

Air-Conditioners For Building Application**INDOOR UNIT****PFD-P250.500VM-A**

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INSTALLATION MANUAL

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

INSTALLATIONSHANDBUCH

Zum sicheren und ordnungsgemäßen Gebrauch der Klimageräte das Installationshandbuch gründlich durchlesen.

MANUEL D'INSTALLATION

Veillez lire le manuel d'installation en entier avant d'installer ce climatiseur pour éviter tout accident et vous assurer d'une utilisation correcte.

MANUAL DE INSTALACIÓN

Para un uso seguro y correcto, lea detalladamente este manual de instalación antes de montar la unidad de aire acondicionado.

MANUALE DI INSTALLAZIONE

Per un uso sicuro e corretto, leggere attentamente questo manuale di installazione prima di installare il condizionatore d'aria.

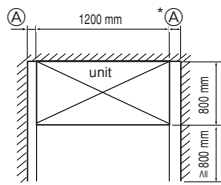
INSTALLATIEHANDLEIDING

Voor een veilig en juist gebruik moet u deze installatiehandleiding grondig doorlezen voordat u de airconditioner installeert.

РУКОВОДСТВО ПО УСТАНОВКЕ

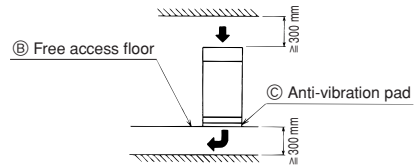
Для осторожного и правильного использования прибора необходимо тщательно ознакомиться с данным руководством по установке до выполнения установки кондиционера.

[Fig. 3.1.1]

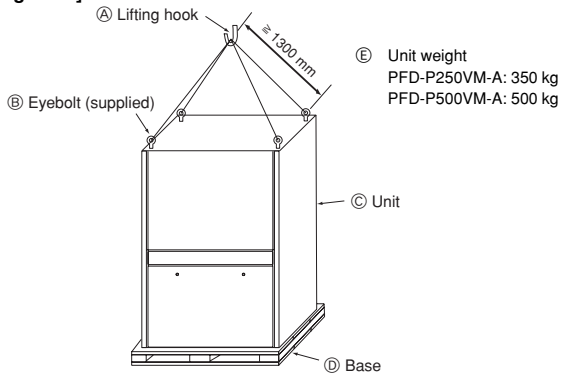


A: 200 mm or more (as seen from top face of unit)
 * At least 500 mm when piping is taken from the right side.

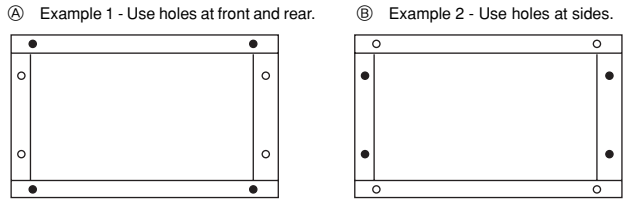
[Fig. 3.1.2]



[Fig. 4.1.1]

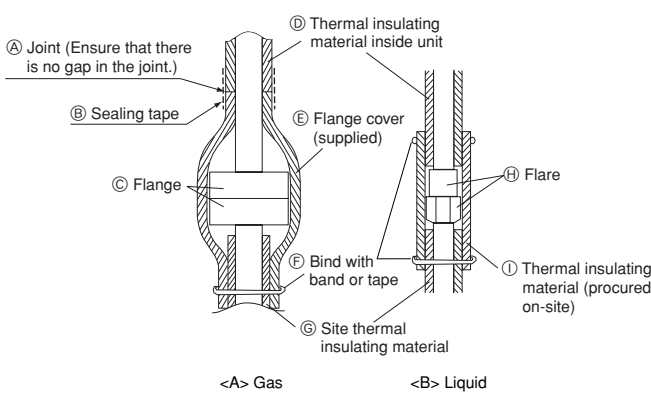


[Fig. 4.2.1]

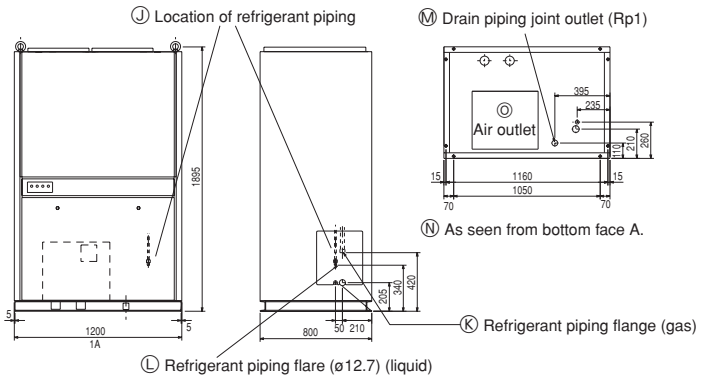


© "●" indicates foundation bolt holes used.

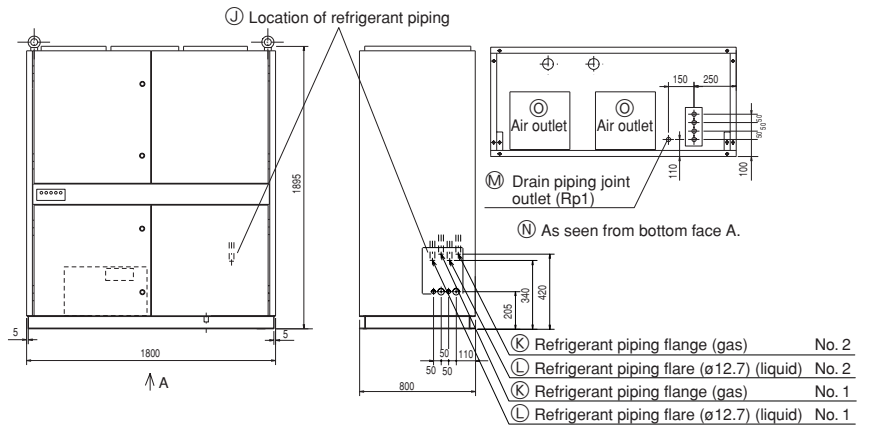
[Fig. 5.1.1]



