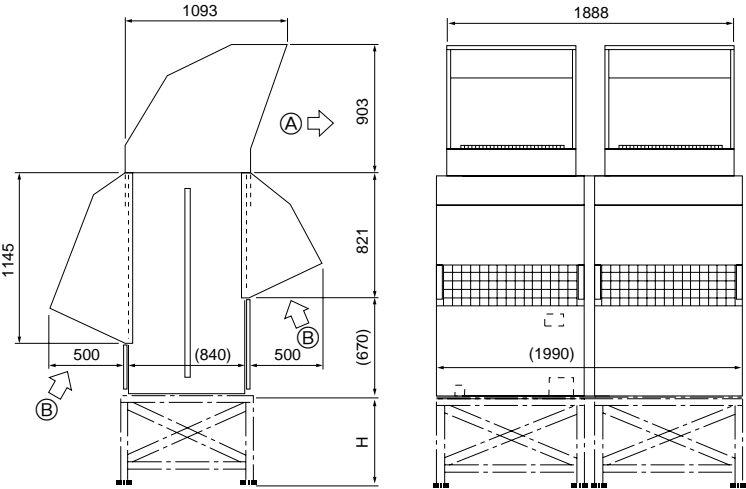
### 9.1. 雪和季风

- 为了防止寒冷或多雪地区风雪的损害，请参考下图所示的防雪罩：
- 防雪罩

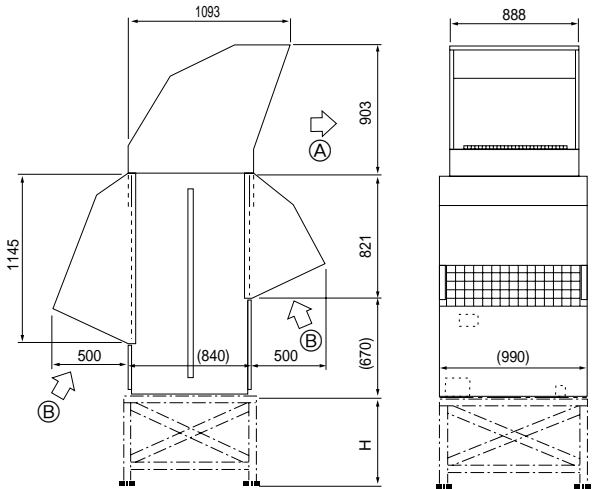
备注：

1. 防雪框架底座的高度(H)必须是预期降雪厚度的2倍。框架底部的宽度不可超过机组底座宽度。框架底部应使用角钢等制成，并要设计得使雪和风从结构物上滑掉（如果框架底部太宽，雪会积在其上面）。
  2. 机组必须安装得季风不会對著其出入口管道的开口直吹。
  3. 在用户处制作框架底座时请参考本图。
- 材 料：镀锌钢板1.2T  
油 漆：使用聚脂粉末涂料  
颜 色：Munsell 5Y8/1（与机组的颜色相同）
4. 当机组在寒冷地区使用并且在室外气温零度以下长期连续进行暖气运行时，请在机组底座处加装一只加热器或采取别的合宜措施，以防止水在底座上结冰。

<PUHY-400/500YMC>



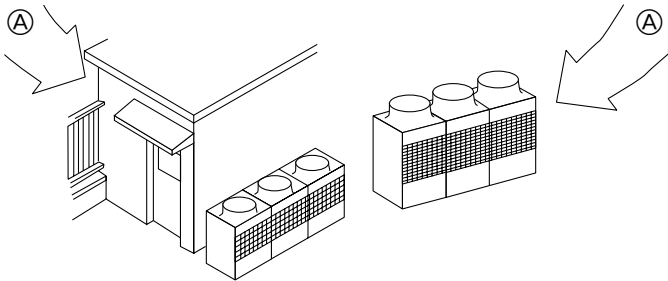
<PUHN-200/250YMC>



- Ⓐ 出口  
Ⓑ 入口

### 9.2. 季风对策

请参考下图，根据安装处的实际情况，因地制宜地采取对策。



- Ⓐ 季风



## 10. 制冷剂管道的安装

将制冷剂管道安装成终端分支型式,即来自室外机组的制冷剂管道在终端分支并连接到各室内机组。

连接方法包括在室内机组上的扩口连接,用于室外机组管道连接的法兰连接,以及用于液体、油平衡管的扩口连接。应注意分支部分为铜钎焊方式。

 **警告：**

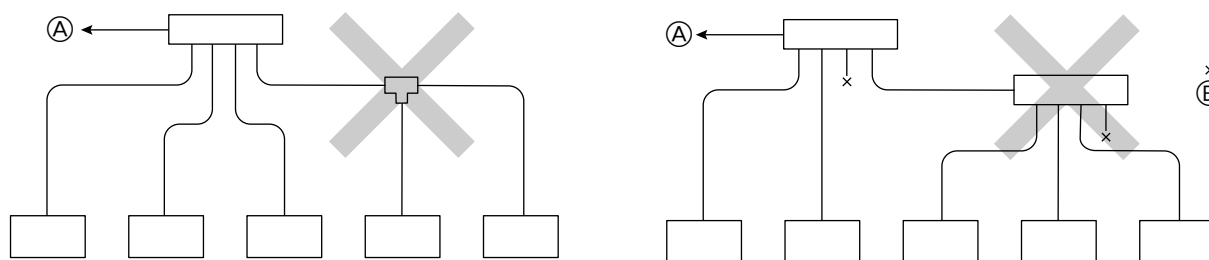
使用明火进行作业时,务必极其小心防止制冷剂气体 (R22) 泄漏。如果制冷剂气体与任何热源 (例如煤气炉) 的火焰接触,则分解而产生的有害气体会造成气体中毒。切勿在不通风的房间内焊接。制冷剂管道安装完毕后,务须检查是否漏气。

### 10.1. 必须注意的方面

- ① 请用下述制冷剂管道材料。
  - 材料: 无缝脱氧磷铜管, C1220T-OL或C1220T-O (备注: 推荐使用C1220T-OL)
  - 尺寸: 参照第50~51页。
- ② 市上出售的管子常含有尘埃和其他杂质, 必须用干的惰性气体将其吹净。
- ③ 敷设时务必防止尘埃、水或其他杂物进入管道。
- ④ 尽可能减少弯曲部数量, 尽可能增大弯曲半径。
- ⑤ 务请采用下图所示成套分支管, 这种分支管单独出售。本机組需要使用一个CMC-30A (选购件)。

成套分支管名称						
管路分支				总管分支		
下游机组总数 型号160以下	下游机组总数 型号160~330	下游机组总数 型号331~630	下游机组总数 型号631以上	4 分支	7 分支	10 分支
CMY-Y102S-F	CMY-Y102L-F	CMY-Y202-F	CMY-Y302-F	CMY-Y104-E	CMY-Y107-E	CMY-Y1010-E

- ⑥ 如果指定的制冷剂管道分支管的直径不同,则可用刀具将其连接部分切除,然后用异径接头将不同直径的管子连接起来。
- ⑦ 务请遵守有关制冷剂管道的规定(例如规定长度、高压/低压之间差异、管子直径)。不遵守规定会导致设备失灵或制冷性能降低。
- ⑧ 在总管分支管(用×表示)后面不能再作另一分支管。



- ④ 至室外机组
  - ⑤ 有盖的管道
- ⑨ 务请采用优质钎焊材料。
- ⑩ 当冷却剂过多或不足而出现异常现象时, City Multi Series Super Y 机组将停止工作。此时, 应向机组加入适量的冷却剂。在检修时, 查看一下该两处有关管子长度和制冷剂追加量的说明; 制冷剂量计算表在检修板的背面; 制冷剂追加量在室内机组合编号的标签上 (参照第 50 ~ 51 页)。
- ⑪ 切勿进行抽气降压。这将会导致压缩机损坏。
- ⑫ 切勿用制冷剂进行空气净化。抽空请用真空泵。
- ⑬ 管道必须适当隔热。隔热不当会导致制热/制冷性能下降, 冷凝水下滴和其他诸如此类的问题 (参照第 58 ~ 59 页)。
- ⑭ 在连接制冷剂管道时, 室外机组的断流阀必须完全关闭 (工厂设定), 并且在室内机组和室外机组的制冷剂管道连接完毕, 制冷剂泄漏测试结束、抽空过程完成之前不可操作。
- ⑮ 机件的钎焊请采用非氧化性钎焊材料。如不用这种材料, 则可能会导致压缩机堵塞或损坏 (有关管道连接和阀的操作详见第 52 ~ 53 页)。

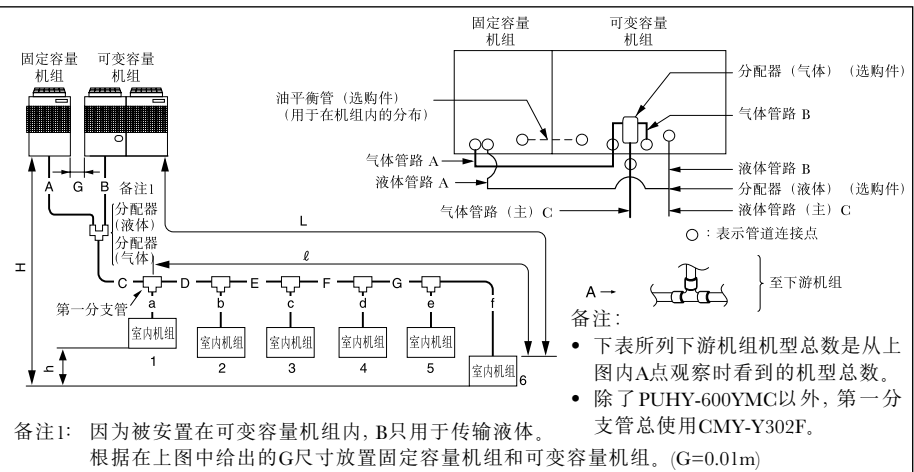
**警告：**

在安装空调器或将空调器转移到另一地方时,不可向其注入不同于本空调器规定的制冷剂(R22)。

- 一 如将不同的制冷剂或空气与原来的制冷剂混合, 则制冷剂的循环会不正常, 导致空调器损坏。

10.2. 制冷剂管道系统

管路分支方法  
连接举例  
(连接到6台室内机组)



		项目	管路部分	公差
容许长度	室内侧	管道总长度	A+B+C+D+E+F+G+a+b+c+d+e+f	220m或以下
		最远管道长度 (L)	A (B)+C+D+E+F+G+f	100m或以下 (最大长度125m)
		第一分支管后最远管道长度 (ℓ)	D+E+F+G+f	40m或以下
	室外侧	油平衡管	I	必须使用提供的油平衡管。如果使用其他任何管道, 则油平衡管的长度不能超过3m (最大等于4m) 和距离底部的高度必须少于0.1m。
		分配器 (液体) /可变容量机组、固定容量机组	A, B (液体管路)	4m或以下 (最大长度5m)
		分配器 (气体) /固定容量机组	A (气体管路)	4m或以下 (最大长度5m)
容许高/低差	室内/室外	室外向上	H	50m或以下
		室外向下	H	40m或以下
	室内/室内	h	15m或以下	
	可变容量机组/固定容量机组		—	必须安装在相同的支架上, 同时必须保证没有高低差。

■ 制冷剂分支管套件的选择  
根据从分支管部分起的下游室内机组机型总数, 按右表进行选择。

下游机组机型总数	分支管套件型号
160或以下	CMY-Y102S-F
161~330	CMY-Y102L-F
331~630	CMY-Y202-F
631或以上	CMY-Y302-F

■ 选择制冷剂管道的各部分

- (1) 从室外机组至第1分支管 (C) 的部分
- (2) 从分支管至室内机组 (a、b、c、d、e、f) 的部分
- (3) 从分支管至分支管 (D、E、F、G) 的部分
- 管道的各部分

(1) 从室外机组至第1分支管部分的制冷剂管道直径 (室外机组管道直径)		(2) 从分支管至室内机组部分的制冷剂管道直径 (室内机组管道直径)	
型 号	管道直径 (mm)	型 号	管道直径 (mm)
PUHY-600YSMC	液体管路	20 · 25 · 32 · 40	液体管路
	气体管路		气体管路
PUHY-650YSMC	φ19.05		φ6.35
	φ38.1		φ12.7
PUHY-700YSMC	φ19.05	50 · 63 · 71 · 80	液体管路
	φ44.45		φ9.52
PUHY-750YSMC	φ19.05		φ15.88
	φ44.45	100 · 125	液体管路
			φ9.52
			φ19.05

从右表选择尺寸。

(kg)			
可变容量机组		固定容量机组	
400	500	200	250
16	22	6.5	8.5

■ 追加充注制冷剂  
根据上表, 出厂时在室外机组中充入制冷剂。因为这一充注量并不包括加长管道所需的总量, 所以各制冷剂管道必须到现场另外充注制冷剂。为了将来能提供正确的检修服务, 请作好各制冷剂管道的尺寸和长度记录, 将其写在室外机组所提供空间内。

- 追加充注制冷剂量的计算
- 根据加长管的长度和制冷剂管路的尺寸来计算追加充注量。
  - 根据右表来计算追加充注量并按此量将制冷剂注入系统。
  - 如果计算的结果少于0.1kg的部分四舍五入。例如, 如果计算结果是23.28kg, 四舍五入结果为23.3kg。
  - 出厂时如果总的制冷剂量包括密封在室外机组中的制冷剂加上为延长管添加的制冷剂超过73kg, 则使用73kg作为总的制冷剂量。出厂时的制冷剂总量+添加的制冷剂量 ≤ 73kg。

下游机组机型总数	液体管路(mm)	气体管路(mm)
80或以下	φ9.52	φ15.88
81~160	φ12.7	φ19.05
161~330	φ12.7	φ25.4
331~480	φ15.88	φ31.75
481~630	φ15.88	φ38.1
631或以上	φ19.05	φ44.45

〈追加充注量〉

液体管尺寸 总长度 φ19.05 × 0.29	+	液体管尺寸 总长度 φ15.88 × 0.25	+	液体管尺寸 总长度 φ12.7 × 0.12	+	液体管尺寸 总长度 φ9.52 × 0.06	+	液体管尺寸 总长度 φ6.35 × 0.024	+	α
(m) × 0.29 (kg/m)		(m) × 0.25 (kg/m)		(m) × 0.12 (kg/m)		(m) × 0.06 (kg/m)		(m) × 0.024 (kg/m)		

〈例子〉 室内

1 : 125	A : φ12.7	3 m	a : φ9.52	15 m
2 : 125	B : φ15.88	1 m	b : φ9.52	15 m
3 : 125	C : φ19.05	40 m	c : φ9.52	10 m
4 : 125	D : φ15.88	10 m	d : φ9.52	5 m
5 : 100	E : φ15.88	5 m	e : φ9.52	5 m
6 : 40	F : φ12.7	5 m	f : φ6.35	5 m
	G : φ12.7	5 m		

