MITSUBISHI ELECTRIC

Changes for the Better

AIR CONDITIONER

2014

R410A

Service Handbook

Model

PUHY-P250YJM-A

PUHY-P500YSJM-A

PFD-P250VM-E

PFD-P500VM-E

2nd edition

Safety Precautions

- Before installing the unit, thoroughly read the following safety precautions.
- Observe these safety precautions for your safety.

⚠ WARNING

This symbol is intended to alert the user to the presence of important instructions that must be followed to avoid the risk of serious injury or death.

⚠ CAUTION

This symbol is intended to alert the user to the presence of important instructions that must be followed to avoid the risk of serious injury or damage to the unit.

- After reading this manual, give it to the user to retain for future reference.
- Keep this manual for easy reference. When the unit is moved or repaired, give this manual to those who provide these services.
  When the user changes, make sure that the new user receives this manual.

⚠ WARNING

Do not use refrigerant other than the type indicated in the manuals provided with the unit and on the nameplate.

Doing so may cause the unit or pipes to burst, or result in explosion or fire during use, during repair, or at the time of disposal of the unit.
It may also be in violation of applicable laws.
MITSUBISHI ELECTRIC CORPORATION cannot be held responsible for malfunctions or accidents resulting from the use of the wrong type of refrigerant.

Ask your dealer or a qualified technician to install the unit.

Improper installation by the user may result in water leakage, electric shock, smoke, and/or fire.

Properly install the unit on a surface that can withstand the weight of the unit.

Unit installed on an unstable surface may fall and cause injury.

Only use specified cables. Securely connect each cable so that the terminals do not carry the weight of the cable.

Improperly connected or fixed cables may produce heat and start a fire.

Take appropriate safety measures against strong winds and earthquakes to prevent the unit from falling.

If the unit is not installed properly, the unit may fall and cause serious injury to the person or damage to the unit.

Do not make any modifications or alterations to the unit. Consult your dealer for repair.

Improper repair may result in water leakage, electric shock, smoke, and/or fire.

Do not touch the heat exchanger fins.

The fins are sharp and dangerous.

In the event of a refrigerant leak, thoroughly ventilate the room.

If refrigerant gas leaks and comes in contact with an open flame, poisonous gases will be produced.

Properly install the unit according to the instructions in the installation manual.

Improper installation may result in water leakage, electric shock, smoke, and/or fire.

Have all electrical work performed by an authorized electrician according to the local regulations and instructions in this manual, and a dedicated circuit must be used.

Insufficient capacity of the power supply circuit or improper installation may result in malfunctions of the unit, electric shock, smoke, and/or fire.

⚠ WARNING

Securely attach the terminal block cover (panel) to the unit.

If the terminal block cover (panel) is not installed properly, dust and/or water may infiltrate and pose a risk of electric shock, smoke, and/or fire.

Only use the type of refrigerant that is indicated on the unit when installing or reinstalling the unit.

Infiltration of any other type of refrigerant or air into the unit may adversely affect the refrigerant cycle and may cause the pipes to burst or explode.

When installing the unit in a small room, exercise caution and take measures against leaked refrigerant reaching the limiting concentration.

Consult your dealer with any questions regarding limiting concentrations and for precautionary measures before installing the unit. Leaked refrigerant gas exceeding the limiting concentration causes oxygen deficiency.

Consult your dealer or a specialist when moving or reinstalling the unit.

Improper installation may result in water leakage, electric shock, and/or fire.

After completing the service work, check for a gas leak.

If leaked refrigerant is exposed to a heat source, such as a fan heater, stove, or electric grill, poisonous gases may be produced.

Do not try to defeat the safety features of the unit.

Forced operation of the pressure switch or the temperature switch by defeating the safety features of these devices, or the use of accessories other than the ones that are recommended by MITSUBISHI may result in smoke, fire, and/or explosion.

Only use accessories recommended by MITSUBISHI.

Ask a qualified technician to install the unit. Improper installation by the user may result in water leakage, electric shock, smoke, and/or fire.

Control box houses high-voltage parts.

When opening or closing the front panel of the control box, do not let it come into contact with any of the internal components. Before inspecting the inside of the control box, turn off the power, keep the unit off for at least 10 minutes, and confirm that the voltage between FT-P and FT-N on INV Board has dropped to DC20V or less. (It takes about 10 minutes to discharge electricity after the power supply is turned off.)

Precautions for handling units for use with R410A

⚠ CAUTION

Do not use the existing refrigerant piping.

- A large amount of chlorine that may be contained in the residual refrigerant and refrigerating machine oil in the existing piping may cause the refrigerating machine oil in the new unit to deteriorate.
- R410A is a high-pressure refrigerant and can cause the existing pipes to burst.

Use refrigerant pipes made of phosphorus deoxidized copper. Keep the inner and outer surfaces of the pipes clean and free of such contaminants as sulfur, oxides, dust, dirt, shaving particles, oil, and water.

These types of contaminants inside the refrigerant pipes may cause the refrigerant oil to deteriorate.

Store the pipes to be installed indoors, and keep both ends of the pipes sealed until immediately before brazing. (Keep elbows and other joints wrapped in plastic.)

Infiltration of dust, dirt, or water into the refrigerant system may cause the refrigerating machine oil to deteriorate or cause the unit to malfunction.

Use a small amount of ester oil, ether oil, or alkylbenzene to coat flares and flanges.

Infiltration of a large amount of mineral oil may cause the refrigerating machine oil to deteriorate.

Charge liquid refrigerant (as opposed to gaseous refrigerant) into the system.

If gaseous refrigerant is charged into the system, the composition of the refrigerant in the cylinder will change and may result in performance loss.

Use a vacuum pump with a reverse-flow check valve.

If a vacuum pump that is not equipped with a reverse-flow check valve is used, the vacuum pump oil may flow into the refrigerant cycle and cause the refrigerating machine oil to deteriorate.

Prepare tools for exclusive use with R410A. Do not use the following tools if they have been used with the conventional refrigerant (gauge manifold, charging hose, gas leak detector, reverse-flow check valve, refrigerant charge base, vacuum gauge, and refrigerant recovery equipment.).

- If the refrigerant or the refrigerating machine oil left on these tools are mixed in with R410A, it may cause the refrigerating machine oil to deteriorate.
- Infiltration of water may cause the refrigerating machine oil to deteriorate.
- Gas leak detectors for conventional refrigerants will not detect an R410A leak because R410A is free of chlorine.

Do not use a charging cylinder.

If a charging cylinder is used, the composition of the refrigerant will change, and the unit may experience power loss.

Exercise special care when handling the tools for use with R410A.

Infiltration of dust, dirt, or water into the refrigerant system may cause the refrigerating machine oil to deteriorate.

Before installing the unit

⚠ WARNING

Do not install the unit where a gas leak may occur.

If gaseous refrigerant leaks and piles up around the unit, it may be ignited.

Do not use the unit to keep food items, animals, plants, artifacts, or for other special purposes.

The unit is not designed to preserve food products.

Do not use the unit in an unusual environment.

- Do not install the unit where a large amount of oil or steam is present or where acidic or alkaline solutions or chemical sprays are used frequently. Doing so may lead to a remarkable drop in performance, electric shock, malfunctions, smoke, and/or fire.
- The presence of organic solvents or corrosive gas (i.e. ammonia, sulfur compounds, and acid) may cause gas leakage or water leakage.

When installing the unit in a hospital, take appropriate measures to reduce noise interference.

High-frequency medical equipment may interfere with the normal operation of the air conditioner or vice versa.

Do not install the unit on or over things that cannot get wet.

When the humidity level exceeds 80% or if the drainage system is clogged, the indoor unit may drip water. Drain water is also discharged from the outdoor unit. Install a centralized drainage system if necessary.

Before installing the unit (moving and reinstalling the unit) and performing electrical work

⚠ CAUTION

Properly ground the unit.

Do not connect the grounding wire to a gas pipe, water pipe, lightning rod, or grounding wire from a telephone pole. Improper grounding may result in electric shock, smoke, fire, and/or malfunction due to noise interference.

Do not put tension on the power supply wires.

If tension is put on the wires, they may break and result in excessive heat, smoke, and/or fire.

Install an earth leakage breaker to avoid the risk of electric shock.

Failure to install an earth leakage breaker may result in electric shock, smoke, and/or fire.

Use the kind of power supply wires that are specified in the installation manual.

The use of wrong kind of power supply wires may result in current leak, electric shock, and/or fire.

Use breakers and fuses (current breaker, remote switch <switch + Type-B fuse>, moulded case circuit breaker) with the proper current capacity.

The use of wrong capacity fuses, steel wires, or copper wires may result in malfunctions, smoke, and/or fire.

Do not spray water on the air conditioner or immerse the air conditioner in water.

Otherwise, electric shock and/or fire may result.

When handling units, always wear protective gloves to protect your hands from metal parts and high-temperature parts.

Periodically check the installation base for damage.

If the unit is left on a damaged platform, it may fall and cause injury.

Properly install the drain pipes according to the instructions in the installation manual. Keep them insulated to avoid dew condensation.

Improper plumbing work may result in water leakage and damage to the furnishings.

Exercise caution when transporting products.

- Products weighing more than 20 kg should not be carried alone.
- Do not carry the product by the PP bands that are used on some products.
- Do not touch the heat exchanger fins. They are sharp and dangerous.
- When lifting the unit with a crane, secure all four corners to prevent the unit from falling.

Properly dispose of the packing materials.

- Nails and wood pieces in the package may pose a risk of injury.
- Plastic bags may pose a risk of choking hazard to children. Tear plastic bags into pieces before disposing of them.

Before the test run

⚠ CAUTION

Turn on the unit at least 12 hours before the test run.

Keep the unit turned on throughout the season. If the unit is turned off in the middle of a season, it may result in malfunctions.

To avoid the risk of electric shock or malfunction of the unit, do not operate switches with wet hands.

Do not touch the refrigerant pipes with bare hands during and immediately after operation.

During or immediately after operation, certain parts of the unit such as pipes and compressor may be either very cold or hot, depending on the state of the refrigerant in the unit at the time. To reduce the risk of frost bites and burns, do not touch these parts with bare hands.

Do not operate the unit without panels and safety guards.

Rotating, high-temperature, or high-voltage parts on the unit pose a risk of burns and/or electric shock.

Do not turn off the power immediately after stopping the operation.

Keep the unit on for at least five minutes before turning off the power to prevent water leakage or malfunction.

Do not operate the unit without the air filter.

Dust particles may build up in the system and cause malfunctions.

CONTENTS

Ⅰ Read Before Servicing

[1] Read Before Servicing

1. **Check the type of refrigerant used in the system to be serviced.**
   Refrigerant Type
   New refrigerant series split-type air-conditioners for computer rooms R410A

2. **Check the symptoms exhibited by the unit to be serviced.**
   Refer to this service handbook for symptoms relating to the refrigerant cycle.

3. **Thoroughly read the safety precautions at the beginning of this manual.**

4. **Preparing necessary tools: Prepare a set of tools to be used exclusively with each type of refrigerant.**
   Refer to "Necessary Tools and Materials" for information on the use of tools.(page 4)

5. **Verification of the connecting pipes: Verify the type of refrigerant used for the unit to be moved or replaced.**
   - Use refrigerant pipes made of phosphorus deoxidized copper. Keep the inner and outer surfaces of the pipes clean and free of such contaminants as sulfur, oxides, dust, dirt, shaving particles, oil, and water.
   - These types of contaminants inside the refrigerant pipes may cause the refrigerant oil to deteriorate.

6. **If there is a leak of gaseous refrigerant and the remaining refrigerant is exposed to an open flame, a poisonous gas hydrofluoric acid may form. Keep workplace well ventilated.**

> ⚠ **CAUTION**
> - Install new pipes immediately after removing old ones to keep moisture out of the refrigerant circuit.
> - The use of refrigerant that contains chloride, such as R22, will cause the refrigerating machine oil to deteriorate.

[2] Necessary Tools and Materials

Prepare the following tools and materials necessary for installing and servicing the unit.

Tools for use with R410A (Adaptability of tools that are for use with R22 or R407C)

1. To be used exclusively with R410A (not to be used if used with R22 or R407C)

Tools/Materials	Use	Notes
Gauge Manifold	Evacuation and refrigerant charging	Higher than 5.09MPa[738psi] on the high-pressure side
Charging Hose	Evacuation and refrigerant charging	The hose diameter is larger than the conventional model.
Refrigerant Recovery Cylinder	Refrigerant recovery	
Refrigerant Cylinder	Refrigerant charging	The refrigerant type is indicated. The cylinder is pink.
Charging Port on the Refrigerant Cylinder	Refrigerant charging	The charge port diameter is larger than that of the current port.
Flare Nut	Connection of the unit with the pipes	Use Type-2 Flare nuts.

2. Tools and materials that may be used with R410A with some restrictions

Tools/Materials	Use	Notes
Gas Leak Detector	Gas leak detection	The ones for use with HFC refrigerant may be used.
Vacuum Pump	Vacuum drying	May be used if a check valve adapter is attached.
Flare Tool	Flare processing	Flare processing dimensions for the piping in the system using the new refrigerant differ from those of R22. Refer to I [3] Piping Materials.
Refrigerant Recovery Equipment	Refrigerant recovery	May be used if compatible with R410A.

3. Tools and materials that are used with R22 or R407C that may also be used with R410A

Tools/Materials	Use	Notes
Vacuum Pump with a Check Valve	Vacuum drying	
Bender	Bending pipes	
Torque Wrench	Tightening flare nuts	Only the flare processing dimensions for pipes that have a diameter of ø12.70 (1/2") and ø15.88 (5/8") have been changed.
Pipe Cutter	Cutting pipes	
Welder and Nitrogen Cylinder	Welding pipes	
Refrigerant Charging Meter	Refrigerant charging	
Vacuum Gauge	Vacuum level check	

4. Tools and materials that must not be used with R410A

Tools/Materials	Use	Notes
Charging Cylinder	Refrigerant charging	Prohibited to use

Tools for R410A must be handled with special care to keep moisture and dust from infiltrating the cycle.

[3] Piping Materials

Do not use the existing piping!

1. Copper pipe materials

O-material (Annealed)	Soft copper pipes (annealed copper pipes). They can easily be bent with hands.
1/2H-material (Drawn)	Hard copper pipes (straight pipes). They are stronger than the O-material (Annealed) at the same radial thickness.

- The distinction between O-materials (Annealed) and 1/2H-materials (Drawn) is made based on the strength of the pipes themselves.
- O-materials (Annealed) can easily be bent with hands.
- 1/2H-materials (Drawn) are considerably stronger than O-material (Annealed) at the same thickness.

2. Types of copper pipes

Maximum working pressure	Refrigerant type
3.45 MPa [500psi]	R22, R407C etc.
4.30 MPa [624psi]	R410A etc.

3. Piping materials/Radial thickness

Use refrigerant pipes made of phosphorus deoxidized copper.
The operation pressure of the units that use R410A is higher than that of the units that use R22.
Use pipes that have at least the radial thickness specified in the chart below.
(Pipes with a radial thickness of 0.7 mm or less may not be used.)

Pipe size (mm[in])		Radial thickness (mm)	Type
ø6.35	[1/4"]	0.8t	O-material (Annealed)
ø9.52	[3/8"]	0.8t	
ø12.7	[1/2"]	0.8t	
ø15.88	[5/8"]	1.0t	
ø19.05	[3/4"]	1.0t	1/2H-material, H-material (Drawn)
ø22.2	[7/8"]	1.0t	
ø25.4	[1"]	1.0t	
ø28.58	[1-1/8"]	1.0t	
ø31.75	[1-1/4"]	1.1t	

- The pipes in the system that uses the refrigerant currently on the market are made with O-material (Annealed), even if the pipe diameter is less than ø19.05 (3/4"). For a system that uses R410A, use pipes that are made with 1/2H-material (Drawn) unless the pipe diameter is at least ø19.05 (3/4") and the radial thickness is at least 1.2t.
- The figures in the radial thickness column are based on the Japanese standards and provided only as a reference. Use pipes that meet the local standards.

4. Thickness and refrigerant type indicated on the piping materials

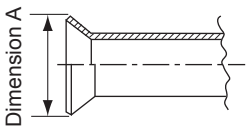
Ask the pipe manufacturer for the symbols indicated on the piping material for new refrigerant.

5. Flare processing (O-material (Annealed) and OL-material only)

The flare processing dimensions for the pipes that are used in the R410A system are larger than those in the R22 system.

Flare processing dimensions (mm[in])

Pipe size (mm[in])		A dimension (mm)	
		R410A	R22, R407C
ø6.35	[1/4"]	9.1	9.0
ø9.52	[3/8"]	13.2	13.0
ø12.7	[1/2"]	16.6	16.2
ø15.88	[5/8"]	19.7	19.4
ø19.05	[3/4"]	24.0	23.3



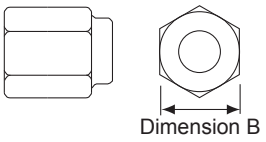
If a clutch-type flare tool is used to flare the pipes in the system using R410A, the length of the pipes must be between 1.0 and 1.5 mm. For margin adjustment, a copper pipe gauge is necessary.

6. Flare nut

The flare nut type has been changed to increase the strength. The size of some of the flare nuts have also been changed.

Flare nut dimensions (mm[in])

Pipe size (mm[in])		B dimension (mm)	
		R410A	R22, R407C
ø6.35	[1/4"]	17.0	17.0
ø9.52	[3/8"]	22.0	22.0
ø12.7	**[1/2"]**	**26.0**	**24.0**
ø15.88	**[5/8"]**	**29.0**	**27.0**
ø19.05	[3/4"]	36.0	36.0



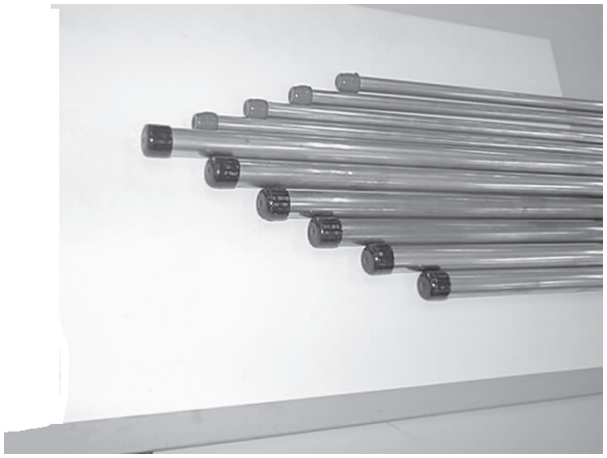
The figures in the radial thickness column are based on the Japanese standards and provided only as a reference. Use pipes that meet the local standards.

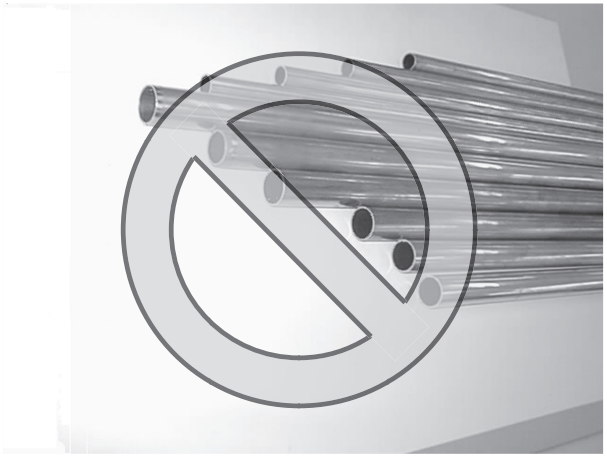
[4] Storage of Piping

1. Storage location

Store the pipes to be used indoors. (Warehouse at site or owner's warehouse)
If they are left outdoors, dust, dirt, or moisture may infiltrate and contaminate the pipe.

2. Sealing the pipe ends





Both ends of the pipes should be sealed until just before brazing.
Keep elbow pipes and T-joints in plastic bags.

The new refrigerator oil is 10 times as hygroscopic as the conventional refrigerating machine oil (such as Suniso) and, if not handled with care, could easily introduce moisture into the system. Keep moisture out of the pipes, for it will cause the oil to deteriorate and cause a compressor failure.

[5] Pipe Processing

Use a small amount of ester oil, ether oil, or alkylbenzene to coat flares and flanges.

Note

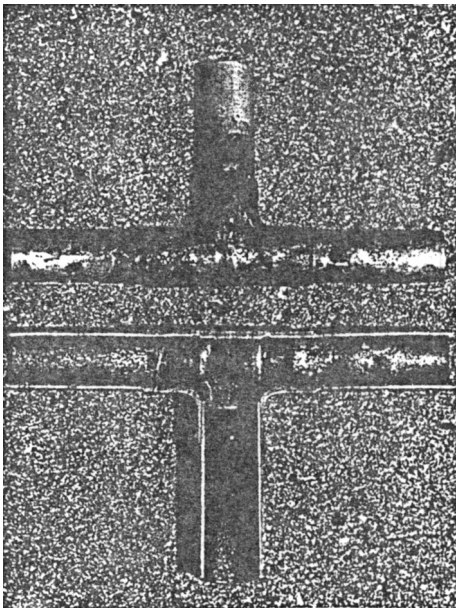
- Use a minimum amount of oil.
- Use only ester oil, ether oil, and alkylbenzene.

[6] Brazing

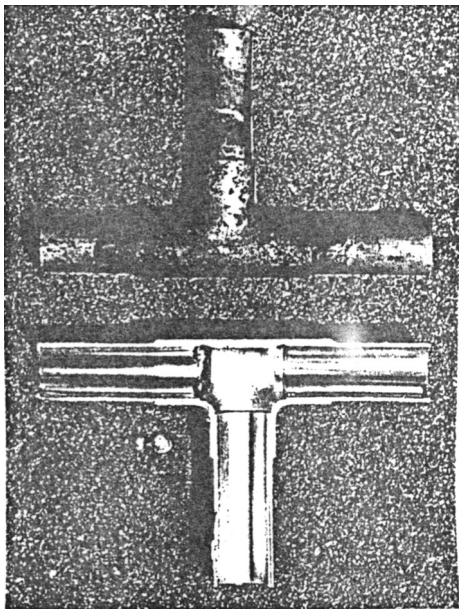
No changes have been made in the brazing procedures. Perform brazing with special care to keep foreign objects (such as oxide scale, water, and dust) out of the refrigerant system.

Example: Inside the brazed connection

Use of oxidized solder for brazing



Use of non-oxidized solder for brazing



1. Items to be strictly observed

- Do not conduct refrigerant piping work outdoors if raining.
- Use non-oxidized solder.
- Use a brazing material (BCuP-3) that requires no flux when brazing between copper pipes or between a copper pipe and copper coupling.
- If installed refrigerant pipes are not immediately connected to the equipment, then braze and seal both ends.

2. Reasons

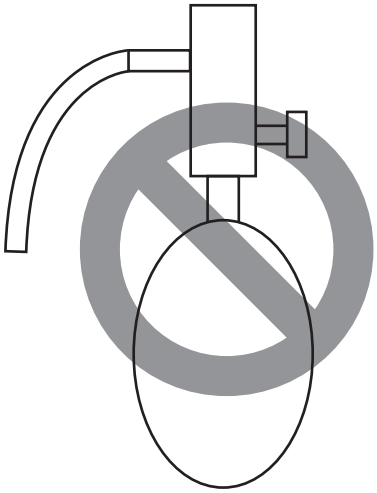
- The new refrigerating machine oil is 10 times as hygroscopic as the conventional oil and is more likely to cause unit failure if water infiltrates into the system.
- Flux generally contains chloride. Residual flux in the refrigerant circuit will cause sludge to form.

3. Notes

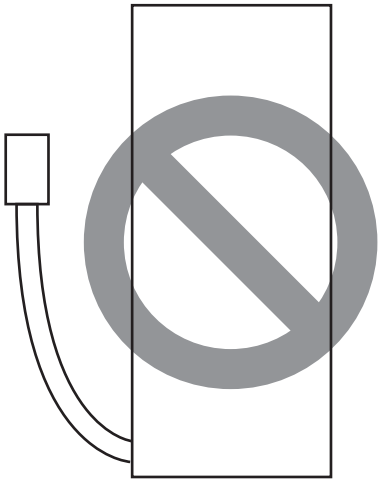
Do not use commercially available antioxidants because they may cause the pipes to corrode or refrigerating machine oil to deteriorate.

[7] Air Tightness Test

No changes have been made in the detection method. Note that a refrigerant leak detector for R22 will not detect an R410A leak.



Halide torch



R22 leakage detector

1. Items to be strictly observed

- Pressurize the equipment with nitrogen up to the design pressure (4.15MPa[601psi]), and then judge the equipment's air tightness, taking temperature variations into account.
- Refrigerant R410A must be charged in its liquid state (vs. gaseous state).

2. Reasons

- Oxygen, if used for an air tightness test, poses a risk of explosion. (Only use nitrogen to check air tightness.)
- Refrigerant R410A must be charged in its liquid state. If gaseous refrigerant in the cylinder is drawn out first, the composition of the remaining refrigerant in the cylinder will change and become unsuitable for use.

3. Notes

Procure a leak detector that is specifically designed to detect an HFC leak. A leak detector for R22 will not detect an HFC(R410A) leak.

[8] Vacuum Drying (Evacuation)

(Photo1) 15010H

(Photo2) 14010

Recommended vacuum gauge:
ROBINAIR 14010 Thermistor Vacuum Gauge

1. Vacuum pump with a reverse-flow check valve (Photo1)

To prevent the vacuum pump oil from flowing into the refrigerant circuit during power OFF or power failure, use a vacuum pump with a reverse-flow check valve.
A reverse-flow check valve may also be added to the vacuum pump currently in use.

2. Standard of vacuum degree (Photo 2)

Use a vacuum pump that attains 0.5Torr(65Pa) or lower degree of vacuum after 5 minutes of operation, and connect it directly to the vacuum gauge. Use a pump well-maintained with an appropriate lubricant. A poorly maintained vacuum pump may not be able to attain the desired degree of vacuum.

3. Required precision of vacuum gauge

Use a vacuum gauge that registers a vacuum degree of 5Torr(650Pa) and measures at intervals of 1Torr(130Pa). (A recommended vacuum gauge is shown in Photo2.)
Do not use a commonly used gauge manifold because it cannot register a vacuum degree of 5Torr(650Pa).

4. Evacuation time

- After the degree of vacuum has reached 5Torr(650Pa), evacuate for an additional 1 hour. (A thorough vacuum drying removes moisture in the pipes.)
- Verify that the vacuum degree has not risen by more than 1Torr(130Pa) 1hour after evacuation. A rise by less than 1Torr(130Pa) is acceptable.
- If the vacuum is lost by more than 1Torr(130Pa), conduct evacuation, following the instructions in section 6. Special vacuum drying.

5. Procedures for stopping vacuum pump

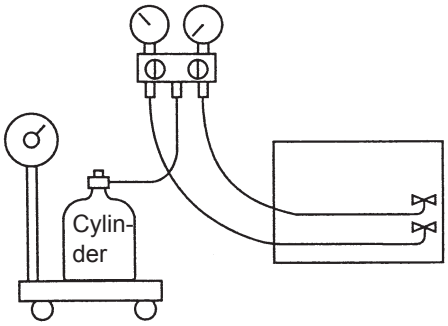
To prevent the reverse flow of vacuum pump oil, open the relief valve on the vacuum pump side, or draw in air by loosening the charge hose, and then stop the operation.
The same procedures should be followed when stopping a vacuum pump with a reverse-flow check valve.

6. Special vacuum drying

- When 5Torr(650Pa) or lower degree of vacuum cannot be attained after 3 hours of evacuation, it is likely that water has penetrated the system or that there is a leak.
- If water infiltrates the system, break the vacuum with nitrogen. Pressurize the system with nitrogen gas to 0.5kgf/cm^{2}G(0.05MPa) and evacuate again. Repeat this cycle of pressurizing and evacuation either until the degree of vacuum below 5Torr(650Pa) is attained or until the pressure stops rising.
- Only use nitrogen gas for vacuum breaking. (The use of oxygen may result in an explosion.)

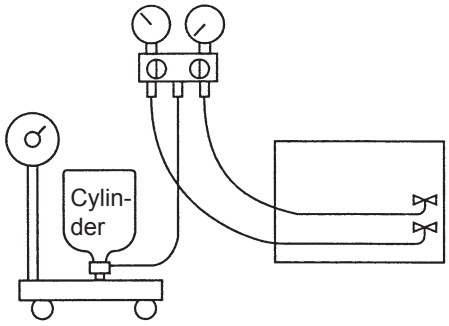
[9] Refrigerant Charging

Cylinder with a siphon

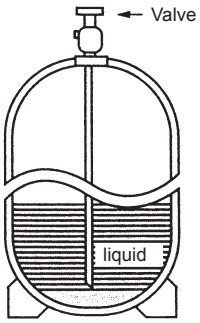


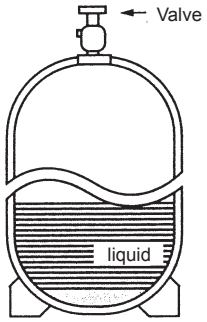
Cylinder color R410A is pink.

Cylinder without a siphon



Refrigerant charging in the liquid state





1. Reasons

R410A is a pseudo-azeotropic HFC blend (boiling point R32=-52°C[-62°F], R125=-49°C[-52°F]) and can almost be handled the same way as a single refrigerant, such as R22. To be safe, however, draw out the refrigerant from the cylinder in the liquid phase. If the refrigerant in the gaseous phase is drawn out, the composition of the remaining refrigerant will change and become unsuitable for use.

2. Notes

When using a cylinder with a siphon, refrigerant is charged in the liquid state without the need for turning it upside down. Check the type of the cylinder on the label before use.

[10] Remedies to be taken in case of a Refrigerant Leak

If the refrigerant leaks out, it may be replenished. The entire refrigerant does not need to be replaced. (Charge refrigerant in the liquid state.)
Refer to "IX [5] Refrigerant Leak."(page 200)

[11] Characteristics of the Conventional and the New Refrigerants

1. Chemical property

As with R22, the new refrigerant (R410A) is low in toxicity and chemically stable nonflammable refrigerant.
However, because the specific gravity of vapor refrigerant is greater than that of air, leaked refrigerant in a closed room will accumulate at the bottom of the room and may cause hypoxia.
If exposed to an open flame, refrigerant will generate poisonous gases. Do not perform installation or service work in a confined area.

	New Refrigerant (HFC type)		Conventional Refrigerant (HCFC type)
	R410A	R407C	R22
	R32/R125	R32/R125/R134a	R22
Composition (wt%)	(50/50)	(23/25/52)	(100)
Type of Refrigerant	Pseudo-azeotropic Refrigerant	Non-azeotropic Refrigerant	Single Refrigerant
Chloride	Not included	Not included	Included
Safety Class	A1/A1	A1/A1	A1
Molecular Weight	72.6	86.2	86.5
Boiling Point (°C/°F)	-51.4/-60.5	-43.6/-46.4	-40.8/-41.4
Steam Pressure (25°C,MPa/77°F,psi) (gauge)	1.557/226	0.9177/133	0.94/136
Saturated Steam Density (25°C,kg/m^3/77°F,psi)	64.0	42.5	44.4
Flammability	Nonflammable	Nonflammable	Nonflammable
Ozone Depletion Coefficient (ODP)*1	**0**	**0**	**0.055**
Global Warming Coefficient (GWP)*2	1730	1530	1700
Refrigerant Charging Method	Refrigerant charging in the liquid state	Refrigerant charging in the liquid state	Refrigerant charging in the gaseous state
Replenishment of Refrigerant after a Refrigerant Leak	Available	Available	Available

*1 When CFC11 is used as a reference
*2 When CO_2 is used as a reference

2. Refrigerant composition

R410A is a pseudo-azeotropic HFC blend and can almost be handled the same way as a single refrigerant, such as R22. To be safe, however, draw out the refrigerant from the cylinder in the liquid phase. If the refrigerant in the gaseous phase is drawn out, the composition of the remaining refrigerant will change and become unsuitable for use.
If the refrigerant leaks out, it may be replenished. The entire refrigerant does not need to be replaced.

3. Pressure characteristics

The pressure in the system using R410A is 1.6 times as great as that in the system using R22.

Temperature (°C/°F)	Pressure (gauge)		
	R410A	R407C	R22
	MPa/psi	MPa/psi	MPa/psi
-20/-4	0.30/44	0.18/26	0.14/20
0/32	0.70/102	0.47/68	0.40/58
20/68	1.34/194	0.94/136	0.81/117
40/104	2.31/335	1.44/209	1.44/209
60/140	3.73/541	2.44/354	2.33/338
65/149	4.17/605	2.75/399	2.60/377

[12] Notes on Refrigerating Machine Oil

1. Refrigerating machine oil in the HFC refrigerant system

HFC type refrigerants use a refrigerating machine oil different from that used in the R22 system.
Note that the ester oil used in the system has properties that are different from commercially available ester oil.

Refrigerant	Refrigerating machine oil
R22	Mineral oil
R407C	Ester oil
R410A	Ester oil

2. Effects of contaminants*1

Refrigerating machine oil used in the HFC system must be handled with special care to keep contaminants out.
The table below shows the effect of contaminants in the refrigerating machine oil on the refrigeration cycle.

3. The effects of contaminants in the refrigerating machine oil on the refrigeration cycle.

<table>
<tr><th colspan="2">Cause</th><th colspan="2">Symptoms</th><th>Effects on the refrigerant cycle</th></tr>
<tr><td colspan="2" rowspan="2">Water infiltration</td><td></td><td>Frozen expansion valve and capillary tubes</td><td rowspan="3">Clogged expansion valve and capillary tubes
Poor cooling performance
Compressor overheat
Motor insulation failure
Burnt motor
Coppering of the orbiting scroll
Lock
Burn-in on the orbiting scroll</td></tr>
<tr><td>Hydrolysis</td><td rowspan="2">Sludge formation and adhesion
Acid generation
Oxidization
Oil degradation</td></tr>
<tr><td colspan="2">Air infiltration</td><td>Oxidization</td></tr>
<tr><td rowspan="4">Infiltration of contaminants</td><td rowspan="2">Dust, dirt</td><td colspan="2">Adhesion to expansion valve and capillary tubes</td><td>Clogged expansion valve, capillary tubes, and drier
Poor cooling performance
Compressor overheat</td></tr>
<tr><td colspan="2">Infiltration of contaminants into the compressor</td><td>Burn-in on the orbiting scroll</td></tr>
<tr><td rowspan="2">Mineral oil etc.</td><td colspan="2">Sludge formation and adhesion</td><td>Clogged expansion valve and capillary tubes
Poor cooling performance
Compressor overheat</td></tr>
<tr><td colspan="2">Oil degradation</td><td>Burn-in on the orbiting scroll</td></tr>
</table>

*1. Contaminants is defined as moisture, air, processing oil, dust/dirt, wrong types of refrigerant, and refrigerating machine oil.

II Restrictions

[1] System configuration

Indoor unit model	Outdoor unit model
PFD-P250VM-E	PUHY-P250YJM-A
PFD-P500VM-E	PUHY-P250YJM-A x 2 *1

*1 When two outdoor units are connected to one indoor unit, two refrigerant circuits must be connected.
Only one refrigerant circuit can be connected to the indoor unit at factory shipment. To connect two refrigerant circuits, perform some work on the unit.

1. Restrictions when the PFD-type indoor units are connected (related to the system)

(1) The PFD-type indoor units cannot be connected to the ME remote controller.

(2) The address settings must be made on this system.

(3) The following functions cannot be selected on the PFD-type indoor units.

1) Switching between automatic power recovery Enabled/Disabled (Fixed to "Enabled" in the PFD-type indoor units)
2) Switching between power source start/stop (Fixed to "Disabled" in the PFD-type indoor units)

(4) The PFD-type indoor units and other types of indoor units cannot be grouped.

(5) The following functions are limited when the system controller (such as G-50A) is connected.

1) To perform group operation in the system with two refrigerant circuits (combination of two outdoor units and one indoor unit: P500 model only), the addresses of the controller boards No.1 and No.2 on a indoor unit must be set within a group.
2) The local operation cannot be prohibited with the main remote controller.
3) When the switches of the PFD-type indoor units are set as follows, the unit ON/OFF operation cannot be made with the main remote controller.
   - ♦When the Normal/Local switching switch is set to "Local"
   - ♦When the DipSW1-10 on the controller circuit board is set to "ON"

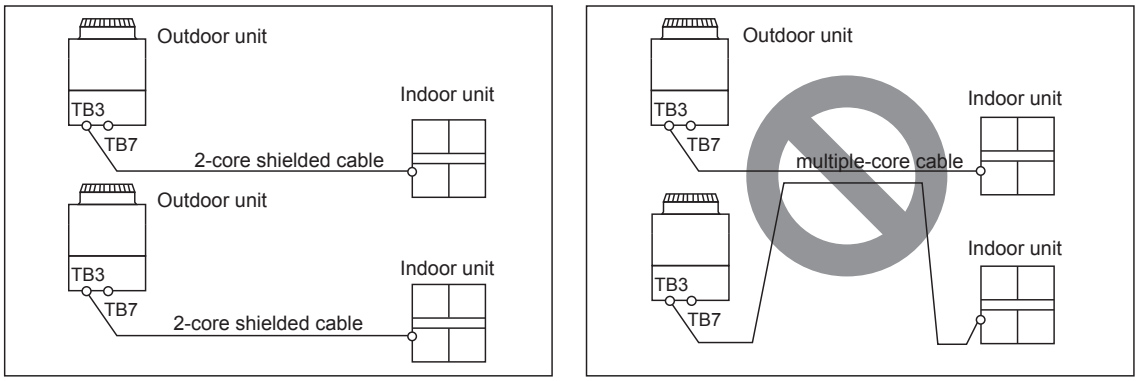
[2] Types and Maximum allowable Length of Cables

1. Wiring work

(1) Notes

1) Have all electrical work performed by an authorized electrician according to the local regulations and instructions in this manual.
2) Install external transmission cables at least 5cm [1-31/32"] away from the power supply cable to avoid noise interference. (Do not put the control cable and power supply cable in the same conduit tube.)
3) Provide grounding for the outdoor unit as required.
4) Run the cable from the electric box of the indoor or outdoor unit in such way that the box is accessible for servicing.
5) Do not connect power supply wiring to the terminal block for transmission line. Doing so will damage the electronic components on the terminal block.
6) Use 2-core shielded cables as transmission cables.

   Use a separate 2-core control cable for each refrigerant system. Do not use a single multiple-core cable to connect indoor units that belong to different refrigerant systems. The use of a multiple-core cable may result in signal transmission errors and malfunctions.



TB3:Terminal block for transmission line connection
TB7:Terminal block for transmission line for centralized control

(2) Control wiring

Different types of control wiring are used for different systems.
Refer to section "[4] An Example of a System to which an MA Remote Controller is connected" before performing wiring work.

Types and maximum allowable length of cables

Control lines are categorized into 2 types: transmission line and remote controller line.

Use the appropriate type of cables and observe the maximum allowable length specified for a given system. If a given system has a long transmission line or if a noise source is located near the unit, place the unit away from the noise source to reduce noise interference.

1) M-NET transmission line

Cable type	Facility type	All facility types
	Type	Shielded cable CVVS, CPEVS, MVVS
	Number of cores	2-core cable
	Cable size	Larger than 1.25mm^2 [AWG16]
Maximum transmission line distance between the outdoor unit and the farthest indoor unit		200m [656ft] max.
Maximum transmission line distance for centralized control and Indoor/outdoor transmission line (Maximum line distance via outdoor unit)		500m [1640ft] max. *The maximum overall line length from the power supply unit on the transmission lines for centralized control to each outdoor unit or to the system controller is 200m [656ft] max.

2) Remote controller wiring

		MA remote controller
Cable type	Type	CVV
	Number of cores	2-core cable
	Cable size	0.3 to 1.25mm^2 *1 [AWG22 to 16]
Maximum overall line length		200m [656ft] max.

*1 The use of cables that are smaller than 0.75mm^2 [AWG18] is recommended for easy handling.

[3] Switch Settings and Address Settings

1. Switch setting

Refer to section "[4] An Example of a System to which an MA Remote Controller is connected" before performing wiring work. Set the switches while the power is turned off.
If the switch settings are changed while the unit is being powered, those changes will not take effect, and the unit will not function properly.

2. Address settings

(1) Address settings table

The need for address settings and the range of address setting depend on the configuration of the system. Refer to section "II [4] An Example of a System to which an MA Remote Controller is connected"

Unit or controller		Symbols	Address setting range	Setting method	Address setting
Indoor unit	Main/sub unit	IC	01 to 50*1	In case of 10HP system, assign an odd number starting with "01". In case of 20HP system with two refrigerant circuits, assign a sequential odd number starting with "01" to the upper indoor controller, and assign "the address of the upper indoor controller + 1" to the lower indoor controller.	00
MA remote controller		MA	No address settings required. (The main/sub switch must be configured if two remote controllers are connected to the system or if the indoor units are connected to different outdoor units.)		Main
Outdoor unit		OC	51 to 100*1	Assign an address of the indoor units in the same refrigerant system and 50.	00

*1. If a given address overlaps any of the addresses that are assigned to indoor or outdoor units in other refrigerant systems, use a different, unused address within the setting range.

(2) Power supply switch connector connection on the outdoor unit
(Factory setting: The male power supply switch connector is connected to CN41.)

System configuration	Connection to the system controller	Power supply unit for transmission lines	Group operation of units in a system with multiple outdoor units	Power supply switch connector connection
System with one outdoor unit	–	–	–	Leave CN41 as it is (Factory setting)
System with multiple outdoor units	Not connected	–	Not grouped	
			Grouped	Disconnect the male connector from the female power supply switch connector (CN41) and connect it to the female power supply switch connector (CN40) on only one of the outdoor units. *Connect the S (shielded) terminal on the terminal block (TB7) on the outdoor unit whose CN41 was replaced with CN40 to the ground terminal (⏚) on the electric box.
	With connection to the indoor-outdoor transmission line	Not required	Grouped/not grouped	
	With connection to the centralized control system	Not required (Powered from the outdoor unit)	Grouped/not grouped	
		Required	Grouped/not grouped	Leave CN41 as it is (Factory setting)

(3) Settings of MA remote controller Main/Sub switching switch (When MA remote controller is used: factory setting "Main")

Main/sub settings are available on the MA remote controller. When two remote controllers are connected, set either of them to "Sub".

(4) Selecting the position of temperature detection for the indoor unit (Factory setting: SWC "Standard")

To use a suction temperature sensor, set SWC to "Option". (The suction temperature sensor is supplied as standard specification.)

(5) Connection of two refrigerant circuits

When two refrigerant circuits are connected on site, make the switch settings on the controller circuit board following the instructions described in the installation manual for the indoor unit.

(6) Cooling-only setting for the indoor unit: Cooling only model (Factory setting: SW3-1 on the indoor unit to "OFF.")

When using indoor unit as a cooling-only unit, set SW3-1 on the indoor unit to ON.

(7) Various types of control using input-output signal connector on the outdoor unit (various connection options)

Type	Usage	Function	Terminal to be used*1	Option
Input	Prohibiting cooling/heating operation (thermo OFF) by an external input to the outdoor unit. *It can be used as the DEMAND control device for each refrigerant system.	DEMAND (level)	CN3D*2	Adapter for external input (PAC-SC36NA-E)
	Performs a low level noise operation of the outdoor unit by an external input to the outdoor unit. * It can be used as the silent operation device for each refrigerant system.	Low-noise mode (level) *3*4		
	Forces the outdoor unit to perform a fan operation by receiving signals from the snow sensor.*5	Snow sensor signal input (level)	CN3S	
Output	How to extract signals from the outdoor unit *It can be used as an operation status display device. *It can be used for an interlock operation with external devices.	Operation status of the compressor*5	CN51	Adapter for external output (PAC-SC37SA-E)
		Error status*6		

*1. For detailed drawing, refer to "Example of wiring connection".

*2. For details, refer to 1) through 2) shown below.

*3. Low-noise mode is valid when Dip SW4-4 on the outdoor unit is set to OFF. When DIP SW4-4 is set to ON, 4 levels of on-DEMAND are possible, using different configurations of low-noise mode input and DEMAND input settings. When 2 or more outdoor units exist in one refrigerant circuit system, 8 levels of on-DEMAND are possible.

*4. By setting Dip SW5-5, the Low-noise mode can be switched between the Capacity priority mode and the Low-noise priority mode.
When SW5-5 is set to ON: The Low-noise mode always remains effective.
When SW5-5 is set to OFF: The Low-noise mode is cancelled when certain outside temperature or pressure criteria are met, and the unit goes into normal operation (capacity priority mode).

Low-noise mode is effective		Capacity priority mode becomes effective	
Cooling	Heating	Cooling	Heating
TH7 < 30°C [86°F] and 63HS1 < 32kg/cm^2	TH7 > 3°C [37°F] and 63LS > 4.6kg/cm^2	TH7 > 35°C [95°F] or 63HS1 > 35kg/cm^2	TH7 < 0°C [32°F] or 63LS < 3.9kg/cm^2

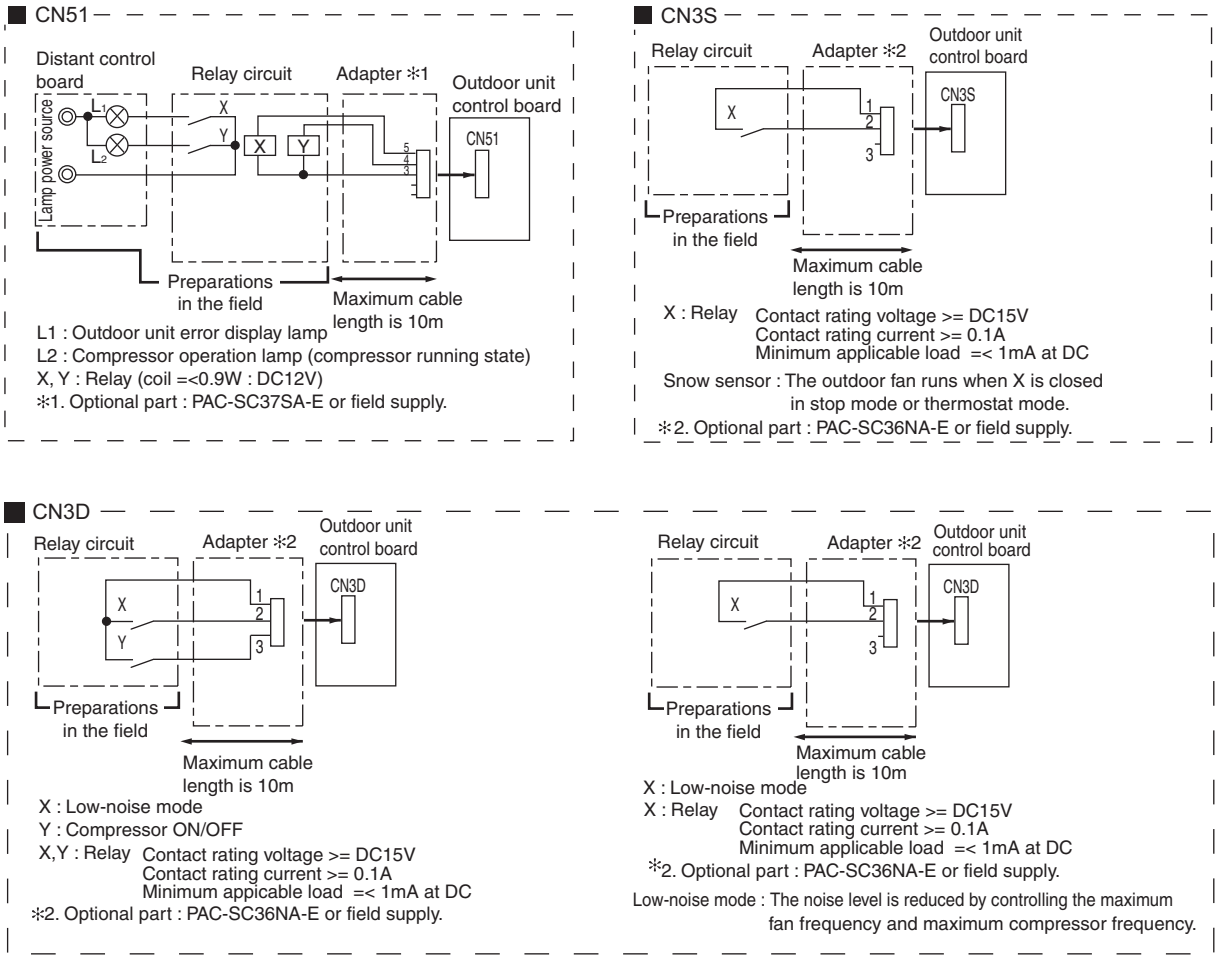
*5. When multiple outdoor units exist in one refrigerant circuit system, settings on every outdoor unit (signal input) are required.

*6. Take out signals from the outdoor unit (OC) if multiple outdoor units exist in a single system.

⚠ 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 2750V or more.

Example of wiring connection



3. Demand control

(1) General outline of control

Demand control is performed by using the external signal input to the 1-2 and 1-3 pins of CN3D on the outdoor units (OC and OS).
Between 2 and 8 steps of demand control is possible by setting DIP SW4-4 on the outdoor units (OC and OS).

Table.1

No	Demand control switch	DipSW4-4		Input to CN3D *2
		OC	OS	
(a)	2 steps(0-100%)	OFF	OFF	OC
(b)	4 steps(0-50-75-100%)	ON	OFF	OC
(c)		OFF	ON	OS
(d)	8 steps(0-25-38-50-63-75-88-100%)	ON	ON	OC and OS

*1. Available demand functions
P250YJM model (single-outdoor-unit system): 2 and 4 steps shown in the rows (a) and (b) in the table above only.
P500YSJM model (two-outdoor-unit system OC+OS): 2-8 steps shown in the rows (a), (b), (c), and (d) in the table above.

*2. External signal is input to CN3D on the outdoor unit whose SW4-4 is set to ON. When SW4-4 is set to OFF on all outdoor units, the signal is input to the CN3D on the OC.
Outdoor units whose SW4-4 is set to ON are selectable in a single refrigerant system.

*3. If wrong sequence of steps are taken, the units may go into the Thermo-OFF (compressor stop) mode.
Ex) When switching from 100% to 50%
(Incorrect) 100% to 0% to 50% : The units may go into the Thermo-OFF mode.
(Correct) 100% to 75% to 50%

*4. The percentage of the demand listed in the table above is an approximate value based on the compressor volume and does not necessarily correspond with the actual capacity.

*5. Notes on using demand control in combination with the low-noise mode
To enable the low-noise mode, it is necessary to short-circuit 1-2 pin of CN3D on the outdoor unit whose SW4-4 is set to OFF.
When SW4-4 is set to ON on all outdoor units, the following operations cannot be performed.
- Performing 4-step demand in combination with the low-noise operation in a single-outdoor-unit system.
- Performing 8-step demand in combination with the low-noise operation in a two-outdoor-unit system.

(2) Contact input and control content

1) 2-step demand control

- The same control as the Thermo-OFF is performed by closing 1-3 pin of CN3D.

CN3D	
1-3P	
Open	x = 100%
Close	x = 0%

2) 4-step demand control (When SW4-4 is set to ON on an outdoor unit)
Demand capacity is shown below.

CN3D	1-2P	
1-3P	Open	Close
Open	x = 100%	x = 75%
Close	x = 0%	x = 50%

3) 8-step demand control (When SW4-4 is set to ON on two outdoor units)
Demand capacity is shown below.

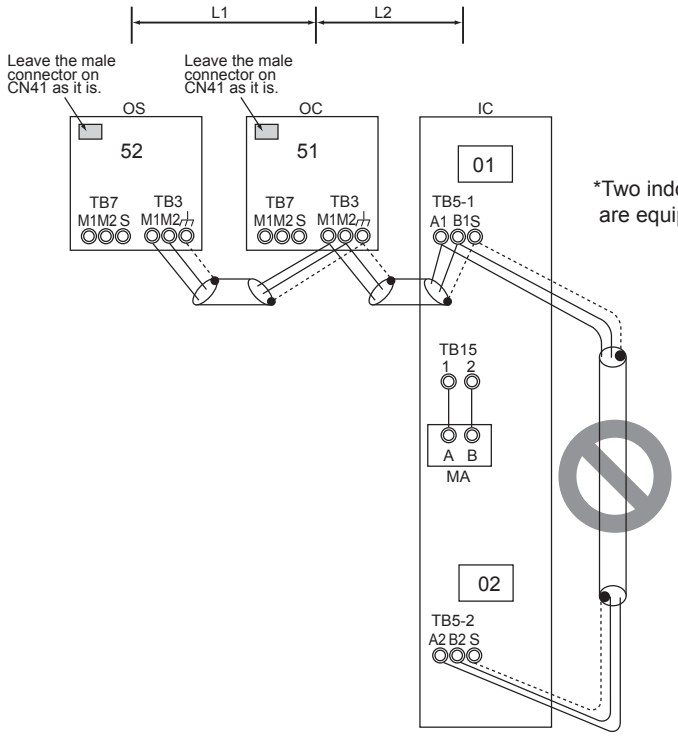
8-step demand		No.2 CN3D				
		1-2P	Open		Short-circuit	
No.1 CN3D	1-2P	1-3P	Open	Short-circuit	Open	Short-circuit
	Open	Open	100%	50%	88%	75%
		Short-circuit	50%	0%	38%	25%
	Short-circuit	Open	88%	38%	75%	63%
		Short-circuit	75%	25%	63%	50%

*1. The outdoor units whose SW4-4 is set to ON are designated as No. 1and No. 2 in the order of address from small to large.
Ex) When outdoor units whose SW4-4 is set to ON are designated as OC and OS, OC=No. 1 and OS=No. 2.

[4] An Example of a System to which an MA Remote Controller is connected

1. System with one refrigerant

(1) Sample control wiring



*Two indoor controllers (controller circuit boards) are equipped in the indoor unit (P500).

(2) Notes

1) Leave the male connector on the female power supply switch connector (CN41) on the outdoor unit as it is.
2) It is not necessary to provide grounding to S terminal on the terminal block for transmission line for centralized control (TB7).
3) Although two indoor controllers (controller circuit boards) are equipped inside the P500 models of indoor units, the board on No.2 side (lower side) is not used. Do not connect wiring to the lower controller circuit board.

(3) Maximum allowable length

1) Indoor/outdoor transmission line
   Maximum distance (1.25mm^2 [AWG16] or larger)
   L1+L2 ≦ 200m [656ft]

(4) Wiring method

1) Indoor/outdoor transmission line

Connect M1, M2 terminals of the indoor/outdoor transmission line terminal block (TB3) on the outdoor unit (OC and OS) and A1, B1 terminals of the indoor/outdoor terminal block (TB5-1) on the indoor unit (IC). (Non-polarized 2-core cable)

♦Only use shielded cables.

Shielded cable connection

Connect the earth terminal of the OC and S terminal of the IC terminal block (TB5-1).

2) Switch setting

Address setting is required as follows.

(5) Address setting method

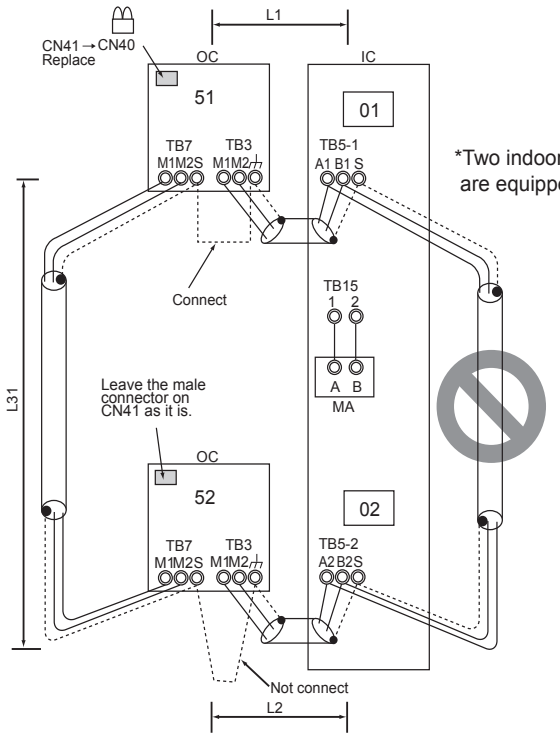
Procedures	Unit or controller			Address setting range	Setting method	Notes	Factory setting
1	Indoor unit	Main unit	IC	01 to 50	Assign a sequential odd number starting with "01" to the upper indoor controller.		00
		Sub unit	IC	01 to 50	Assign sequential numbers starting with the address of the main unit in the same group. (Main unit address +1)		
2	Outdoor unit		OC OS	51 to 100	Assign sequential numbers to the outdoor units starting with the number that equals the address of the indoor unit in the same refrigerant circuit plus 50.		00
3	MA remote controller	Main remote controller	MA	No settings required.	-		Main
		Sub remote controller	MA	Sub remote controller	Settings to be made with the sub/main switch		

Note

The outdoor units in the same refrigerant circuit are automatically designated as OC and OS.
Units are designated as OC and OS in the descending order of capacity (ascending order of address if the capacities are the same).

2. System with two refrigerant circuits

(1) Sample control wiring



(2) Notes

1) Assign the sequential number to the indoor units.
2) Do not connect the terminal blocks (TB5) on the indoor unitsthat are connected to different outdoor units with each other.
3) Replacement of male power supply switch connector(CN41) must be performed only on one of the outdoor units.
4) Provide grounding to S terminal on the terminal block for-transmission line for centralized control (TB7) on only one ofthe outdoor units.
5) When the power supply unit is connected to the transmission line for centralized control, leave the male connector on the female power supply switch connector (CN41) as it is. (Factory setting)

(3) Maximum allowable length

1) Indoor/outdoor transmission line
   Maximum distance (1.25mm^2 [AWG16] or larger)
   L1, L2 ≤ 200m [656ft]
2) Transmission line for centralized control
   Maximum line distance via outdoor unit.
   (1.25mm^2 [AWG16] or larger)
   L1+L31+L2 ≤ 500m [1640ft]

(4) Wiring method

1) Indoor/outdoor transmission line

Connect M1, M2 terminals of the indoor/outdoor transmission line terminal block (TB3) on the outdoor unit (OC) and A1, B1 terminals of the indoor/outdoor terminal block (TB5-1) on the indoor unit (IC). (Non-polarized 2-core cable)

♦Only use shielded cables.

Shielded cable connection

Connect the earth terminal of the OC and S terminal of the IC terminal block (TB5-1).

2) Transmission line for centralized control

Daisy-chain terminals M1 and M2 on the terminal block for transmission line for centralized control (TB7) on each outdoor unit (OC). Disconnect the male connector on the controller board from the female power supply switch connector (CN41), and connect it to the female power supply switch connector (CN40) on only one of the outdoor units.

♦Only use shielded cables.

Shielded cable connection

To ground the shielded cable, daisy-chain the S-terminals on the terminal block (TB7) on each of the outdoor units. Connect the S (shielded) terminal on the terminal block (TB7) on the outdoor unit whose male connector on CN41 was disconnected and connected to CN40 to the earth terminal(⏚) on the electric box.

3) Switch setting

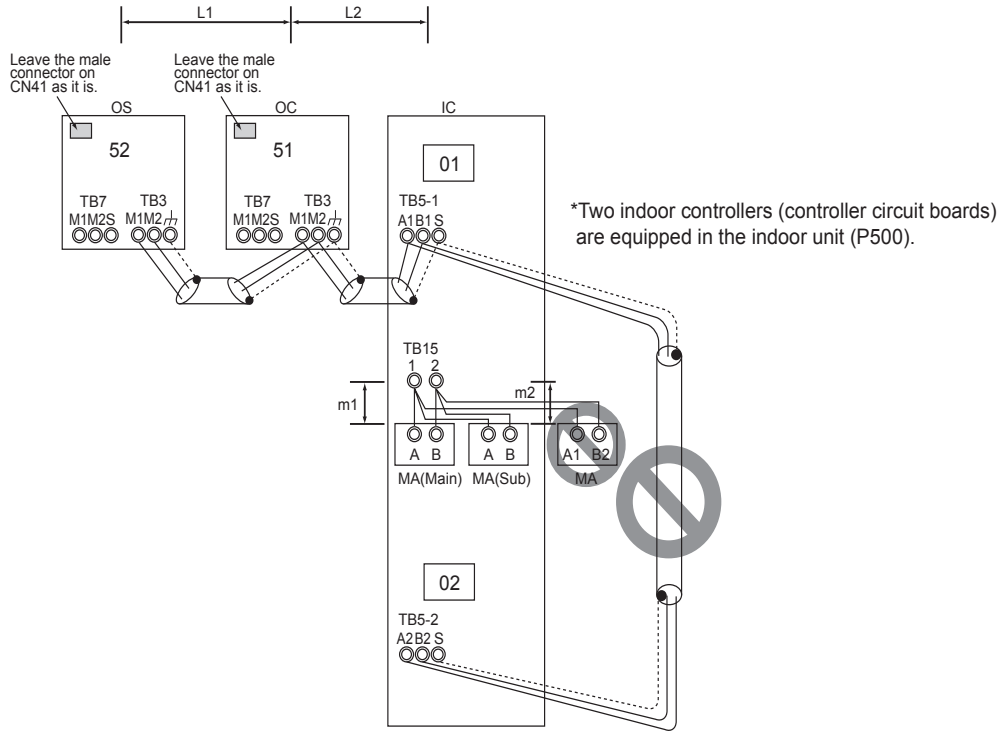
Address setting is required as follows.

(5) Address setting method

Procedures	Unit or controller			Address setting range	Setting method	Notes	Factory setting
1	Indoor unit	Main unit	IC	01 to 50	Assign a sequential odd number starting with "01" to the upper indoor controller.		00
		Sub unit	IC	01 to 50	Assign sequential numbers starting with the address of the main unit in the same group. (Main unit address +1)		
2	Outdoor unit		OC	51 to 100	Add 50 to the address assigned to the indoor unit connected to the system with one outdoor unit.		00
3	MA remote controller	Main remote controller	MA	No settings required.	-		Main
		Sub remote controller	MA	Sub remote controller	Settings to be made with the sub/main switch		

3. System in which two MA remote controllers are connected to one indoor unit

(1) Sample control wiring



(2) Notes

1) Leave the male connector on the female power supply switch connector (CN41) on the outdoor unit as it is.
2) It is not necessary to provide grounding to S terminal on the terminal block for transmission line for centralized control (TB7).
3) Although two indoor controllers (controller circuit boards) are equipped inside the P500 models of indoor units, the board on No.2 side (lower side) is not used. Do not connect wiring to the lower controller circuit board.
4) No more than two MA remote controllers (including both main and sub controllers) can be connected to a group of indoor units. If three or more MA remote controllers are connected, remove the wire for the MA remote controller from the terminal block (TB15).

(3) Maximum allowable length

1) Indoor/outdoor transmission line

   Same as [4] 1.
2) MA remote controller wiring

   Maximum overall line length (0.3 to 1.25mm^2 [AWG 22 to 16])

   m1+m2 ≤ 200m [656ft]

(4) Wiring method

1) Indoor/outdoor transmission line

   Same as [4] 1.

2) MA remote controller wiring

   When 2 remote controllers are connected to the system

   When two remote controllers are connected to the system, connect terminals 1 and 2 of the terminal block (TB15) on the indoor unit (IC) to the terminal block on the MA remote controllers (option).

   ♦Set the Main/Sub switch on the connected MA remote controllers (option) to SUB.(See the installation manual for the MA remote controller for the setting method.)

3) Switch setting

   Address setting is required as follows.