<C> Model 250



<D> Model 500

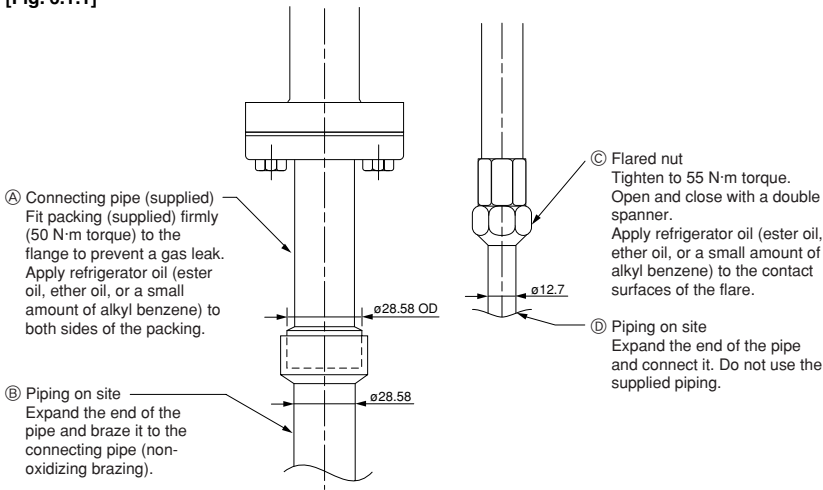


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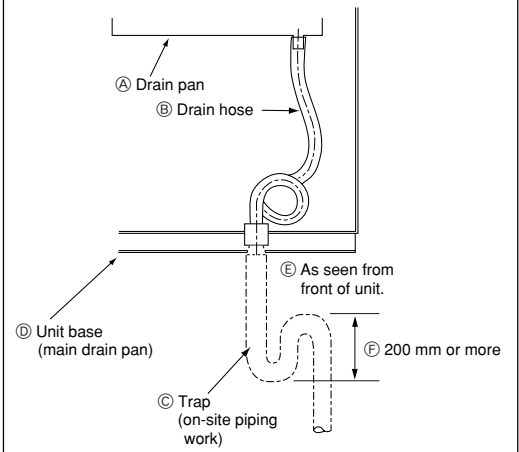
6.1

6.2

[Fig. 6.1.1]



[Fig. 6.2.1]

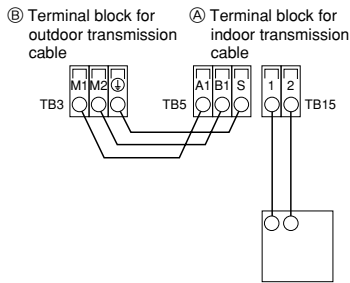


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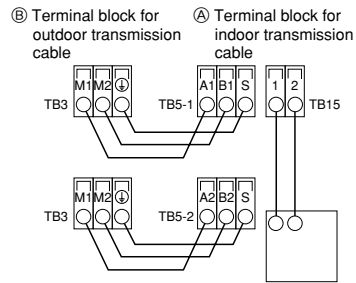
7.2

[Fig. 7.2.1]

<A> Model 250

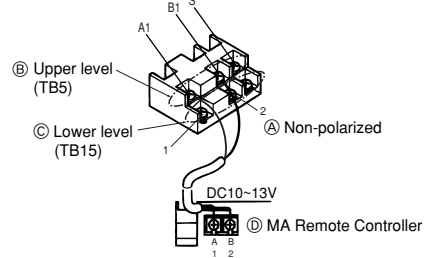


 Model 500

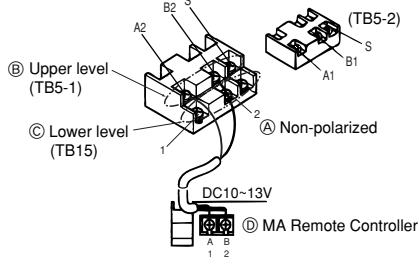


[Fig. 7.2.2]

<A> Model 250



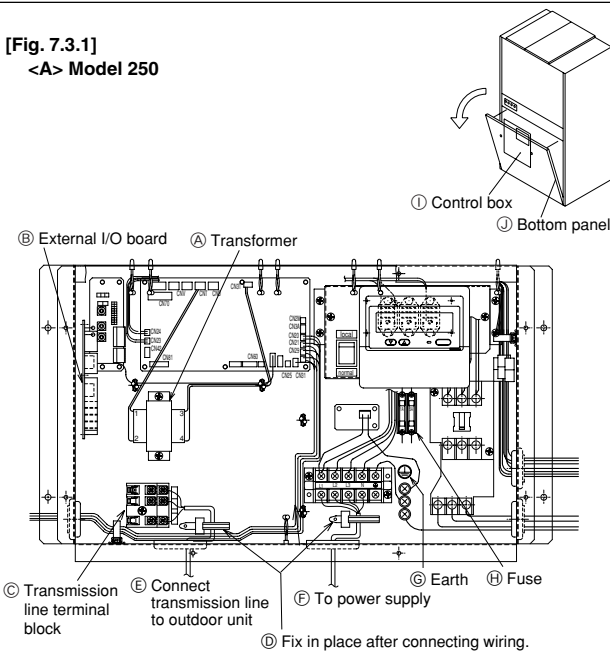
 Model 500



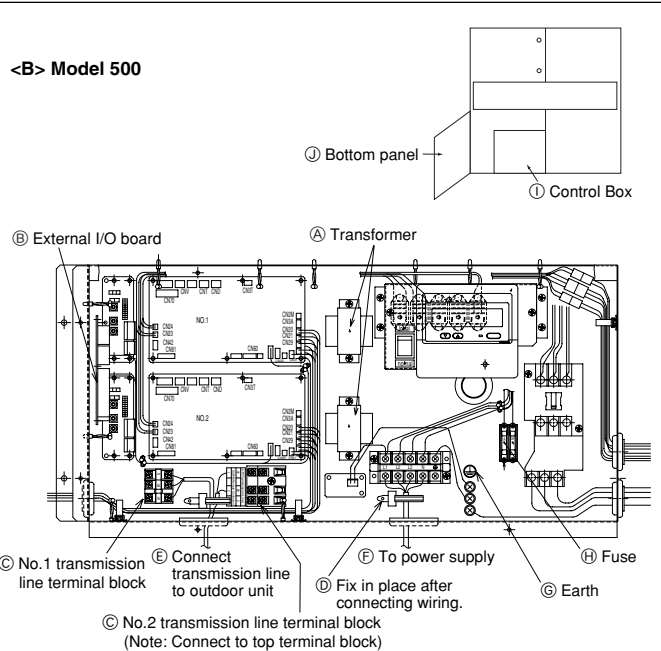
7.3

[Fig. 7.3.1]

