MITSUBISHI ELECTRIC CITY MULTI

Air-Conditioners For Building Application

HEAT SOURCE UNIT

WR2 SERIES

MODEL: PQRY- 200 & 250 M-B-BM

INSTALLATION MANUAL

MITSUBISHI ELECTRIC

Contents

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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.**
- **2: 1995 and EN61000-3-3: 1995.**
- **This equipment may cause the adverse effect on the same supply system.**
- **Please report to or take consent by the supply authority before connection to the system.**

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 Heat Source 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 rain and other moisture 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.
- **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 heat source 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 (R407C) 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.
- **To dispose of this product, consult your dealer.**
- **The installer and system specialist shall secure safety against leakage according to local regulation or standards. Following standards may be applicable if local regulation are not available.**
- **Pay a special attention to the place, such as a basement, etc. where refrigeration gas can stay, since refrigeration is heavier than the air.**

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1.3. 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 heat source unit, as required.

1.4. 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.
- **The reverse phase of L lines (L1, L2, L3) can be detected (Error cord: 4103)**
  - The some electric parts should be damaged when power is supplied under the miss wiring.
- **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.
  - When transporting the heat source unit, etc., by the hanger bolts, support it at four points. If it is supported at three points or less, it will become unstable when set down and may fall.
- **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.

1.5. 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 frostbite 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.

Heat source unit model name	Total capacity of connected indoor unit models	Quantity of connectable indoor unit	Model name of connectable BC controller	Model name of connectable indoor unit	
PQRY-P200	100 to 302 (100 to 260)	2 to 15	CMB-P104NU-F CMB-P105NU-F CMB-P106NU-F CMB-P108NU-F CMB-P1010NU-F CMB-P1013NU-F CMB-P1016NU-F	PMFY-P25 · 32 · 40 · 63	VBM-A
				PDFY-P20 · 25 · 32 · 40 · 50 · 63 · 71 · 80 · 100 · 125	VM-A
				PLFY-P32 · 40 · 50 · 63 · 80 · 100 · 125	VKM-A
				PLFY-P20 · 25 · 32 · 40 · 50 · 63 · 80 · 100 · 125	VLMD-A
				PEFY-P20 · 25 · 32	VML-A
				PEFY-P40 · 50 · 63 · 71 · 80 · 100 · 125 · 140	VMH-A
				PCFY-P40 · 63 · 100 · 125	VGM-A
				PFFY-P20 · 25 · 32 · 40 · 50 · 63	VLEM-A
				PFFY-P20 · 25 · 32 · 40 · 50 · 63	VLRM-A
				PKFY-P20 · 25	VAM-A
				PKFY-P32 · 40 · 50	VGM-A
PQRY-P250	125 to 378 (125 to 325)	2 to 16			

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Note:

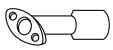
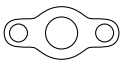
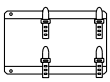
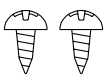
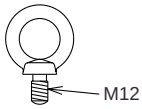
1. The total capacity of connected indoor unit models represents the total sum of the figures expressed in the indoor model name.

2. Figure in ( ) is to be employed for the actual length of refrigerant piping of 90 m or more for PQRY-200, 250.

eat source unit, th e capacity of each indoor unit lowers from the rated capacity at simultaneous operation. Therefore, combine indoor units within the capacity of heat source unit if the circumstance allows.

3. Confirmation of parts attached

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

	Name	① Connecting pipe	② Packing	③ Wiring mounting board	④ Tapping screw M4	⑤ Hanger bolts
	Shape		 inside ø23 outside ø35			
Model name	PQRY-P200	1	1	1	2	4
	PQRY-P250	1	1	1	2	4

*① Connecting pipe is fixed with the unit.

4. Selection of installation site

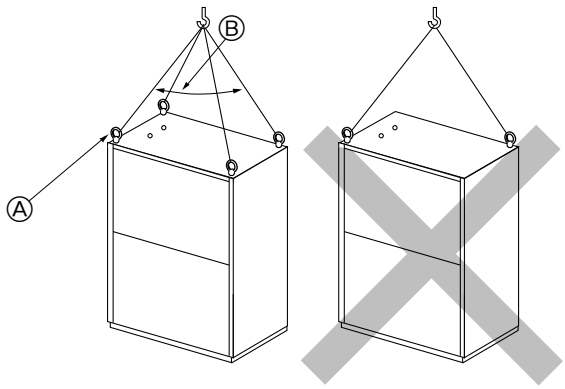
Select space for installing heat source unit, which will meet the following conditions:

- no direct thermal radiation from other heat sources
- no possibility of annoying neighbors by noise from unit
- with strength which bears weight of unit
- note that drain flows out of unit when heating
- with space and service work shown 6.2. Service space

  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.
- Do not use unit in any special environment where oil, steam and sulfuric gas exist.
- No exposure to rain or other moisture. (the heat source unit should only be used indoors)
- The declining gradient of the exhaust pipe should be higher than 1/100.

5. Lifting method and weight of product

- When transporting the product by the hanger bolts, make sure to use accessory hanger bolts firmly screwed into the designated holes on the unit's top surface.
- 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 60° or less.
- Use two ropes at least 3 m long.



Dangerous!

Ⓐ Hanger bolts accessory firmly attached all the way in. (at four points)
Ⓑ 60° or less

Weight of product:

PQRY-P200	PQRY-P250
270 kg	280 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.
- Tear plastic packaging bag and scrap it so that children cannot play with it. Otherwise plastic packaging bag may suffocate children to death.
- When transporting the heat source unit, etc., by the hanger bolts, support it at four points. If it is supported at three points or less, it will become unstable when set down and may fall.

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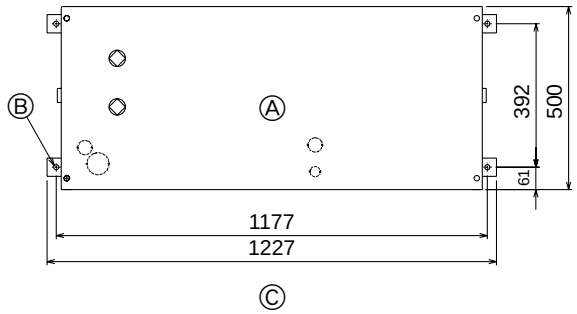
6. Installation of unit and service space

6.1. Installation

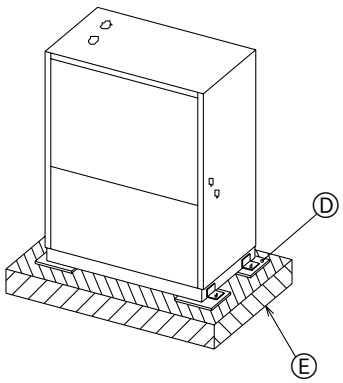
- Using the anchoring holes shown below, firmly bolt the unit to the base.



Ⓐ Heat source unit
Ⓑ 4-ø14 (Anchoring hole)
Ⓒ (Top view)

Bases and anti-vibration

- Be sure to install unit in a place strong enough to withstand its weight. If the base is unstable, reinforce with a concrete base.
- The unit must be anchored on a level surface. Use a level to check after installation.
- Anti-vibration pads must be placed under the base of the unit.
- If the unit is installed near a room where noise is a problem, using an anti-vibration stand on the base of the unit is recommended.



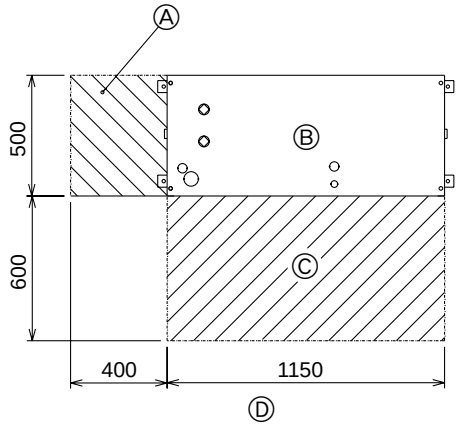
Ⓓ Anti-vibration pad
Ⓔ Concrete base

⚠ Warning:

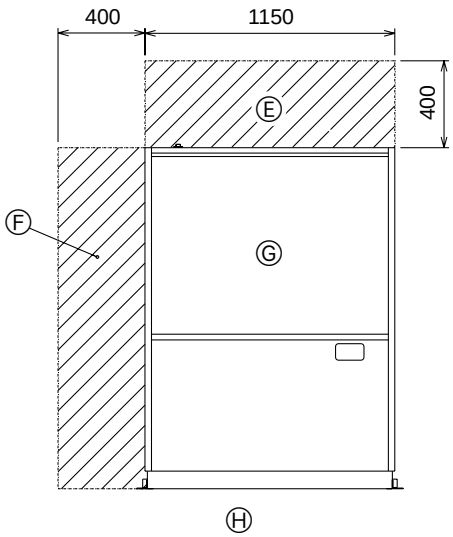
- **Be sure to install unit in a place strong enough to withstand its weight.**
  Any lack of strength may cause unit to fall down, resulting in a personal injury.
- **Have installation work in order to protect against earthquake.**
  Any installation deficiency may cause unit to fall down, resulting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

6.2. Service space

- Please allow for the following service spaces after installation. (All servicing can be performed from the front of the unit)



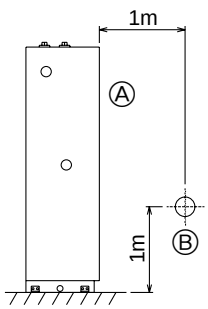
Ⓐ Piping space (for left piping)
Ⓑ Heat source unit
Ⓒ Service space (front side)
Ⓓ (Top view)
Ⓔ Piping space (for top piping)



Ⓕ Piping space (for left piping)
Ⓖ Heat source unit
Ⓗ (Front view)

6.3. Noise level

PQRY-200	PQRY-250
53 dB(A)	54 dB(A)



Ⓐ Front
Ⓑ Measuring point

Measuring location: a room free from echoes and reverberations

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7. Refrigerant piping installation

City Multi WR2 Series is constituted by an end branching system in which the refrigerant piping from heat source unit is branched at BC controller and connected to each indoor unit.
The connection method adapted is flange connection for low pressure pipe and flare connection for high pressure pipe between heat source unit and BC controller, and flare connection between BC controller and indoor unit. Brazing connection is employed for joint pipe set and branch pipe set.

⚠ Warning:

Always use extreme care to prevent the refrigerant gas 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.

7.1. Caution

① Use the following materials for refrigeration piping.
- Material: Use refrigerant piping made of **C1220 phosphorus deoxidized copper as specified in the *JIS H3300 “Copper and copper alloy seamless pipes and tubes”. In addition, be sure that the inner and outer surfaces of the pipes are clean and free of hazardous sulphur, oxides, dust/dirt, shaving particles, oils, moisture, or any other contaminant.
- Size: Refer to Pages ***10*** to ***11***.