(5) Address setting method

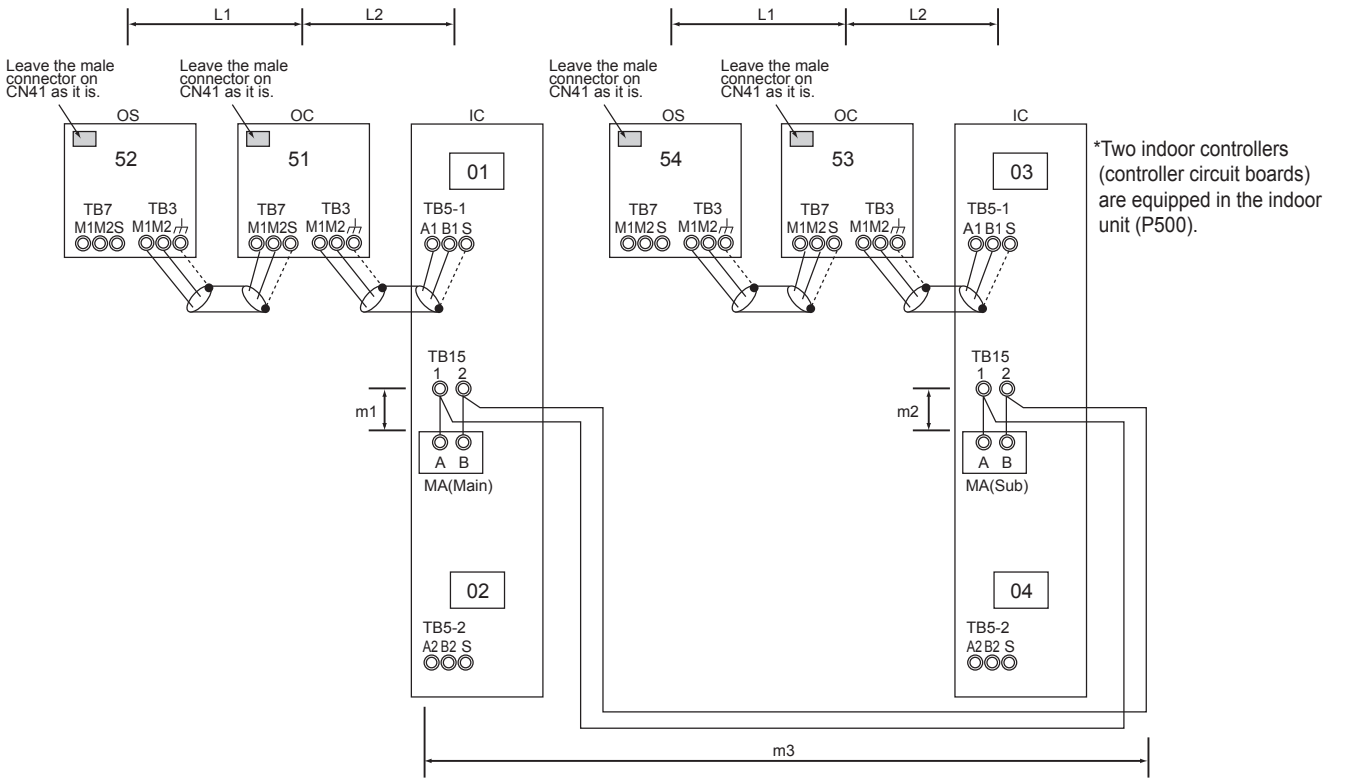
Procedures	Unit or controller			Address setting range	Setting method	Notes	Factory setting
1	Indoor unit	Main unit	IC	01 to 50	Assign a sequential odd number starting with "01" to the upper indoor controller.		00
		Sub unit	IC	01 to 50	Assign sequential numbers starting with the address of the main unit in the same group. (Main unit address +1)		
2	Outdoor unit		OC OS	51 to 100	Assign sequential numbers to the outdoor units starting with the number that equals the address of the indoor unit in the same refrigerant circuit plus 50.		00
3	MA remote controller	Main remote controller	MA	No settings required.	-		Main
		Sub remote controller	MA	Sub remote controller	Settings to be made with the sub/main switch		

Note

The outdoor units in the same refrigerant circuit are automatically designated as OC and OS.
Units are designated as OC and OS in the descending order of capacity (ascending order of address if the capacities are the same).

4. System in which two indoor units are grouped with the MA remote controller

(1) Sample control wiring



(2) Notes

1) Leave the male connector on the female power supply switch connector (CN41) on the outdoor unit as it is.
2) It is not necessary to provide grounding to S terminal on the terminal block for transmission line for centralized control (TB7).
3) Although two indoor controllers (controller circuit boards) are equipped inside the P500 models of indoor units, the board on No.2 side (lower side) is not used. Do not connect wiring to the lower controller circuit board.
4) No more than two MA remote controllers (including both main and sub controllers) can be connected to a group of indoor units. If three or more MA remote controllers are connected, remove the wire for the MA remote controller from the terminal block (TB15).

(3) Maximum allowable length

1) Indoor/outdoor transmission line

   Same as [4] 1.
2) MA remote controller wiring

   Maximum overall line length (0.3 to 1.25mm^2 [AWG22 to 16])

   m1+m2+m3 ≤ 200m [656ft]

(4) Wiring method

1) Indoor/outdoor transmission line

   Same as [4] 1.

2) MA remote controller wiring

   Group operation of indoor units

   To perform a group operation of indoor units (IC), daisy-chain terminals 1 and 2 on the terminal block (TB15) on all indoor units (IC). (Non-polarized 2-core cable)

   ♦Set the Main/Sub switch on one of the MA remote controllers to SUB.

3) Switch setting

   Address setting is required as follows.

(5) Address setting method

Procedures	Unit or controller			Address setting range	Setting method	Notes	Factory setting
1	Indoor unit	Main unit	IC	01 to 50	Assign a sequential odd number starting with "01" to the upper indoor controller.		00
		Sub unit	IC	01 to 50	Assign sequential numbers starting with the address of the main unit in the same group. (Main unit address +1)		
2	Outdoor unit		OC OS	51 to 100	Assign sequential numbers to the outdoor units starting with the number that equals the address of the indoor unit in the same refrigerant circuit plus 50.		00
3	MA remote controller	Main remote controller	MA	No settings required.	-		Main
		Sub remote controller	MA	Sub remote controller	Settings to be made with the sub / main switch		

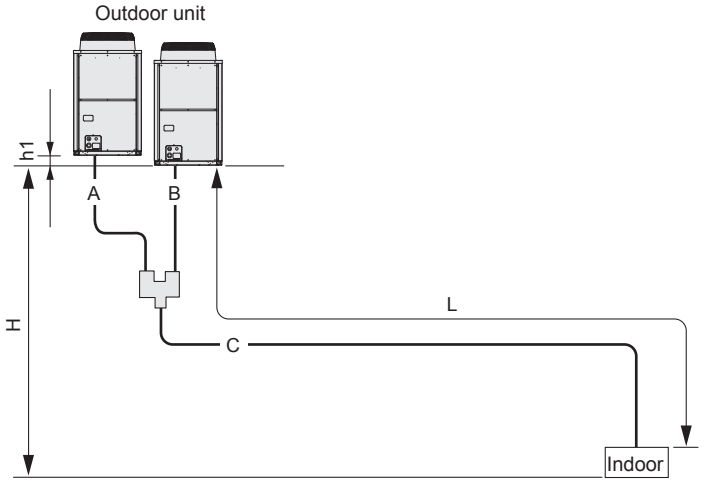
Note

The outdoor units in the same refrigerant circuit are automatically designated as OC and OS.
Units are designated as OC and OS in the descending order of capacity (ascending order of address if the capacities are the same).

[5] Restrictions on Pipe Length

1. Sample connection

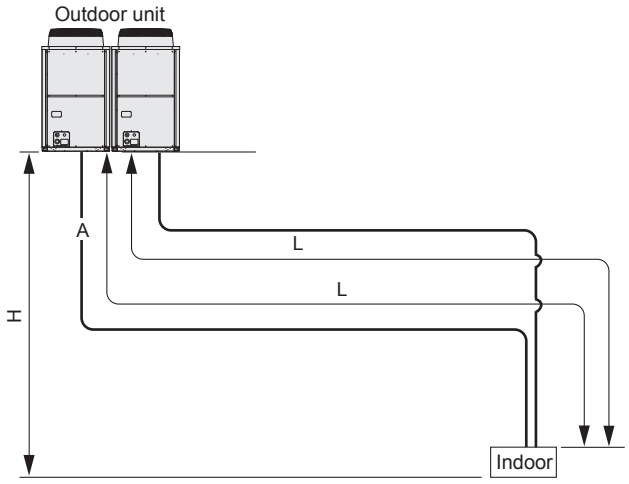
(1) System with one refrigerant circuit (P500 model)



Unit: m [ft]

Operation		Pipe sections	Allowable length of pipes
Length	Between outdoor units	A+B	10 [32] or less
	Total pipe length (L) from the outdoor unit to the farthest indoor unit	A(B)+C	165 [541] or less (Equivalent length 190 [623] or less)
Height difference	Between indoor and outdoor units	H	50m [164ft] or less (40m [131ft] or less when the outdoor unit is lower, 15m [49ft] when the outdoor temperature is 10°C [50°F] or lower)
	Between outdoor units	h1	0.1 [0.3] or less

(2) System with two refrigerant circuits (P250, P500 models)



Allowable length	Total pipe length (L) from the outdoor unit to thefarthest indoor unit	Actual length 165m [541ft] or less
Allowable height difference	Height difference between the indoor and the outdoor units (H)	50m [164ft] or less (40m [131ft] or less when the outdoor unit is lower, 15m [49ft] when the outdoor temperature is 10°C [50°F] or lower)

2. Refrigerant pipe size

(1) Diameter of the refrigerant pipe between the outdoor unit and the first branch (outdoor unit pipe size)

Outdoor unit set name (total capacity)	Liquid pipe size (mm) [inch]	Gas pipe size (mm) [inch]
250 model	ø9.52 [3/8"] *1	ø22.2 [7/8"]

*1 Use ø12.7 [1/2"] pipes if the piping length exceeds 90 m [295 ft].

(2) Size of the refrigerant pipe between the first branch and the indoor unit (indoor unit pipe size)

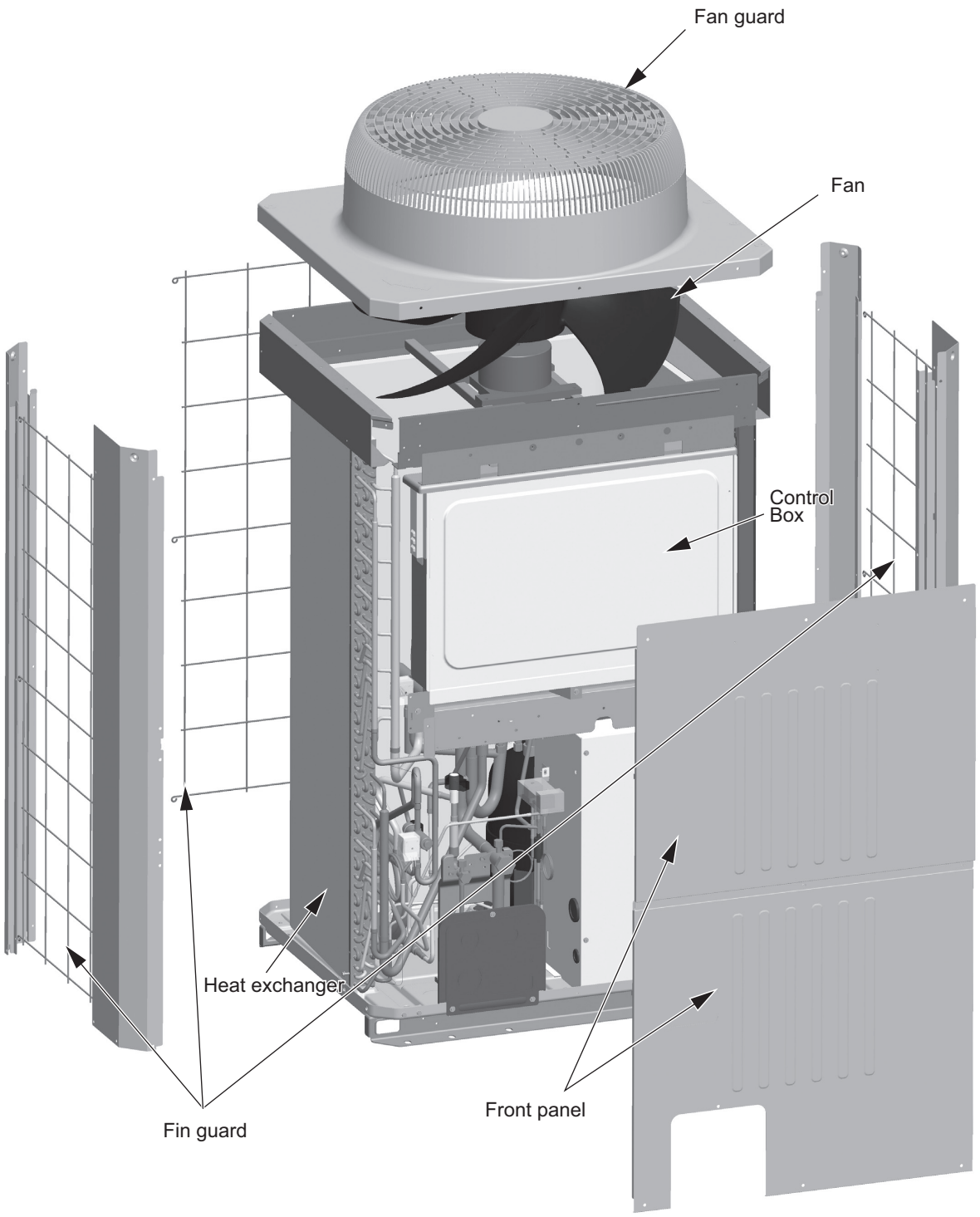
model	Pipe diameter (mm) [inch]	
250 model	Liquid pipe	ø9.52 [3/8"]
	Gas pipe	ø22.2 [7/8"]
500 model	Liquid pipe	ø15.88 [5/8"]
	Gas pipe	ø28.58 [1-1/8"]

III Outdoor Unit Components

[1] Outdoor Unit Components and Refrigerant Circuit

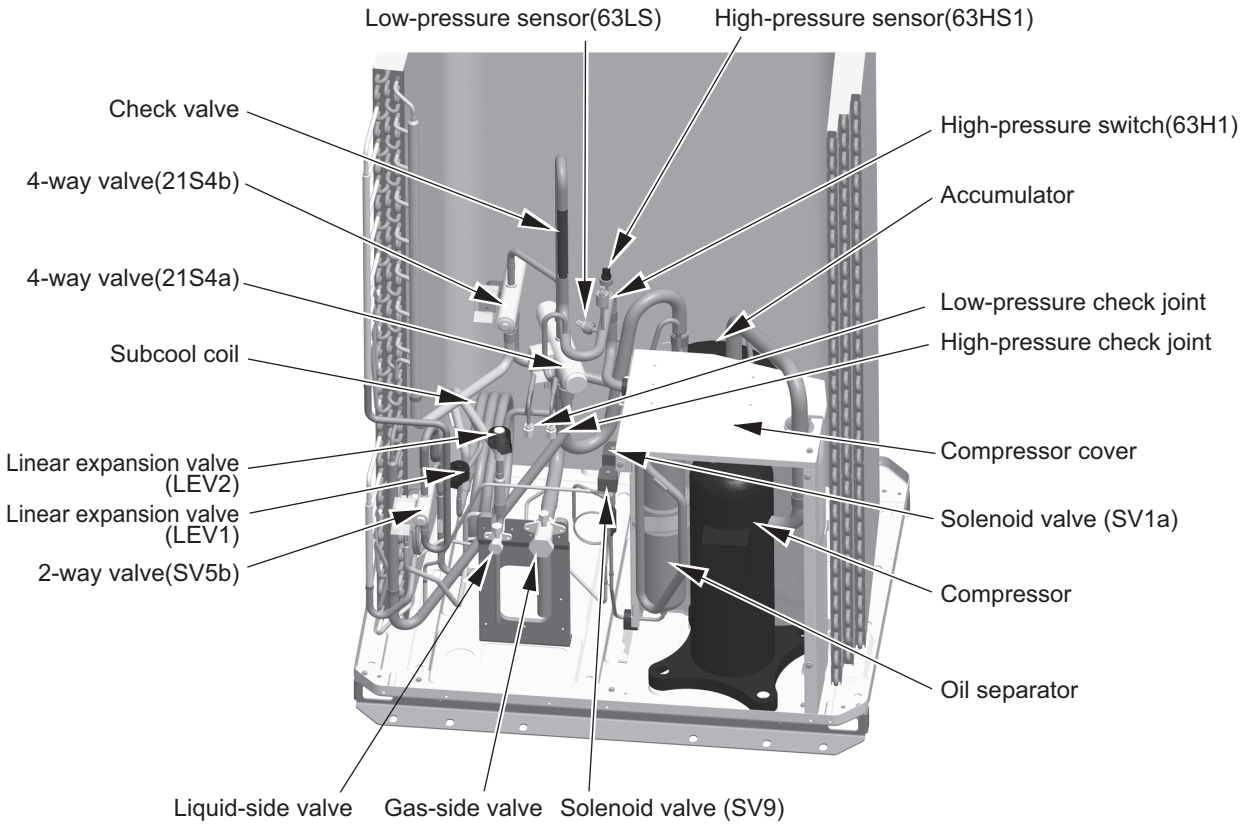
1. PUHY-P250YJM-A

(1) Front view of a outdoor unit



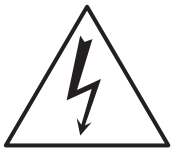
2. PUHY-P250YJM-A

(1) Refrigerant circuit

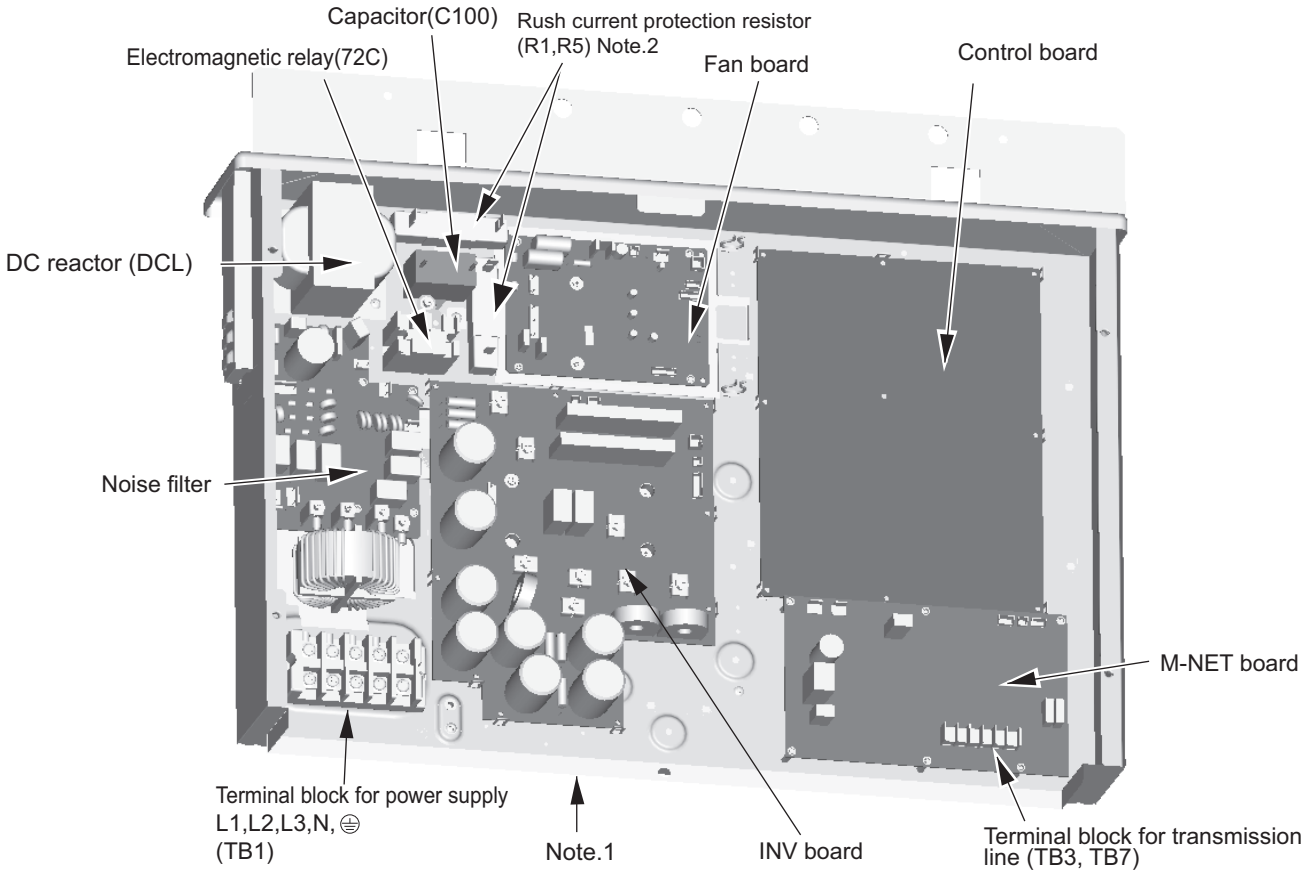


[2] Control Box of the Outdoor Unit

<HIGH VOLTAGE WARNING>



- Control box houses high-voltage parts.
- When opening or closing the front panel of the control box, do not let it come into contact with any of the internal components.
- Before inspecting the inside of the control box, turn off the power, keep the unit off for at least 10 minutes, and confirm that the voltage between FT-P and FT-N on INV Board has dropped to DC20V or less. (It takes about 10 minutes to discharge electricity after the power supply is turned off.)

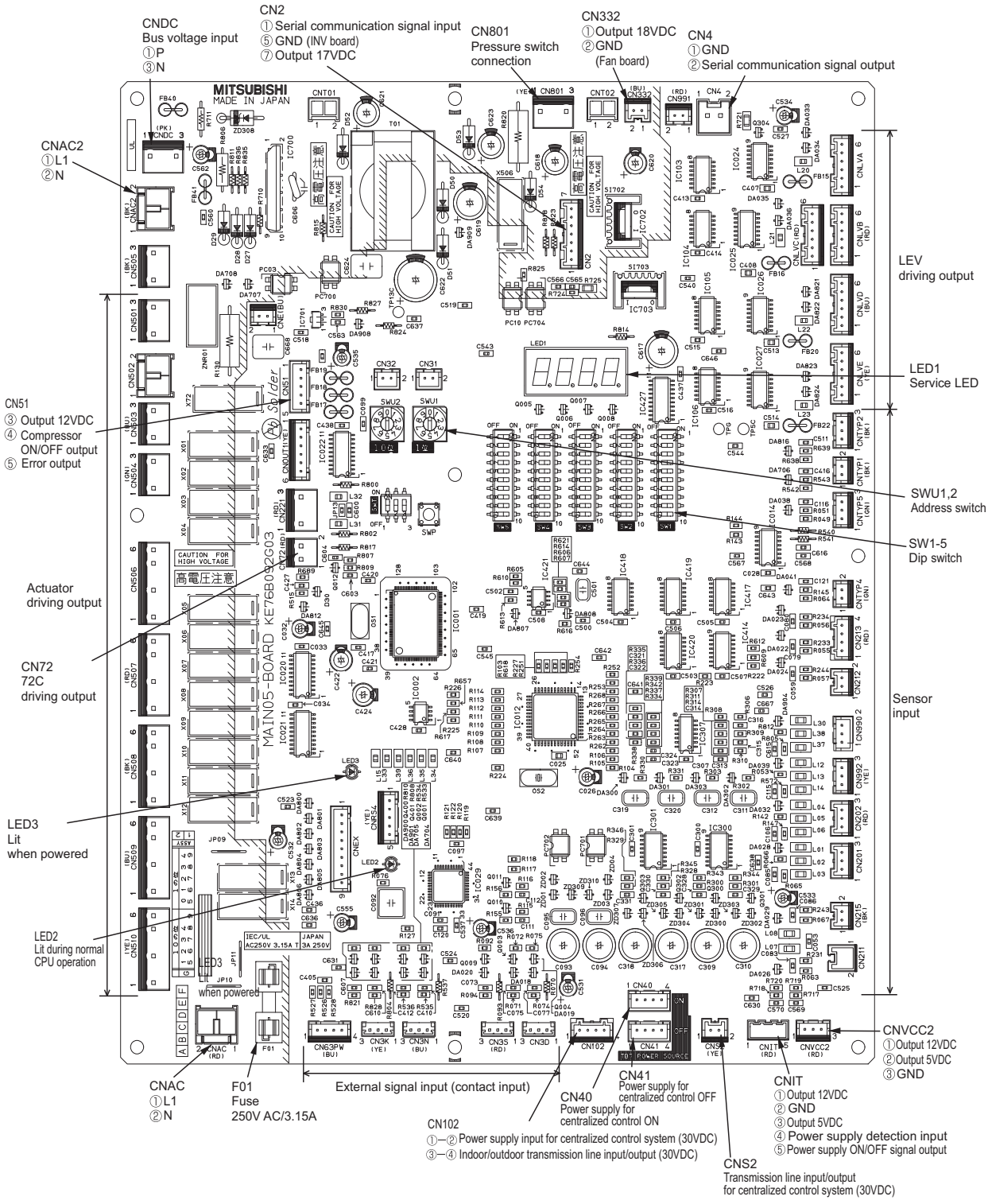


Note

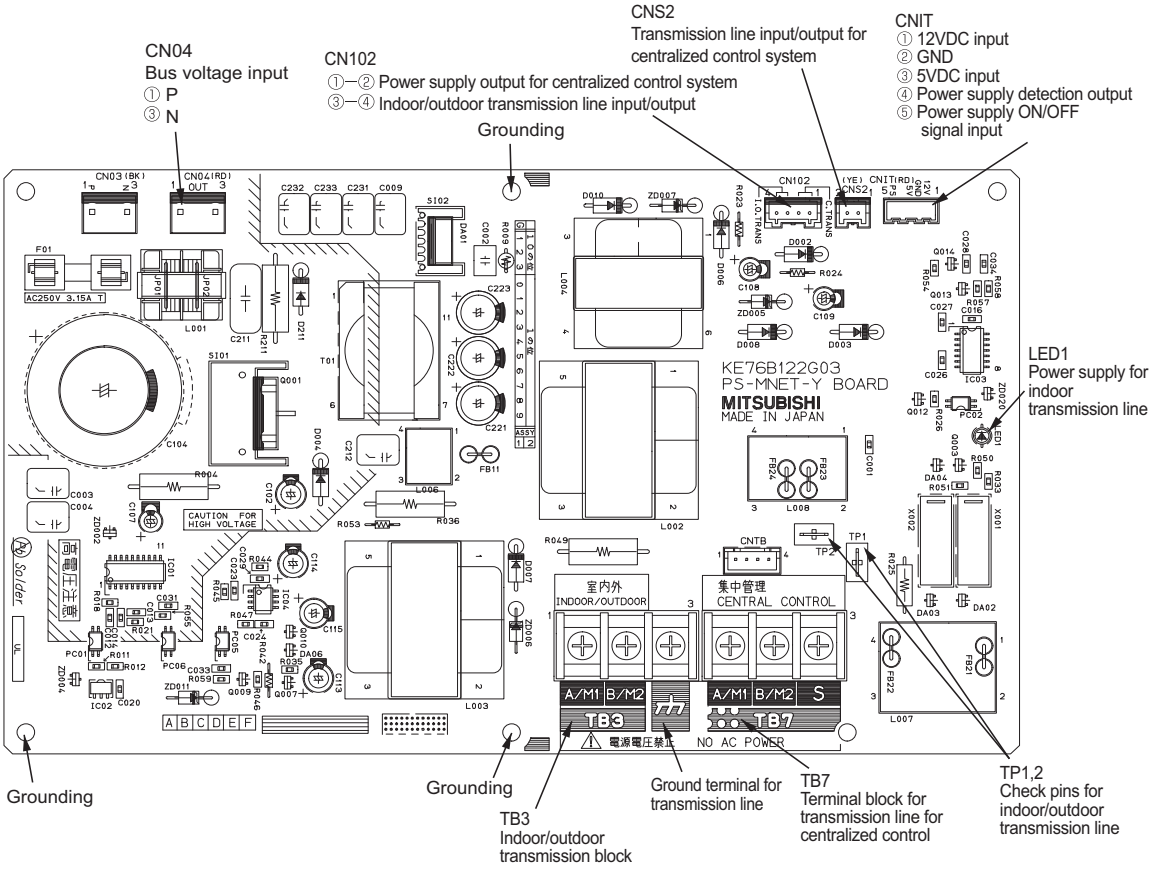
1) Exercise caution not to damage the bottom and the front panel of the control box. Damage to these parts affect the water-proof and dust proof properties of the control box and may result in damage to its internal components.
2) Faston terminals have a locking function. Make sure the cable heads are securely locked in place. Press the tab on the terminals to remove them.

[3] Outdoor Unit Circuit Board

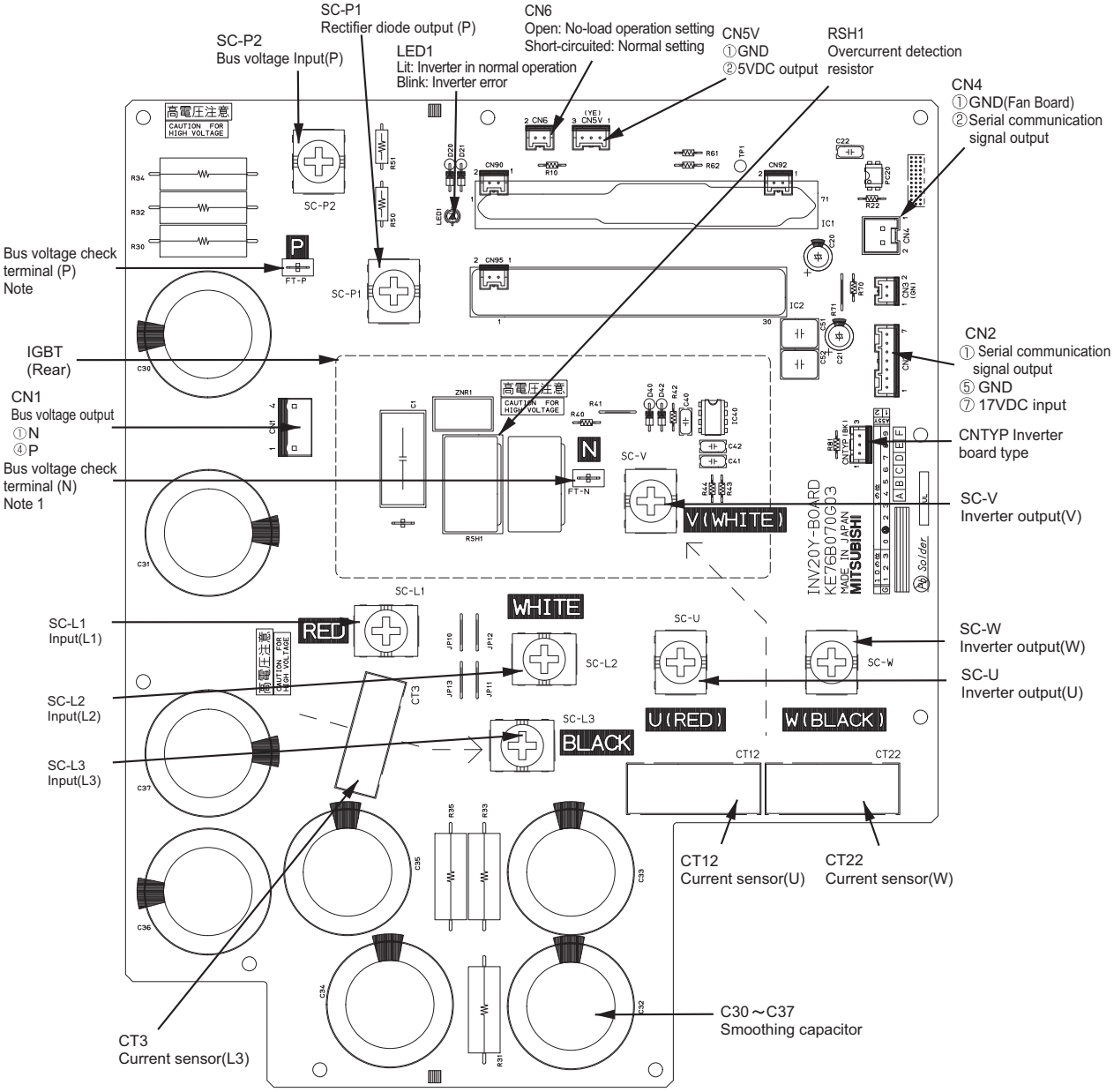
1. Outdoor unit control board



2. M-NET board


CN04
Bus voltage input
① P
③ N
CN102
①—② Power supply output for centralized control system
③—④ Indoor/outdoor transmission line input/output
CNS2
Transmission line input/output for centralized control system
CNIT
① 12VDC input
② GND
③ 5VDC input
④ Power supply detection output
⑤ Power supply ON/OFF signal input
Grounding
LED1
Power supply for indoor transmission line
KE76B122G03
PS-MNET-Y BOARD
MITSUBISHI
MADE IN JAPAN
室内外
INDOOR/OUTDOOR
集中管理
CENTRAL CONTROL
A/M1 B/M2
A/M1 B/M2 S
TB3
TB7
NO AC POWER
Grounding
Grounding
TB3
Indoor/outdoor transmission block
Ground terminal for transmission line
TB7
Terminal block for transmission line for centralized control
TP1,2
Check pins for indoor/outdoor transmission line

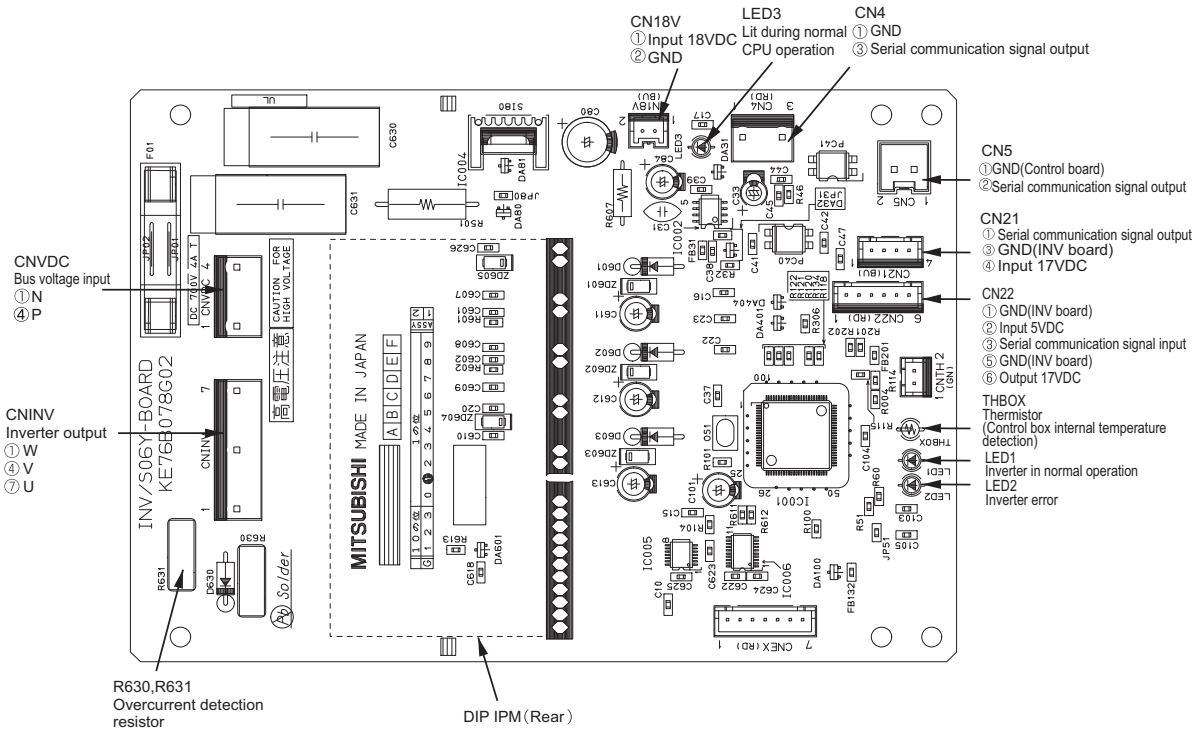
3. INV board



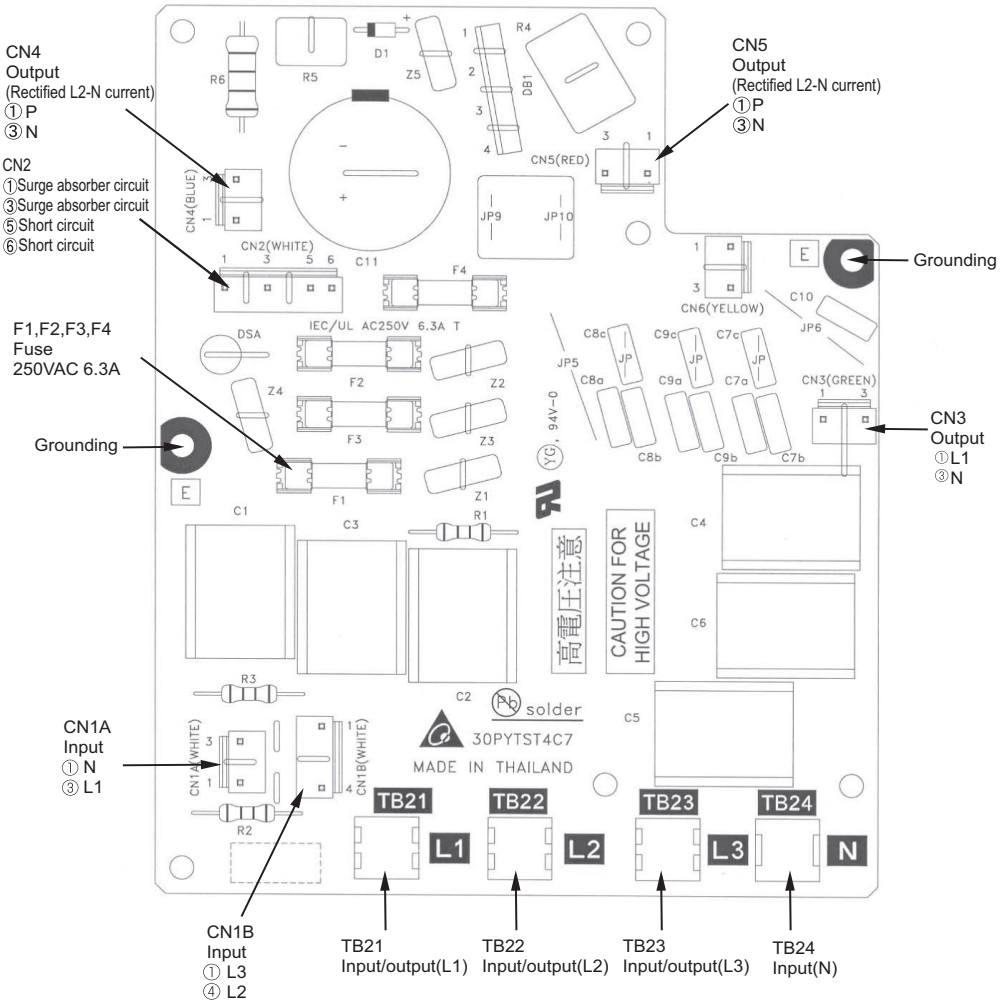
Note

1) Before inspecting the inside of the control box, turn off the power, keep the unit off for at least 10 minutes, and confirm that the voltage between FT-P and FT-N on INV Board has dropped to DC20V or less.
It takes about 10 minutes to discharge electricity after the power supply is turned off.

4. Fan board


CN18V
①Input 18VDC
②GND
LED3
Lit during normal
CPU operation
CN4
① GND
③ Serial communication signal output
CN5
①GND(Control board)
②Serial communication signal output
CN21
① Serial communication signal output
③ GND(INV board)
④ Input 17VDC
CN22
① GND(INV board)
② Input 5VDC
③ Serial communication signal input
⑤ GND(INV board)
⑥ Output 17VDC
THBOX
Thermistor
(Control box internal temperature detection)
LED1
Inverter in normal operation
LED2
Inverter error
CNVDC
Bus voltage input
①N
④P
CNINV
Inverter output
① W
④ V
⑦ U
R630,R631
Overcurrent detection resistor
DIP IPM（Rear）
INV/S06Y-BOARD
KE76B078G02
MITSUBISHI MADE IN JAPAN