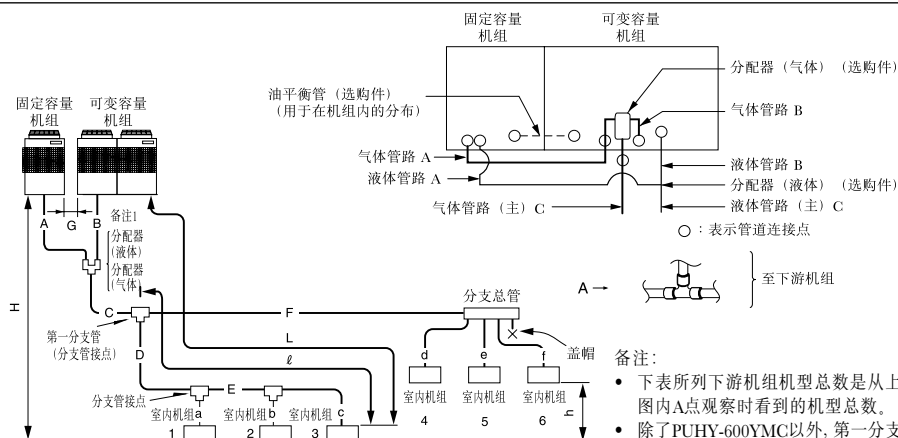
各液体管路的总长度如下  
φ19.05 : C = 40 m  
φ15.88 : B + D + E = 1 + 10 + 5 = 16 m  
φ12.7 : A + F + G = 3 + 5 + 5 = 13 m  
φ9.52 : a + b + c + d + e = 50 m  
φ6.35 : f = 5 = 5 m  
因此  
〈计算举例〉  
追加制冷剂  
充注量 = 40 × 0.29 + 16 × 0.25 + 13 × 0.12 + 50 × 0.06 + 5 × 0.024 + 3.0 = 23.3 kg

α值

连接的室内 机组总容量	α
至型号80	1.0 kg
型号81-160	1.5 kg
型号161-330	2.0 kg
型号331-480	2.5 kg
型号481-630	3.0 kg
型号631或以上	4.0 kg

在下列条件时:

# 多管路/总管 连接举例 (连接到6台室内机组)



备注1: 因为被安置在可变容量机组内, B只用于传输液体。  
根据在上图中给出的G尺寸放置固定容量机组和可变容量机组。(G=0.01m)

项目		管路部分	公差
室内侧	管道总长度	A+B+C+D+E+F+a+b+c+d+e+f	220m或以下
	最远管道长度 (L)	A (B)+C+D+E+c	100m或以下 (最大长度125m)
	第一分支管后最远管道长度 (ℓ)	D+E+c	40m或以下
室外侧	油平衡管	I	必须使用提供的油平衡管。如果使用其他任何管道, 则油平衡管的长度不能超过3m (最大等于4m) 和距离底部的高度必须少于0.1m。
	分配器 (液体) / 可变容量机组、固定容量机组	A, B (液体管路)	4m或以下 (最大长度5m)
	分配器 (气体) / 固定容量机组	A (气体管路)	4m或以下 (最大长度5m)
容许高/低差	室内/室外	H	50m或以下
	室外向上	H	40m或以下
	室外向下	h	15m或以下
	室内/室外	—	必须安装在相同的支架上, 同时必须保证没有高低差。

## ■ 选择制冷剂分支管套件

利用右表根据分支管部分的下游室内机组机型总数和要在分支总管连接的室内机组数来进行选择。

从下表中选择单独销售的分支管套件。(每套中包括制冷剂和气体管)

管道分支				总管分支		
180型号以下的下游机组总数	型号181-370的下游机组总数	型号371-710的下游机组总数	711型号以上的下游机组总数	4分支总管	7分支总管	10分支总管
CMY-Y102S-C	CMY-Y102L-C	CMY-Y202-C	CMY-Y302-C	CMY-Y104	CMY-Y107	CMY-Y1010

## ■ 选择制冷剂管道的各部分

- 从室外机组至第1分支管 (C) 的部分
- 从分支管至室内机组 (a、b、c、d、e、f) 的部分
- 从分支管至分支管 (D、E、F) 的部分

从右表选择尺寸。

- 从室外机组至第一分支管部分的制冷剂管道直径 (室外机组管道直径)

型 号	管道直径 (mm)	
	液体管路	气体管路
PUHY-600YSMC	φ19.05	φ38.1
PUHY-650YSMC	φ19.05	φ44.45
PUHY-700YSMC	φ19.05	φ44.45
PUHY-750YSMC	φ19.05	φ44.45

- 从分支管至室内机组部分的制冷剂管道直径 (室内机组管道直径)

型 号	管道直径 (mm)	
	液体管路	气体管路
22·28·36·45	φ6.35	φ12.7
56~90	φ9.52	φ15.88
112·140·160	φ9.52	φ19.05
224	φ12.7	φ25.4
280	φ12.7	φ28.6

- 从分支管至分支管部分的制冷剂管道直径

下游机组机型总数	液体管路(mm)	气体管路(mm)
90或以下	φ9.52	φ15.88
91~180	φ12.7	φ19.05
181~370	φ12.7	φ25.4
371~540	φ15.88	φ31.75
541~710	φ15.88	φ38.1
711或以上	φ19.05	φ44.45

## ■ 追加充注制冷剂

根据上表, 出厂时在室外机组中充入制冷剂。因为这一充注量并不包括加长管道所需的总量, 所以各制冷剂管道必须现场另外充注制冷剂。为了将来能提供正确的检修服务, 请作好各制冷剂管道的尺寸和长度记录, 将其写在室外机组所提供空间内。

## ■ 追加充注制冷剂量的计算

- 根据加长管的长度和制冷剂管路的尺寸来计算追加充注量。
- 根据右表来计算追加充注量并按此量将制冷剂注入系统。
- 如果计算的结果少于0.1kg的部分四舍五入。例如, 如果计算结果是23.28kg, 四舍五入结果为23.3kg。
- 出厂时如果总的制冷剂量包括密封在室外机组中的制冷剂加上为延长管添加的制冷剂超过73kg, 则使用73kg作为总的制冷剂量。出厂时的制冷剂总量+添加的制冷剂量 ≤ 73kg。

## 〈追加充注量〉

液体管尺寸总长度 φ19.05 × 0.29	液体管尺寸总长度 φ15.88 × 0.25	液体管尺寸总长度 φ12.7 × 0.12	液体管尺寸总长度 φ9.52 × 0.06	液体管尺寸总长度 φ6.35 × 0.024	α
(m) × 0.29 (kg/m)	(m) × 0.25 (kg/m)	(m) × 0.12 (kg/m)	(m) × 0.06 (kg/m)	(m) × 0.024 (kg/m)	

〈例子〉	室内	1 : 125	A : φ12.7	3 m	a : φ9.52	10 m
		2 : 125	B : φ15.88	1 m	b : φ9.52	5 m
		3 : 125	C : φ19.05	30 m	c : φ9.52	5 m
		4 : 125	D : φ15.88	10 m	d : φ9.52	10 m
		5 : 100	E : φ12.7	5 m	e : φ9.52	15 m
		6 : 40	F : φ12.7	15 m	f : φ6.35	5 m

各液体管路的总长度如下

φ19.05 : C = 30 m  
φ15.88 : B + D = 1 + 10 = 11 m  
φ12.7 : A + E + F = 3 + 5 + 15 = 23 m  
φ9.52 : a + b + c + d + e = 10 + 5 + 5 + 10 + 15 = 45 m  
φ6.35 : f = 5 m

因此

〈计算举例〉

追加制冷剂  
充注量 = 30 × 0.29 + 11 × 0.25 + 23 × 0.12 + 45 × 0.06 + 5 × 0.024 + 3.0 = 20.1 kg

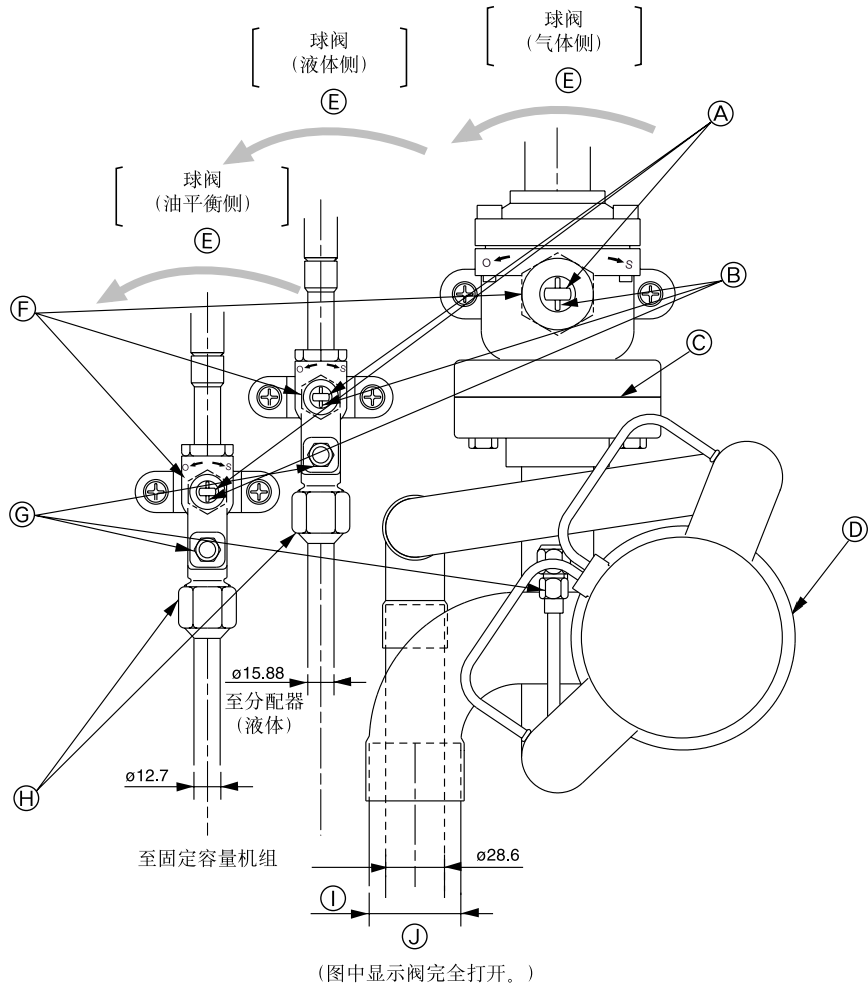
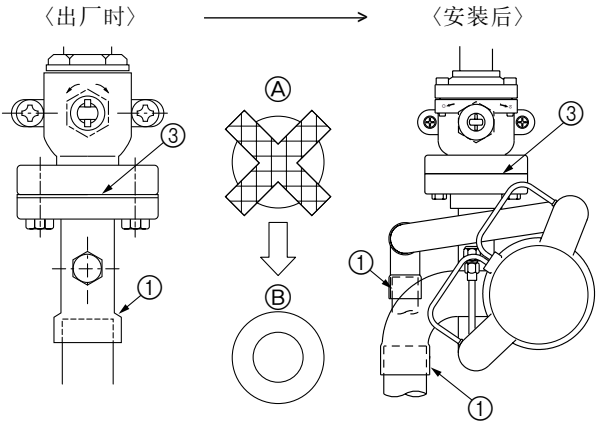
α值

连接的室内 机组总容量	α
至型号80	1.0 kg
型号81-160	1.5 kg
型号161-330	2.0 kg
型号331-480	2.5 kg
型号481或以上	3.0 kg

### 10.3. 有关管连接和阀操作的注意事项

〈适用于可变容量机组〉

- 按下图中的描述连接管和操作阀。
- 在执行完以下分配器 (气体) 的连接后, 拆下包括可变容量机组球阀的连接管, 并且安装分配器 (气体) (选购件)。
  - 当铜焊分配器 (气体) 时, 在安装到可变容量机组上之前, 在机组的外侧进行铜焊。
  - 在拆卸连接管和法兰时, 将附在此板背面的密封拆下, 并将其粘贴在球阀的法兰面上, 以防止尘埃进入球阀。
  - 发货时, 制冷剂的循环回路是用一圆形实心密封垫进行密封, 以防止法兰之间气体泄漏。由于在这种状态下不能运行, 所以请用附在管道连接处的空心密封垫将其换下。
  - 安装空心密封垫时, 应擦干净法兰板表面和密封垫上的尘埃, 将制冷机油涂在密封垫的两侧。
- 在抽真空和填充制冷剂后, 确保把手完全打开。如果在阀门关闭时进行操作, 则将对制冷剂回路的高或低压侧形成异常的压力, 或由于机组之间缺少油流动而导致压缩机中的油缺乏, 而损坏压缩机、四通阀等。
- 抽真空时, 确保在可变容量和固定容量机组之间提供油平衡管。
- 利用公式计算出的制冷剂追加充注量, 在管道连接作业完成后应通过检修口如数注入此追加量。
- 在完成工作后, 紧紧地关闭检修端口和盖帽以免发生气体泄漏。
- 按 (油平衡管) → (液体侧) → (气体侧) 的顺序连接球阀管。