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 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.

⑥ The City Multi Series WR2 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 ***10*** to ***11***.)

⑦ **Use liquid refrigerant to fill the system.**

⑧ Never use refrigerant to perform an air purge. Always evacuate using a vacuum pump.

⑨ 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 ***15*** to ***16***.)

⑩ When connecting the refrigerant piping, make sure the ball valve of the heat source unit is completely closed (the factory setting) and do not operate it until the refrigerant piping for the heat source and indoor units has been connected, a refrigerant leakage test has been performed and the evacuation process has been completed.

⑪ 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 ***12*** to ***13***.)

⚠ Warning :

When installing and moving the unit, do not charge it with refrigerant other than the refrigerant (R407C) specified on the unit.
- Mixing of a different refrigerant, air, etc. may cause the refrigerant cycle to malfunction and result in severe damage.

⚠ Caution:

- **Use refrigerant piping made of **C1220 phosphorus deoxidized copper as specified in the *JIS H3300 “Copper and copper alloy seamless pipes and tubes”. In addition, be sure that the inner and outer surfaces of the pipes are clean and free of hazardous sulphur, oxides, dust/dirt, shaving particles, oils, moisture, or any other contaminant.**
  - Contaminants on the inside of the refrigerant piping may cause the refrigerant residual oil to deteriorate.
- **Use liquid refrigerant for sealing.**
  - Sealing with gas refrigerant will change the composition of the refrigerant in the cylinder and reduce the unit’s performance.
- **Never use existing refrigerant piping.**
  - The large amount of chlorine in conventional refrigerant and refrigerator oil in the existing piping will cause the new refrigerant to deteriorate.
- **Store the piping to be used during installation indoors and keep both ends of the piping sealed until just before brazing.**
  - If dust, dirt, or water gets into the refrigerant cycle, the oil will deteriorate and the compressor may fail.
- **Do not use a charging cylinder.**
  - Using a charging cylinder may cause the refrigerant to deteriorate.

* Japanese industrial standard.
** Comparable to CU-DHP (CUPROCLIMA), Cu-bl (AFNOR), C12200 (ASTN), SF-Cu (DIN)

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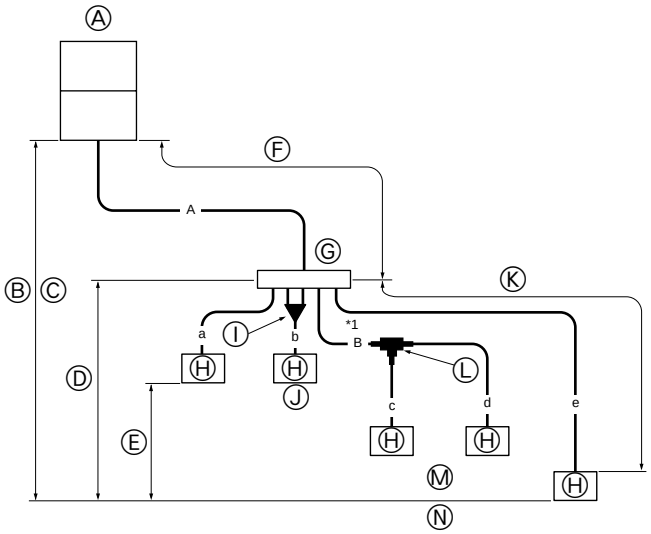
7.2. Refrigerant piping system

- Connection Example (Connection of 5 indoor units)



Ⓐ Heat source unit
Ⓑ H=50 meters or less (Higher heat source unit than indoor unit)
Ⓒ H'=40 meters or less (Lower heat source unit than indoor unit)
Ⓓ h1=15 meters or less (10 meters or less for type 125 unit)
Ⓔ h2=15 meters or less
Ⓕ 70(60) meters or less
Ⓖ BC controller
Ⓗ Indoor unit
Ⓘ Joint pipe CMY-R160-G (For V-E type of BC controller)
Ⓙ (Models over 81)
Ⓚ 30 meters or less
Ⓛ Branch pipe CMY-Y102S-F
Ⓜ Max. 3 sets for 1 connection
Total capacity less than 80
(But cooling/heating mode is same)
Ⓝ *1 For selection of piping B. see (3).

Permissible Length	Total Piping Length		A+B+a+b+c+d+e is 220 meters or less
	Farthest Piping Length (A+e)		A+e is 100 meters or less (90 meters or less if capacity of indoor unit exceeds 130%)
	Heat source-BC Controller Piping Length (A)		70 meters or less (60 meters or less if capacity of indoor unit exceeds 130%)
	Indoor-BC Controller Piping Length (e)		30 meters or less
Permissible High/Low Difference	Indoor-Heat source	Higher Heat source High/Low Difference (H)	50 meters or less
		Lower Heat source High/Low Difference (H')	40 meters or less
	High/Low Difference in Indoor/BC controller Section (h1)		15 meters or less
	High/Low Difference in Indoor/Indoor Section (h2)		15 meters or less

■ Select Each Section of Refrigerant Piping

(1) Between Heat Source Unit and BC Controller (A).
(2) Between BC Controller and Indoor Units (a, b, c, d, e).
(3) Connection of Plural Indoor Units With One Connection (B)

} Each Section of Piping

Select the size from the table to the right.

(1) Diameter of refrigerant piping between heat source unit and BC controller

Model	Piping Diameter (mm)	
PQRY-200	High press. pipe	ø19.05
	Low press. pipe	ø25.4
PQRY-250	High press. pipe	ø19.05
	Low press. pipe	ø28.58
Connection of heat source unit/ BC controller	High press. pipe	ø19.05 (Flare)
	Low press. pipe	ø25.4 (Flange) ø28.58 (Flange)

(2) Diameter of refrigerant piping between BC controller and indoor unit.

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

(3) Selection of refrigerant piping (Piping size of B section in the above figure)
Select the size according to the total capacity of indoor units to be installed downstream.

Total capacity of indoor units	Liquid line (mm)	Gas line (mm)
Less than 80	ø9.52	ø15.88
81 to 160	ø12.7	ø19.05

■ Additional Refrigerant Charge

At the time of shipping, the heat source unit PQRY-200 is charged with 7.5 kilograms of refrigerant and the PQRY-P250 is charged with 8.5 kilograms. 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 heat source 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 of the calculation result 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 10.62 kilograms, round the result up to 10.7 kilograms.

$$\frac{\text{Additional refrigerant charge}}{\text{(kg)}} = \frac{\text{Liquid pipe size Total length of ø19.05}}{\text{(m)} \times 0.16\ \text{(kg/m)}} + \frac{\text{Liquid pipe size Total length of ø9.52}}{\text{(m)} \times 0.06\ \text{(kg/m)}} + \frac{\text{Liquid pipe size Total length of ø6.35}}{\text{(m)} \times 0.024\ \text{(kg/m)}} + \alpha$$

<Example>
Indoor 1 : 40 A : ø19.05 40 m a : ø6.35 10 m
2 : 100 B : ø 9.52 10 m b : ø9.52 5 m
3 : 40 c : ø6.35 10 m
4 : 32 d : ø6.35 10 m
5 : 63 e : ø9.52 10 m

} At the conditions below:

The total length of each liquid line is as follows
ø19.05 : A = 40 m
ø9.52 : B + b + e = 10 + 5 + 10 = 25 m
ø6.35 : a + c + d = 10 + 10 + 10 = 30 m
Therefore,
<Calculation example>
Additional
refrigerant charge = 40 × 0.16 + 25 × 0.06 + 30 × 0.024 + 2 = 10.7 kg

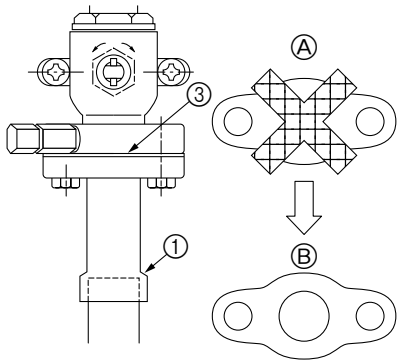
Value of α

Total capacity of connecting indoor units	α
to Model 80	1.0 kg
Models 81 to 160	1.5 kg
Models 161 to 325	2.0 kg

ENGLISH

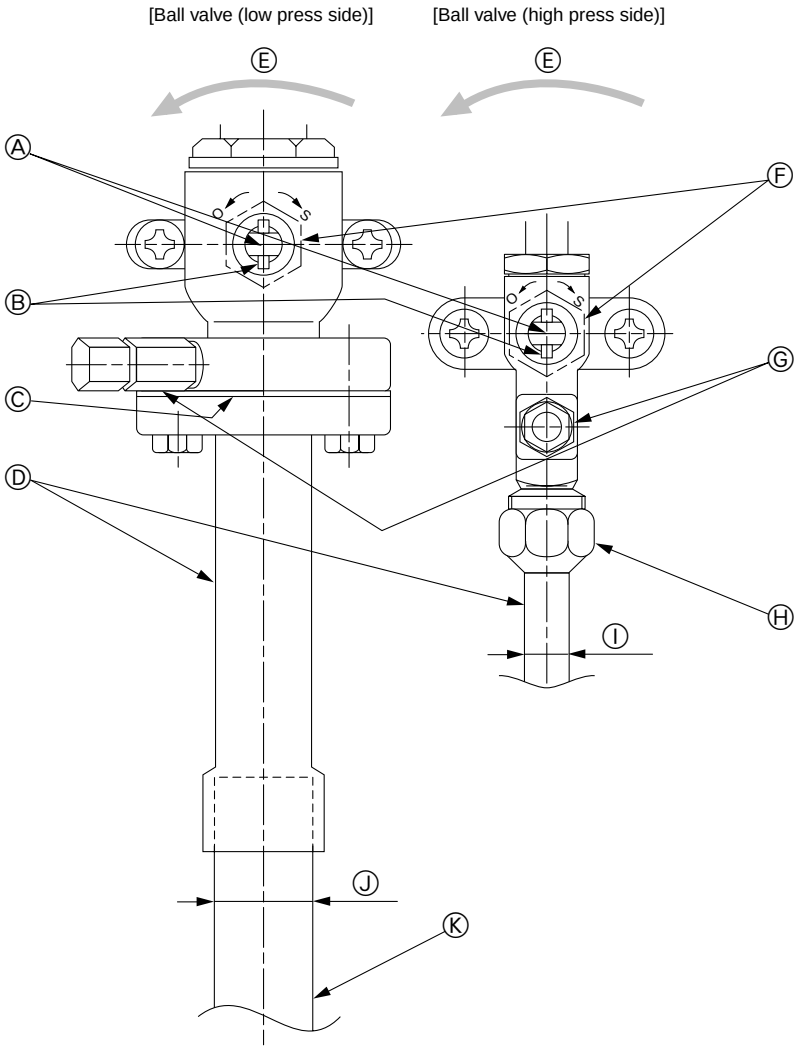
7.3. Caution for piping connection/valve operation

- Conduct piping connection and valve operation accurately by following the figure below.
- The gas side connecting pipe is being assembled for shipment. (See the figure at the right.)
  - ① For brazing to the connecting pipe with flange, remove the connecting pipe with flange from the ball valve, and braze it 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 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 (Ester oil, ether oil or alkylbenzene [small amount]) onto both surfaces of the packing.