5. Noise Filter

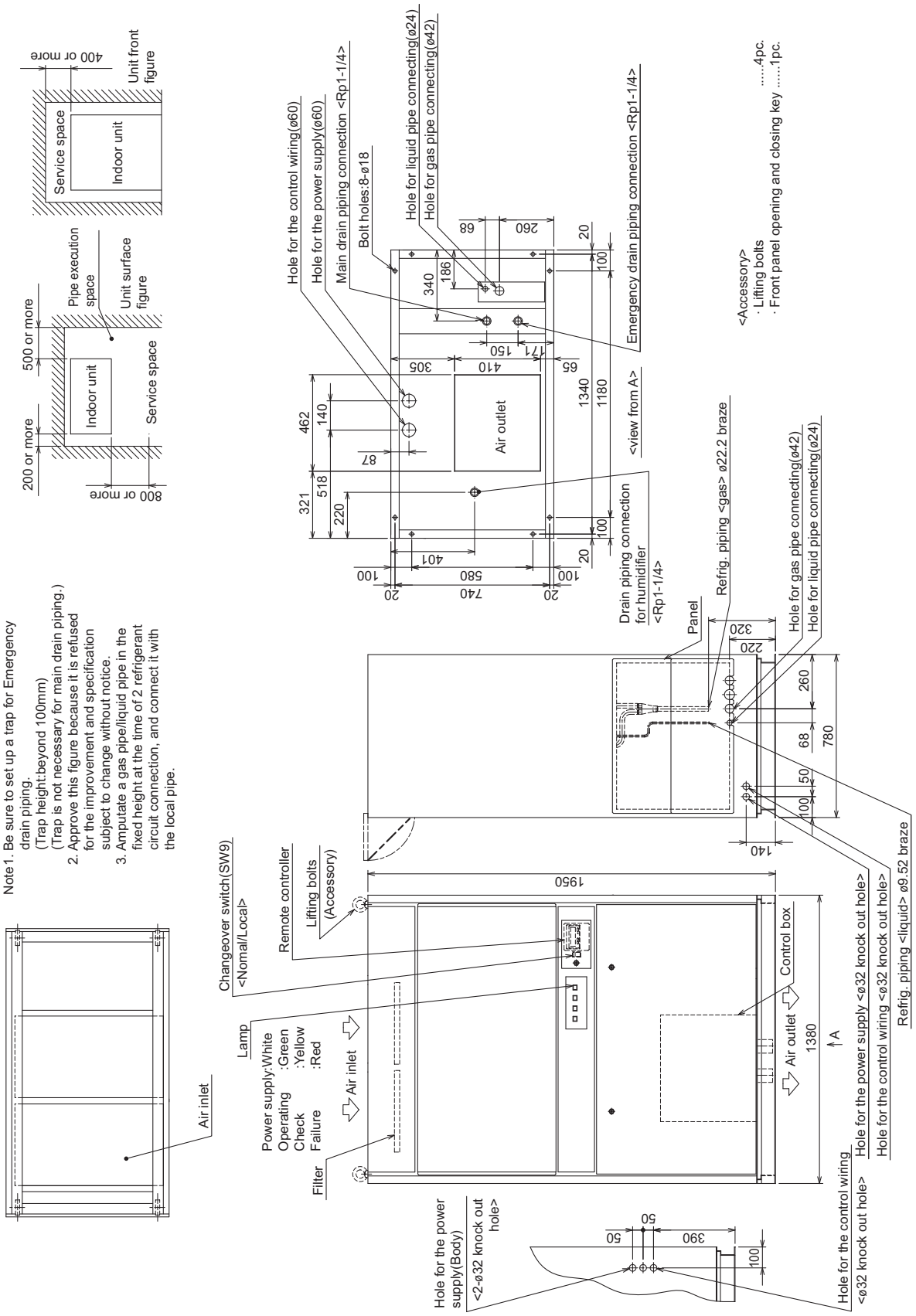


Ⅳ Indoor Unit Components

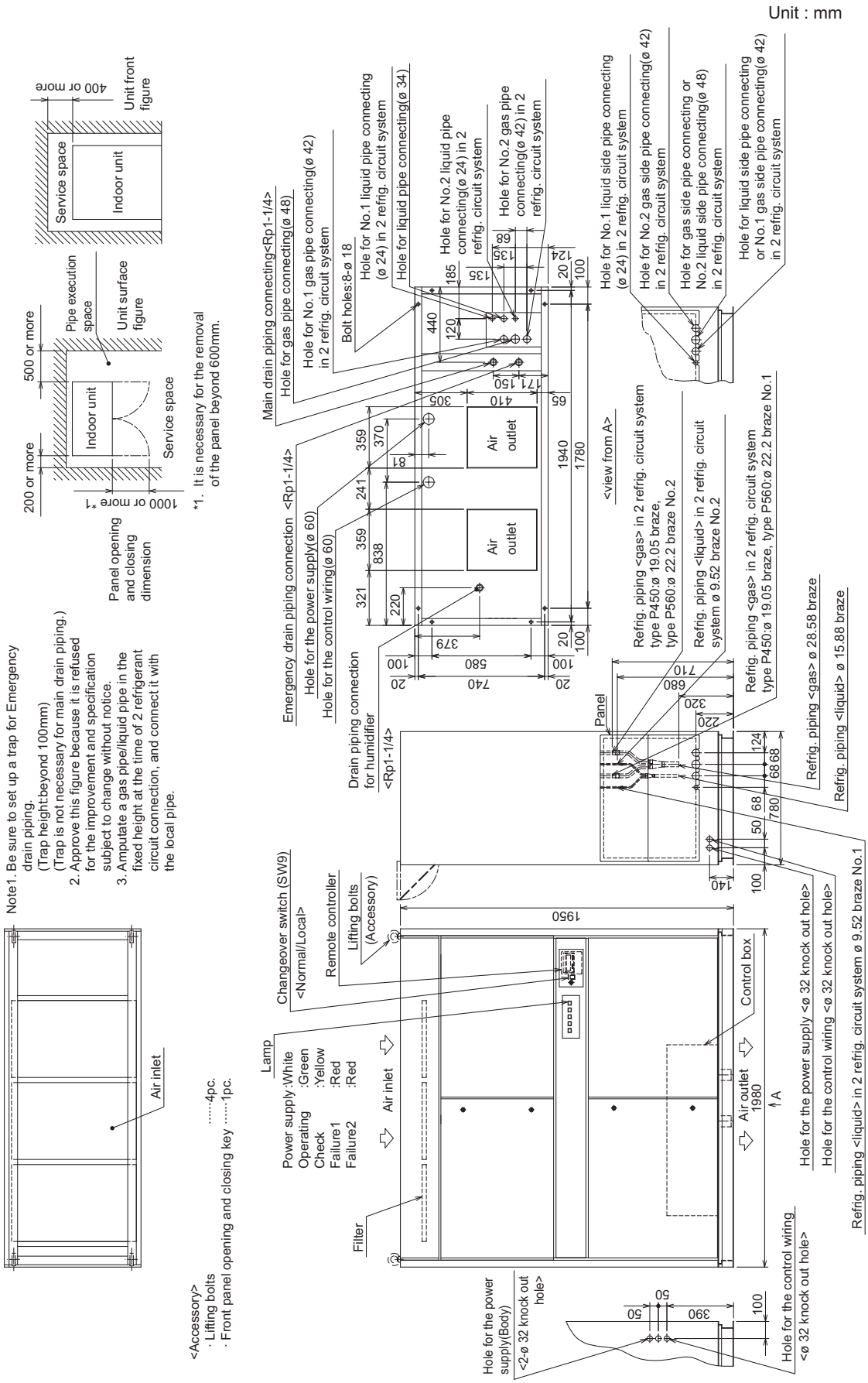
[1] External Dimensions

1. PFD-P250VM-E model

Unit : mm



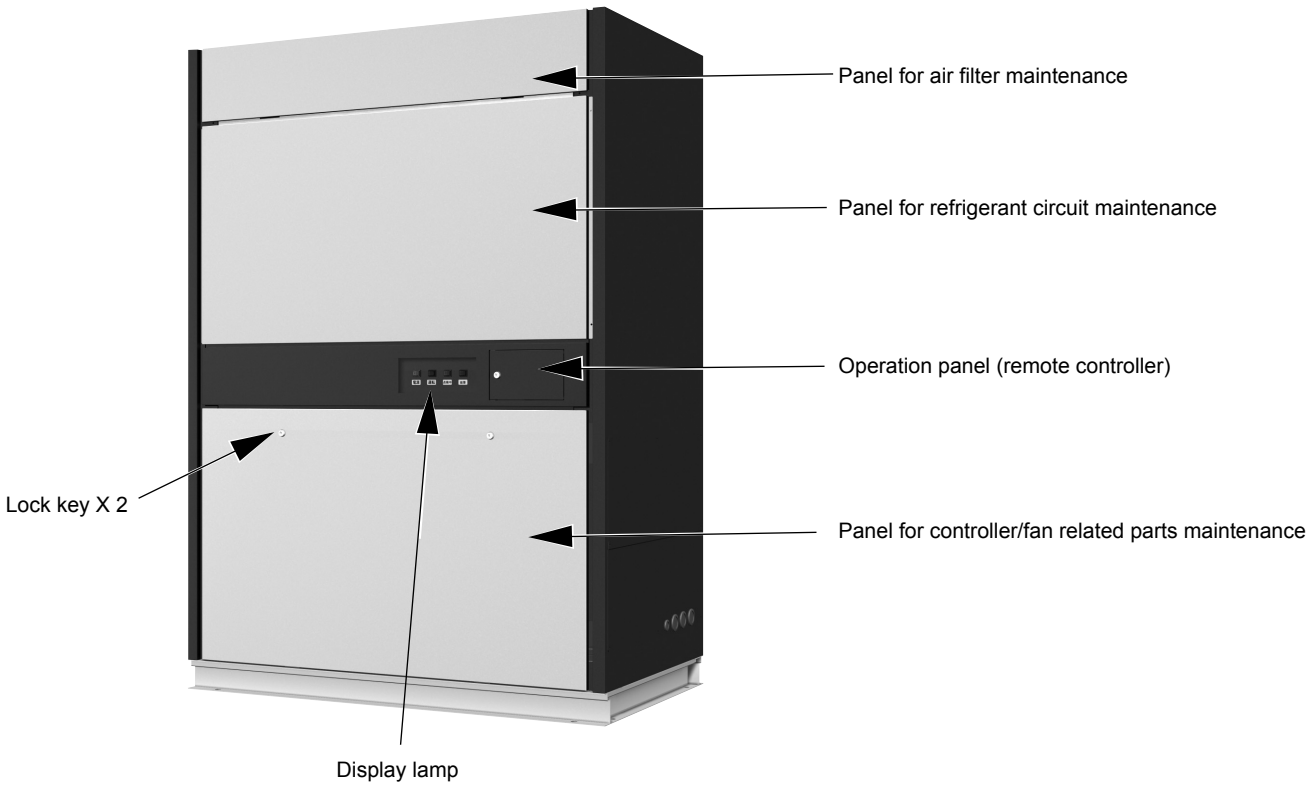
2. PFD-P500VM-E model



[2] Indoor Unit Components and Internal Structure

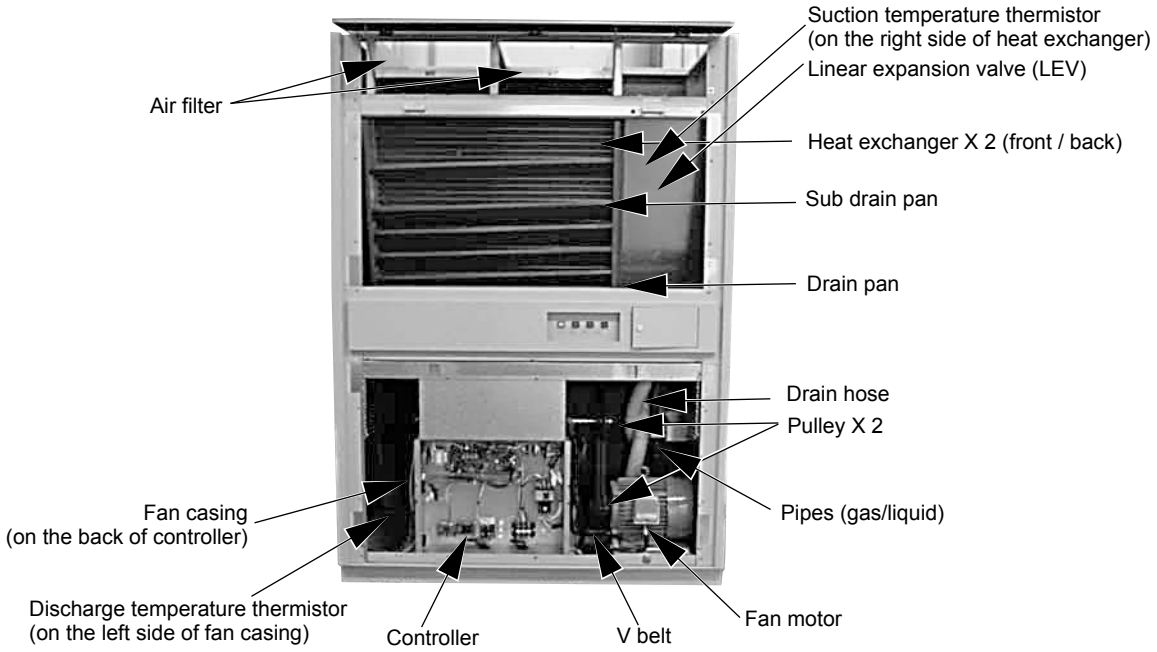
1. PFD-P250VM-E model

(1) Front view of a indoor unit

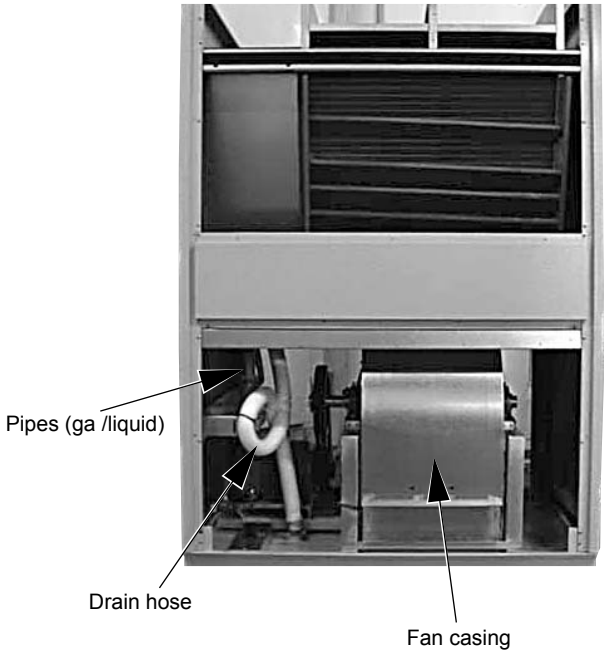


(2) Rear view of a indoor unit

(3) Front view of internal structure

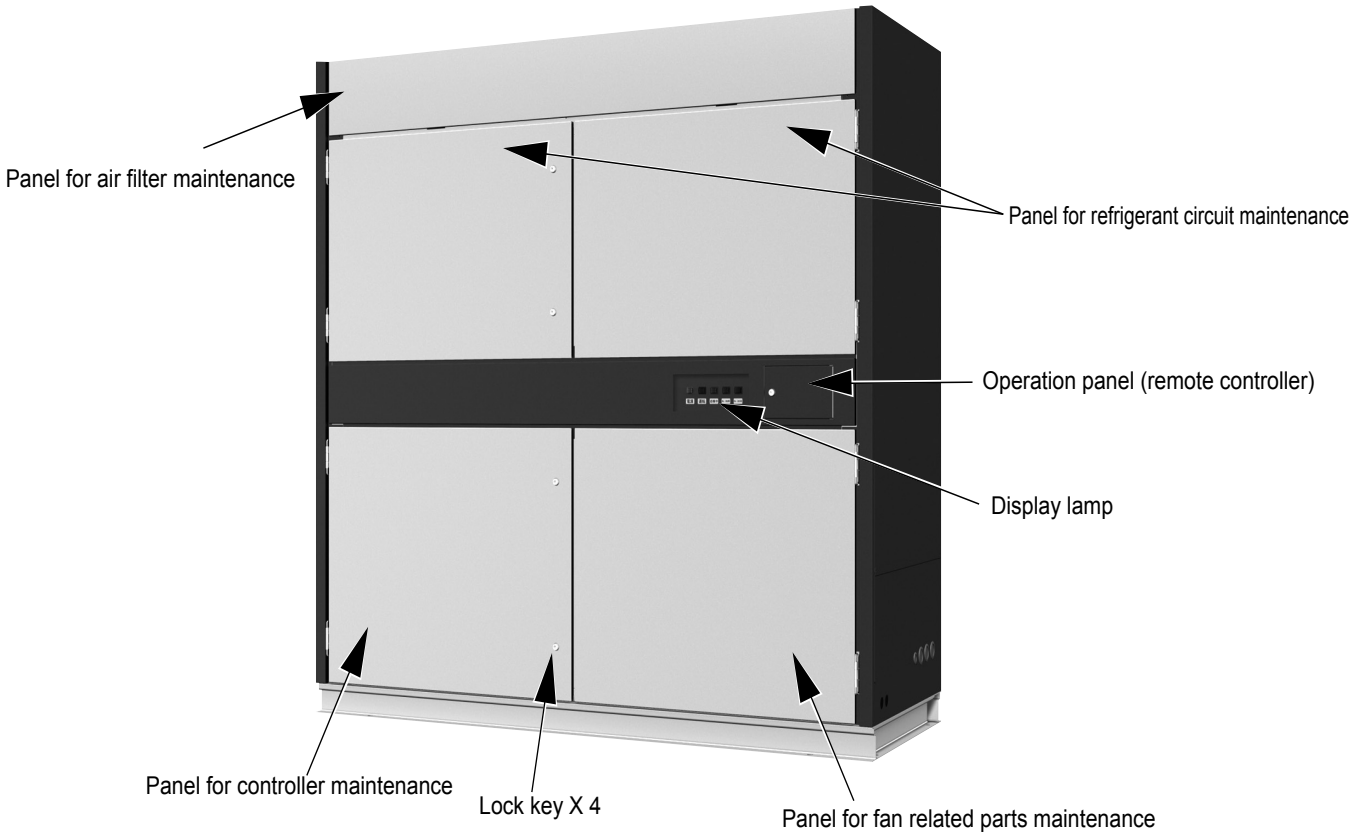


(4) Rear view of internal structure



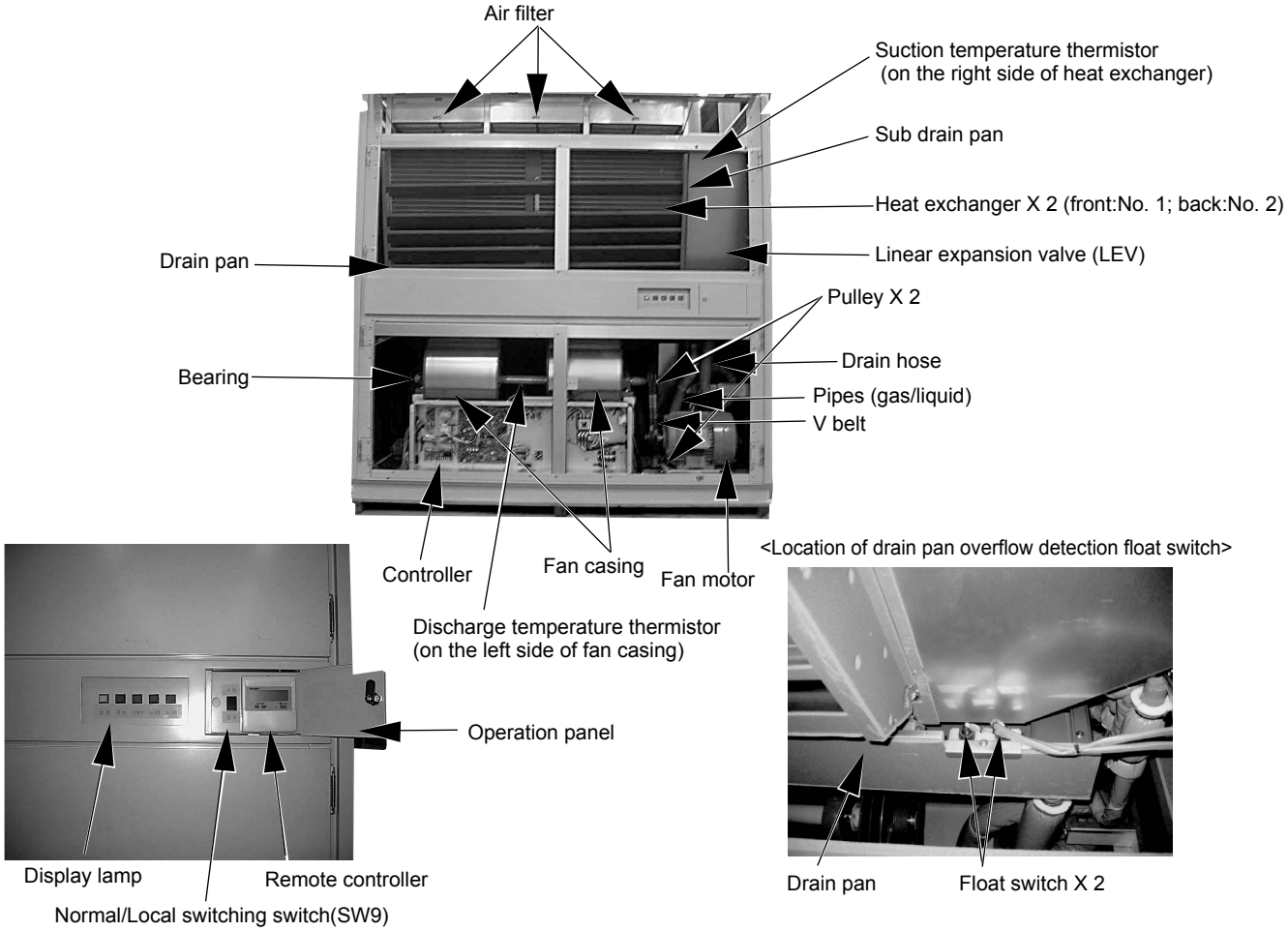
2. PFD-P500VM-E model

(1) Front view of a indoor unit

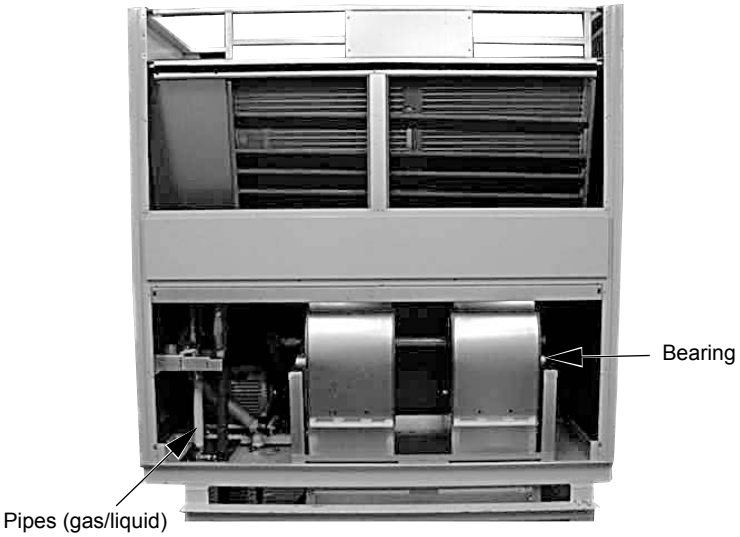


(2) Rear view of a indoor unit

(3) Front view of internal structure

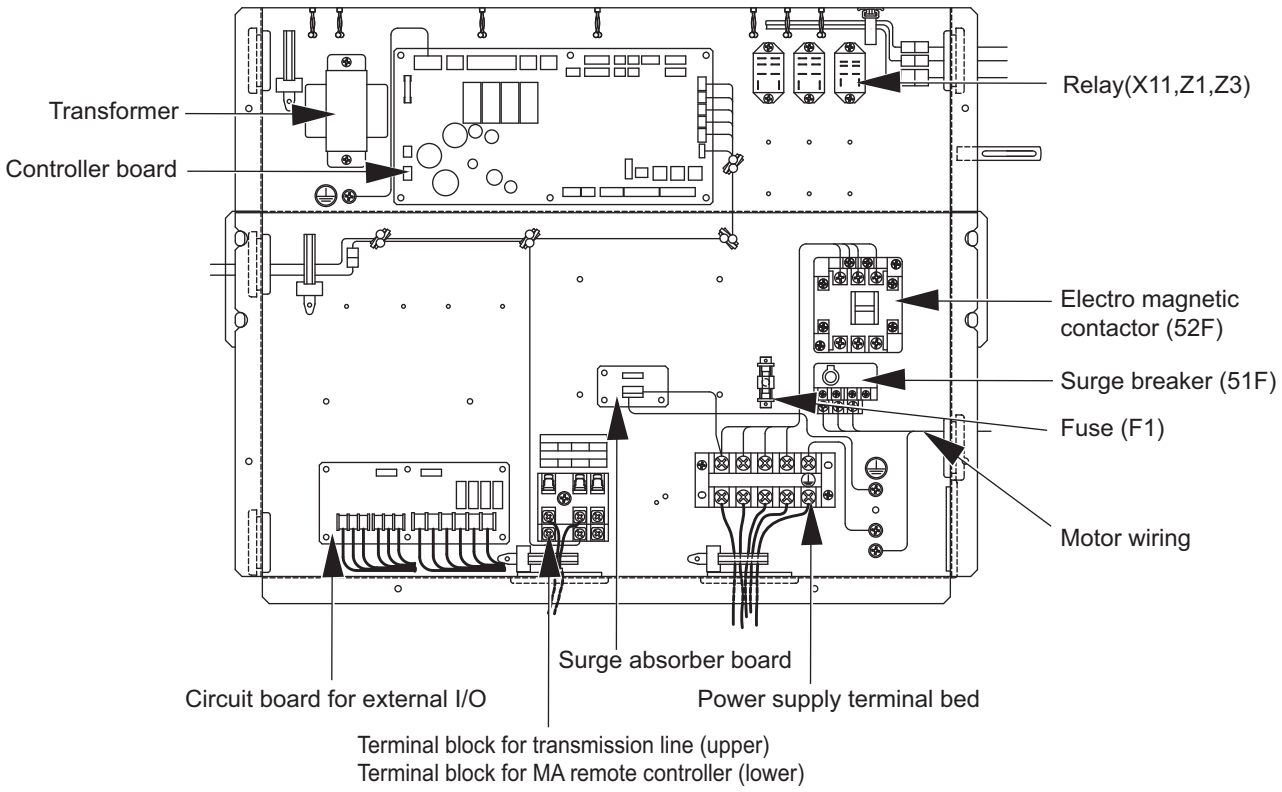


(4) Rear view of internal structure

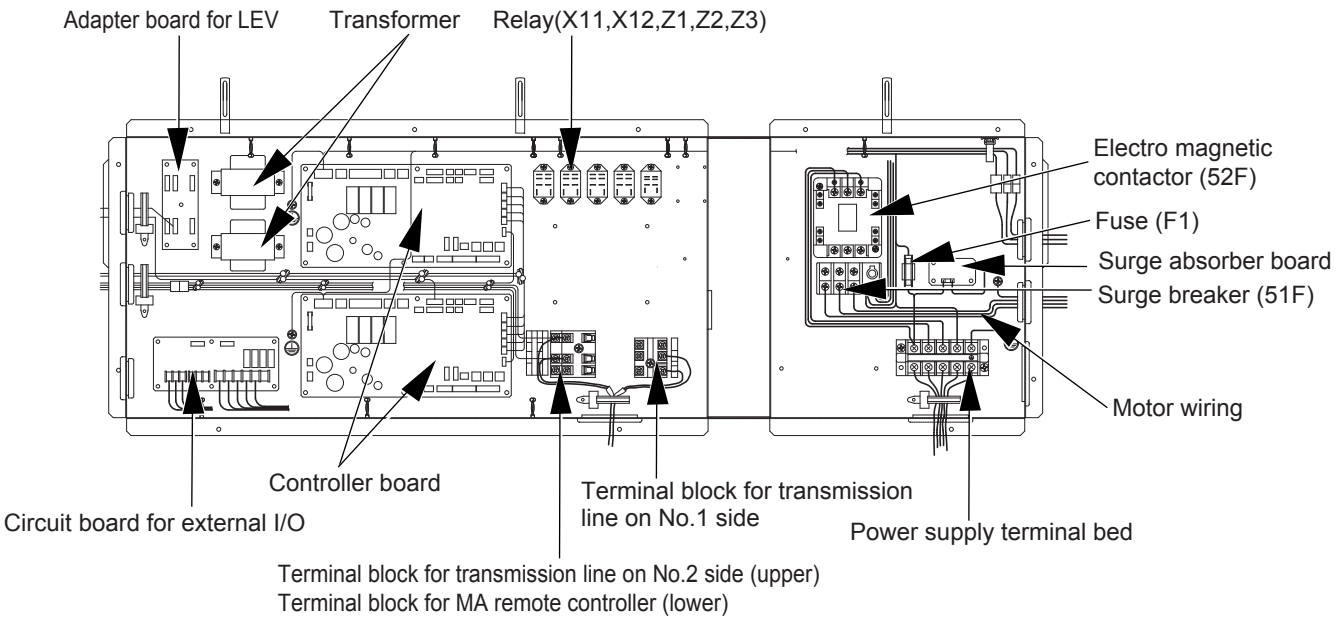


[3] Control Box of the Indoor Unit

1. PFD-P250VM-E model



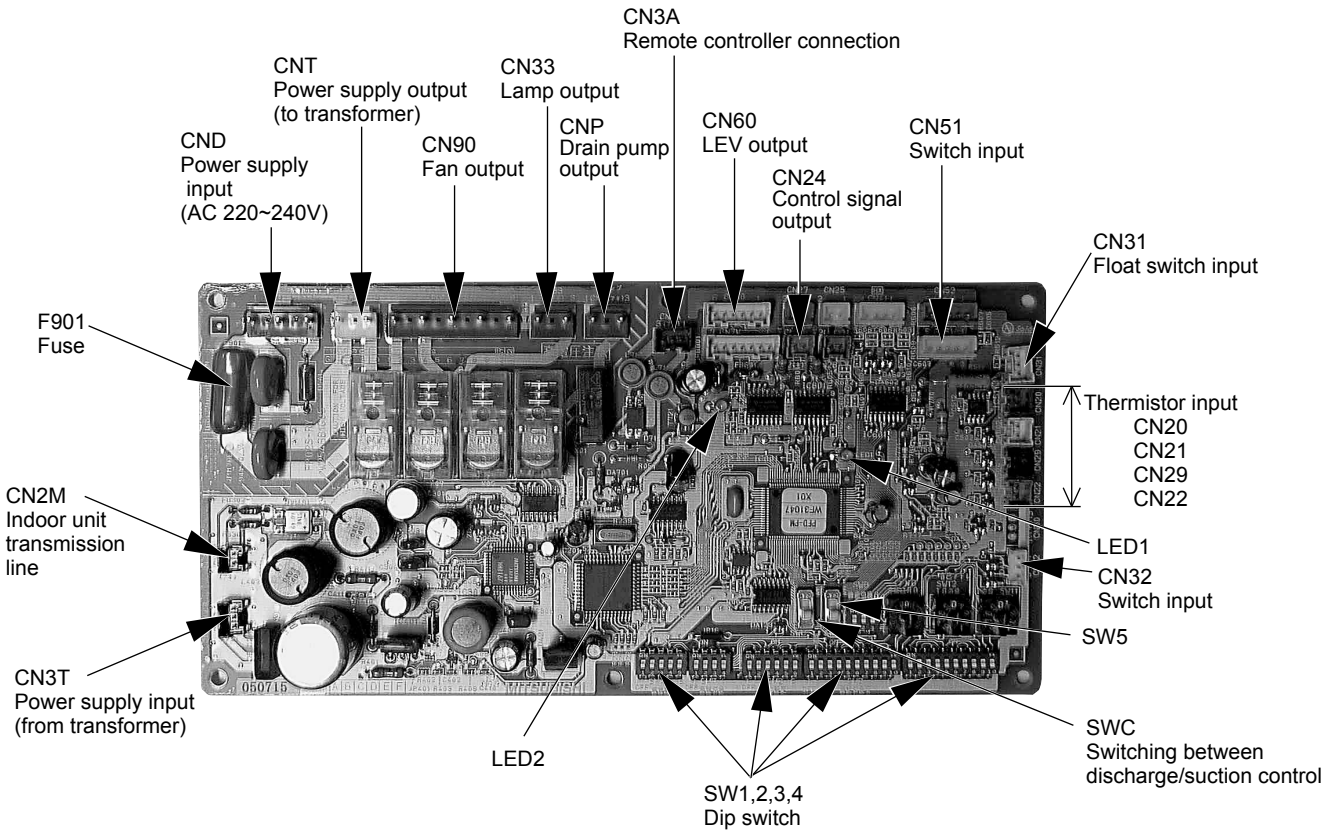
2. PFD-P500VM-E model



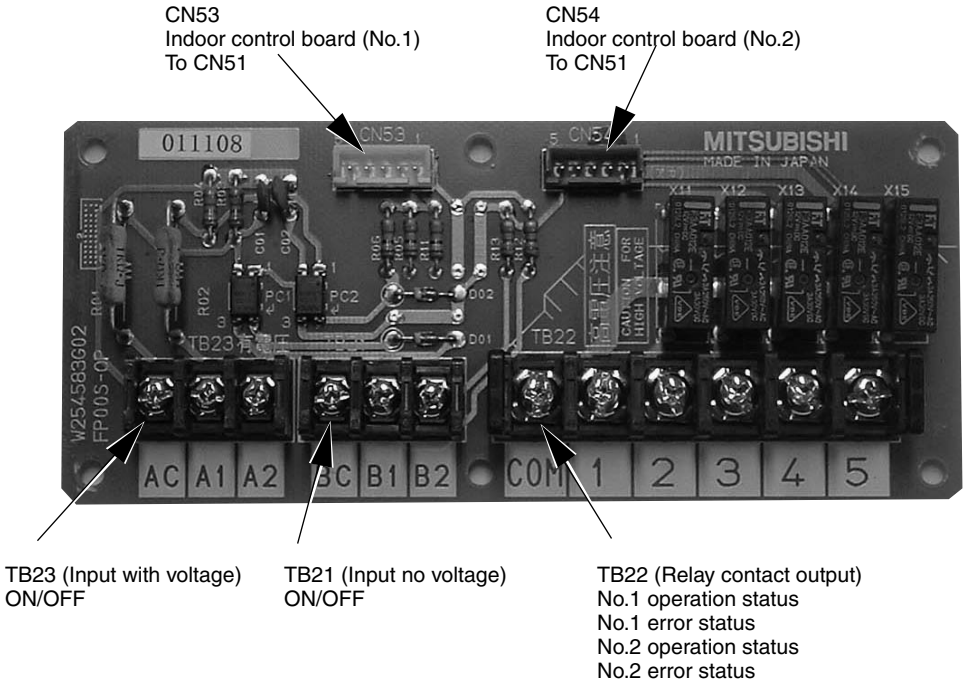
[4] Indoor Unit Circuit Board

1. PFD-P250,P500VM-E models

(1) Indoor Control Board



(2) External Input/Output Circuit Board



[5] Separating the top and bottom of the unit

The top and the bottom of the unit can be separated. (Requires brazing)
When separating the top and the bottom of the unit, perform the work on a level surface.

Follow the procedures below when separating the sections.

Necessary tools and materials:

- Ratchet wrench with a socket size of 17 mm (for M10)
- General tools
- Cable ties (for wires)
- Gray vinyl tape (for pipes)
- Supporting wood piece Height 800 mm x width 100 mm x thickness 20 (mm) 1 piece

(1) Removing the decoration panel and filter
<Model 250>
- Remove the front panels (2), rear panels (2), and the side panels (2) in this order by removing the hinges and the screws on the unit as shown in [Fig.1].
- Open the filter cover and remove the filters (2 filters).

<Model 500>
- Remove the front panels (4), rear panels (3), and the side panels (2) in this order by removing the hinges and screws on the unit as shown in [Fig.1].
- Open the filter cover and remove the filters (3 filters).

(2) Disconnecting the electric wires
- Disconnect the wiring connectors from the remote controller, thermistor, float switch, lamp , and linear expansion valve as shown in [Fig.2].
- After removing the connectors, pull out the wires from the control box.
- Unclamp the wires from the frame.
- Put all wires together in a bundle on the unit.

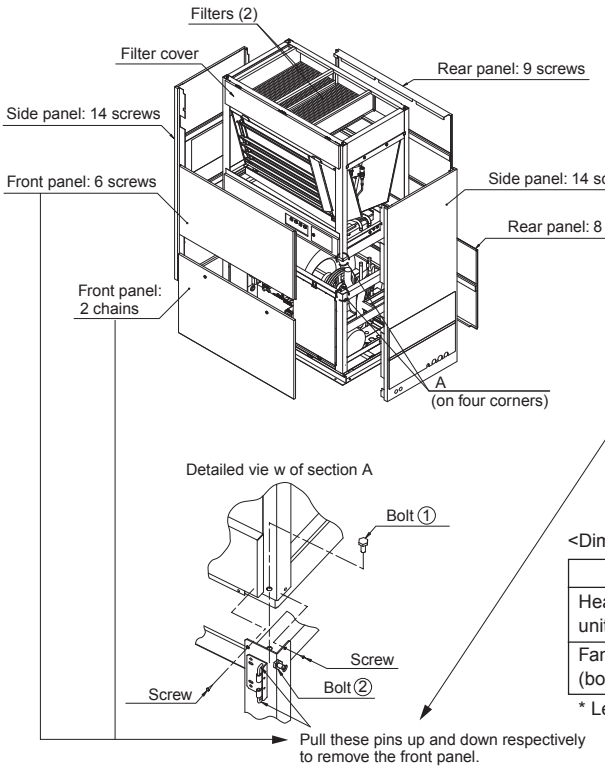
(3) Removing the drain hose and the pipes from the brazed section of the pipe
- Remove the drain hose by unscrewing the screws on both ends of the hose band.
- Peel off the pipe cover on the pipe so that the torch flame will not reach the cover. Remove the pipe from the brazed section as shown in [Fig.3].

*Protect the section around the area to be worked on from the torch flame (drain pan, wiring, insulation material on the frame etc).

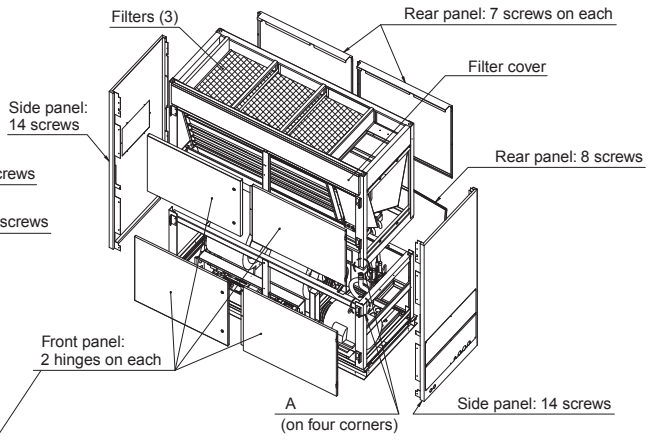
(4) Separate the top and the bottom of the unit
- Unscrew the screws and loosen bolt ① that are marked with the letter A in [Fig.1] (on four corners)
  Loosen bolt ② loose enough to allow the top and the bottom of the unit to be separated. Be sure to re-tighten bolt ② after separating the top and bottom (Tightening torque: 74N·m).

Separation work is now complete. Exercise caution not to damage or scratch the unit during transportation or get your fingers caught between the units.

< Model 250 >



< Model 500 >



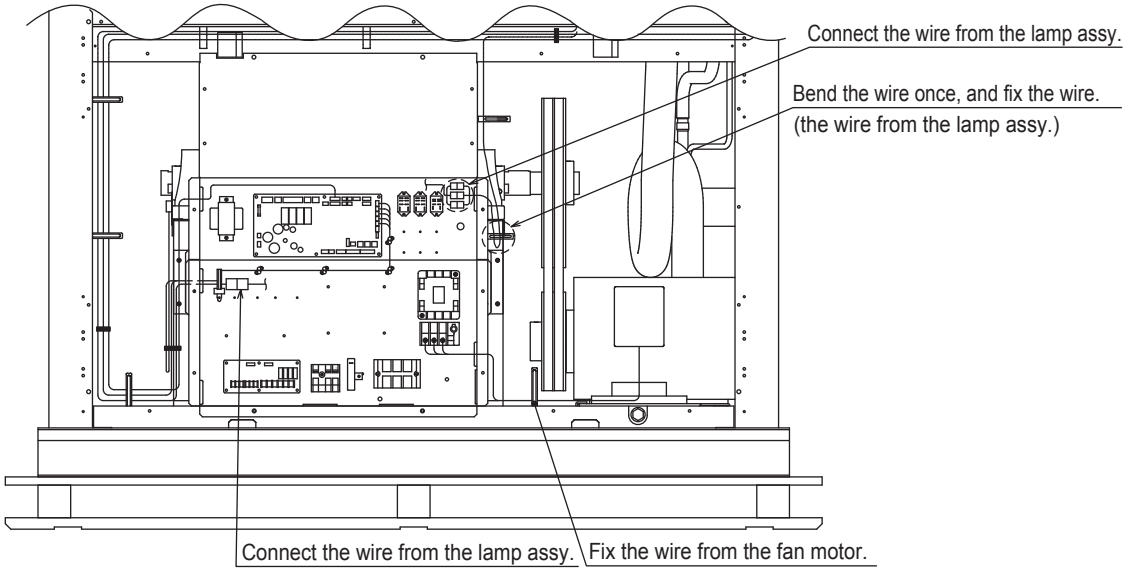
[Fig.1]

<Dimensions and weight of parts>

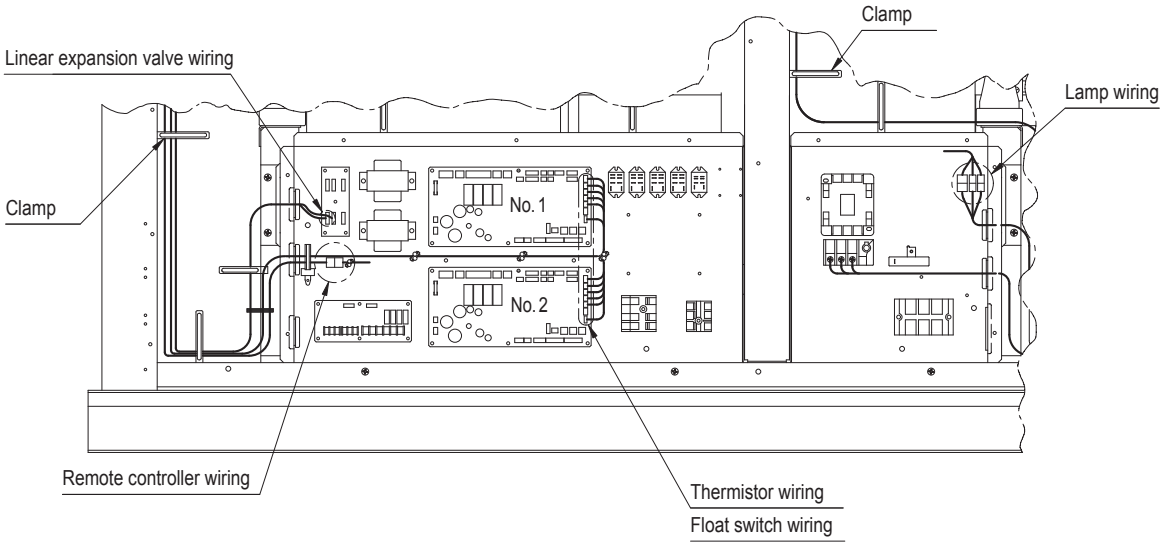
	Height (mm)	Width (mm)	Depth (mm)	Weight (kg)
Heat exchanger unit (top)	1120+510 *1	P250:1380 P500:1980	780	P250:158 P500:246
Fan unit (bottom)	860	P250:1380 P500:1980	780	P250:128.5 P500:159

* Length of protruded pipe (removable)

<Model 250>

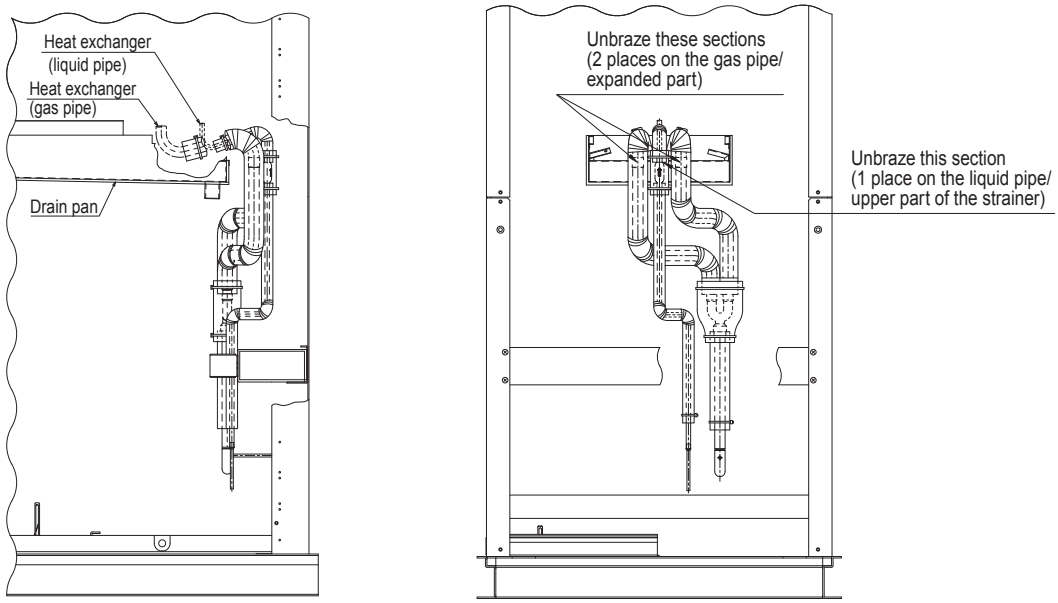


<Model 500>

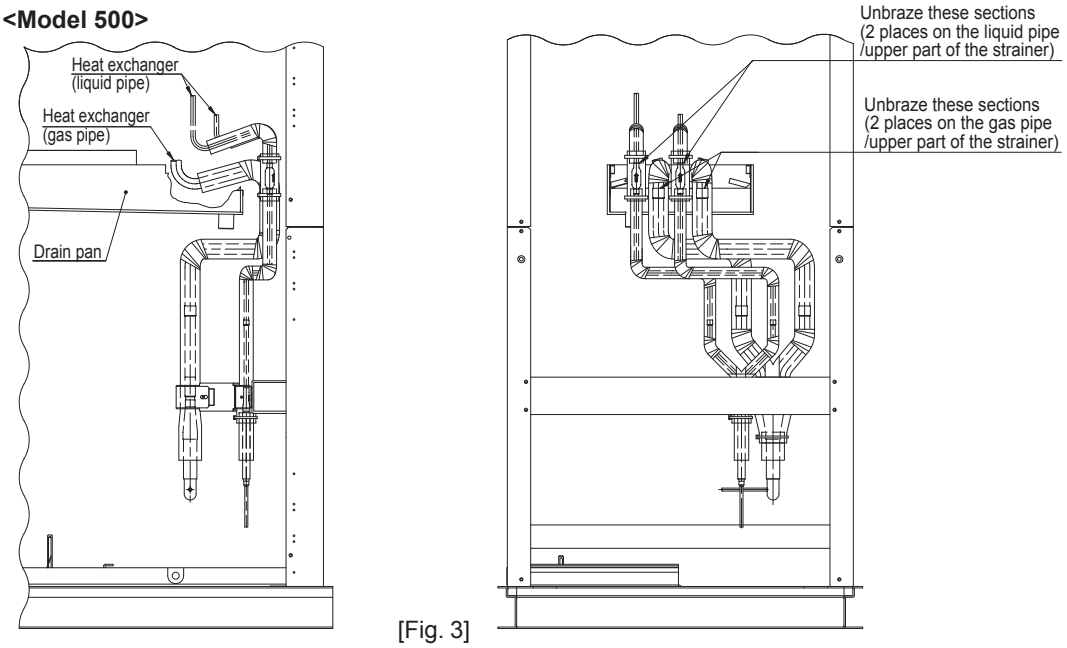


[Fig.2]

<Model 250>



<Model 500>

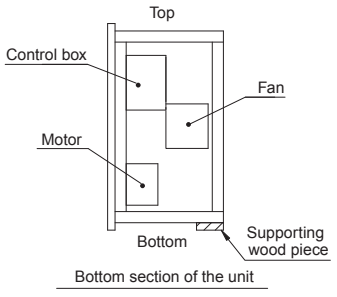


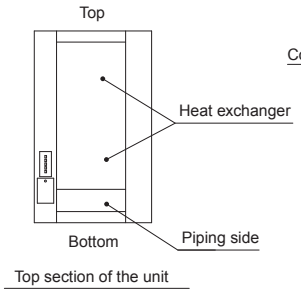
[Fig. 3]

Note

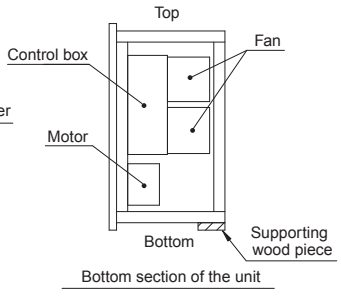
1. Peel off the pipe cover carefully. The cover will be needed again when putting the units together.
2. When loading the unit on an elevator, place the separated sections upright as shown below.
   (Place the right side up.) Place a piece of wood at the bottom of the bottom section for support to keep it level.

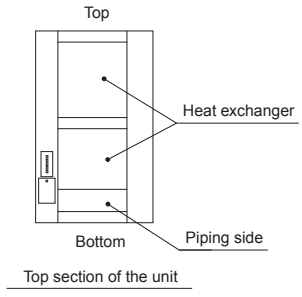
<Model 250>





<Model 500>





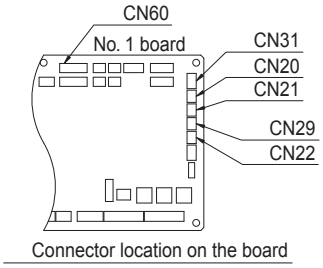
To put the top and bottom sections of the unit together, follow the procedures above in the reverse order.

- Check to make sure that the frame is perpendicular to the horizontal plane before putting the panels together.
- When the frames will not fit back into place, loosen bolt ② as shown in [Fig.1], place the frames, and tighten bolt ②.
- Be sure to securely tighten all screws and bolts. (tightening torque: 74N·m)
- Using [Fig.4] and Table 1 as a reference, connect all connectors correctly.
  Use a cable tie and bundle the wires as they were before.
- Keep torch flame away from the insulation material on the drain pan and from other flammable materials when performing brazing work. Use the shielding board that is supplied.
- Perform a test run and check for abnormal sound, rattling, and water leaks.

<Model 250>

Table 1

Board No.	Connector	Wire mark	Connector color	No. of pins	Parts name
No.1	CN31	1	White	3	Float switch
	CN20	S1	Red	2	Inlet thermistor
	CN21	E1	White	2	Liquid pipe thermistor
	CN29	G1	Black	2	Gas pipe thermistor
	CN60	V1	White	6	Linear expansion valve

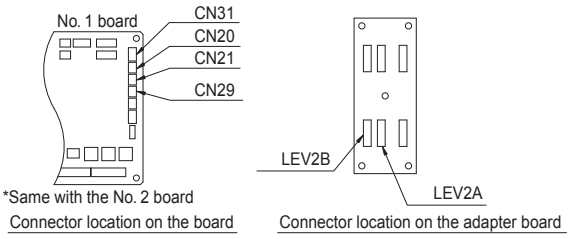


[Fig. 4]

<Model 500>

Table 1

Board No.	Connector	Wire mark	Connector color	No. of pins	Parts name
No.1	CN31	1	White	3	Float switch
	CN20	S1	Red	2	Inlet thermistor
	CN21	E1	White	2	Liquid pipe thermistor
	CN29	G1	Black	2	Gas pipe thermistor
	LEV2A	V1	White	6	Linear expansion valve
No.2	CN31	2	White	3	Float switch
	CN20	S2	Red	2	Inlet thermistor
	CN21	E2	White	2	Liquid pipe thermistor
	CN29	G2	Black	2	Gas pipe thermistor
	LEV2B	V2	White	6	Linear expansion valve



[Fig. 4]

⚠Caution

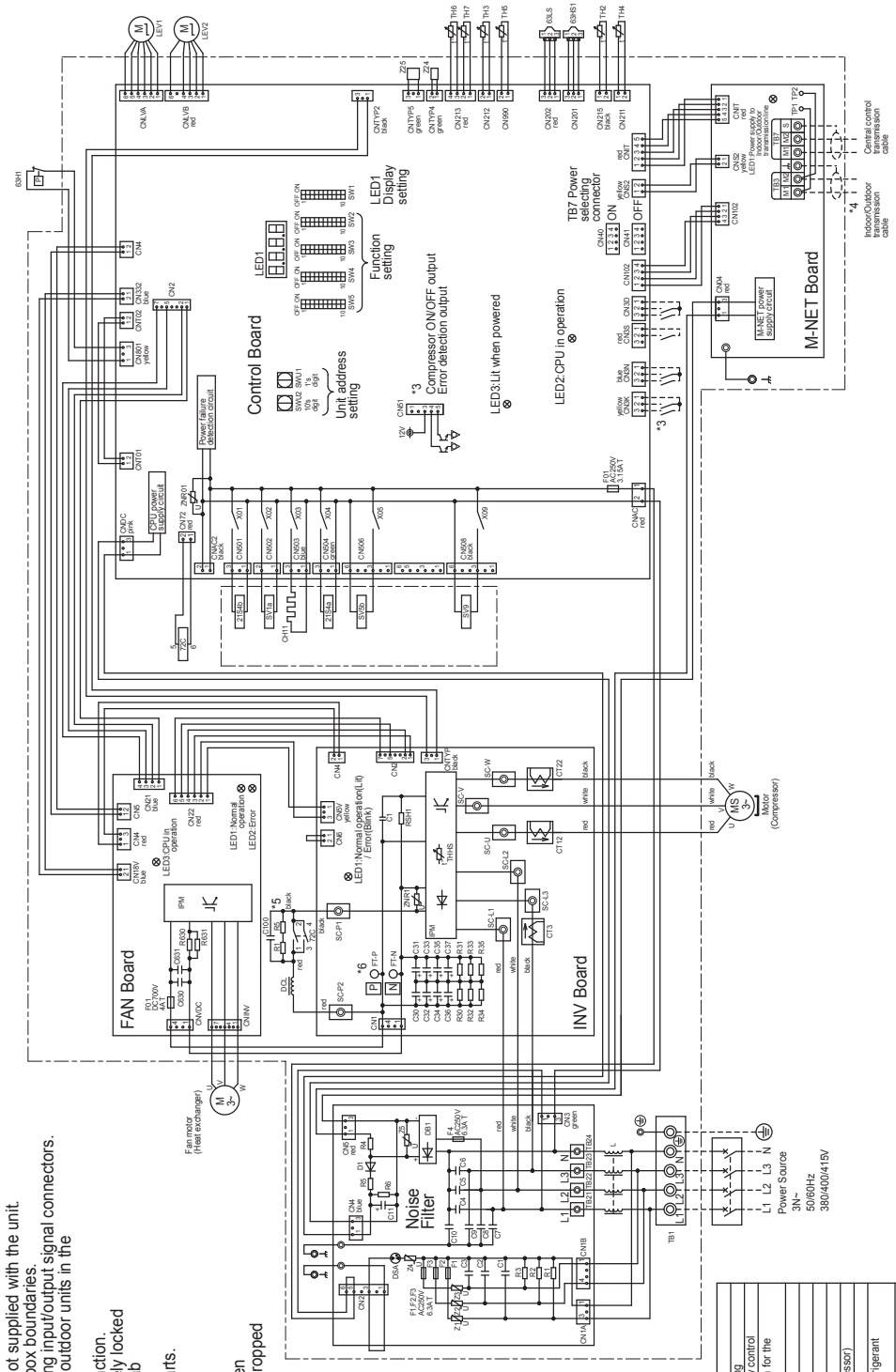
Use a hand-lift truck to transport the units; they are heavy even when the top and button sections are separated. Carrying the units by hand is dangerous and may result in personal injury if the units fall or topple over.
Exercise caution not to get your fingers caught when separating or assembling the top and bottom sections of the unit.

Ⅴ Electrical Wiring Diagram

[1] Electrical Wiring Diagram of the Outdoor Unit

1. Electrical wiring diagram of the outdoor unit

(1) PUHY-P250YJM-A



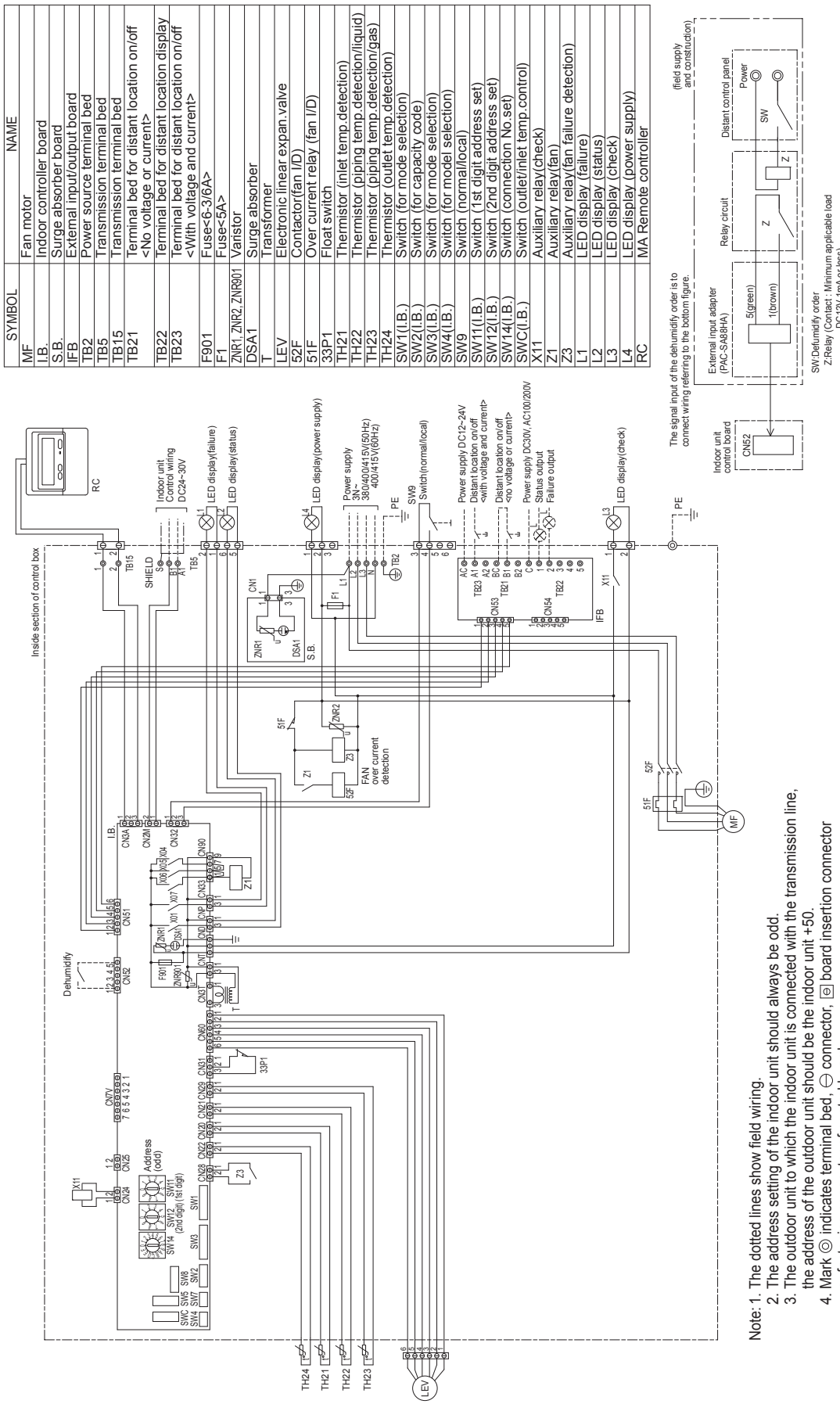
*1.Single-dotted lines indicate wiring not supplied with the unit.
*2.Dot-dash lines indicate the control box boundaries.
*3.Refer to the Data book for connecting input/output signal connectors.
*4.Daisy-chain terminals (TB3) on the outdoor units in the same refrigerant system together.
*5.Faston terminals have a locking function.
Make sure the terminals are securely locked in place after insertion. Press the tab on the terminals to remove them.
*6.Control box houses high-voltage parts.
Before inspecting the inside of the control box,turn off the power,keep the unit off for at least 10 minutes, and confirm that the voltage between FT-P and FT-N on INV Board has dropped to DC20V or less.

<Symbol explanation>

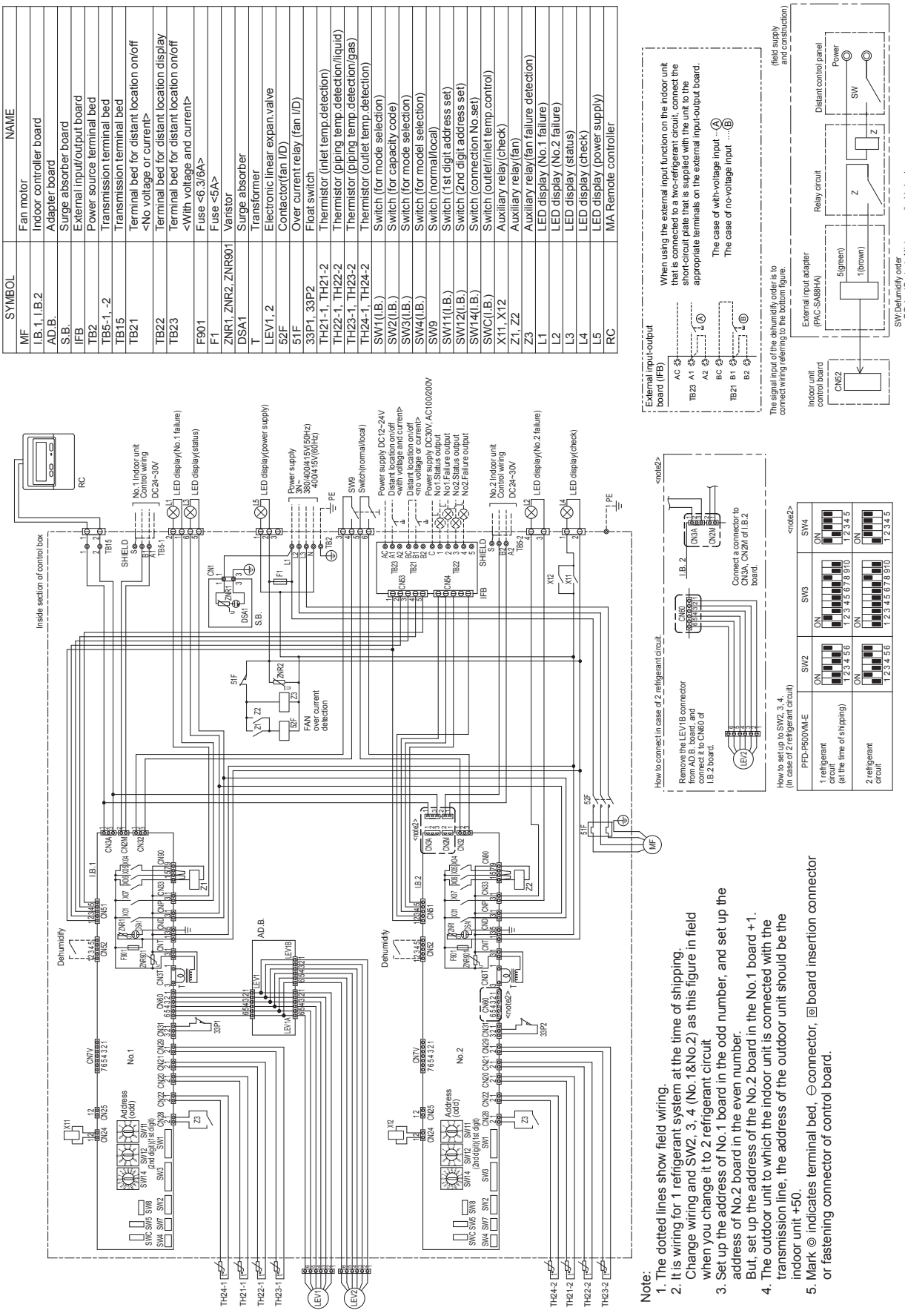
Symbol		Explanation
21S4a	4-way valve	Cooling/Heating switching
21S4b		Heat exchanger capacity control
63H1	Pressure switch	High pressure protection for the outdoor unit
63HS1	Pressure sensor	Discharge pressure
63LS		Low pressure
72C	Magnetic relay	Inverter main circuit)
CT12,22,3	Current sensor	(AC)
CH11	Crankcase heater	(for heating the compressor)
DCL	DC reactor	
LEV1	Linear expansion valve	HIC bypass,Controls refrigerant flow in HIC circuit
LEV2		Pressure control,Refrigerant flow rate control
SV1a	Solenoid valve	For opening/closing the bypass circuit under the O/S
SV5b		Outdoor unit heat exchanger capacity control
SV9		For opening/closing the bypass circuit
TB1	Terminal block	Power supply
TB3		Indoor/Outdoor transmission cable
TB7		Central control transmission cable
TH2	Thermistor	Subcool bypass outlet temperature
TH3		Pipe temperature
TH4		Discharge pipe temperature
TH5		ACC inlet pipe temperature
TH6		Subcooled liquid refrigerant temperature
TH7		OA temperature
THHS		TRM temperature
Z24,25	Function setting connector	

[2] Electrical Wiring Diagram of the Indoor Unit

1. PFD-P250VM-E



2. PFD-P500VM-E



SYMBOL	NAME
MF	Fan motor
I.B.1, I.B.2	Indoor controller board
AD.B.	Adapter board
S.B.	Surge absorber board
IFB	External input/output board
TB2	Power source terminal bed
TB5-1, -2	Transmission terminal bed
TB15	Transmission terminal bed
TB21	Terminal bed for distant location on/off <No voltage or current>
TB22	Terminal bed for distant location display
TB23	Terminal bed for distant location on/off <With voltage and current>
F901	Fuse <6.3/6A>
F1	Fuse <5A>
ZNR1, ZNR2, ZNR901	Varistor
DSA1	Surge absorber
T	Transformer
LEV1, 2	Electronic linear expan.valve
52F	Contactor(fan I/D)
51F	Over current relay (fan I/D)
33P1, 33P2	Float switch
TH21-1, TH21-2	Thermistor (inlet temp.detection)
TH22-1, TH22-2	Thermistor (piping temp.detection/liquid)
TH23-1, TH23-2	Thermistor (piping temp.detection/gas)
TH24-1, TH24-2	Thermistor (outlet temp.detection)
SW1(I.B.)	Switch (for mode selection)
SW2(I.B.)	Switch (for capacity code)
SW3(I.B.)	Switch (for mode selection)
SW4(I.B.)	Switch (for model selection)
SW9	Switch (normal/local)
SW11(I.B.)	Switch (1st digit address set)
SW12(I.B.)	Switch (2nd digit address set)
SW14(I.B.)	Switch (connection No.set)
SWC(I.B.)	Switch (outlet/inlet temp.control)
X11, X12	Auxiliary relay(check)
Z1, Z2	Auxiliary relay(fan)
Z3	Auxiliary relay(fan failure detection)
L1	LED display (No.1 failure)
L2	LED display (No.2 failure)
L3	LED display (status)
L4	LED display (check)
L5	LED display (power supply)
RC	MA Remote controller

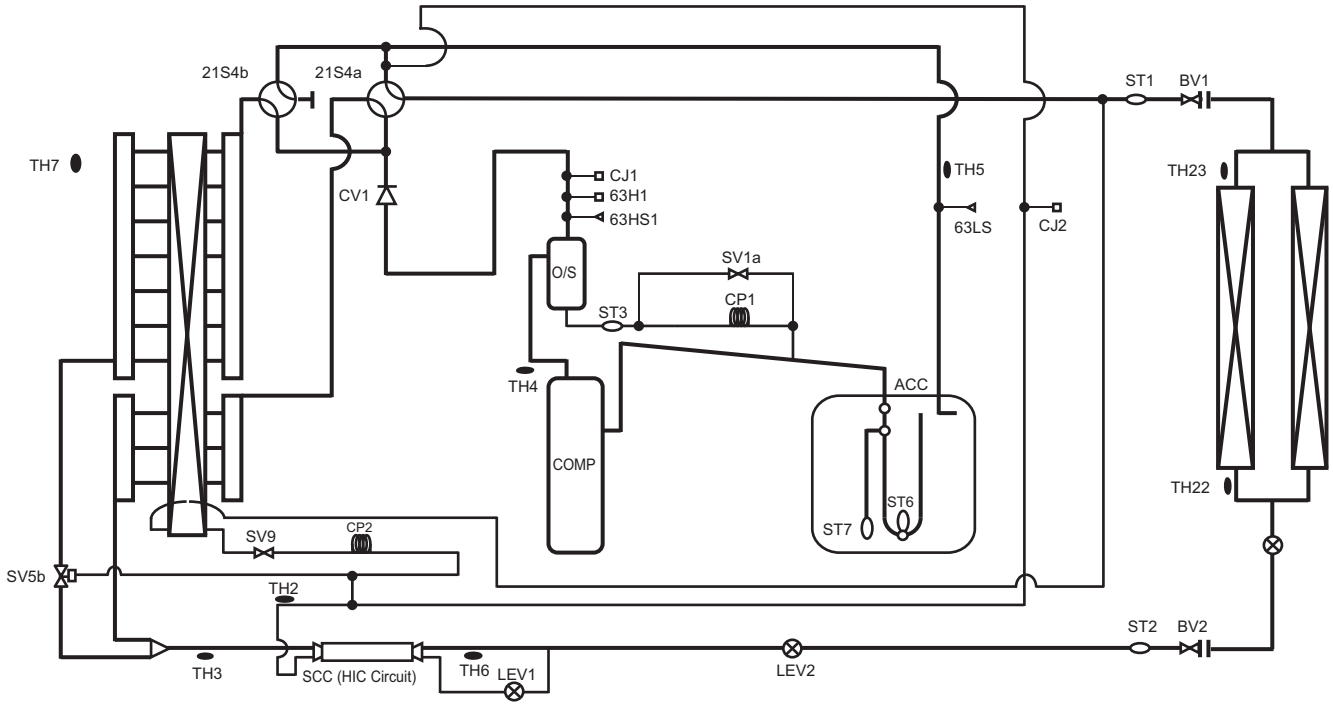
Note:
1. The dotted lines show field wiring.
2. It is wiring for 1 refrigerant system at the time of shipping.
   Change wiring and SW2, 3, 4 (No.1&No.2) as this figure in field when you change it to 2 refrigerant circuit
3. Set up the address of No.1 board in the odd number, and set up the address of No.2 board in the even number.
   But, set up the address of the No.2 board in the No.1 board +1.
4. The outdoor unit to which the indoor unit is connected with the transmission line, the address of the outdoor unit should be the indoor unit +50.
5. Mark ◎ indicates terminal bed, ⊖ connector, ⊟ board insertion connector or fastening connector of control board.

Ⅵ Refrigerant Circuit

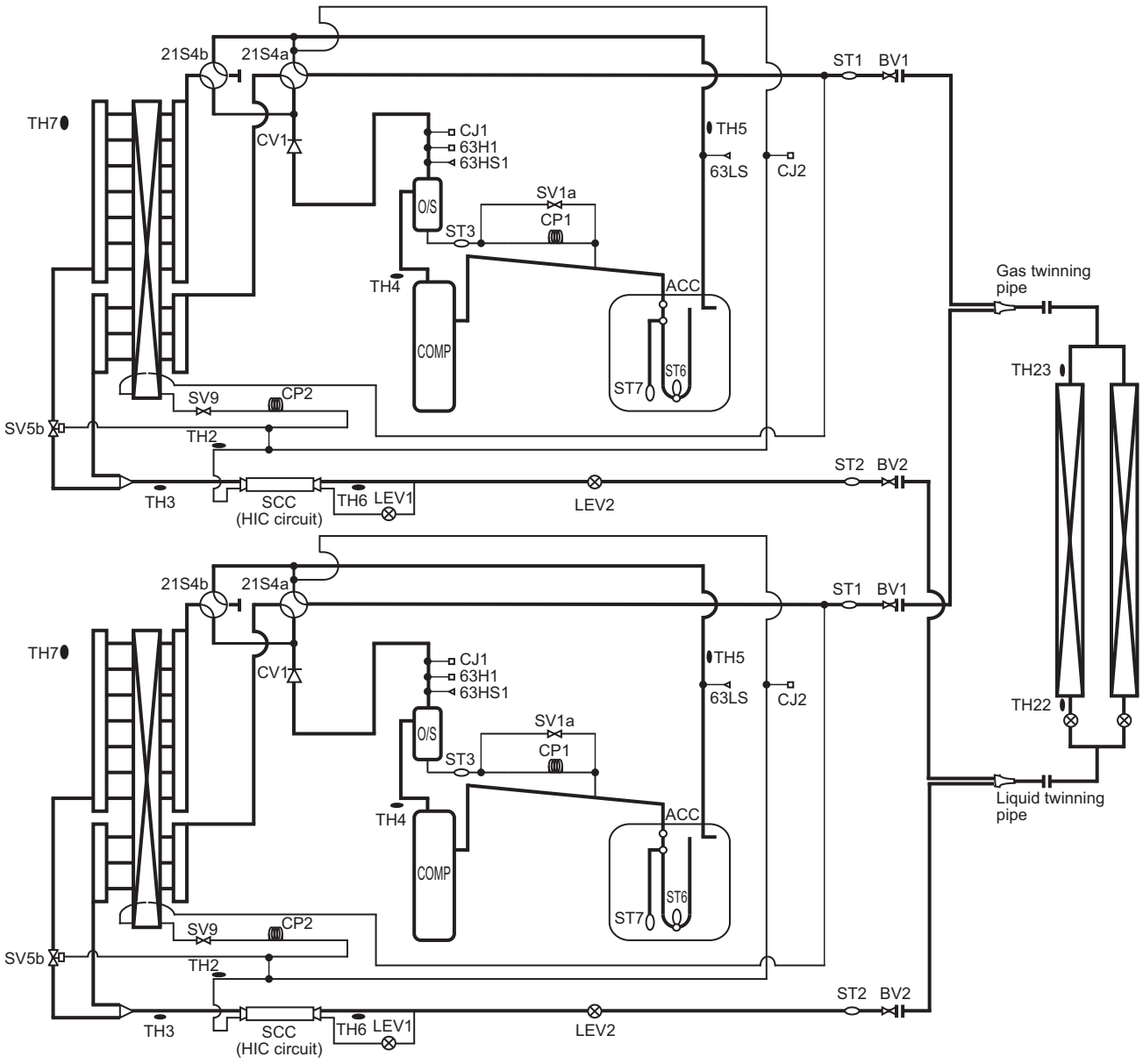
[1] Refrigerant Circuit Diagram

1. System with one refrigerant

(1) PUHY-P250YJM-A

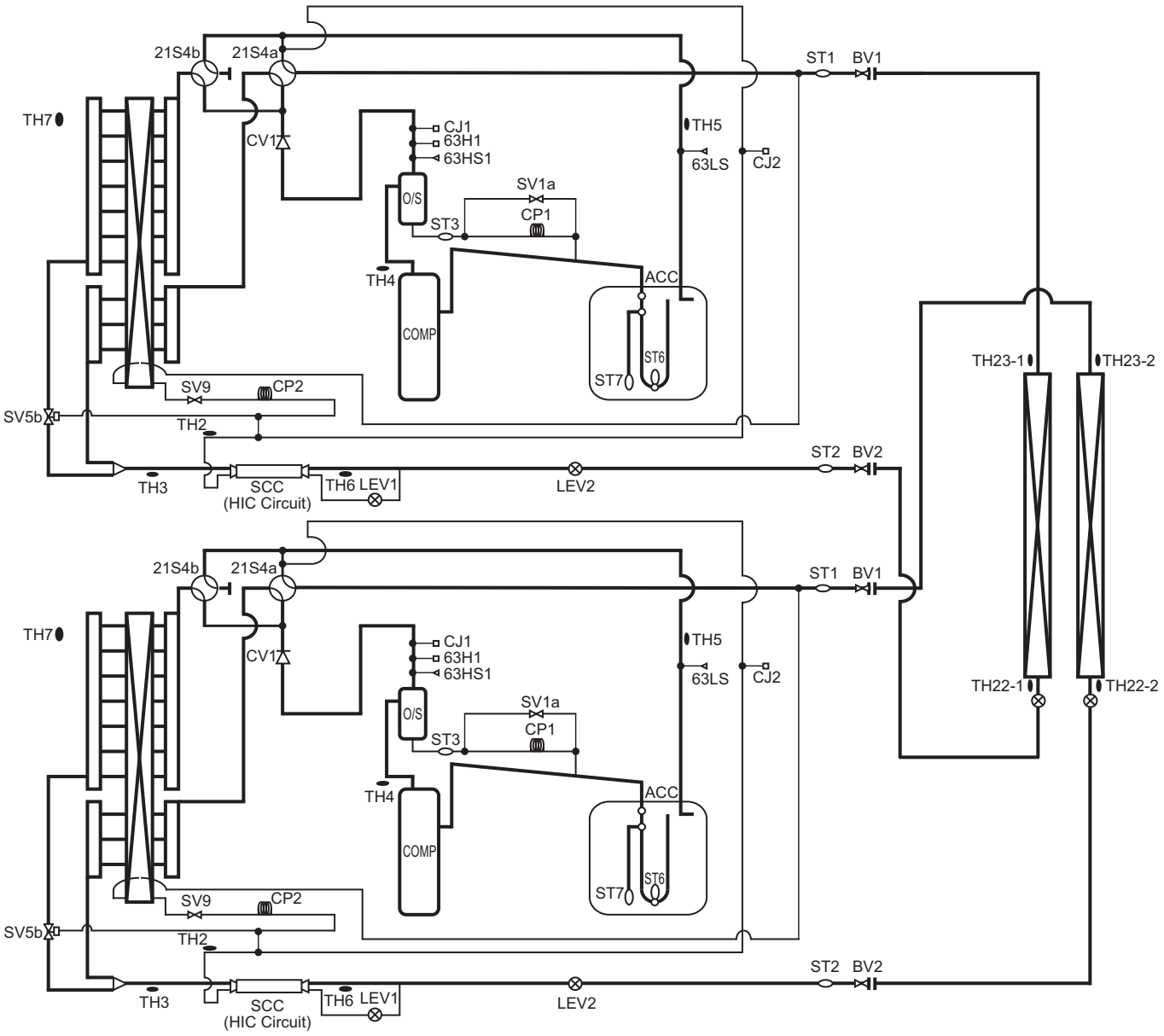


(2) PUHY-P500YSJM-A



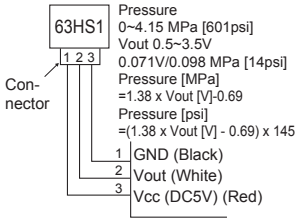
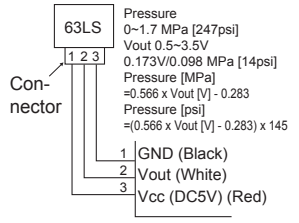
2. System with two refrigerant circuits

(1) PUHY-P250YJM-A x 2



[2] Principal Parts and Functions

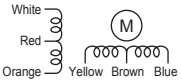
1. Outdoor unit

Part name	Symbols (functions)	Notes	Usage	Specifications	Check method
Compressor	MC1 (Comp1)		Adjusts the amount of circulating refrigerant by adjusting the operating frequency based on the operating pressure data	250 models Low-pressure shell scroll compressor Wirewound resistance 20°C[68°F] : 0.981ohm	
High pressure sensor	63HS1		1) Detects high pressure 2) Regulates frequency and provides high-pressure protection		
Low pressure sensor	63LS		1) Detects low pressure 2) Provides low-pressure protection		
Pressure switch	63H1		1) Detects high pressure 2) Provides high-pressure protection	4.15MPa[601psi] OFF setting	

Part name	Symbols (functions)	Notes	Usage	Specifications	Check method
Thermistor	TH4 (Discharge)		1) Detects discharge air temperature 2) Provides high-pressure protection	Degrees Celsius R_{120} = 7.465kΩ $R_{25/120}$ = 4057 $R_t = 7.465\exp\{4057(\frac{1}{273+t}-\frac{1}{393})\}$	Resistance check
			0°C[32°F] :698kohm 10°C[50°F] :413kohm 20°C[68°F] :250kohm 30°C[86°F] :160kohm 40°C[104°F] :104kohm 50°C[122°F] : 70kohm 60°C[140°F] : 48kohm 70°C[158°F] : 34kohm 80°C[176°F] : 24kohm 90°C[194°F] :17.5kohm 100°C[212°F] :13.0kohm 110°C[230°F] : 9.8kohm		
	TH2		LEV 1 is controlled based on the TH2, TH3, and TH6 values.	Degrees Celsius R_0 = 15kΩ $R_{0/80}$ = 3460 $R_t = 15\exp\{3460\ (\frac{1}{273+t}-\frac{1}{273})\}$ 0°C[32°F] :15kohm 10°C[50°F] :9.7kohm 20°C[68°F] :6.4kohm 25°C[77°F] :5.3kohm 30°C[86°F] :4.3kohm 40°C[104°F] :3.1kohm	Resistance check
	TH3 (Pipe temperature)		1) Controls frequency 2) Controls defrosting during heating operation 3) Detects subcool at the heat exchanger outlet and controls LEV1 based on HPS data and TH3 data		
	TH7 (Outdoor temperature)		1) Detects outdoor air temperature 2) Controls fan operation		
	TH5		LEV2a and LEV2b are controlled based on the 63LS and TH5 values.		
	TH6		Controls LEV1 based on TH2, TH3, and TH6 data.		
	THHS Inverter heat sink temperature		Controls inverter cooling fan based on THHS temperature	Degrees Celsius R_{50} = 17kΩ $R_{25/120}$ = 4016 $R_t = 17\exp\{4016\ (\frac{1}{273+t}-\frac{1}{323})\}$ 0°C[32°F] :161kohm 10°C[50°F] :97kohm 20°C[68°F] :60kohm 25°C[77°F] :48kohm 30°C[86°F] :39kohm 40°C[104°F] :25kohm	
Solenoid valve	SV1a Discharge-suction bypass		1) High/low pressure bypass at start-up and stopping, and capacity control during low-load operation 2) High-pressure-rise prevention	AC220-240V Open while being powered/ closed while not being powered	Continuity check with a tester
	SV5b Heat exchanger capacity control		Controls outdoor unit heat exchanger capacity	AC220-240V Closed while being powered/ open while not being powered	
	SV9		High-pressure-rise prevention	Open while being powered/ closed while not being powered	

Part name	Symbols (functions)	Notes	Usage	Specifications	Check method
Linear expansion valve	LEV1 (SC control)		Adjusts the amount of bypass flow from the liquid pipe on the outdoor unit during cooling	DC12V Opening of a valve driven by a stepping motor 0-480 pulses (direct driven type)	Same as indoor LEV The resistance value differs from that of the indoor LEV. (Refer to the section "LEV Troubleshooting."(page 185))
	LEV2 (Refrigerant flow adjustment)		Adjusts refrigerant flow during heating	DC12V Opening of a valve driven by a stepping motor 2100 pulses (Max. 3000 pulses)	Same as indoor LEV
Heater	CH11		Heats the refrigerant in the compressor	Cord heater AC240V P250 model 1511 ohm 35W	Resistance check
4-way valve	21S4a		Changeover between heating and cooling	AC220-240V Dead: cooling cycle Live: heating cycle	Continuity check with a tester
	21S4b		1) Changeover between heating and cooling 2) Controls outdoor unit heat exchanger capacity	AC220-240V Dead: cooling cycle Outdoor unit heat exchanger capacity at 100% Live: heating cycle Outdoor unit heat exchanger capacity at 50% or heating cycle	
FAN motor	FAN motor		Regulates the heat exchanger capacity by adjusting the operating frequency and operating the propeller fan, based on the operating pressure	AC342V, 50.5Hz, 920W	

2. Indoor unit

Part name	Symbols (functions)	Notes	Usage	Specifications	Check method
Linear expansion valve (LEV)	LEV		1) Adjusts superheat at the heat exchanger outlet of the indoor unit during cooling 2) Adjusts subcool at the heat exchanger outlet of the indoor unit during heating	DC12V Opening of a valve driven by a stepping motor 0-(2000) pulses	Continuity check with a tester Continuity between white, red, and orange. Continuity between yellow, brown, and blue. 
Thermistor	TH21 (Suction air temperature)		Indoor unit control (Thermo)	R_0 = 15kΩ $R_{0/80}$ = 3460 $R_t = 15\exp\{3460\ (\frac{1}{273+t} - \frac{1}{273})\}$ 0°C[32°F] : 15kohm 10°C[50°F] :9.7kohm 20°C[68°F] :6.4kohm 25°C[77°F] :5.3kohm 30°C[86°F]:4.3kohm 40°C[104°F] :3.1kohm	Resistance check
	TH22 (Pipe temperature)		Indoor unit control (Freeze prevention, Pre-heating stand-by)		
	TH23 (Gas pipe temperature)		LEV control during cooling operation (Superheat detection)		
	TH24 (Discharge air temperature)		Controls indoor unit discharge (thermostat)		
Float Switch	33P1		Detects drain pan water level	Contact Resistance: Under 250 mohm B contact type	Continuity check with a tester
	33P2	P500 model only			
Motor	MF		Sends air	PFD-P250VM-E AC380~415V Type E 4P Output 3.7kW	Rotation number check Standard 930rpm
				PFD-P500VM-E AC380~415V Type B 4P Output 5.5kW	Rotation number check Standard 978rpm

VII Control

[1] Functions and Factory Settings of the Dipswitches

1. Outdoor unit

(1) Control board

Switch		Function	Function according to switch setting		Switch setting timing		Units that require switch setting Note.2	
			OFF	ON	OFF	ON	OC	OS
SWU	1-2	Unit address setting	Set to 51-100 with the dial switch		Before power on		C	C
SW1	1-10	For self-diagnosis/ operation monitoring	Refer to the LED monitor display on the outdoor unit board.		Anytime after power on		C	C
SW2	1	-	-	-	-		-	-
	2	Deletion of connection information	Normal control	Deletion	Before power on		A	-
	3	Deletion of error history SW	(OC) Storage of IC/ OC error history	(OC) Deletion of IC/ OC error history	Anytime after power on (When switched from OFF to ON)		C	C
	4	Pump down mode	Normal control	Pump down mode	After being energized and while the compressor is stopped		A	-
	5	-	-	-	-		-	-
	6	-	-	-	-		-	-
	7	Forced defrost Note 3	Normal control	Forced defrost starts	10 minutes after compressor startup	Anytime after power on (When switched from OFF to ON)	A	A
	8	Defrost timer setting Note 3	50 minutes	90 minutes	Anytime after power on (When switched from OFF to ON)		B	B
	9	-	-	-	-		-	-
	10	-	-	-	-		-	-

Note

1) Unless otherwise specified, leave the switch to OFF where indicated by "-," which may be set to OFF for a reason.
2) A: Only the switch on either the OC or OS needs to be set for the setting to be effective on both units.
   B: The switches on both the OC and OS need to be set to the same setting for the setting to be effective.
   C: The setting is effective for the unit on which the setting is made.
3) Refer to "VII [2] Controlling the Outdoor Unit" for details.(page 82)

Switch		Function	Function according to switch setting		Switch setting timing		Units that require switch setting Note.2	
			OFF	ON	OFF	ON	OC	OS
SW3	1	Test run mode: enabled/disabled	SW3-2 disabled	SW3-2 enabled	Anytime after power on		A	-
	2	Test run mode: ON/OFF	Stops all ICs	Sends a test-run signal to all ICs	After power on and when SW3-1 is on.		A	-
	3	Defrost start temperature	-10°C [14°F]	-5°C [23°F]	Anytime after power on		B	B
	4	Defrost end temperature	10°C [50°F]	5°C [41°F]	Anytime after power on (except during defrost operation)		B	B
	5	-	-	-	-		-	-
	6	Temperature unit selection	Centigrade	Fahrenheit Note 4	Any time after being powered		C	C
	7	-	-	-	-		-	-
	8	-	-	-	-		-	-
	9	Model setting	Outdoor standard static pressure	Outdoor high static pressure	Before being energized		C	C
	10	Model setting	High static pressure 60Pa	High static pressure 30Pa	Before being energized		C	C
SW4	1	-	-	-	-		-	-
	2	-	-	-	-		-	-
	3	Refrigerant amount adjustment	Normal operation mode	Refrigerant amount adjust mode	Anytime after being energized (except during initial startup mode. Automatically cancelled 60 minutes after compressor startup)		A	-
	4	Low-noise mode/ step demand switching	Low-noise mode Note 3	Step demand mode	Before being energized		C	C
	5	-	-	-	-		-	-
	6	Cumulative compressor operation time data deletion	Cumulative compressor operation time data is retained.	Cumulative compressor operation time data is deleted.	Anytime after power on (when the unit is turned on)		C	C
	7	-	-	-	-		-	-
	8	-	-	-	-		-	-
	9	-	-	-	-		-	-
	10	Dehumidifying operation priority mode:Enable/Disable	Enabled	Disabled	Anytime after being powered		A	-

Note

1) Unless otherwise specified, leave the switch to OFF where indicated by "-," which may be set to OFF for a reason.
2) A: Only the switch on either the OC or OS needs to be set for the setting to be effective on both units.
   B: The switches on both the OC and OS need to be set to the same setting for the setting to be effective.
   C: The setting is effective for the unit on which the setting is made.
3) The noise level is reduced by controlling the compressor frequency and outdoor fan rotation speed.
   Setting of CN3D is required.(page 23)
4) Set this switch back to OFF (°C) at the completion of maintenance.