<A> Model 250



 Model 500

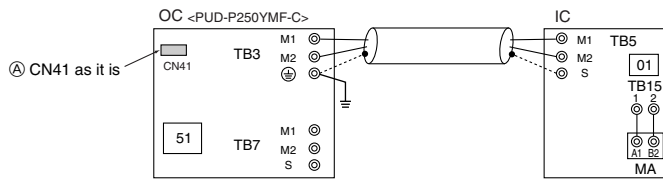


7.4

[Fig. 7.4.1]

- When there is a single Model 250 unit

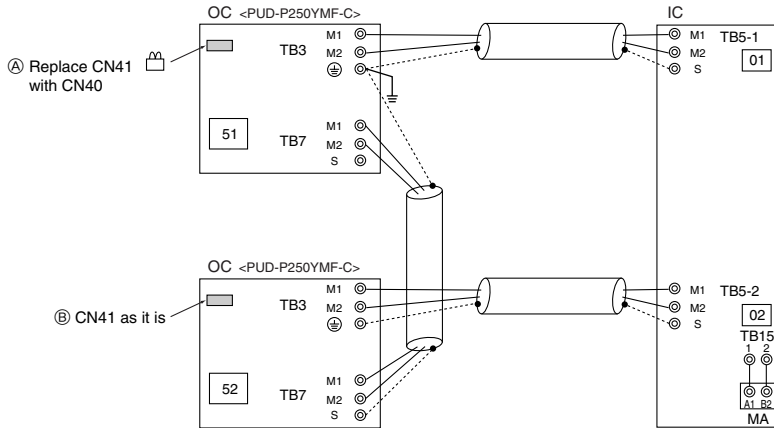
*1 The numbers shown in the square (□) are addresses.



*2 The Model 250 indoor unit contains one indoor controller board.

[Fig. 7.4.2]

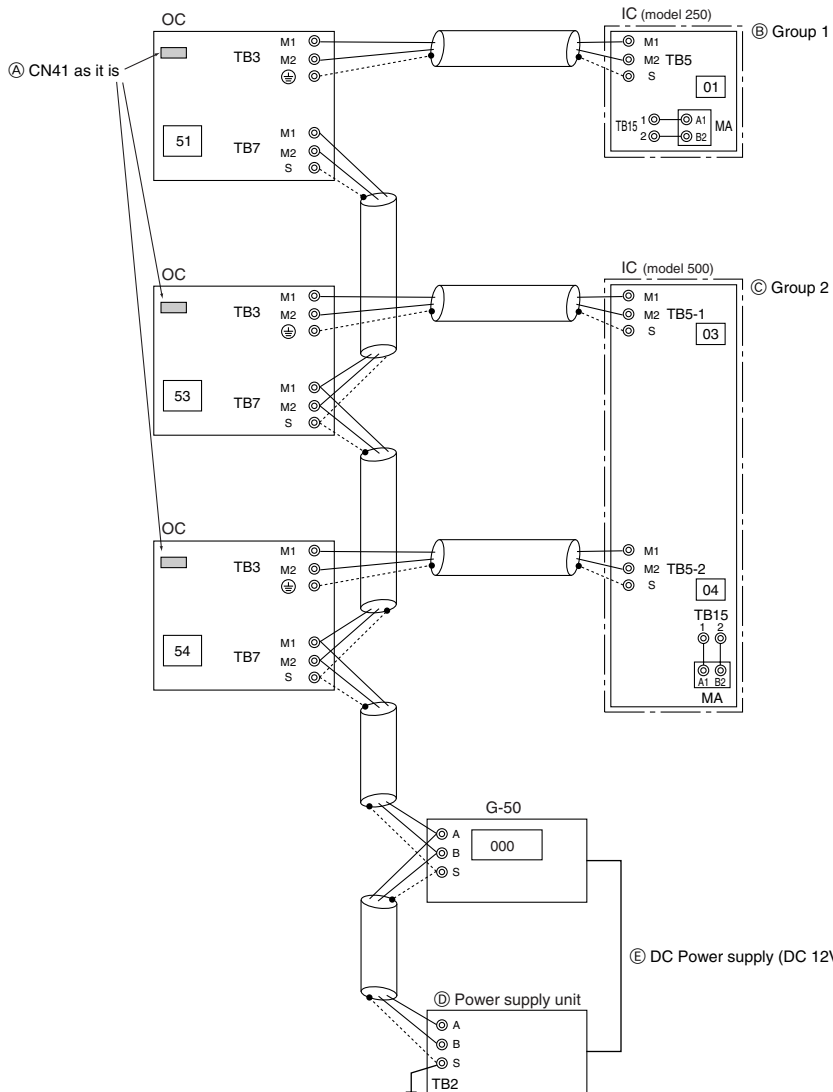
- When there is a single Model 500 unit



* The Model 500 indoor unit contains two indoor controller boards.

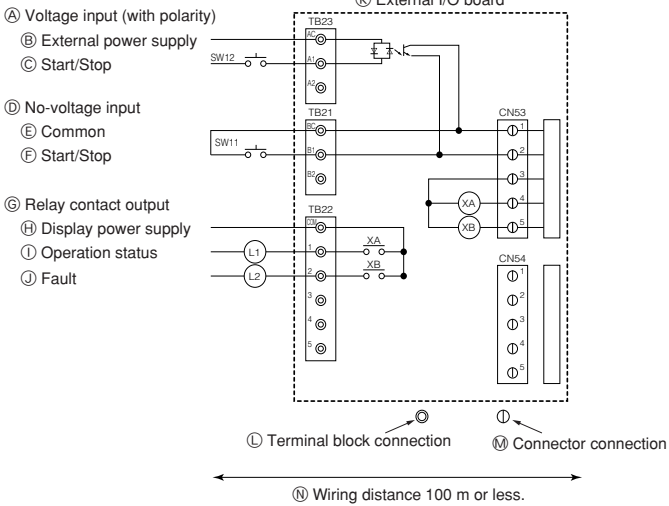
[Fig. 7.4.3]