Ⓐ Replace the close-packed packing
Ⓑ Hollow 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, giving damage to the compressor, four-way valve, etc.
- 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, tighten the service port and cap securely not to generate gas leak.



(This figure shows the valve in the fully open state.)

ENGLISH

Ⓐ 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)
[Manufacturer: Nichiasu corporation]
[Type: T/#1991-NF]

Ⓓ Connecting pipe (Accessory)
[Use packing and securely install this pipe to the valve flange so that gas leakage will not occur. (Tightening torque: 250 kg-cm (25 N·m)) Coat both surfaces of the packing with refrigerator oil (Ester oil, ether oil or alkylbenzene [small amount]).]

Ⓔ 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: 250 kg-cm (25 N·m) 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: 140 kg-cm (14 N·m) or more)]

Ⓗ Flare nut
[Tightening torque: 1200 kg-cm (120 N·m)
Loosen and tighten this nut using a double-ended wrench.
Coat the flare contact surface with refrigerator oil (Ester oil, ether oil or alkylbenzene [small amount]).]

Ⓘ ø19.05

Ⓙ ø25.4 (PQRY-P200)
ø28.58 (PQRY-P250)

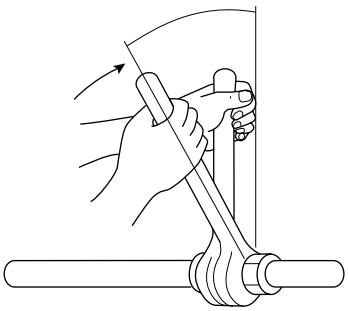
Ⓚ Field piping
[Braze to the connecting pipe. (When brazing, use unoxidized brazing.)]

Appropriate tightening torque by torque wrench

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

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:

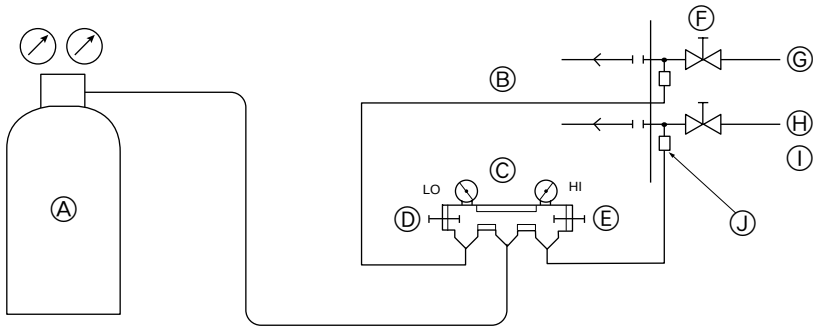
- **Always remove the connecting pipe from the ball valve and braze it outside the unit.**
  - Brazing the connecting pipe while it is installed will heat the ball valve and cause trouble or gas leakage. The piping, etc. inside the unit may also be burned.
- **Use ester oil, ether oil or alkylbenzene (small amount) as the refrigerator oil to coat flares and flange connections.**
  - The refrigerator oil will degrade if it is mixed with a large amount of mineral oil.

7.4. Airtight test, evacuation, and refrigerant charging

① **Airtight test**

Perform with the stop valve of the heat source unit closed, and pressurize the connection piping and the indoor unit from the service port provided on the stop valve of the heat source unit. (Always pressurize from both the liquid pipe and the gas pipe service ports.)

Ⓐ Nitrogen gas
Ⓑ To indoor unit
Ⓒ System analyzer
Ⓓ Lo Knob
Ⓔ Hi Knob
Ⓕ Stop valve
Ⓖ Liquid pipe
Ⓗ Gas pipe
Ⓘ Heat source unit
Ⓙ Service port



The method of conducting the airtight test is basically the same as for older models. However, since the restrictions have a large affect on deterioration of the refrigerator oil, always observe them.

ENGLISH

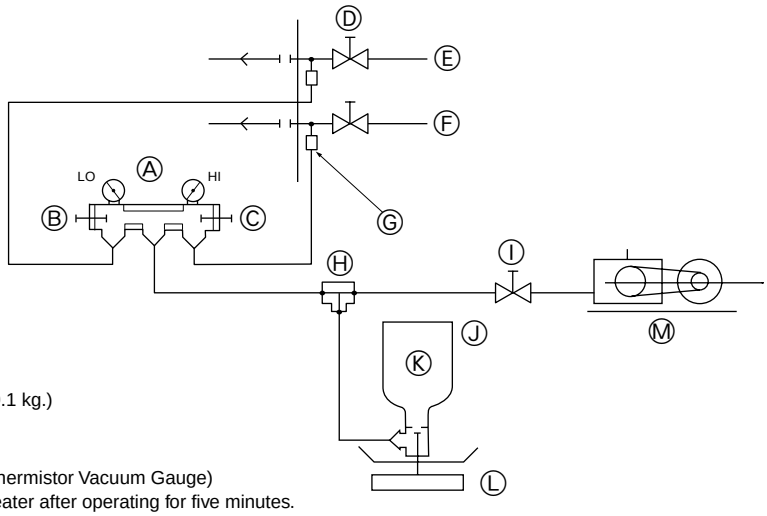
Airtight test procedure	Restriction
1. Nitrogen gas pressurization (1) After pressurizing to the design pressure (2.94 MPa) using nitrogen gas, let stand for about one day. If the pressure does not drop, airtightness is good. However, if the pressure drops, since the leaking point is unknown, the following bubble test may also be performed. (2) After the pressurization described above, spray the flare connection parts, brazed parts, flanges, and other parts that may leak with a bubbling agent (Kyuboflex, etc.) and visually check for bubbles. (3) After the airtight test, wipe off the bubbling agent.	• If a flammable gas or air (oxygen) is used as the pressurization gas, it may catch fire or explode.
2. Pressurization using refrigerant gas and nitrogen gas (1) After sealing with liquid R22 from a cylinder and pressurizing to a gas pressure of approximately 0.2 MPa, pressurize to the design pressure (2.94 MPa) using nitrogen gas. However, do not pressurize at one time. Stop during pressurization and check that the pressure does not drop. (2) Check for gas leaks by checking the flare connection parts, brazed parts, flanges, and other parts which may leak using an R22 compatible electric leak detector. (3) This test may be used together the with bubble type gas leak test.	• Do not use a refrigerant other than that indicated on the unit. . • Use a pressure gauge, charge box, and other parts especially for R22. • An electric leak detector for R22 can detect leaks.

② **Evacuation**

As shown in the figure below, evacuate with the ball valve of the heat source unit closed and evacuate both the connection piping and the indoor unit from the service port provided on the ball valve of the heat source unit using a vacuum pump. (Always evacuate from the service port of both the liquid pipe and the gas pipe.) After the vacuum reaches 5 Torr, continue evacuation for at least one hour or more. Then, stop the vacuum pump and let stand for one day and check if the vacuum does not rise. (If the vacuum increases by 1 Torr, since water may be mixed in, pressurize up to 0.05 MPa using dry nitrogen gas and evacuate again.) Finally, seal with liquid refrigerant from the liquid pipe. Moreover, during operation, adjust the refrigerant amount from the gas pipe so that the refrigerant is always an appropriate amount.

* Never perform air purging using refrigerant.

Ⓐ System analyzer
Ⓑ Lo Knob
Ⓒ Hi Knob
Ⓓ Ball valve
Ⓔ Liquid pipe
Ⓕ Gas pipe
Ⓖ Service port
Ⓗ Three-way joint
Ⓘ Valve
Ⓙ Valve
Ⓚ R22 cylinder
Ⓛ Scale
Use a graviometer. (One that can measure down to 0.1 kg.)
Ⓜ Vacuum pump
Use a vacuum pump with a reverse flow check valve.
(Recommended vacuum gauge: ROBINAIR 14010 Thermistor Vacuum Gauge)
Also use a vacuum pump that reaches 0.5 Torr or greater after operating for five minutes.

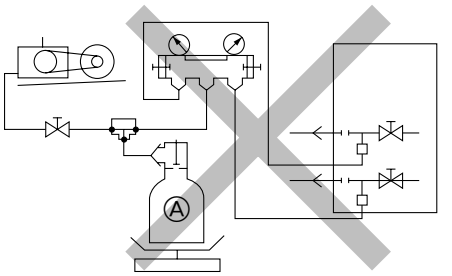


Note:

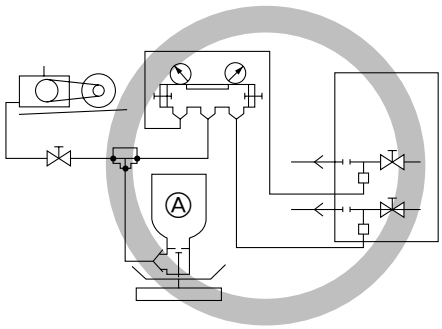
- **Always add an appropriate amount of refrigerant. (For the refrigerant additional charge, see pages *11*.) Also always seal the system with liquid refrigerant. Too much or too little refrigerant will cause trouble.**
- **Use a gauge manifold, charging hose, and other parts for the refrigerant indicated on the unit.**

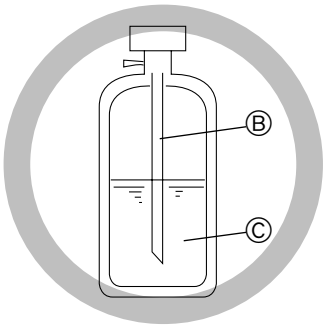
③ **Refrigerant Charging**

Since the refrigerant used with the unit is nonazerotropic, it must be charged in the liquid state. Consequently, when charging the unit with refrigerant from a cylinder, if the cylinder does not have a syphon pipe, charge the liquid refrigerant by turning the cylinder upside-down as shown below. If the cylinder has a syphon valve like that shown in the figure at the right, the liquid refrigerant can be charged with the cylinder standing upright. Therefore, give careful attention to the cylinder specifications. If the unit should be charged with gas refrigerant, replace all the refrigerant with new refrigerant. Do not use the refrigerant remaining in the cylinder.