Switch		Function	Function according to switch setting		Switch setting timing		Units that require switch setting Note.2	
			OFF	ON	OFF	ON	OC	OS
SW5	1	Model selection	See the table below (Note 4)		Before being energized		C	C
	2							
	3							
	4							
	5	Low-noise mode selection	Capacity priority mode Note 3	Low-noise mode	Before being energized		A	-
	6	-	-	-	-		-	-
	7	Model selection	See the table below Note 4		Before being energized		B	B
	8	-	-	-	-		-	-
	9	-	-	-	-		-	-
	10	System rotation control	No units are specified as the control unit	Control unit is specified.	While the unit is stopped (When the switch is turned from OFF to ON)		A	-

Note

1) Unless otherwise specified, leave the switch to OFF where indicated by "-," which may be set to OFF for a reason.
2) A: Only the switch on either the OC or OS needs to be set for the setting to be effective on both units.
   B: The switches on both the OC and OS need to be set to the same setting for the setting to be effective.
   C: The setting is effective for the unit on which the setting is made.
3) When set to the capacity priority mode and if the following conditions are met, the Low-noise mode will terminate, and the unit will go back into the normal operation mode.
   Cooling: Outside temperature is high or high pressure is high.
4) The table below summarizes the factory settings for dipswitches SW5-1 through SW5-4, and SW5-7. The factory setting for all other dipswitches is OFF.

SW 5					model
1	2	3	4	7	
ON	ON	OFF	OFF	ON	P250 model

(2) INV board

Functions are switched with the following connector.

Connector	Function	Function according to connector		Setting timing	
		Enabled	Disabled	Enabled	Disabled
CN6 short-circuit connector	Enabling/disabling the following error detection functions; ACCT sensor failure (5301 Detail No. 115) ACCT sensor circuit failure (5301 Detail No.117) IPM open/ACCT erroneous wiring (5301 Detail No. 119) Detection of ACCT erroneous wiring (5301 Detail No.120)	Error detection enabled	Error detection disable (No load operation is possible.)	Anytime after power on	

Note

- CN6 short-circuit connector is mated with the mating connector.
- Leave the short-circuit connector on the mating connector during normal operation to enable error detection and protect the equipment from damage.

2. Function of the switch (Indoor unit)

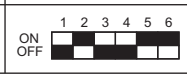
(1) Dipswitches

1) SW1,3

Switch		Function	Function according to switch setting		Switch setting timing		Notes
			OFF	ON	OFF	ON	
SW1	1	-	-	-	While the unit is stopped (Remote controller OFF)		
	2	Clogged filter detection	Not available	Available			
	3	Filter check reminder time setting	100h	2500h			
	4	-	-	-			
	5	Remote display option	Fan output	Thermo-ON signal			
	6	-	-	-			
	7	-	-	-			
	8	-	-	-			
	9	External input	Level	Pulse			
	10	Operation switching	External input	MA remote controller			
SW3	1	Model setting	Heat pump	Cooling-only			
	2	Capacity code	Refer to the combination with SW2				
	3	-	-	-			
	4	-	-	-			
	5	-	-	-			
	6	-	-	-			
	7	LEV setting conversion function	Not available	Available			
	8	-	-	-			
	9	-	-	-			
	10	-	-	-			
SW7	1	Reset of the integrated operation time Valid/Invalid (fan belt)	Not available	Available			
	2	Reset of the integrated operation time Valid/Invalid (fan motor)	Not available	Available			
	3	-	-	-			
	4	-	-	-			

Note 1. Setting timing for DIPSW 1 and 3 is during unit stoppage (remote controller OFF). It is not necessary to reset the settings by power-off.
Note 2. Settings in the shaded areas are factory settings.

2) SW2,SW3-2,SW4

Model	System	Capacity code	SW3-2	SW2	SW4
P250	One-refrigerant circuit connection	50	OFF		
P500	One-refrigerant circuit connection	100	ON		
	Two-refrigerant circuit connection*	50	OFF		

* The setting is changed at site under two-refrigerant circuit connection

<Capacity code and function setting>

If the capacity code or the model setting is changed upon replacement of the circuit board, power reset the indoor and outdoor units.

3) SW5

Function	Operation by switch setting	Switch setting timing
Reset of the integrated operation time	Resetting the integrated operation time according to the setting of SW7-1 and 7-2	During unit stoppage (remote controller OFF) (when switching from OFF to ON)

4) SW8

Function	Operation by switch setting	Switch setting timing
Compulsory thermo OFF setting during test run (used in the grouped indoor units connected to different outdoor units)	ON OFF 1 2 3 Normal control ON OFF 1 2 3 Compulsory thermo OFF	Anytime after power on

(2) Slide switches

Switch		Function	Operation by switch setting	Switch setting timing
SWC	1~2	Switching between suction/discharge temperature control	Option / Standard *	Anytime after power on

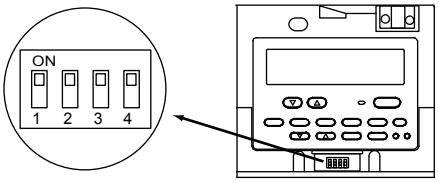
	Input setting
Option	Suction temperature control
Standard	Discharge temperature control

* The settings for the two circuit boards must be equivalent to switch between suction/discharge temperature control under two-refrigerant circuit system.

3. Function of the switch <Remote controller>

(1) MA remote controller (PAR-20MAA)

The SW is located at the bottom of the remote controller under the cover. Operate the switches to perform the remote controller main/sub setting or other function settings. Normally, do not change the settings of switches other than the SW1 (main/sub switching switch). (All the switches are set to "ON" at factory setting.)



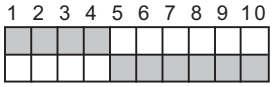
Switching switch Remote controller

Switch	Function	ON	OFF	Operation by switch settings	Switch setting timing
1	Remote controller main/sub setting	Main	Sub	When two remote controllers are connected to one group, set either of the remote controllers to "Sub".	Before power on
2	At power on of the remote controller	Normal startup	Timer mode startup	To resume the operation with timer mode after the power is restored when the schedule timer is connected, set to "Timer mode startup".	Before power on
3	Cooling/heating display set by automatic setting	Displayed	Not displayed	When the automatic mode is set and the "Cooling"/"Heating" display is not necessary, set to "Not displayed".	Before power on
4	Suction temperature display (discharge temperature display)	Displayed	Not displayed	When the suction temperature (discharge temperature) display is not necessary, set to "Not displayed".	Before power on

[2] Controlling the Outdoor Unit

-1- Outline of Control Method

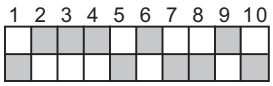
- The outdoor units are designated as OC and OS in the order of capacity from large to small (if two or more units have the same capacity, in the order of address from small to large).
- The setting of outdoor unit can be verified by using the self-diagnosis switch (SW1).

SW1	Display
ON 	■ The unit is designated as the OC: “oc” appears on the display. ■ The unit is designated as OS: “oS-1” appears on the display

- The OC determines the operation mode and the control mode, and it also communicates with the indoor units.
- The OS exercises autonomous distributed control (over defrost, error detection, and actuator control etc.) according to the operation/control mode signals that are sent from the OC.

-2- Startup sequence rotation (Single refrigerant circuit)

- At the initial startup, outdoor units start up in the order of "OC and OS." When the cumulative operation time of the OC reaches two hours, the OS will start up before the OC at the next start up.
- Startup sequence rotation is performed while all the indoor units are stopped. (Even after two hours of operation, startup sequence rotation is not performed while the compressor is in operation.)
- Refer to [-12- Control at Initial Start-up] for the initial startup.(page 87)
- Performing startup sequence rotation does not change the basic operation of OC and OS. Only startup sequence is changed.
- Startup sequence of the outdoor units can be checked with the self-diagnosis switch (SW1) on the OC.

SW1	Display
ON 	■ OC→OS: “oc” and the “OC” address appear alternately on the display. ■ OS→OC: “oS-1” and the “OS” address appear alternately on the display.

-3- Initial Control

- When the power is turned on, the initial processing of the microcomputer is given top priority.
- During the initial processing, control processing of the operation signal is suspended. (The control processing is resumed after the initial processing is completed. Initial processing involves data processing in the microcomputer and initial setting of each of the LEV opening. This process will take up to 1 minute. This process will take approximately three minutes when it is performed for the first time.)
- During the initial processing, the LED monitor on the outdoor unit's control board displays S/W version -> refrigerant type -> heat pump -> cooling only and capacity -> and communication address in turn every second.

-4- Control at Start-up

- The upper limit of frequency during the first 3 minutes of the operation is 50 Hz.
- When the power is turned on, normal operation will start after the initial start-up mode (to be described later) has been completed (with a restriction on the frequency).

-5- Bypass Control

Bypass solenoid valves (SV1a), which bypass the high- and low- pressure sides, perform the following functions.

(1) Bypass solenoid valve (SV1a) (ON = Open), (SV9) (ON = Open)

Operation	SV1a	
	ON	OFF
When starting-up the compressor of each outdoor unit	ON for 4 minutes.	
After the restoration of thermo or 20 seconds after restart	ON for 4 minutes.	
During cooling or heating operation with the compressor stopped	Always ON. Exception: OFF when 63HS1-63LS is 0.2 MPa [29 psi] or less	
After the operation has stopped	ON for 3 minutes. Exception: OFF when 63HS1-63LS is 0.2 MPa [29 psi] or less	
During defrost operation	ON	
During compressor operation at Fmin frequency in the cooling mode and when the low pressure (63LS) drops (three or more minutes after compressor startup)	When low pressure (63LS) drops below 0.23 MPa [33 psi].	When low pressure (63LS) exceeds 0.38 MPa [55 psi].
When high pressure (63HS1) rises	When 63HS1 exceeds 3.62 MPa [525 psi]	When 63HS1 is or below 3.43 MPa [497 psi] and 30 seconds have passed

Operation	SV9	
	ON	OFF
When high pressure (63HS1) rises during the heating operation	When 63HS1 exceeds 3.50MPa [507psi]	When 63HS1 is or below 2.70Mpa [391psi]
When startup or resuming operation after a defrost cycle	If TH7>-15°C, stays ON for five minutes, then turns off If TH7< = -15°C, stays ON for 25 minutes, or stays ON until 63HS's reading is below 1.96 MPa [284 psi], then turns off	
Others	Always OFF	

-6- Compressor Frequency Control

- Depending on the capacity required, the frequency of the compressor is controlled to bring the evaporation temperature (Te) close to the target evaporation temperature (Tem) during cooling operation, and to keep constant condensing temperature (49°C[120°F] =2.88MPa[418psi]) during heating operation.
- The target evaporation temperature (Tem) varies as follows during cooling operation depending on the capacity required.

When the capacity exceeds the needs : Tem is lowered.
When lacking in capacity : Tem is raised.
Minimum and maximum Tem Valued : -10°C[14°F] ≤ Tem < 25°C[77°F]

Model	Frequency/cooling (Hz)		Frequency/heating (Hz)	
	Max	Min	Max	Min
250 model	56	10	63	10
500 model	112	10	126	10

(1) Pressure limit

The upper limit of high pressure (63HS1) is preset, and when it exceeds the upper limit, the frequency is decreased every 15 seconds.

- The actuation pressure is when the high-pressure reading on 63HS1 is 3.58MPa[519psi].

(2) Discharge temperature limit

Discharge temperature (TH4) of the compressor in operation is monitored, and when it exceeds the upper limit, the frequency is decreased every minute.

- Operating temperature is 115°C [239°F].

(3) Periodic frequency control

Frequency control other than the ones performed at start-up, upon status change, and for protection is called periodic frequency control (convergent control) and is performed in the following manner.

Periodic control cycle

Periodic control is performed after the following time has passed

- 30 seconds after either compressor start-up or the completion of defrost operation
- 30 seconds after frequency control based on discharge temperature or pressure limit

The amount of frequency change

The amount of frequency change is controlled to approximate the target value based on the evaporation temperature (Te) and condensing temperature (Tc).

-7- Defrost Operation Control

(1) Starting the defrost operation

- The defrost cycle starts when the pipe temperature (TH3) at or below the value in the table below has continuously been detected for three minutes after the cumulative compressor operation time of 50 minutes have passed (90 minutes when the defrost prohibit timer is set to 90 minutes.).
- If 10 minutes have passed since compressor start-up or since the completion of defrost operation, forced defrost operation will start by turning on the forced defrost switch (DIP SW2-7).
- Even if the defrost prohibit timer is set to 90 minutes, the actual defrost prohibit time for the next operation will be 50 minutes if defrosting took 12 minutes.
- In the multiple-outdoor-unit system, all of the outdoor units that are in operation go into the defrost mode simultaneously. The unit(s) that is stopped at the time defrost operation starts remains stopped.

Model	TH3	
	SW3 - 3 OFF	SW3 - 3 ON
250 model	- 10°C [14°F]	- 5°C [23°F]

(2) Defrost operation

Compressor frequency	Model	Compressor frequency
	250 model	65 Hz
Outdoor unit fan	Stopped	
SV1a	ON	
SV5b	OFF (open)	
21S4a	OFF	
21S4b	OFF	
SV9	OFF	
LEV1	0 pulse*1	
LEV2	3000 pulses	

*1. This value may be greater than 0 pulse depending on the 63LS and TH4 status.

(3) Stopping the defrost operation

- The defrost cycle ends when 12 minutes have passed since the beginning of the cycle, or when the pipe temperature (TH3), in the following table, or above has been continuously detected for 4 minutes (when SW3-4 is set to OFF) or 2 minutes (when SW3-4 is set to ON) that exceeds the values in the table below.
- The defrost cycle will not end for two minutes once started unless one of the following conditions is met : Pipe temperature reaches 25°C [77°F] and SW3-4 is set to OFF OR α *1=25°C+TH7°C [77°F+TH7°F] and SW3-4 is set to ON.
  *1 5°C [41°F] $\leq \alpha \leq$ 25°C [77°F]
- In the multiple system, defrosting is stopped on all units at the same time.

Model	TH3	
	SW3 - 4 OFF	SW3 - 4 ON
250 model	10°C [50°F]	5°C [41°F]

(4) Problems during defrost operation

- If a problem is detected during defrost operation, the operation will be stopped, and the defrost prohibition time based on the integrated compressor operation time will be set to 20 minutes.

-8- Refrigerant Recovery Control

Recovery of refrigerant is performed during heating operation to prevent the refrigerant from accumulating inside the unit while it is stopped (unit in fan mode), or inside the indoor unit that is in cooling mode or in heating mode with thermo off. It is also performed during cooling operation to prevent an excessive amount of refrigerant from accumulating in the outdoor heat exchanger.
It is also performed during cooling operation to prevent an excessive amount of refrigerant from accumulating in the outdoor heat exchanger.

(1) During heating operation

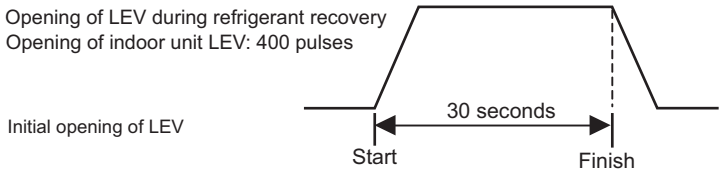
Starting refrigerant recovery mode

The refrigerant recovery mode in heating starts when all of the following three conditions are met:

- 15 minutes have passed since the completion of previous refrigerant recovery.
- TH4 > 115°C [239°F]
- Frequencies below 50 Hz

Refrigerant recovery

1) Refrigerant is recovered with the LEV on the applicable indoor unit (unit under stopping mode, fan mode, cooling, heating with thermo off) being opened for 30 seconds.



2) Periodic capacity control of the outdoor units and periodic LEV control of the indoor units will be suspended during refrigerant recovery operation; they will be performed after the recovery has been completed.

(2) During cooling operation

Starting refrigerant recovery mode

The refrigerant recovery mode starts when all the following conditions are met:

- 30 minutes have passed since the completion of previous refrigerant recovery.
- When the unit keeps running for 3 minutes in a row or more with high discharge temperature
- TH4 > 105°C [221°F] or 63HS1 > 3.43 MPa [497 psi] (35 kg/cm^{2}G) and SC0 > 10°C [18°F]

Refrigerant recovery

The opening of LEV1 is increased and periodic control begins again.

-9- Capacity Control of Outdoor Fan

(1) Control method

- Depending on the capacity required, the rotation speed of the outdoor unit fan is controlled by the inverter to keep a constant condensing temperature during cooling operation and a constant evaporation temperature during heating operation.

(2) Control

- Outdoor unit fan stops while the compressor is stopped (except in the presence of input from snow sensor).
- The fan operates at full speed for 5 seconds after start-up.(Only when TH7<0°C [32°F])
- The outdoor unit fan stops during defrost operation.

-10- Subcool Coil Control (Linear Expansion Valve <LEV1>)

- The OC and OS control the subcool coil individually.
- The LEV is controlled every 30 seconds to maintain constant the subcool at the outdoor unit heat exchanger outlet that is calculated from the values of high pressure (63HS1) and liquid piping temperature (TH3), or the superheat that is calculated from the values of low pressure (63LS) and the bypass outlet temperature (TH2) of the subcool coil.
- LEV opening is controlled based on the values of the inlet (TH6) and the outlet (TH3) temperatures of the subcool coil, high pressure (63HS1), and discharge temperature (TH4). The LEV is closed (0) in the heating mode, while the compressor is stopped, and during cooling Thermo-OFF. The LEV opens to a specified position when 15 minutes have passed after Thermo-OFF. (65 pulses)
- During defrost, normally, the valve is initially set at 0 pulse, although it may operate at higher pulses depending on the 63 LS and TH4 status.

-11- Refrigerant flow control (Linear expansion valve <LEV2>)

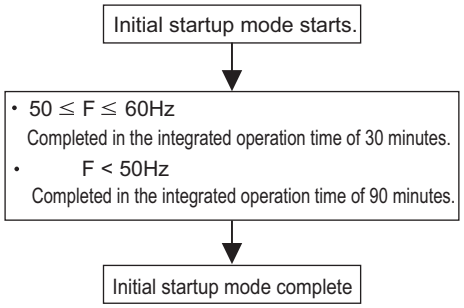
- ♦Refrigerant flow is controlled by each unit in the combined models during heating. Refrigerant flow control is performed by the OC and OS individually. The valve opens to a specified angle during cooling (Opening: 2100 pulses)
- ♦Valve opening is controlled based on the values of high pressure (63HS1), discharge temperature (TH4), low pressure(63LS), and piping temperature (TH5).
- ♦The valve moves to the predetermined position while the unit is stopped.
- ♦The valve opening may increase to 3000 pulses during the defrost cycle or when the units are operated in unusual operating conditions.

-12- Control at Initial Start-up

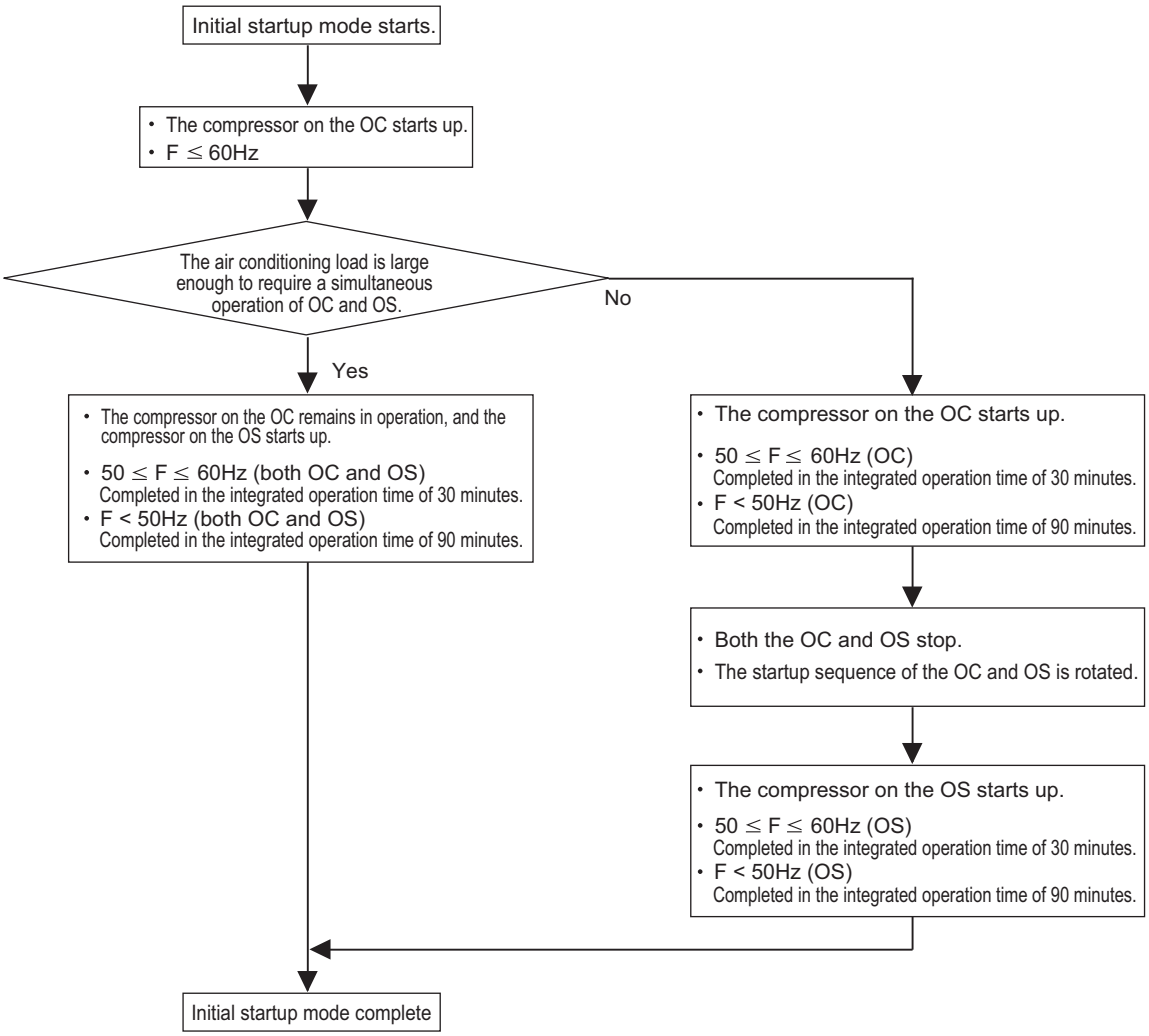
- ♦When started up for the first time before 12 hours have elapsed after power on, the unit goes into the initial startup mode.

1. Flowchart of initial operation

♦Single outdoor unit system (P250 model)



♦Multiple outdoor unit system (P500 model)



-13- Emergency Operation Mode

Backup mode is a mode in which the unit is operated when the thermistor malfunctions. The unit automatically goes into the backup mode when the following error is detected.

(1) Starting the emergency operation

1) When an error occurs, the error source and the error code will be displayed on the display on the remote controller.
2) Only the outdoor units that has not detected any errors will stay in operation.
3) If a TH2, TH3, TH5, or TH6 fault is detected, the sensor reading is complemented, and the unit will stay in operation.
4) If another thermistor fault is detected during the above-mentioned operation, the unit will make an abnormal stop.

Error codes that permit an emergency operation (Applicable to both OC and OS)

Trouble source		Error codes that permit an emergency operation	Error code description
Compressor Fan motor Inverter		0403	Serial communication error
		4220, 4225	Bus voltage drop
		4230	Heatsink overheat protection
		4240	Overload protection
		4250, 4255	Overcurrent relay trip
		5110	Heatsink temperature sensor failure (THHS)
		5301	Current sensor/circuit failure
Thermistor	TH2	5102	Subcool heat exchanger bypass outlet temperature sensor failure
	TH3	5103	Pipe temperature sensor failure
	TH4	5104	Discharge temperature sensor failure
	TH5	5105	Accumulator inlet temperature sensor failure
	TH6	5106	Subcool heat exchanger liquid outlet sensor failure
	TH7	5107	Outside air temperature sensor failure
Power		4102	Open phase
		4115	Power supply sync signal abnormality

(2) Ending the emergency operation

1) End conditions

When one of the following conditions is met, emergency operation will end.

- When an error is reset

*When resetting an error with the remote controller or the external input

- When an error is detected that does not allow the unit to run the emergency operation.

(3) Miscellaneous

1) End conditions

- When encountering problems other than the ones listed above, the system makes an error stop without performing emergency operation. (Only the indoor fan operates unless problems are found with the fan.)
- When problems are found in only one of the two units of a 2-refrigerant circuit, only the unit with the problems will run an emergency operation or stop its operation, and the other unit will keep running its operation.
- Emergency operation is intended only as a first aid until the unit is serviced. Have the unit serviced without delay to restore a normal operation.

-14- Capacity Control between Outdoor Units (when two refrigerant circuits are connected)

The following two capacity control methods between indoor units are available.

- Control to make only one of the outdoor units (which has the smaller address) operate and keep running during low-load hours at startup.
- Control to make one of the outdoor units stop, and the other outdoor unit operate when the load becomes low during normal operation. After a certain period of time has passed since only one of the outdoor units started operation, the unit in operation stops, and the other outdoor unit starts operation automatically.

(1) Starting Conditions

- Air conditioning load that is calculated based on the return air temperature is 50% or above.
- Operation frequencies of both indoor and outdoor units remain near the minimum level three minutes after start-up.

(2) Stopping Conditions

- When operation frequency of the running unit rises up near the maximum capacity.
- When it is determined that the load is over 50%, using suction temperature as a reference.
- When compressor stops while running only one unit.

-15- Dehumidification priority control

The dehumidification priority control is the control to increase the amount of dehumidification by increasing the frequency of the compressor when the external signal (dehumidification command) is received during cooling operation.
During dehumidification priority control, the room temperature may drop below the preset temperature set during normal operation.
Under this control, the set temperature wil be compulsory at the minimum value.
(Under discharge temperature control:14°C[57°F] Under suction temperature conrol:19°C[66°F])
The temperature nor the humidity can be controlled simultaneously as the reheat function is not available.

-16- Operation Mode

(1) Indoor unit operation mode

The operation mode can be selected from the following 4 modes using the remote controller.

1	Cooling mode
2	Heating mode
3	Fan mode
4	Stopping mode

(2) Outdoor unit operation mode

1	Cooling mode	All indoor units in operation are in cooling mode.
2	Heating mode	All indoor units in operation are in heating mode.
3	Stopping mode	All indoor units are in fan mode or stopping mode.

Note

The heating mode can be used for standby of the indoor unit when the outdoor temperature is low. Confirm that the devices to be cooled are not influenced by the heat.
The discharge temperature control cannot be used.
The discharge temperature is controlled not to drop less or equal 30°C[86°F]. It may take time to reach the indoor target temperature.
When the indoor temperature reaches the cooling operation range, switch the operation from heating to cooling.

-17- DEMAND Control

Cooling/heating operation can be prohibited (Thermo-OFF) by an external input to the indoor units.

Note

When DIP SW4-4 is set to ON, the 4-step DEMAND control is enabled.
Eight-step demand control is possible in the system with two outdoor units.

Refer to Chapter II [3] 2. (7) "Various types of control using input-output signal connector on the outdoor unit (various connection options)" for details.(page 21)

-18- System Rotation Control Instructions

1. General Descriptions
   - Each group can consist of a maximum of 5 systems and a minimum of 2 systems.
   - With the use of this control function, one system in a given group serves as a backup and remains stopped.
   - The unit designated as the control unit (System 1 in Figure 1) sends command signals to other units in the group to start or stop, and rotates the backup unit every 480 hours.
   - Rotation sequence is in the ascending order of address, starting from the lowest address after the control unit address. (e.g., System 2 -> System 3 -> System 4 -> System 5 -> System 1 in Figure 1 below)
   - If other units in the group detect an error or if there is a communication failure between the systems, this control is terminated, and the backup unit goes into operation.

> **⚠ CAUTION**
> To enable this control function, the following wiring and settings are required at installation.
>
> 1) Daisy-chain terminals M1 and M2 on the terminal block for transmission line for centralized control (TB7) on all applicable outdoor units.
>   Move the power jumper connected to CN41 to CN40 on only one of the outdoor units.
>   To supply power to the outdoor unit from a power supply unit, leave the power jumper connected to CN41as it is (factory setting).
> 2) Check that the label on the indoor unit circuit board reads KE90D352, if it does not, replace the circuit board.
> 3) Set the SW1-9 and SW1-10 on indoor units as follows to enable the external input: (SW1-9: ON; SW1-10: OFF).
> 4) Assign sequential addresses to the units as shown below (Figure 1 and 2).
>   (Only use odd numbers for the 10HP system.)
> 5) Make the rotation group settings by setting the appropriate switches on the outdoor units.
>   <Refer to Item 2 below.>

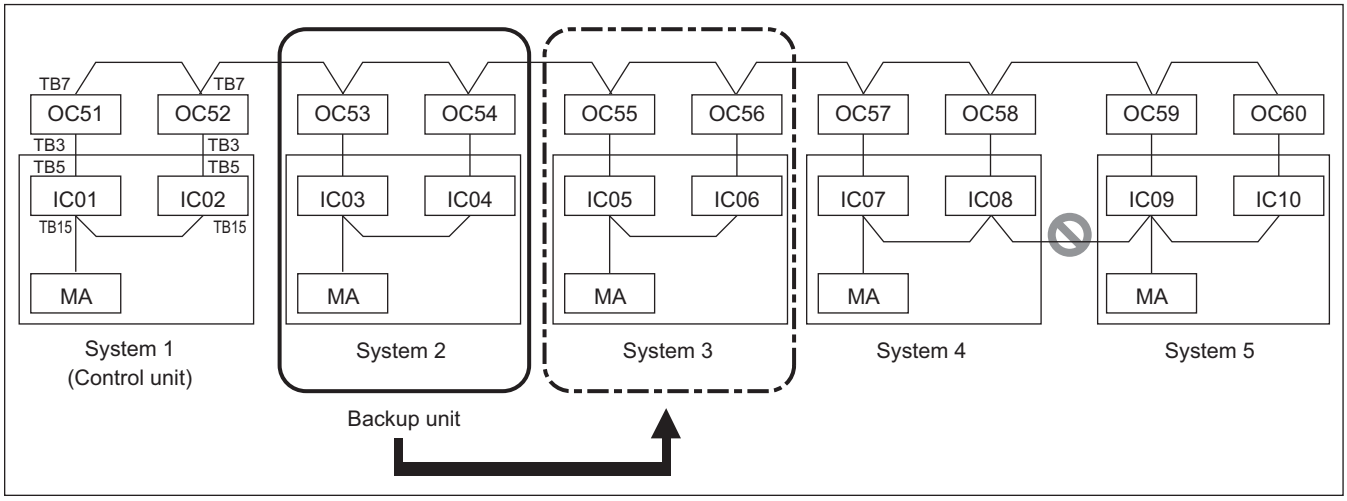


Figure 1 Sample 20HP system group

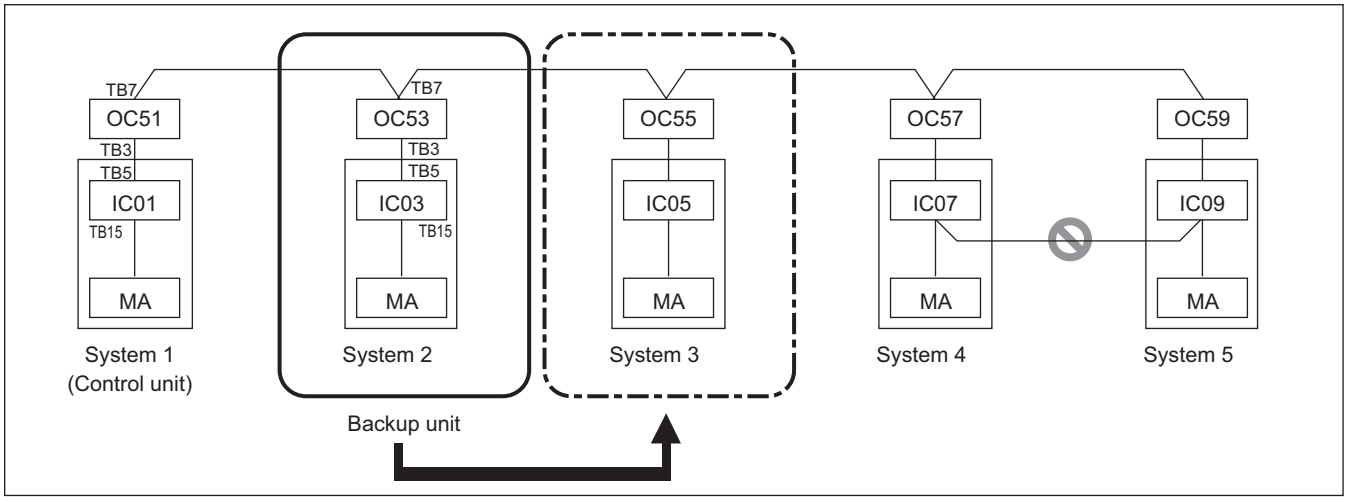


Figure 2 Sample 10HP system group

(1) Rotation Group Setting

- Group setting is required to enable the system rotation control function.
- Group setting must be made after the setup sequence for all applicable indoor and outdoor units have been completed.
- By turning the Dip SW5-10 from OFF to ON on the outdoor unit with the lowest odd number address in a given group while the unit is stopped, this unit is designated as the control unit.
- The control unit sends signals to other units with the addresses that equals "the control unit address + 2, +4, +6, +8" in this order and includes the units that returned the response signal in the group.
  If there is a unit that does not return a response signal or if a response is returned that indicates another unit is designated as a control unit, communication and group setting will be completed.
- Group setting pattern will fall into one of the following 9 patterns as shown in Figure 3. In patterns 5 and 9, only the control unit will be designated, but this function will not be used.
- In patterns 6 through 9, the second CU and on will be in another group.

Outdoor unit addresses

	A	A+2	A+4	A+6	A+8
Pattern 1	CU	○	○	○	○
Pattern 2	CU	○	○	○	×
Pattern 3	CU	○	○	×	—
Pattern 4	CU	○	×	—	—
Pattern 5	CU	×	—	—	—
Pattern 6	CU	○	○	○	CU
Pattern 7	CU	○	○	CU	—
Pattern 8	CU	○	CU	—	—
Pattern 9	CU	CU	—	—	—

A: Odd numbers between 51 and 91

CU: Control unit ○ : Response returned × : No response — : Optional

Figure 3 Group patterns

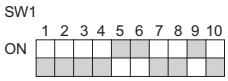
(2) Starting Conditions

This control function is initiated after group settings have been made and if all of the following conditions are met.

- Initial setup sequence for all the units in the group has been completed.
- All the units in the group are in operation.
- No errors are detected by any unit in the group.

(3) Rotation Operation

- When the above starting conditions are met, the control unit will bring the backup unit to stop, and the system rotation timer starts counting.
- When the system rotation timer reaches 480 hours, units are rotated to become the backup unit.
- When rotation is performed, first the stopped backup unit is started, then the system rotation timer is reset, and finally the next backup unit is brought to stop in three minutes or less.
- The address of the unit that is currently designated as the backup unit can be found by setting Dip SW1 on the outdoor unit that is designated as the control unit as shown below.



(4) End Conditions

- This control function is terminated by turning the Dip SW 5-10 from ON to OFF on the control unit (outdoor unit) while the unit is stopped.
- When this function is disabled, the group setting information and the system rotation timer on the control unit will be cleared. If any backup unit other than the control unit is stopped as a backup unit, that unit will automatically resume its operation.

(5) Running/Stopping the Units on Rotation

- Indoor units whose SW9 (Normal/Local switching switch) is set to "Local" will not be able to accept the Run/Stop signal from the control unit and will not operate properly. After the unit whose SW9 is set to "Local" is operated or stopped from the MA remote controller, the operation status needs to be changed back to the original status, and the SW9 setting needs to be set back to "Normal."
- If an attempt is made to Run/Stop the indoor unit whose SW9 is set to "Normal", the following types of errors may happen.

  Example 1 Backup units are not rotated when the system rotation timer has reached 480 hours.
  Example 2 The backup unit does not go into operation when a unit in the group detects an error.
  These symptoms can be solved by bringing the stopped unit into operation. By doing so, although all the units will temporarily operate, the rotation function will remain effective.

(6) When an Error Occurs

- If an error is detected by a unit or a communication failure between the systems in the group while the rotation function is enabled, the units will perform the actions as described in Table 1, and the rotation control will be temporarily stopped.
- When the starting conditions are met, this function will be resumed, and the rotation sequence and the system rotation timer count effective at the time of error will be kept.

Table.1 Operation of Units during an Error

	Rotation status	A unit in the group made an abnormal stop.	Communication failure between systems
Control unit	Backup unit	Goes into operation	Goes into operation
	Regular unit	Sends a startup signal to the backup unit	Sends a startup signal to the backup unit
Other units	Backup unit	Goes into operation by receiving a signal from the control unit	1) Goes into operation by receiving a signal from the control unit 2) Goes into operation*1
	Regular unit	Sends its own error status to the control unit	-

*1. The backup unit will automatically resume its operation when periodical communication from the control unit is lost.

(7) Rotation Function Test Run Mode

- Proper operation of the rotation function can be checked in a short time using the rotation function test run mode.
- Rotation function test run mode can be initiated by starting the control unit in the test run mode (via MA remote controller).
- In this mode, the system rotation timer setting is reduced to approximately three minutes (from the usual 480 hours), and the test run will automatically end when the control unit is rotated to the backup unit.
- At the completion of the test run mode, the system rotation timer setting goes back to 480 hours, and this function will remain effective.

Note

Important Notes on Rotation Control

- All the units in the system using the rotation function must be the same capacity and installed within the same area to be cooled.
- Check that the items to be cooled are not affected no matter which unit stops when designated as a backup unit.
- The backup unit automatically goes into operation only when there is a problem with other units in the group. It will not automatically go into operation even if the heat load increases.
- The control unit cannot perform a test run while the system rotation function is performed. Disable the system rotation control function to perform a test run.
- If multiple units are grouped with an MA remote controller or a G-50A controller, this control function will not work properly.

[3] Controlling the Indoor Unit

<Indoor unit control>

There are two controller circuit boards with two refrigerant circuits inside the indoor unit of 20 HP.
There is one controller circuit board with one refrigerant circuit. Each refrigerant circuit is controlled independently (in case of one refrigerant circuit, one-to-one control of indoor unit and outdoor unit) in the following method.

-1- Thermostat Functions

(1) Thermostat Functions and Function Selection

·Two control methods are available; suction temperature control and discharge temperature control.

·The suction/discharge temperature control can be switched by the switches (SWC) on the controller circuit board inside the controller of the indoor unit.

·The discharge temperature control is selected (SWC is set to "Standard") at factory shipment.

·To switch the control, set SWC on two controller circuit boards inside the controller as follows.

To perform suction temperature control: Set SWC to "Option".
To perform discharge temperature control: Set SWC to "Standard".

·The SWC settings made on two controller circuit boards must be equivalent.<20HP only>

*Only the suction temperature control is performed in the heating mode regardless of the SWC settings.

(2) Thermostat Reading

A. Discharge temperature control (SWC is set to "Standard".)

(a) Thermo ON Condition
- Three minutes have past since thermo OFF AND
- TH24 -Preset temperature > 1°C [34°F]
- The TH21 value has gone up by 1°C or more compared to its value during Thermo-OFF.

TH24: Discharge thermistor
TH21: Suction thermistor

(b) Thermo OFF Condition

< When Dipsw4-5 on the outdoor unit is ON >
- 30 minutes have past since thermo ON AND
- TH24 -Target Temperature < -1°C [30°F] has been detected fo r10 minutes OR TH24 - Target Temperature < -5°C [23°F] was detected

< When Dipsw4-5 on the outdoor unit is OFF >
- Two minutes have past since thermo ON
- TH24 - Target Temperature < -1°C [30°F] has been detected for 5 minute. AND F=Fmin

B. Suction Temperature Control (SWC is set to "Option".)

(a) Thermo ON Condition
- Three minutes have past since thermo OFF AND
- TH21 - Target Temperature > 1°C [34°F]

(b) Thermo OFF Condition

< When Dipsw4-5 on the outdoor unit is ON >
- Thirty minutes have past since thermo ON AND
- TH21 - Target Temperature < -1°C [30°F] has been detected for 10 minutes OR TH21 - Target Temperature < -5°C [23°F] was detected.

< When Dipsw4-5 on the outdoor unit is OFF >
- Two minutes have past since thermo ON AND
- TH21 - Target Temperature < -1°C [30°F] has been detected for 5 minute. AND F=Fmin

-2- Actuator Control

(1) LEV Control

· At startup, the LEV is set to the initial position based on the outside temperature.

· After the start-up, the degree of LEV opening is controlled every minute so that the superheat detected by the thermistors TH22 (liquid pipe) and TH23 (gas pipe) of the indoor unit can be within a certain range.

· Depending on the operating condition of the outdoor unit, a control other than the superheat control described above may be performed.

· The degree of LEV full opening/closing is 41 pulses.

(2) Fan Control

Whether the thermostat is ON or OFF, the fan stays ON except during operation stoppage.
Exception: Fan stops when problem with the fan is detected (Error Code 4109).

* Fan problems may be experienced in the following situations: Surge breaker trip (51F) or malfunctions of sub relays (Z1,Z2, or Z3.)

(3) Float Switch Control

The unit makes an error stop when the contact point (B contact) of the float switch loses its contact (i.e. loosened floated parts, disconnected wire, unfastened connector etc.) for more than 1 minute or longer.

(4) Indicator Lamp

Indicator lamps on the front side of the unit indicate the operation status of the indoor unit.

Power Supply Lamp (White)	: Lit upon power ON. Extinguished upon power OFF.
Operation Lamp (Green)	: Lit during operation. Extinguished during stoppage.
Error Lamp (Red)	: Lit when errors are detected in each refrigerant circuit. Extinguished during normal operation or after error reset.
Inspection lamp (orange)	: Lit when the inspection switch of the indoor unit is ON (during inspection). Extinguished when the switch is OFF (during normal operation).

-3- Temperature Setting Range

The temperature range can be set between 19℃ [66℉] (14℃ [57℉]) and 30℃ [86℉] using the remote controller when the suction temperature control (or the discharge temperature control) is performed.

* Depending on the operating conditions, target temperature and actual discharge/suction temperatures may not match.For example, even if the target discharge temperature is set at 14℃ [57℉], if the load exceeds the capability of the unit, the actual temperature will not reach 14℃ [57℉]

-4- Emergency Operation Mode

The emergency operation is an operation that operates the unit temporarily depending on the error types described later. The emergency operation is run automatically when the following errors are detected.

(1) Starting an Emergency Operation

- When the following problems are detected, the system runs an emergency operation, displaying error codes.
- During this operation, near normal operation is run, ignoring the following abnormal operation data. (Some of the actuator will run at a fixed state during this time.)

Chart: Types of errors in which emergency operation can be run

Types of Errors			Error codes
Thermistor Error	TH21	Open/Short Detection	5101
	TH22		5102
	TH23		5103
	TH24		5104

(2) Stopping the Emergency Operation

Emergency operation mode is stopped in the following situations:

- When abnormal mode is reset
  * How to reset an abnormal mode
  · When the operation is stopped by the remote controller or by the external input
- A different type of error is detected during emergency operation
  * i.e. when TH22 error is detected during emergency operation caused by TH21 error
- When emergency operation disabled error is detected

(3) Miscellaneous

- When the errors other than described in the chart, the unit makes an error stop without performing emergency operation. (Only the indoor fan operates, however; it stops when the fan is in trouble.)
- When one of the two refrigerant circuits, the outdoor unit with the refrigerant circuit in error performs emergency operation or makes an error stop, while the other outdoor unit keeps normal operation.
- Emergency operation is intended only as a first aid until the unit is serviced. Have the unit serviced without delay to restore a normal operation.

-5- Twenty-second restart-suspension mode

The unit will be in a twenty-second restart-suspension mode (same operation as Thermo OFF) in any of the following situations.

- · When the demand for outdoor unit changes from Thermo ON to Thermo OFF.
- · When operation mode changes from normal to emergency mode.
- · When anti-freeze mode is completed.

* The outdoor unit has also a twenty-second restart-suspension mode, and it works separately from the indoor unit.

-6- Anti-Freeze Control (In cooling mode)

(1) Starting Conditions

This operation will start when all of the following conditions are met:

- · Thermo ON status has been detected for 16 minutes.
- · TH22 (liquid pipe temp. Thermistor) < 1˚C [34˚F] has been detected for 20 minutes.

(2) Control Operation

The unit will be in the same condition as Thermo OFF condition for six minutes. When the following conditions are met, the unit will be in a 20-second restart-suspension mode.

(3) Stopping Conditions

When either of the following conditions is met:

- · TH22 ≥ 10˚C [50˚F]
- · Six minutes have elapsed since the beginning of this operation.

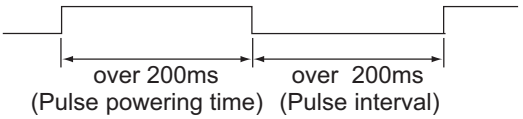
-7- Switching Between Pulse and Level of MA Remote Controller External Input

The start/stop operation can be performed by either of the MA remote controller or the external input (pulse/level).

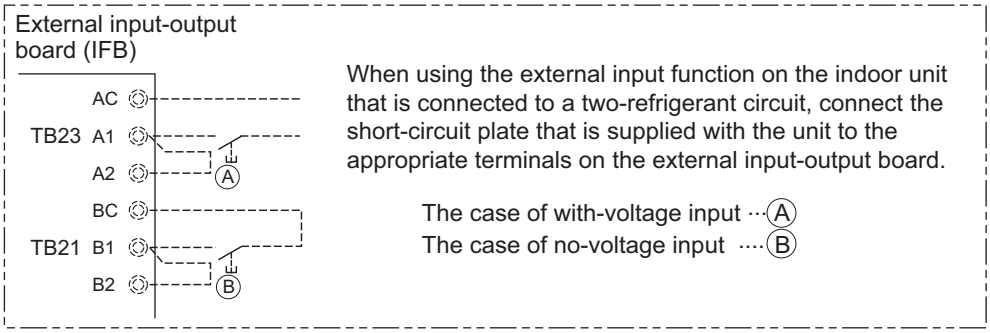
DIPSW on the address circuit board (No.1 and No. 2)		Valid operation
SW1-10 = OFF	SW1-9 = OFF	External input (level)
	SW1-9 = ON	External input (pulse)
SW1-10 = ON		MA remote controller

* The manipulator for centralized control can be operated regardless of the SW1-9 status (ON), and SW1-10 status (OFF).
* For the MA remote controller and the external input, the operation command sent later has no priority.
* When the Normal/Inspection switch on the main unit is set to "Inspection", the external input will be disabled. Only the operation performed by the MA remote controller is valid.

Input

Function	Usage	Signal specifications
Start/Stop	Sending ON/OFF command to the indoor unit	Pulse (With-voltage/No-voltage a-contact) * <In case of with-voltage> Power supply:12~24V DC Electrical current:10mA (12V DC) <Pulse specification> 

* Use a contact point for small electrical current (12V DC 1mA).



-8- Operation during Electrical Power Failure

After the controller in this air conditioning unit receives signals indicating power failure or an instantaneous drop in voltage, unless the unit receives a command not to restart, it will resume its operation after power supply is restored.
Depending on the duration of power outage, the following operations will be run.

Duration of Power Outage	Unit Operation
Shorter than 6msec	Both indoor and outdoor units will stay on.
Longer than 6msec and Shorter than 50msec (Note1, Note2)	It is recognized by the unit as aninstantaneous power outage Indoor Unit: The fan stays on. Outdoor Unit: Compressor stops, then resumes its operation 20 seconds later.
Longer than 50msec (Note1, Note2)	It is recognized by the unit as power outage. Air-conditioning unit will stop (incl. fan and compressor). It will resume operation after the power has been restored. * The time it takes for the indoor unit fan to resume its operation after power failure is as follows: 20 seconds + (indoor unit address/2) seconds (55 seconds max.). * The compressor on the outdoor unit will resume its operation according to the operation signal from the indoor units after 30 seconds since power restoration.

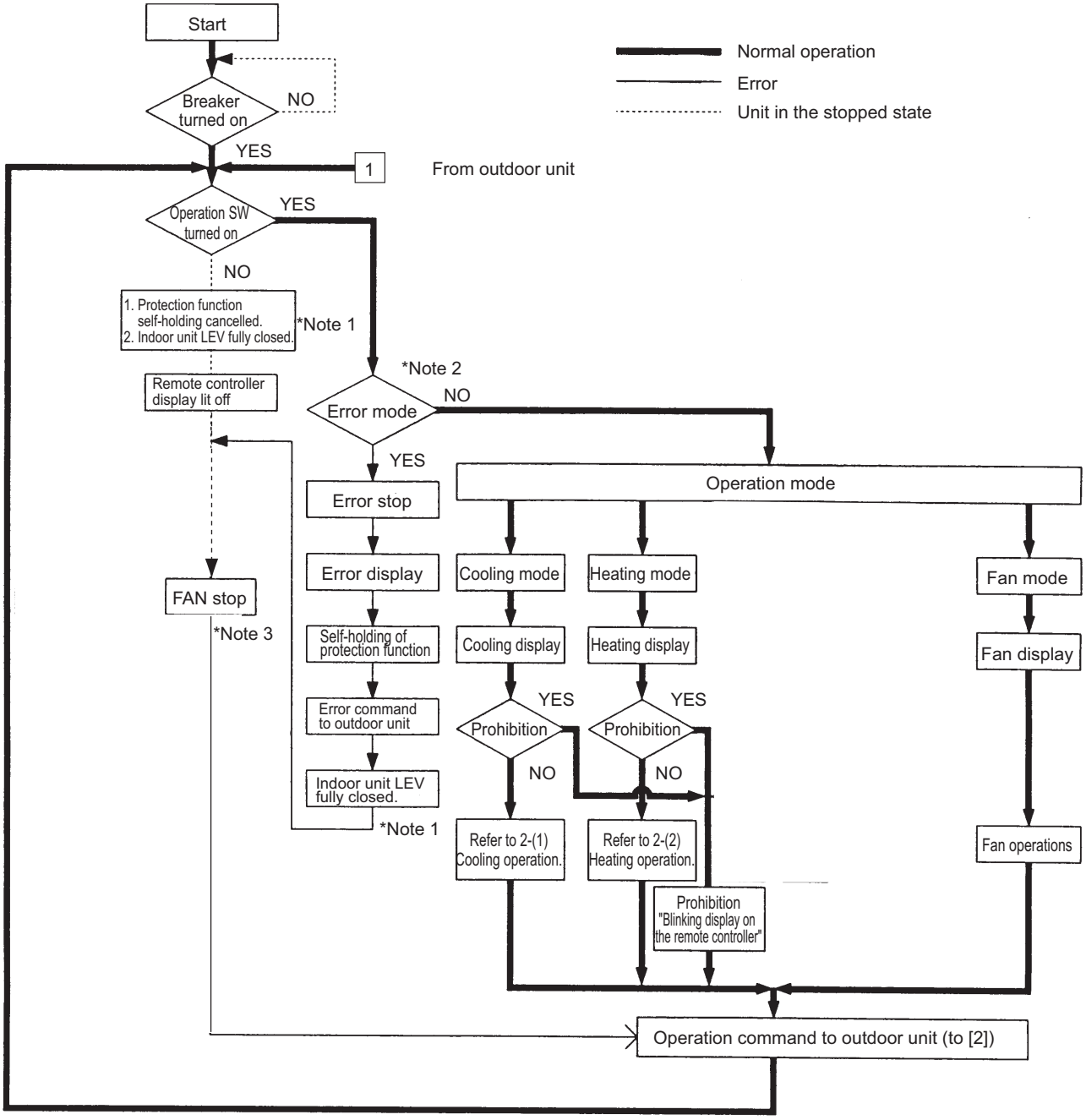
Note 1: When indoor unit is in the maintenance mode, it will not resume operation even after the power has been restored.

Note 2: After the unit resumes its operation, MA remote controller will display 'HO' for fifteen seconds, **during which time the MA remote controller will not respond. To turn off the unit during this time, turn off the power with an electric leak breaker.**

[4] Operation Flow Chart

1. Mode determination flowchart

(1) Indoor unit (cooling, heating, fan mode)

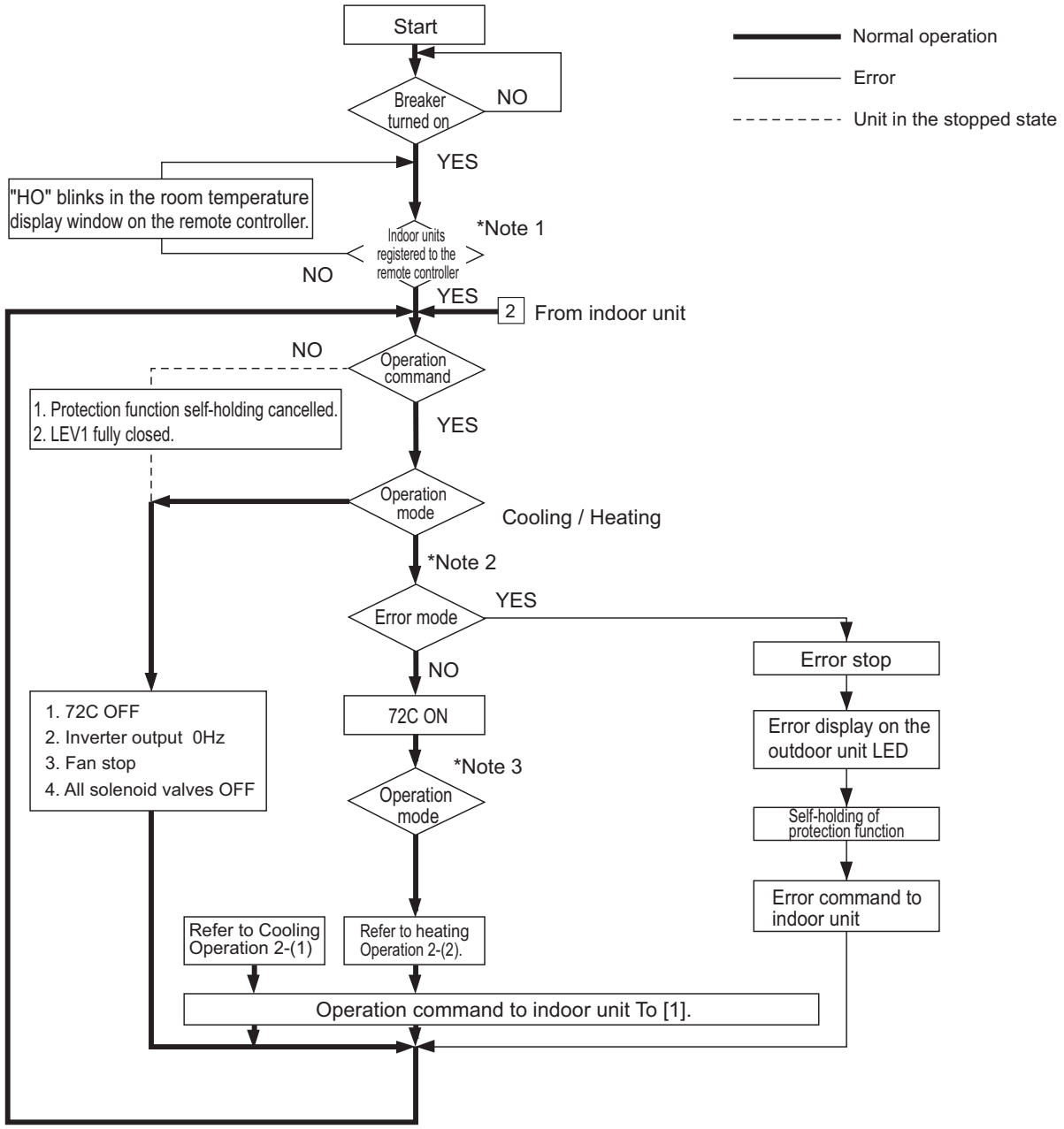


*Note 1. Indoor unit LEV fully closed : Opening 41.

*Note 2. The system may go into the error mode on either the indoor unit or the outdoor unit side. If some of the indoor units are experiencing a problem (except water leakage), only those indoor units that are experiencing the problems will stop. If the outdoor unit is experiencing a problem, all connected indoor units will stop.

*Note 3. The fan stops only when there is a problem with the fan.

(2) Outdoor unit (cooling and heating modes)



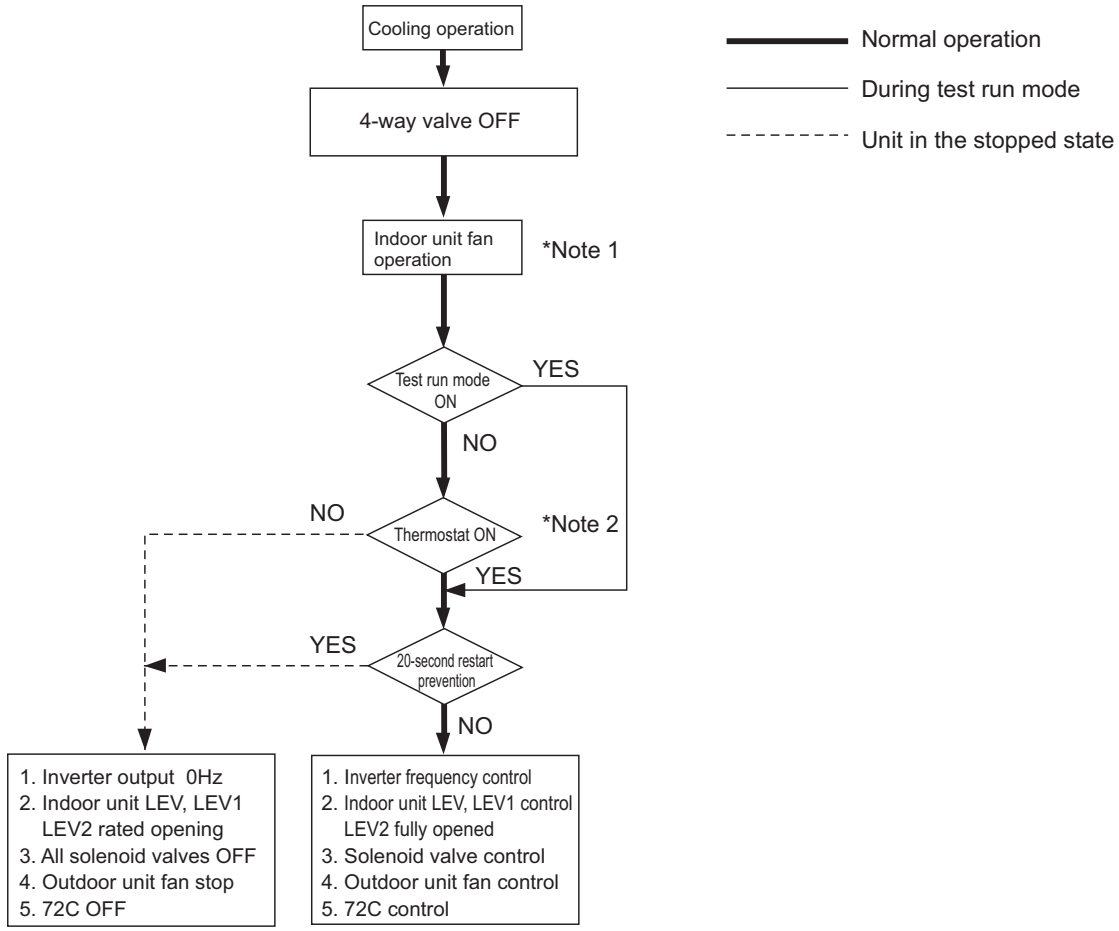
*Note 1. For approximately one minute after power on, a search for the indoor unit address, remote controller address, and group information is performed. While this process is performed, "HO" blinks on the display.

*Note 2. The system may go into the error mode on either the indoor unit or the outdoor unit side. In either case, the connected indoor and outdoor units will come to an error stop. (If the units go into the backup mode, they will remain in operation.)

*Note 3. The outdoor unit operates according to the operation mode selection signal from the indoor unit.