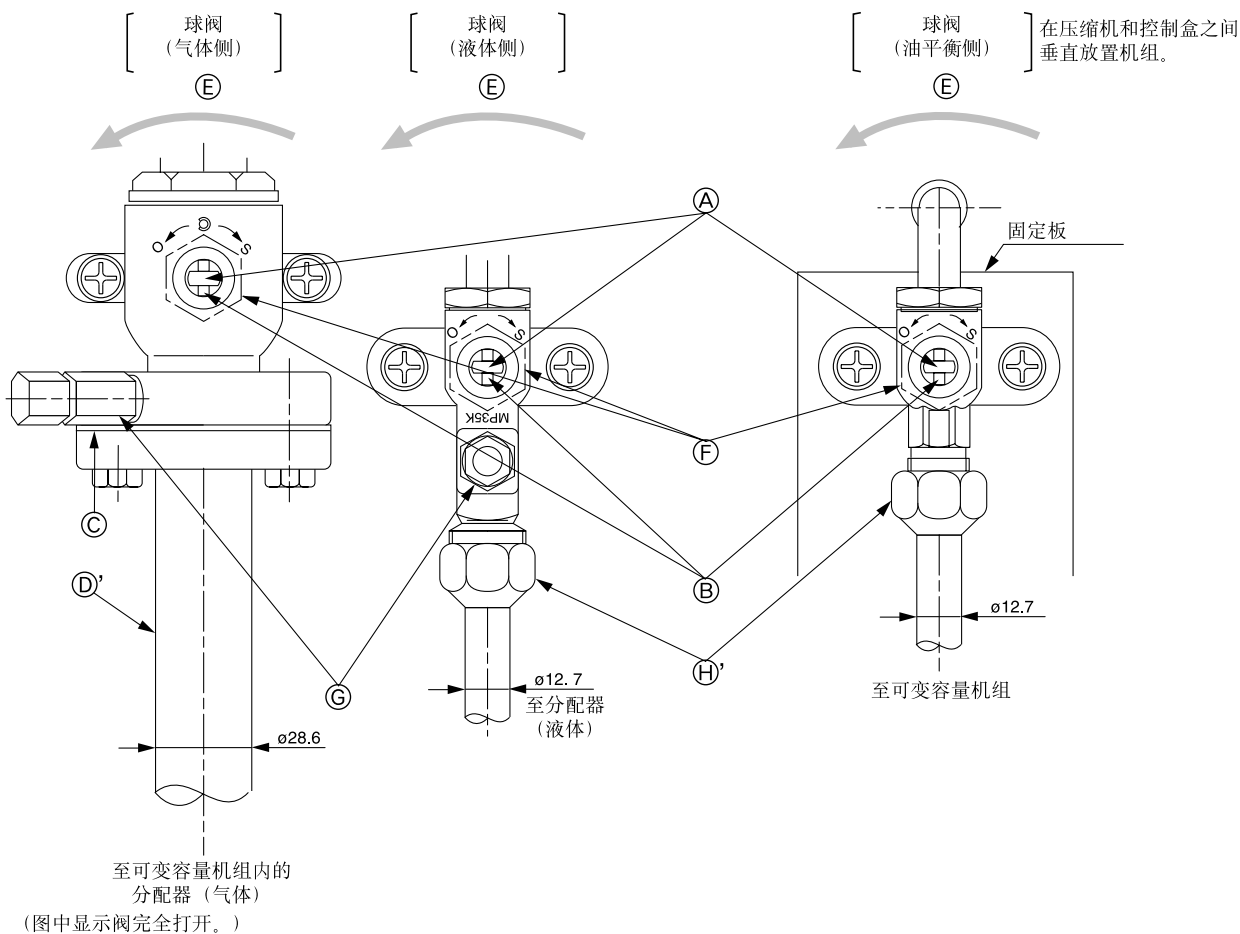
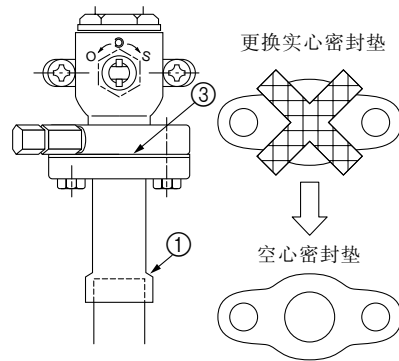


#### ⚠ 警告:

在将分配器 (气体) \*安装到可变容量机组的球阀上时, 在机组的外侧铜焊分配器 (气体)。  
 — 如果在安装时铜焊, 球阀受热可能导致出现裂纹或气体泄漏。机组内的布线也可能被点燃。

〈适用于固定容量机组〉

- 按下图中的描述连接管和操作阀。
- 当设备出厂时气体侧的连接管已经装配。（见右图）
  - ① 当使用铜焊焊接带法兰的管时，应从球阀上取下带法兰的管，并在机组的外侧进行铜焊。
  - ② 在拆卸连接管和法兰时，将附在此板背面的密封拆下，并将其粘贴在球阀的法兰面上，以防止尘埃进入球阀。
  - ③ 发货时，制冷剂的循环回路是用一圆形实心密封垫进行密封，以防止法兰之间气体泄漏。由于在这种状态下不能运行，所以请用附在管道连接处的空心密封垫将其换下。
  - ④ 安装空心密封垫时，应擦干净法兰板表面和密封垫上的尘埃，将制冷机油涂在密封垫的两侧。
- 在抽真空和填充制冷剂后，确保把手完全打开。如果在阀关闭时进行操作，则将对制冷剂回路的高或低压侧形成异常的压力，或由于机组之间缺少油流动而导致压缩机中的油缺乏，而损坏压缩机、四通阀等。
- 抽真空时，确保在可变容量和固定容量机组之间提供油平衡管。
- 利用公式计算出的制冷剂追加充注量，在管道连接作业完成后应通过检修口如数注入此追加量。
- 在完成工作后，紧紧地关闭检修端口和盖帽以免发生气体泄漏。



⚠ 警告：

确保从球阀上取下连接管，并在机组外面进行铜焊。  
 — 如果在安装时铜焊，球阀受热可能导致出现裂纹或气体泄漏。机组内的布线也可能被点燃。

Ⓐ 阀杆

(在出厂时, 在进行管道连接、抽空、充注追加制冷剂时此完全关闭此阀。上述操作完成后, 请将其完全打开。)

Ⓑ 止动销 (防止阀杆转动90° 以上)

Ⓒ 密封垫 (附件)

Ⓓ 分配器 (气体) (选购件)

将密封垫 (附件) 牢固安装在阀门的法兰上, 使气体不会漏。(螺丝的拧紧力矩为43N·m (430kg·cm) 。) 将制冷机油涂在密封垫的两侧。

Ⓔ 连接管 (附件)

(用密封垫将此管紧密地安装于阀门凸缘, 以使漏气不会发生。(拧紧力矩: 25N·m (250kg·cm) 。在密封垫两面涂冷冻机油。)

Ⓕ 打开 (缓慢地操作)

Ⓖ 帽盖、铜垫片

(拆下帽盖, 操作阀杆。操作完毕后一定要重新装上帽盖。(阀杆帽盖拧紧力矩: 25N·m (250kg·cm) 以上) )

Ⓖ 检修口

(利用此口以制冷剂管道抽真空, 在施工现场充注制冷剂追加量。)

用一双头扳手来开启和关闭检修口。

操作完毕后一定要重新装上帽盖。(检修口帽盖拧紧力矩: 14N·m (140kg·cm) 或以上)

Ⓖ 喇叭口螺母

(拧紧力矩: 80N·m (800kg·cm) …液体, 55N·m (550kg·cm) …油阀)

用双头扳手拧松和拧紧此螺母。在螺母的喇叭口接触面上涂冷冻机油)

Ⓖ 喇叭口螺母

拧紧扭矩是55N·m (550kg·cm) 。使用双头扳手打开和关闭。在喇叭口结合面的两侧涂上一层制冷剂机油。

① ø38.1 (PUHY-600YSMC)

ø44.5 (PUHY-650/700/750YSMC)

Ⓖ 现场管道

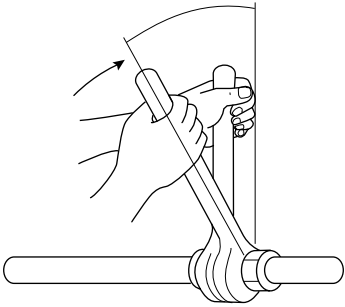
(钎焊到连接管上。(在钎焊时, 请用非氧化的钎焊料) )

使用扭力扳手时的正确力矩

铜管外径 (mm)	拧紧力矩 (N·m) / (kg·cm)
ø6.35	14~18 / 140~180
ø9.52	35~42 / 350~420
ø12.7	50~57.5 / 500~575
ø15.88	75~80 / 750~800
ø19.05	100~140 / 1000~1400

拧紧角度标准

管径(mm)	拧紧角度(°)
ø6.35, ø9.52	60~90
ø12.7, ø15.88	30~60
ø19.05	20~35



备注:

如果没有扭力扳手, 则可用下述方法作为标准:

用一扳手转动喇叭口螺母。当转动到拧紧力矩突然增大的位置时, 将螺母再转过上表所示的角度。

⚠ 注意:

务必将连接管从球阀上拆下, 在机外进行钎焊。

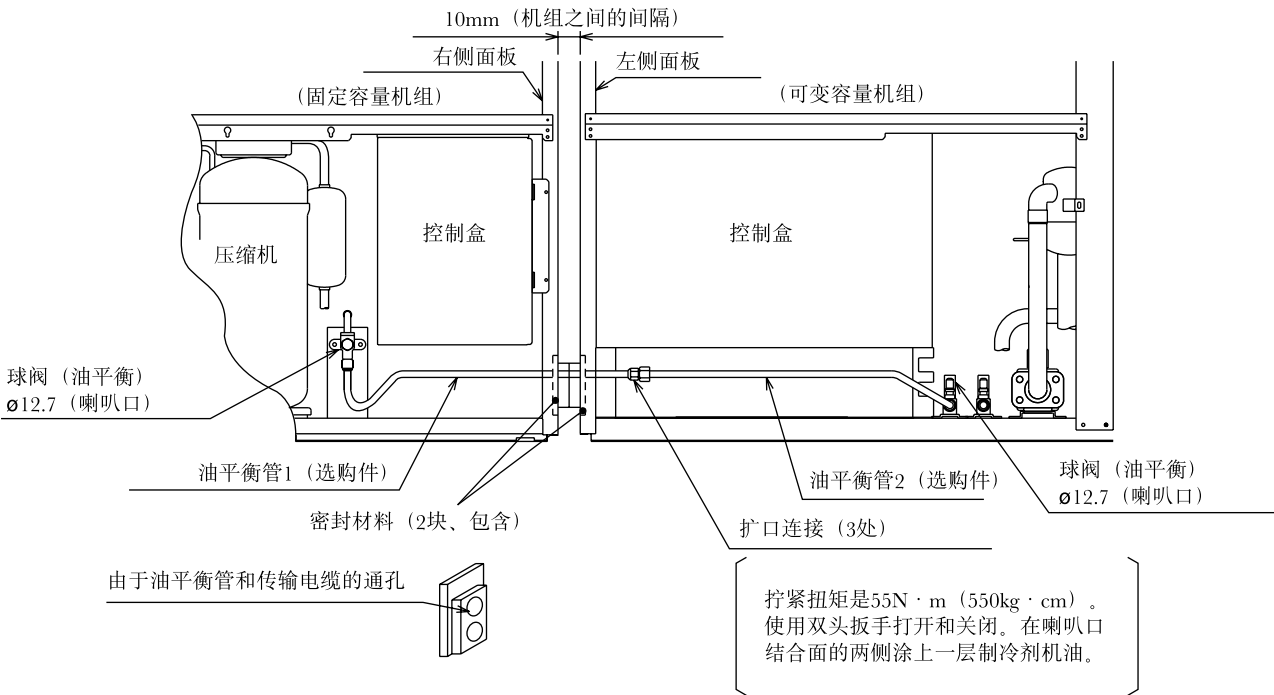
— 如果不拆下而在其装于球阀的位置上钎焊, 则球阀受热后会产生故障或漏气, 机组内部也可能会烧伤。

10.4. 油平衡管的连接方法

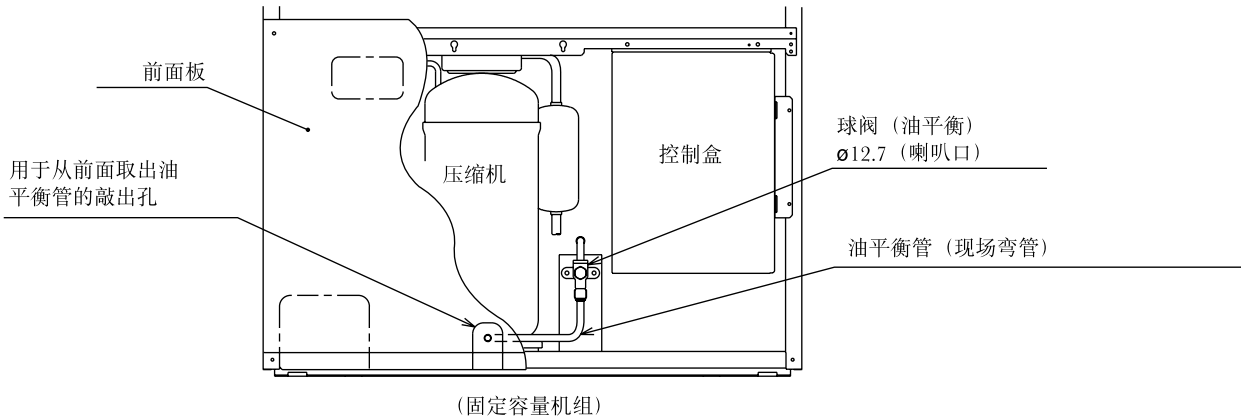
- 可以从机组的前面、底部或侧面取出油平衡管。（左侧用于可变容量机组，右侧用于固定容量机组）
- 完全按下面的描述连接管道和操作阀门。（有关细详，见条目10.3.）
  - ① 在连接油平衡管后，确保使用可变容量机组侧阀门的检修端口进行抽真空。
  - ② 在抽真空后，确保完全打开每个阀门手扳，如果在阀门关闭时进行操作，则由于机组之间缺少油流动而造成压缩机中缺油，这样会损坏压缩机。
  - ③ 在完成工作后，紧紧关闭检修端口的盖帽和手扳部分，以免发生气体泄漏。

**警告：**  
错误连接油平衡管将导致压缩机损坏。

- 在可变容量机组和固定容量机组之间提供10mm的间隔。定位可变容量机组以使其正面向右侧，然后定位固定容量机组以使其正面面向左侧，按照下面的步骤为可选的CMC-30A连接油平衡管。
  - ① 打开左侧面板上用于可变容量机组的敲出孔，和右侧面板上用于固定容量机组的敲出孔。
  - ② 在安装机组后，扩口连接机组的管道（ $\phi 12.7$ ）。
  - ③ 用随固定容量机组提供的2个密封材料塞住机组之间间隔。



- 如果用于固定容量机组的油平衡管从机组前面伸出，则按下图所示，弯曲管道。（这样做时，小心不要让管道碰到压缩机或其他部件。）



## 10.5. 分配器 (气体) 的连接方法

### ■ 从前面取出管道

- (1) 取下安装在管道上铜帽和橡胶垫块以及分配器 (气体) (选购件) 的法兰。
- (2) 使用指定形状的弯管 (⑧) 在机组外面组装并进行铜焊 (见图1)。  
对于600型号, 也要铜焊连接管 (⑦)。

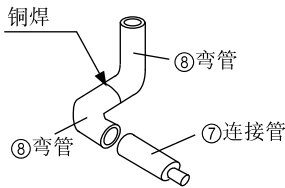


图 1

- (3) 铜焊连接管 (④) 并按步骤 (2) 将管道组装到分配器 (气体) 上以便按图2所示安装连接管。有关组装步骤, 见图3。当铜焊管道时, 使用湿的废布冷却分配器侧的管道, 以免由于铜焊造成过热。