[When cylinder does not have a syphon pipe]





[When cylinder has a syphon pipe (Refrigerant can be charged with the cylinder standing upright.)]

Ⓐ R22 cylinder
Ⓑ Syphon pipe
Ⓒ Liquid refrigerant

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⚠ Warning:

When installing or moving the unit, do not charge it with refrigerant other than the refrigerant specified on the unit.

- Mixing of different refrigerant, air, etc. may cause the refrigerant cycle to malfunction and result in severe damage.

⚠ Caution:

- **Use a vacuum pump with a reverse flow check valve.**
  - If the vacuum pump does not have a reverse flow check valve, the vacuum pump oil may flow back into the refrigerant cycle and cause deterioration of the refrigerator oil and other trouble.
- **Do not use a charging cylinder.**
  - Using a charging cylinder may cause the refrigerant to deteriorate.
- **Do not use the tools shown below used with conventional refrigerant.**
  (Gauge manifold, charge hose, gas leak detector, check valve, refrigerant charge base, refrigerant recovery equipment)
  - Mixing of conventional refrigerant and refrigerator oil may cause the refrigerator oil to deteriorate.
  - Mixing of water will cause the refrigerator oil to deteriorate.
- **Manage the tools more carefully than normal.**
  - If dust, dirt, or water gets in the refrigerant cycle, the refrigerator oil will deteriorate.

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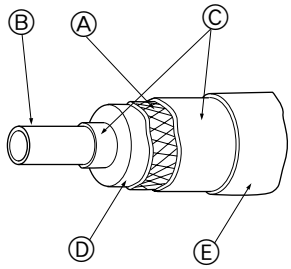
7.5. Thermal insulation of refrigerant piping

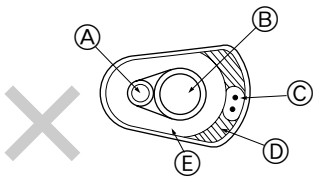
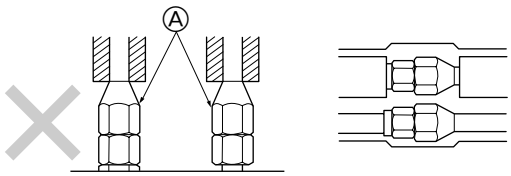
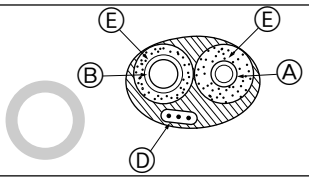
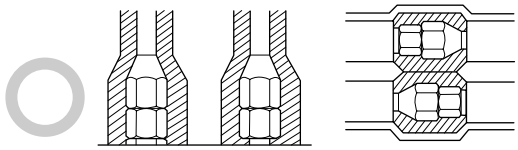
Be sure to give insulation work to refrigerant piping by covering liquid pipe and gas pipe separately with enough thickness heat-resistant polyethylene, so that no gap is observed in the joint between indoor unit and insulating material, and insulating materials themselves. When insulation work is insufficient,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



Ⓐ Steel wire
Ⓑ Piping
Ⓒ Asphaltic oily mastic or asphalt
Ⓓ Heat insulation material A
Ⓔ 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

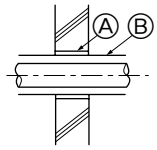
Note:
When using polyethylene cover as covering material, asphalt roofing shall not be required.

Bad example	• Do not insulate gas or low pressure pipe and liquid or high pressure pipe together.  Ⓐ Liquid pipe Ⓑ Gas pipe Ⓒ Electric wire Ⓓ Finishing tape Ⓔ Insulating material	• Be sure to fully insulate connecting portion.  Ⓐ These parts are not insulated.
Good example	 Ⓐ Liquid pipe Ⓑ Gas pipe Ⓓ Finishing tape Ⓔ Insulating material	

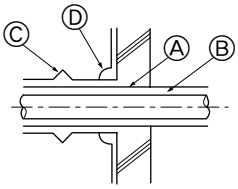
Note:
No heat insulation must be provided for electric wires.

Penetrations

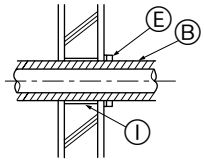
Inner wall (concealed)



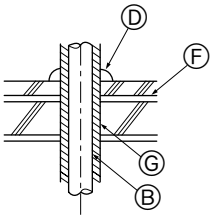
Outer wall



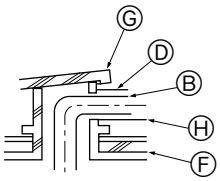
Outer wall (exposed)



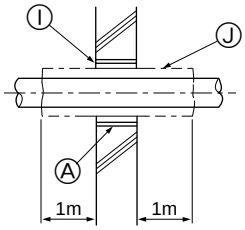
Floor (fireproofing)



Roof pipe shaft



Penetrating portion on fire limit and boundary wall



Ⓐ Sleeve
Ⓑ Heat insulating material
Ⓒ Lagging
Ⓓ Caulking material
Ⓔ Band
Ⓕ Waterproofing layer
Ⓖ Sleeve with edge
Ⓗ Lagging material
Ⓘ Mortar or other incombustible caulking
Ⓙ 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.)

ENGLISH

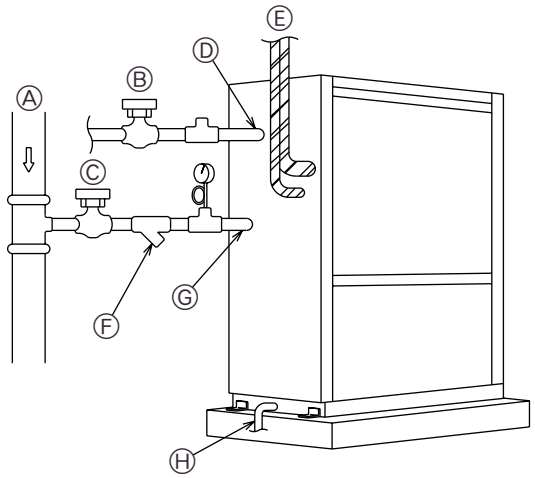
8. Water pipe installation

- City Multi WR2 Series pipes are similar to other air-conditioning pipes, however, please observe the following precautions during installation.

8.1. Precautions during installation

- Use the reverse-return method to insure proper pipe resistance to each unit.
- To insure easy maintenance, inspection, and replacement of the unit, use a proper joint, valve, etc. on the water intake and outlet port. In addition, be sure to install a strainer on the water intake pipe. (In order to maintain the heat source unit, a strainer on the circulating water inlet is necessary.)
  * An example of the heat source unit installation is shown in the diagram below.
- Install a suitable air vent on the water pipe. After sending water through the pipe, be sure to vent the excess air.
- Compressed water may form in the low-temperature sections of heat source unit. Use a drainage pipe connected to the drain valve at the base of the unit to drain the water.
- There is a water vent plug in the center of the heat exchanger water inlet head at the middle of the unit. Use this for maintenance, etc. In addition, do not allow any of the unit's electrical parts (such as the solenoid valve coil or compressor power supply) to become wet.
- Install a back flow-prevention valve on the pump and a flexible joint to prevent excess vibration.
- Use a sleeve to protect the pipes where they go through a wall.
- Use metal fittings to secure the pipes, and install them so that they have maximum protection against breakage and bending.
- Do not confuse the water intake and outlet valves.
- This unit doesn't have any heater to prevent freezing within tubes. When the water flow is stopped on low ambient, take out the water from tubes.

Example of heat source unit installation (using left piping)



Ⓐ Water circulation pipe
Ⓑ Close valve
Ⓒ Close valve
Ⓓ Water outlet
Ⓔ Refrigerant piping
Ⓕ Y-type strainer
Ⓖ Water inlet
Ⓗ Drain pipe

8.2. Insulation installation

With City Multi WR2 Series piping, as long as the temperature range of the circulating water is kept to average temperatures year-round (30°C in the summer, 20°C in the winter), there is no need to insulate or otherwise protect indoor piping from exposure. You should use insulation in the following situations:

- Any outdoor piping.
- Indoor piping in cold-weather regions where frozen pipes are a problem.
- When air coming from the outside causes condensation to form on piping.
- Any drainage piping.

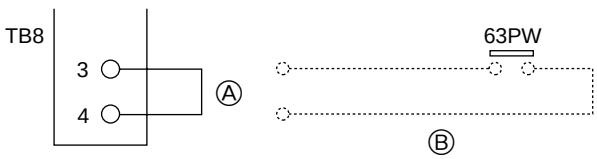
8.3. Water processing and water quality control

To preserve water quality, use the closed type of cooling tower for WR2. When the circulating water quality is poor, the water heat exchanger can develop scales, leading to a reduction in heat-exchange power and possible corrosion of the heat exchanger. Please pay careful attention to water processing and water quality control when installing the water circulation system.

- Removal of foreign objects or impurities within the pipes.
  During installation, be careful that foreign objects, such as welding fragments, sealant particles, or rust, do not enter the pipes.
- Water Quality Processing
  ① Depending on the quality of the cold-temperature water used in the air-conditioner, the copper piping of the heat exchanger may become corroded. We recommend regular water quality processing.
  Cold water circulation systems using open heat storage tanks are particularly prone to corrosion.
  ② For detailed water quality control methods and water quality calculations, please refer to each regulation of the region.
  (Ex. pH8.5 ~ 9.5 reference to CIBSE GUIDE)
  ③ Please consult with a water quality control specialist about water quality control methods and water quality calculations before using anti-corrosive solutions for water quality management.
  ④ When replacing a previously installed air conditioning device (even when only the heat exchanger is being replaced), first conduct a water quality analysis and check for possible corrosion.
  Corrosion can occur in cold-water systems even if there has been no prior signs of corrosion.
  If the water quality level has dropped, please adjust water quality sufficiently before replacing the unit.

8.4. Pump interlock

The heat source unit may become damaged if it is operated with no water circulating through the pipes.
Be sure to interlock unit operation and the water-circuit pump. Use the terminal blocks for interlocking (TB8-3, 4) that can be found on the unit. In the case of a pump interlock circuit signal connection to the TB8-3, 4, remove the short-circuit wire. Also, to prevent mistaken error detection, resulting from a poor connection, in the pressure valve 63PW, use a low maintained current of 5mA or less.



Ⓐ Short-circuit wire (Connected before delivery from manufacturer)
Ⓑ Pump interlock circuit connection

ENGLISH

9. Electrical work

9.1. 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, if may cause an electric shock or fire.