2. Operations in each mode

(1) Cooling operation



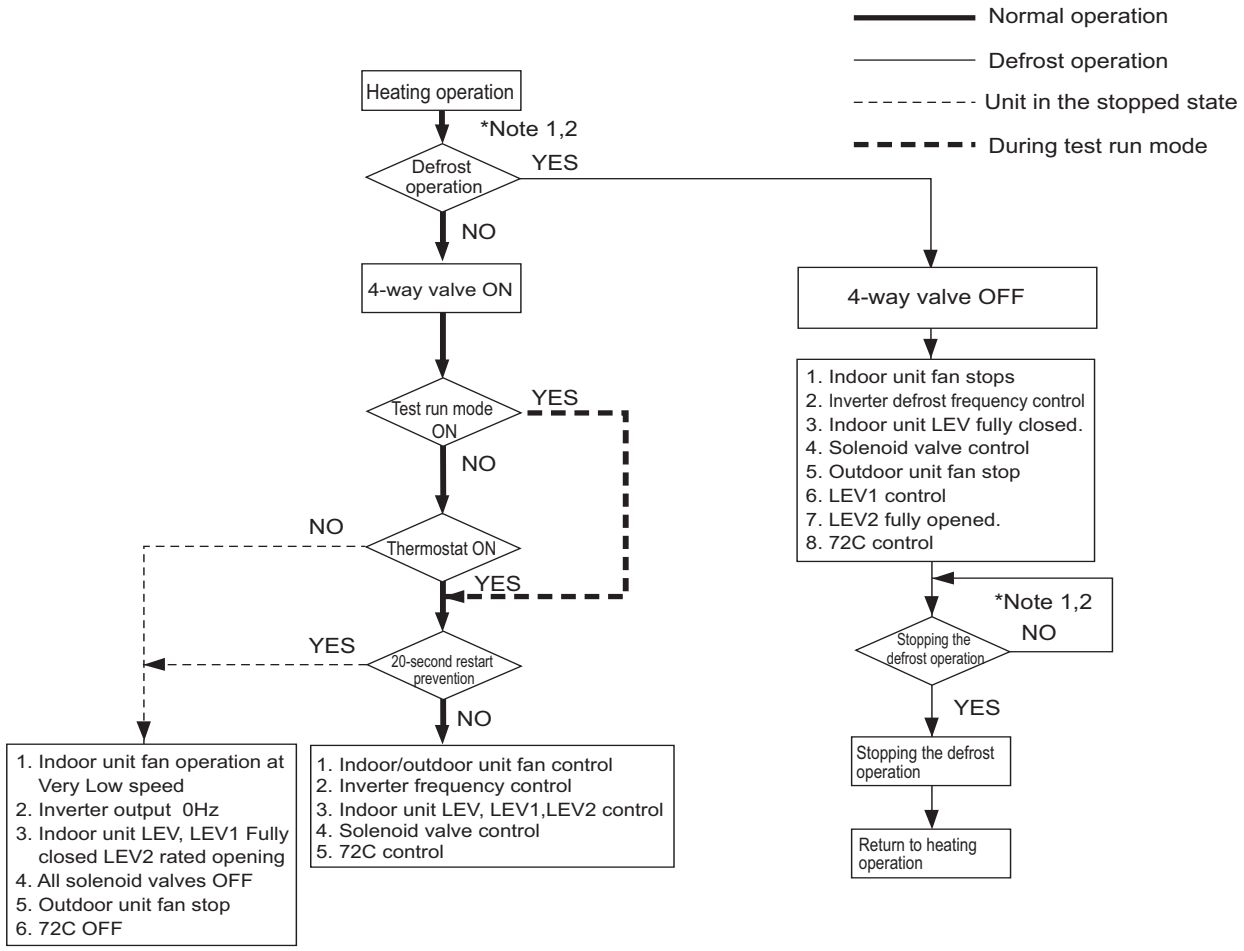
*Note 1. The indoor fan operates in the cooling mode regardless of the ON/OFF state of the thermostat.

*Note 2. The following two methods are available to perform the test run.

1) Using DipSW3-1 and 3-2 on the outdoor unit

2) Using MA remote controller

(2) Heating operation



Note

1) When outdoor unit starts defrosting, it transmits defrost operations command to indoor unit, and the indoor unit start defrosting operations. Similarly when defrosting operation stops, indoor unit returns to heating operation after receiving defrost end command of outdoor unit.
2) Defrost end condition: 12 or more minutes must pass after defrost operation or outdoor unit piping temperature.
   Refer to "-7-. Defrost operation control" of [2] Controlling the Outdoor Unit(page 85) for the temperature.
3) The discharge temperature is controlled to keep approx. 30°C[86°F] or below in heating mode.

VIII Test Run Mode

[1] Items to be checked before a Test Run

(1) Check for refrigerant leak and loose cables and connectors.

(2) Measure the insulation resistance between the power supply terminal block and the ground with a 500V megger and make sure it reads at least 1.0Mohm.

Note

- Do not operate the unit if the insulation resistance is below 1.0Mohm.
- Do not apply megger voltage to the terminal block for transmission line. Doing so will damage the controller board.
- The insulation resistance between the power supply terminal block and the ground could go down to close to 1Mohm immediately after installation or when the power is kept off for an extended period of time because of the accumulation of refrigerant in the compressor.
- If insulation resistance reads at least 1Mohm, by turning on the main power and powering the crankcase heater for at least 12 hours, the refrigerant in the compressor will evaporate and the insulation resistance will go up.
- Do not measure the insulation resistance of the terminal block for transmission line for the unit remote controller.

(3) Check that the valve on the gas pipe and liquid pipe are fully open.

Note

Securely tighten the cap.

(4) Check the phase sequence and the voltage of the power supply.

(5) [When a transmission booster is connected]
Turn on the transmission booster before turning on the outdoor units.

Note

- If the outdoor units are turned on first, the connection information for the refrigerant circuit may not be properly recognized.
- In case the outdoor units are turned on before the transmission booster is turned on, perform a power reset on the outdoor units after turning on the power booster.

(6) Turn on the main power to the unit at least 12 hours before test run to power the crankcase heater.

Note

Insufficient powering time may result in compressor damage.

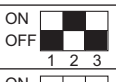
(7) When a power supply unit is connected to the transmission line for centralized control (*), perform a test run with the power supply unit being energized. Leave the power jumper connector on CN41 as it is (factory setting).

*Includes the cases where power is supplied to the transmission line from a system controller with a power-supply function

[2] Test Run Method

	Procedures
	Turn on the main power. → It will take approximately three minute until the unit is operable. Leave the unit on for 12 hours (to power the outdoor unit compressor crankcase heater).
	Run an individual test on each of the refrigerant circuit to make sure that pipes or wires are not cross-connected.
1	First, run a test on No.1-side refrigerant circuit.
2	Set the Normal/Maintenance Switch of the indoor unit to Maintenance.
3	While the unit is stopped, set the SW8-2 on **the circuit board on No.2 side** to "OFF". (See Note 1.)
4	Run a **test**, using the remote controller for the indoor unit. →Indoor fan will start, and outdoor unit of only No.1 refrigerant circuit will start operating. During this time, the outdoor unit on No.2-side refrigerant circuit will remain at a halt. →Confirm that indoor fan and outdoor unit in the No.1-side refrigerant circuit operate normally. →Confirm that pipes or wires are connected correctly.
5	Stop the operation with the remote controller for the indoor unit. →End of No.1 refrigerant circuit test run.
6	Run a test on No.2-side refrigerant circuit.
7	While the unit is stopped, set the SW8-2 on **the circuit board on No.1 side** to "OFF", and set the SW8-2 on **the circuit board on No.2 side** to "ON".
8	Run a **test** by using the remote controller in the indoor unit. → Indoor fan will start, and only the outdoor unit in No.2-side refrigerant circuit will start. During this time, the outdoor unit in No.1-side refrigerant circuit is stopped. →Confirm that indoor fan and outdoor unit of No.2-side refrigerant circuit are operating normally. →Confirm that pipes and wires are connected correctly.
9	Stop the test, using the remote controller for the indoor unit. → End of No.2 refrigerant circuit test run.
10	While the unit is stopped, set the SW8-2 on **the circuit board on No.1 side** to "ON".
11	Finally, run simultaneous tests in both No.1- and No.2-side refrigerant circuit.
12	Perform **test run** with the remote controller for the indoor unit. → Indoor fan will start, and outdoor units in both No.1- and No.2-side refrigerant circuit will start. → Confirm that indoor fan and both outdoor units operate normally.
13	Stop the test, using the remote controller in the indoor unit → End of test
14	Switch the Normal/Maintenance switch inside indoor unit back to Normal. → After the test run is completed, set the Normal/Maintenance switch to "Normal", and confirm that the SW8 on the circuit boards on both No.1 and No.2 sides is set as shown below (factory setting).

Note 1 When two refrigerant circuits are connected, both refrigerant circuits start running when the operation is started with the remote controller without setting the SW8 on the indoor unit as shown on the right.
To enable each refrigerant circuit to operate individually, the setting of the SW8 shown on the right is required.

SW8	Unit operation	Remarks
	Performs test run when the test run command is received	Factory setting
	Remains a halt even if the test run command is received	

Unit operation when SW8 on the circuit board inside the indoor unit is operated

Note 2 The error code is displayed on the remote controller when the error lamp is lit on the indoor unit during test run.
Refer to Chapter IX “Troubleshooting” for check codes.

Note 3 Set the Dip SW4-5 to "ON" on the outdoor unit if the test run cannot be kept due to low load.
After the test run is completed, set the Dip SW4-5 to "OFF". **(The SW must be switched while the unit is stopped.)**

Note 4 When one refrigerant circuit is connected, the procedures 3 and 6-13 in the chart above are not required.

Note 5 When the test run is performed for the first time after the power is turned on, the standby operation of the compressor is performed.
The compressor may run and stop repeatedly. This is not a malfunction.
This operation lasts for 70 minutes at maximum.

[3] Operating Characteristic and Refrigerant Amount

It is important to have a clear understanding of the characteristics of refrigerant and the operating characteristics of air conditioners before attempting to adjust the refrigerant amount in a given system.

1. Operating characteristic and refrigerant amount

The following table shows items of particular importance.

1) During cooling operation, the amount of refrigerant in the accumulator is the smallest when all indoor units are in operation.
2) During heating operation, the amount of refrigerant in the accumulator is the largest when all indoor units are in operation.
3) General tendency of discharge temperature
   - ♦Discharge temperature tends to rise when the system is short on refrigerant.
   - ♦Changing the amount of refrigerant in the system while there is refrigerant in the accumulator has little effect on the discharge temperature.
   - ♦The higher the pressure, the more likely it is for the discharge temperature to rise.
   - ♦The lower the pressure, the more likely it is for the discharge temperature to rise.
4) When the amount of refrigerant in the system is adequate, the compressor shell temperature is 10 to 60°C [18 to 108°F] higher than the low pressure saturation temperature (Te).

   -> If the temperature difference between the compressor shell temperature and low pressure saturation temperature (Te) is smaller than 5°C [9°F], an overcharging of refrigerant is suspected.

[4] Adjusting the Refrigerant Amount

1. Symptoms

Overcharging or undercharging of refrigerant can cause the following symptoms:
Before attempting to adjust the amount of refrigerant in the system, thoroughly check the operating conditions of the system. Then, adjust the refrigerant amount by running the unit in the refrigerant amount adjust mode.

The system comes to an abnormal stop, displaying 1500 (overcharged refrigerant) on the controller.	Overcharged refrigerant
The operating frequency does not reach the set frequency, and there is a problem with performance.	Insufficient refrigerant amount
The system comes to an abnormal stop, displaying 1102 (abnormal discharge temperature) on the controller.	

2. Amount of refrigerant

(1) To be checked during operation

Operate all indoor units in either cooling-only or heating-only mode, and check such items as discharge temperature, subcooling, low pressure, suction temperature, and shell bottom temperature to estimate the amount of refrigerant in the system.

Symptoms	Conclusion
Discharge temperature is high. (Normal discharge temperature is below 95°C [203°F].)	Slightly undercharged refrigerant
Low pressure is unusually low.	
Suction superheat is large. (Normal suction superheat is less than 20°C [36°F].)	
Compressor shell bottom temperature is high. (The difference between the compressor shell bottom temperature and low pressure saturation temperature (Te) is greater than 60°C [108°F].)	
Discharge superheat is small. (Normal discharge superheat is greater than 10°C [18°F].)	Slightly overcharged refrigerant
Compressor shell bottom temperature is low. (The difference between the compressor shell bottom temperature and low pressure saturation temperature (Te) is less than 5°C [9°F].)	

3. Amount of refrigerant to be added

The amount of refrigerant that is shown in the table below is factory-charged to the outdoor units.
The amount necessary for extended pipe (field piping) is not included and must be added on site.

Outdoor unit model	P250
Amount of pre-charged refrigerant in the outdoor unit (kg)	8.0
Amount of pre-charged refrigerant in the outdoor unit [lbs-oz]	19-13

(1) Calculation formula

The amount of refrigerant to be added depends on the size and the length of field piping. (unit in m[ft])

Amount of added refrigerant (kg) = $(0.29 \times L_1) + (0.2 \times L_2) + (0.12 \times L_3) + (0.06 \times L_4) + (0.024 \times L_5) + \alpha$
Amount of added refrigerant (oz) = $(3.12 \times L_1') + (2.15 \times L_2') + (1.29 \times L_3') + (0.65 \times L_4') + (0.26 \times L_5') + \alpha'$

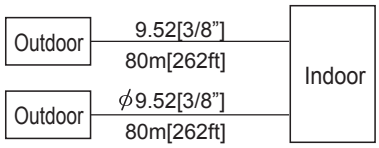
L_1 : Length of ø19.05 [3/4"] liquid pipe (m)
L_2 : Length of ø15.88 [5/8"] liquid pipe (m)
L_3 : Length of ø12.7 [1/2"] liquid pipe (m)
L_4 : Length of ø9.52 [3/8"] liquid pipe (m)
L_5 : Length of ø6.35 [1/4"] liquid pipe (m)
L_1' : Length of ø19.05 [3/4"] liquid pipe [ft]
L_2' : Length of ø15.88 [5/8"] liquid pipe [ft]
L_3' : Length of ø12.7 [1/2"] liquid pipe [ft]
L_4' : Length of ø9.52 [3/8"] liquid pipe [ft]
L_5' : Length of ø6.35 [1/4"] liquid pipe[ft]
α, α' : Refer to the table below.

Total capacity of connected indoor units	α (kg)	α'(oz)
P250 model	2.0	71
P500 model`*1	4.0	142

*1. For P500 model, the value will be 2.0kg x 2 when two refrigerant circuits are connected.

Round up the calculation result to the nearest 0.01kg. (Example: 18.54kg to 18.6kg)
Round up the calculation result in increments of 4oz (0.1kg) or round it up to the nearest 1oz. (Example: 178.21 to 179oz)

(2) Example:Outdoor unit PUHY-P250YJM-A x 2; Indoor unit PFD-P500VM-E



When the liquid pipe size is ϕ9.52, and the pipe length is 80m,
According to the above formula
Amount of refrigerant to be charged (kg) = 0.06×80+2.0=6.8kg
The final result will be as follows:
Amount of refrigerant to be charged = 6.8kg (for one refrigerant circuit)

When the liquid pipe size is ϕ[3/8"], and the pipe length is 262ft,
According to the above formula
Amount of refrigerant to be charged (oz) = 0.65×262+71 = 241.3oz
The final result will be as follows:
Amount of refrigerant to be charged = 242oz (for one refrigerant circuit)

⚠ CAUTION
Charge liquid refrigerant (as opposed to gaseous refrigerant) into the system.
- If gaseous refrigerant is charged into the system, the composition of the refrigerant in the cylinder will change and may result in performance loss.

[5] Refrigerant Amount Adjust Mode

1. Procedures

Follow the procedures below to add or extract refrigerant as necessary depending on the operation mode.

When the function switch (SW4-3) on the main board on the outdoor unit (OC only) is turned to ON, the unit goes into the refrigerant amount adjust mode, and the following sequence is followed.

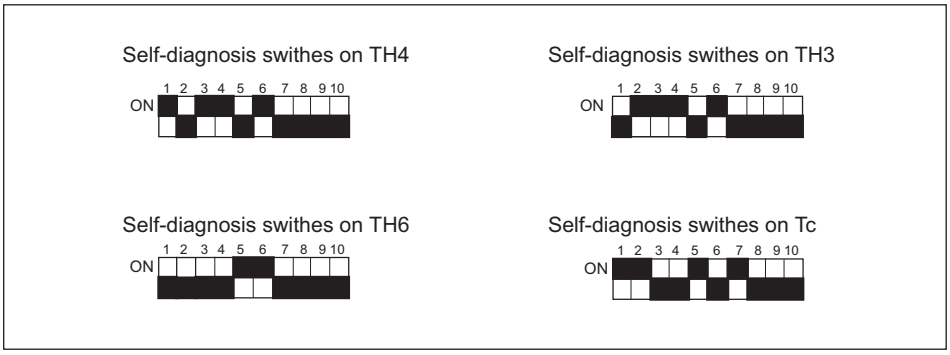
Operation

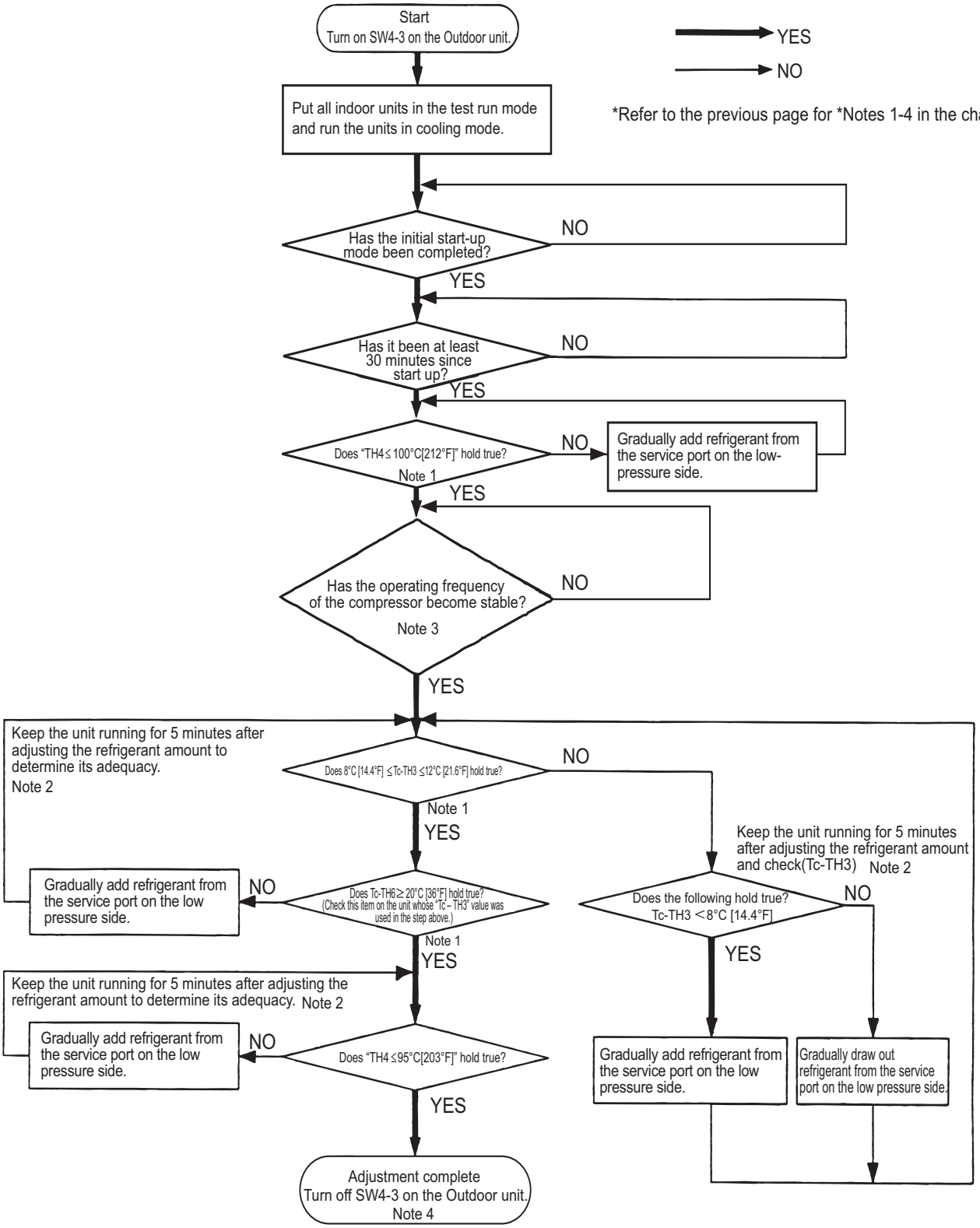
When the unit is in the refrigerant amount adjust mode, the LEV on the indoor unit does not open as fully as it normally does during cooling operation to secure subcooling.

Note

1) Refrigerant charge is adjusted based on the values of TH4, TH3, TH6, and Tc as shown in the flowchart below. Check the TH4, TH3, TH6, and Tc values, using the formula in the flowchart. The TH4, TH3, TH6, and Tc values can be displayed by setting the diagnostic switch (SW1) on the MAIN board.
2) There may be cases when the refrigerant amount may seem adequate for a short while after starting the unit in the refrigerant amount adjust mode but turn out to be inadequate later on (when the refrigerant system stabilizes).

   When the amount of refrigerant is truly adequate.
   TH3-TH6 on the indoor unit is 5°C [9°F] or above and SH on the indoor unit is between 5 and 15°C [9 and 27°F].
   The refrigerant amount may seem adequate at the moment, but may turn out to be inadequate later on.
   TH3-TH6 on the indoor unit is 5°C [9°F] or less and SH on the indoor unit is 5°C [9°F] or less.
   Wait until the TH3-TH6 reaches 5°C [9°F] or above and the SH of the indoor unit is between 5 and 15°C [9 and 27°F] to determine that the refrigerant amount is adequate.
3) High pressure must be at least 2.0MPa[290psi] to enable a proper adjustment of refrigerant amount to be made.
4) Refrigerant amount adjust mode automatically ends 90 minutes after beginning. When this happens, by turning off the SW4-3 and turning them back on, the unit will go back into the refrigerant amount adjust mode.





⚠ CAUTION

Do not release the extracted refrigerant into the air.

⚠ CAUTION

Charge liquid refrigerant (as opposed to gaseous refrigerant) into the system.

- If gaseous refrigerant is charged into the system, the composition of the refrigerant in the cylinder will change and may result in performance loss.

[6] The following symptoms are normal.

Symptoms	Remote controller display	Cause
The fan stops during heating operation.	Defrost	The fan remains stopped during defrost operation.
When the main power is turned on, the display shown on the right appears on the indoor unit remote controller for 5 minutes.	"Ho" blinks	System is starting up. Wait until "HO" goes off.
Sound of the refrigerant flow is heard from the indoor unit immediately after starting operation.	Normal display	This is caused by the transient instability of the refrigerant flow and is normal.

[7] Standard Operation Data (Reference Data)

(1) Cooling operation

Operation				Indoor unit model	Outdoor unit model
				PFD-P500VM-E	PUHY-P250YJM-A x 2
Operating conditions	Ambient temperature	Indoor	DB/WB	27°C/19°C [81°F/66°F]	
		Outdoor		35°C/- [95°F/-]	
	Piping	Total pipe length	m[ft]	7.5 [24-9/16]	
Outdoor unit	Compressor frequency		Hz	56	
LEV opening	Indoor unit		Pulse	700	
	SC (LEV1)			105	
Pressure	Pressure High pressure (after O/S) /low pressure (before accumulator)		MPa [psi]	2.90/0.99 [421/144]	
Temp. of each section	Outdoor unit	Discharge(TH4)	°C [°F]	76 [169]	
		Heat exchanger outlet (TH3)		40 [104]	
		Compressor inlet		22 [72]	
		Compressor shell bottom		36 [97]	
		SC heat exchanger outlet (TH6)		24 [75]	
		Bypass outlet (TH2)		14 [57]	
	Indoor unit	LEV inlet		22 [72]	
		Heat exchanger outlet		18 [64]	

[8] Initialization Procedure for System Rotation Settings

1. Summary

This document is to inform how to do the setting for system rotation function, and procedures for service/maintenance when the units in system rotation.

2. Items to be checked at commissioning

Following are items to be confirmed at initial setting and commissioning.

2-1. Install

(1)	Change connecter from CN41 to CN40 for switching power feeding.
(2)	Confirm the label on control board in indoor unit 'KE90D352'.
(3)	Confirm that IU addresses are sequence number (Odd only).

2-2. Setting

(1)	Make group setting after the setup sequence for all units have been completed.
(2)	Turning DipSW5-10 from OFF to ON on the lowest address outdoor unit in the group while the unit is stopped.
(3)	Change SW9 from 'Local' to 'Normal' after switching running/stopping mode by MA remote controller.

2-3. Test run

(1)	Run control unit only in test run mode, and run other units in normal mode.

*Rotate time will be changed from 480hr to about 3min.
*Test rotation will be performed only once.

2-4. Deliberate error

(1)	Remove transmission line TB7.

After detecting error, backup unit will begin to run immediately.

Start condition of system rotation

(1) Initial setup sequence for all units in the group have been completed.
(2) All units are running.
(3) There is no error detected in the group.

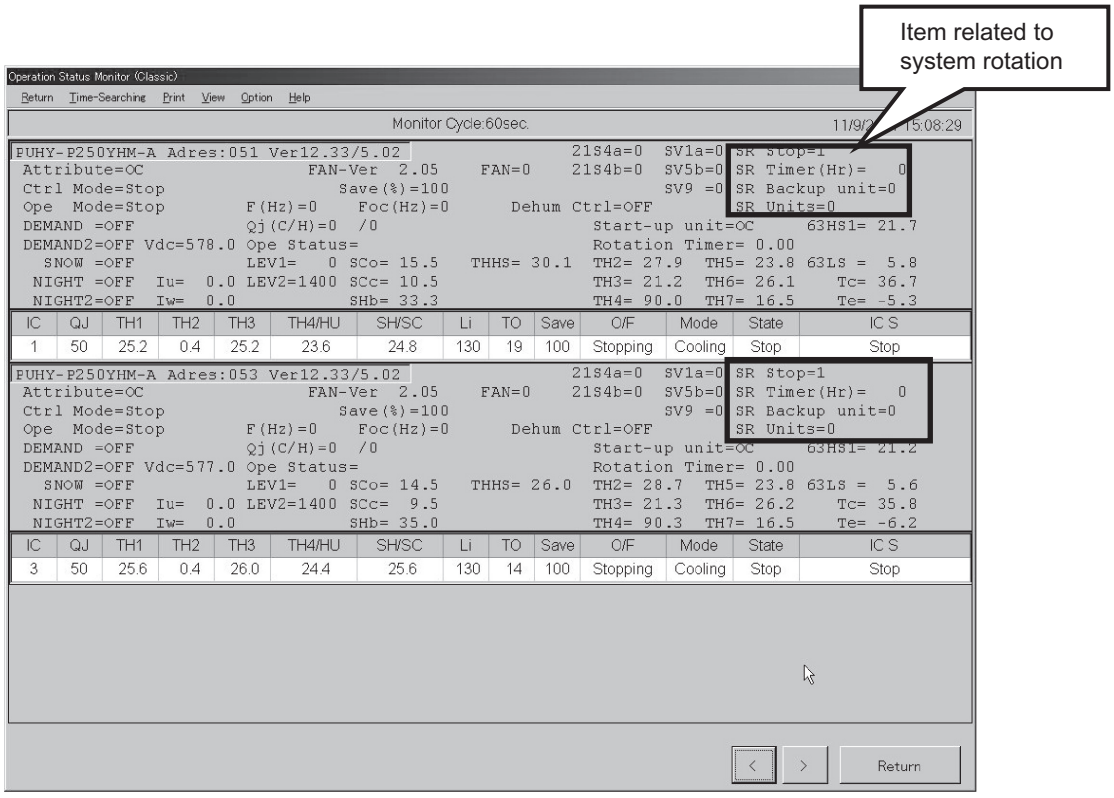
3. Descriptions of the items displayed on Maintenance tool and LED on outdoor control board.

Below table is the meanings of each items displayed on MN tool and LED on outdoor unit.

No	Item	Maintenance Tool		LED on outdoor control board (*2)	
		Item name	Description	No.	Description
1	Back up unit (*1)	SR Backup unit	Address of current backup unit will show.	No.304	Address of current backup unit will show.
2	Rotation timer [Hr](*1)	SR Timer (Hr)	Stoppage time of unit will show.	No.305	Stoppage time of unit will show.
3	Units composing System rotation (*1)	SR Units	Number of units Composing system rotation will show (Min:2/Max:10)	No.303	The addresses of units in the group are displayed one by one every second.
4	Current status	SR Stop	0:Running 1:Stopped under system rotation control (Status changes after 1 cycle rotation finished)	No.7 (LD5)	LD5 will be lit when the unit is stopped under system rotation control. (Status changes after 1 cycle rotation finished)

*1. No.1-3 are displayed only on the control unit, No.4 are displayed on every unit.

*2. By setting DipSW 1-1 through 1-10, each item can be monitored. Please refer to last chapter of service handbook how to set DipSW.



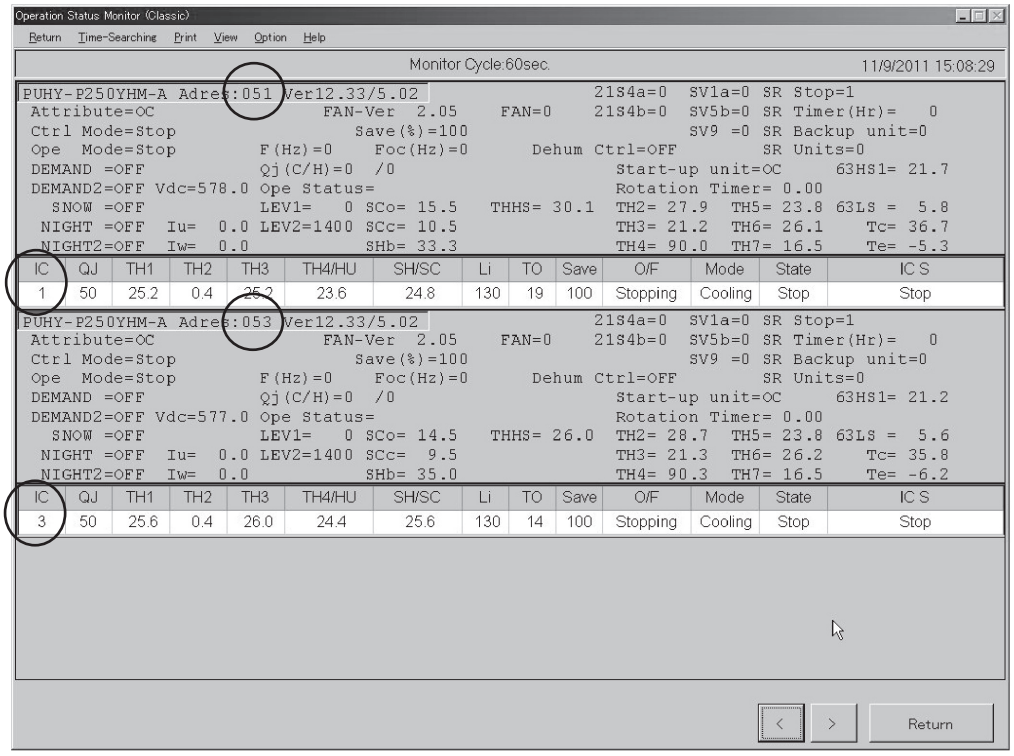
Monitoring screen of maintenance tool

4. Sample maintenance tool screen during system rotation setting

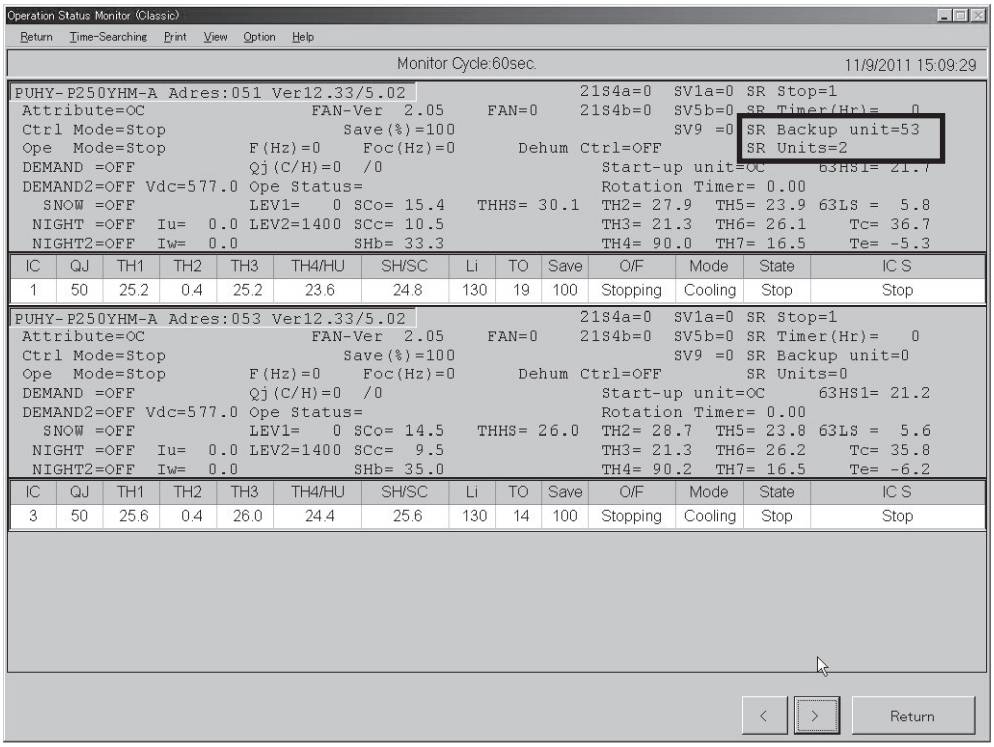
4-1 Using test run mode

Using test run mode for the setting of system rotation is recommended because you can demonstrate the rotation in a short time.

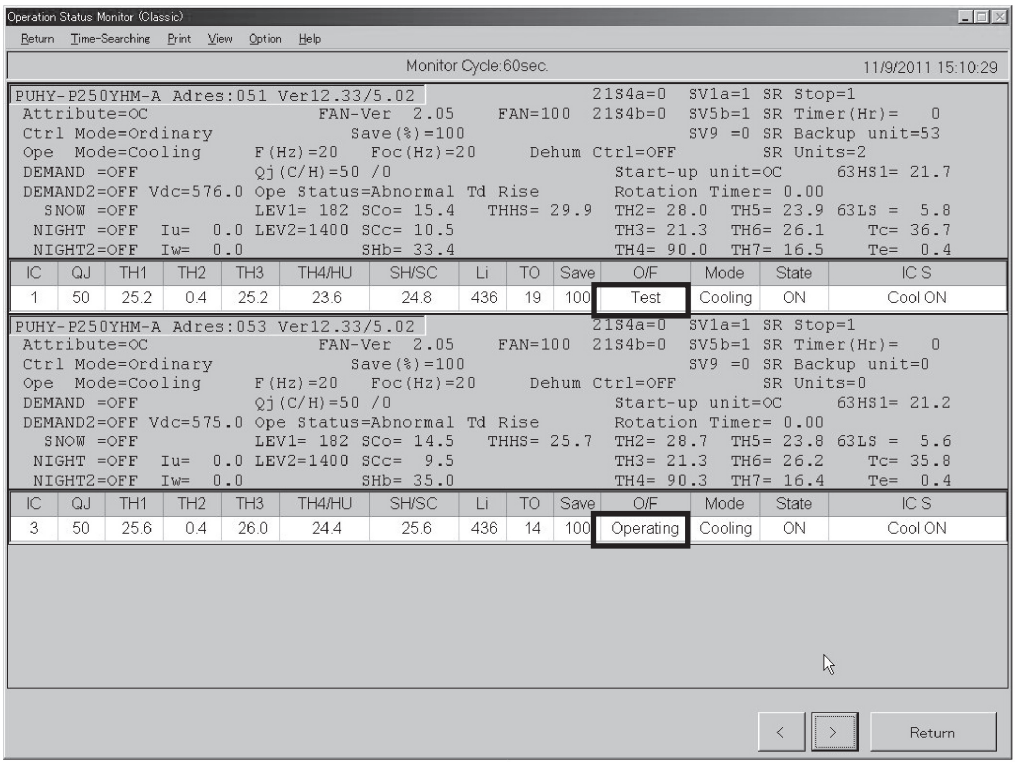
(1) Before setting is started, default value of “SR Stop” is 1. (It depends on previous status)



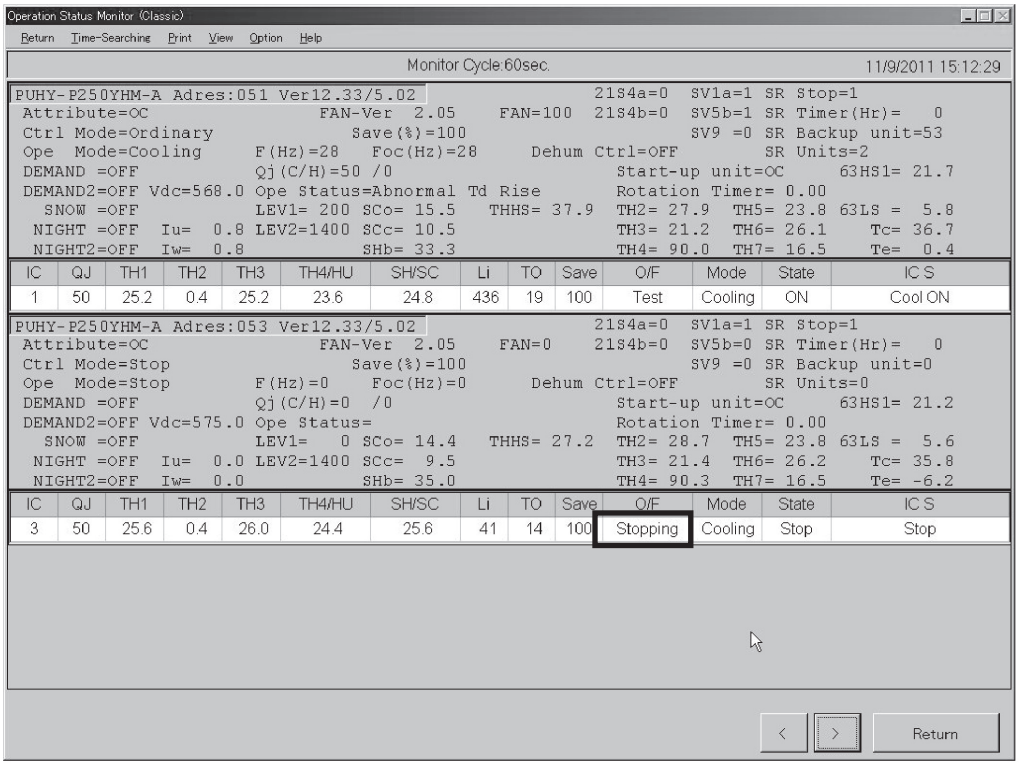
(2) Turn DipSW 5-10 ON on control unit (#51), then “SR Backup unit” and “SR units” changes.



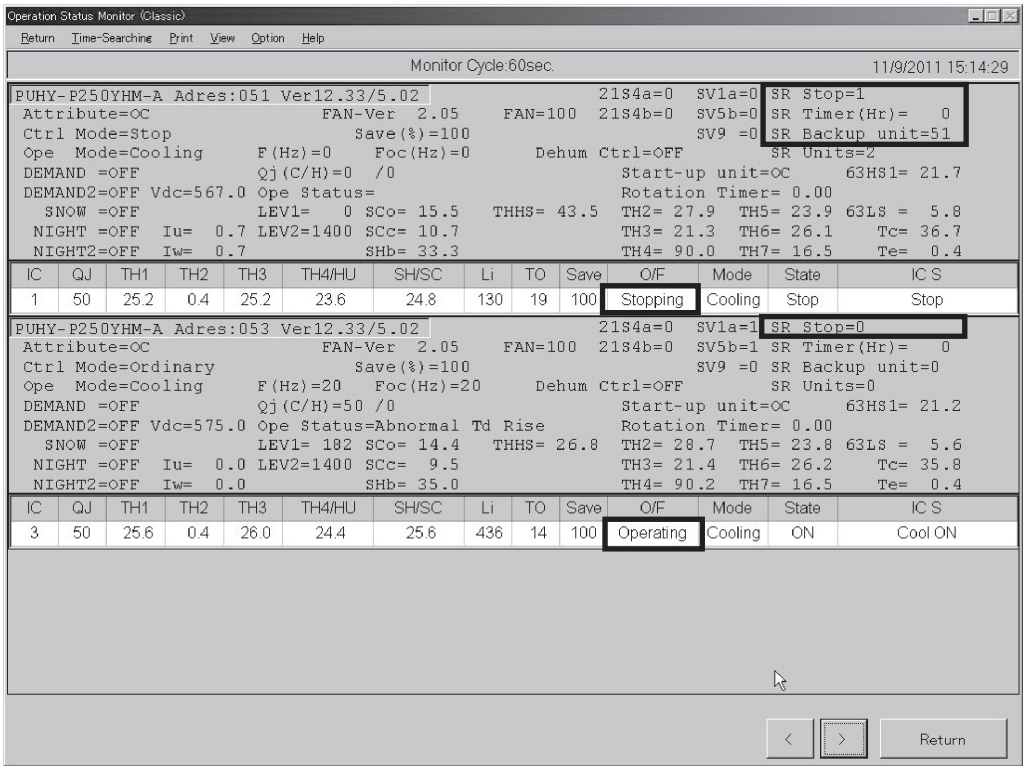
(3) Switch SW9 to “Local” on all the units and run all units other than control unit (IC1) via remote controller.
Then run control unit (IC1) in test run mode, and switch SW9 to “Normal” on all the units.



(4) Within 3 minutes, backup unit will automatically stop.

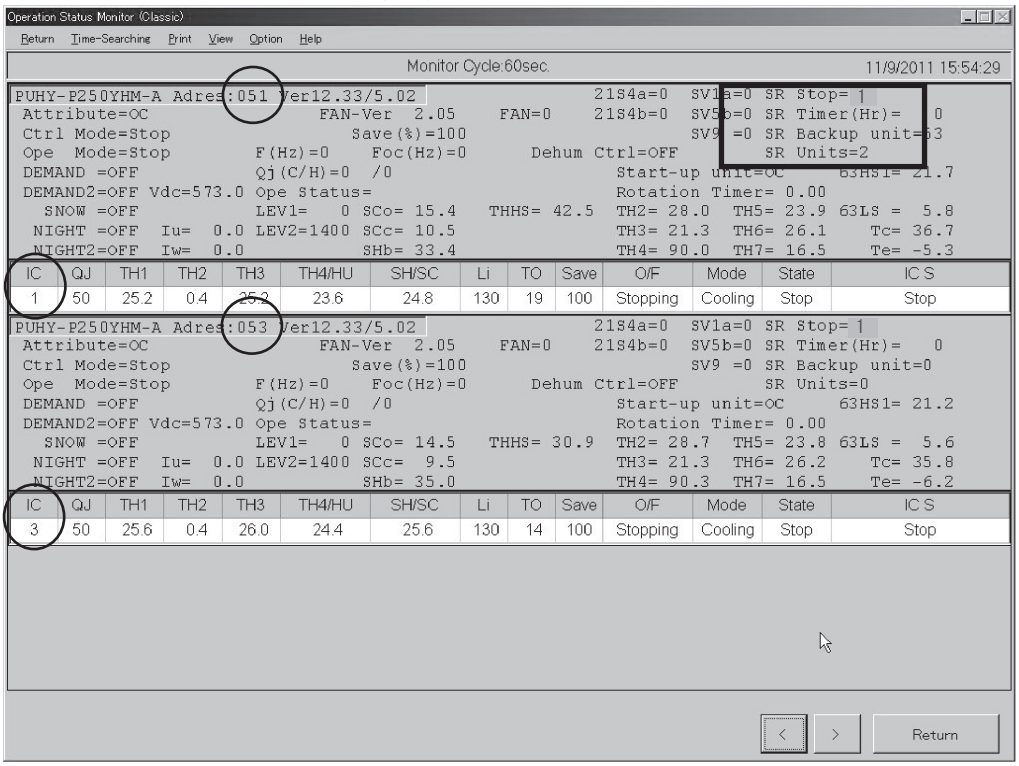


(5) Rotation will be performed after 3 minutes, “SR Stop” changes to 0 on backup unit and “SR Timer (Hr)” will start counting.
Then the system goes to normal operation with system rotation, next rotation will be performed after 480hrs.

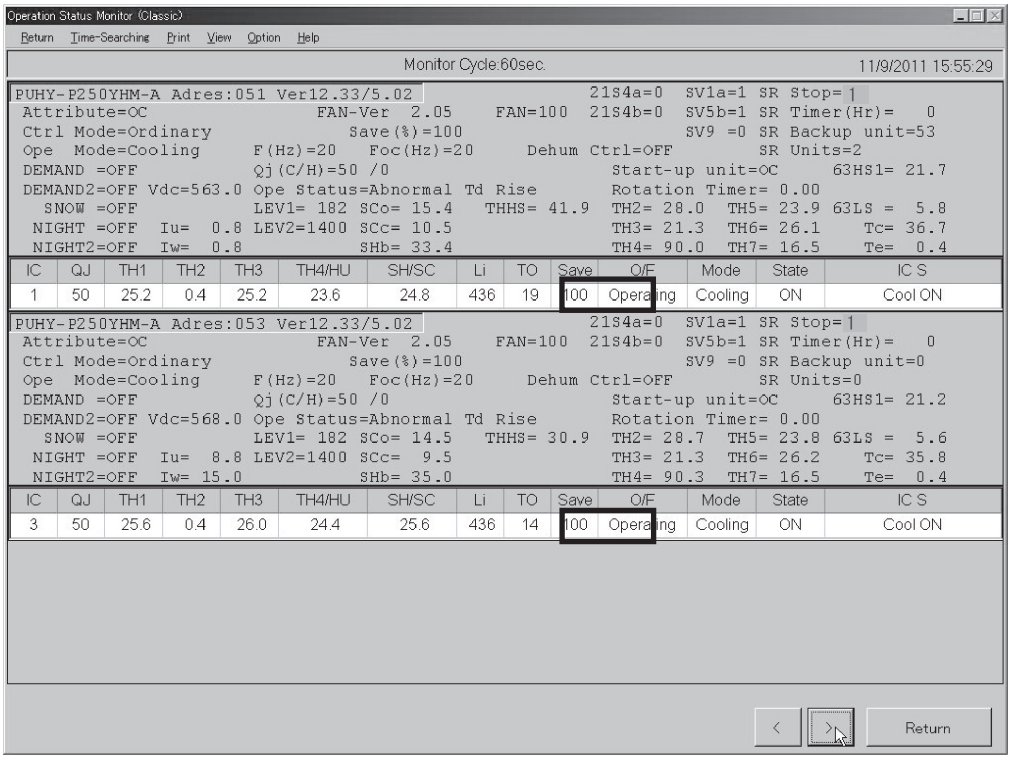


4-2 Normal mode (without test run mode)

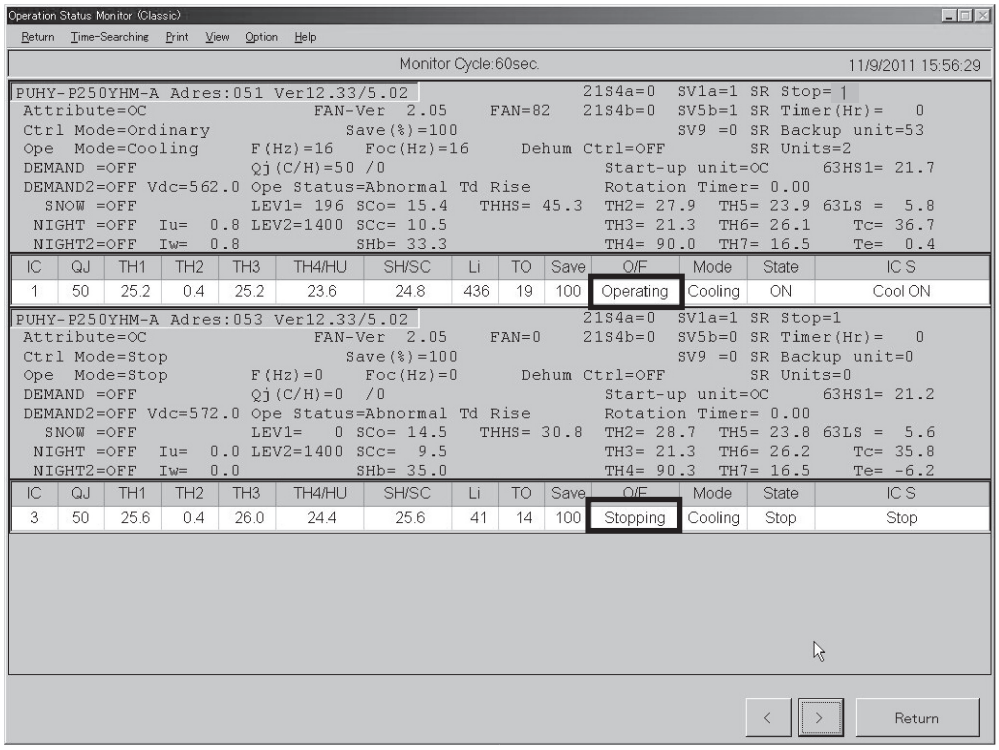
(1) Before setting is started, default value of “SR Stop” is 1. (It depends on the previous status.)
Turn DipSW5-10 on control unit (#51) then “SR Backup unit” and “SR units” changes.



(2) Switch SW9 to “Local” and run all units via remote controller, then switch SW9 to “Normal”.



(3) Within 3 mins, backup unit will stop. “SR Timer (Hr)” will start counting but “SR Stop” doesn’t change at this time changes at next rotation timing.
Then the system goes to normal operation with system rotation, next rotation will be performed after 480hrs.



5. Cautions when service/maintenance

Following are procedures for service/maintenance to continue system rotation function after service / maintenance.

5-1. In case you would like to shutdown power supply to unit to do maintenance.

5-1-1. In case shutdown power supply to back-up unit to do maintenance

(1) Switch SW9 from “Normal” to “Local” on the back up unit
(2) Shutdown power supply to back-up unit, then do maintenance
(3) Restore power supply to back-up unit
(4) Switch SW9 to “Normal”

5-1-2. In case you would like to shutdown power supply to other than back-up unit to do maintenance.

(1) Switch SW9 from “Normal” to “Local” on the back up unit
(2) Run backup-unit via remote controller
(3) Switch SW9 to from “Normal” to “Local” on the unit to be maintained
(4) Stop the unit you would like to do maintenance via remote controller
(5) Shutdown power supply to the unit, and do maintenance.
(6) Restore power supply to the unit and run the unit via remote controller
(7) Switch SW9 on the unit from “Local” to “Normal”
(8) Stop back-up unit via remote controller
(9) Switch SW9 from “Local” to “Normal”

Note: If no need to run back up unit during maintenance, step #1, 2, 8 and 9 are no need.

5-2. In case you would like to restore error occurring unit.

(1) Switch SW9 from “Normal” to “Local” on the error unit
(2) Stop the error unit via remote controller
(3) Shutdown power supply to the unit
(4) Fix the error.
(5) Restore power supply to the unit
(6) Run the unit via remote controller
(7) Switch SW9 from “Local” to “Normal”, then back up unit will automatically stop within 3 minutes.

5-3. In case you would like to restore system rotation function after mistakenly manually operated despite switch SW9 is set as “Normal”.

5-3-1. In case you would like to continue the current rotation order

5-3-1-1. In case backup unit was manually operated

(1) Leave the unit in operation
(2) Leave SW9 as “Normal” on all the units

Then, back up unit will automatically stop after the elapse of a certain period of time (Max 480hrs)

5-3-1-2. In case other than backup unit was manually stopped

(1) Run the unit that was manually stopped
(2) Leave SW9 as “Normal” on the all the units, then system rotation will work continuously.

5-3-2. In case you would like to do set-up from the beginning

(1) Run all the units via remote controller
(2) Stop the smallest address unit in the group via remote controller
(3) Turn DipSW5-10 on outdoor unit from “ON” to “OFF”
(4) Turn DipSW5-10 on outdoor unit from “OFF” to “ON”
(5) Run all the units via remote controller
(6) Switch SW9 to “Normal” on the all the units

Then second smallest address unit will automatically stop as a backup unit within 3 minutes.

6. Other cautions

(1) In case error occurs which go into emergency operation, the backup unit will not start.
(2) In case error occurs at even numbered address unit and other than control unit, max 7 minutes will take for backup unit to start

IX Troubleshooting

[1] Error Code Lists

Error Code	Preliminary error code	Error (preliminary) detail code	Error code definition		Searched unit: Outdoor unit	Searched unit: Indoor unit	Searched unit: Remote controller	Notes
0403	4300 4305	01 05 (Note)	Serial communication error		O			
1102	1202	-	Discharge temperature fault		O			
1301	-	-	Low pressure fault		O			
1302	1402	-	High pressure fault		O			
1500	1600	-	Refrigerant overcharge		O			
-	1605	-	Preliminary suction pressure fault		O			
2503	-	-	Float switch trip			O		
4102	4152	-	Open phase		O			
4106	-	-	Transmission power supply fault		O			
4109	-	-	Fan fault			O		
4115	-	-	Power supply signal sync error		O			
4220 4225 (Note)	4320 4325 (Note)	[108]	Abnormal bus voltage drop		O			
		[109]	Abnormal bus voltage rise		O			
		[111]	Logic error		O			
		[131]	Low bus voltage at startup		O			
4230	4330	-	Heatsink overheat protection		O			
4240	4340	-	Overload protection		O			
4250 4255 (Note)	4350 4355 (Note)	[101]	IPM error		O			
		[104]	Short-circuited IPM/Ground fault		O			
		[105]	Overcurrent error due to short-circuited motor		O			
		[106]	Instantaneous overcurrent		O			
		[107]	Overcurrent		O			
4260	-	-	Heatsink overheat protection at startup		O			
5101	1202	-	Temperature sensor fault	Return air temperature (TH21)		O		
5102	1217	-	Temperature sensor fault	Indoor unit pipe temperature (TH22)		O		
				HIC bypass circuit outlet temperature (TH2)	O			
5103	1205	00	Temperature sensor fault	Indoor unit gas-side pipe temperature (TH23)		O		
				Pipe temperature at heatexchanger outlet (TH3)	O			
5104	1202	-	Temperature sensor fault	Supply air temperature (TH24)		O		
				Outdoor unit discharge temperature (TH4)	O			

Error Code	Prelimi-nary error code	Error (prelim-inary) detail code	Error code definition		Searched unit			Notes
					Outdoor unit	Indoor unit	Remote controller	
5105	1204	-	Temperature sensor fault	Accumulator inlet temperature (TH5)	O			
5106	1216	-	Temperature sensor fault	HIC circuit outlet temperature (TH6)	O			
5107	1221	-	Temperature sensor fault	Outside temperature (TH7)	O			
5110	1214	01	Temperature sensor fault	Heatsink temperature (THHS)	O			
5201	-	-	High-pressure sensor fault (63HS1)		O			
5301	4300	[115]	ACCT sensor fault		O			
		[117]	ACCT sensor circuit fault		O			
		[119]	Open-circuited IPM/Loose ACCT connector		O			
		[120]	Faulty ACCT wiring		O			
6600	-	-	Address overlap		O	O	O	
6601	-	-	Polarity setting error		O			
6602	-	-	Transmission processor hardware error		O	O	O	
6603	-	-	Transmission line bus busy error		O	O	O	
6606	-	-	Communication error between device and transmission processors		O	O	O	
6607	-	-	No ACK error		O	O	O	
6608	-	-	No response error		O	O	O	
6831	-	-	MA controller signal reception error (No signal reception)			O	O	
6832	-	-	MA remote controller signal transmission error (Synchroni-zation error)			O	O	
6833	-	-	MA remote controller signal transmission error (Hardware error)			O	O	
6834	-	-	MA controller signal reception error (Start bit detection er-ror)			O	O	
7100	-	-	Total capacity error		O			
7101	-	-	Capacity code setting error		O	O		
7102	-	-	Wrong number of connected units		O			
7105	-	-	Address setting error		O			
7110	-	-	Connection information signal transmission/reception er-ror		O			
7111	-	-	Remote controller sensor fault			O		
7113	-	-	Function setting error		O			
7117	-	-	Model setting error		O			
7130	-	-	Incompatible unit combination		O			

Note

The last digit in the check error codes in the 4000's and 5000's and two-digit detail codes indicate if the codes apply to compressor inverter on fan inverter.

Example
Code 4225 (detail code 108): Bus voltage drop in the fan inverter system
Code 4230 : Heatsink overheat protection in the compressor inverter system

The last digit	Inverter system
0 or 1	Compressor inverter system
5	Fan inverter system

[2] Responding to Error Display on the Remote Controller

1. Error Code

0403

Serial communication error

2. Error definition and error detection method

Serial communication error between the control board and the INV board on the compressor, and between the control board and the Fan board
Detail code 01: Between the control board and the INV board
Detail code 05: Between the control board and the Fan board

3. Cause, check method and remedy

(1) Faulty wiring

Check the following wiring connections.

1) Between Control board and Fan board

Control board	FAN board
CN2	CN21
CN4	CN5
CN332	CN18V

2) Between Fan board and INV board

FAN board	INV board
CN22	CN2
	CN5V
CN4	CN4

(2) INV board failure, Fan board failure and Control board failure

Replace the INV board or the Fan board or control board when the power turns on automatically, even if the power source is reset.

Note

Refer to section -6- "Inverter" under part [4] Troubleshooting Principal Parts for error codes related to the inverter.(page 191)

1. Error Code

1102

Discharge temperature fault

2. Error definition and error detection method

1) If the discharge temperature sensor detects a temperature of 120° C [248°F] or higher during operation (first detection), the outdoor unit stops, goes into the 20-second restart delay mode, and automatically restarts after twenty seconds.
2) If the discharge temperature sensor detects a temperature of 120°C [248°F] or higher again (second detection) within 30 minutes of the first stoppage of the outdoor unit as described above, the outdoor unit stops again, goes into the 20-second restart mode, and restarts after 20 seconds.
3) If the discharge temperature of 120°C [248°F] or more is detected (the 30th detection) within 30 minutes after the stop of the outdoor unit described above (regardless of the first or the 29th stop), the outdoor unit will make an error stop, and the error code "1102" will be displayed.
4) If the discharge temperature of 120°C [248°F] or more is detected more than 30 minutes after the previous stop of the outdoor unit, the detection is regarded as the first detection, and the operation described in step 1 above will start.
5) For 30 minutes after the stop (the first stop or the second stop) of the outdoor unit, preliminary errors will be displayed on the LED display.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Gas leak, gas shortage	Refer to the page on refrigerant amount evaluation.(page 107)
(2) Overload operation	Check operating conditions and operation status of indoor/ outdoor units.
(3) LEV failure on the indoor unit (4) Outdoor unit LEV1 actuation failure Outdoor unit LEV2 actuation failure	Perform a cooling or heating operation to check the operation. Cooling: Indoor unit LEV LEV1 LEV2 Heating: Indoor unit LEV LEV2 Refer to the section on troubleshooting the LEV.(page 185)
(5) Closed refrigerant service valve	Confirm that the refrigerant service valve is fully open.
(6) Outdoor fan (including fan parts) failure, motor failure, or fan controller malfunction Rise in discharge temp. by low pressure drawing for (3) - (6).	Check the fan on the outdoor unit. Refer to the section on troubleshooting the outdoor unit fan.(page 184)
(7) Gas leak between low and high pressures (4-way valve failure, Compressor failure, Solenoid valve (SV1a) failure)	Perform a cooling or heating operation and check the operation.
(8) Thermistor failure (TH4)	Check the thermistor resistor.(page 143)
(9) Input circuit failure on the controller board thermistor	Check the inlet air temperature on the LED monitor.

1. Error Code

1301

Low pressure fault

2. Error definition and error detection method

When starting the compressor from Stop Mode for the first time if low pressure reads 0.098MPa [14psi] immediately before start-up, the operation immediately stops.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Inner pressure drop due to a leakage.	Refer to the section on troubleshooting the low pressure sensor.(page 182)
(2)	Low pressure sensor failure	
(3)	Short-circuited pressure sensor cable due to torn outer rubber	
(4)	A pin on the male connector is missing.	
(5)	Disconnected wire	
(6)	Failure of the low pressure input circuit on the controller board	

1. Error Code

1302

High pressure fault 1 (Outdoor unit)

2. Error definition and error detection method

1) If the pressure sensor detects a pressure of 3.78 MPa [548 psi] or higher during operation, the outdoor unit stops, goes into the 20-second restart delay mode, and automatically restarts after 20 seconds.
2) If the pressure sensor detects a pressure of 3.78 MPa [548 psi] or higher again (second detection) within 30 minutes of the first stoppage of the outdoor unit, the outdoor unit stops, goes into the 20-second restart delay mode, and automatically restarts after 20 seconds.
3) If the pressure of 3.87MPa [561psi] or higher is detected by the pressure sensor (the third detection) within 30 minutes of the second stop of the outdoor unit, the outdoor unit will make an error stop, and the error code "1302" will be displayed.
4) If the pressure of 3.78MPa [548psi] or higher is detected more than 30 minutes after the stop of the outdoor unit, the detection is regarded as the first detection, and the operation described in step 1 above will start.
5) For 30 minutes after the stop of the outdoor unit, preliminary errors will be displayed on the LED display.
6) The outdoor unit makes an error stop immediately when not only the pressure sensor but also the pressure switch detects $4.15^{+0,-0.15}$ MPa [$601^{+0,-22}$ psi]
7) Open phase due to unstable power supply voltage may cause the pressure switch to malfunction or cause the units to come to an abnormal stop.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Outdoor unit LEV2 actuation failure -> Cooling Indoor unit LEV actuation failure -> Heating	Perform a cooling or heating operation to check the operation. Cooling: Outdoor unit LEV2 Heating: Indoor unit LEV Refer to the section on troubleshooting the LEV. (page 185)
(2)	Closed refrigerant service valve	Confirm that the refrigerant service valve is fully open.
(3)	Short cycle on the indoor unit side	Check the indoor units for problems and correct them, if any.
(4)	Clogged filter on the indoor unit	
(5)	Reduced air flow due to dirty fan on the indoor unit fan	
(6)	Dirty heat exchanger of the indoor unit	
(7)	Indoor fan (including fan parts) failure or motor failure Rise in high pressure caused by lowered condensing capacity in heating operation for (2) - (7).	
(8)	Short cycle on the outdoor unit	Check the outdoor units for problems and correct them, if any.
(9)	Dirty heat exchanger of the outdoor unit	
(10)	Outdoor fan (including fan parts) failure, motor failure, or fan controller malfunction Rise in discharge temp. by low pressure drawing for (8) - (10).	Check the fan on the outdoor unit. Refer to the section on troubleshooting the outdoor unit fan.(page 184)
(11)	Solenoid valve (SV1a) malfunction (The by-pass valve (SV1a) can not control rise in high pressure).	Refer to the section on troubleshooting the solenoid valve.(page 183)
(12)	Thermistor failure (TH3, TH7)	Check the thermistor resistor.(page 143)
(13)	Pressure sensor failure	Refer to the page on the troubleshooting of the high pressure sensor. (page 181)
(14)	Failure of the thermistor input circuit and pressure sensor input circuit on the controller board	Check the temperature and the pressure of the sensor with LED monitor.
(15)	Thermistor mounting problem (TH3, TH7)	Check the temperature and the pressure of the sensor with LED monitor.
(16)	Disconnected male connector on the pressure switch (63H1) or disconnected wire	
(17)	Voltage drop caused by unstable power supply voltage	Check the input voltage at the power supply terminal block (TB1).

1. Error Code

1302

High pressure fault 2 (Outdoor unit)

2. Error definition and error detection method

If the pressure of 0.098MPa [14psi] or lower is registered on the pressure sensor immediately before start-up, it will trigger an abnormal stop, and error code "1302" will be displayed.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Inner pressure drop due to a leakage.	Refer to the page on the troubleshooting of the high pressure sensor.(page 181)
(2)	Pressure sensor failure	
(3)	Shorted-circuited pressure sensor cable due to torn outer rubber	
(4)	A pin on the male connector on the pressure sensor is missing or contact failure	
(5)	Disconnected pressure sensor cable	
(6)	Failure of the pressure sensor input circuit on the controller board	

1. Error Code

1500

Refrigerant overcharge

2. Error definition and error detection method

An error can be detected by the discharge temperature superheat.