- When connected to G50

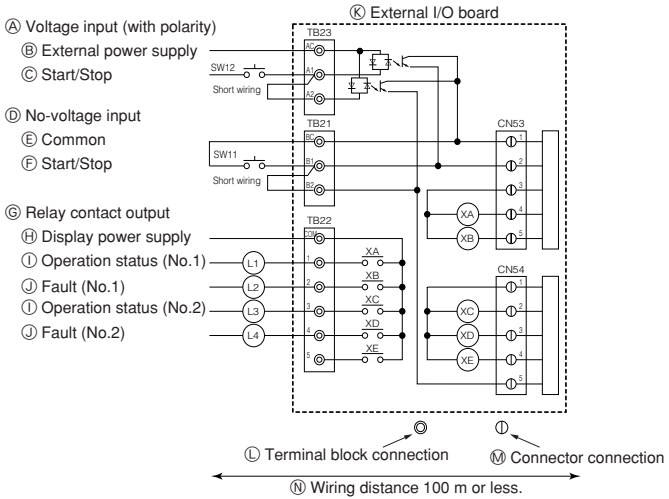


[Fig. 7.5.1]

<A> Model 250



 Model 500



Ⓐ Voltage input (with polarity)

External power supply	Pulse input of start or stop DC12 - 24 V Input current (per contact) Approximately 10 mA (DC12 V)
SW12	Remote Start/Stop switch * Toggles ON/OFF each time switch is pressed (pulse input).

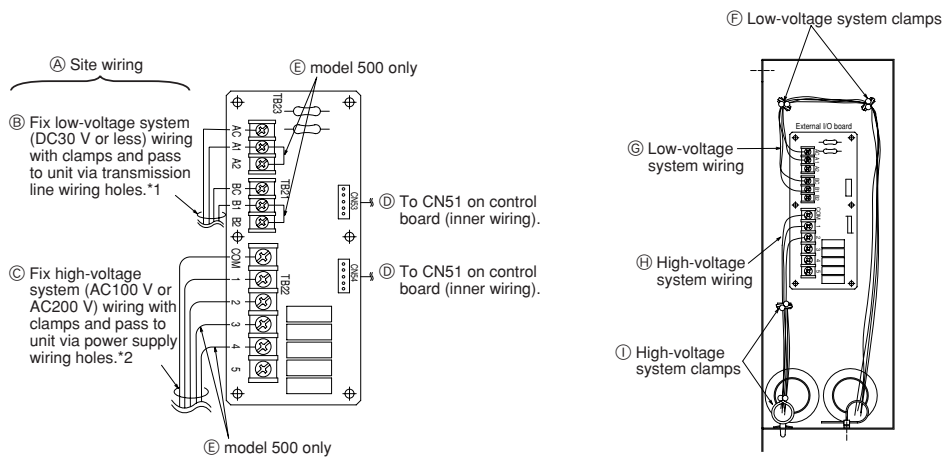
Ⓓ No-voltage input

SW11	Remote Start/Stop switch * Toggles ON/OFF each time switch is pressed (pulse input).
Micro-current contacts (DC12 V 1 mA)	

Ⓖ Relay contact output

Display power supply	DC30 V 1 A AC100 V/200 V 1 A
L1, L3	Operation status
L2, L4	Fault status
XA ~ XE	Relay (allowable current 10 mA - 1 A)

[Fig. 7.5.2]



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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>

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

⚠ 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 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.
- **When handling this product, always wear protective equipment.**
EG: Gloves, full arm protection namely boiler suit, and safety glasses.
 - 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 wire regulation of the region and 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 outdoor unit terminal cover (panel).**
 - If the terminal cover (panel) is 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 (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.

1.2. Precautions for devices that use R407C refrigerant

⚠ Caution:

- **Do not use the existing refrigerant piping.**
 - The old refrigerant and refrigerator oil in the existing piping contains a large amount of chlorine which may cause the refrigerator oil of the new unit to deteriorate.
- **Use refrigerant piping made of phosphorus deoxidized 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.
- **Store the piping to be used during installation indoors and keep both ends of the piping sealed until just before brazing. (Store elbows and other joints in a plastic bag.)**
 - If dust, dirt, or water enters the refrigerant cycle, deterioration of the oil and compressor trouble may result.
- **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.
- **Use liquid refrigerant to fill the system.**
 - If gas refrigerant is used to seal the system, the composition of the refrigerant in the cylinder will change and performance may drop.
- **Do not use a refrigerant other than R407C.**
 - If another refrigerant (R22, etc.) is used, the chlorine in the refrigerant may cause the refrigerator oil to deteriorate.
- **Use a vacuum pump with a reverse flow check valve.**
 - The vacuum pump oil may flow back into the refrigerant cycle and cause the refrigerator oil to deteriorate.

- **Do not use the following tools that are used with conventional refrigerants.**
(Gauge manifold, charge hose, gas leak detector, reverse flow check valve, refrigerant charge base, vacuum gauge, refrigerant recovery equipment)
 - If the conventional refrigerant and refrigerator oil are mixed in the R407C, the refrigerant may deteriorate.
 - If water is mixed in the R407C, the refrigerator oil may deteriorate.
 - Since R407C does not contain any chlorine, gas leak detectors for conventional refrigerants will not react to it.
- **Do not use a charging cylinder.**
 - Using a charging cylinder may cause the refrigerant to deteriorate.
- **Be especially careful when managing the tools.**
 - If dust, dirt, or water gets in the refrigerant cycle, the refrigerant may deteriorate.

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, 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 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.

1.4. 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.
- **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 a current leakage breaker, as required.**
 - If a current leakage breaker is not installed, electric shock may result.

2. Indoor unit accessories

The unit is provided with the following accessories:

Part No.	Accessories	Qty		Place to Set
		250	500	
1	Eye bolt	4	4	Inside body
2	Packing	1	2	
3	Flange cover	1	2	
4	Flare nut	1	2	

- **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.

1.5. 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.

3. Selecting an installation site

- Select a location so that air can be blown into all corners of the room.
- Avoid locations exposed to outside air.
- Select a location free of obstructions to the airflow in and out of the unit.
- Avoid locations exposed to steam or oil vapour.
- Avoid locations where combustible gas may leak, settle or be generated.
- Avoid installation near machines emitting high-frequency waves (high-frequency welders, etc.).
- Avoid locations where the airflow is directed at a fire alarm sensor. (Hot air could trigger the alarm during the heating operation.)
- Avoid places where acidic solutions are frequently handled.
- Avoid places where sulphur-based or other sprays are frequently used.

⚠ Warning:

Install the indoor unit on a strong enough to sustain its weight. If not enough, it may cause the unit to fall down, resulting in an injury.

3.1. Securing installation and service space

[Fig. 3.1.1] (P.2)

A: 200 mm or more (as seen from top face of unit)
* At least 500 mm when piping is taken from the right side.