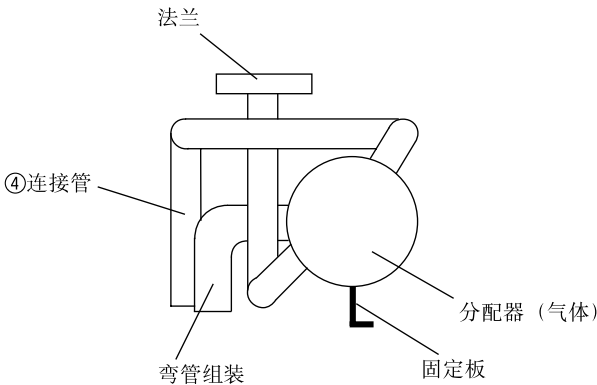


图 2

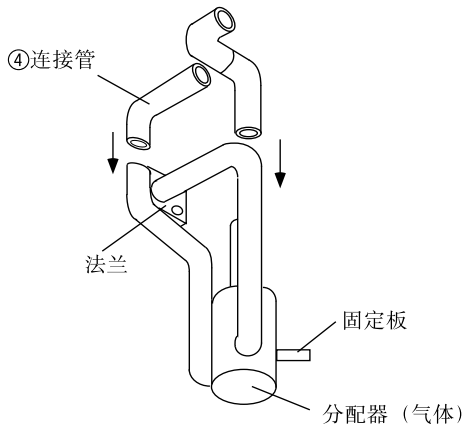


图 3

- (4) 将 $\phi 12.7$ 油平衡管连接到可变容量机组 (油平衡) 和固定容量机组的球阀。
- (5) 通过分配器 (液体) 将 $\phi 15.88$ 分支管连接到可变容量机组 (液体侧) 的球阀。
- (6) 将分配器 (气体) 插入可变容量机组内并连接到球阀 (气体侧) 的法兰。(使用管钳和管钳延长把) 当这样做时, 确保在球阀 (气体侧) 和分配器的法兰之间安装提供的垫块。
- (7) 使用螺丝将分配器 (气体) 的板固定到机组支架上。
- (8) 连接和铜焊 $\phi 44.45$ 气体管 ( $\phi 38.1$ 用于600型) (主管), 和连接固定容量机组的 $\phi 28.58$ 气体管, 将它们与分配器 (气体) 连接在一起。

### ■ 按向下的方向取出管道

- (1) 取下安装在管道上的铜帽和橡胶垫块以及分配器 (气体) (选购件) 的法兰。
- (2) 使用指定形状的弯管 (⑧)、连接管 (⑦ 适用于600型) 或连接管 (⑥ 适用于除600以外的其他类型) 在机组外面组装并进行铜焊 (见图4)。

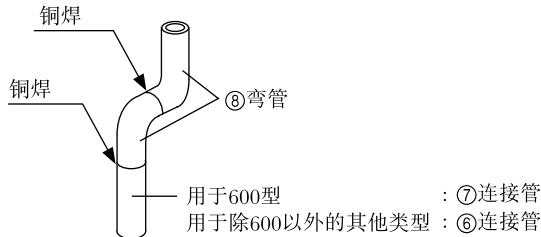


图 4

- (3) 铜焊连接管 (⑤) 并在机组外面将在步骤 (2) 中组装的管道连接到分配器 (气体) 上。有关组装步骤, 见图5。当铜焊管道时, 使用湿的废布冷却分配器侧的管道, 以免由于铜焊造成过热。

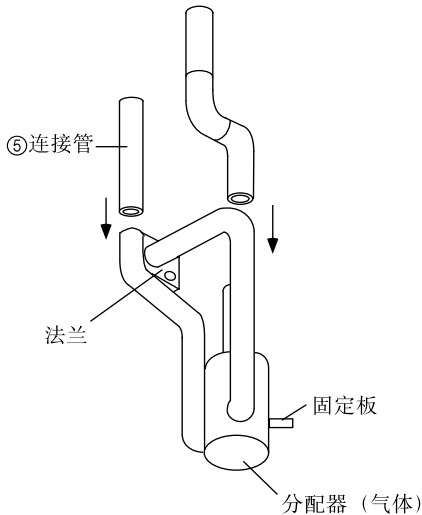


图 5

剩余的步骤与“从前面的方向布管”相同。

### ⚠ 警告:

在铜焊时, 使用湿的废布冷却, 以免法兰和分配器侧的管道两端过热。

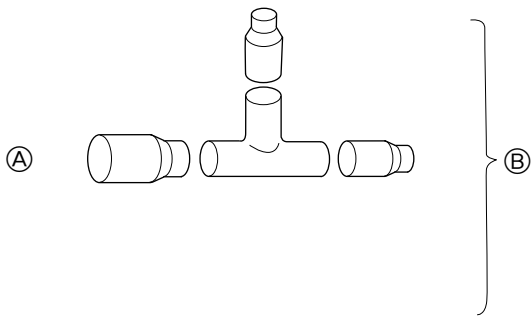
— 如果不充分冷却会损坏部件。



10.6. 分支管安装方法

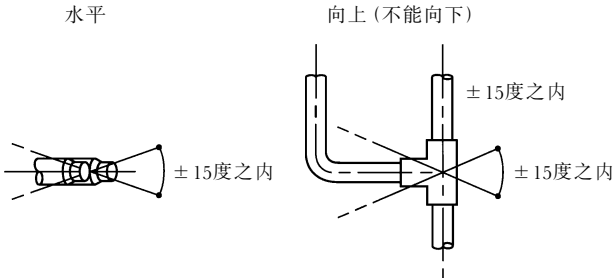
详细请参阅附在制冷剂分支管套件内的说明书。

■ 接头



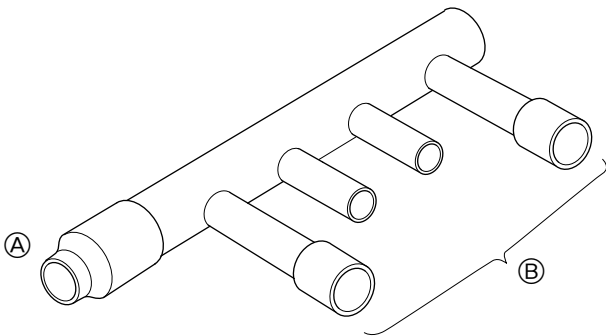
- ① 至室外机组
- ② 至分支管或室内机组

- 从CMY-Y202-F和CMY-Y302-F气体侧处分开, 对于连接点在形状上没有限制。
- 确保用于CMY-Y202-F和CMY-Y302-F气体侧的分支管被水平安装或面向上安装(见下图)。



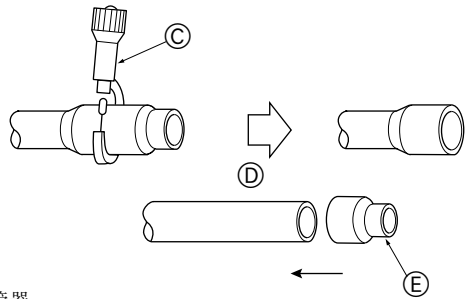
- 接头的安装形态不受限制。
- 如果按50~51页上所阐述的方法所选择的制冷剂管道直径与接头的尺寸不同, 则可用一变径接头与其尺寸相匹配。变径接头装在套件包内。

■ 总管



- ① 至室外机组
- ② 至室内机组

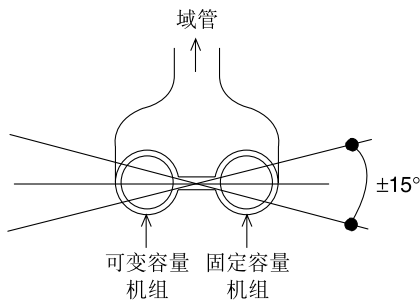
- 总管的装形态不受限制
- 如果按照第52页上所阐述的方法所选择的制冷剂管道直径与接头的尺寸不同, 则可用一变径接头与其尺寸相匹配。变径接头装在套件包内。



- ③ 割管器
- ④ 或
- ⑤ 变径接头

- 当拟连接的管子数少于总管的分支管数时, 在未连接的分支管上装一只帽盖。帽盖装在套件包内。

■ 分配器(液体)

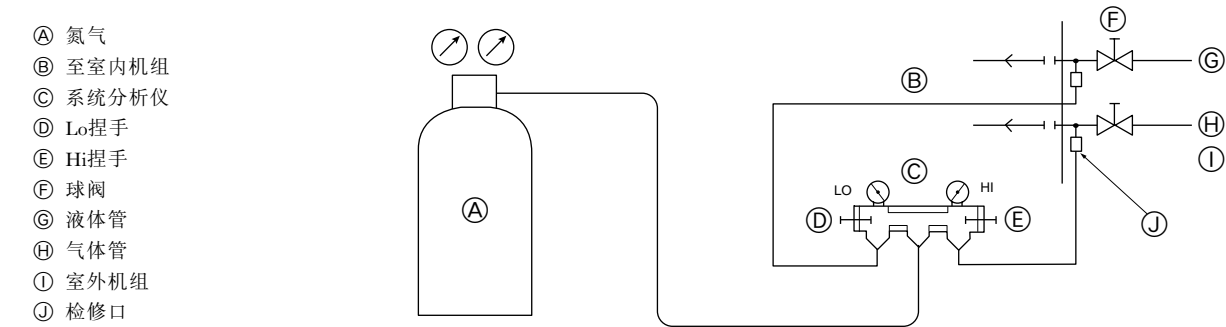


- 安装分配器(液体、选购件CMC-30A)以便对应于水平板在±15度之内(见上图)。

10.7. 气密性试验和抽真空

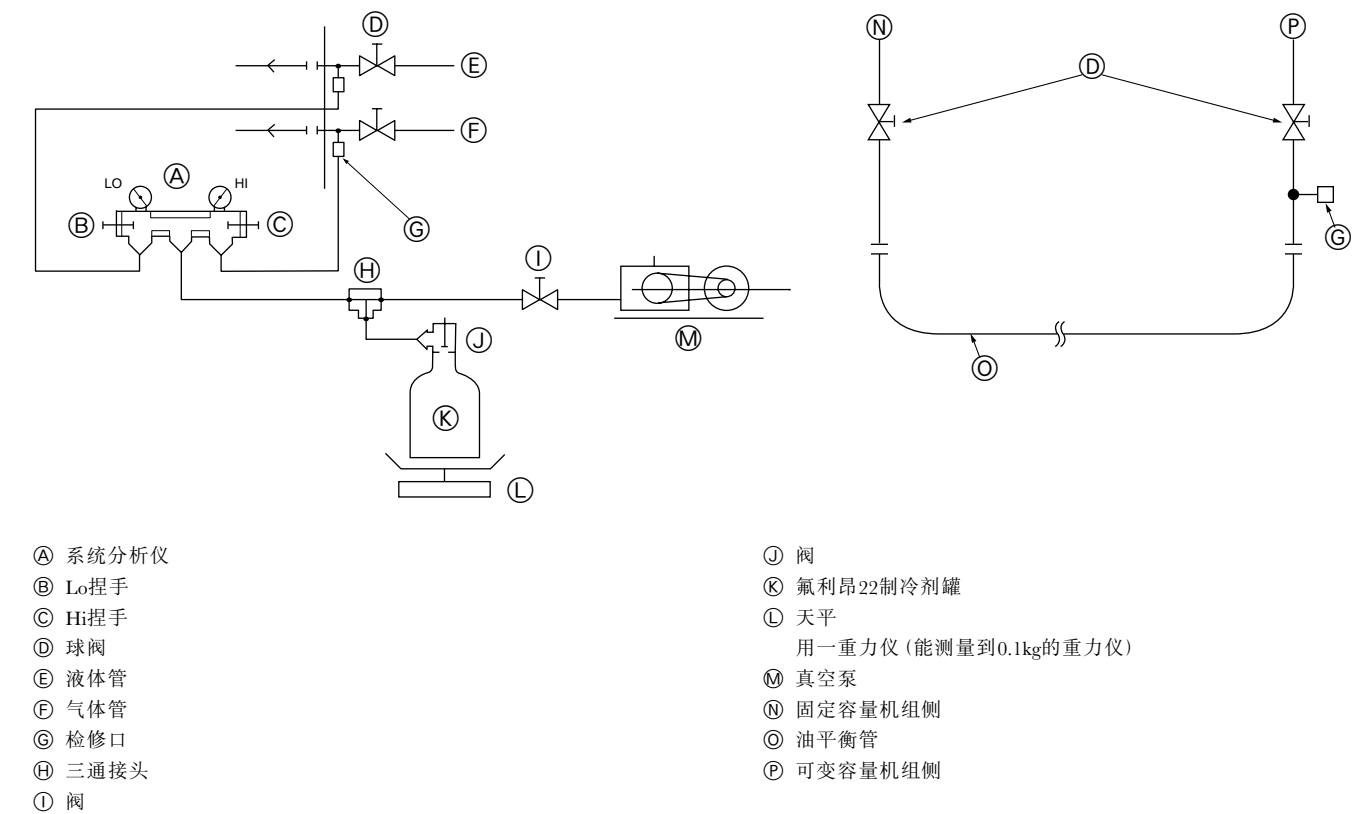
① 气密性试验

气密性试验应使用加压到3.0MPa的氮气进行。试验方法请参照下图。（在止动阀关闭的状态下进行。而且还应对液体或高压管以及气体或低压管都加压。）  
如果在加压氮气并保持一天以上后压力不下降，则可判定试验结果为正常。



② 抽真空

抽真空应从室外机止动阀上的维修口进行，真空泵用于液体或高压管以及气体或低压管。（务必在止动阀关闭的状态下从液体或高压管以及气体或低压管两侧抽真空。）  
在两个机组的油平衡球阀都关闭时将连接可变容量机组和固定容量机组的油平衡管抽真空。使用真空泵从可变容量机组球阀的检修端口抽真空。  
\* 切勿用制冷剂进行空气净化。



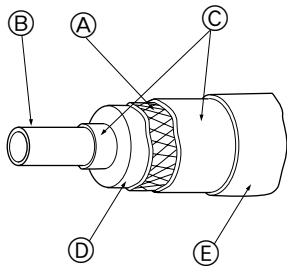
备注：  
必须加入适量的制冷剂（关于制冷剂追加充注量请见第50～51页）。制冷剂太多或太少都会导致故障。  
注意不能确定累加器等级（AL）是否使用正确的数量。

警告：  
在安装空调器或将空调器转移到另一地方时，不可向其注入不同于本空调器规定的制冷剂（R22）。  
— 如将不同的制冷剂或空气与原来的制冷剂混合，则制冷剂的循环会不正常，导致空调器损坏。

10.8. 制冷剂管道的隔热

制冷剂管道必须隔热，用足够厚度的耐热聚乙烯将液体和气体管分别包扎起来，使室内机组与隔热材料之间的接头和隔热材料本身之间没有间隙。隔热不完善可能会造成凝结水滴下。必须极其重视隔热。

隔热材料A	玻璃纤维+钢丝	
	粘结剂+耐热聚乙烯泡沫+胶粘带	
外覆层B	室内	聚氯乙烯绝缘胶带
	裸露的地板	防水麻布+Bronze沥青
	室外	防水麻布+锌板+油性漆