1) If the formula "TdSH ≦ 10°C [18°F]" is satisfied during operation (first detection), the outdoor unit stops, goes into the 20-second restart delay mode, and automatically restarts after 20 seconds.
2) If the formula "TdSH ≦ 10°C [18°F]" is satisfied again within 30 minutes of the fifth stoppage of the outdoor unit (sixth detection), the unit comes to an abnormal stop, and the error code "1500" appears.
3) If the formula "TdSH ≦ 10°C [18°F]" is satisfied 30 minutes or more after the first stoppage of the outdoor unit, the same sequence as Item "1 above (first detection) is followed.
4) For 30 minutes after the stop of the outdoor unit, preliminary errors will be displayed on the LED display.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Overcharged refrigerant	Refer to the page on refrigerant amount evaluation.(page 107)
(2)	Thermistor input circuit failure on the control board	Check the temperature and pressure readings on the sensor that are displayed on the LED monitor.
(3)	Faulty mounting of thermistor (TH4)	Check the temperature and pressure readings on the thermistor that are displayed on the LED monitor.
(4)	Outdoor unit LEV2 actuation failure -> Heating	Refer to the section on troubleshooting the LEV. (page 185)

1. Error Code

2503

Float switch trip

2. Error definition and error detection method

- This error is detected if the float switch trips during operation and open-circuit (-40°C [-40°F] below) is detected continuously for 30 seconds. (Normal operation will be resumed in 20 seconds if open-circuit is no longer detected before the 20 seconds have elapsed.)

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Faulty connector (CN31) insertion.	1) Check for connector connection failure. Reinsert the connector, restart the operation, and check for proper operation.
(2) Broken or partially broken float switch wire	2) Check for broken float switch wire.
(3) Float switch failure	3) Check the resistance of the float switch. 250mΩ below
(4) Indoor unit control board (error detection circuit) failure	4) Operate the unit with pins No. 1 and No. 2 of connector CN31 short-circuited. If the problem recurs, replace the indoor unit control board. If the above item checks out OK, there are no problems with the drain sensor. Turn off the power and turn it back on.

1. Error Code

3121

Out-of-range outside air temperature

2. Error definition and error detection method

- When the thermistor temperature of -28°C[-18°F] or below has continuously been detected for 3 minutes during heating operation (during compressor operation), the unit makes an error stop and "3121" appears on the display. (Use the OC thermistor temperature to determine when two outdoor units are in operation.)
- The compressor restarts when the thermistor temperature is -26°C[-15°F] or above (both OC and OS) during error stop. (The error display needs to be canceled by setting the remote controller.)
- Outdoor temperature error is canceled if the units stop during error stop. (The error display needs to be canceled by setting the remote controller.)

3. Cause, check method and remedy

Check the following factors if an error is detected, without drop in the outdoor temperature.

Cause		Check method and remedy
(1)	Thermistor failure	Check thermistor resistance.
(2)	Pinched lead wire	Check for pinched lead wire.
(3)	Torn wire coating	Check for wire coating.
(4)	A pin on the male connector is missing or contact failure	Check connector.
(5)	Disconnected wire	Check for wire.
(6)	Thermistor input circuit failure on the control board	Check the intake temperature of the sensor with the LED monitor. When the temperature is far different from the actual temperature, replace the control board.

<Reference>

	Short detection	Open detection
TH7	110 ˚C [230 ˚F] and above (0.4 kΩ)	-40 ˚C [-40 ˚F] and below (130 kΩ)

1. Error Code

4102

Open phase

2. Error definition and error detection method

- An open phase of the power supply (L1 phase, N phase) was detected at power on.
- The L3 phase current is outside of the specified range.

Note

The open phase of the power supply may not always be detected if a power voltage from another circuit is applied.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Power supply problem • Open phase voltage of the power supply • Power supply voltage drop	Check the input voltage to the power supply terminal block TB1.
(2) Noise filter problem • Coil problem • Circuit board failure	• Check the coil connections. • Check for coil burnout. • Confirm that the voltage at the CN3 connector is 198 V or above.
(3) Wiring failure	Confirm that the voltage at the control board connector CNAC is 198 V or above. If the voltage is below 198V, check the wiring connection between the noise filter board CN3, noise filter board CN2 and control board CNAC. Confirm that the wiring between noise filter TB23 and INV board SC-L3 is put through CT3.
(4) Blown fuse	Check for a blown fuse (F01) on the control board. ->If a blown fuse is found, check for a short-circuiting or earth fault of the actuator.
(5) CT3 failure	Replace the inverter if this problem is detected after the compressor has gone into operation.
(6) Control board failure	Replace the control board if none of the above is causing the problem.

1. Error Code

4106

<Transmission power supply fault Error detail code FF (Outdoor unit)>

2. Error definition and error detection method

Transmission power output failure

3. Cause

1) Wiring failure
2) Transmission power supply cannot output voltage because overcurrent was detected.
3) Voltage cannot be output due to transmission power supply problem.
4) Transmission voltage detection circuit failure

4. Check method and remedy

Check the items in IX [4] -7- (2) Troubleshooting transmission power circuit of outdoor unit on all outdoor units in the same refrigerant circuit.(page 199)

<Transmission power supply fault other than error detail code FF (Outdoor unit)>

2. Error definition and error detection method

Transmission power reception failure

3. Cause

One of the outdoor units stopped supplying power, but no other outdoor units start supplying power.

4. Check method and remedy

Check the items in IX [4] -7- (2) Troubleshooting transmission power circuit of outdoor unit on all outdoor units in the same refrigerant circuit.(page 199)

1. Error Code

4109

Fan fault

2. Error definition and error detection method

If the auxiliary relay X4 (for fan fault detection) remains unexcited for a certain period of time, the unit will come to an abnormal stop, and the fan output goes off.

Overcurrent breaker trigger value

Model name, motor output		Preset value
PFD	P250 model, 3.7kW	7.5A
	P500 model, 5.5kW	12A

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Overcurrent breaker (51F) is tripped.	Check the fan for proper rotation, check for worn bearings, and check the pulley for proper alignment. Check for proper belt tension (esp. overtension). Check the motor for proper operation. 51F malfunction (Test switch is left to ON.)
(2)	Blown fuse (F1)	Check for a loose or blown fuse
(3)	Auxiliary relay (X4) fault	Loose, broken, or incorrect lead wire wiring Coil fault, contact failure
(4)	Broken wire	Check for broken wire.
(5)	Loose connector	Check the connector for proper connection.
(6)	Indoor unit control board (I.B1, I.B2) fault	If no problems are found with the items above and if the problem persists, circuit board failure is suspected.

1. Error Code

4115

Power supply signal sync error

2. Error definition and error detection method

The frequency cannot be determined when the power is switched on.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Power supply error	Check the voltage of the power supply terminal block (TB1).
(2)	Noise filter problem ♦Coil problem ♦Circuit board failure	♦Check the coil connections. ♦Check for coil burnout. ♦Confirm that the voltage at the CN3 connector is 198 V or above.
(3)	Faulty wiring	Check fuse F01 on the control board.
(4)	Wiring failure Between noise filter CN3 and noise filter CN2 and control board CNAC	Confirm that the voltage at the control board connector CNAC is 198 V or above.
(5)	Control board failure	If none of the items described above is applicable, and if the trouble reappears even after the power is switched on again, replace the control board.

1. Error Code

4220
4225

Abnormal bus voltage drop (Detail code 108)

2. Error definition and error detection method

If Vdc 289V or less is detected during Inverter operation. (S/W detection)

3. Cause, check method and remedy

(1) Power supply environment

Check whether the unit makes an instantaneous stop when the detection result is abnormal or a power failure occurs.
Check whether the power voltage (Between L1 and L2, L2 and L3, and L1 and L3) is 342V or less across all phases.

(2) Voltage drop detected

4220

- Check the voltage between the FT-P and FT-N terminals on the INV board while the inverter is stopped and if it is 420 V or above, check the following items.
  1) Confirm on the LED monitor that the bus voltage is above 289V.
     Replace the INV board if it is below 289 V.
  2) Check the voltage at CN72 on the control board. ->Go to (3).
  3) Check the noise filter coil connections and for coil burnout.
  4) Check the wiring connections between the following sections
     Between the noise filter board and INV board. Between the INV board and DCL.
     Replace 72C if no problems are found.
  5) Check the IGBT module resistance on the INV board (Refer to the Trouble shooting for IGBT module).
- Check the voltage between the FT-P and FT-N terminals on the INV board while the inverter is stopped and if it is less than 420 V, check the following items.
  1) Check the coil connections and for coil burnout on the noise filter.
  2) Check the wiring between the noise filter board and INV board.
  3) Check the connection to SCP1 and SC-P2 on the INV board.
  4) Check the in-rush current resistor value.
  5) Check the 72C resistance value.
  6) Check the DCL resistance value.
     Replace the INV board if no problems are found.

4225

- Check the voltage at CNVDC on the Fan board while the inverter is stopped and if it is 420 V or above, check the following items.
  1) Check the voltage at CN72 on the control board. ->Go to 3).
  2) Check the noise filter coil connections and for coil burnout.
  3) Check the wiring connections between the following sections
     Between the INV board and the Fan board.
  4) Check contents 4220
     Replace the Fan board if no problems are found.
- Check the voltage at CNVDC on the Fan board while the inverter is stopped and if it is less than 420 V, check the following items.
  1) Check the state of the wiring connections between the INV board and the Fan board.
  2) Check contents 4220
     Replace the Fan board if no problems are found.

(3) Control board failure

Confirm that DC12V is applied to the connector CN72 on the control board while the inverter is operating. If not, replace the control board.

Note

Refer to section -6- "Inverter" under part [4] Troubleshooting Principal Parts for error codes related to the inverter.(page 191)

1. Error Code

4220 4225

Abnormal bus voltage rise (Detail code 109)

2. Error definition and error detection method

If Vdc ≥ 830V is detected during inverter operation.

3. Cause, check method and remedy

(1) Different voltage connection

Check the power supply voltage on the power supply terminal block (TB1).

(2) INV board failure

If the problem recurs, replace the INV board.
In the case of 4220: INV board
In the case of 4225: Fan board

Note

Refer to section -6- "Inverter" under part [4] Troubleshooting Principal Parts for error codes related to the inverter.(page 191)

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1. Error Code

4220 4225

Logic error (Detail code 111)

2. Error definition and error detection method

H/W error
If only the H/W error logic circuit operates, and no identifiable error is detected.

3. Cause, Check method and remedy

In the case of 4220

Cause	Check method and remedy
(1) External noise	
(2) INV board failure	Refer to IX [4] -6- (2) [1].(page 193)

In the case of 4225

Cause	Check method and remedy
(1) External noise	
(2) Fan board failure	Refer to IX [4] -6- (2) [6].(page 194)

Note

Refer to section -6- "Inverter" under part [4] Troubleshooting Principal Parts for error codes related to the inverter.(page 191)

1. Error Code

4220
4225

Low bus voltage at startup (Detail code 131)

2. Error definition and error detection method

When Vdc ≤160 V is detected just before the inverter operation.

3. Cause, check method and remedy

(1) Inverter main circuit failure

Same as detail code 108 of 4220 error

Note

Refer to section -6- "Inverter" under part [4] Troubleshooting Principal Parts for error codes related to the inverter.(page 191)

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1. Error Code

4230

Heatsink overheat protection

2. Error definition and error detection method

When the heat sink temperature (THHS) remains at or above 105°C [221°F] is detected.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Fan board failure	Refer to IX [4] -6- (2) [6].(page 194)
(2) Outdoor unit fan failure	Check the outdoor unit fan operation. If any problem is found with the fan operation, check the fan motor. ->Refer to IX [4] -6- (2) [5].(page 194)
(3) Air passage blockage	Check that the heat sink cooling air passage is not blocked
(4) THHS failure	1) Check for proper installation of the INV board IGBT. (Check for proper installation of the IGBT heatsink.) 2) Check the THHS sensor reading on the LED monitor. ->If an abnormal value appears, replace the INV board.

Note

Refer to section -6- "Inverter" under part [4] Troubleshooting Principal Parts for error codes related to the inverter.(page 191)

1. Error Code

4240

Overload protection

2. Error definition and error detection method

If the output current of "(Iac) >Imax (Arms)" or "THHS > 100°C [212°F] " is continuously detected for 10 minutes or more during inverter operation.

Model	Imax(Arms)
P250 model	19

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Air passage blockage	Check that the heat sink cooling air passage is not blocked
(2) Power supply environment	Power supply voltage is 342 V or above.
(3) Inverter failure	Refer to IX [4] -6-.(page 191)
(4) Compressor failure	Check that the compressor has not overheated during operation. -> Check the refrigerant circuit (oil return section). Refer to IX [4] -6- (2) [2].(page 193)

Note

Refer to section -6- "Inverter" under part [4] Troubleshooting Principal Parts for error codes related to the inverter.(page 191)

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1. Error Code

4250
4255

IPM error (Detail code 101)

2. Error definition and error detection method

In the case of 4250

Overcurrent is detected by the overcurrent detection resistor (RSH) on the INV board.

In the case of 4255

IPM error signal is detected.

3. Cause, check method and remedy

In the case of 4250

Cause	Check method and remedy
(1) Inverter output related	Refer to IX [4] -6- (2) [1] - [4].(page 193) Check the IGBT module resistance value of the INV board, if no problems are found. (Refer to the Trouble shooting for IGBT module)

In the case of 4255

Cause	Check method and remedy
(1) Fan motor abnormality	Refer to IX [4] -6- (2) [5].(page 194)
(2) Fan board failure	Refer to IX [4] -6- (2) [6].(page 194)

Note

Refer to section -6- "Inverter" under part [4] Troubleshooting Principal Parts for error codes related to the inverter.(page 191)

1. Error Code

4250

Instantaneous overcurrent (Detail code 106)
Overcurrent (Detail code 107)

2. Error definition and error detection method

P250 model
Overcurrent 94 Apeak or 22 Arms and above is detected by the current sensor.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Inverter output related	Refer to IX [4] -6- (2) [1] - [4].(page 193) Check the IGBT module resistance value of the INV board, if no problems are found. (Refer to the Trouble shooting for IGBT module)

Note

Refer to section -6- "Inverter" under part [4] Troubleshooting Principal Parts for error codes related to the inverter.(page 191)

1. Error Code

4250
4255

Short-circuited IPM/Ground fault (Detail code 104)

2. Error definition and error detection method

When IPM/IGBT short damage or grounding on the load side is detected just before starting the inverter.

3. Cause, check method and remedy

In the case of 4250

Cause	Check method and remedy
(1) Grounding fault compressor	Refer to IX [4] -6- (2) [2].(page 193)
(2) Inverter output related	Refer to IX [4] -6- (2) [1] - [4].(page 193)

In the case of 4255

Cause	Check method and remedy
(1) Grounding fault of fan motor	Refer to IX [4] -6- (2) [5].(page 194)
(2) Fan board failure	Refer to IX [4] -6- (2) [6].(page 194)

Note

Refer to section -6- "Inverter" under part [4] Troubleshooting Principal Parts for error codes related to the inverter.(page 191)

1. Error Code

4250
4255

Overcurrent error due to short-circuited motor (Detail code 105)

2. Error definition and error detection method
When a short is detected on the load side just before starting the inverter operation.

3. Cause, Check method and remedy
In the case of 4250

Cause	Check method and remedy
(1) Short - circuited compressor	Refer to IX [4] -6- (2) [2].(page 193)
(2) Output wiring	Check for a short circuit.

In the case of 4255

Cause	Check method and remedy
(1) Short - circuited fan motor	Refer to IX [4] -6- (2) [5].(page 194)
(2) Output wiring	Check for a short circuit.

Note
Refer to section -6- "Inverter" under part [4] Troubleshooting Principal Parts for error codes related to the inverter.(page 191)

1. Error Code

4260

Heatsink overheat protection at startup

2. Error definition and error detection method
The heatsink temperature (THHS) remains at or above 105°C [221°F] for 10 minutes or more at inverter startup.

3. Cause, check method and remedy
Same as 4230 error

1. Error Code

5101

Return air temperature sensor (TH21) fault (Indoor unit)

5102

Pipe temperature sensor (TH22) fault (Indoor unit)

5103

Gas-side pipe temperature sensor (TH23) fault (Indoor unit)

5104

Supply air temperature sensor fault (TH24) (Indoor unit)

2. Error definition and error detection method

- If a short- or open-circuit of the sensor is detected during Thermo-ON, the unit goes into the 20-second restart delay mode. If normal operation is not resumed in 20 seconds, the unit will come to an abnormal stop.
  Short: detectable at 90°C [194°F] or higher
  Open: detectable at -40°C [-40°F] or lower
- Sensor error at gas-side cannot be detected under the following conditions.
  * During heating operation
  * During cooling operation for 3 minutes after the compressor turns on.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Thermistor failure (2) Connector contact failure (3) Disconnected wire or partial disconnected thermistor wire (4) Unattached thermistor or contact failure	Check the thermistor resistor. 0°C [32°F]: 15 kohm 10°C [50°F]: 9.7 kohm 20°C [68°F] : 6.4 kohm 30°C [86°F] : 4.3 kohm 40°C [104°F] : 3.1 kohm
(5) Indoor board (detection circuit) failure	Check the connector contact. When no fault is found, the indoor board is a failure.

1. Error Code

5102

HIC bypass circuit outlet temperature sensor (TH2) fault (Outdoor unit)

5103

Heat exchanger outlet temperature sensor (TH3) fault (Outdoor unit)

5104

Discharge temperature sensor (TH4) fault (Outdoor unit)

5105

Accumulator inlet temperature sensor (TH5) fault (Outdoor unit)

5106

HIC circuit outlet temperature sensor (TH6) fault (Outdoor unit)

5107

Outside temperature sensor (TH7) fault (Outdoor unit)

2. Error definition and error detection method

- If a shorted-circuited (high temperature intake) or an open-circuited thermistor (low temperature intake) is detected (first detection), the outdoor unit stops, goes into the 20-second restart delay mode, and automatically restarts if the thermistor temperature reading is within the normal range at the end of the restart delay mode.
- If a short- or open-circuited thermistor is detected again (second detection) after restart, the outdoor unit stops again, goes into the 20-second restart delay mode, and automatically restarts if the thermistor temperature reading is within the normal range at the end of the restart delay mode.
- When a short or an open is detected again (the third detection) after the previous restart of the outdoor unit, the outdoor unit makes an error stop.
- When a short or an open of the thermistor is detected just before the restart of the outdoor unit, the outdoor unit makes an error stop, and the error code "5102", "5103", 5104", "5105", "5106"or "5107" will appear.
- During 20-second antirestart mode, preliminary errors will be displayed on the LED display.
- A short or an open described above is not detected for 10 minutes after the compressor start, during defrost mode, or for 3 minutes after defrost mode.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Thermistor failure	Check thermistor resistance.
(2)	Pinched lead wire	Check for pinched lead wire.
(3)	Torn wire coating	Check for wire coating.
(4)	A pin on the male connector is missing or contact failure	Check connector.
(5)	Disconnected wire	Check for wire.
(6)	Thermistor input circuit failure on the control board	Check the intake temperature of the sensor with the LED monitor. When the temperature is far different from the actual temperature, replace the control board.

<Reference>

	Short detection	Open detection
TH2	70 ℃ [158 ℉] and above (0.4 kΩ)	-40 ℃ [-40 ℉] and below (130 kΩ)
TH3	110 ℃ [230 ℉] and above (0.4 kΩ)	-40 ℃ [-40 ℉] and below (130 kΩ)
TH4	240 ℃ [464 ℉] and above (0.57 kΩ)	0 ℃ [32 ℉] and below (698 kΩ)
TH5	70 ℃ [158 ℉] and above (0.4 kΩ)	-40 ℃ [-40 ℉] and below (130 kΩ)
TH6	70 ℃ [158 ℉] and above (1.14 kΩ)	-40 ℃ [-40 ℉] and below (130 kΩ)
TH7	110 ℃ [230 ℉] and above (0.4 kΩ)	-40 ℃ [-40 ℉] and below (130 kΩ)

1. Error Code

5110

Heatsink temperature sensor (THHS) fault (Detail code 01)

2. Error definition and error detection method

When a short or an open of THHS is detected just before or during the inverter operation.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) INV board failure	If the problem recurs when the unit is put into operation, replace the INV board.

Note

Refer to section -6- "Inverter" under part [4] Troubleshooting Principal Parts for error codes related to the inverter.(page 191)

1. Error Code

5201

High-pressure sensor fault (63HS1)

2. Error definition and error detection method

- If the high-pressure sensor detects a pressure of 0.098MPa [14psi] or below during operation, the outdoor unit stops, goes into the 20-second restart delay mode, and restarts if the pressure reaches above 0.098MPa [14psi] at the end of the restart delay mode.
- If the high pressure sensor detects 0.098MPa [14psi] or less just before the restart, the outdoor unit makes an error stop, and the error code "5201" will appear.
- When the unit is in the 20-second restart delay mode, a preliminary error code appears on the LED.
- A error is not detected for 3 minutes after the compressor start, during defrost operation, or 3 minutes after defrost operation.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) High pressure sensor failure	Refer to the page on the troubleshooting of the high pressure sensor. (IX [4] -1- (page 181))
(2) Pressure drop due to refrigerant leak	
(3) Torn wire coating	
(4) A pin on the male connector is missing or contact failure	
(5) Disconnected wire	
(6) High pressure sensor input circuit failure on the control board	

1. Error Code

5301

ACCT sensor fault (Detail code 115)

2. Error definition and error detection method

When the formula "output current < 1.5 Arms" remains satisfied for 10 seconds while the inverter is in operation.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Inverter open output phase	Check the output wiring connections.
(2) Compressor failure	Refer to IX [4] -6- (2) [2].(page 193)
(3) INV board failure	Refer to IX [4] -6- (2) [1],[3],[4].(page 193)

Note

Refer to section -6-"Inverter" under part [4] Troubleshooting Principal Parts for error codes related to the inverter.(page 191)

1. Error Code

5301

ACCT sensor circuit fault (Detail code 117)

2. Error definition and error detection method

When an error value is detected with the ACCT detection circuit just before the inverter starts

3. Cause, check method and remedy

Cause	Check method and remedy
(1) INV board failure	Refer to IX [4] -6- (2) [1],[3],[4].(page 193)
(2) Compressor failure	Refer to IX [4] -6- (2) [2].(page 193)

Note

Refer to section -6-"Inverter" under part [4] Troubleshooting Principal Parts for error codes related to the inverter.(page 191)

1. Error Code

5301

Open-circuited IPM/Loose ACCT connector (Detail code 119)

2. Error definition and error detection method

Presence of enough current cannot be detected during the self-diagnostic operation immediately before inverter startup.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Inverter output wiring problem	Check output wiring connections. Confirm that the U- and W-phase output cables are put through CT12 and CT22 on the INV board respectively.
(2) Inverter failure	Refer to IX [4] -6- (2) [3], [4].(page 194)
(3) Compressor failure	Refer to IX [4] -6- (2) [2].(page 193)

Note

Refer to section -6- "Inverter" under part [4] Troubleshooting Principal Parts for error codes related to the inverter.(page 191)

1. Error Code

5301

Faulty ACCT wiring (Detail code 120)

2. Error definition and error detection method

Presence of target current cannot be detected during the self-diagnostic operation immediately before startup. (Detection of improperly mounted ACCT sensor)

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Inverter output wiring problem	Check output wiring connections. Confirm that the U- and W-phase output cables are put through CT12 and CT22 on the INV board respectively.
(2) Inverter failure	Refer to IX [4] -6- (2) [3], [4].(page 194)
(3) Compressor failure	Refer to IX [4] -6- (2) [2].(page 193)

Note

Refer to section -6- "Inverter" under part [4] Troubleshooting Principal Parts for error codes related to the inverter.(page 191)

1. Error Code

6600

Address overlap

2. Error definition and error detection method

An error in which signals from more than one indoor units with the same address are received

Note

The address and attribute that appear on the remote controller indicate the controller that detected the error.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Two or more of the following have the same address: Outdoor units, indoor units, and controllers. <Example> 6600 "01" appears on the remote controller Unit #01 detected the error. Two or more units in the system have 01 as their address. (2) Signals are distorted by the noise on the transmission line.	♦Find the unit that has the same address as that of the error source.**Once the unit is found, correct the address. Then, turn off the outdoor units and indoor units, keep them all turned off for at least five minutes, and turn them back on.** ♦When air conditioning units are operating normally despite the address overlap error Check the transmission wave shape and noise on the transmission line. See the section "Investigation of Transmission Wave Shape/Noise."

1. Error Code

6601

Polarity setting error

2. Error definition and error detection method

The error detected when transmission processor cannot distinguish the polarities of the M-NET transmission line.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) No voltage is applied to the M-NET transmission line that AG-150A/GB-50ADA/PAC-YG50ECA/BAC-HD150 are connected to. (2) M-NET transmission line to which AG-150A/GB-50ADA/PAC-YG50ECA/BAC-HD150 are connected is short-circuited.	Check if power is supplied to the M-NET transmission line of the AG-150A/GB-50ADA/PAC-YG50ECA/BAC-HD150, and correct any problem found.

1. Error Code

6602

Transmission processor hardware error

2. Error definition and error detection method

Although "0" was surely transmitted by the transmission processor, "1" is displayed on the transmission line.

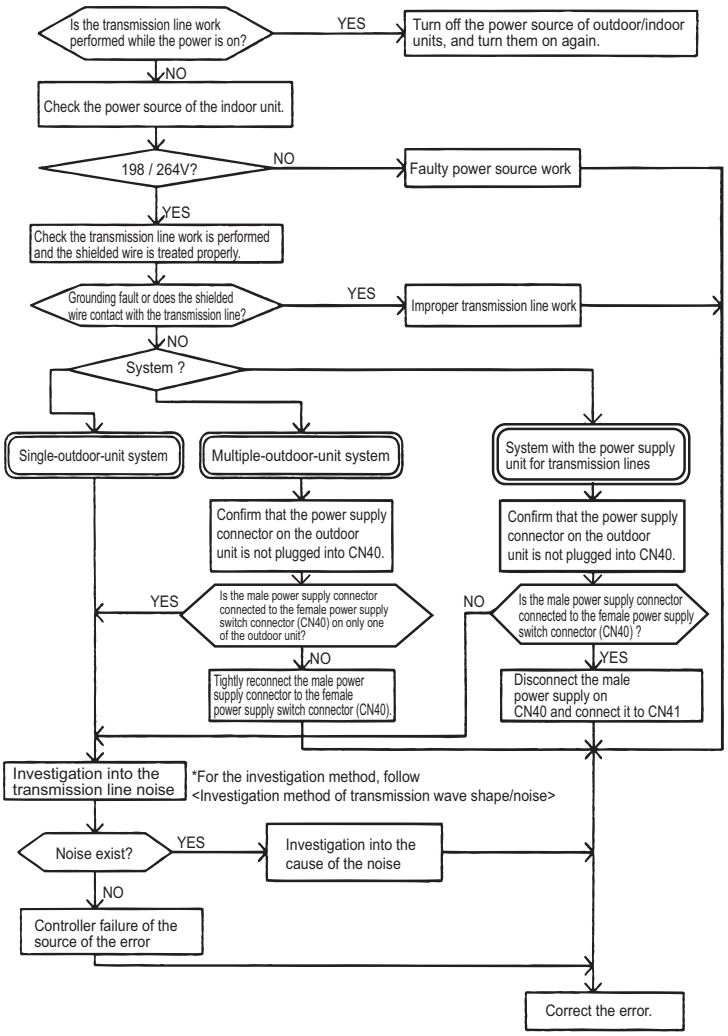
Note

The address/attribute appeared on the display on the remote controller indicates the controller where an error occurred.

3. Cause

1) When the wiring work of or the polarity of either the indoor or outdoor transmission line is performed or is changed while the power is on, the transmitted data will collide, the wave shape will be changed, and an error will be detected.
2) Grounding fault of the transmission line
3) When grouping the indoor units that are connected to different outdoor units, the male power supply connectors on the multiple outdoor units are connected to the female power supply switch connector (CN40).
4) When the power supply unit for transmission lines is used in the system connected with MELANS, the male power supply connector is connected to the female power supply switch connector (CN40) on the outdoor unit.
5) Controller failure of the source of the error
6) When the transmission data is changed due to the noise on the transmission line
7) Voltage is not applied on the transmission line for centralized control (in case of grouped indoor units connected to different outdoor units or in case of the system connected with MELANS)

4. Check method and remedy



1. Error Code

6603

Transmission line bus busy error

2. Error definition and error detection method

- Generated error when the command cannot be transmitted for 4-10 minutes in a row due to bus-busy
- Generated error when the command cannot be transmitted to the transmission line for 4-10 minutes in a row due to noise

Note

The address/attribute appeared on the display on the remote controller indicates the controller where an error occurred.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	The transmission processor cannot be transmitted as the short-wavelength voltage like noise exists consecutively on the transmission line.	Check the transmission wave shape and noise on the transmission line. See the section "Investigation of Transmission Wave Shape/Noise." -> No noise indicates that the error source controller is a failure. -> If noise exists, investigate the noise.
(2)	Error source controller failure	

1. Error Code

6606

Communication error between device and transmission processors

2. Error definition and error detection method

Communication error between the main microcomputer on the indoor unit board and the microcomputer for transmission

Note

The address/attribute appeared on the display on the remote controller indicates the controller where an error occurred.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Data is not properly transmitted due to accidental erroneous operation of the controller of the error source.	Turn off the power source of the outdoor and the indoor units.(When the power source is turned off separately, the microcomputer will not be reset, and the error will not be corrected.) -> If the same error occurs, the error source controller is a failure.
(2)	Error source controller failure	

1. Error Code

6607

No ACK error

2. Error definition and error detection method

The error is detected when no acknowledgement (ACK signal) is received after the transmission. (eg. When the data is transmitted six times in a row with 30 seconds interval, the error is detected on the transmission side.)

Note

The address/attribute appeared on the display on the remote controller indicates the controller which did not provide the response (ACK).

3. System configuration

(1) System with one outdoor unit

Error source address	Error display	Detection method	Cause	Check method and remedy
Outdoor unit (OC)	System controller(SC) MA remote controller (MA)	No acknowledgement (ACK) at IC transmission to OC	(1) Contact failure of transmission line of OC or IC (2) Decrease of transmission line voltage/signal by exceeding acceptable range of transmission wiring. Farthest:200 m [656ft] or less Remote controller wiring: 10m [32ft] or less (3) Erroneous sizing of transmission line (Not within the range below). Wire diameter: 1.25mm^2 [AWG16] or more (4) Indoor unit control board failure	Turn off the power source of the outdoor unit, and turn it on again. If the error is accidental, it will run normally. If not, check the causes (1) - (4).
Indoor unit (IC)	System controller (SC)	No acknowledgement (ACK) at SC transmission to IC	(1) When IC unit address is changed or modified during operation. (2) Faulty or disconnected IC transmission wiring (3) Disconnected IC connector (CN2M) (4) Indoor unit controller failure	Turn off the outdoor/indoor units for 5 or more minutes, and turn them on again. If the error is accidental, they will run normally. If not, check the causes (1) - (5).

1. Error Code

6607

No ACK error

2. Error definition and error detection method

The error is detected when no acknowledgement (ACK signal) is received after the transmission. (eg. When the data is transmitted six times in a row with 30 seconds interval, the error is detected on the transmission side.)

Note

The address/attribute appeared on the display on the remote controller indicates the controller which did not provide the response (ACK).

3. System configuration

(2) Grouping of units in a system with multiple outdoor units

Error source address	Error display	Detection method	Cause	Check method and remedy
Outdoor unit (OC)	System controller (SC) MA remote controller (MA)	No acknowledgement (ACK) at IC transmission to OC	Same cause as that for system with one outdoor unit	Same remedy as that for system with one outdoor unit
Indoor unit (IC)	System controller (SC) MA remote controller (MA)	No acknowledgement (ACK) at SC transmission to IC	(1) Same causes as (1) - (5) for system with one outdoor unit (2) Disconnection or short circuit of the transmission line for the outdoor unit on the terminal block for centralized control line connection (TB7) (3) When multiple outdoor units are connected and the power source of one of the outdoor units has been shut off. (4) The male power supply connector of the outdoor unit is not connected to the female power supply switch connector (CN40). (5) The male power supply connectors on 2 or more outdoor units are connected to the female power supply switch connector (CN40) for centralized control. If an error occurs, after the unit runs normally once, the following causes may be considered. ♦Total capacity error (7100) ♦Capacity code error (7101) ♦Error in the number of connected units (7102) ♦Address setting error (7105)	1) Turn off the power sources of the outdoor and indoor units for 5 or more minutes, and turn them on again. If the error is accidental, the will run normally.If not, check the cause 2). 2) Check the causes of (1) - (5). If the cause is found, correct it. If no cause is found, check 3). 3) Check the LED displays for troubleshooting on other remote controllers whether an error occurs. If an error is found, -> If an error is found, check the check code definition, and correct the error. If no error is found, -> Indoor unit board failure

1. Error Code

6607

No ACK error

2. Error definition and error detection method

The error is detected when no acknowledgement (ACK signal) is received after the transmission. (eg. When the data is transmitted six times in a row with 30 seconds interval, the error is detected on the transmission side.)

Note

The address/attribute appeared on the display on the remote controller indicates the controller which did not provide the response (ACK).

3. System configuration

(3) System connected to the system controllers (MELANS)

Error source address	Error display	Detection method	Cause	Check method and remedy
Outdoor unit (OC)	System controller (SC) MA remote controller (MA)	No acknowledgement (ACK) at IC transmission to OC	Same cause as that for system with one outdoor unit	Same remedy as that for system with one outdoor unit
Indoor unit (IC)	System controller (SC)	No acknowledgement (ACK) at SC transmission to IC	1. Error occurrence on some IC (1) Same cause as that for system with one outdoor unit	Same remedy as that for system with one outdoor unit
			2. Error occurrence on all IC in the system with one outdoor unit (1) Total capacity error (7100) (2) Capacity code error (7101) (3) Error in the number of connected units (7102) (4) Address setting error (7105) (5) Disconnection or short circuit of the transmission line for the outdoor unit on the terminal block for centralized control line connection (TB7) (6) Turn off the power source of the outdoor unit (7) Malfunction of electrical system for the outdoor unit	1) Check the LED display for troubleshooting on the outdoor unit. • If an error is found, check the check code definition, and correct the error. • If no error is found, check 2). 2) Check (5) - (7) on the left.
			3. Error occurrence on all IC (1) Same causes as (1) - (7) described in 2. (2) The male power supply connectors on 2 or more outdoor units are connected to the female power supply switch connector (CN40) for the transmission line for centralized control. (3) Disconnection or shutdown of the power source of the power supply unit for transmission line (4) System controller (MELANS) malfunction	Check voltage of the transmission line for centralized control. • 20V or more: Check (1) and (2) on the left. • Less than 20V: Check (3) on the left.

1. Error Code

6607

No ACK error

2. Error definition and error detection method

The error is detected when no acknowledgement (ACK signal) is received after the transmission. (eg. When the data is transmitted six times in a row with 30 seconds interval, the error is detected on the transmission side.)

Note

The address/attribute appeared on the display on the remote controller indicates the controller which did not provide the response (ACK).

3. System configuration

(3) System connected to the system controllers (MELANS)

Error source address	Error display	Detection method	Cause	Check method and remedy
System controller (SC)	MA remote controller (MA)	No acknowledgement (ACK) at IC transmission to SC	1. Error occurrence on all IC in the system with one outdoor unit (1) An error is found by the outdoor unit. Total capacity error (7100) Capacity code error (7101) Error in the number of connected units (7102) Address setting error (7105) (2) Disconnection or short circuit of the transmission line for the outdoor unit on the terminal block for centralized control line connection (TB7) (3) Turn off the power source of the outdoor unit (4) Malfunction of electrical system for the outdoor unit	1) Check the LED display for troubleshooting on the outdoor unit. • If an error is found, check the check code definition, and correct the error. • If no error is found, check the cause 2) 2) Check (2) - (4) on the left.
			2. Error display on all displays on MA remote controllers (1) Same causes as (1) - (4) described in 2. (2) When the power supply unit for transmission lines is used and the male power supply connector is connected to the female power supply switch connector (CN40) for the transmission line for centralized control (3) Disconnection or shutdown of the power source of the power supply unit for transmission line (4) System controller (MELANS) malfunction	Check (1) - (4) on the left

1. Error Code

6607

No ACK error

2. Error definition and error detection method

The error is detected when no acknowledgement (ACK signal) is received after the transmission. (eg. When the data is transmitted six times in a row with 30 seconds interval, the error is detected on the transmission side.)

Note

The address/attribute appeared on the display on the remote controller indicates the controller which did not provide the response (ACK).

3. System configuration

(4) Errors that are not limited to a particular system

Error source address	Error display	Detection method	Cause	Check method and remedy
Address which should not be existed	-	-	(1) System controller address was changed after the group setting had been made via the controller, and the old address is still retained by the indoor unit. (2) The address of the LOSSNAY unit was changed after the interlocking setting had been made via the MA remote controller, and the old address is still retained by the indoor unit.	Delete unnecessary information of non-existing address which some indoor units have. Use either of the following two methods for deletion. 1) Deleting unnecessary addresses from the system controller Delete unnecessary addresses using the manual address setting function on the system controller. Refer to the Instructions Manual that came with the system controller. 2) Deletion of connection information of the outdoor unit by the deleting switch **Note that the above method will delete all the group settings set via the system controller and all the interlock settings between LOSSNAY unit and indoor units.** ♦Turn off the power source of the outdoor unit, and wait for 5 minutes. ♦Turn on the dip switch (SW2-2) on the outdoor unit control board. ♦Turn on the power source of the outdoor unit, and wait for 5 minutes. ♦Turn off the power source of the outdoor unit, and wait for 5 minutes. ♦Turn off the dip switch (SW2-2) on the outdoor unit control board. ♦ Turn on the power source of the outdoor unit.

1. Error Code

6608

No response error

2. Error definition and error detection method

- When no response command is returned although acknowledgement (ACK) is received after transmission, an error is detected.
- When the data is transmitted 10 times in a row with 3 seconds interval, an error is detected on the transmission side.

Note

The address/attribute appeared on the display on the remote controller indicates the controller where an error occurred.

3. Cause

1) The transmission line work is performed while the power is on, the transmitted data will collide, and the wave shape will be changed.
2) The transmission is sent and received repeatedly due to noise.
3) Decrease of transmission line voltage/signal by exceeding acceptable range of transmission wiring.
   Farthest:200m [656ft] or less
4) The transmission line voltage/signal is decreased due to erroneous sizing of transmission line.
   Wire diameter: 1.25mm^2[AWG16] or more

4. Check method and remedy

1) If this error happens during a test run, turn off the power to the outdoor and indoor units and keep it turned off simultaneously for at least five minutes, and turn it back on.
   - When they return to normal operation, the cause of the error is the transmission line work performed with the power on.
   - If an error occurs again, check the cause 2).
2) Check 3) and 4) above.
   - If the cause is found, correct it.
   - If no cause is found, check 3).
3) Check transmission wave shape/ noise on trans-mission line by following IX [3] Investigation of Transmission Wave Shape/ Noise(page 178).
   Noise is the most possible cause of the error "6608".

1. Error Code

6831

MA controller signal reception error (No signal reception)

2. Error definition and error detection method

- Communication between the MA remote controller and the indoor unit is not done properly.
- No proper data has been received for 3 minutes.

3. Cause

1) Contact failure of the remote controller lines of MA remote controller or the indoor unit.
2) All the remote controllers are set to SUB.
3) Failure to meet wiring regulations
   - Wire length
   - Wire size
   - Number of remote controllers
   - Number of indoor units
4) The remote controller is removed after the installation without turning the power source off.
5) Noise interference on the remote controller transmission lines
6) Faulty circuit that is on the indoor board and performs transmission/ reception of the signal from the remote controller
7) Problems with the circuit on the remote controller that sends or receives the signals from the remote controller

4. Check method and remedy

1) Check for disconnected or loose transmission lines for the indoor units or MA remote controllers.
2) Confirm that the power is supplied to the main power source and the remote controller line.
3) Confirm that MA remote controller's capacity limit is not exceeded.
4) Check the sub/main setting of the MA remote controllers.One of them must be set to MAIN.
5) Diagnose the remote controller (described in the remote controller installation manual).
   [OK]: no problems with the remote controller (check the wiring regulations)
   [NG]: Replace the MA remote controller.
   [6832, 6833, ERC]: Due to noise interference <Go to 6)>
6) Check wave shape/noise on MA remote controller line by following "IX [3] Investigation of Transmission Wave Shape/ Noise".(page 178)
7) When no problems are found with items 1) through 6), replace the indoor unit board or the MA remote controller.
   The following status can be confirmed on LED1 and 2 on the indoor unit board.
   - If LED1 is lit, the main power source of the indoor unit is turned on.
   - If LED2 is lit, the MA remote controller line is being powered.

1. Error Code

6832

MA remote controller signal transmission error (Synchronization error)

2. Error definition and error detection method

- MA remote controller and the indoor unit is not done properly.
- Failure to detect opening in the transmission path and unable to send signals
  - Indoor unit : 3 minutes
  - Remote controller : 6 seconds

3. Cause

1) Contact failure of the remote controller lines of MA remote controller or the indoor unit
2) 2 or more remote controllers are set to MAIN
3) Overlapped indoor unit address
4) Noise interference on the remote controller lines
5) Failure to meet wiring regulations
   - Wire length
   - Wire size
   - Number of remote controllers
   - Number of indoor units
6) Problems with the circuit on the remote controller that sends or receives the signals from the remote controller

4. Check method and remedy

1) Check for disconnected or loose transmission lines for the indoor units or MA remote controllers.
2) Confirm that the power is supplied to the main power source and the remote controller line.
3) Confirm that MA remote controller's capacity limit is not exceeded.
4) Check the sub/main setting of the MA remote controllers.One of them must be set to MAIN.
5) Diagnose the remote controller (described in the remote controller installation manual).
   [OK]: no problems with the remote controller (check the wiring regulations)
   [NG]: Replace the MA remote controller.
   [6832, 6833, ERC]: Due to noise interference <Go to 6)>
6) Check wave shape/noise on MA remote controller line by following "IX [3] Investigation of Transmission Wave Shape/ Noise".(page 178)
7) When no problems are found with items 1) through 6), replace the indoor unit board or the MA remote controller.
   The following status can be confirmed on LED1 and 2 on the indoor unit board.
   - If LED1 is lit, the main power source of the indoor unit is turned on.
   - If LED2 is lit, the MA remote controller line is being powered.

1. Error Code

6833

MA remote controller signal transmission error (Hardware error)

2. Error definition and error detection method

- Communication between the MA remote controller and the indoor unit is not done properly.
- An error occurs when the transmitted data and the received data differ for 30 times in a row.

3. Cause

1) Contact failure of the remote controller lines of MA remote controller or the indoor unit
2) 2 or more remote controllers are set to MAIN
3) Overlapped indoor unit address
4) Noise interference on the remote controller lines
5) Failure to meet wiring regulations
   - Wire length
   - Wire size
   - Number of remote controllers
   - Number of indoor units
6) Problems with the circuit on the remote controller that sends or receives the signals from the remote controller

4. Check method and remedy

1) Check for disconnected or loose transmission lines for the indoor units or MA remote controllers.
2) Confirm that the power is supplied to the main power source and the remote controller line.
3) Confirm that MA remote controller's capacity limit is not exceeded.
4) Check the sub/main setting of the MA remote controllers.One of them must be set to MAIN.
5) Diagnose the remote controller (described in the remote controller installation manual).
   [OK]: no problems with the remote controller (check the wiring regulations)
   [NG]: Replace the MA remote controller.
   [6832, 6833, ERC]: Due to noise interference <Go to 6)>
6) Check wave shape/noise on MA remote controller line by following "IX [3] Investigation of Transmission Wave Shape/ Noise".(page 178)
7) When no problems are found with items 1) through 6), replace the indoor unit board or the MA remote controller.
   The following status can be confirmed on LED1 and 2 on the indoor unit board.
   - If LED1 is lit, the main power source of the indoor unit is turned on.
   - If LED2 is lit, the MA remote controller line is being powered.

1. Error Code

6834

MA controller signal reception error (Start bit detection error)

2. Error definition and error detection method

- Communication between the MA remote controller and the indoor unit is not done properly.
- No proper data has been received for 2 minutes.

3. Cause

1) Contact failure of the remote controller lines of MA remote controller or the indoor unit.
2) All the remote controllers are set to SUB.
3) Failure to meet wiring regulations
   - Wire length
   - Wire size
   - Number of remote controllers
   - Number of indoor units
4) The remote controller is removed after the installation without turning the power source off.
5) Noise interference on the remote controller transmission lines
6) Faulty circuit that is on the indoor board and performs transmission/ reception of the signal from the remote controller
7) Problems with the circuit on the remote controller that sends or receives the signals from the remote controller

4. Check method and remedy

1) Check for disconnected or loose transmission lines for the indoor units or MA remote controllers.
2) Confirm that the power is supplied to the main power source and the remote controller line.
3) Confirm that MA remote controller's capacity limit is not exceeded.
4) Check the sub/main setting of the MA remote controllers.One of them must be set to MAIN.
5) Diagnose the remote controller (described in the remote controller installation manual).
   [OK]: no problems with the remote controller (check the wiring regulations)
   [NG]: Replace the MA remote controller.
   [6832, 6833, ERC]: Due to noise interference <Go to 6)>
6) Check wave shape/noise on MA remote controller line by following "IX [3] Investigation of Transmission Wave Shape/ Noise".(page 178)
7) When no problems are found with items 1) through 6), replace the indoor unit board or the MA remote controller.
   The following status can be confirmed on LED1 and 2 on the indoor unit board.
   - If LED1 is lit, the main power source of the indoor unit is turned on
   - If LED2 is lit, the MA remote controller line is being powered.

1. Error Code

7100

Total capacity error

2. Error definition and error detection method

The model total of indoor units in the system with one outdoor unit exceeds limitations.

3. Error source, cause, check method and remedy,

<table>
<tr><th>Error source</th><th>Cause</th><th>Check method and remedy</th></tr>
<tr><td rowspan="2">Outdoor unit</td><td>(1) The model total of indoor units in the system with one outdoor unit exceeds the following table.
<table><tr><th>Model</th><th>Qj</th></tr><tr><td>250 model</td><td>50</td></tr><tr><td>500 model</td><td>100</td></tr></table></td><td>1) Check the Qj (capacity code total) of indoor units connected.

2) Check the Qj (capacity code) of the connected indoor unit set by the switch (SW2 on indoor unit board).

When the model name set by the switch is different from that of the unit connected, turn off the power source of the outdoor and the indoor units, and change the setting of the Qj (capacity code).</td></tr>
<tr><td>(2) The model selection switches (SW5-1 - 5-4) on the outdoor unit are set incorrectly.
<table><tr><th rowspan="2">Model</th><th colspan="4">SW5</th></tr><tr><th>1</th><th>2</th><th>3</th><th>4</th></tr><tr><td>250 model</td><td>ON</td><td>ON</td><td>OFF</td><td>OFF</td></tr></table></td><td>Check the setting for the model selection switch on the outdoor unit (Dipswitches SW5-1 - 5-4 on the outdoor unit control board).</td></tr>
<tr><td></td><td>(3) The outdoor unit and the auxiliary unit (OS) that is connected to the same system are not properly connected.</td><td>Confirm that the TB3 on the OC and OS are properly connected.</td></tr>
</table>

1. Error Code

7101

Capacity code setting error

2. Error definition and error detection method

Connection of incompatible (wrong capacity code or Qj) indoor unit or outdoor unit

3. Error source, cause, check method and remedy

Error source	Cause	Check method and remedy
Outdoor unit Indoor unit	(1) The Qj (capacity code) set by the switch (SW2) is wrong. *The capacity of the indoor unit can be confirmed by the self-diagnosis function (SW1 operation) of the outdoor unit.	1) Check the Qj (capacity code) of the indoor unit which has the error source address set by the switch (SW2 on indoor unit board). When the model name set by the switch is different from that of the unit connected, turn off the power source of the outdoor and the indoor units, and change the setting of the capacity code.
Outdoor unit	(2) The model selection switches (SW5-1 - 5-4) on the outdoor unit are set incorrectly.	Check the setting for the model selection switch on the outdoor unit (Dipswitches SW5-1 - 5-4 on the outdoor unit control board).

Model	SW5			
	1	2	3	4
250 model	ON	ON	OFF	OFF

1. Error Code

7102

Wrong number of connected units

2. Error definition and error detection method

- The number of connected indoor units is "0" or exceeds the allowable value.
- The address setting for the indoor unit is incorrect.

3. Error source, cause, check method and remedy

<table>
<tr><th>Error source</th><th colspan="2">Cause</th><th colspan="2">Check method and remedy</th></tr>
<tr><td>Outdoor unit</td><td>(1)</td><td>Number of indoor units connected to the outdoor terminal block (TB3) for indoor/ outdoor transmission lines exceeds limitations described below.
<table><tr><th>Number of units</th><th>Restriction on the number of units</th></tr><tr><td>Total number of indoor units</td><td>1 : 250, 500 model</td></tr><tr><td>Total number of outdoor units</td><td>1 : 250 model
2 : 500 model</td></tr></table></td><td>1)</td><td>Check whether the number of units connected to the outdoor terminal block (TB3) for indoor/ outdoor transmission lines does not exceed the limitation. (See (1) and (2) on the left.)</td></tr>
<tr><td></td><td>(2)</td><td>Disconnected transmission line of the outdoor unit</td><td>2)</td><td>Check (2) - (3) on the left.</td></tr>
<tr><td></td><td>(3)</td><td>Short-circuited transmission line
When (2) and (3) apply, the following display will appear.
- MA remote controller
"HO" is blinking.</td><td>3)</td><td>Check whether the transmission line for the terminal block for centralized control (TB7) is not connected to the terminal block for the indoor/outdoor transmission line (TB3).</td></tr>
<tr><td></td><td>(4)</td><td>The indoor unit address is not set to an address that equals "outdoor unit address minus 50."</td><td>4)</td><td>Check items (4) on the left.</td></tr>
<tr><td></td><td>(5)</td><td>The model selection switch (SW5-7) on the outdoor unit is set to OFF. (normally ON)</td><td>5)</td><td>Check the setting of the model selection switch (SW5-7 on the outdoor unit control board).</td></tr>
<tr><td></td><td>(6)</td><td>Outdoor unit address setting error
The addresses of the outdoor units in the same refrigerant circuit are not consecutive.</td><td></td><td></td></tr>
</table>

1. Error Code

7105

Address setting error

2. Error definition and error detection method

Erroneous setting of OC unit address

3. Cause, check method and remedy

Error source	Cause	Check method and remedy
Outdoor unit	Erroneous setting of OC unit address The address of outdoor unit is not being set to 51 - 100.	Check that the address of OC unit is set to 51-100. Reset the address if it stays out of the range, while shutting the power source off.

1. Error Code

7110

Connection information signal transmission/reception error

2. Error definition and error detection method

The given indoor unit is inoperable because it is not properly connected to the outdoor unit in the same system.

3. Error source, cause, check method and remedy

Error source	Cause	Check method and remedy
Outdoor unit	(1) Power to the transmission booster is cut off.	1) Confirm that the power to the transmission booster is not cut off by the booster being connected to the switch on the indoor unit. (The unit will not function properly unless the transmission booster is turned on.)
	(2) Power resetting of the transmission booster and outdoor unit.	->Reset the power to the outdoor unit.
	(3) Wiring failure between OC and OS	2) Confirm that the TB3 on the OC and OS are properly connected.
	(4) Broken wire between OC and OS.	3) Check the model selection switch on the outdoor unit (Dipswitch SW5-7 on the control board.).
	(5) The model selection switch (SW5-7) on the outdoor unit is set to OFF. (Normally set to ON)	

1. Error Code

7111

Remote controller sensor fault

2. Error definition and error detection method

This error occurs when the temperature data is not sent although the remote controller sensor is specified.

3. Error source, cause, check method and remedy

Error source	Cause	Check method and remedy
Indoor unit OA processing unit	The remote controller without the temperature sensor (the wireless remote controller or the ME compact remote controller (mounted type)) is used and the remote controller sensor for the indoor unit is specified. (SW1-1 is ON.)	Replace the remote controller with the one with built-in temperature sensor.

1. Error Code

7113

Function setting error (incorrect resistor connection)

2. Error source, cause, check method and remedy

Error source	Cause	Check method and remedy
Outdoor unit	(1) Wiring fault (2) Loose connectors, short-circuit, contact failure	(Detail code 15) 1) Check the connector CNTYP5 on the control board for proper connection.
	(3) Incompatible control board and INV board (replacement with a wrong circuit board) (4) DIP SW setting error on the control board	(Detail code 14) 1) Check the connector CNTYP4 on the control board for proper connection. 2) Check the connector CNTYP5 on the control board for proper connection. 3) Check the settings of SW5-1 through SW5-4 on the control board.
		(Detail code 12) 1) Check the connector CNTYP2 on the control board for proper connection. 2) Check the connector CNTYP5 on the control board for proper connection. 3) Check the connector CNTYP4 on the control board for proper connection. 4) Check the settings of SW5-1 through SW5-4 on the control board.
		(Detail code 16) 1) Check the connector CNTYP on the INV board for proper connection. 2) Check the connector CNTYP5 on the control board for proper connection. 3) Check the connector CNTYP4 on the control board for proper connection. 4) Check the settings of SW5-1 through SW5-4 on the control board. 5) Check the wiring between the control board and INV board. (Refer to the section on Error code 0403.) (page 126)
		(Detail code 00, 01, 05) 1) Check the wiring between the control board and INV board. (Refer to the section on Error code 0403.) (page 126) 2) Check the settings of SW5-1 through SW5-4 on the control board. 3) Check the connector CNTYP5 on the control board for proper connection. 4) Check the connector CNTYP4 on the control board for proper connection.
		(Detail code Miscellaneous) *If a set-model-name identification error occurs, check the detail code on the unit on which the error occurred. The detail code that appears on other units will be different from the ones shown above.

1. Error Code

7117

Model setting error

2. Error source, cause, check method and remedy

Error source	Cause	Check method and remedy
Outdoor unit	(1) Wiring fault (2) Loose connectors, short-circuit, contact failure	(Detail code 15) 1) Check the connector CNTYP5 on the control board for proper connection.
		(Detail code 14) 1) Check the connector CNTYP4 on the control board for proper connection.
		(Detail code 12) 1) Check the connector CNTYP2 on the control board for proper connection. 2) Check the connector CNTYP5 on the control board for proper connection.
		(Detail code 16) 1) Check the connector CNTYP on the INV board for proper connection. 2) Check the connector CNTYP5 on the control board for proper connection. 3) Check the connector CNTYP4 on the control board for proper connection. 4) Check the wiring between the control board and INV board. (Refer to the section on Error code 0403.) (page 126)
		(Detail code 00, 01, 05) 1) Check the wiring between the control board and INV board. (Refer to the section on Error code 0403.) (page 126) 2) Check the settings of SW5-1 through SW5-4 on the control board. 3) Check the connector CNTYP5 on the control board for proper connection. 4) Check the connector CNTYP4 on the control board for proper connection.
		(Detail code Miscellaneous) *If a set-model-name identification error occurs, check the detail code on the unit on which the error occurred. The detail code that appears on other units will be different from the ones shown above.

1. Error Code

7130

Incompatible unit combination

2. Error definition and error detection method

The check code will appear when the indoor units with different refrigerant systems are connected.

3. Error source, cause, check method and remedy

Error source	Cause	Check method and remedy
Outdoor unit	(1) The connected indoor unit is for use with R22 or R407C. (2) Incorrect type of indoor units are connected.	1) Check the connected indoor unit model.

-1- Troubleshooting according to the remote controller malfunction or the external input error

In the case of MA remote controller

1. Phenomena

Even if the operation button on the remote controller is pressed, the display remains unlit and the unit does not start running.(Power indicator ◎ does not appear on the screen.)

(1) Cause

1) The power is not supplied to the indoor unit.
   - The main power of the indoor unit is not on.
   - The connector on the indoor unit board has come off.
   - The fuse on the indoor unit board has melted.
   - Transformer failure and disconnected wire of the indoor unit.
2) Incorrect wiring for the MA remote controller
   - Disconnected wire for the MA remote controller or disconnected line to the terminal block.
   - Short-circuited MA remote controller wiring
   - Incorrect wiring of the MA remote controller cables
   - Incorrect connection of the MA remote wiring to the terminal block for transmission line (TB5) on the indoor unit
   - Wiring mixup between the MA remote controller cable and 200 VAC power supply cable
   - Reversed connection of the wire for the MA remote controller and the M-NET transmission line on the indoor unit
3) The number of the MA remote controllers that are connected to an indoor unit exceeds the allowable range (2 units).
4) The length or the diameter of the wire for the MA remote controller are out of specification.
5) Short circuit of the wire for the remote display output of the outdoor unit or reversed polarity connection of the relay.
6) The indoor unit board failure
7) MA remote controller failure

(2) Check method and remedy

1) Measure voltages of the MA remote controller terminal (among 1 to 3).
   - If the voltage is between DC 9 and 12V, the remote controller is a failure.
   - If no voltage is applied, check the causes 1) and 3) and if the cause is found, correct it.

   If no cause is found, refer to 2).
2) Remove the wire for the remote controller from the terminal block (TB15) on the MA remote controller for the indoor unit, and check voltage among 1 to 3.
   - If the voltage is between DC 9 and 12 V, check the causes 2) and 4) and if the cause is found, correct it.
   - If no voltage is applied, check the cause 1) and if the cause is found, correct it.

   If no cause is found, check the wire for the remote display output (relay polarity).
   If no further cause is found, replace the indoor unit board.

In the case of MA remote controller

2. Phenomena

When the remote controller operation SW is turned on, the operation status briefly appears on the display, then it goes off, and the display lights out immediately, and the unit stops.

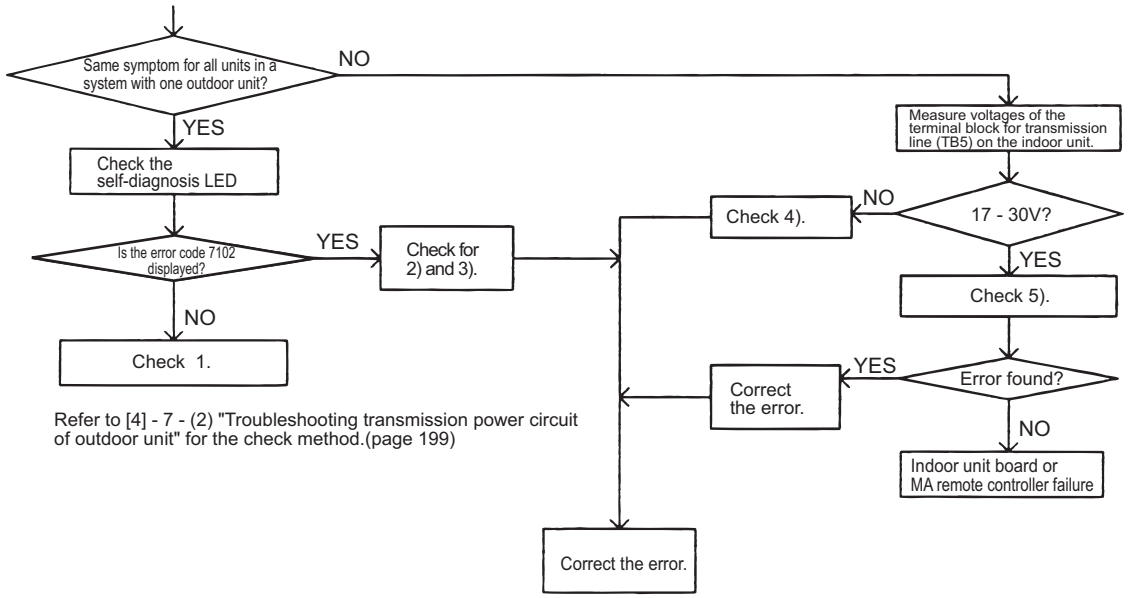
(1) Cause

1) The power for the M-NET transmission line is not supplied from the outdoor unit.
2) Short circuit of the transmission line.
3) Incorrect wiring of the M-NETtransmission line on the outdoorunit.
   - Disconnected wire for the MA remote controller or disconnected line to the terminal block.
   - The indoor transmission line is connected incorrectly to the transmission terminal block for centralized controller (TB7).
   - The male power supply connectors on the multiple outdoor units are connected to the female power supply switch connector (CN40).

   In the system to which the power supply unit for transmission lines is connected, the male power supply connector is connected to the female power supply switch connector (CN40) on the outdoor unit.
4) Disconnected M-NET transmission line on the indoor unit side.
5) Disconnected wire between the terminal block for M-NET line (TB5) of the indoor unit and the indoor unit board (CN2M) or disconnected connector.

(2) Check method and remedy

1) **When 2) and 3) above apply, check code 7102 will be displayed on the self-diagnosis LED.**



In the case of MA remote controller

3. Phenomena

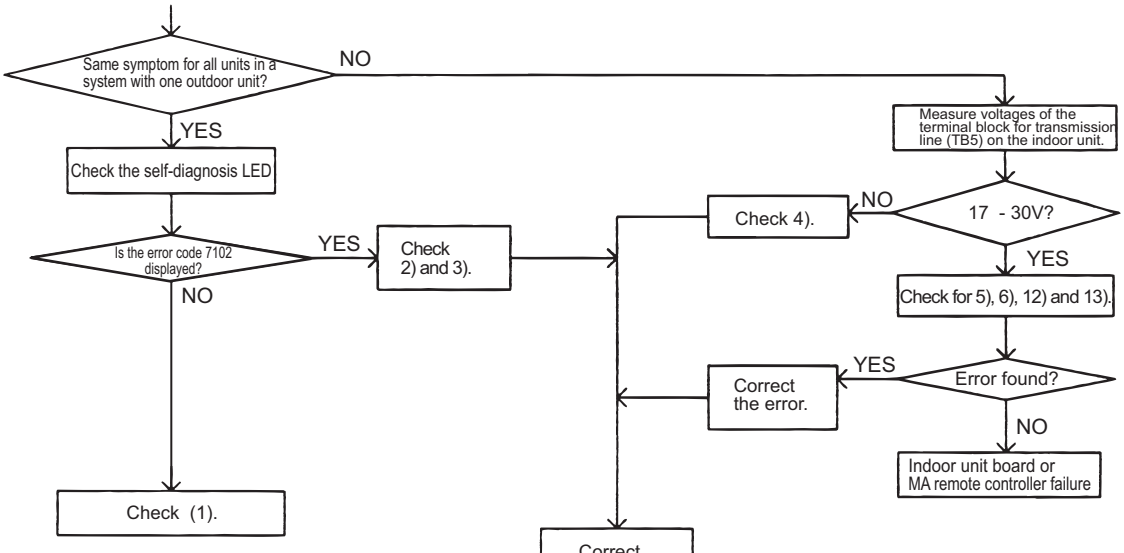
"HO" stays lit on the remote controller display, and the buttons do not work. (Normally, "HO" goes off approximately after 5 minutes of power on.)