- Select a strong floor on which to install the indoor unit. Always ensure that sufficient space is available for servicing as shown in Fig.3.1.1.
- In some case the structure of the floor may result in resonant vibration with the air-conditioner. It is therefore recommended that anti-vibration pads be installed between the air-conditioner and the floor.
- It is recommended that the base of the air-conditioner and openings in the floor be sealed to ensure that air does not leak into the room from openings in the floor.
- Ensure that the raised height of a free access floor and the height of the air-conditioner inlet are at least as shown in Fig.3.1.2.

[Fig. 3.1.2] (P.2)

Ⓟ Free access floor

Ⓞ Anti-vibration pad

4. Installing the unit

4.1. Hanging unit

- Use the eyebolts (supplied) and ropes when lifting the air-conditioner into place.
- Ensure that the air-conditioner is not subject to physical shock while being lifted into place.
- Ensure that the rope used is of sufficient strength to support the air-conditioner.
- Ensure that there is at least 1300 mm of rope between the eyebolts and the lifting hook.

[Fig. 4.1.1] (P.2)

- Ⓐ Lifting hook
 - Ⓑ Eyebolt (supplied)
 - Ⓒ Unit
 - Ⓓ Base
 - Ⓔ Unit weight
- PFD-P250VM-A: 350 kg
PFD-P500VM-A: 500 kg

5. Refrigerant pipe and drain pipe specifications

To avoid dew drops, provide sufficient antisweating and insulating work to the refrigerant and drain pipes.

When using commercially available refrigerant pipes, be sure to wind commercially available insulating material (with a heat-resisting temperature of more than 100 °C and thickness given below) onto both liquid and gas pipes.

Be also sure to wind commercially available insulating material (with a form polyethylene's specific gravity of 0.03 and thickness given below) onto all pipes which pass through rooms.

Use thermal insulating material to insulate piping connections inside the unit (gas: flanges, liquid: flares) as shown in Fig. 5.1.1.

- ① Select the thickness of insulating material by pipe size.

Pipe size	Insulating material's thickness
6.4 mm to 25.4 mm	More than 10 mm
28.6 mm to 38.1 mm	More than 15 mm

- ② If the unit is used on the highest story of a building and under conditions of high temperature and humidity, it is necessary to use pipe size and insulating material's thickness more than those given in the table above.
- ③ If there are customer's specifications, simply follow them.

6. Connecting refrigerant pipes and drain pipes

6.1. Refrigerant piping work

This piping work must be done in accordance with the installation manuals for both outdoor unit.

- For constraints on pipe length and allowable difference of elevation, refer to the outdoor unit manual.
- The method of pipe connection is flare connection (liquid) and flange connection (gas).

Cautions on refrigerant piping

- ▶ **Be sure to use non-oxidative brazing for brazing to ensure that no foreign matter or moisture enter into the pipe.**
- ▶ **Be sure to apply refrigerating machine oil over the flare connection seating surface and tighten the connection using a double spanner.**
- ▶ **Provide a metal brace to support the refrigerant pipe so that no load is imparted to the indoor unit end pipe. This metal brace should be provided 50 cm away from the indoor unit's flare connection.**

⚠ Warning:

When installing and moving the unit, do not charge it with refrigerant other than the refrigerant 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 phosphorus deoxidized 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.**
- **Never use existing refrigerant piping.**
 - The large amount of chlorine in conventional refrigerant and refrigerant oil in the existing piping will cause the new refrigerant to deteriorate.

4.2. Fixing unit

- Always ensure that the indoor unit is installed horizontally. If it is installed at an angle, the center of gravity of the air-conditioner will be co-located with the center and may tip. This may also result in a drain leakage.
- Two foundation bolt holes are located at front and rear and two at each side. Use a combination of four holes to fix the air-conditioner in place at the corners. (see Fig. 4.2.1)

[Fig. 4.2.1] (P.2)

- Ⓐ Example 1 - Use holes at front and rear.
- Ⓑ Example 2 - Use holes at sides.
- Ⓒ "●" indicates foundation bolt holes used.

5.1. Refrigerant pipe and drain pipe specifications

Item		Model	250-500
Refrigerant pipe (Flare connection)	Liquid pipe		ø12.7
	Gas pipe		ø28.58
Drain pipe			Rp1

[Fig. 5.1.1] (P.2)

- <A> Gas
- Liquid
- <C> Model 250
- <D> Model 500
- Ⓐ Joint (Ensure that there is no gap in the joint.)
- Ⓑ Sealing tape
- Ⓒ Flange
- Ⓓ Thermal insulating material inside unit
- Ⓔ Flange cover (supplied)
- Ⓕ Bind with band or tape.
- Ⓖ Site thermal insulating material
- Ⓖ Flare
- Ⓙ Thermal insulating material (procured on-site)
- Ⓚ Location of refrigerant piping
- Ⓛ Refrigerant piping flare (ø12.7) (liquid)
- Ⓜ Refrigerant piping joint outlet (Rp1)
- Ⓨ Refrigerant piping flange (gas)
- Ⓩ Air outlet
- Ⓩ As seen from bottom face A.

6. Connecting refrigerant pipes and drain pipes

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- For constraints on pipe length and allowable difference of elevation, refer to the outdoor unit manual.
- The method of pipe connection is flare connection (liquid) and flange connection (gas).

Cautions on refrigerant piping

- ▶ **Be sure to use non-oxidative brazing for brazing to ensure that no foreign matter or moisture enter into the pipe.**
- ▶ **Be sure to apply refrigerating machine oil over the flare connection seating surface and tighten the connection using a double spanner.**
- ▶ **Provide a metal brace to support the refrigerant pipe so that no load is imparted to the indoor unit end pipe. This metal brace should be provided 50 cm away from the indoor unit's flare connection.**

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

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

⚠ Caution:

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- **Never use existing refrigerant piping.**
 - The large amount of chlorine in conventional refrigerant and refrigerant 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.

- **Apply ester oil, ether oil, or a small amount of alkyl benzene to the flare and flange connections.**

- The refrigerator oil will deteriorate if it is mixed with a large amount of mineral oil.