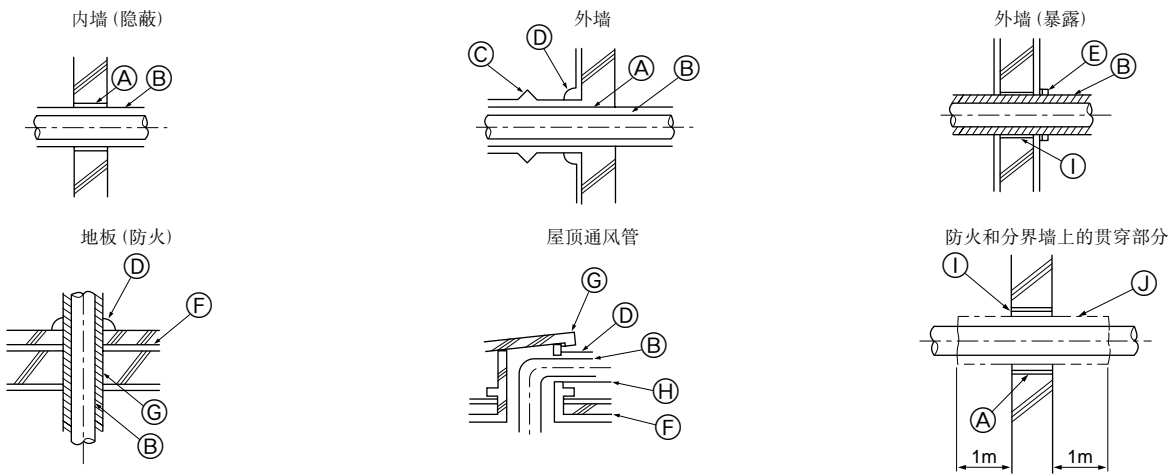
- ① 钢丝
- ② 管子
- ③ 沥青油性胶泥
- ④ 隔热材料A
- ⑤ 外覆层B

备注：  
当用聚乙烯套作为覆盖材料时，就不需要沥青涂覆层。

不好例子	<ul style="list-style-type: none"><li>不要将气体管或低压管和液体管或高压管包扎在一起隔热。</li></ul>	<ul style="list-style-type: none"><li>连接部分必须完全隔热。</li></ul>

备注：  
电线不可隔热。

贯穿部分



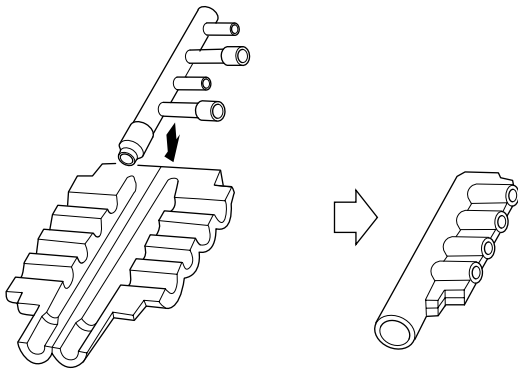
- ① 套管
- ② 隔热材料
- ③ 隔热层
- ④ 捻缝材料
- ⑤ 带子
- ⑥ 防水层
- ⑦ 有边套管
- ⑧ 隔热层

- ① 砂浆或其他不可燃捻缝材料
- ② 不可燃隔热材料

用砂浆填充空隙时，将贯穿部分用钢板盖住，以使隔热材料不会塌陷。这一部分要用不可燃材料作为绝缘和覆盖层（不可用乙烯基覆盖层）。

## 分支管部分

用分支管套件随带的绝缘材料将总管绝缘, 如图所示。



## 11. 电气工程

### 11.1. 注意事项

① 请用户遵守当地政府机关关于电气设备技术标准的法令, 以及各电力公司的布线规定和则准。

#### ⚠ 警告:

电气工程必须由有资格的电工使用专用电路, 按照有关规章和本手册的说明进行施工。如果电源电路容量不足或施工不当, 则可能会导致触电或火灾。

② 室内机组传输线必须避开电源线路, 使其不受电源电噪声的影响。(不要从同一导管穿过)

③ 室外机组必须按规定接地。

#### ⚠ 注意:

室外机组必须接地, 不可将接地线连接在煤气管、自来水管、避雷装置或电话接地线上。接地不当会导致触电。

④ 室内机组和室外机组的电气部件箱的布线要留有一定的余量, 因为检修时此箱需要经常拆下。

⑤ 切勿将主电源连接于传输线的端子板上, 否则电气部件将会烧毁。

⑥ 传输线必须使用双芯屏蔽电缆。(下图中的“○”记号) 如果不同系统的传输线都用同种多芯电缆, 则因传输和接收不良将会导致运行不正常。(下图中的“×”记号)

⑦ 只有规定的传输线才可连接于室外机组的传输端子板。

(与室内机组连接的传输线: 传输线用TB3端子板。其他: 中央集中控制用TB7端子板)。

连接错误会使系统不能运行。

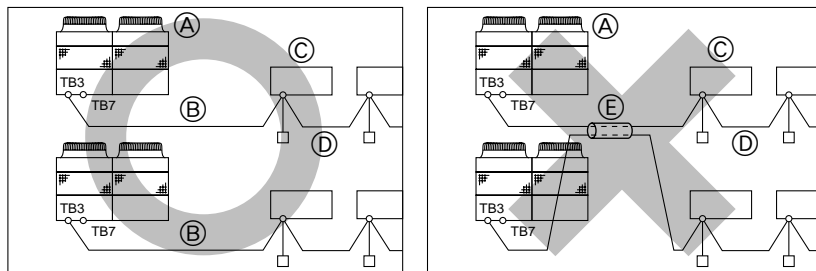
⑧ 在与上一级控制器连接, 或以不同的制冷系统进行群组运行的情况下, 室外机组相互之间须有传输控制线。

将此控制线连接于中央集中控制用端子板之间。(无极性双线线路)

如以不同的制冷系统进行群组运行而未连接于上一级控制器, 则应将短路连接器从一台室外机组的CN41改插到CN40。

⑨ 群组通过操作遥控器进行设定。

⑩ 注意! 如果没有正确连接电源线 ( $L_1$ 、 $L_2$ 、 $L_3$ 、 $N$  ①) 可能会导致机组损坏。



TB3: 传输线端子板; TB7: 中央集中控制线端子板

Ⓐ 室外机组

Ⓑ 双芯电缆

Ⓒ 室内机组

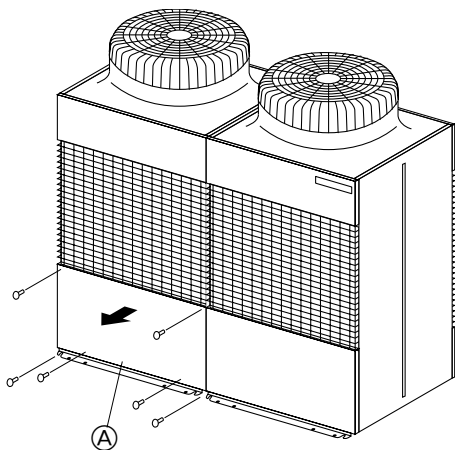
Ⓓ 遥控器

Ⓔ 多芯电缆

## 11.2. 控制箱和电线连接位置

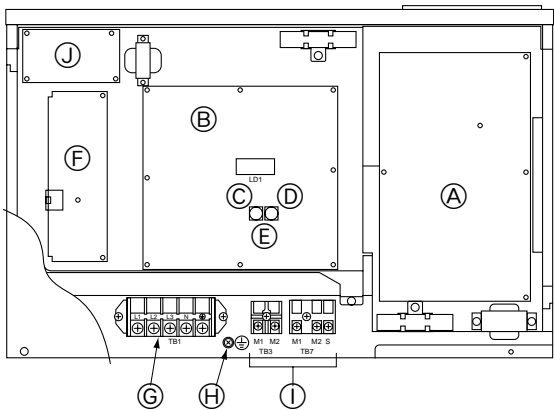
### a. 可变量机组

1. 拧下顶部和底部的六只螺钉。将检修面板向前拉即可将其拆下。  
(见下图)



① 检修面板

2. 卸下控制盒基座左右两侧的两只螺丝，并向下拉整个盖板使其分离(下图给出了取下控制盒盖之后的图示)。

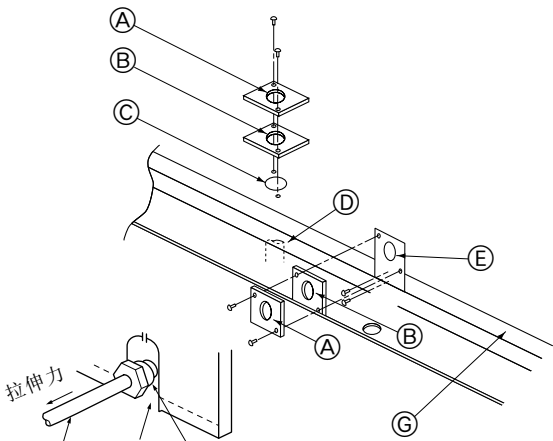


- ① INV板  
② MAIN板  
③ 10位  
④ 个位  
⑤ 地址  
⑥ FANCON板  
⑦ 电源  
⑧ 接地螺钉  
⑨ 传输线路  
⑩ RELAY板

3. 通过传输线路(TB3)的端子板把室外机组和室内机组连接起来。各室外机组和接至中央控制系统的各端子都接至端子板,以便进行集中控制(TB7)。当用屏蔽线进行室内/室外的连接时,应把屏蔽接地部连接到接地螺钉(⑧)。当用屏蔽线进行中央控制系统的连接时,应使用端子板以便集中控制(TB7)。当用连接器CN40更换室外机组的电源连接器CN41时,集中控制(TB7)用的屏蔽端子(S)也应连接到接地螺钉(⑧)。

### 4. 如何使用导管安装板

- (1) 提供套管安装板(φ46、φ53、φ62)。请按照所用的套管外径来选择套管安装板,并按下图所示进行安装。  
(2) 用拉伸力(PG接头或类似的)缓冲衬套把电源线固定于控制箱。

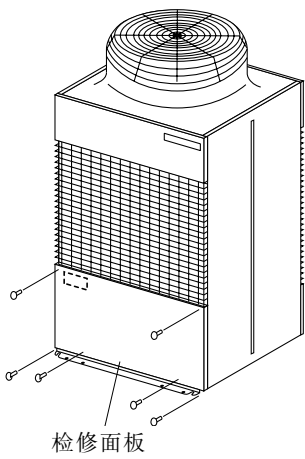


为了防止外部拉伸力作用于电线接头,电源端子板部分应使用PG接头或类似的缓冲衬套。

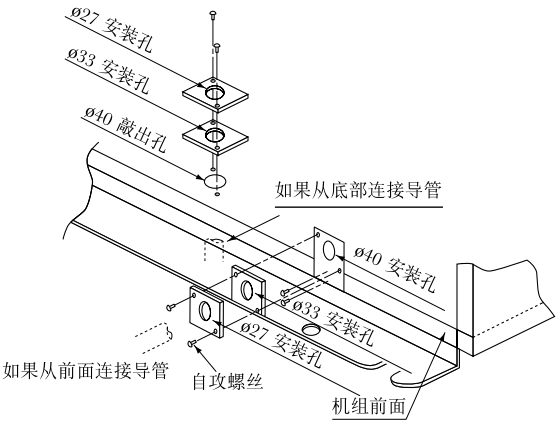
- ① φ46 安装孔  
② φ53 安装孔  
③ φ62 敲出孔  
④ 用于底部导管的连接  
⑤ φ62 安装孔  
⑥ 用于前部导管的连接  
⑦ 室外机组的前面

### b. 固定容量机组

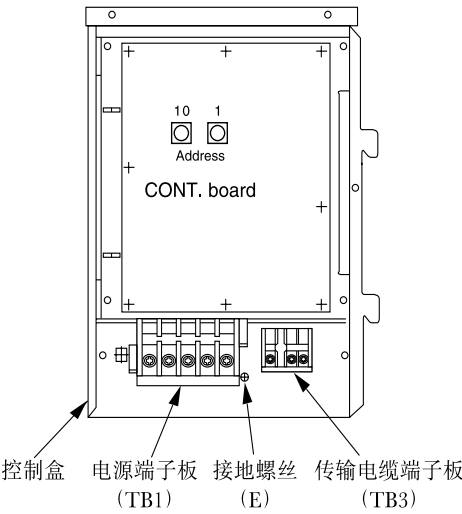
1. 通过取下在顶部和底部的六只螺丝并向前拉取下检修面板。(见下图)



2. 通过取下2只螺丝并向下拉取下控制盒盖。（下图显示了取下盖的控制盒。）
3. 使用导管安装板的方法  
设备包含导管安装板 (ø27、ø33、ø40)，根据使用导管的尺寸选择导管安装板，并按下图所示进行安装。

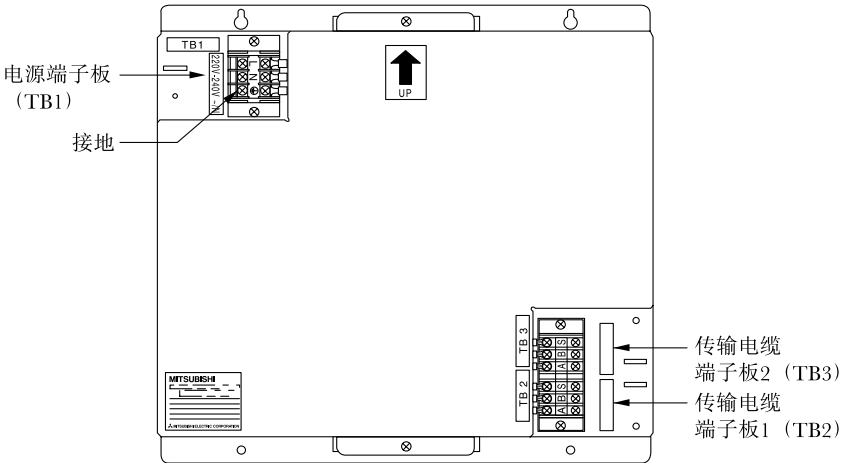


4. 管道连接  
将可变频容量机组的传输电缆端子板 (TB3) 的室内机组交叉电缆连接到传输电缆端子板 (TB3) 上。当使用屏蔽线进行室内/室外连接时，将屏蔽地线连接到接地螺丝(⊕)。



c. 传输线放大器 (选购件)  
(有关细节, 见条目11.3“传输电缆的布线”)

- 将220/230/240VAC连接到电源端子板 (TB1) 的L/N。
- 将接地线连接到电源端子板 (TB1) 的 ⊕ 端子。
- 将室外机组侧的传输电缆连接到传输电缆端子板1 (TB2) 的A/B。
- 将室外机组侧的传输电缆的屏蔽线连接到传输电缆端子板1 (TB2) 的S。
- 将附加的室内机组侧的传输电缆连接到传输电缆端子板2 (TB3) 的A/B。
- 将附加的室内机组侧的传输电缆的屏蔽线连接到传输电缆端子板2 (TB3) 的S。



11.3. 传输电缆的布线

布线方法、地址设定方法和允许的布线长度将根据您是否使用传输放大器而改变。在布线前检查允许的布线长度。  
根据室内机组的数量可能需要A。  
条目 ④ “布线举例”给出典型的布线举例 (a-c)。

- a. 使用遥控器的系统 (1个室外机组)
- b. 使用遥控器的系统 (在多制冷系统中作为一个组操作的系统)
- c. 为传输线放大器使用电源扩展机组的系统 (系统a-b的组合)