② Wiring for control (hereinafter referred to as transmission line) shall be (5 cm or more) apart from power source wiring so that it is not influenced by electric noise from power source wiring. (Do not insert transmission line and power source wire in the same conduit.)

③ Be sure to provide designated grounding work to heat source unit.

⚠ Caution:

Be sure to put heat source 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 heat source units, because the box is sometimes removed at the time of service work.

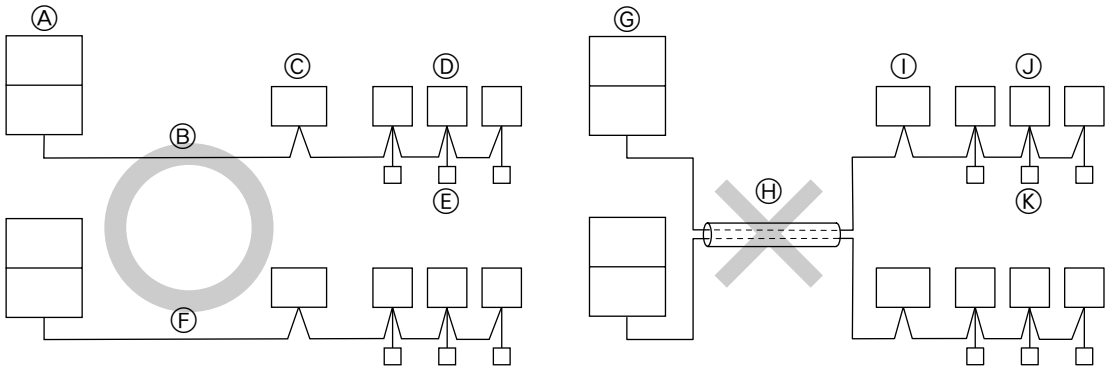
⑤ Never connect the main power source to terminal block of transmission line. If connected, electrical parts will be burnt out.

⑥ Use 2-core shield cable for transmission line. If transmission lines of different systems are wired with the same multiplecore cable, the resultant poor transmitting and receiving will cause erroneous operations.

⑦ Only the transmission line specified should be connected to the terminal block for heat source 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.

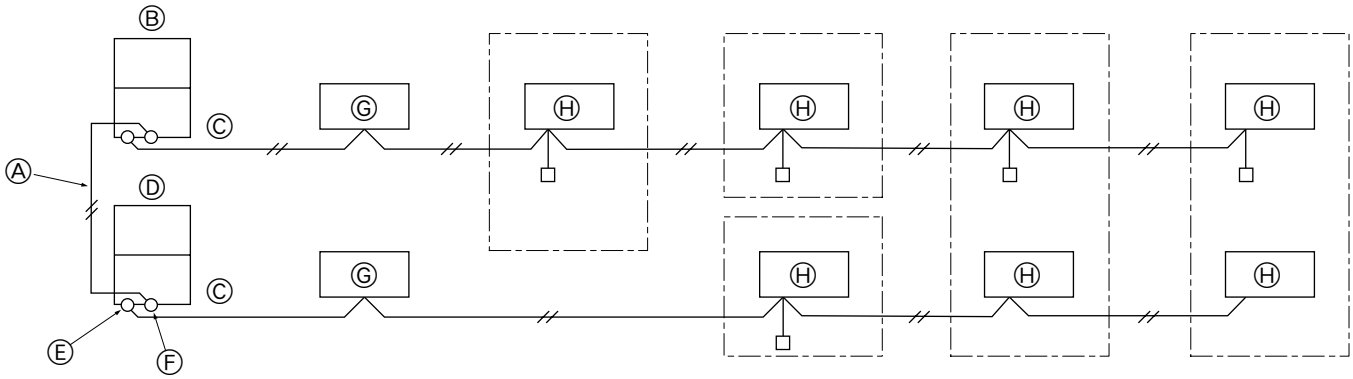
⑧ In case to connect with the upper class controller or to conduct group operation in different refrigerant systems, the control line for transmission is required between the heat source units each other.
Connect this control line between the terminal blocks for centralized control. (2-wire line with 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 heat source unit to CN40.

⑨ Group is set by operating the remote controller.



Ⓐ Heat source unit
Ⓑ Transmission line (2-core shielding cable)
Ⓒ BC controller
Ⓓ Indoor unit
Ⓔ Remote controller
Ⓕ Transmission line (2-core shielding cable)

Ⓖ Heat source unit
Ⓗ Multiple-core cable
Ⓘ BC controller
Ⓙ Indoor unit
Ⓚ Remote controller



Ⓐ Transmission line for centralized control (required for the group operation in different refrigerant system)
Ⓑ Heat source unit (No. 1)
Ⓒ Transmission line
Ⓓ Heat source unit (No. 2)

Ⓔ Terminal block for transmission line TB3
Ⓕ Terminal block for centralized control TB7
Ⓖ BC controller
Ⓗ Indoor unit

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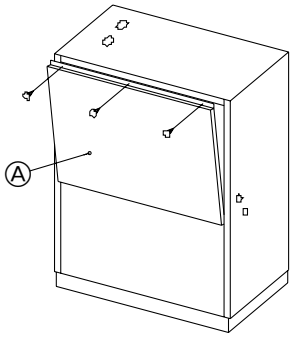
9.2. Control box and connecting position of wiring

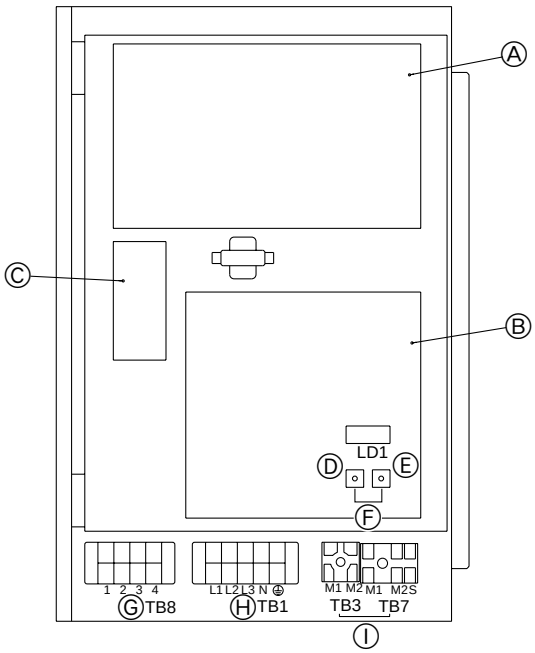
① **Heat source unit**

1. The service panel can be taken off by removing the three screws along the top, leaning the panel forward, and lifting upwards. (see diagram below)



Ⓐ Service panel

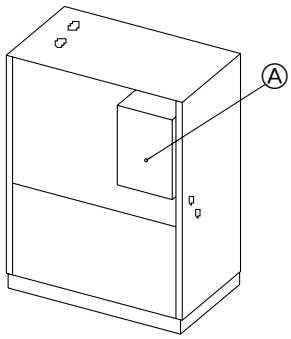
2. Remove the screw on each side (right and left) of the control box cover, then pull the cover down to remove it. (The illustration below shows the control box with the cover removed.)



Ⓐ Inverter board (INV board)
Ⓑ Control board (MAIN board)
Ⓒ Relay board
Ⓓ Ten position
Ⓔ One position
Ⓕ Address switch
Ⓖ Signal IN/OUT (1, 2 : UNIT ON/OFF, 3, 4 : PUMP INTERLOCK)
Ⓗ Power source
Ⓘ Transmission line

3. Connect the indoor unit transmission line to transmission terminal block (TB3), or connect the wiring between heat source units or the wiring with the central control system to the central control terminal block (TB7).
   When using shielded wiring, connect shield ground of the heat source unit transmission line to the earth screw (⏚) and connect shield ground of the line between heat source units and the central control system transmission line to the shield (S) terminal of the central control terminal block (TB7) shield (S) terminal. In addition, in the case of heat source units whose power supply connector CN41 has been replaced by CN40, the shield terminal (S) of central control terminal block (TB7) should also be connected to the ground (⏚).

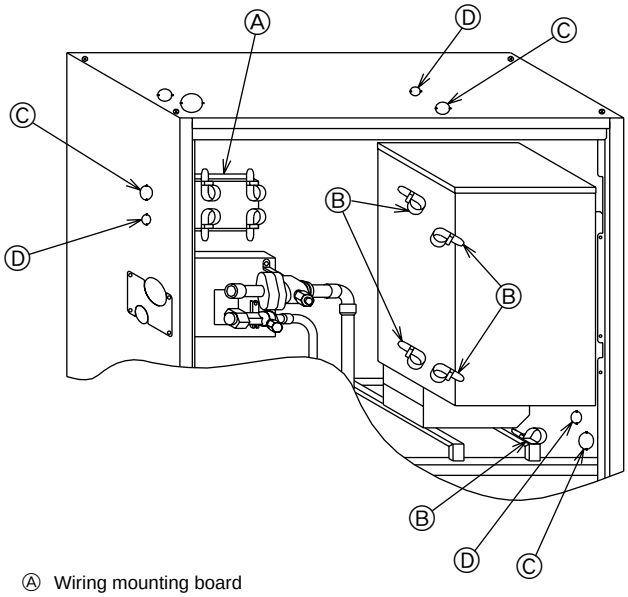
4. When attaching an interlock to the water circuit pump, use the pump interlock terminal block (TB8-3, 4). At this time, be sure to remove the short-circuit wire attached to the terminal block.



Ⓐ Control box

② **Wiring Procedure**

When wiring at the site of installation, separate the power source lines and transmission lines, and proceed with installation holding them in proper bundles.
Also use the wiring mounting board and cable straps to hold the wires in place. When installing pump interlock wiring on-site, use the same path as the power source lines.



Ⓐ Wiring mounting board
Ⓑ Cable straps
Ⓒ ø39 Knockout hole (Hole for the power supply)
Ⓓ ø28 Knockout hole (Hole for the control wiring)

9.3. Wiring transmission cables

① **Types of control cables**

1. Wiring transmission cables

- Types of transmission cables
  Shielding wire CVVS or CPEVS
- Cable diameter
  More than 1.25 mm^2
- 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^2
Remarks	When 10 m is exceeded, use cable with the same specifications as (1) Transmission line wiring.

② **Wiring examples**

Typical wiring examples are shown on pages ***22*** to ***25***.