[Fig. 6.1.1] (P.3)

- Ⓐ Connecting pipe (supplied)
Fit packing (supplied) firmly (50 N·m torque) to the flange to prevent a gas leak. Apply refrigerant oil (ester oil, ether oil, or a small amount of alkyl benzene) to both sides of the packing.
- Ⓑ Piping on site
Expand the end of the pipe and braze it to the connecting pipe (non-oxidizing brazing).
- Ⓒ Flared nut
Tighten to 55 N·m torque.
Open and close with a double spanner.
Apply refrigerant oil (ester oil, ether oil, or a small amount of alkyl benzene) to the contact surfaces of the flare.
- Ⓓ Piping on site
Expand the end of the pipe and connect it. Do not use the supplied piping.

6.2. Drain piping work

[Fig. 6.2.1] (P.3)

- Ⓐ Drain pan
- Ⓑ Drain hose
- Ⓒ Trap (on-site piping work)
- Ⓓ Unit base (main drain pan)
- Ⓔ As seen from front of unit.
- Ⓕ 200 mm or more

1. Ensure that the drain piping is downward (pitch of more than 1/100) to the outdoor (discharge) side. Do not provide any trap or irregularity on the way.
2. Ensure that any cross-wise drain piping is less than 20 m (excluding the difference of elevation). If the drain piping is long, provide metal braces to prevent it from waving. Never provide any air vent pipe. Otherwise drain may be ejected.

3. Do not provide any odor trap at the drain discharge port.
4. Put the end of the drain piping in a position where no odor is generated.
5. Do not put the end of the drain piping in any drain where ionic gases are generated.
6. Check drainage by pouring water into the drain pan and check to see that it drains properly.
7. Check for ease of operation of the fault detection float switch in the drain pan, and breakage of leads.
8. Provide a drain trap to the drain piping installed on site.

* The loop on the drain hose provided with the unit does not function as a trap; it is only used to drain water to the main drain pan at the bottom of the product.

7. Electrical wiring

Precautions on electrical wiring

Warning:

Electrical work should be done by qualified electrical engineers in accordance with "Engineering Standards For Electrical Installation" and supplied installation manuals. Special circuits should also be used. If the power circuit lacks capacity or has an installation failure, it may cause a risk of electric shock or fire.

1. Be sure to take power from the special branch circuit.
2. Be sure to install an earth leakage breaker to the power.
3. Install the unit to prevent that any of the control circuit cables (remote controller, transmission cables) is brought in direct contact with the power cable outside the unit.
4. Ensure that there is no slack on all wire connections.
5. Some cables (power, remote controller, transmission cables) above the ceiling may be bitten by mouses. Use as many metal pipes as possible to insert the cables into them for protection.
6. Never connect the power cable to leads for the transmission cables. Otherwise the cables would be broken.
7. Be sure to connect control cables to the indoor unit, remote controller, and the outdoor unit.
8. Put the unit to the ground on the outdoor unit side.
9. Select control cables from the conditions given in below.

Caution:

Be sure to put the unit to the ground on the outdoor unit side. Do not connect the earth cable to any gas pipe, water pipe, lightning rod, or telephone earth cable. Incomplete grounding may cause a risk of electric shock.

Types of control cables

1. Wiring transmission cables

- Types of transmission cables
Shielding wire (2-core)
CVVS or CPEVS <max length: 200 m>.
- Cable diameter
More than 1.25 mm²

2. Remote controller cables

	MA remote controller
Types of cables	2-core cable (unshielded)
Cable diameter	0.3 to 1.25 mm ²
Length	Less than 200 m

7.1. Power supply wiring

Model	PFD-P250VM-A	PFD-P500VM-A
Power supply	380 - 415V	
Power supply wiring cross-section	2.5 mm ²	4.0 mm ²
Earth wiring cross-section	2.5 mm ²	4.0 mm ²
Earth leakage breaker	Type <capacity>	20 A
	Rated sensitivity	30 mA less than 0.1 s
Wiring breaker (NFB)	20 A	30 A

Note:

1. Bear in mind ambient conditions (ambient temperature, direct sunlight, rain water, etc.) when proceeding with the wiring and connections.
2. 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 %.

Note:

If the rise portion is long, there will be a lot of returned water in an operation stop, generating slime or odor during off-season. Ensure that the rise portion is at a minimum.

Caution:

Always prepare the water seal by filling the trap with water from the drain pan during test operation. Inject water into the drain trap during the periodic check (six-monthly) to check water-sealing. If the trap is not filled with water, it will cease to function and this may result in leaks.

Caution:

Pipe the drain piping to ensure that it discharges drain, and insulate it to prevent dew condensation. A failure to the piping work may cause water leakage and so wet your property.

3. Specific wiring requirements should adhere to the wiring regulations of the region.



4. Wiring cross-sections noted are the minimum values for metal and plastic wiring conduits (containing up to three cables).

- Power supply cords of appliances shall not be lighter than design 245 IEC 53 or 227 IEC 53.
- A switch with at least 3 mm contact separation in each pole shall be provided by the Air conditioner installation.

Caution:

1. Use only breakers and fuses of the correct capacity. Use of larger capacity fuses, or wire may result in a fault and smoke or flames.
2. Wire the power supply so that no tension is imparted. Otherwise disconnection, heating or fire result.


7.2. Connecting remote controller, indoor and outdoor transmission cables


- Connect indoor unit TB5 and outdoor unit TB3. (Non-polarized 2-wire)
The "S" on indoor unit TB5 is a shielding wire connection. For specifications about the connecting cables, refer to the outdoor unit installation manual.
- Do not connect the indoor unit terminal block (TB5) to another indoor unit terminal block (TB5) that is connected to a different outdoor unit.
- If it is a Model 500, always ensure the connection between each outdoor unit passes across the "A" and "B" pins (TB7) of the central controller's transmission cable terminal block. (See Fig. 7.4.2.)
- The shielded grounding wire for the central controller's transmission cable must pass across the S pin of the central controller's transmission cable terminal block (TB7) of each outdoor unit.
- When a feeding device is not connected to the central controller's transmission cable, replace the feed switching connector of a single outdoor unit (CN41) with CN40. In this case, the shielded grounding wire for the central controller's transmission cable connects the S terminal block of the terminal block of a single outdoor unit (TB7) that had its connector replaced to CN40, to the grounding screw .
- When a feeding device is connected to the central controller's transmission cable, the shielded grounding wire of the central controller's transmission cable must be grounded with the  pin of the feeding device. In this case, the feed switching connector (CN41) of the outdoor unit is not replaced.
- Install a remote controller following the manual supplied with the remote controller.
- Connect the "1" and "2" on indoor unit TB15 to a MA remote controller. (Non-polarized 2-wire)


[Fig. 7.2.1] (P.3) MA Remote controller

<A> Model 250

 Model 500

 Terminal block for indoor transmission cable

 Terminal block for outdoor transmission cable


 MA Remote controller

- DC 9 to 13 V between 1 and 2 (MA remote controller)


[Fig. 7.2.2] (P.3) MA Remote controller


<A> Model 250

 Model 500


 Non-polarized

 Upper level

 Lower level

 MA Remote Controller

Note:

1. Ensure that the wiring is not pinched when fitting the terminal box cover. Pinching the wiring may cut it.
2. Put the transmission cable earth via the outdoor unit's earth terminal  to the ground.