① 连接一个传输放大器

当在制冷系统中连接的室内机组型号的数量超过在下表中指定的型号的数量时需要配备一个传输放大器(RP)。  
\* 可以控制的机组的最大数量取决于室内机组的型号、遥控器的类型和它们的容量。

(*1) 连接的室内 机组的容量	遥控器类型	遥控器PAR-F25MA	
	未连接RP时可连接的室内机组数量	早于E版本	晚于F版本
	200或更低	16 (32)	20 (40)
	200或更高	16 (32)	16 (32)

在圆括号 ( ) 中显示室内机组的数量和遥控器的全部数量。

\*1 在制冷系统中即使只有一个机组超过200, 则最大容量将是“200或更高”。

② 名称、代码和可能的机组连接

名称		代码	可能的机组连接
室外机组	可变容量机组控制器	OC	—
	固定容量机组控制器	OS	每1个OC 1台
室内机组	室内机组控制器	IC	每1个OC 2~32台 (*1)
遥控器	遥控器 (*1)	RC	每组最多2台
其他	传输放大器	RP	每1个OC 0~1台 (*1)

\* 1根据连接的室内机组控制器的数量可能需要一个传输放大器 (RP)。

③ 控制电缆的类型

- (1) 传输电缆的布线
- 传输电缆的种类：  
屏蔽线CVVS或CPEVS
  - 电缆直径：  
1.25mm²以上
  - 最大布线长度：200m以内

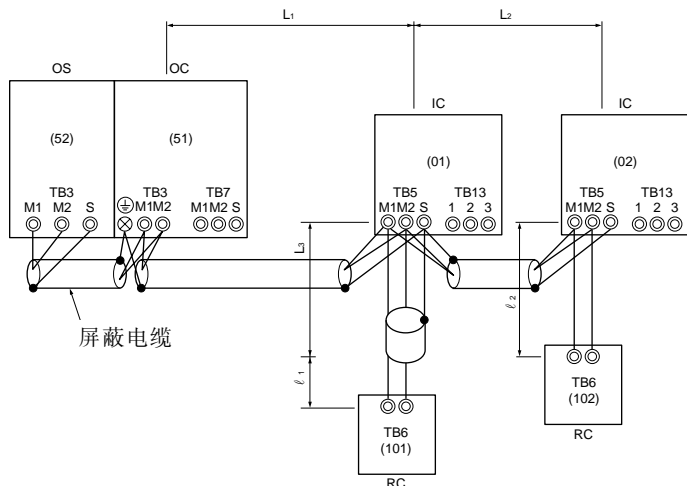
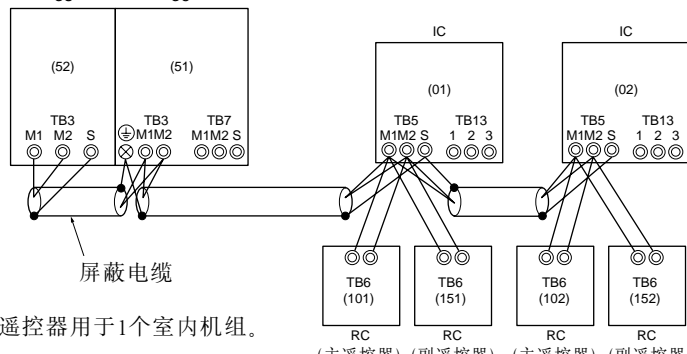
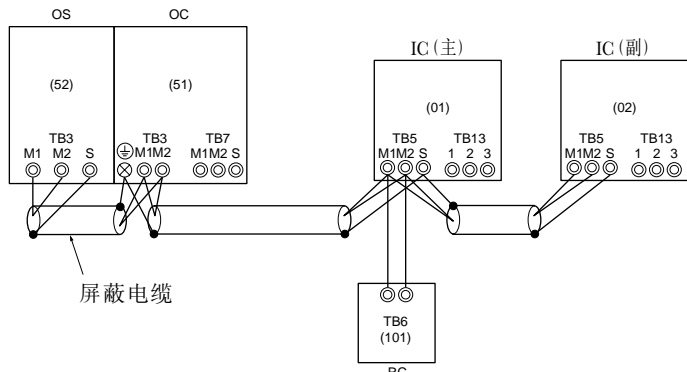
(2) 遥控电缆

遥控电缆种类	双芯电缆 (无屏蔽)
电缆直径	0.5~0.75mm²
备注	当长度超过10m时, 采用规格与传输线(1)相同的电缆。

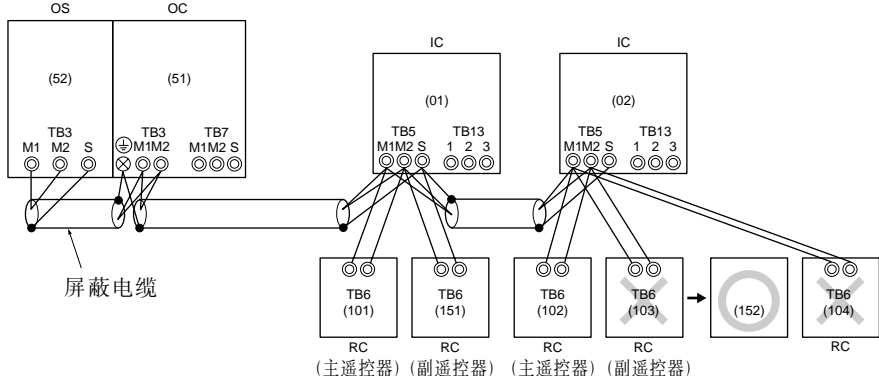
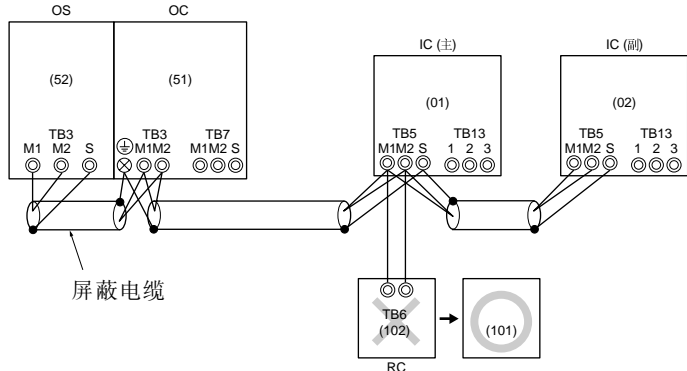
④ 布线举例

典型的布线例子示于第64~68页。(布线举例 A-C)

A. 在单制冷剂系统中使用屏蔽电缆举例（必须设定地址）

控制电缆布线举例		布线方法和地址设定																						
1. 标准		a. 将布线连接到可变容量机组 (OC) 传输线端子板 (TB3) 的端子M1和M2和在固定容量机组 (OS) 传输线端子板 (TB3) 上的端子M1和M2, 以及每个室内机组 (IC) 的传输线端子板 (TB5) 上的端子M1和M2。(双线、非极性) 同时, 将屏蔽接地线连接到可变容量机组的接地端子 ⊕、固定容量机组 (TB3) 的S端子和每个室内机组 (TB5) 的S端子。 b. 将线连接到每个室内机组(IC)传输线端子板 (TB5) 上的端子M1和M2, 并连接到遥控器 (RC) 端子板 (TB6)。 c. 按下表所示进行地址设定。																						
		<table><tr><th>机组</th><th>范围</th><th>设定方法</th></tr><tr><td>室内机组</td><td>01 ~ 50</td><td>—</td></tr><tr><td>遥控器</td><td>101 ~ 150 备注2</td><td>室内机组地址再加100。</td></tr><tr><td>可变容量机组</td><td>51 ~ 100 备注1</td><td>室内机组的最小地址再加50。</td></tr><tr><td>固定容量机组</td><td>51 ~ 100 备注1</td><td>可变容量机组地址再加1</td></tr></table> <p>备注1 如果可变容量机组的地址或固定容量机组的地址设定为100, 则将地址开关中的一个设定为01-50。 备注2 不需要在遥控器上设定100的位置。</p>		机组	范围	设定方法	室内机组	01 ~ 50	—	遥控器	101 ~ 150 备注2	室内机组地址再加100。	可变容量机组	51 ~ 100 备注1	室内机组的最小地址再加50。	固定容量机组	51 ~ 100 备注1	可变容量机组地址再加1						
机组	范围	设定方法																						
室内机组	01 ~ 50	—																						
遥控器	101 ~ 150 备注2	室内机组地址再加100。																						
可变容量机组	51 ~ 100 备注1	室内机组的最小地址再加50。																						
固定容量机组	51 ~ 100 备注1	可变容量机组地址再加1																						
• 每一室内机组配备1个遥控器。 ( ) 内: 地址																								
2) 2个遥控操作		a. 同上 b. 同上 c. 按下表设定地址设定开关。																						
		<table><tr><th>机组</th><th>范围</th><th>设定方法</th></tr><tr><td>室内机组</td><td>01 ~ 50</td><td>—</td></tr><tr><td>主遥控开关</td><td>101 ~ 150 备注2</td><td>室内机组地址再加100。</td></tr><tr><td>副遥控开关</td><td>151 ~ 200 备注2</td><td>室内机组地址再加150。</td></tr><tr><td>可变容量机组</td><td>51 ~ 100 备注1</td><td>室内机组的最小地址再加50。</td></tr><tr><td>固定容量机组</td><td>51 ~ 100 备注1</td><td>可变容量机组地址再加1</td></tr></table> <p>备注1、2. 与上面的相同。</p>		机组	范围	设定方法	室内机组	01 ~ 50	—	主遥控开关	101 ~ 150 备注2	室内机组地址再加100。	副遥控开关	151 ~ 200 备注2	室内机组地址再加150。	可变容量机组	51 ~ 100 备注1	室内机组的最小地址再加50。	固定容量机组	51 ~ 100 备注1	可变容量机组地址再加1			
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可变容量机组	51 ~ 100 备注1	室内机组的最小地址再加50。																						
固定容量机组	51 ~ 100 备注1	可变容量机组地址再加1																						
• 2个遥控器用于1个室内机组。																								
3) 群组操作		a. 同上 b. 在相同的组中连接所有室内机组 (IC) 中有最低地址的室内机组 (IC主) 传输线端子板 (TB5) 的端子A和B (M1和M2) 以及遥控器 (RC) 端子板 (TB6) 上的端子。 c. 按下表所示设定地址设定开关。 d. 在相同的组中, 让功能最多的室内机组 (IC) 为 IC (主) 机组。																						
		<table><tr><th>机组</th><th>范围</th><th>设定方法</th></tr><tr><td>IC (主)</td><td>01 ~ 50</td><td>在相同的组中所有室内机组中地址最低的室内机组的地址。</td></tr><tr><td>IC (副)</td><td>01 ~ 50</td><td>除了IC (主) 地址以外任何室内机组的地址。让数据按照IC (主) 中的顺序。</td></tr><tr><td>主遥控器</td><td>101 ~ 150 备注2</td><td>在相同组中IC (主) 的地址再加100。</td></tr><tr><td>副遥控器</td><td>151 ~ 200 备注2</td><td>在相同组中IC (主) 的地址再加150。</td></tr><tr><td>可变容量机组</td><td>51 ~ 100 备注1</td><td>室内机组的最小地址再加50。</td></tr><tr><td>固定容量机组</td><td>51 ~ 100 备注1</td><td>可变容量机组地址再加1</td></tr></table> <p>备注1、2. 与上面的相同。</p>		机组	范围	设定方法	IC (主)	01 ~ 50	在相同的组中所有室内机组中地址最低的室内机组的地址。	IC (副)	01 ~ 50	除了IC (主) 地址以外任何室内机组的地址。让数据按照IC (主) 中的顺序。	主遥控器	101 ~ 150 备注2	在相同组中IC (主) 的地址再加100。	副遥控器	151 ~ 200 备注2	在相同组中IC (主) 的地址再加150。	可变容量机组	51 ~ 100 备注1	室内机组的最小地址再加50。	固定容量机组	51 ~ 100 备注1	可变容量机组地址再加1
机组	范围	设定方法																						
IC (主)	01 ~ 50	在相同的组中所有室内机组中地址最低的室内机组的地址。																						
IC (副)	01 ~ 50	除了IC (主) 地址以外任何室内机组的地址。让数据按照IC (主) 中的顺序。																						
主遥控器	101 ~ 150 备注2	在相同组中IC (主) 的地址再加100。																						
副遥控器	151 ~ 200 备注2	在相同组中IC (主) 的地址再加150。																						
可变容量机组	51 ~ 100 备注1	室内机组的最小地址再加50。																						
固定容量机组	51 ~ 100 备注1	可变容量机组地址再加1																						
• 用1个遥控器操作多台室内机组。																								
可进行上图所示1) ~ 3) 的组合。																								



容许长度	禁止项目
<p>在系统中到最远的室内机组 (1.25mm<sup>2</sup>) 的布线长度</p> <p><math>L_1+L_2</math>、<math>L_2+L_3</math>、<math>L_3+L_1 \leq 200\text{m}</math></p> <p>遥控器布线长度</p> <p>1 在使用 0.5~0.75mm<sup>2</sup>线的情况下, <math>\ell_1</math>、<math>\ell_2 \leq 10\text{m}</math>。</p> <p>2 如果长度超过 10m, 使用 1.25mm<sup>2</sup>的线并保持长度在系统中到最远的室内机组的布线长度 (<math>L_3</math>) 以内。</p>	
同上。	 <p>(主遥控器) (副遥控器) (主遥控器) (副遥控器)</p> <ul style="list-style-type: none"> <li>使从遥控器的地址是室内机组 (IC) 地址再加 150, 在此情况下, 地址将是 152。</li> <li>不能为一个室内机组连接超过 3 个遥控器 (RC)。</li> </ul>
同上。	 <p>屏蔽电缆</p> <ul style="list-style-type: none"> <li>遥控器地址为室内机组地址再加 100。在本例中为 101。</li> </ul>

备注:

- 如果在相同的制冷系统中有一个或更多 200 或更高的室内机组, 并且室内机组的数量超过 16 台时, 则需要一个传输放大器。(当使用的遥控器是“PAR-F25MA 版本 F”或后续型号时)。
- 如果在相同的制冷系统中没有一个或 200 或更高的室内机组, 并且室内机组的数量超过 20 台时, 则需要一个传输放大器。(当使用的遥控器是“PAR-F25MA 版本 F”或后续型号时)。