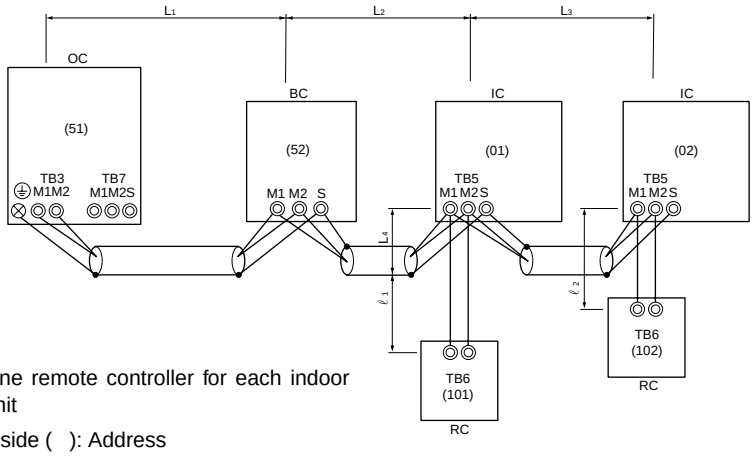
- Controller name, symbol and allowable number of controllers.

Name	Symbol	Allowable number of controllers
Heat Source Unit Controller	OC	
BC Controller	BC	One controller for one OC
Indoor Unit Controller	IC	Two to sixteen controllers for one OC
Remote Controller	RC	Maximum of two per group

A. Example of a single-heat source-unit system (Shielding wires and address setting are necessary.)

Example of wiring control cables	Wiring Method and Address Setting

1. Standard operation

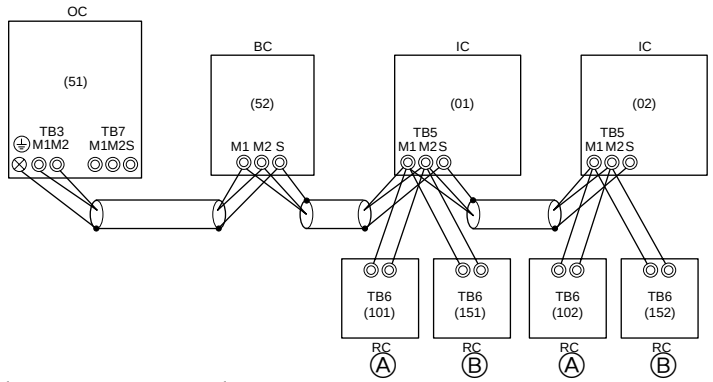


- One remote controller for each indoor unit
- Inside ( ): Address
  There is no need for setting the 100 position on the remote controller.

a. Use feed wiring to connect terminals M1 and M2 on transmission cable block (TB3) for the heat source unit (OC) to terminals M1 and M2 on the transmission cable block (TB5) of each indoor unit (IC). Use non-polarized two wire.
To ground the shielded wire, use cross-over wiring from the ground terminal ⏚ on the heat source unit and terminal S on the indoor unit (TB5).
b. Connect terminals A and B on the transmission cable block (TB4) for each indoor unit with the terminal block (TB6) for the remote controller (RC).
c. Set the address setting switch as shown below.
* To set the heat source unit address to 100, the heat source address setting switch must be set to 50.

Unit	Range	Setting Method
Indoor Unit	01 to 50	—
Heat Source Unit	51 to 100	Use the most recent address of all the indoor units plus 50.
BC controller	51 to 100	Heat source unit address plus 1.
Remote controller	101 to 150	Indoor unit address plus 100.

2. Operation Using Two Remote controllers



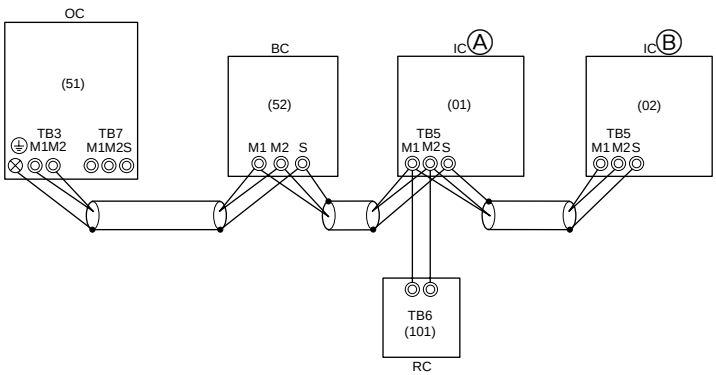
- Using two remote controllers for each indoor unit.

Ⓐ Main Remote Controller
Ⓑ Sub Remote Controller

a. Same as above.
b. Same as above.
c. Set address switch as shown below.
* To set the heat source unit address to 100, the heat source address setting switch must be set to 50.

Unit	Range	Setting Method
Indoor Unit	01 to 50	—
Heat Source Unit	51 to 100	Use the most recent address of all the indoor units plus 50.
BC controller	51 to 100	Heat source unit address plus 1.
Main Remote Controller	101 to 150	Indoor unit address plus 100.
Sub Remote Controller	151 to 200	Indoor unit address plus 150.

3. Group operation



- Two to five indoor units operated together by one remote controller

Ⓐ Main
Ⓑ Sub

a. Same as above.
b. Connect terminals M1 and M2 on transmission cable terminal block (TB5) of the IC main unit with the most recent address within the same indoor unit (IC) group to terminal block (TB6) on the remote controller.
c. Set the address setting switch as shown below.
* To set the heat source unit address to 100, the heat source address setting switch must be set to 50.

Unit	Range	Setting Method
IC (Main)	01 to 50	Use the most recent address within the same group of indoor units.
IC (Sub)	01 to 50	Use an address, other than that of the IC (Main) from among the units within the same group of indoor units. This must be in sequence with the IC (Main).
Heat Source Unit	51 to 100	Use the most recent address of all the indoor units plus 50.
BC controller	51 to 100	Heat source unit address plus 1.
Main Remote Controller	101 to 150	Set at an IC (Main) address within the same group plus 100.
Sub Remote Controller	151 to 200	Set at an IC (Main) address within the same group plus 150.

d. Use the indoor unit (IC) within the group with the most functions as the IC (Main) unit.

Combinations of 1 through 3 above are possible.

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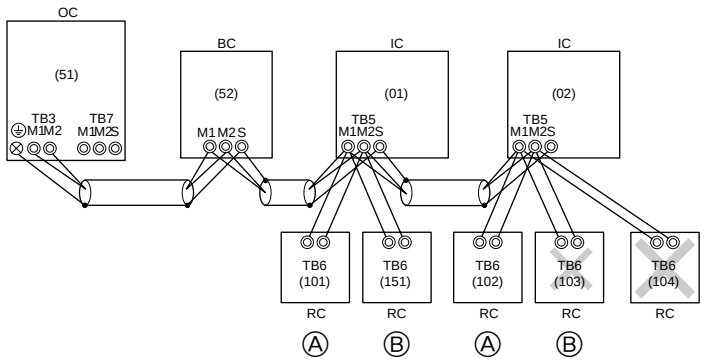
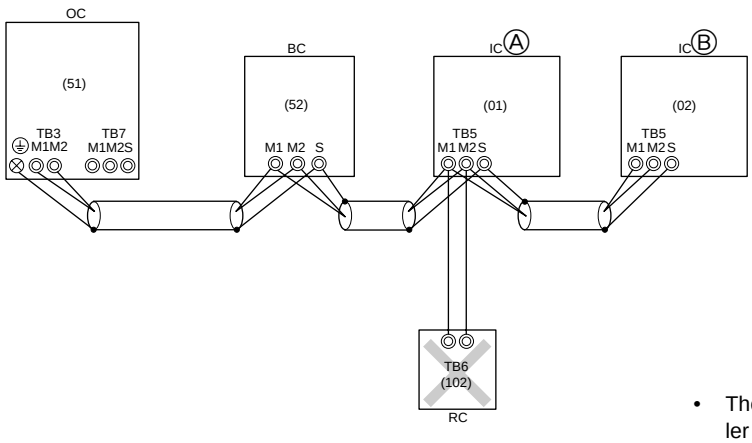
	Permissible Lengths	Prohibited items
	Longest transmission cable length (1.25 mm^2) $L_1 + L_2 + L_3$, $L_3 + L_4$, $L_4 + L_1 + L_2 \leqq 200$ m Remote controller cable length 1 If 0.5 to 0.75 mm^2 ℓ_1, $\ell_2 \leqq 10$ m 2 If the length exceeds 10 meters, the exceeding section should be 1.25 mm^2 and that section should be a value within the total extension length of the transmission cable and maximum transmission cable length. (L_4)	———
	Same as above	 • Use the indoor unit (IC) address plus 150 as the sub remote controller address. In this case, it is 152. • Three or more remote controllers (RC) cannot be connected to one indoor unit. Ⓐ Main Ⓑ Sub
	Same as above	 • The remote controller address is the indoor unit main address plus 100. In this case, it is 101. Ⓐ Main Ⓑ Sub

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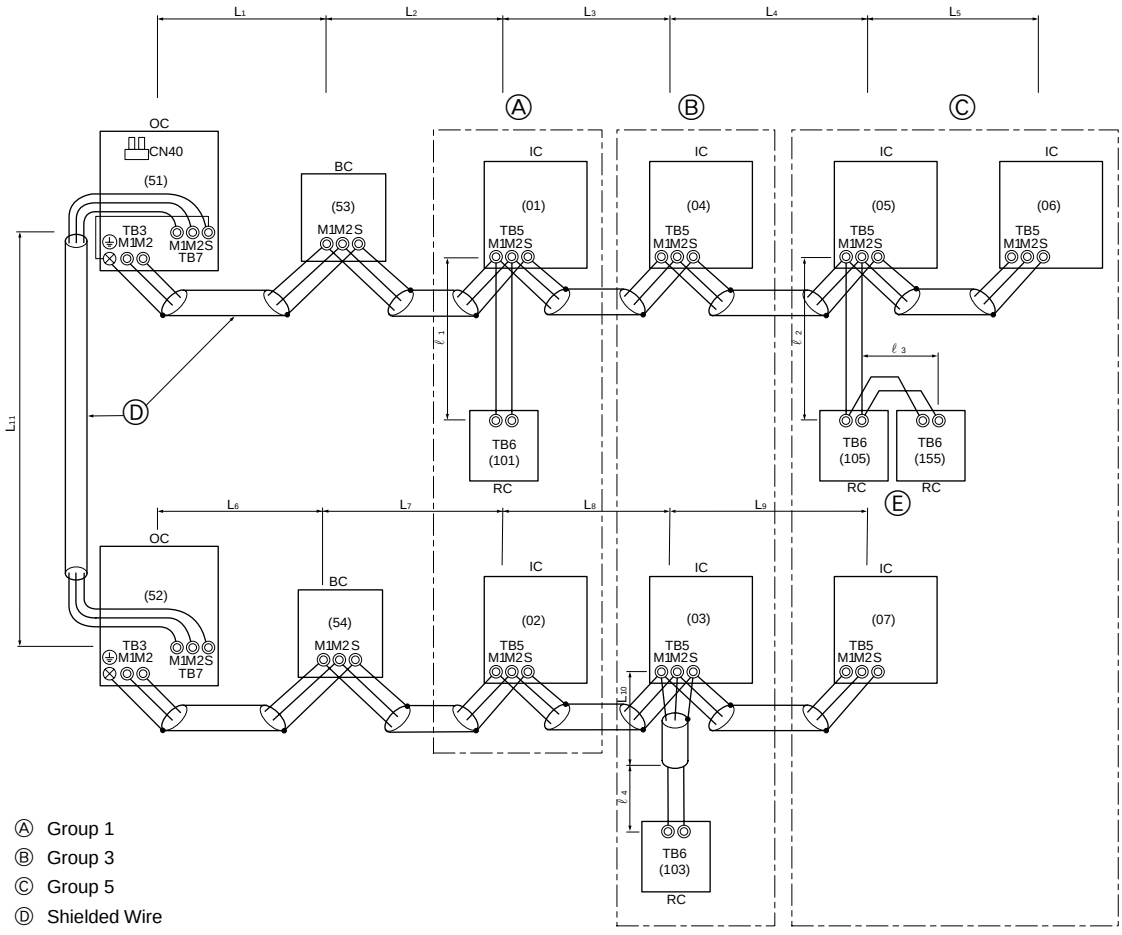
B. Example of a group operation system with multiple heat source units (Shielding wires and address setting are necessary.)