⚠ Caution:

Install wiring so that it is not tight and under tension. Wiring under tension may break, or overheat and burn.

- Fix power source wiring to control box by using buffer bushing for tensile force. (PG connection or the like.) Connect transmission wiring to transmission terminal block through the knockout hole of control box using ordinary bushing.
- After wiring is complete, make sure again that there is no slack on the connections, and attach the cover onto the control box in the reverse order removal.

7.3. Connecting electrical connections

(Be sure to prevent terminal screws from loosening.)

⚠ Caution:

- Fix the site wiring firmly in place with wiring clamps.
- Ensure that wiring installation work does not result in tension being applied to the wiring. Such tension may result in breaks in wiring, and consequent overheating, smoke, or flame.

Step 1. Turn the key in the center of the panel at the bottom of the unit to open the panel. Next, remove the four screws in the control box cover to remove the cover.

Step 2. Install electrical wiring, internal and external connecting wiring, and earth wiring, as shown in Fig. 7.3.1. Refer to “7.5. External I/O Specifications” if installing wiring when external I/O terminals are used.

Step 3. When wiring is complete, check for less connections and wiring mistakes, and close the panel.

[Fig. 7.3.1] (P.3) MA Remote controller

<A> Model 250

 Model 500

- | | |
|---|---|
| Ⓐ Transformer | Ⓑ External I/O board |
| Ⓒ Transmission line terminal block | Ⓓ Fix in place after connecting wiring. |
| Ⓔ Connect transmission line to outdoor unit | |
| Ⓕ To power supply | Ⓔ Earth |
| Ⓖ Fuse | Ⓘ Control box |
| Ⓙ Bottom panel | |

7.4. Setting addresses

(Be sure to operate with the main power turned OFF.)

- There are two types of rotary switch setting available: setting addresses 1 to 9 and over 10.

<How to set addresses>

Example: If Address is “3”, remain SW12 (for over 10) at “0”, and match SW11 (for 1 to 9) with “3”.

⚠ Caution:

Setting the address of the indoor unit controller

- **For the Model 500**
The top side indoor controller address of the indoor unit must always be odd number. The bottom side indoor controller address must be 1 more than the top side indoor controller address.
- **Setting the address of the outdoor unit controller**
The address must be 50 more than the address of the indoor units using the same refrigerant.

* If the address is not correctly set, operation will not run correctly.

After setting the address, enter the set address on the product nameplate on the front panel using a permanent marker.

- The rotary switches are all set to “0” when shipped from the factory. These switches can be used to set unit addresses.
- The determination of indoor unit addresses varies with the system at site. Set them referring to technical data.
- If connecting a controller inside a central controller, the address of the two controllers inside the Model 500 indoor unit must always be set in the same group.

[Fig. 7.4.1] (P.4)

- **When there is a single Model 250 unit**

Ⓐ CN41 as it is

*1 The numbers shown in the square (□) are addresses.

*2 The Model 250 indoor unit contains one indoor controller board.

[Fig. 7.4.2] (P.4)

- **When there is a single Model 500 unit**

Ⓐ Replace CN41 with CN40

Ⓑ CN41 as it is

* The Model 500 indoor unit contains two indoor controller boards.

[Fig. 7.4.3] (P.4)

- **When connected to G-50**

Ⓐ CN41 as it is

Ⓑ Group 1

Ⓒ Group 2

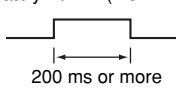
Ⓓ Power supply unit

Ⓔ DC Power supply (DC 12V)

7.5. External I/O Specifications

I/O Specifications

Input

Function	Application	Signal specifications
Run/stop	Allows issue of ON/OFF command to indoor unit.	Pulse (Voltage/no-voltage “a” contact)* <Voltage> Power supply: DC12 - 24 V Current: Approximately 10 mA (DC12 V) <Pulse standard> 

* Use micro-current contacts (DC12 V 1 mA).

⚠ Caution:

1. Wiring should be covered by insulation tube with supplementary insulation.
2. Use relays or switches with IEC or equivalent standard.
3. The electric strength between accessible parts and control circuit should have 2750 V or more.

Output

Function	Application	Signal specifications
Operation status	External output of operation status signal for each coolant circuit of indoor unit.	Relay “a” contact output DC30 V or AC100 V/200 V Contact rated current: 1 A
Fault	External output of fault signal for each coolant circuit of indoor unit.	Contact minimum load: 10 mA

[Fig. 7.5.1] (P.5)

<A> Model 250

 Model 500

- | | |
|---------------------------------|----------------------------------|
| Ⓐ Voltage input (with polarity) | Ⓑ External power supply |
| Ⓒ Start/Stop | Ⓓ No-voltage input |
| Ⓔ Common | Ⓕ Start/Stop |
| Ⓖ Relay contact output | Ⓗ Display power supply |
| Ⓘ Operation status | Ⓙ Fault |
| Ⓚ External I/O board | Ⓛ Terminal block connection |
| Ⓜ Connector connection | Ⓝ Wiring distance 100 m or less. |

Ⓐ Voltage input (with polarity)

External power supply	Pulse input of start or stop DC12 - 24 V Input current (per contact) Approximately 10 mA (DC12 V)
SW12	Remote Start/Stop switch * Toggles ON/OFF each time switch is pressed (pulse input).

Ⓓ No-voltage input

SW11	Remote Start/Stop switch * Toggles ON/OFF each time switch is pressed (pulse input).
Micro-current contacts (DC12 V 1 mA)	

Ⓔ Relay contact output

Display power supply	DC30 V 1 A AC100 V/200 V 1 A
L1, L3	Operation status
L2, L4	Fault status
XA ~ XE	Relay (allowable current 10 mA - 1 A)

- Settings for indoor unit
Check that the following settings have been entered when using external input.