\* 有关细节, 见布线举例 C。

B. 在有组操作的系统内的多个室外机组中使用屏蔽电缆举例 (必须设定地址)

中文

传输线布线举例

( ) 内: 地址

布线方法、地址设定方法

a. 在室外机组 (OC和OS) 和室内机组 (IC) 之间、在OC和OC之间以及在IC和IC 之间布线时确保使用屏蔽电缆。

b. 每个可变容量机组 (OC) 传输线端子板 (TB3) 的端子M1和M2和接地端子 ④、固定容量机组 (OS) 传输线端子板 (TB3) ④ 的端子M1、M2和S, 以及每个室内机组 (IC) 传输线端子板 (TB5) 的端子M1、M2和S应交叉布线。

c. 将在相同组中有最小地址的室内机组IC (主) 的传输线端子板 (TB5) 上的M1和M2端子连接到遥控器 (RC) 端子板 (TB6)。

d. 连接可变容量机组 (OC) 中央控制端子板 (TB7) 上的端子M1、M2和S, 以及其他制冷系统中可变容量机组 (OC) 中央控制端子板 (TB7) 上的端子M1、M2和S。

e. 只可以为一个可变容量机组 (OC) 将主板上的电源连接头从CN41改变为到CN40。

f. 连接可变容量机组 (OC) 中央控制端子板 (TB7) 上的S端子, 此机组将它连接在e中的CN40上的电源连接头连接到电气设备面板中的接地端 ④。

g. 应在开启电源后使用遥控器 (RC) 执行多制冷系统之间的组设定。有关设定方法, 参考遥控器的安装手册。

机组	范围	设定方法
IC (主)	01~50	在相同组中所有室内机组 (IC) 的最小地址。
IC (副)	01~50	在相同组中除了室内机组IC (主) 的其他地址。使用按照IC (主) 的序号。
主遥控器	101~150 备注2	IC (主) 再加100
副遥控器	151~200 备注2	IC (主) 再加150
可变容量机组	51~100 备注1	在相同的制冷系统中室内机组的最小地址再加50。
固定容量机组	51~100 备注1、3	可变容量机组地址再加1

备注:

1. 如果可变容量机组或固定容量机组的地址设定为100, 则将地址设定开关中的一个设定为01或50。

2. 不需要在遥控器上设定100的位置。

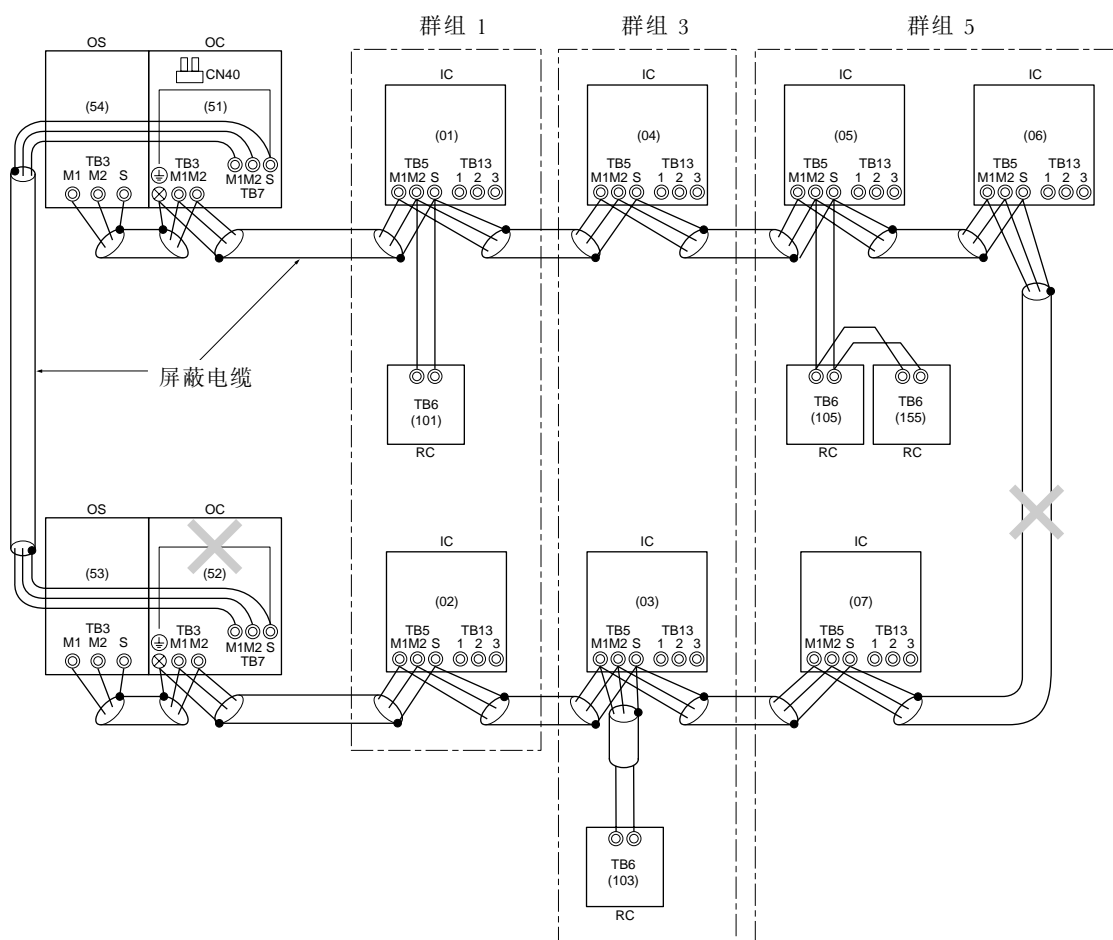
3. 如果与其他制冷系统的可变容量机组的地址重叠, 选择一个未使用的其他地址。

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允许长度

- 由室外机组到最远的机组的布线长度： $L_1+L_2+L_3+L_4+L_5+L_6+L_7+L_8$ ， $L_1+L_2+L_3+L_4+L_5+L_6+L_8+L_9 \leq 500\text{m}$  ( $1.25\text{mm}^2$ )
- 由室内系统到最远的机组的布线长度： $L_1+L_2+L_3+L_4$ ， $L_5+L_6+L_7$ ， $L_5+L_6+L_8$ ， $L_7+L_8 \leq 200\text{m}$  ( $1.25\text{mm}^2$ )
- 遥控器布线长度： $\ell_1, \ell_2, \ell_3, \ell_4 \leq 10\text{m}$  ( $0.5 \sim 0.75\text{mm}^2$ )  
如果长度超过10m，使用 $1.25\text{mm}^2$ 线并且在总的扩展长度内计算那部分的长度 ( $L_8$ ) 和到最远的机组的长度。

禁止项目



- 只将一个可变量机组的中央控制端子板 (TB7) 的S端子连接到电气设备面板的接地端 (⊕)。
- 连接到不同制冷系统的室内机组 (IC) 的传输线端子板 (TB5) 不应被连接到一起。

备注：

- 如果在相同的制冷系统中有一个或更多200或更高的室内机组，并且室内机组的数量超过16台时，则需要一个传输放大器。（当使用的遥控器是“PAR-F25MA版本F”或后续型号时）。
  - 如果在相同的制冷系统中没有一个或J224或更高的室内机组，并且室内机组的数量超过20台时，则需要一个传输放大器。（当使用的遥控器是“PAR-F25MA版本F”或后续型号时）。
- \* 有关细节，见布线举例C。

传输线布线举例

布线方法、地址设定方法

a. 地址设定与布线连接举例A和B相同。

b. 使室内机组和连接的遥控器的数量在下表所示的机组限制数量内, 此表用于在可变容量机组 (OC) 和传输放大器 (RP) N<sub>1</sub>之间所连接的机组的全部数量, 以及在传输放大器 (RP) N<sub>2</sub>后连接的机组的数量。

c. 牢固地将电源的地线连接到传输放大器 (RP)。

将室外机组侧的传输线连接到传输放大器 (RP) 传输线端子板1 (TB2) 上的A和B端子。

将扩展室内机组侧的传输线连接到传输放大器 (RP) 传输线端子板2 (TB3) 上的A和B端子。

(*1) 连接的室内 机组的容量	遥控器类型	遥控器PAR-F25MA	
	未连接RP时可连接的室内机组数量	早于E版本	晚于F版本
200或更低		16 (32)	20 (40)
200或更高		16 (32)	16 (32)

在圆括号 ( ) 中显示室内机组的数量和遥控器的全部数量。

\*1 在制冷系统中即使只有一个机组超过200, 则最大容量将是“200或更高”。

容许长度

- 室内系统最远的布线长度：
  - ①  $L_1+L_2+L_3+L_5+L_6 \leq 200\text{ m}$  (1.25 mm<sup>2</sup>)
  - ②  $L_1+L_2+L_3+L_5+L_7 \leq 200\text{ m}$  (1.25 mm<sup>2</sup>)
  - ③  $L_1+L_2+L_4 \leq 200\text{ m}$  (1.25 mm<sup>2</sup>)
  - ④  $L_6+L_5+L_3+L_4, L_4+L_3+L_5+L_7 \leq 200\text{ m}$  (1.25 mm<sup>2</sup>)
- 遥控器布线长度： $\ell_1, \ell_2 \leq 10\text{m}$  (0.5~0.75mm<sup>2</sup>)

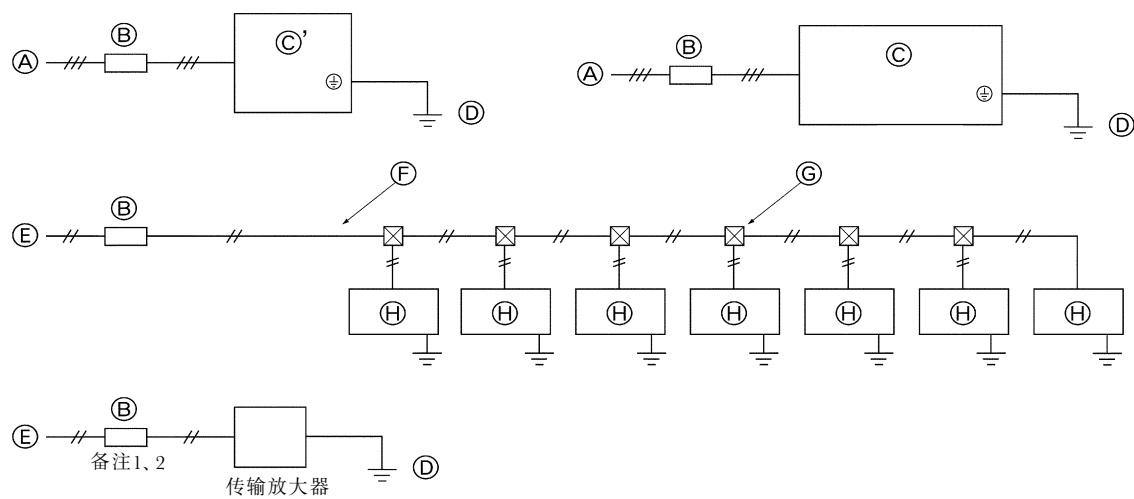
如果长度超过10m, 使用1.25mm<sup>2</sup>屏蔽电缆并在护套的扩展长度内计算那部分的长度 (L<sub>4</sub>和L<sub>7</sub>) 的部分和最长的远程长度。

禁止项目

- 不要弄错传输放大器 (RP) 传输线端子板1 (TB2) 和传输线端子板2 (TB3) 的连接位置。(如果弄错将不能正常操作。)
- 不要将传输放大器 (RP) 传输线端子板1 (TB2) 和传输线端子板2 (TB3) 的S端子连接在一起。

11.4. 主电源的布线和设备容量

布线图（举例）



- 备注：
- 1. 根据连接的室内机组的数量可能需要传输放大器。（有关细节，见条目11.4“传输电缆的布线”）
  - 2. 有关开关容量的细节，见传输放大器的安装手册。

- Ⓐ 电源（3相、4线）380/400/415V
- Ⓑ 开关
- Ⓒ 可变容量机组    Ⓒ' 固定容量机组
- Ⓓ 接地
- Ⓔ 电源（单相）220/230/240V
- Ⓕ 1.5mm² 以上
- Ⓖ 引线盒
- Ⓗ 室内机组

主电源线直径和开/关容量（举例）

型号		最小电线直径(mm²)			开关(A)		布线用断路器(NFB)	电流漏电断路器
		主电缆	分路	接地	容量	保险丝		
室外机组	PUHY-400	10.0	—	10.0	63	63	75A	75A 100mA 0.1秒或以下
	PUHY-500	16.0	—	16.0	63	63		
	PUHN-200	4.0	—	4.0	32	32	40	30A 100mA 0.1秒或以下
	PUHN-250	6.0	—	6.0	40	40		40A 100mA 0.1秒或以下

型号		最小电线直径(mm²)			开关(A)		布线用断路器(NFB)	电流漏电断路器
		主电缆	分路	接地	容量	保险丝		
室内机组	所有型号	1.5	1.5	1.5	16	16	20A	20A 30mA 0.1秒或以下

- 1. 室外机组、室内机组应分别使用独立电源。
- 2. 当进行绕线和连接时，应记住周围条件（周围温度、直射太阳光、雨水等）。
- 3. 电线尺寸为金属导体绕线的最小值。在考虑电压降的情况下，电源接线尺寸应该粗一级，应保证在接线处电源电压降不超过10%。
- 4. 布线的具体要求，应符合当地布线规则。
- 5. 器具在室外使用的部分，对电源线的要求不应低于氯丁橡胶铠装软线（IEC 245 中的 57 号线）。  
例如使用YZW等电源。

- ⚠ 警告：
- 务必采用规定的电线进行连接，使没有任何外力作用在端子连接处。如果连接处未牢固固定，则可能会产生热量或酿成火灾。
  - 务必采用类型合适的过载电流保护开关。请注意，所产生的过载电流可能包含一定量的直流电。

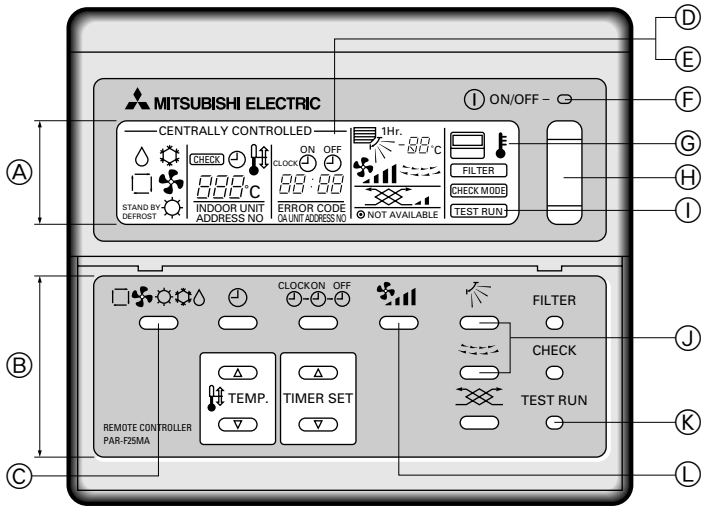
- ⚠ 注意：
- 有些安装位置可能要求附装一个接地漏电断路器，否则可能会导致触电。
  - 不可使用任何容量不正确的断路器和保险丝。如使用容量过大的保险丝、电线或铜丝，则可能会导致机组失灵或火灾。
  - 如果电气布线连接不正确（L1、L2、L3、N ⊕），可能会导致机组损坏。