Examples of Transmission Cable Wiring



Ⓐ Group 1
Ⓑ Group 3
Ⓒ Group 5
Ⓓ Shielded Wire
Ⓔ Sub Remote Controller

( ) Address

Wiring Method and Address Settings

a. Always use shielded wire when making connections between the heat source unit (OC) and the indoor unit (IC), as well for all OC-OC, and IC-IC wiring intervals.
b. Use feed wiring to connect terminals M1 and M2 and the ground terminal on the transmission cable terminal block (TB3) of each heat source unit (OC) to terminals M1, M2 and terminal S on the transmission cable block of the indoor unit (IC).
c. Connect terminals M1 and M2 on the transmission cable terminal block of the indoor unit (IC) that has the most recent address within the same group to the terminal block (TB6) on the remote controller (RC).
d. Connect together terminals M1, M2 and terminal S on the terminal block for central control (TB7) for the heat source unit (OC).
e. On one heat source unit only, change the jumper connector on the control panel from CN41 to CN40.
f. If the jumper connector was changed to CN40 in step e, connect terminal S on the central control terminal block (TB7) of the heat source unit (OC) to the ground screw ⏚ in the electrical component box.
g. Set the address setting switch as follows.
* To set the heat source unit address to 100, the heat source address setting switch must be set to 50.

Unit	Range	Setting Method
IC (Main)	01 to 50	Use the most recent address within the same group of indoor units.
IC (Sub)	01 to 50	Use an address, other than that of the IC (Main) from among the units within the same group of indoor units. This must be in sequence with the IC (Main).
Heat Source Unit	51 to 100	Use the most recent address of all the indoor units plus 50.
BC controller	51 to 100	Heat source unit address plus 1. Make sure that each heat source unit and BC controller is set to a different withiin the specified range.
Main Remote Controller	101 to 150	Set at an IC (Main) address within the same group plus 100.
Sub Remote Controller	151 to 200	Set at an IC (Main) address within the same group plus 150.

h. The group setting operations among the multiple indoor units is done by the remote controller (RC) after the electrical power has been turned on.

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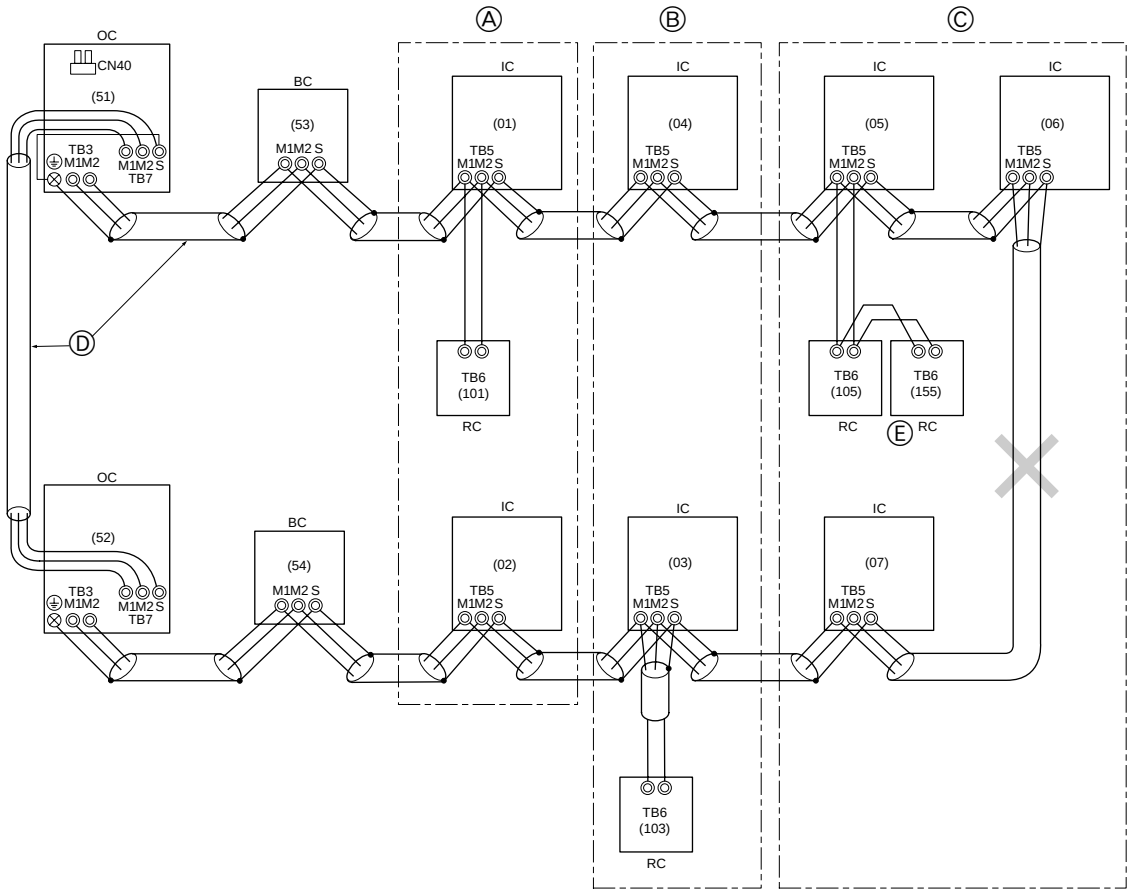
Permissible Lengths

- Max length via heat source units : $L_1+L_2+L_3+L_4+L_5+L_6+L_7+L_8+L_9+L_{11}$,
  $L_1+L_2+L_3+L_4+L_5+L_6+L_7+L_8+L_{10}+L_{11} \leqq 500$ meters (1.25 mm²)
- Max transmission cable length : $L_1+L_2+L_3+L_4+L_5$, $L_6+L_7+L_8+L_9$, $L_6+L_7+L_8+L_{10}$, $L_9+L_{10} \leqq 200$ meters (1.25 mm²)
- Remote controller cable length : ℓ_1, ℓ_2, ℓ_3, $\ell_4 \leqq 10$ meters (0.5 to 0.75 mm²)
  If the length exceeds 10 meters, use a 1.25 mm² shielded wire. The length of this section (L_8) should be included in the calculation of the maximum length and overall length.

Prohibited items



Ⓐ Group 1
Ⓑ Group 3
Ⓒ Group 5
Ⓓ Shielded wire
Ⓔ Sub Remote Controller

- The terminal S on the terminal block (TB7) for the central control panel should be connected to the ground terminal ⏚ of the electric components box for one heat source unit only.
- Never connect together the terminal blocks (TB5) for transmission wires for indoor units (IC) that have been connected to different heat source units (OC).
- Set all addresses to ensure that they are not overlapped.

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9.4. Wiring of main power supply and equipment capacity

⚠ 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.**

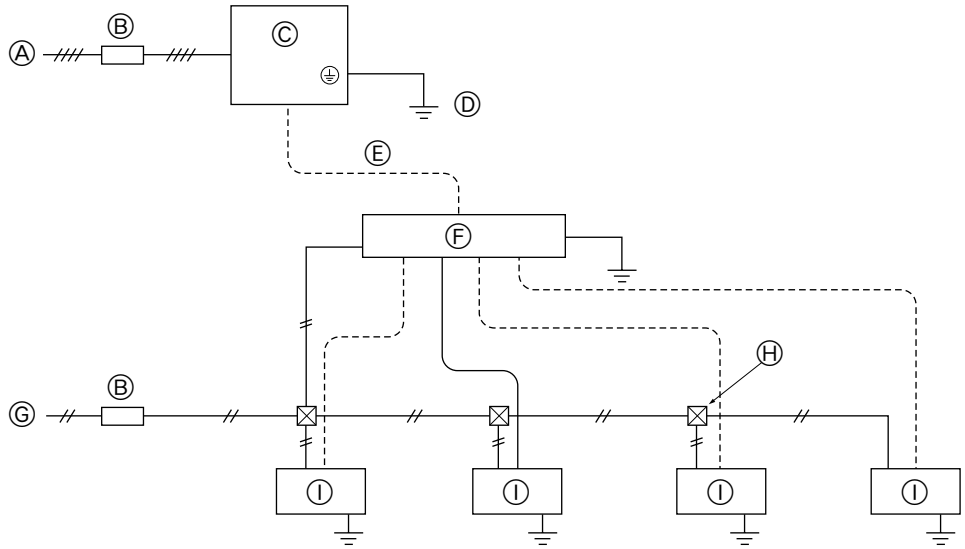
⚠ Caution:

- **The reverse phase of L lines (L1, L2, L3) can be detected (Error cord: 4103), but the reverse phase of L lines and N line can d.**

he some electric parts should be damaged when power is supplied under the miss wiri ng.