- 1) Control board DIP SW3 - 8 ON
(Set to ON prior to shipment from factory. External input disabled when set to OFF.)
- 2) Address board DIP SW1 - 10 OFF
(Set to OFF prior to shipment from factory. External input disabled when set to ON.)
- 3) Normal/Check switch inside unit control box set to Normal.
(Set to Normal prior to shipment from factory. External input disabled when set to Check.)

Wiring Method

1. Check the indoor unit settings (Refer to 7. Electrical Wiring Diagram).
2. When using the external output function, connect the signal lines to the external output terminal (TB22) of the unit as appropriate for the application. Peel the cover of wires and connect to the terminals.
3. When using the external input function, connect the signal lines to the external input terminal (TB21 or TB23) of the unit as appropriate for the application. Peel the cover of wires and connect to the terminals.

⚠ Caution:

1. **TB21 is a dedicated terminal for no-voltage contact input. Connection to a voltage may result in a fault in the indoor control board.**
2. **TB23 is a dedicated terminal for voltage contact input. Connect only after checking polarity. Failure to do so may result in a fault.**
3. **When using AC100 V or AC200 V, ensure that input wiring and communication cables are installed separately from output wiring.**
4. **External signal lines may be extended up to 100 m.**

[Fig. 7.5.2] (P.5)

- Ⓐ Site wiring
- Ⓑ Fix low-voltage system (DC30 V or less) wiring with clamps and pass to unit via transmission line wiring holes.*1
- Ⓒ Fix high-voltage system (AC100 V or AC200 V) wiring with clamps and pass to unit via power supply wiring holes.*2
- Ⓓ To CN51 on control board (air-conditioner internal wiring).
- Ⓔ model 500 only
- Ⓕ Low-voltage system wiring
- Ⓖ Low-voltage system clamps
- Ⓗ High-voltage system wiring
- Ⓘ High-voltage system clamps

*1 Installation together with AC100 V or AC200 V high-voltage system wiring may result in mis-operation of the unit due to noise.

*2 Installation together with DC30 V (or less) low-voltage system wiring may result in mis-operation of the unit due to noise.

<Arrangement parts on site>

External output functions

Product name	Model and specifications
External output signal lines	Use plastic-sheathed cord or cable. Wiring type: CV, CVS, or equivalent. Wiring size: Twisted 0.5 mm ² - 1.25 mm ² Single wire: ø0.65 mm - ø1.2 mm
Display lamps etc.	No-voltage "a" contacts DC30 V 1 A or less AC100 V or AC200 V 1 A or less

External input functions

Product name	Model and specifications
External input signal lines	Use plastic-sheathed cord or cable. Wiring type: CV, CVS, or equivalent. Wiring size: Twisted 0.5 mm ² - 1.25 mm ² Single wire: ø0.65 mm - ø1.2 mm
Switches	No-voltage contacts

8. Remote Controller Operation Problems and Solutions

Phenomenon	Cause	Description
Not appear "●" mark on MA remote controller display (MA dose not receive the power supply)	<ul style="list-style-type: none"> • Power failure of indoor unit • Power failure of outdoor unit • Over connection of MA remote controller (Max. 2 remo-con) • Transmission line connects to TB7 of outdoor unit (Should be connected to TB3) • MA remo-con connects to TB5 of indoor unit (Should be connected to TB15) • MA remo-con line is shorted or broken. • Power supply line or transmission line is shorted or broken. • Blow out fuse on indoor control board. 	The power will not be supplied to MA remo-con after finishing the initial mode correctly.
Not disappear of "HO"	<ul style="list-style-type: none"> • Power failure of outdoor unit • MA setting is "Sub" Main setting: SW1 ON Sub setting: SW1 OFF • MA remo-con connects to TB5 of indoor unit (Should be connected to TB15) 	"HO" is flashing during the initial mode. (Max. 20sec.)
Appear "●" mark but hot operated.	<ul style="list-style-type: none"> • Transmission line connects to TB7 of outdoor unit (Should be connected to TB3) • Transmission line is shorted, broken or connection failure. • Blow out fuse on indoor control board. 	The units cannot operate if transmission line is incorrect.
Operates or stops the unit without push the remo-con button	<ul style="list-style-type: none"> • Timer operation with remo-con • Operation with external I/O controller 	

9. Test Operation (read OPERATION MANUAL as well)

- After completing installation of the indoor and outdoor units, piping, and wiring, check the power supply, and check for refrigerant leaks, wiring mistakes, loose transmission lines, and incorrect polarity.
- Using a DC500 V Mega, check that the resistance between the power supply terminal block and earth is 1.0 MΩ or more. Do not operate if this resistance is less than 1.0 MΩ.
 - * Do not measure the resistance of transmission lines.
- Refer to the following Test Run Procedure.
- Check functions as follows when using external I/O.

Test Run Procedure

Operation procedure	
Turn main power supply on before 12 hours or more. → Ready for operation in approximately one minute. Leave for 12 hours or more (with outdoor unit compressor crankcase heater ON).	
①	Set Normal/Local switch of indoor unit to local.
②	Start test run by the remote controller. → Check that the indoor fan and outdoor unit operate normally. → Check for piping and wiring mistakes.
③	Stop the unit by the remote controller. → Test run complete.
④	Set indoor unit Normal/Local switch of indoor unit to Normal. → Check that the Normal/Local switch is set to Normal after test run.

- Notes: 1 An error code will be appeared on the remote controller if the Fault lamp on the indoor unit is lit during test run. Refer to the Outdoor Units Installation Manual for details of error codes.
- 2 Set DIP SW3 - 7 to ON if operation cannot be continued at low-load during test run. Always set DIP SW3 - 7 to OFF after completing test run (change the switch setting only while power is OFF).

• Check functions as follows when using external I/O.

• External input function check

	Item	Operation details	Check details	Measures required
1	Start/Stop	Operate from external input.	Air-conditioner operates or stops. Remote controller display changes.	<ul style="list-style-type: none"> • Check connection of Start/Stop input terminal. • Check SW1 - 10 are OFF. • Check SW3 - 8 are ON. • Check the Normal/Local switch is set to Normal.

• External output function check

	Item	Operation details	Check details	Measures required
1	Operation status	Operate (Stop) air-conditioner from remote controller.	Device connected to output terminal responds.	• Check connection of output terminal.
2	Fault	Stop air-conditioner at fault.	Check specified number air-conditioner.	

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

The product at hand is based on the following EU regulations:

- Low Voltage Directive 73/23/EEC
- Electromagnetic Compatibility Directive 89/336/EEC

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