12. 试运行

12.1. 试运行前的检查

1	检查制冷剂是否泄漏，电源线或传输电缆是否松弛。
2	确认电源端子板和接地间的500V兆欧表是否指示在1.0MΩ以上。不可在低于1.0MΩ的情况下进行运行。 备注：切勿在终端控制电路板上进行高阻抗检查，否则控制电路板将会破裂。 在刚安装机组后或将机组电源关断放置很长时间后，电源端子电路板和接地间的绝缘电阻可能会降低到1.0MΩ左右，这是因压缩机内部的制冷剂积聚而引起的。 如果绝缘电阻大于1.0MΩ，则可接通主电源并将曲轴箱加热器通电12小时以上，这样制冷剂就会挥发，而使绝缘电阻升高。
3	检查气体阀和液体阀是否完全开启。 备注：将帽盖拧紧。
4	检查相序及各相之间的电压。 备注：如果相序颠倒，则在进行试运行时会发生故障（4103）而使机组停止。
5	如果连接了一个传输放大器： 在开启室外机组的电源前开启传输放大器的电源。 备注1：如果首先开启室外机组的电源，则制冷剂系统连接数据可能不能被正确识别。 备注2：如果首先开启室外机组的电源，则在开启传输放大器的电源后掣位室外机组的电源。
6	为了将电流输送给曲轴箱加热器，在进行试运行之前至少要将通用电源接通12小时。如果电流供给时间太短，则压缩机可能会工作失灵。

12.2. 试运行方法



- ① 显示板

② 控制板

③ 冷气/暖气选择按钮 ③, ④

④ 检验码指示器 (见备注1)

⑤ 试运行剩余时间指示器 (见备注3)

⑥ 开/关发光二极管 (运行时点亮)
- ⑦ 室内机组液体管温度指示器 (见备注4)

⑧ 开/关按钮 ⑧

⑨ 试运行指示器

⑩ 风量调整按钮 ⑩

⑪ 试运行按钮 ⑪

⑫ 送风调整按钮 ⑫

操作程序	
①	在试运行开始前至少先接通用电源12小时→显示板上显示出指示符“HO”约2分钟。通用电源处于接通状态至少保持12小时（在曲轴箱加热器接通的状态下）。如果连接了一个传输放大器，则在开启室外机组的电源前开启传输放大器的电源。
②	按二次[TEST RUN]按钮→显示板上显示出“TEST RUN”。
③	按下〔冷气/暖气〕选择按钮→确认是否有风吹出。
④	按下〔冷气/暖气〕选择按钮从冷气运行改变到暖气运行，或相反→确认是否吹出暖风或冷风。
⑤	按下〔风量〕调节按钮→确认吹出的风量是否改变。
⑥	按下〔Up/Down〕或〔Louver〕按钮来改变风向→确认是否可以朝水平或向下调节风向。
⑦	→确认室内机组风扇是否正常运转。
⑧	确认通风装置等联动的装置是否正常工作，如果装备的话。
⑨	按下〔开/关〕按钮来解除试运行→运行停止。
备注1：如果检查模式显示在遥控器上或遥控器工作不正常，请见第72页以后各页所述。 备注2：通过设定于2个小时的定时器的动作，过2小时后试运行就自动停止。 备注3：在试运行中，试运行剩余时间显示在时间显示区。 备注4：在试运行中，室内机组液体管的温度显示在遥控器室温显示区。 备注5：当按下〔风量〕调节按钮时，根据机型的不同可能会在遥控器上显示出“无此功能”的信息。但这不是故障。 备注6：如果室外温度低，则机组将最长不能运行到4个小时。	

12.3. 试运行异常的排除

① 当机组因异常而停止运行时，遥控器显示板上就显示出一个4位检验码。请查看异常原因。

1. 室内机组

检验码	异常	检验码	异常
2500	漏水异常	6603	传输出错（传输路线占线）
2502	排水泵出错	6606	传输和接收出错 （与传输处理器通信故障）
2503	排水传感器出错, 浮子开关接通		
5101	进气传感器出错		
5102	管道传感器出错		
5103	气体侧管道传感器出错	6607	传输和接收出错（无ACK出错）
6600	机组地址设定重复	6608	传输和接收出错（无响应帧出错）
6602	传输出错（传输处理器硬件出错）	7101	容量代码出错
		7111	遥控器传感器出错

2. 室外机组

a. 可变容量机组

检验码	异常	检验码	异常
0403	串行传输不正常	5104	液位检测温度传感器出错 (TH4)
1102	排气温度异常	5105	管道温度传感器出错 (TH5)
1111	低压饱和温度异常 (由饱和温度传感器检测)	5106	室外温度传感器出错 (TH6)
1112	低压饱和温度异常 (由液位检测温度传感器检测)	5107	副冷却盘管液体出口温度传感器出错 (TH7)
1113	低压饱和温度异常 (由液位检测温度传感器检测)	5108	副冷却盘管旁路出口温度传感器出错 (TH8)
1301	低压异常	5109	副冷却盘管旁路进口温度传感器出错 (TH9)
1302	高压异常	5110	变频器冷却板温度传感器出错 (THHS)
1500	制冷剂补给过量	5112	气体管传感器出错 (TH10a)
1501	制冷剂不足异常	5113	气体管传感器出错 (TH10b)
1505	低压异常	5201	高压传感器 (HPS) 不出错
4103	反相	5301	IDC传感器电路不出错
4108	过载保护 (压缩机)	6600	机组地址设定重复
4115	电源同步信号异常	6602	传输出错 (传输处理器硬件出错)
4116	风扇速度异常 (电动机异常)	6603	传输出错 (传输路线占线)
4200	VDC检测电路出错	6606	传输和接收出错 (与传输处理器通信故障)
4210	过电流中断	6607	传输和接收出错 (无ACK出错)
4220	变频器总线线路电压低	6608	传输和接收出错 (无响应帧出错)
4230	散热器板过热保护	7100	总容量出错
4240	过电流保护	7101	容量代码出错
4260	冷气风扇不异常	7102	连接的机组号出错
5101	排气温度传感器出错 (TH1)	7105	地址设定出错
5102	低压饱和温度出错 (TH2)	7109	连接不正确
5103	液位检测温度传感器出错 (TH3)	7130	设置不正确

b. 固定容量机组

检验码	异常	检验码	异常
1102	排气温度异常	5105	管道温度传感器出错 (TH5)
1112	低压饱和温度异常 (由液位检测温度传感器检测)	5106	室外温度传感器出错 (TH6)
1113	低压饱和温度异常 (由液位检测温度传感器检测)	5107	副冷却盘管液体出口温度传感器出错 (TH7)
1302	高压异常	5108	副冷却盘管旁路出口温度传感器出错 (TH8)
1500	制冷剂补给过量	5109	副制冷线圈旁路进口温度传感器出错 (TH9)
1505	低压异常	5112	气体管传感器出错 (TH10a)
1559	油平衡电路故障	5113	气体管传感器出错 (TH10b)
4103	反相出错	6600	机组地址设定重复
4106	电源故障出错	6602	传输出错 (传输处理器硬件出错)
4108	过载保护 (压缩机)	6603	传输出错 (传输路线占线)
4115	电源同步信号异常	6606	传输和接收出错 (与传输处理器通信故障)
5101	排气温度传感器出错 (TH1)	6607	传输和接收出错 (无ACK出错)
5103	液位检测温度传感器出错 (TH3)	6608	传输和接收出错 (无响应帧出错)
5104	液位检测温度传感器出错 (TH4)		

3. 遥控器

检验码	异常	检验码	异常
6101	难以辨别接收到的响应出错	6606	传输和接收出错 (与传输处理器通信故障)
6600	机组地址设定重复	6607	传输和接收出错 (无ACK出错)
6602	传输出错 (传输处理器硬件出错)	6608	传输和接收出错 (无响应帧出错)
6603	传输出错 (传输路线占线)		

② 可变量机组多控制板上的诊断开关 (SW1) 和检修灯LED可以用于判断室外机组的故障。  
〈自诊断开关(SW1)和检修发光二极管显示的操作〉

自诊断项目		SW1设定	LED点亮 (闪烁)								显示
			标志1	标志2	标志3	标志4	标志5	标志6	标志7	标志8	
③	继电器输出显示1 (点亮)	<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div><div>Ⓒ</div></div></div>	压缩机运转时	压缩机1运转	压缩机2运转	21S4	SV1		SV22/32 (备注1)	始终点亮	微电脑通电时标志8始终点亮
	检查显示1 (闪烁)		0000~9999 (交替地显示地址和错误代码)								(备注1) 只是类型500
	继电器输出显示2	<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	SV4	21S4b	SV5b	SV6	CH2, 3	52F			标志1时SV5A和5B是关闭的
④	检查室内机组	<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	机组1	机组2	机组3	机组4	机组5	机组6	机组7	机组8	IC应急停止时点亮 复位后熄灭
		<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	机组9	机组10	机组11	机组12	机组13	机组14	机组15	机组16	
		<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	机组17	机组18	机组19	机组20	机组21	机组22	机组23	机组24	
		<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	机组25	机组26	机组27	机组28	机组29	机组30	机组31	机组32	
	室内机组模式	<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	机组1	机组2	机组3	机组4	机组5	机组6	机组7	机组8	冷气运行时点亮 暖气运行时闪烁 停止/风扇运转时熄灭
		<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	机组9	机组10	机组11	机组12	机组13	机组14	机组15	机组16	
		<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	机组17	机组18	机组19	机组20	机组21	机组22	机组23	机组24	
		<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	机组25	机组26	机组27	机组28	机组29	机组30	机组31	机组32	
	室内机组恒温器	<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	机组1	机组2	机组3	机组4	机组5	机组6	机组7	机组8	恒温器接通时点亮 断开时熄灭
		<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	机组9	机组10	机组11	机组12	机组13	机组14	机组15	机组16	
		<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	机组17	机组18	机组19	机组20	机组21	机组22	机组23	机组24	
		<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	机组25	机组26	机组27	机组28	机组29	机组30	机组31	机组32	
	室内机组地址	<div><div>Ⓐ</div><div>Ⓑ</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1 2 3 4 5 6 7 8 9 10</div></div></div>	以连接到室外机组的所有室内机组地址(1~50)依次显示。								

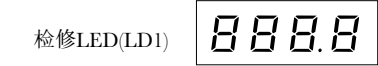
③ 室外机组  
④ 室内机组

Ⓐ 开  
Ⓑ 关  
Ⓒ 制造厂发货时

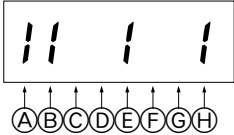
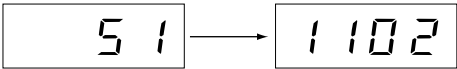
\* 关闭可变量机组的SW4-2。如果SW4-2开启, 将显示固定容量机组数据。



检修发光二极管(LED)的显示

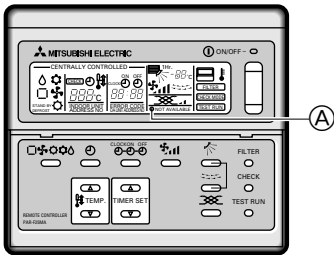


- 错误代码显示  
交替地显示错误发生地址和错误代码。  
例如室外机组地址51, 排气温度异常 (代码1102)
- 标志显示  
例如压缩机运转下的SV1 ON



- Ⓐ 标志1                      Ⓔ 标志5
- Ⓑ 标志2                      ⓕ 标志6
- Ⓒ 标志3                      ⓖ 标志7
- Ⓓ 标志4                      ⓓ 标志8

12.4. 遥控器异常的排除



Ⓐ 显示: 有电流时显示

	现象	原因	异常排除方法
1	按下遥控器上的ON开关后机组也不运行, 无显示。 (电流指示器不点亮)	(1) 室外机组电源未接通。 (2) 传输或遥控器电缆短路或连接不当。 (3) 电源线接触不良。 (4) 遥控器与机组遥控器端子板接错。 (5) 遥控器或室内机组连接过多。	(a) 检查遥控器端子之间的电压。 (i) 电压17~30V时遥控器失灵。 (ii) 如果没有电压 <ul style="list-style-type: none"><li>• 检查所连接的遥控器和室内机组数。</li><li>• 将电线从室外机组传输电缆端子板(TB3)上拆下, 检查端子间的电压。<ul style="list-style-type: none"><li>• 如果电压为17~30V, 则检查左侧的(2)和(4)。</li><li>• 如果没有电压, 则检查左侧(1)和(3)。</li></ul></li></ul>
2	指示符“HO”不消失。即使按下开关机组也不运行。	(1) 传输电缆没有连接到室内机组的传输电缆端子板。 (2) 室外机组地址设定错误。 (3) 室内机组地址设定错误。	• 检查左侧的所有项目。
3	显示一度出现但按下开关后立即消失。	(1) 室内机组电源未接通。	• 检查左侧的项目。

## 11.5. 下列现象并非异常 (意外现象)

现象	遥控器显示	原因
室内机组不进行冷气 (暖气) 运行。	“Cooling (冷气) (Heating (暖气))” 闪烁	当另一台室内机组正在进行暖气 (冷气) 运行时, 不进行冷气 (暖气) 运行。
自动风门片自由转动。	正常显示	由于自动风门片的控制起作用, 在冷气运行时当向下送风时间持续1小时后, 它会从向下送风自动转换到水平送风。在暖气运行时除霜、热调节和恒温器断开时, 风门片会自动转换到水平送风。
在暖气运行中风扇设定改变。	正常显示	在恒温器断开时, 开始极低转速运转。 在恒温器接通时, 根据时间或管道温度微风会自动转换到设定值。
在暖气运行中风扇停止。	除霜显示	在除霜时风扇停止。
在运行停止后风扇不停止。	不点亮	运行停止后, 风扇继续转动1分钟以排出余热 (仅在暖气运行时)。
当起动开关已接通后无风扇设定。	热准备就绪	在开关接通或管道温度变成35℃后, 以极低转速运转5分钟, 接着以低速运转2分钟, 然后开始档位设定。(热调节控制)
接通开关后室外机组不运行。	正常显示	当室外机组正在冷却, 制冷剂静止不动时, 至少要预热运转35分钟使压缩机温度升高。此时, 只有风扇运转。
在接通用电源后, 室内机组遥控器上显示出指示符“HO”达2分钟左右。	“HO” 闪烁	系统正在被驱动。 “HO” 消失后再次操作遥控器。
机组停止运行后排水泵不停止。	熄灭	在冷气运行停止后, 机组继续使排水泵运转3分钟, 然后停止。
机组停止后排水泵继续运转。		如果停止运行后仍有排水, 则机组会使排水泵继续运转。
当可变容量机组运行时, 即使固定容量机组没有运行, 其风扇也将转动。	正常显示	为了不使制冷剂堆积, 固定容量机组的风扇自动运行。

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This product is designed and intended for use in the residential,  
commercial and light-industrial environment.

Please be sure to put the contact address/telephone number on  
this manual before handing it to the customer.