(1) Cause

1) The power for the M-NET transmission line is not supplied from the outdoor unit.
2) Short-circuited transmission line
3) Incorrect wiring of the M-NET transmission line on the outdoor unit.
   - Disconnected wire for the MA remote controller or disconnected line to the terminal block.
   - The indoor transmission line is connected incorrectly to the transmission terminal block for centralized controller (TB7).
   - The male power supply connectors on the multiple outdoor units are connected to the female power supply switch connector (CN40).
     In the system to which the power supply unit for transmission lines is connected, the male power supply connector is connected to the female power supply switch connector (CN40) on the outdoor unit
4) Disconnected M-NET transmission line on the indoor unit.
5) Disconnected wire between the terminal block for M-NET line (TB5) of the indoor unit and the indoor unit board (CN2M) or disconnected connector.
6) Incorrect wiring for the MA remote controller
   - Short-circuited wire for the MA remote controller
   - Disconnected wire for the MA remote controller (No.2) and disconnected line to the terminal block.
   - Reversed daisy-chain connection between groups
   - Incorrect wiring for the MA remote controller to the terminal block for transmission line connection (TB5) on the indoor unit
   - The M-NET transmission line is connected incorrectly to the terminal block (TB13) for the MA remote controller.
7) The sub/main setting of the MA remote controller is set to sub.
8) 2 or more main MA remote controllers are connected.
9) Indoor unit board failure (MA remote controller communication circuit)
10) Remote controller failure
11) Outdoor unit failure (Refer to IX [7] Troubleshooting Using the Outdoor Unit LED Error Display.)(page 203)
12) The outdoor unit address is set to an address other than "indoor unit address plus 50."
13) The indoor unit address is set to a number 51 or highe

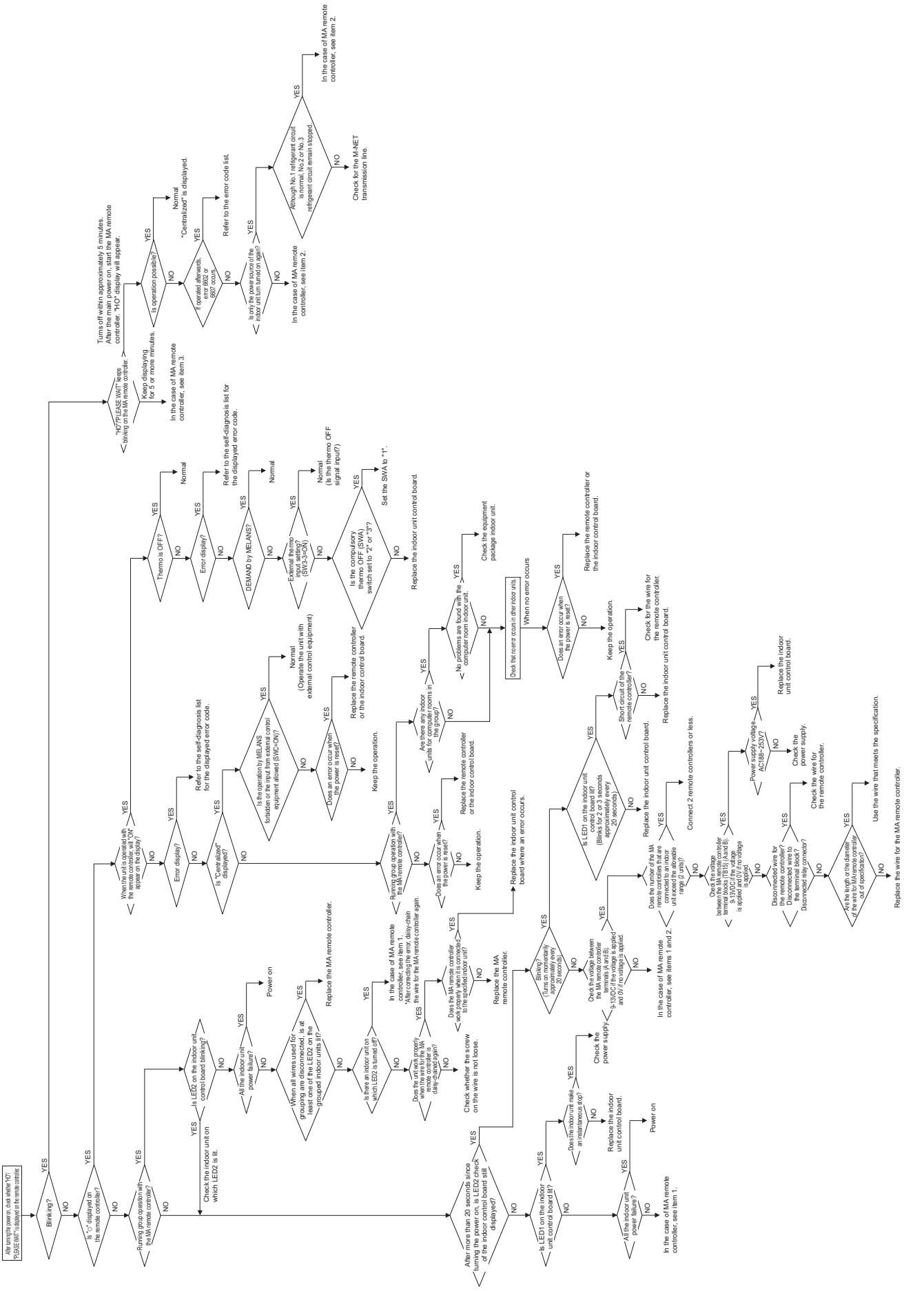
(2) Check method and remedy

1) **When 2) and 3) above apply, check code 7102 will be displayed on the self-diagnosis LED.**



Flow chart

Even if the operation button on the remote controller is pressed, the indoor and the outdoor units do not start running.

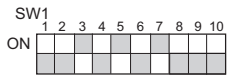
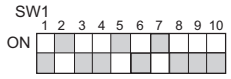


System controller

1. Phenomena

Although cooling operation starts with the normal remote controller display, the capacity is not enough

(1) Cause, check method and remedy

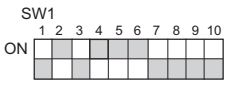
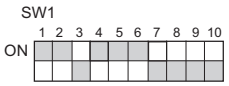
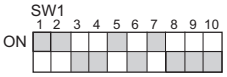
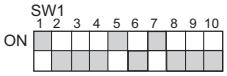
Cause	Check method and remedy
1. Compressor frequency does not rise sufficiently. ♦Inaccurate TH22 (Te) temperature reading ♦Protection works and compressor frequency does not rise due to high discharge temperature ♦Protection works and compressor frequency does not rise due to high pressure ♦Pressure drops excessively.	(1) Check the difference between the temperature reading by TH22 on the LED monitor and the actual temperature. -> Check the thermistor if there is a problem with the temperature reading. (Refer to the section that corresponds to error code 5102.) Note: If the TH22 reading is lower than the actual temperature, the units are operating at a lower performance level than it should. (2) Check temperature difference between the evaporating temperature (Te) and the target evaporating temperature (Tem) with self-diagnosis LED. Note: Higher Te than Tem causes insufficient capacity. SW1 setting Evaporating temperature Te  Target evaporating temperature Tem  Note: Protection works and compressor frequency does not rise even at higher Te than Tem due to high discharge temperature and high pressure. At high discharge temperature: Refer to 1102.(page 127) At high pressure: Refer to 1302.(page 129)
2. Indoor unit LEV malfunction ♦Insufficient refrigerant flows due to LEV malfunction (not enough opening) or protection works and compressor frequency does not rise due to pressure drop.	Refer to the page of LEV troubleshooting ([4] -5-).(page 185)
3. RPM error of the outdoor unit FAN ♦Motor failure or board failure, or airflow rate decrease due to clogging of the heat exchanger ♦The fan is not properly controlled as the outdoor temperature cannot be precisely detected by the temperature sensor. ♦The fan is not properly controlled as the pressure cannot be precisely detected by the pressure sensor.	Refer to the page on troubleshooting of the outdoor unit fan. Refer to 5106.(page 143) Refer to 1302.(page 129)

Cause	Check method and remedy
4. Long piping length The cooling capacity varies greatly depending on the pressure loss. (When the pressure loss is large, the cooling capacity drops.)	Check the piping length to determine if it is contributing to performance loss. Piping pressure loss can be estimated from the temperature difference between the indoor unit heat exchanger outlet temperature and the saturation temperature (Te) of 63LS. ->Correct the piping.
5. Piping size is not proper (thin)	
6. Insufficient refrigerant amount Protection works and compressor frequency does not rise due to high discharge temperature.	Refer to 1-1. (Compressor frequency does not rise sufficiently.)Refer to the page on refrigerant amount adjustment
7. Clogging by foreign object	Check the temperature difference between in front of and behind the place where the foreign object is clogging the pipe (upstream side and downstream side). When the temperature drops significantly, the foreign object may clog the pipe. -> Remove the foreign object inside the pipe.
8. The indoor unit inlet temperature is excessively. (Less than 11°C [52°F] WB)	Check the inlet air temperature and for short cycling. Change the environment where the indoor unit is used.
9. Compressor failure The amount of circulating refrigerant decreases due to refrigerant leak in the compressor.	Check the discharge temperature to determine if the refrigerant leaks, as it rises if there is a leak.
10. LEV1 malfunction Sufficient liquid refrigerant is not be supplied to the indoor unit as sufficient sub cool cannot be secured due to LEV1 malfunction.	Refer to the page of LEV troubleshooting ([4] -5-).(page 185) It most likely happens when there is little difference or no difference between TH3 and TH6.
11. TH3, TH6 and 63HS1 sensor failure or faulty wiring LEV1 is not controlled normally.	♦Check the thermistor. ♦Check wiring.
12. LEV2 actuation failure A drop in the low pressure that is caused either by a blockage of liquid pipe or by a pressure loss and the resultant slowing of refrigerant flow causes a tendency for the discharge temperature to rise.	Refer to the page on troubleshooting the LEV ([4] -5-).(page 185)
13. Dirty heat exchanger, short cycling	

2. Phenomena

Although heating operation starts with the normal remote controller display, the capacity is not enough.

(1) Cause, check method and remedy

Cause	Check method and remedy
1. Compressor frequency does not rise sufficiently. ♦Faulty detection of pressure sensor. ♦Protection works and compressor frequency does not rise due to high discharge temperature ♦Protection works and compressor frequency does not rise due to high pressure.	(1) Check pressure difference between the detected pressure by the pressure sensor and the actual pressure with self-diagnosis LED. -> If the accurate pressure is not detected, check the pressure sensor.(Refer to the page on Trouble-shooting of Pressure Sensor) Note: Higher inlet pressure by the high pressure sensor than the actual pressure causes insufficient capac-ity. SW1 setting High pressure sensor  Low pressure sensor  (2) Check the difference between the condensing tem-perature (Tc) and the target condensing tempera-ture (Tcm) with self-diagnosis LED. Note: Higher Tc than Tcm causes insufficient capacity. SW1 setting Condensing temperature Tc  Target condensing temperature Tcm  Note: Protection works and compressor frequency does not rise even at lower Tc than Tcm due to high dis-charge temperature and high pressure. At high discharge temperature: Refer to 1102.(page 127) At high pressure: Refer to 1302.(page 129)

Cause		Check method and remedy
2.	Indoor unit LEV malfunction Insufficient refrigerant flows due to LEV malfunction (not enough opening).	Refer to the page of LEV troubleshooting ([4] -5-).(page 185)
3.	Temperature reading error on the indoor unit piping temperature sensor If the temperature reading on the sensor is higher than the actual temperature, it makes the subcool seem smaller than it is, and the LEV opening decreases too much.	Check the thermistor.
4	RPM error of the outdoor unit FAN ♦Motor failure or board failure, or airflow rate decrease, pressure drop due to clogging of the heat exchanger leading to high discharge temperature ♦The fan is not properly controlled as the temperature cannot be precisely detected with the piping sensor.	Refer to the page on outdoor unit fan ([4] -4-).(page 184)
5.	Insulation failure of the refrigerant piping	
6.	Long piping length Excessively long piping on the high pressure side causes pressure loss leading to increase in the high pressure.	Confirm that the characteristic of capacity drop due to piping length. -> Change the pipe
7.	Piping size is not proper (thin)	
8.	Clogging by foreign object	Check the temperature difference between the upstream and the downstream of the pipe section that is blocked. Since blockage in the extended section is difficult to locate, operate the unit in the cooling cycle, and follow the same procedures that are used to locate the blockage of pipe during cooling operation. ->Remove the blockage in the pipe.
9.	The indoor unit inlet temperature is excessively high.(exceeding 28°C [82°F])	Check the inlet air temperature and for short cycling. Change the environment where the indoor unit is used.
10.	Insufficient refrigerant amount Protection works and compressor frequency does not rise due to low discharge temperature Refrigerant recovery operation is likely to start.	Refer to 2 - 1. (Compressor frequency does not rise sufficiently.)(page 174) Refer to the page on refrigerant amount adjustment.(page 107)
11.	Compressor failure (same as in case of cooling)	Check the discharge temperature.
12.	LEV2 actuation failure A drop in the low pressure that is caused either by a blockage of liquid pipe or by a pressure loss and the resultant slowing of refrigerant flow causes a tendency for the discharge temperature to rise.	Refer to the page on troubleshooting the LEV ([4] -5-).(page 185)

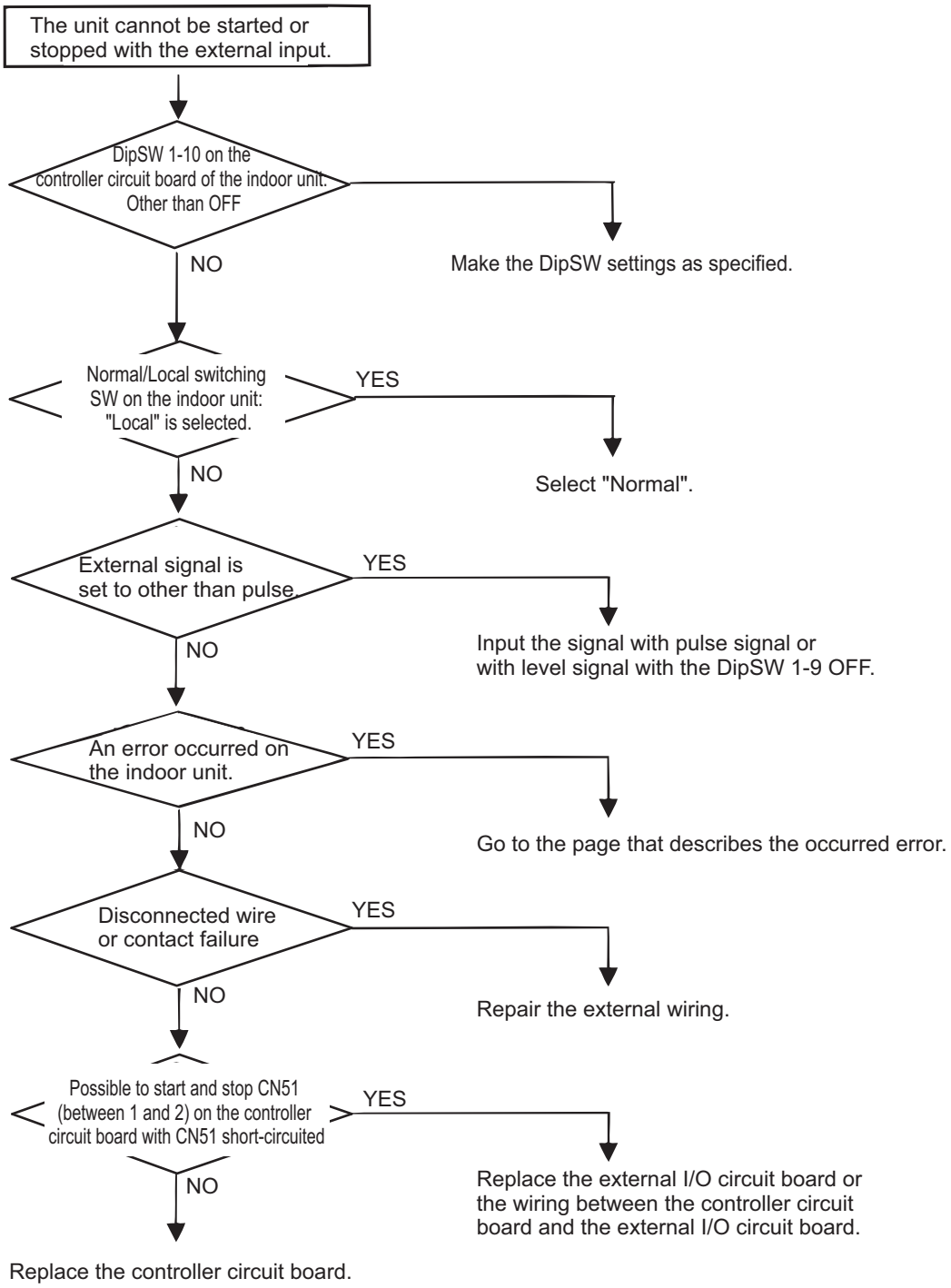
3. Phenomena

Outdoor unit stops at times during operation.

(1) Cause, check method and remedy

Cause		Check method and remedy	
	The first stop is not considered as an error, as the unit turns to anti-restart mode for 20 minutes as a preliminary error.	(1)	Check the mode operated in the past by displaying preliminary error history on LED display with SW1.
	Error mode	(2)	Reoperate the unit to find the mode that stops the unit by displaying preliminary error history on LED display with SW1. Refer to the reference page for each error mode.
1)	Abnormal high pressure		
2)	Abnormal discharge air temperature		
3)	Heatsink thermistor failure		*Display the indoor piping temperature table with SW1 to check whether the freeze proof operation runs properly, and check the temperature.
4)	Thermistor failure		
5)	Pressure sensor failure		
6)	Over-current break		
7)	Refrigerant overcharge		
Note1:	Frost prevention tripping only under cooling mode may be considered in addition to the above. (Freeze protection is detected by one or all indoor units.)		
Note2:	Even the second stop is not considered as an error when some specified errors occur. (eg. The third stop is considered as an error when the thermistor error occurs.)		

In case of external input (including operation mode)



[3] Investigation of Transmission Wave Shape/Noise

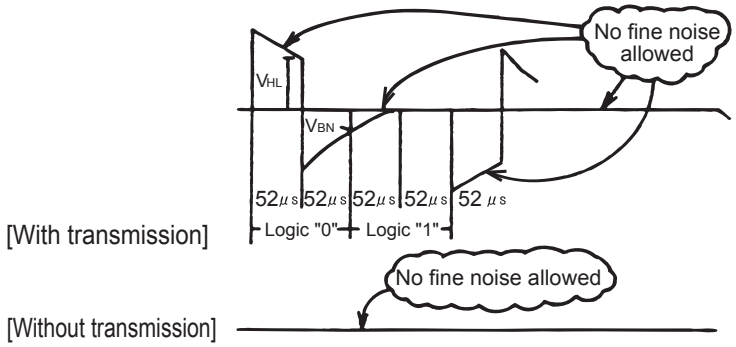
1. M-NET transmission

Control is performed by exchanging signals between the outdoor unit and the indoor unit (ME remote controller) through M-NET transmission. Noise interference on the transmission line will interrupt the normal transmission, leading to erroneous operation.

(1) Symptoms caused by noise interference on the transmission line

Cause	Erroneous operation	Error code	Error code definition
Noise interference on the transmission line	Signal is transformed and will be misjudged as the signal of another address.	6600	Address overlap
	Transmission wave pattern is transformed due to the noise creating a new signal	6602	Transmission processor hardware error
	Transmission wave pattern is transformed due to the noise, and will not be received normally leading to no acknowledgement (ACK).	6607	No ACK error
	Transmission cannot be performed due to the fine noise.	6603	Transmission line bus busy error
	Transmission is successful; however, the acknowledgement (ACK) or the response cannot be received normally due to the noise.	6607 6608	No ACK error No response error

(2) Wave shape check



Wave shape check

Check the wave pattern of the transmission line with an oscilloscope. The following conditions must be met.

1) Small wave pattern (noise) must not exist on the transmission signal. (Minute noise (approximately 1V) can be generated by DC-DC converter or the inverter operation; however, such noise is not a problem when the shield of the transmission line is grounded.)
2) The sectional voltage level of transmission signal should be as follows.

Logic	Voltage level of the transmission line
0	V_{HL} = 2.5V or higher
1	V_{BN} = 1.3V or below

(3) Check method and remedy

1) Measures against noise
Check the followings when noise exists on the wave or the errors described in (1) occur.

	Error code definition	Remedy
Check that the wiring work is performed according to wiring specifications.	1. The transmission line and the power line are not wired too closely.	Isolate the transmission line from the power line (5cm [1-31/32"] or more). Do not insert them in the same conduit.
	2. The transmission line is not bundled with that for another systems.	The transmission line must be isolated from another transmission line. When they are bundled, erroneous operation may be caused.
	3. The specified wire is used for the transmission line.	Use the specified transmission line. Type: Shielded wire CVVS/CPEVS/MVVS (For ME remote controller) Diameter: 1.25mm^2 [AWG16] or more (Remote controller wire: 0.3 - 1.25mm^2 [AWG22-16])
	4. When the transmission line is daisy-chained on the indoor unit terminals, are the shields daisy-chained on the terminals, too?	The transmission is two-wire daisy-chained. The shielded wire must be also daisy-chained. When the shielded cable is not daisy-chained, the noise cannot be reduced enough.
Check that the grounding work is performed according to grounding specifications.	5. Is the shield of the indoor-outdoor transmission cable grounded to the earth terminal on the outdoor unit?	Connect the shield of the indoor-outdoor transmission cable to the earth terminal (⏚) on the outdoor unit. If no grounding is provided, the noise on the transmission line cannot escape leading to change of the transmission signal.
	6. Check the treatment method of the shield of the transmission line (for centralized control).	The transmission cable for centralized control is less subject to noise interference if it is grounded to the outdoor unit whose power jumper cable was moved from CN41 to CN40 or to the power supply unit. The environment against noise varies depending on the distance of the transmission lines, the number of the connected units, the type of the controllers to be connected, or the environment of the installation site. Therefore, the transmission line work for centralized control must be performed as follows. 1. When no grounding is provided: Ground the shield of the transmission cable by connecting to the outdoor unit whose power jumper connector was moved from CN41 to CN40 or to the power supply unit. 2. When an error occurs even though one point grounding is provided: Ground the shield on all outdoor units.

2) Check the followings when the error "6607" occurs, or "HO" appears on the display on the remote controller.

Error code definition	Remedy
7. The farthest distance of transmission line is 200m [656ft] or longer.	Check that the farthest distance from the outdoor unit to the indoor unit and to the remote controller is within 200m [656ft].
8. The types of transmission lines are different.	Use the specified transmission line. Type: Shielded wire CVVS/CPEVS/MVVS (For ME remote controller) Diameter: 1.25mm^2 [AWG16] or more (Remote controller wire: 0.3-1.25mm^2 [AWG22-16])
9. Outdoor unit circuit board failure	Replace the outdoor unit control board or the power supply board for the transmission line.
10. Indoor unit circuit board failure or remote controller failure	Replace the indoor unit circuit board or the remote controller.
11. The MA remote controller is connected to the M-NET transmission line.	Connect the MA remote controller to the terminal block for MA remote controller (TB15).

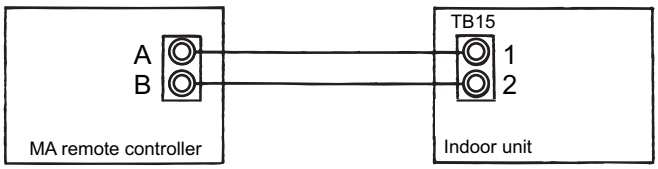
2. MA remote controller transmission

The communication between the MA remote controller and the indoor unit is performed with current tone burst.

(1) Symptoms caused by noise interference on the transmission line

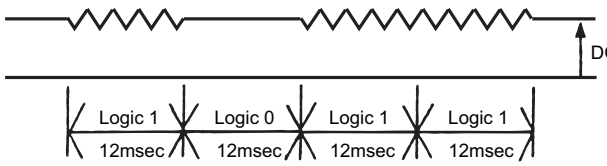
If noise is generated on the transmission line, and the communication between the MA remote controller and the indoor unit is interrupted for 3 minutes in a row, MA transmission error (6831) will occur.

(2) Confirmation of transmission specifications and wave pattern



A, B : No polarity
Across terminal No. 1-2
: Power supply (9V to 12VDC)

Transmission waveform (Across terminal No.1 - 2)



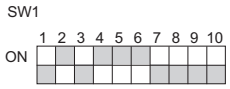
① Satisfies the formula
12 msec/bit ± 5%
② Voltage among terminals must be between DC9 and 12 V.

[4] Troubleshooting Principal Parts

-1- High-Pressure Sensor (63HS1)

1. Compare the pressure that is detected by the high pressure sensor, and the high-pressure gauge pressure to check for failure.

By configuring the digital display setting switch (SW1) as shown in the figure below, the pressure as measured by the high-pressure sensor appears on the LED1 on the control board.



(1) While the sensor is stopped, compare the gauge pressure and the pressure displayed on self-diagnosis LED1.

1) When the gauge pressure is between 0 and 0.098MPa [14psi], internal pressure is caused due to gas leak.
2) When the pressure displayed on self-diagnosis LED1 is between 0 and 0.098MPa [14psi], the connector may be defective or be disconnected. Check the connector and go to (4).
3) When the pressure displayed on self-diagnosis LED1 exceeds 4.15MPa [601psi], go to (3).
4) If other than 1), 2) or 3), compare the pressures while the sensor is running. Go to (2).

(2) Compare the gauge pressure and the pressure displayed on self-diagnosis LED1 while the sensor is running. (Compare them by MPa [psi] unit.)

1) When the difference between both pressures is within 0.098MPa [14psi], both the high pressure sensor and the control board are normal.
2) When the difference between both pressures exceeds 0.098MPa [14psi], the high pressure sensor has a problem. (performance deterioration)
3) When the pressure displayed on self-diagnosis LED1 does not change, the high pressure sensor has a problem.

(3) Remove the high pressure sensor from the control board to check the pressure on the self-diagnosis LED1.

1) When the pressure displayed on self-diagnosis LED1 is between 0 and 0.098MPa [14psi], the high pressure sensor has a problem.
2) When the pressure displayed on self-diagnosis LED1 is approximately 4.15MPa [601psi], the control board has a problem.

(4) Remove the high pressure sensor from the control board, and short-circuit between the No.2 and 3 connectors (63HS1) to check the pressure with self-diagnosis LED1.

1) When the pressure displayed on the self-diagnosis LED1 exceeds 4.15MPa [601psi], the high pressure sensor has a problem.
2) If other than 1), the control board has a problem.

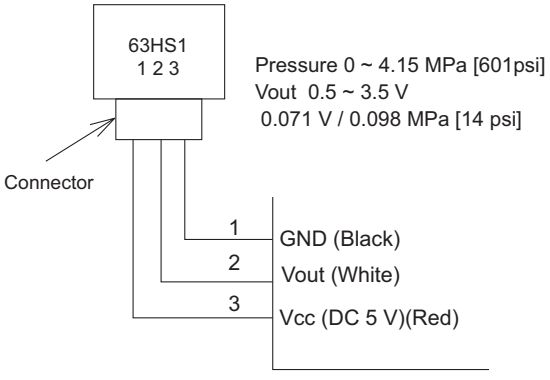
2. High-pressure sensor configuration

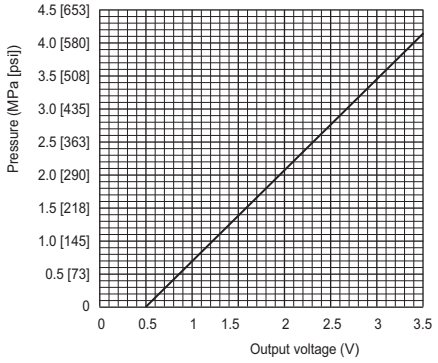
The high pressure sensor consists of the circuit shown in the figure below. If DC 5V is applied between the red and the black wires, voltage corresponding to the pressure between the white and the black wires will be output, and the value of this voltage will be converted by the microcomputer. The output voltage is 0.071V per 0.098MPa [14psi].

Note

The pressure sensor on the body side is designed to connect to the connector. The connector pin number on the body side is different from that on the control board side.

	Body side	Control board side
Vcc	Pin 1	Pin 3
Vout	Pin 2	Pin 2
GND	Pin 3	Pin 1

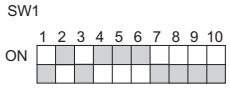




-2- Low-Pressure Sensor (63LS)

1. Compare the pressure that is detected by the low pressure sensor, and the low pressure gauge pressure to check for failure.

By configuring the digital display setting switch (SW1) as shown in the figure below, the pressure as measured by the low-pressure sensor appears on the LED1 on the control board.



(1) While the sensor is stopped, compare the gauge pressure and the pressure displayed on self-diagnosis LED1.

1) When the gauge pressure is between 0 and 0.098MPa [14psi], internal pressure is caused due to gas leak.
2) When the pressure displayed on self-diagnosis LED1 is between 0 and 0.098MPa [14psi], the connector may be defective or be disconnected. Check the connector and go to (4).
3) When the pressure displayed on self-diagnosis LED1 exceeds 1.7MPa [247psi], go to (3).
4) If other than 1), 2) or 3), compare the pressures while the sensor is running. Go to (2).

(2) Compare the gauge pressure and the pressure displayed on self-diagnosis LED1 while the sensor is running.(Compare them by MPa [psi] unit.)

1) When the difference between both pressures is within 0.03MPa [4psi], both the low pressure sensor and the control board are normal.
2) When the difference between both pressures exceeds 0.03MPa [4psi], the low pressure sensor has a problem. (performance deterioration)
3) When the pressure displayed on the self-diagnosis LED1 does not change, the low pressure sensor has a problem.

(3) Remove the low pressure sensor from the control board to check the pressure with the self-diagnosis LED1 display.

1) When the pressure displayed on the self-diagnosis LED1 is between 0 and 0.098MPa [14psi], the low pressure sensor has a problem.
2) When the pressure displayed on self-diagnosis LED1 is approximately 1.7MPa [247psi], the control board has a problem.
   - ♦When the outdoor temperature is 30°C [86°F] or less, the control board has a problem.
   - ♦When the outdoor temperature exceeds 30°C [86°F], go to (5).

(4) Remove the low pressure sensor from the control board, and short-circuit between the No.2 and 3 connectors (63LS:CN202) to check the pressure with the self-diagnosis LED1.

1) When the pressure displayed on the self-diagnosis LED1 exceeds 1.7MPa [247psi], the low pressure sensor has a problem.
2) If other than 1), the control board has a problem.

(5) Remove the high pressure sensor (63HS1) from the control board, and insert it into the connector for the low pressure sensor (63LS) to check the pressure with the self-diagnosis LED1.

1) When the pressure displayed on the self-diagnosis LED1 exceeds 1.7MPa [247psi], the control board has a problem.
2) If other than 1), the control board has a problem.

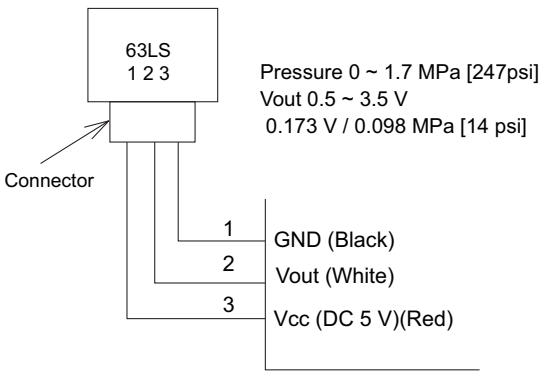
2. Low-pressure sensor configuration

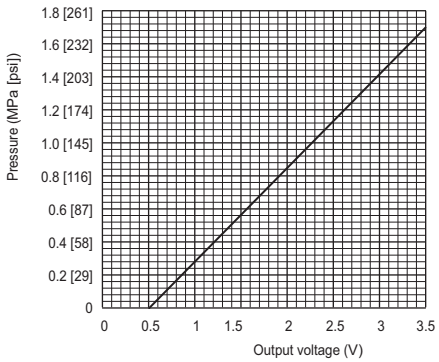
The low pressure sensor consists of the circuit shown in the figure below. If DC5V is applied between the red and the black wires, voltage corresponding to the pressure between the white and the black wires will be output, and the value of this voltage will be converted by the microcomputer. The output voltage is 0.173V per 0.098MPa [14psi].

Note

The pressure sensor on the body side is designed to connect to the connector. The connector pin number on the body side is different from that on the control board side.

	Body side	Control board side
Vcc	Pin 1	Pin 3
Vout	Pin 2	Pin 2
GND	Pin 3	Pin 1



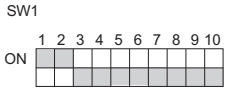
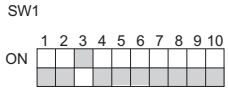


-3- Solenoid Valve

Check whether the output signal from the control board and the operation of the solenoid valve match.
Setting the self-diagnosis switch (SW1) as shown in the figure below causes the ON signal of each relay to be output to the LED's. Each LED shows whether the relays for the following parts are ON or OFF. LEDs light up when relays are ON.

Note

The circuits on some parts are closed when the relays are ON. Refer to the following instructions.

SW1		Display							
		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8
	Upper	21S4a		CH11		SV1a			
	Lower			21S4b	SV5b				
	Upper							SV9	
	Lower								

When a valve malfunctions, check if the wrong solenoid valve coil is not attached the lead wire of the coil is not disconnected, the connector on the board is not inserted wrongly, or the wire for the connector is not disconnected.

(1) In case of 21S4a (4-way switching valve)

About this 4-way valve
When not powered:
Conducts electricity between the oil separator outlet and heat exchanger, and between the gas ball valve (BV1) and the accumulator to complete the circuit for the cooling cycle.
When powered:
The electricity runs between the oil separator and the gas ball valve, and between the heat exchanger and the accumulator. This circulation is for heating.

Check the LED display and the intake and the discharge temperature for the 4-way valve to check whether the valve has no faults and the electricity runs between where and where.Do not touch the pipe when checking the temperature, as the pipe on the oil separator side will be hot.

Note

Do not give an impact from outside, as the outer hull will be deformed leading to the malfunction of the inner valve.

(2) In case of 21S4b (4-way switching valve)

About this 4-way valve
When not powered:
Conducts electricity between the oil separator outlet and the heat exchaner1 (the top heat exchanger) and opens and closes the heat exchanger circuit for the heating and cooling cycles.
When powered:
The electricity runs between the heat exchanger and the accumulator, and the valve opens or closes the heat exchanger circuit when cooling or heating.

Whether the valve has no fault can be checked by checking the LED display and the switching sound; however, it may be difficult to check by the sound, as the switching coincides with 21S4b or 21S4c. In this case, check the intake and the discharge temperature for the 4-way valve to check that the electricity runs between where and where.

Note

- Do not touch the valve when checking the temperature, as it will be hot.
- Do not give an impact from outside, as the outer hull will be deformed leading to the malfunction of the inner valve.

(3) In case of SV1a (Bypass valve)

This solenoid valve opens when powered (Relay ON).

1) At compressor start-up, the SV1a turns on for 4 minutes, and the operation can be checked by the self-diagnosis LED display and the closing sound.
2) To check whether the valve is open or closed, check the change of the SV1a downstream piping temperature while the valve is being powered.Even when the valve is closed, high-temperature refrigerant flows inside the capillary next to the valve. (Therefore, temperature of the downstream piping will not be low with the valve closed.)

(4) In the case of SV5b (2-way valve)

This 2-way valve is a switching valve that opens when de-energized. Proper operation of this valve can be checked on the LED and by the switching sound. During the cooling mode, SV5b and 21S4b are switched simultaneously, which may make it difficult to check for proper operation of the SV5b or SV5c by listening for the switching sound. If this is the case, the temperature before and after SV5b or SV5c can be used to determine if the refrigerant is the pipe.

(5) In the case of SV9 (Solenoid valve)

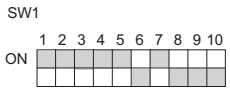
This solenoid valve is a switching valve that opens when energized. Proper operation of this valve can be checked on the LED display and by the switching sound.

Note

Do not give an impact from outside, as the outer hull will be deformed leading to the malfunction of the inner valve.

-4- Outdoor Unit Fan

- To check the revolution of the fan, check the inverter output state on the self-diagnosis LED, as the inverter on the outdoor fan controls the revolutions of the fan.
- When starting the fan, the fan runs at full speed for 5 seconds.
- When setting the DIP SW1 as shown in the figure below, the inverter output [%] will appear. 100% indicates the full speed and 0% indicates the stopping.



- As the revolution of the fan changes under control, at the interphase or when the indoor unit operation capacity is low, the revolution of the fan may change.
- If the fan does not move or it vibrates, Fan board problem or fan motor problem is suspected. Refer to IX [4] -6- (2) [5] "Check the fan motor ground fault or the winding."(page 194) and IX [4] -6- (2) [6] "Check the Fan board failure."

-5- LEV

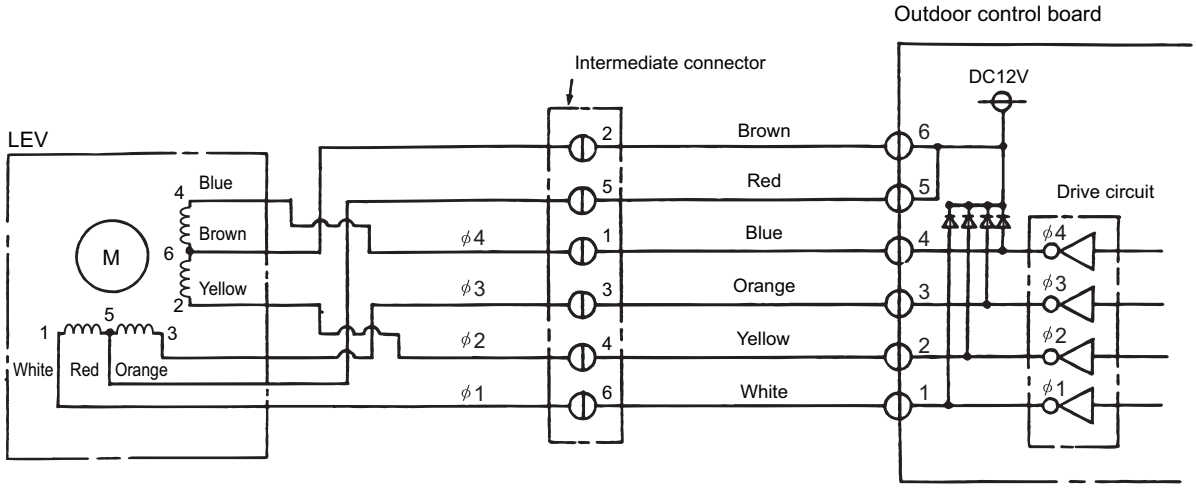
LEV operation

LEV (Indoor unit: Linear expansion valve) and LEV2 (Outdoor unit: Linear expansion valve) are stepping-motor-driven valves that operate by receiving the pulse signals from the indoor and outdoor unit control boards.

(1) Indoor LEV and Outdoor LEV (LEV2)

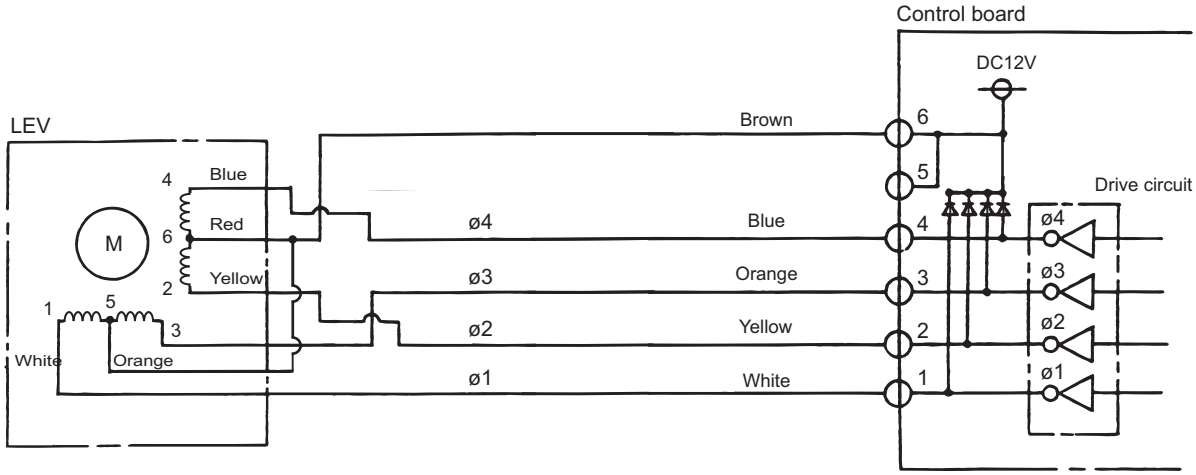
The valve opening changes according to the number of pulses.

1) Indoor and outdoor unit control boards and the LEV (Indoor unit: Linear expansion valve)



Note. The connector numbers on the intermediate connector and the connector on the control board differ. Check the color of the lead wire to judge the number.

2) Outdoor unit control board and the LEV (Outdoor unit: Linear expansion valve)



3) Pulse signal output and valve operation

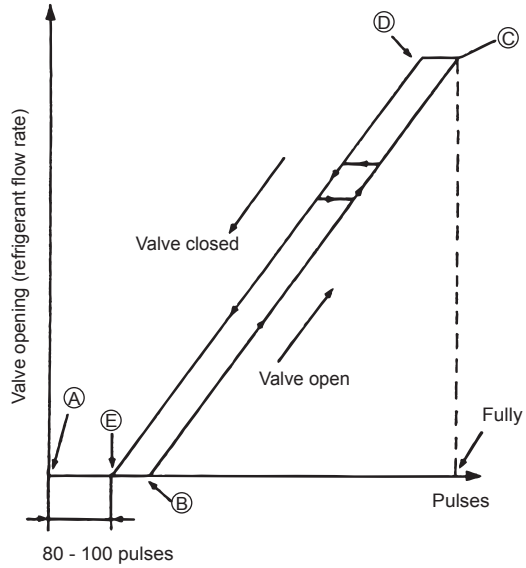
Output (phase) number	Output state			
	1	2	3	4
ϕ1	ON	OFF	OFF	ON
ϕ2	ON	ON	OFF	OFF
ϕ3	OFF	ON	ON	OFF
ϕ4	OFF	OFF	ON	ON

Output pulses change in the following orders when the
Valve is closed; 1 →2 →3 → 4 → 1
Valve is open; 4 →3 →2 → 1 → 4

*1. When the LEV opening angle does not change, all the output phases will be off.

*2. When the output is open phase or remains ON, the motor cannot run smoothly, and rattles and vibrates.

4) LEV valve closing and opening operation



Fully open: 1600 pulses (indoor unit LEV) *1
2100 pulses (outdoor unit LEV) *1

*Upon power on, the indoor unit circuit board sends a 2200 pulse signal to the indoor unit LEV and a 3200 pulse signal to the outdoor unit LEV to determine the valve position and always brings the valve to the position as indicated by "Ⓐ" in the diagram.

When the valve operates smoothly, no sound from LEV or no vibration occurs, however, when the pulses change from Ⓔ to Ⓐ in the chart or the valve is locked, a big sound occurs.

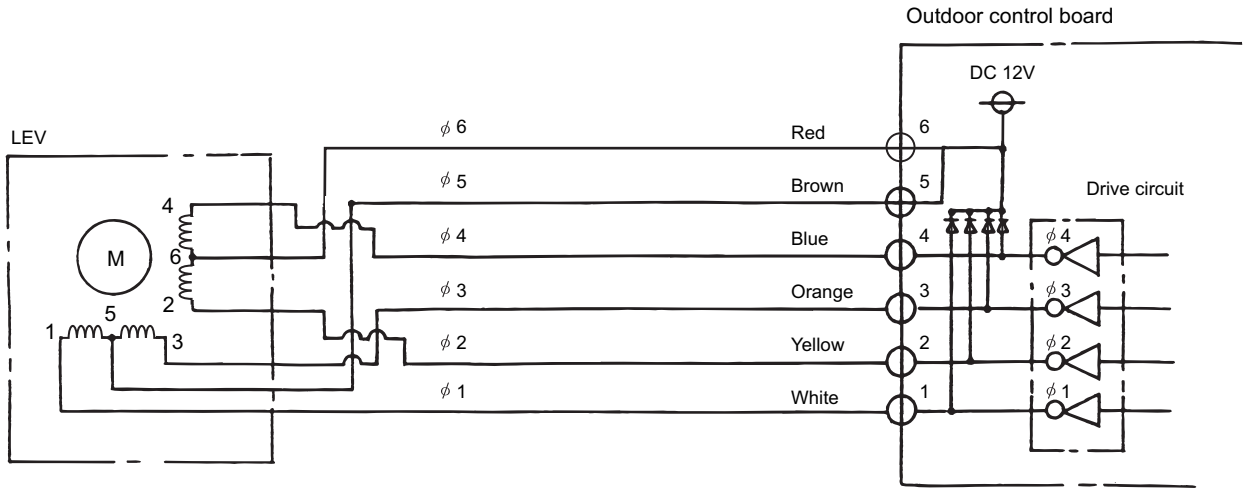
*Whether a sound is generated or not can be determined by holding a screwdriver against it, then placing your ear against the handle.

*1 The LEV opening may become greater depending on the operation status.

(2) Outdoor LEV (LEV1)

The valve opening changes according to the number of pulses.

1) Connections between the outdoor control board and LEV1 (outdoor expansion valve)



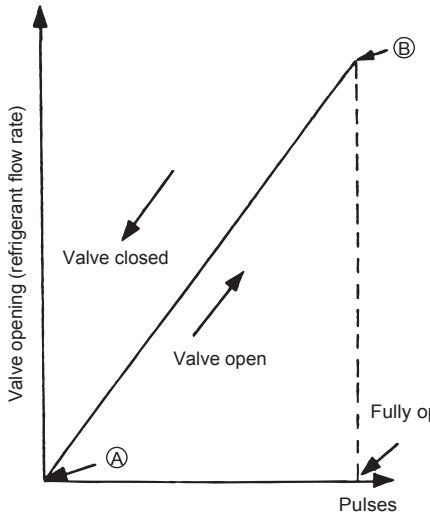
2) Pulse signal output and valve operation

Output (phase) number	Output state							
	1	2	3	4	5	6	7	8
ϕ1	ON	OFF	OFF	OFF	OFF	OFF	ON	ON
ϕ2	ON	ON	ON	OFF	OFF	OFF	OFF	OFF
ϕ3	OFF	OFF	ON	ON	ON	OFF	OFF	OFF
ϕ4	OFF	OFF	OFF	OFF	ON	ON	ON	OFF

Output pulses change in the following orders when the
Valve is open; 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 1
Valve is closed; 8 → 7 → 6 → 5 → 4 → 3 → 2 → 1 → 8

*1. When the LEV opening angle does not change, all the output phases will be off.
*2. When the output is open phase or remains ON, the motor cannot run smoothly, and rattles and vibrates.

3) LEV valve closing and opening operation



*When the power is turned on, the valve closing signal of 520 pulses will be output from the indoor board to LEV to fix the valve position. It must be fixed at point Ⓐ
(Pulse signal is output for approximately 17 seconds.)

When the valve operates smoothly, there is no sound from the LEV and no vibration occurs, but when the valve is locked, noise is generated.

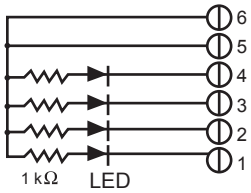
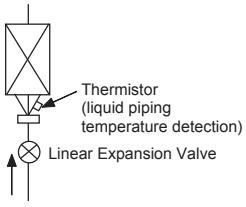
*Whether a sound is generated or not can be determined by holding a screwdriver against it, then placing your ear against the handle.

*If liquid refrigerant flows inside the LEV, the sound may become smaller.

(3) Judgment methods and possible failure mode

Note

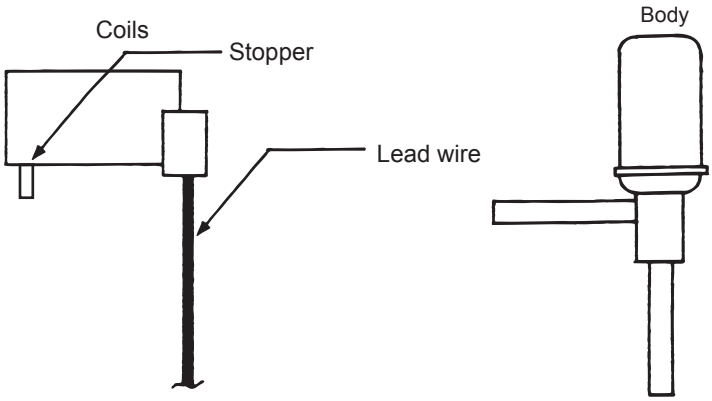
The specifications of the outdoor unit (outdoor LEV) and the indoor unit (indoor LEV) differ.Therefore, remedies for each failure may vary. Check the remedy specified for the appropriate LEV as indicated in the right column.

Malfunction mode	Judgment method	Remedy	Target LEV
Microcomputer driver circuit failure	Disconnect the control board connector and connect the check LED as shown in the figure below.  resistance : 0.25W 1kΩ LED : DC15V 20mA or more When the main power is turned on, the indoor unit circuit board outputs pulse signals to the indoor unit LEV for 10 seconds, and the outdoor unit circuit board outputs pulse signals to the outdoor unit LEV for 17 seconds. If any of the LED remains lit or unlit, the drive circuit is faulty.	When the drive circuit has a problem, replace the control board.	Indoor Outdoor
LEV mechanism is locked	If the LEV is locked, the drive motor runs idle, and makes a small clicking sound. When the valve makes a closing and opening sound, the valve has a problem.	Replace the LEV.	Indoor Outdoor
Disconnected or short-circuited LEV motor coil	Measure resistance between the coils (red - white, red -orange, brown - yellow, brown - blue) using a tester. They are normal if resistance is 150ohm ± 10%.	Replace the LEV coils.	Indoor Outdoor (LEV2)
	Measure resistance between the coils (red - white, red -orange, brown - yellow, brown - blue) using a tester. They are normal if resistance is 46ohm ± 3%.	Replace the LEV coils.	Outdoor (LEV1)
Incomple sealing (leak from the valve)	When checking the refrigerant leak from the indoor LEV, run the target indoor unit in the fan mode, and the other indoor units in the cooling mode. Then, check the liquid temperature (TH22) with the self-diagnosis LED. When the unit is running in the fan mode, the LEV is fully closed, and the temperature detected by the thermistor is not low. If there is a leak, however, the temperature will be low. If the temperature is extremely low compared with the inlet temperature displayed on the remote controller, the LEV is not properly sealed, however, if there is a little leak, it is not necessary to replace the LEV when there are no effects to other parts. 	If there is a large amount of leakage, replace the LEV.	Indoor
Faulty wire connections in the connector or faulty contact	1. Check for loose pins on the connector and check the colors of the lead wires visually 2. Disconnect the control board's connector and conduct a continuity check using a tester.	Check the continuity at the points where an error occurs.	Indoor Outdoor

(4) Outdoor unit LEV (LEV1) coil removal procedure

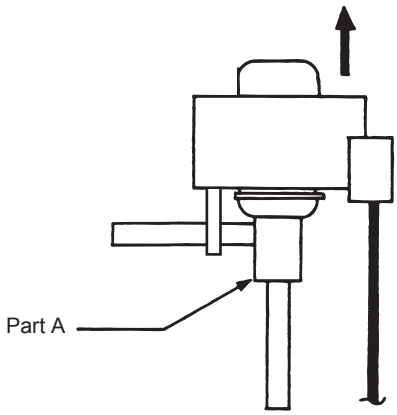
1) LEV component

As shown in the figure, the outdoor LEV is made in such a way that the coils and the body can be separated.



2) Removing the coils

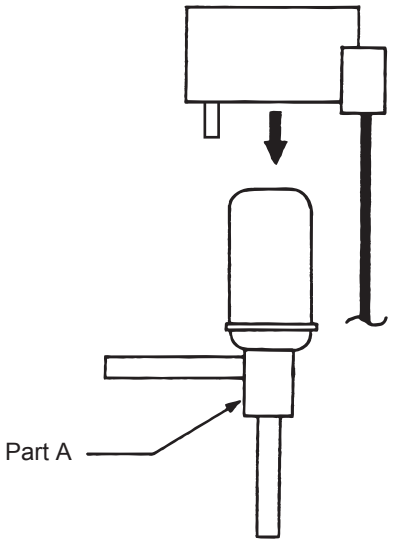
Fasten the body tightly at the bottom (Part A in the figure) so that the body will not move, then pull out the coils toward the top.If the coils are pulled out without the body gripped, undue force will be applied and the pipe will be bent.



3) Installing the coils

Fix the body tightly at the bottom (Part A in the figure) so that the body will not move, then insert the coils from the top, and insert the coil stopper securely in the pipe on the body. Hold the body when pulling out the coils to prevent so that the pipe will not be bent.

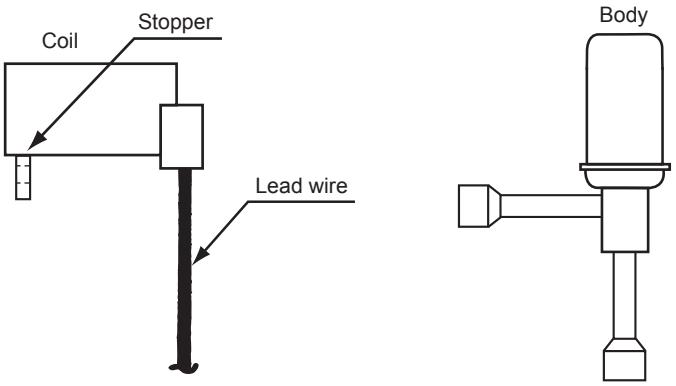
If the coils are pushed without the body gripped, undue force will be applied and the pipe will be bent. Hold the body when pulling out the coils to prevent so that the pipe will not be bent.



(5) Removal procedure of outdoor unit LEV2 coil

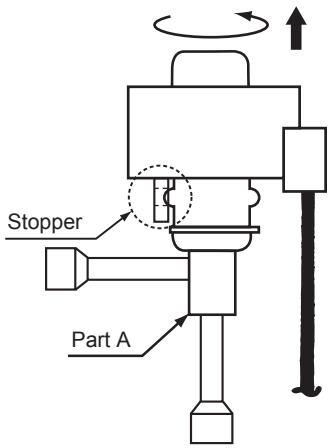
1) Components

The outdoor unit LEV consists of a coil and a valve body that can be separated from each other.



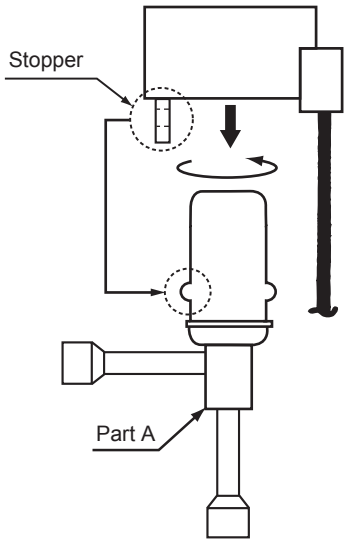
2) Removing the coil

Securely hold the LEV at the bottom (as indicated by A in the figure), and turn the coil. After checking that the stopper is removed, pull up and out the coil.
When removing the coil, hold the LEV body securely to prevent undue force from being placed on the pipe and bending the pipe.



3) Installing the coil

Securely hold the bottom of the LEV (section A in the figure), insert the coil from above, and turn the coil until the coil stopper is properly installed on the LEV body.
When removing the coil, hold the LEV body securely to prevent undue force from being placed on the pipe and bending the pipe.

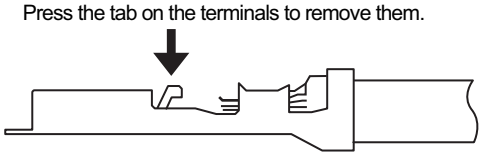


-6- Inverter

- ♦Replace only the compressor if only the compressor is found to be defective.
- ♦Replace only the fan motor if only the fan motor is found to be defective.
- ♦Replace the defective components if the inverter is found to be defective.
- ♦If both the compressor and the inverter are found to be defective, replace the defective component(s) of both devices.

(1) Inverter-related problems: Troubleshooting and remedies

1) The INV board has a large-capacity electrolytic capacitor, in which residual voltage remains even after the main power is turned off, posing a risk of electric shock. Before inspecting the inside of the control box, turn off the power, keep the unit off for at least 10 minutes, and confirm that the voltage between FT-P and FT-N on INV Board has dropped to DC20V or less. (It takes about 10 minutes to discharge electricity after the power supply is turn off.)
2) The IPM on the inverter becomes damaged if there are loose screws are connectors. If a problem occurs after replacing some of the parts, mixed up wiring is often the cause of the problem. Check for proper connection of the wiring, screws, connectors, and Faston terminals.
3) To avoid damage to the circuit board, do not connect or disconnect the inverter-related connectors with the main power turned on.
4) Faston terminals have a locking function. Make sure the terminals are securely locked in place after insertion.



5) When the IPM or IGBT is replaced, apply a thin layer of heat radiation grease that is supplied evenly to these parts. Wipe off any grease that may get on the wiring terminal to avoid terminal contact failure.
6) Faulty wiring to the compressor damages the compressor. Connect the wiring in the correct phase sequence.

	Error display/failure condition	Measure/inspection item
[1]	Inverter related errors 4250, 4255, 4220, 4225, 4230, 4240,4260, 5301, 0403	Check the details of the inverter error in the error log at X [1] How to Read the LED on the Service Monitor. Take appropriate measures to the error code and the error details in accordance with IX [2] Responding to Error Display on the Remote Controller.
[2]	Main power breaker trip	Refer to "(3) Trouble treatment when the main power breaker is tripped".(page 195)
[3]	Main power earth leakage breaker trip	Refer to "(4) Trouble treatment when the main power earth leakage breaker is tripped".(page 195)
[4]	Only the compressor does not operate.	Check the inverter frequency on the LED monitor and proceed to (2) - [4] if the compressor is in operation.(page 194)
[5]	The compressor vibrates violently at all times or makes an abnormal sound.	See (2)-[4].(page 194)
[6]	Only the fan motor does not operate.	Check the inverter frequency on the LED monitor and proceed to (2)-[6] if the fan motor is in operation.(page 194)
[7]	The fan motor shakes violently at all times or makes an abnormal sound.	Check the inverter frequency on the LED monitor and proceed to (2)-[6] if the fan motor is in operation.(page 194)
[8]	Noise is picked up by the peripheral device	<1> Check that power supply wiring of the peripheral device does not run close to the power supply wiring of the outdoor unit.
		<2> Check if the inverter output wiring is not running parallel to the power supply wiring and the transmission lines.
		<3> Check that the shielded wire is used as the transmission line when it is required, and check that the grounding work is performed properly on the shielded wire.
		<4> Meg failure for electrical system other than the inverter
		<5> Attach a ferrite core to the inverter output wiring. (Contact the factory for details of the service part settings.)
		<6> Provide separate power supply to the air conditioner and other electric appliances.
		<7> If the error occurred suddenly, a ground fault of the inverter output can be considered. See (2)-[4].(page 194)
		*Contact the factory for cases other than those listed above.
[9]	Sudden malfunction (as a result of external noise.)	<1> Check that the grounding work is performed properly.
		<2>Check that the shielded wire is used as the transmission line when it is required, and check that the grounding work is performed properly on the shielded wire.
		<3>Check that neither the transmission line nor the external connection wiring does not run close to another power supply system or does not run through the same conduit pipe.
		* Contact the factory for cases other than those listed above.

(2) Inverter output related troubles

	Items to be checked	Phenomena	Remedy
[1] Check the INV board error detection circuit.	(1) Disconnect the inverter output wire from the terminals of the INV board (SC-U, SC-V, SC-W). (2) Put the outdoor unit into operation.	1) Overcurrent error (4250 Detail code No. 101, 104, 105, 106, and 107)	Replace the INV board.
		2) Logic error (4220 Detail code No. 111)	Replace the INV board.
		3) ACCT sensor circuit failure (5301 Detail code No.117)	Replace the INV board.
		4) IPM open (5301 Detail code No.119)	Normal
[2] Check for compressor ground fault or coil error.	Disconnect the compressor wiring, and check the compressor Meg, and coil resistance.	1) Compressor Meg failure Error if less than 1 Mohm.	Check that there is no liquid refrigerant in the compressor. If there is none, replace the compressor.
		2) Compressor coil resistance failure Coil resistance value of 0.71 ohm (20°C [68°F]): P250 model	Replace the compressor.

	Items to be checked	Phenomena	Remedy
[3] Check whether the inverter is damaged. (No load)	(1) Disconnect the inverter output wire from the terminals of the INV board (SC-U, SC-V, SC-W). (2) Disconnect the short-circuit connector from CN6 on the INV board. (3) Put the outdoor unit into operation. Check the inverter output voltage after the inverter output frequency has stabilized.	1) Inverter-related problems are detected.	Connect the short-circuit connector to CN6, and go to section [1].
		2) Inverter voltage is not output at the terminals (SC-U, SC-V, and SC-W)	Replace the INV board.
		3) There is an voltage imbalance between the wires. Greater than 5% imbalance or 5V	Replace the INV board.
		4) There is no voltage imbalance between the wires.	Normal *Reconnect the short-circuit connector to CN6 after checking the voltage.
[4] Check whether the inverter is damaged. (During compressor operation)	Put the outdoor unit into operation. Check the inverter output voltage after the inverter output frequency has stabilized.	1) Overcurrent error occurs immediately after the compressor startup. (4250 Detail code No.101,106,107)	a) Go over the check items [1] through [3] to find the problem. b) Check if the high/low pressure are in proper balance. c) Check that no liquid refrigerant is present in the compressor. →Proceed to d) if no improvement is seen after several times of reboot. Even if it was recovered after the reboot, check the crankcase heater just to make sure there is no problem with it. d) After the reboot, check if there is sufficient pressure difference between high and low pressure. →Check on LED monitor if the high pressure changes. If it does not, replace the compressor. (The compressor may be locked.)
		2) After the inverter output voltage became stable, an imbalance (stated below) is seen between each wires. Greater than the larger of the following values: imbalance of 5% or 5V	In the case of imbalance, replace the INV board. Even if there is no imbalance seen, check the crankcase heater just to make sure there is no problem with it. →Some liquid refrigerant might have been present in the compressor when the problem occurred.
[5] Check the fan motor ground fault or the winding.	Remove the wire for the outdoor fan motor, and check the fan motor megger and the winding resistance.	1) Fan motor megger failure Failure when the megger is 1Mohm or less.	Replace the fan motor.
		2) Fan motor disconnection Standard: The winding resistance is approximately several ohm. (It varies depending on the temperature, or while the inner thermo is operating, it will be ∞ ohm)	
[6] Check the FAN board failure.	(1) Check the fan output wiring.	Connector contact failure ♦Board side (CNINV) ♦Fan motor side	Connect the connector.
	(2) Check the connector CN-VDC connection.	Cnnector contact failure	Connect the connector.
	(3) Check the FAN board failure.	1) The voltage imbalance among each motor wiring during operation (The voltage imbalance is greater than the larger of the values represented by 5% or 5 V.)	Replace the FAN board.
		2) The same error occurs even after the operation is restarted.	

(3) Trouble treatment when the main power breaker is tripped

	Items to be checked	Phenomena	Remedy
[1]	Check the breaker capacity.	Use of a non-specified breaker	Replace it with a specified breaker.
[2]	Perform Meg check between the terminals on the power terminal block TB1.	Zero to several ohm, or Meg failure	Check each part and wiring. *Refer to (5) "Simple checking Procedures for individual components of main inverter circuit".(page 196) ♦IGBT module ♦Rush current protection resistor ♦Electromagnetic relay ♦DC reactor
[3]	Turn on the power again and check again.	1) Main power breaker trip	
		2) No remote control display	
[4]	Turn on the outdoor unit and check that it operates normally.	1) Operates normally without tripping the main breaker.	a) The wiring may have been short-circuited. Search for the wire that short-circuited, and repair it. b) If item a) above is not the cause of the problem, refer to (2)-[1]-[6].
		2) Main power breaker trip	

(4) Trouble treatment when the main power earth leakage breaker is tripped

	Items to be checked	Phenomena	Remedy
[1]	Check the earth leakage breaker capacity and the sensitivity current.	Use of a non-specified earth leakage breaker	Replace with a regulation earth leakage breaker.
[2]	Check the resistance at the power supply terminal block with a megger.	Failure resistance value	Check each part and wiring. *Refer to (5) "Simple checking Procedures for individual components of main inverter circuit".(page 196) ♦IGBT module ♦Rush current protection resistor ♦Electromagnetic relay ♦DC reactor
[3]	Disconnect the compressor wirings and check the resistance of the compressor with a megger.	Failure compressor if the insulating resistance value is not in specified range. Failure when the insulating resistance value is 1 Mohm or less.	Check that there is no liquid refrigerant in the compressor. If there is none, replace the compressor.
[4]	Disconnect the fan motor wirings and check the resistance of the fan motor with a megger.	Failure fan motor if the insulating resistance value is not in specified range. Failure when the insulating resistance value is 1 Mohm or less.	Replace the fan motor.