- **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.**

Schematic Drawing of Wiring (Example)



Ⓐ Power Supply (3-Phase, 4-Wire) 380/400/415 Volt
Ⓑ Switch (Breakers for Wiring and Current Leakage)
Ⓒ Heat Source Unit
Ⓓ Ground
Ⓔ Refrigerant pipe
Ⓕ BC Controller
Ⓖ Power Supply (Single-Phase) 220/230/240 Volt
Ⓗ Pull Box
Ⓘ Indoor Unit

Thickness of Wire for Main Power Supply and On/Off Capacities

	Model	Minimum Wire Thickness AWG			Switch (A)		Breaker for Wiring (NFB)	Breaker for Current Leakage
		Main Cable	Branch	Ground	Capacity	Fuse		
Heat Source Unit	PQRY-P200	6	–	6	32	50	50A	30 A 100 mA 0.1 sec. or less
	PQRY-P250	6	–	6.0	40	50	50A	40 A 100 mA 0.1 sec. or less

Model	Wire Thickness (mm)			Switch (A)		Breaker for Wiring	Breaker for Current Leakage
	Main Cable	Branch	Ground	Capacity	Fuse		
BC controller	1.5	1.5	1.5	16	16	20 A	20 A 30 mA 0.1 sec or less
Indoor Unit							

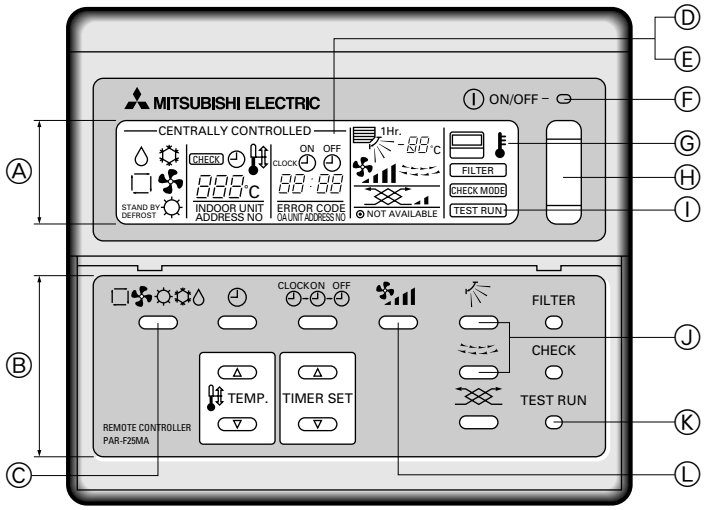
1. **Use a separate power supply for the heat source unit and indoor unit, BC controller.**
2. **Bear in mind ambient conditions(ambient temperature,direct sunlight, rain water,etc.) when proceeding with the wiring and connections.**
3. **The wire size is the minimum value for metal conduit wiring. The 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 reglon.**
5. **Power supply cords of parts of appliances for heat source use shall not be lighter than polychloroprene sheathed flexible cord (design 245 IEC57). For example, use wiring such as YZW.**

10. Test run

10.1. 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 block for transmission. 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 block and the ground may decrease to approx. 1 MΩ as a result of refrigerant accumulating in the internal compressor. If the insulation resistance is more than 1 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	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.

10.2. Test run method



Ⓐ Display panel
Ⓑ Control panel
Ⓒ Cooling/Heating select button ③, ④
Ⓓ Check code indicator (see note 1)
Ⓔ Test run remaining time indicator (see note 3)
Ⓕ ON/OFF LED (Lights up in operation)
Ⓖ Indoor unit liquid pipe temperature indicator (See note 5)
Ⓗ ON/OFF button ⑨
Ⓘ Test run indicator
Ⓙ Wind adjust button ⑥
Ⓚ Test run button ②
Ⓛ Air blow adjust button ⑤

	Operation procedure
①	Turn on universal power supply at least 12 hours before getting started → displaying “HO” on display panel for about three minutes. The universal power supply must be left on for at least 12 hours (with the crank case heater turned 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 ***29*** 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.

10.3. How to cope with test run trouble

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

1. Indoor unit

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

2. Heat source unit

Check code	Trouble	Check code	Trouble
0403	Serial transmission malfunction	5103	Liquid surface detecting temperature sensor trouble (TH3)
1102	Discharge temperature trouble		
1111	Low pressure saturated temperature trouble (Detected by saturated temperature sensor)	5104	Liquid surface detecting temperature sensor trouble (TH4)
1112	Low pressure saturated temperature trouble (Detected by liquid level detecting temperature sensor)	5106	Water temperature sensor trouble (TH6)
		5107	(Inverter cooling heat exchanger outlet)
1113	Low pressure saturated temperature trouble (Detected by liquid level detecting temperature sensor)	5110	Inverter cooling plate temperature sensor abnormal (THHS)
		5112	Compressor shell temperature sensor abnormal (TH10)
1301	Low pressure trouble	5201	High-pressure sensor (HPS) malfunction
1302	High pressure trouble	5301	IDC sensor circuit malfunction
1500	Excessive refrigerant replenishment	6600	Duplicated unit address setting
1501	Lacked refrigerant trouble	6602	Transmission error (Transmission processor hardware error)
2000	Interlock operation		
2134	Water temperature trouble	6603	Transmission error (Transmission route BUSY)
2135	Water heat exchange frozen	6606	Transmission and reception error (Communication trouble with transmission processor)
4103	Reverse phase		
4115	Power supply simultaneous signal malfunction	6607	Transmission and reception error (No ACK error)
4200	VDC/IDC detection circuit malfunction	6608	Transmission and reception error (No responsive frame error)
4210	Overcurrent interruption		
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 malfunction	7105	Address set error
5101	Discharge temperature sensor trouble (TH1)	7109	Incorrect connection
5102	Low pressure saturated temperature trouble (TH2)	7130	Incorrect setup

3. BC controller

Check code	Trouble	Check code	Trouble
1368	High pressure trouble (Detected by pressure sensor in the liquid side)	5116	Intermediate section temperature sensor trouble
		5201	Pressure sensor trouble in the liquid side (63HS1)
1369	High pressure trouble (Detected by pressure sensor in the gas side)	5203	Intermediate pressure sensor trouble (63HS3)
		6101	Unreadable response receiving error
1370	High pressure trouble (Detected by intermediate pressure sensor)	6600	Duplicated unit address setting
		6602	Transmission error (Transmission processor hardware trouble)
2503	Float switch on		
5111	Liquid inlet temperature sensor trouble (TH11)	6603	Transmission error (Transmission route BUSY)
5112	Bypass outlet temperature sensor trouble (TH12)	6606	Transmission and reception error (Communication trouble with Transmission processor)
5113	Outlet temperature sensor trouble of liquid surface detecting heat exchanger (TH13)		
		6607	Transmission and reception error (No ACK error)
5114	Inlet temperature sensor trouble of liquid surface detecting heat exchanger (TH14)	6608	Transmission and reception error (No responsive flame error)
5115	Bypass inlet temperature sensor trouble (TH15)	7107	Connection No. setting error

4. Remote controller

Check code	Trouble	Check code	Trouble
6101	Unreadable response receiving error	6606	Transmission and reception error (Communication trouble with transmission processor)
6600	Duplicated unit address setting		
6602	Transmission error (Transmission processor hardware error)	6607	Transmission and reception error (No ACK 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 indoor unit can be used to judge a malfunction of heat source 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	
ⓐ	Relay output display 1 (Lighting)	Ⓐ Ⓑ 1 2 3 4 5 6 7 8 9 10 Ⓒ	During compressor run	Crank case heater	21S4	SV1	SV2	SV3	SV4	Always lighting	Flag 8 always lights at microcomputer power ON
	Check display 1 (Blinking)		0000 to 9999 (Alternate display of address and error code)								
	Relay output display 2	Ⓐ Ⓑ 1 2 3 4 5 6 7 8 9 10	SV5	SV6	SV71	SV72	SV73		SSR		
ⓑ	Check indoor unit	Ⓐ Ⓑ 1 2 3 4 5 6 7 8 9 10	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 and BC Turns off by resetting
	Check indoor unit	Ⓐ Ⓑ 1 2 3 4 5 6 7 8 9 10	No.9 unit	No.10 unit	No.11 unit	No.12 unit	No.13 unit	No.14 unit	No.15 unit	No.16 unit	
	Indoor unit mode	Ⓐ Ⓑ 1 2 3 4 5 6 7 8 9 10	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
	Indoor unit mode	Ⓐ Ⓑ 1 2 3 4 5 6 7 8 9 10	No.9 unit	No.10 unit	No.11 unit	No.12 unit	No.13 unit	No.14 unit	No.15 unit	No.16 unit	
	Indoor unit thermostat	Ⓐ Ⓑ 1 2 3 4 5 6 7 8 9 10	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
	Indoor unit thermostat	Ⓐ Ⓑ 1 2 3 4 5 6 7 8 9 10	No.9 unit	No.10 unit	No.11 unit	No.12 unit	No.13 unit	No.14 unit	No.15 unit	No.16 unit	

ⓐ Heat source unit ⓑ Indoor unit

Ⓐ ON Ⓑ OFF Ⓒ At factory shipment

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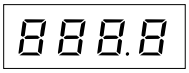
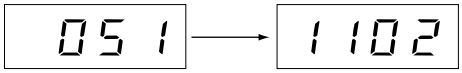
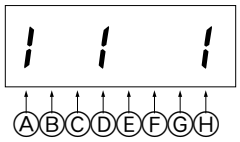
Displaying the service LED

Service LED (LD1) 

- Error code display
  Alternate display of error generating address and error code
  Example At heat source unit address 51, abnormal discharge temperature (Code 1102)



- Flag display
  Example SV1 ON under compressor operation



Ⓐ Flag 1
Ⓑ Flag 2
Ⓒ Flag 3
Ⓓ Flag 4
Ⓔ Flag 5
Ⓕ Flag 6
Ⓖ Flag 7
Ⓗ Flag 8

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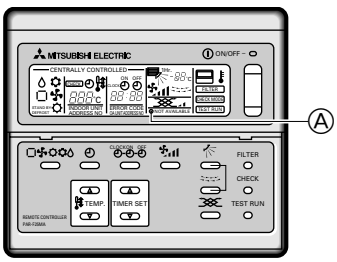
10.4. Coping with remote controller trouble



Ⓐ Display: Appears when current is carried

	Phenomenon	Cause	How to cope with trouble
1	Unit does not operate and display stays off even after pressing remote controller ON switch. (Current-carrying indicator does not light up)	(1) Heat source 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 • Check the number of remote controllers and indoor units connected. • Remove wire from transmission cable terminal block (TB3) on heat source unit, and check voltage between terminals. • If voltage is 17 to 30 V, check (2) and (4) at left. • If there is no voltage, check (1) and (3) at left.
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) Heat source unit address was erroneously set (3) Indoor unit address was erroneously set.	• Check all items at left.
3	Display comes on once but disappears immediately after a press of the switch.	(1) Indoor unit power was not turned on.	• Check item at left.