Note

The insulation resistance could go down to close to 1Mohm after installation or when the power is kept off for an extended period of time because of the accumulation of refrigerant in the compressor. If the earth leakage breaker is triggered, please use the following procedure to take care of this.

♦Disconnect the wires from the compressor's terminal block.
♦If the resistance is less than 1 Mohm, switch on the power for the outdoor unit with the wires still disconnected.
♦Leave the power on for at least 12 hours.
♦Check that the resistance has recovered to 1 Mohm or greater.

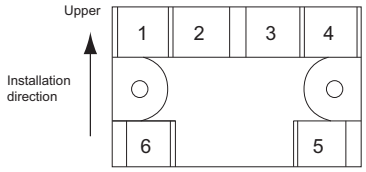
Earth leakage current measurement method

♦For easy on-site measurement of the earth leakage current, enable the filter with a measurement instrument that has filter functions as below, clamp all the power supply wires, and measure.
Recommended measurement instrument: CLAMP ON LEAK HiTESTER 3283 made by HIOKI E.E. CORPORATION
♦When measuring one device alone, measure near the device's power supply terminal block.

(5) Simple checking procedure for individual components of main inverter circuit

Note

Before inspecting the inside of the control box, turn off the power, keep the unit off for at least 10 minutes, and confirm that the voltage between FT-P and FT-N on INV Board has dropped to DC20V or less.

Part name	Judgment method
IGBT module	See "Troubleshooting for IGBT Module ". (IX [4] - 6 - (6))(page 196)
Rush current protection resistor R1, R5	Measure the resistance between terminals R1 and R5: 22 ohm ± 10%
Electromagnetic relay 72C	**Note** This electromagnetic relay is rated at DC12V and is driven by a coil. Check the resistance between terminals  Check point / Checking criteria(W) Coil: Between Terminals 5 and 6 — Not to be short-circuited (Center value 75 ohm) Contact: Between Terminals 1 and 2 — ∞ Contact: Between Terminals 3 and 4 — ∞
DC reactor DCL	Measure the resistance between terminals: 1ohm or lower (almost 0 ohm) Measure the resistance between terminals and the chassis: ∞

(6) Troubleshooting for IGBT Module

Measure the resistances between each pair of terminals on the IGBT with a tester, and use the results for troubleshooting. The terminals on the INV board are used for the measurement.

1) Notes on measurement

- Check the polarity before measuring. (On the tester, black normally indicates plus.)
- Check that the resistance is not open (∞ ohm) or not shorted (to 0 ohm).
- The values are for reference, and the margin of errors is allowed.
- The result that is more than double or half of the result that is measured at the same measurement point is not allowed.
- Disconnect all the wiring connected the INV board, and make the measurement.

2) Tester restriction

- Use the tester whose internal electrical power source is 1.5V or greater
- Use the dry-battery-powered tester.

Note

(The accurate diode-specific resistance cannot be measured with the button-battery-powered card tester, as the applied voltage is low.)

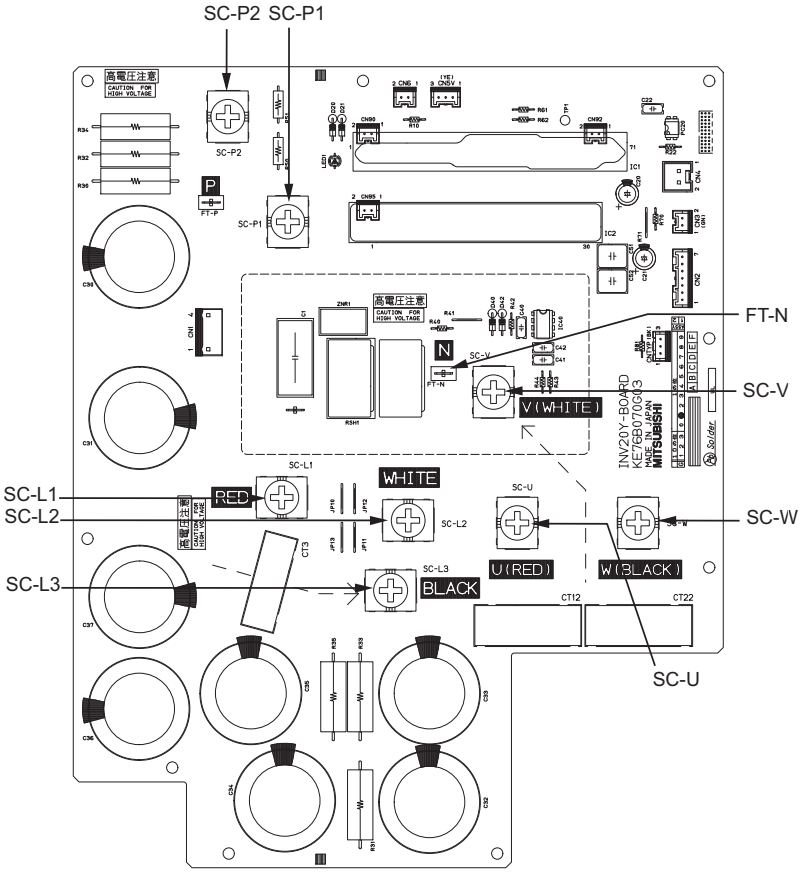
- Use a low-range tester if possible. A more accurate resistance can be measured.

Judgment value (reference)

		Black (+)				
		SC-P1	FT-N	SC-L1	SC-L2	SC-L3
Red (-)	SC-P1	-	-	5 - 200 ohm	5 - 200 ohm	5 - 200 ohm
	FT-N	-	-	∞	∞	∞
	SC-L1	∞	5 - 200 ohm	-	-	-
	SC-L2	∞	5 - 200 ohm	-	-	-
	SC-L3	∞	5 - 200 ohm	-	-	-

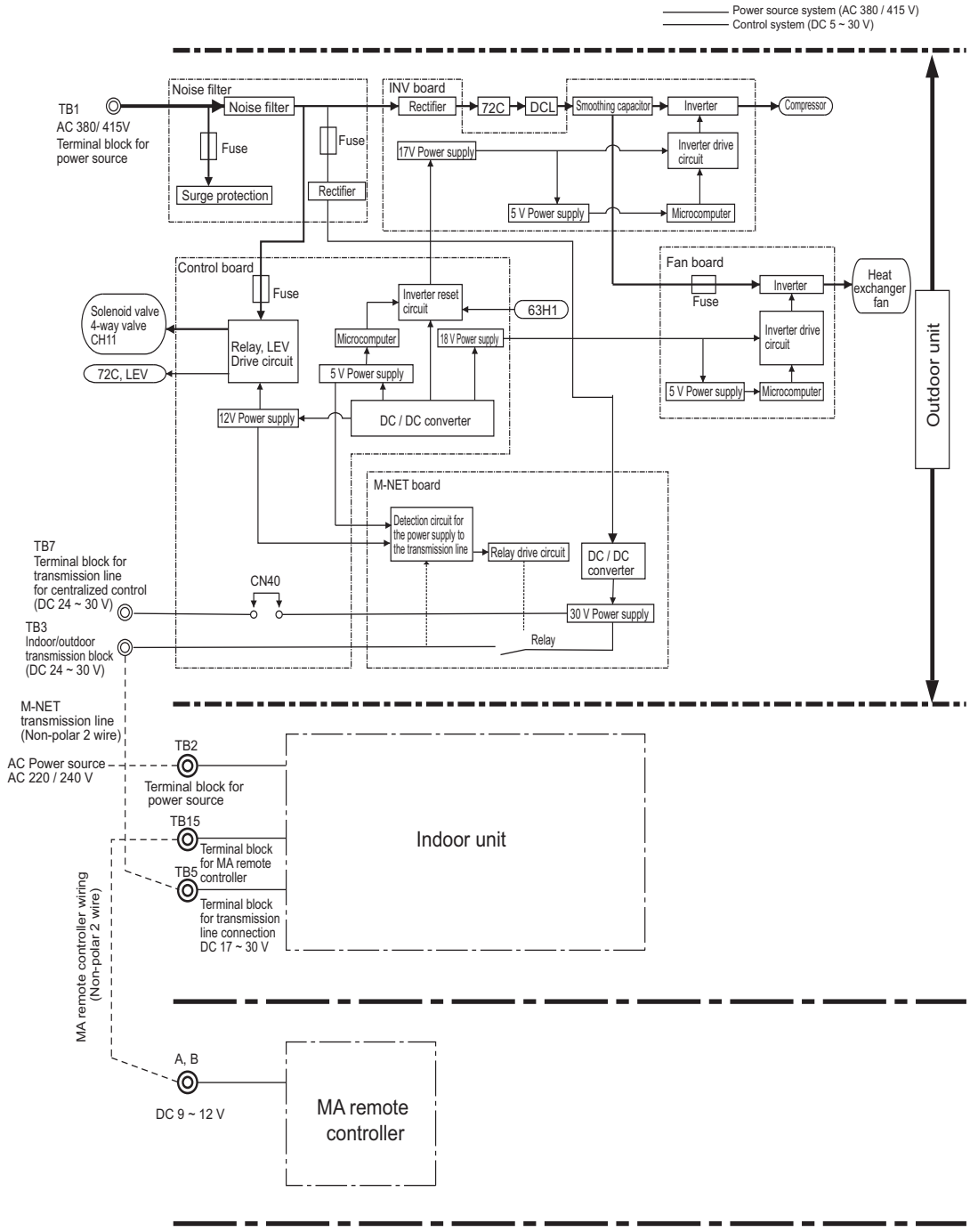
		Black (+)				
		SC-P2	FT-N	SC-U	SC-V	SC-W
Red (-)	SC-P2	-	-	5 - 200 ohm	5 - 200 ohm	5 - 200 ohm
	FT-N	-	-	∞	∞	∞
	SC-U	∞	5 - 200 ohm	-	-	-
	SC-V	∞	5 - 200 ohm	-	-	-
	SC-W	∞	5 - 200 ohm	-	-	-

INV board external diagram



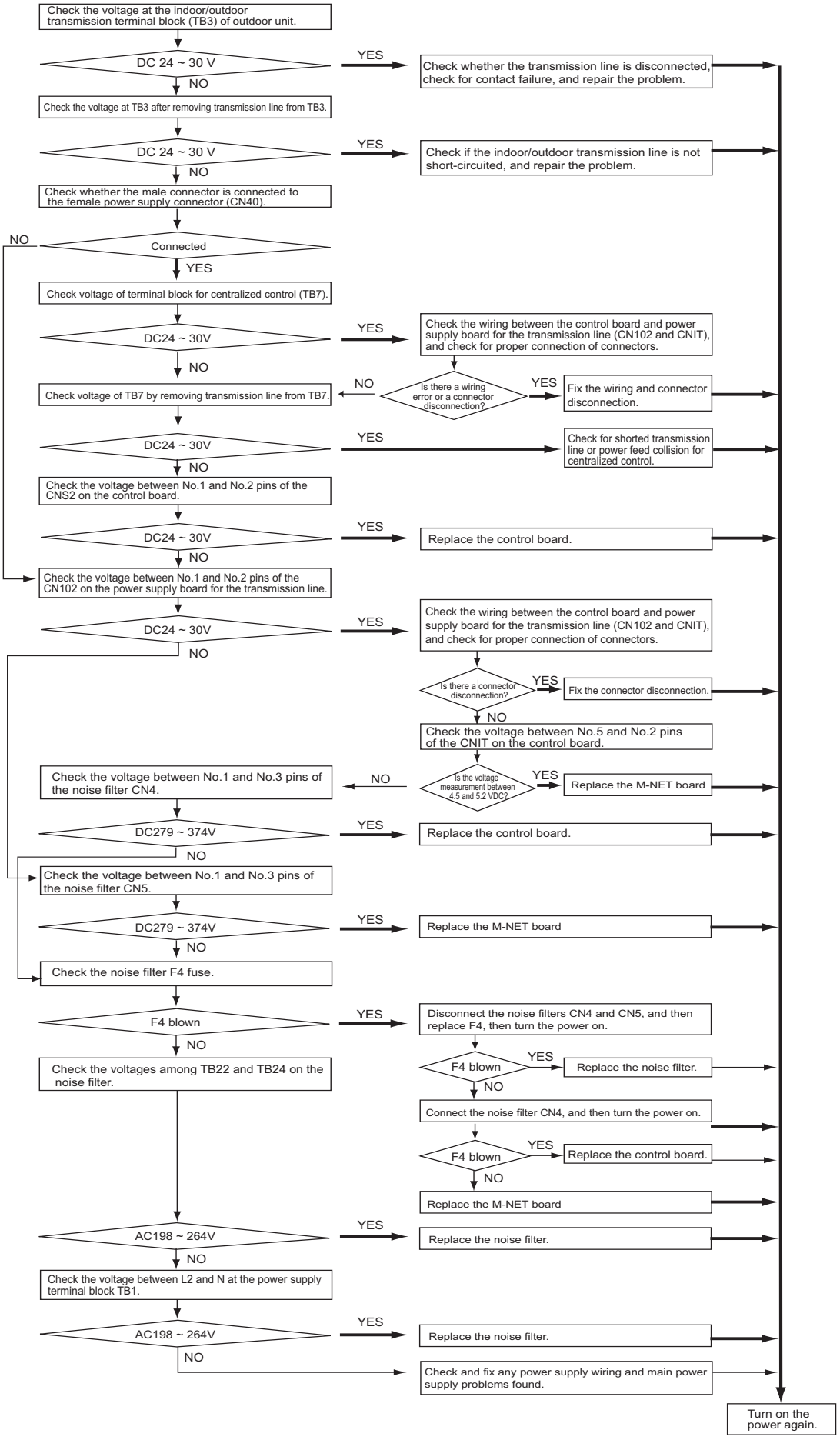
-7- Control Circuit

(1) Control power source function block



* MA remote controllers and M-NET remote controllers cannot be used together.
(Both the M-NET and MA remote controller can be connected to a system with a system controller.)

(2) Troubleshooting transmission power circuit of outdoor unit



[5] Refrigerant Leak

1. Leak spot: In the case of extension pipe for indoor unit (Cooling season)

1) Mount a pressure gauge on the service check joint (CJ2) on the low-pressure side.
2) Stop all the indoor units, and close the liquid service valve (BV2) inside the outdoor unit while the compressor is being stopped.
3) Stop all the indoor units; turn on SW2-4 on the outdoor unit control board while the compressor is being stopped.(Pump down mode will start, and all the indoor units will run in cooling test run mode.)
4) In the pump down mode (SW2-4 is ON), all the indoor units will automatically stop when the low pressure (63LS) reaches 0.383MPa [55psi] or less or 15 minutes have passed after the pump mode started. Stop all the indoor units and compressors when the pressure indicated by the pressure gauge, which is on the check joint (CJ2) for low-pressure service, reaches 0.383MPa [55psi] or 20 minutes pass after the pump down operation is started.
5) Close the gas service valve (BV1) inside the outdoor unit.
6) Collect the refrigerant that remains in the extended pipe for the indoor unit. Do not discharge refrigerant into the atmosphere when it is collected.
7) Repair the leak.
8) After repairing the leak, vacuum the extension pipe and the indoor unit.
9) To adjust refrigerant amount, open the service valves (BV1 and BV2) inside the outdoor unit and turn off SW2-4.

2. Leak spot: In the case of outdoor unit (Cooling season)

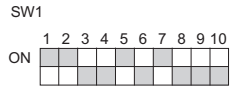
(1) Run all the indoor units in the cooling test run mode.

1) To run the indoor unit in test run mode, turn SW3-2 from ON to OFF when SW3-1 on the outdoor control board is ON.
2) Change the setting of the remote controller for all the indoor units to the cooling mode.
3) Check that all the indoor units are performing a cooling operation.

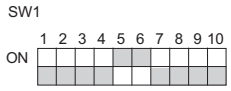
(2) Check the values of Tc and TH6.
(To display the values on the LED screen, use the self-diagnosis switch (SW1) on the outdoor unit control board.)

1) When Tc-TH6 is 10°C [18°F] or more : See the next item (3).
2) When Tc-TH6 is less than 10°C [18°F] : After the compressor stops, collect the refrigerant inside the system, repair the leak, perform evacuation, and recharge new refrigerant. (Leak spot: 4. In the case of outdoor unit, handle in the same way as heating season.)

Tc self-diagnosis switch



TH6 self-diagnosis switch



(3) Stop all the indoor units, and stop the compressor.

1) To stop all the indoor units and the compressors, turn SW3-2 from ON to OFF when SW3-1 on the outdoor control board is ON.
2) Check that all the indoor units are being stopped.

(4) Close the service valves (BV1 and BV2).

(5) To prevent the liquid seal, extract small amount of refrigerant from the check joint of the liquid service valve (BV2), as the liquid seal may cause a malfunction of the unit.

(6) Collect the refrigerant that remains inside the outdoor unit.Do not discharge refrigerant into air into the atmosphere when it is collected.

(7) Repair the leak.

(8) After repairing the leak, replace the dryer with the new one, and perform evacuation inside the outdoor unit.

(9) To adjust refrigerant amount, open the service valves (BV1 and BV2) inside the outdoor unit.

Note

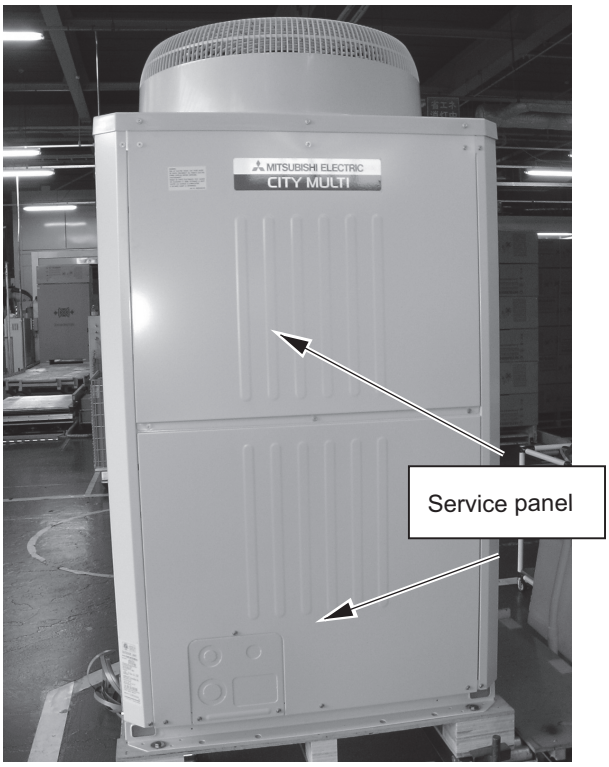
After taking step 4) above, if the power to the outdoor and indoor units needs to be turned off to repair leaks, wait for approximately an hour after the units have stopped before turning off the power supply.

1) When 30 minutes have passed after the item 4 above, the indoor unit lev turns from fully closed to slightly open to prevent the refrigerant seal.
   LEV2 opens when the outdoor unit remains stopped for 15 minutes to allow for the collection of refrigerant in the outdoor unit heat exchanger and to enable the evacuation of the outdoor unit heat exchanger.
   If the power is turned of in less than 5 minutes, LEV2 may close, trapping high-pressure refrigerant in the outdoor unit heat exchanger and creating a highly dangerous situation.
2) Therefore, if the power source is turned off within 30 minutes, the lev remains fully closed and the refrigerant remains sealed. When only the power for the indoor unit is turned off, the indoor unit LEV turns from faintly open to fully closed.

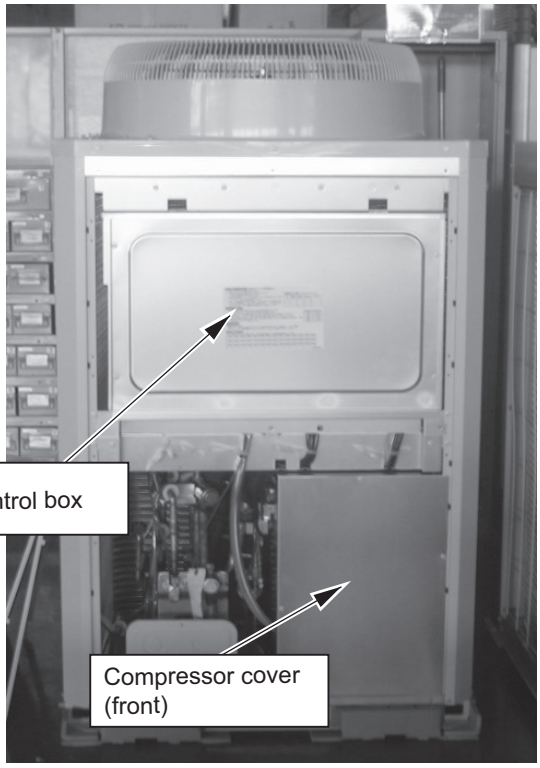
[6] Compressor Replacement Instructions

[Compressor replacement procedures]

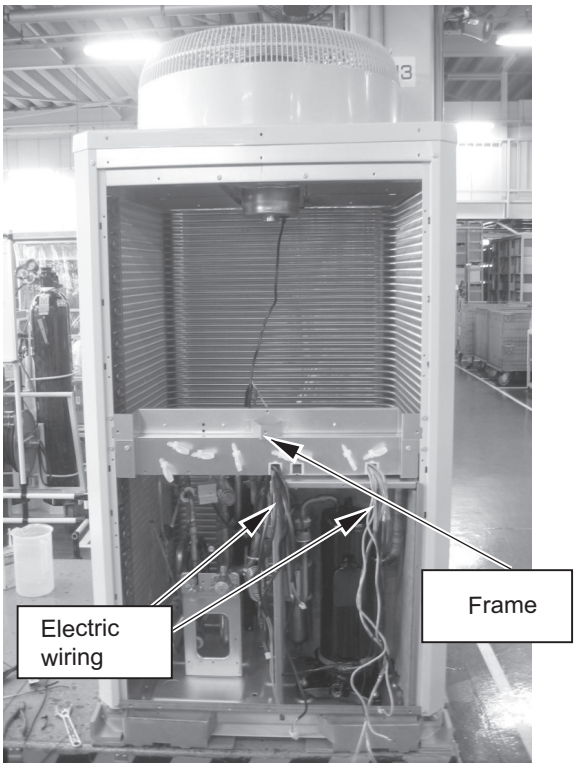
Follow the procedures below (Steps 1 through 6) to remove the compressor components and replace the compressor.
Reassemble them in the reverse order after replacing the compressor.



1. Remove both the top and bottom service panels (front panels).

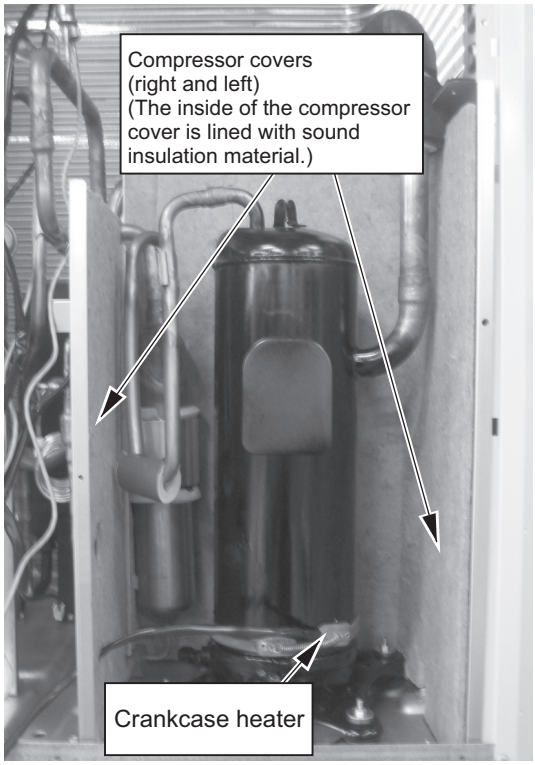


2. Remove the control box and the compressor cover (front).

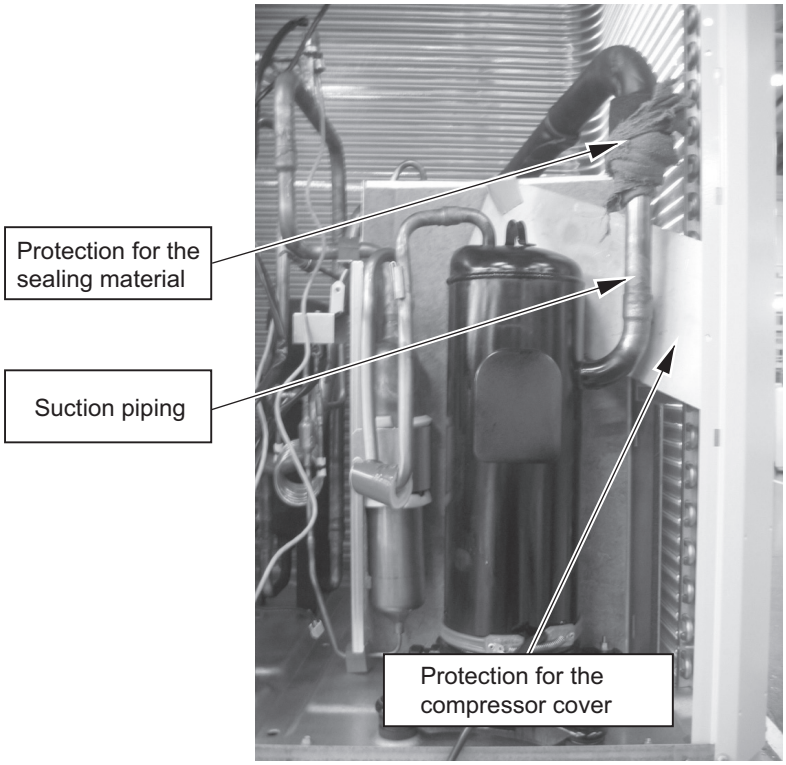


3. Remove the wires that are secured to the frame, and remove the frame.

4. Remove the compressor cover (top).



5. Remove the compressor wires, compressor covers (right and left), and crankcase heater.



6. Place protective materials on the insulation lining of the compressor cover and on the sealing material on the compressor suction pipe to protect them from the torch flame, debraze the pipe, and replace the compressor.

[7] Troubleshooting Using the Outdoor Unit LED Error Display

If the LED error display appear as follows while all the SW1 switches are set to OFF, check the items under the applicable item numbers below.

1. Error code appears on the LED display.
Refer to IX [2] Responding to Error Display on the Remote Controller.

2. LED is blank.
Take the following troubleshooting steps.

(1) If the voltage between pins 1 and 3 of CNDC on the control board is outside the range between 220 VDC and 380 VDC, refer to IX [4] -7- (2) Troubleshooting transmission power circuit of outdoor unit.

(2) If the LED error display becomes lit when the power is turned on with all the connectors on the control board except CNDE disconnected, there is a problem with the wiring to those connectors or with the connectors themselves.

(3) If nothing appears on the display under item (2) above AND the voltage between pins 1 and 3 of CNDC is within the range between 220 VDC and 380 VDC, control board failure is suspected.

3. Only the software version appears on the LED display.

(1) Only the software version appears while the transmission cables to TB3 and TB7 are disconnected.

1) Wiring failure between the control board and the transmission line power supply board.(CN1T, CNS2, CN102)
2) If item 1) checks out OK, the transmission line power supply board failure is suspected.
3) If items 1) and 2) check out OK, control board failure is suspected.

(2) If the LED display appears as noted in "X [1] 2. LED display at Initial setting"(page 215) while the transmission cables to TB3 and TB7 are disconnected, failure with the transmission cable or the connected equipment is suspected.

[8] Replacement instructions for motor and bearing

<Applicable models>
PFD-P250･500VM-E

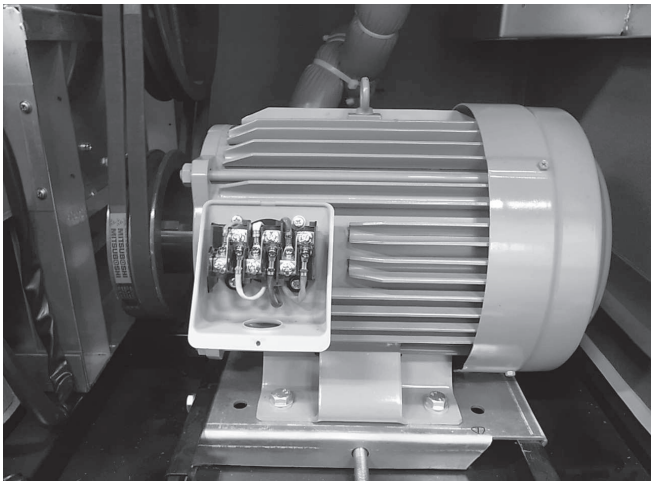
<Notes>
• Thoroughly read the "Safety Precautions" in the installation manual.
• Provide the replacement after turning off the main power of the unit.
• It is recommended to read the data book before starting the replacement.

<Required tools>
General tools (Phillips screwdriver, Socket wrench, Hex key, Plastic hammer, Scale, etc.)
Torque wrench, Screw lock, Tension gauge, Pulley puller, Bearing puller, and Pallet jack

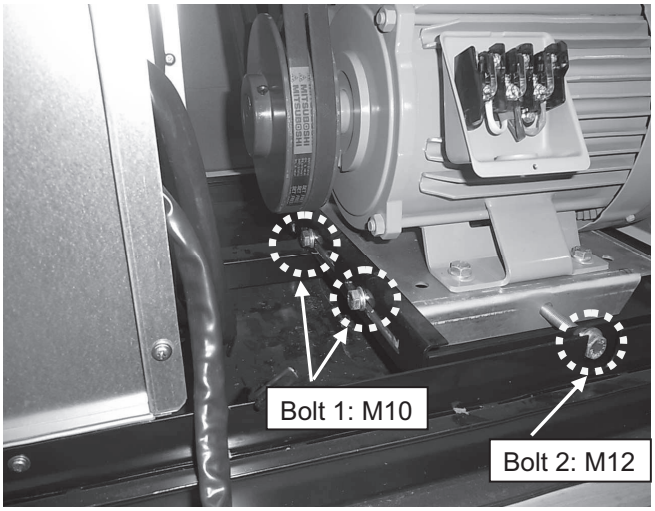
<Instructions>

1. Removing the motor

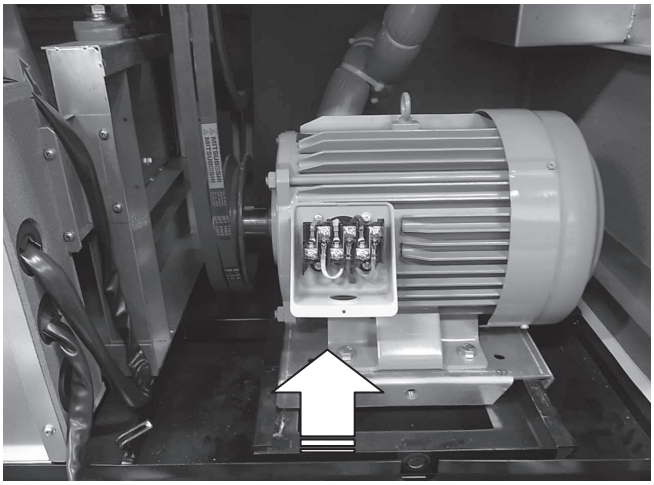
(1) Disconnect the motor wiring.



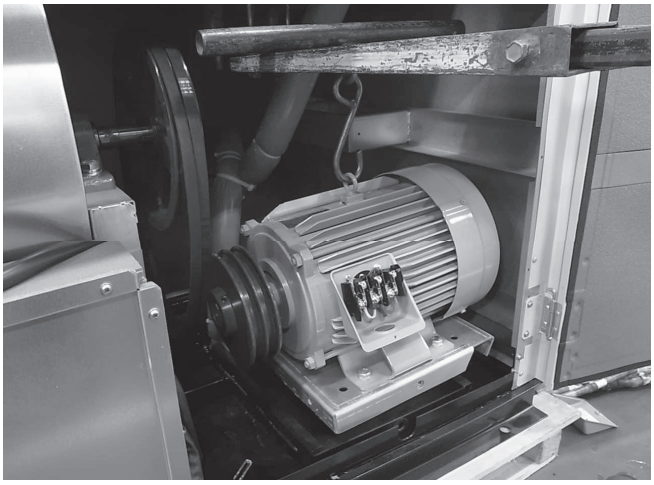
(2) Remove the Bolt 1 (two places) and Bolt 2 (one place) on the motor.



(3) Slide the motor backwards, then remove the V-belt.



(4) Lift the motor using a pallet jack, then pull it forward.

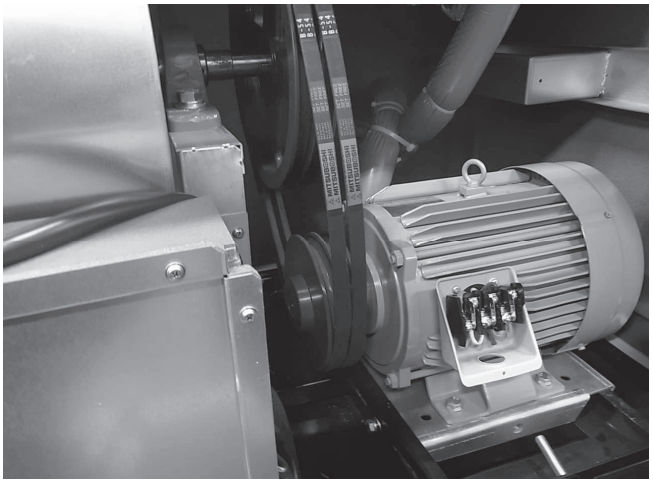


2. Installing a new motor

Basically the reverse order of step 1 "Removing the motor" can be followed to install a new motor.

(1) Lift the motor using a pallet jack, then install it so that the dotted part is inside the rail.

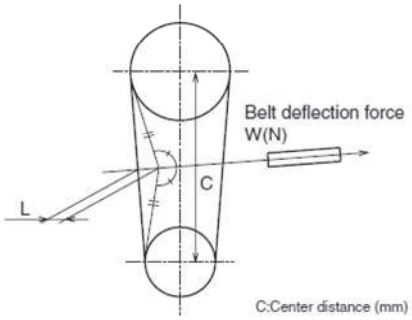
(2) Attach the V-belt, and temporarily tighten the Bolt 1 (two places).



(3) Tighten the Bolt 2 so that the V-belt tension is proper, and then tighten the Bolt 1.
Refer to the following table for the V-belt tension.

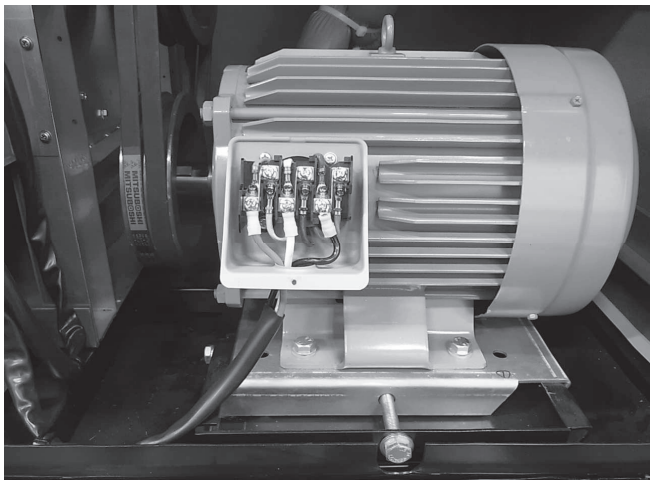
◎Belt tension

Model Name	Power source frequency [Hz]	Deflection force W [N]	Amount of deflection L [mm]
PFD-P250VM-E	50	15.5~16.5	5.0~5.5
	60	14.5~15.5	5.0~5.5
PFD-P500VM-E	50	20.0~22.5	5
	60	19.5~21.0	4.5~5.0



(Figure 2) Belt tension

(4) Reconnect the motor wiring.

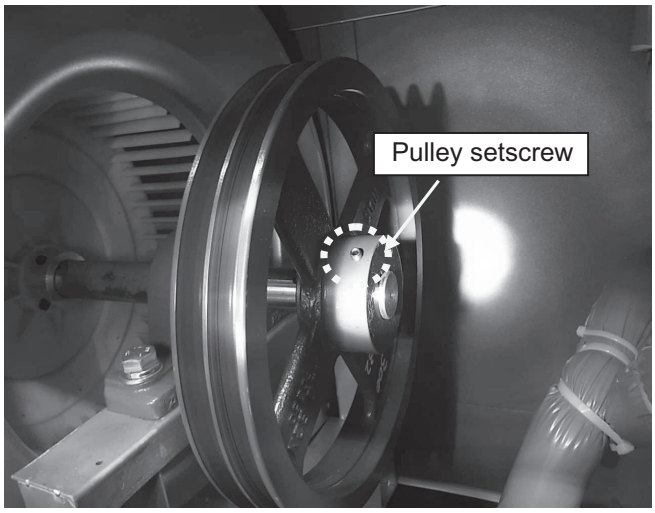


3. Removing the bearing on the right side (motor side)

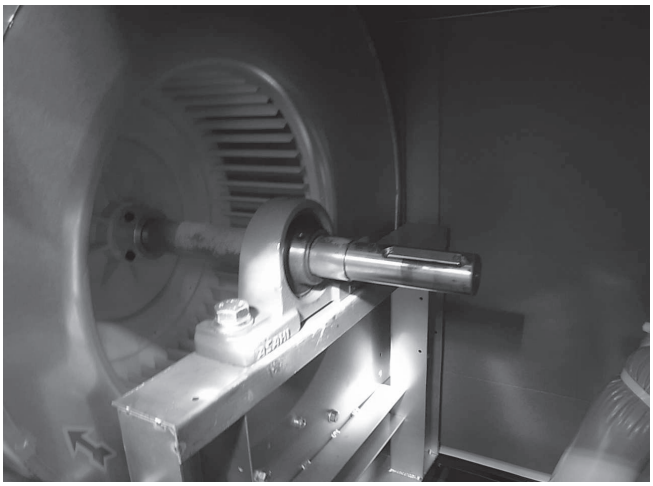
(1) Remove the motor, following the instructions in 1.-(1) through (4).

(2) Support the fan shaft in the center.
(There are no problems to use blocks to support the fan weight.)

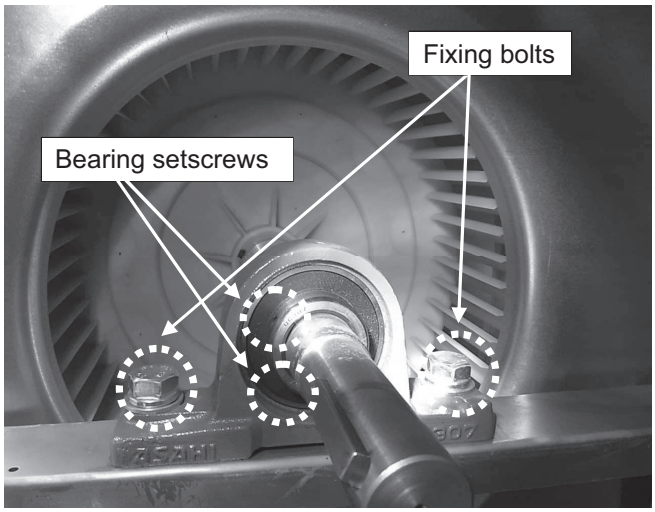
(3) Loosen the pulley setscrew.



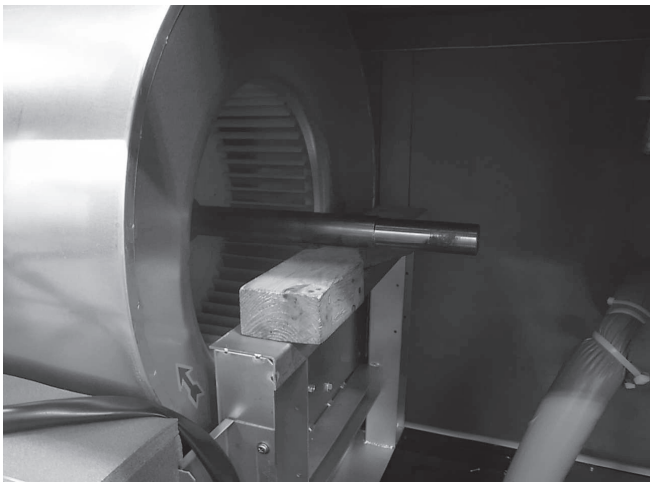
(4) Remove the pulley using a pulley puller.



(5) Loosen the two bearing setscrews and two fixing bolts.



(6) Remove the bearing using a bearing puller.



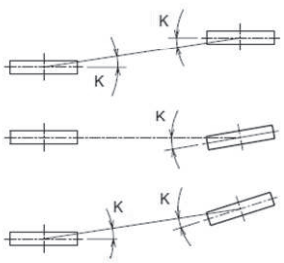
4. Installing a new bearing on the right side

Install a new bearing, following step 3 "Removing the bearing on the right side" in the reverse order.
Refer to the following table for the tightening torque for pulley/bearing setscrew.
Apply screw lock to the setscrews.

	Tightening torque [N・m]
Pulley setscrew	13.5
Bearing setscrew	11.8

Refer to the following table for the horizontal pulley alignment.
◎ Horizontal pulley alignment

Degree of paralleism / Pulley	K (arc-minute)	Note
Cast iron pulley	10 or smaller	Equivalent to 3 mm of displacement per 1 m.

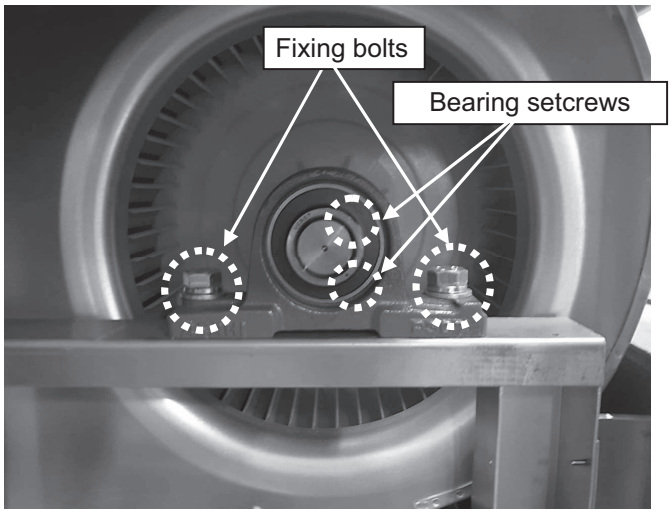


(Figure 1) Pulley's degree of parallelism

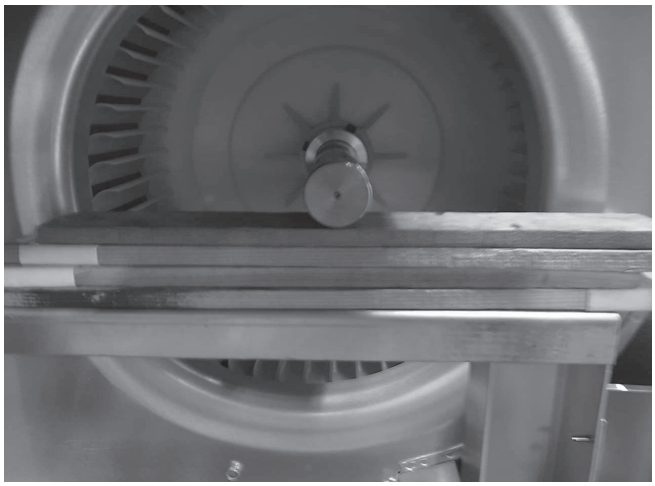
5. Removing the bearing on the left side

(1) Remove the maintenance panel.

(2) Loosen the two bearing setscrews and two fixing bolts.



(3) Remove the bearing using a bearing puller.



* When enough space for the replacement cannot be provided on the unit's side or the unit has no maintenance panels, first disconnect the wiring and remove the control box, and then pull the fan ASSY forward. V-belt and discharge thermistor should be removed before the fan ASSY is pulled out.

6. Installing a new bearing on the left side

Install a new bearing, following step 5 "Removing the bearing on the left side" in the reverse order. Refer to step 4 for the tightening torque for bearing setscrew.

[9] Maintenance/Inspection Schedule

Having the units inspected by a specialist on a regular basis, in addition to regular maintenance such as changing the filters, will allow the users to use them safely and in good condition for an extended period of time.
The chart below indicates standard maintenance schedule.

(1) Approximate Longevity of Various Parts

The chart shows an approximate longevity of parts. It is an estimation of the time when old parts may need to be replaced or repairs need to be made.
It does not mean that the parts must absolutely be replaced (except for the fan belt).
Please note that the figures in the chart do not mean warranty periods.

Unit	Parts	Check every	Replace after	Daily check	Periodically check	Remarks
Indoor	Fan Motor	6 months	40000 hours		Yes	
	Bearing	6 months	40000 hours		Yes	Add lubricant once a year
	Fan Belt	6 months	8000 hours		Yes	Disposable parts
	Air Filter	3 months	5 years	Yes		Maintenance schedule changes depending on the local conditions
	Drain Pan	6 months	8 years		Yes	
	Drain Hose	6 months	8 years		Yes	
	Linear Expansion Valve	1 year	25000 hours		Yes	
	Heat Exchanger	1 year	5 years		Yes	
	Float Switch	6 months	25000 hours		Yes	
	Display Lamp (LED)	1year	25000 hours		Yes	
Outdoor	Compressor	6 months	40000 hours		Yes	
	Fan motor	6 months	40000 hours		Yes	
	Linear Expansion Valve	1 year	25000 hours		Yes	
	4-way valve	1 year	25000 hours		Yes	
	Heat Exchanger	1 year	5 years		Yes	
	Pressure Switch	1 year	25000 hours		Yes	

(2) Notes

- The above chart shows a maintenance schedule for a unit that is used under the following conditions:
  A. Less than 6 times per hour of compressor stoppage
  B. The unit stays on 24 hours a day.

- Shortening the inspection cycle may need to be considered when the following conditions apply:
  ① When used in high temperature/high humidity area or when used in a place where the temperature and/or humidity fluctuate greatly
  ② When plugged into an unstable power source (sudden change in voltage, frequency, wave distortions) (Do not exceed the maximum capacity.)
  ③ When the unit is installed in a place where it receives vibrations or major impacts.
  ④ When used in a place with poor air quality (containing dust particles, salt, poisonous gas such as sulfuric acid gas and sulfuric hydrogen gas, oil mist).

- Even when the above maintenance schedule is followed, there could be unexpected problems that cannot be predicted.

- Holding of Parts
  We will hold parts for the units for at least 9 years after the termination of the production of the unit, following the standards set by the ministry of economics and industries.

(3) Details of Maintenance/Inspection

Unit	Parts	Inspection Cycle	Check points	Assessment	What to do
Indoor	Fan motor	6 months	· Check for unusual noise · Measure the insulation resistance	· Free of unusual noise · Insulation resistance over 1MΩ	Replace when insulation resistance is under 1MΩ
	Bearing	6 months	· Check for unusual noise	· Free of unusual noise	If the noise doesn't stop after lubrication, change the oil. Add lubricant once a year.
	Fan belt	6 months	· Check for excessive slack · Check for wear and tear · Check for unusual noise	· Resistance (30~40N/belt) · Adequate amount of slack=5mm · Belt length=no longer than 102% of the original length · Free of wear and tear · Free of unusual noise	Adjust the belt Replace if the belt length exceeds 2% of the original length, worn, or used over 5000 hours
	Air filter	3 months	· Check for clogging and tear · Clean the filter	· Clean, free of damage	Clean the filter Replace if extremely dirty or damaged
	Drain pan	6 months	· Check for clogging of the drainage system · Check for loosened bolts · Check for corrosion	· Clean, free of clogging · Free of loose screws · No major disintegration	Clean if dirty or clogged Tighten bolts Replace if extremely worn
	Drain hose	6 months	· Check for clogging of the drainage system · Check for corrosion · Check the drainage of the drain trap	· Clean, free of clogging · Free of wear and tear	Clean if dirty or clogged Replace if extremely worm Pour water into the drain trap
	Linear expansion valve	1 year	· Perform an operation check using the operation data	· Adequately controls the air temperature	Replace if malfunctioning
	Heat exchanger	1 year	· Check for clogging, dirt, and damage	· Clean, free of clogging or damage	Clean
	Float switch	6 months	· Check the outer appearance · Make sure its free of foreign objects	· Free of frayed or cut wires · Free of foreign objects	Replace if damaged or extremely worn Remove foreign objects
	Display lamp (LED)	1 year	· Make sure the lamp comes on	· Comes on when the output is on · Rapid drop in brightness	Replace if the light does not come on when the power is on
Outdoor	Compressor	6 months	· Check for unusual noise · Check insulation resistance · Check for loosened terminals	· Free of unusual sound · Insulation resistance over 1MΩ · Free of loosened terminals	Replace if insulation resistance goes below 1MΩ (under the condition that the refrigerant is not liquefied) Tighten loosened bolts
	Fan motor	6 months	· Check for unusual noise · Measure insulation resistance	· Free of unusual sound · Insulation resistance over 1MΩ	Replace if insulation resistance goes below 1MΩ
	Linear expansion valve	1 year	· Perform an operation check using the operation data	· Adequately controls the air temperature	Replace if malfunctioning
	4-way valve	1 year	· Perform an operation check using the operation data	· Adequately controls the refrigerant temperature when the valve is switched (Check temperature change when cooling/heating is switched.)	Replace if malfunctioning
	Heat exchanger	1 year	· Check for clogging, dirt, and damage	· Clean, free of clogging or damage	Clean
	Pressure switch	1 year	· Check for torn wire, fraying, and unplugged connectors · Check insulation resistance	· No frayed or cut wires or unplugged connectors · Insulation resistance over 1MΩ	Replace when cut or shorted, when the insulation resistance goes below 1MΩ, or if there is a history of abnormal operation

(4) Check method

① Select the "Local" mode using the "Normal/Local" switching switch on the indoor unit.

→ When the “Normal/Local” switch is set to “Local,” local operation of the units will be effective, and only the remote ON/OFF operation (external input/system controller) will be ineffective.
If there is no external input, local operation of the units will be effective regardless of the “Normal/Local” switch setting.
No alarm signals will be sent to the upper-level system such as a building control system, including a system controller.
(If an error occurs during inspection, the error history will be stored on the unit only.)

② Select the "OFF" mode using the MA remote controller of the indoor unit to stop the unit.
Before inspecting the unit, turn off the power to the unit as necessary.
(When the power to the outdoor unit is turned off, it is detected by the system controller as a transmission error. This is normal.)

*Normal operation of LEV needs to be confirmed during operation.
Check that the pipe temperature after the LEV changes according to the LEV opening on the diagnostic LED on the outdoor unit.

③ Check whether an error history remains on the nonvolatile memory on the indoor and outdoor units.
If an error history remains, take out the data before an error occurs, and correct the error after analyzing the causes.

④ Check each component based on the maintenance/inspection items described on the previous page.

→ If problems are found, repair the component.

⑤ At the completion of inspection, delete the error history codes stored in the nonvolatile memory on the unit. (By turning the dipswitch 2-3 on the outdoor unit from OFF to ON while the unit is powered, the history on the outdoor unit will be deleted.) If the power to the outdoor unit is turned off for inspection, the transmission error that was detected by the system controller will be deleted after power restoration. (All histories on the system controller will be deleted. Wait until the inspection of all units is completed to delete the histories. The above step is not necessary if no system controllers are connected.)

*The transmission error (detected by the system controller while the outdoor unit is under power failure conditions) will be automatically reset when normal transmission is restored.

⑥ Select the "ON" mode using the MA remote controller of the indoor unit to operate the unit.

⑦ Select the "Normal" mode using the using the "Normal/Local" switching switch on the indoor unit.

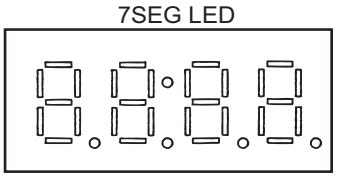
⑧ Completed

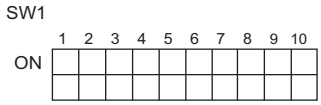
X LED Monitor Display on the Outdoor Unit Board

[1] How to Read the LED on the Service Monitor

1. How to read the LED

By setting the DIP SW 1-1 through 1-10 (Switch number 10 is represented by 0), the operating condition of the unit can be monitored on the service monitor. (Refer to the table on the following pages for DIP SW settings.)
The service monitor uses 4-digit 7-segment LED to display numerical values and other types of information.





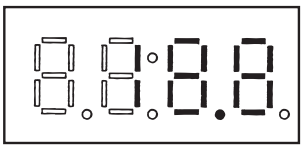
SW1-10 is represented as “0” in the table.

Pressure and temperature are examples of numerical values, and operating conditions and the on-off status of solenoid valve are examples of flag display.

1) Display of numerical values

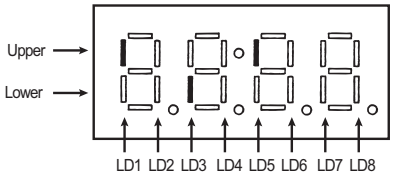
Example: When the pressure data sensor reads 18.8kg/cm^2 (Item No. 58)

- The unit of pressure is in kg/cm^2
- Use the following conversion formula to convert the displayed value into a value in SI unit.
  Value in SI unit (MPa) = Displayed value (kg/cm^2) x 0.098

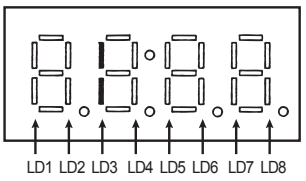


2) Flag display

Example: When 21S4a, 21S4b, SV1a are ON. (Item No. 3)

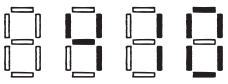
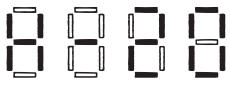
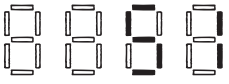


Example: 20-second restart mode (Item No. 14)



2. LED display at initial setting

From power on until the completion of initial settings, the following information will be displayed on the monitor screen. (Displays No. 1 through No. 4 in order repeatedly.)

No	Item	Display	Remarks
1	Software version		[0103] : Version 1.03
2	Refrigerant type		[410] : R410A
3	Model and capacity		[H-20] : Cooling/Heating 20 HP For the first few minutes after power on, the capacity of each outdoor unit is displayed. Thereafter, the combined capacity is displayed.
4	Communication address		[51] : Address 51

After the initial settings have been completed, the information on these items can be checked by making the switch setting that corresponds to No. 517 in the LED display table.

Note

Only item No. 1 "Software Version" appears on the display if there is a wiring failure between the control board and the transmission line power supply board or if the circuit board has failed.

3. Time data storage function

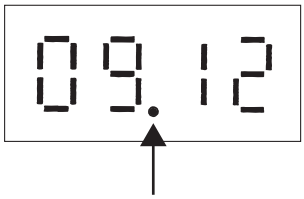
The outdoor unit has a simple clock function that enables the unit to calculate the current time with an internal timer by receiving the time set by the system controller, such as G(B)-50A.
If an error (including a preliminary error) occurs, the error history data and the error detection time are stored into the service memory.
The error detection time stored in the service memory and the current time can be seen on the service LED.

Note

1) Use the time displayed on the service LED as a reference.
2) The date and the time are set to "00" by default. If a system controller that sets the time, such as G(B)-50A is not connected, the elapsed time and days since the first power on will be displayed.
   If the time set on a system controller is received, the count will start from the set date and the time.
3) The time is not updated while the power of the indoor unit is turned off. When the power is turned off and then on again, the count will resume from the time before the power was turned off. Thus, the time that differs the actual time will be displayed. (This also applies when a power failure occurs.)
   The system controller, such as G(B)-50A, adjusts the time once a day. When the system controller is connected, the time will be automatically updated to the correct current time after the time set by the system controller is received. (The data stored into the memory before the set time is received will not be updated.)

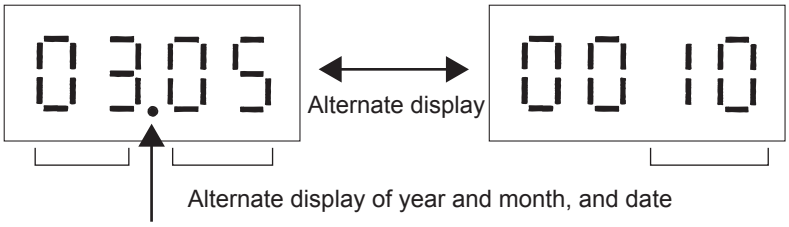
(1) Reading the time data:

1) Time display
   Example: 12 past 9



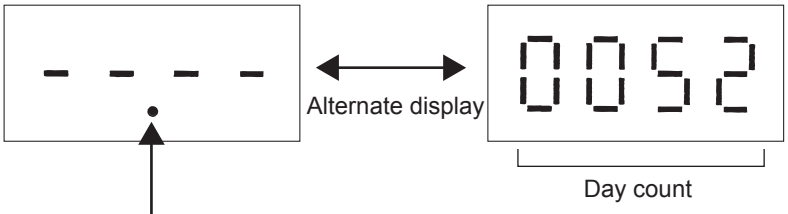
* Disappears if the time data is deviated due to a power failure, or if a system controller that sets the time is not connected.

2) Date display
   ♦When the main controller that can set the time is connected
   Example: May 10, 2003



* Appears between the year and the month, and nothing appears when the date is displayed.

♦When the main controller that can set the time is not connected
Example: 52 days after power was turned on



* Appears between the year and the month, and nothing appears when the date is displayed.

LED monitor display

Current data

No.	SW1	Item		Display								Unit (A, B) *1		Remarks
	1234567890			LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
0	0000000000	Relay output display 1 Lighting		Comp in operation				72C		OC	CPU in operation	A	A	
		Check (error) display 1 OC/OS error		0000 to 9999 (Address and error codes highlighted)								B	B	
1	1000000000	Check (error) display 2 OC/OS error		0000 to 9999 (Address and error codes highlighted)								A	A	Display of the latest preliminary error If no preliminary errors are detected, "----" appears on the display.
2	0100000000	Check (error) display 3 (Including IC and BC)		0000 to 9999 (Address and error codes highlighted)								B		If no errors are detected, "----" appears on the display.
3	1100000000	Relay output display 2	Top	21S4a		CH11		SV1a				A	A	
			Bottom			21S4b	SV5b							
4	0010000000	Relay output display 3	Top							SV9	Power supply for indoor transmission line	A	A	
			Bottom											
5	1010000000													
6	0110000000													
7	1110000000	Special control					System rotation in-progress	Stopped under the system rotation control			Communication error 20-second restart delay mode	B		
8	0001000000													
9	1001000000	Communication demand capacity		0000 to 9999								B		If not demanded controlled, "----" [%] appears on the display.
10	0101000000	Contact point demand capacity		0000 to 9999								B		If not demanded controlled, "----" [%] appears on the display.

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Current data

No.	SW1	Item		Display								Unit (A, B) *1		Remarks
	1234567890			LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
11	1101000000	External signal (Open input contact point)		Contact point demand	Low-noise mode (Capacity priority)	Snow sensor	Cooling-heating changeover (Cooling)	Cooling-heating changeover (Heating)				A	A	
12	0011000000	External signal (Open input contact point)									Low-noise mode (Quiet priority)	A	A	
13	1011000000													
14	0111000000	Outdoor unit operation status				20-second restart mode	Compressor in operation	Preliminary error	Error	20-second restart after instantaneous power failure	Preliminary low pressure error	A	A	
15	1111000000	OC/OS identification		OC/OS-1								A	A	
16	0000100000	Indoor unit check	Top	Unit No. 1								B		The lamp that corresponds to the unit that came to an abnormal stop lights. The lamp goes off when the error is reset. Each unit that comes to an abnormal unit will be given a sequential number in ascending order starting with 1.
			Bottom											
17	1000100000													
18	0100100000													
19	1100100000													
20	0010100000	Indoor unit Operation mode	Top	Unit No. 1								B		Lit during cooling Lit during heating Unlit while the unit is stopped or in the fan mode
			Bottom											
21	1010100000													
22	0110100000													
23	1110100000													

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Current data

No.	SW1	Item		Display								Unit (A, B) *1		Remarks
	1234567890			LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
24	0001100000	Indoor unit thermo-stat	Top	Unit No. 1								B		Lit when thermostat is on Unlit when thermostat is off
			Bottom											
25	1001100000													
26	0101100000													
27	1101100000													
28	0011100000													
29	1011100000													
30	0111100000													
31	1111100000													
32	0000010000													
33	1000010000													
34	0100010000													
35	1100010000													
36	0010010000													
37	1010010000													
38	0110010000													
39	1110010000	Outdoor unit Operation mode		Permissible stop	Standby	Cooling		Heating			Dehumidify-ing operation	B		
40	0001010000													
41	1001010000													
42	0101010000	Outdoor unit control mode		Stop	Thermo OFF	Abnormal stop	Scheduled control	Initial start up	Defrost	Oil balance	Low fre-quency oil recovery	A	A	
43	1101010000				Refrigerant recovery							A	A	
44	0011010000													

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Current data

No.	SW1	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
45	1011010000	TH4	-99.9 to 999.9								A	A	The unit is [°C]
46	0111010000	TH3	-99.9 to 999.9								A	A	
47	1111010000	TH7	-99.9 to 999.9								A	A	
48	0000110000	TH6	-99.9 to 999.9								A	A	
49	1000110000	TH2	-99.9 to 999.9								A	A	
50	0100110000	TH5	-99.9 to 999.9								A	A	
51	1100110000												
52	0010110000												
53	1010110000												
54	0110110000												
55	1110110000												
56	0001110000	THHS1	-99.9 to 999.9								A	A	The unit is [°C]
57	1001110000												
58	0101110000	High-pressure sensor data	-99.9 to 999.9								A	A	The unit is [kgf/cm^2]
59	1101110000	Low-pressure sensor data	-99.9 to 999.9								A	A	
60	0011110000												
61	1011110000												
62	0111110000												
63	1111110000												
64	0000001000												
65	1000001000												
66	0100001000												
67	1100001000												
68	0010001000												
69	1010001000												
70	0110001000												
71	1110001000												

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Current data

No.	SW1	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
72	0001001000												
73	1001001000												
74	0101001000												
75	1101001000												
76	0011001000												
77	1011001000												
78	0111001000	∑ Qj	0000 to 9999								B	B	
79	1111001000	∑ Qjc	0000 to 9999								B	B	
80	0000101000	∑ Qjh	0000 to 9999								B	B	
81	1000101000	Target Tc	-99.9 to 999.9								B		The unit is [°C]
82	0100101000	Target Te	-99.9 to 999.9								B		
83	1100101000	Tc	-99.9 to 999.9								A	A	
84	0010101000	Te	-99.9 to 999.9								A	A	
85	1010101000												
86	0110101000	Total frequencies (OC+OS)	0000 to 9999								B		Control data [Hz]
87	1110101000	Total frequency of each unit	0000 to 9999								A	A	
88	0001101000	COMP frequency	0000 to 9999								A	A	
89	1001101000												
90	0101101000												
91	1101101000	COMP operating frequency	0000 to 9999								A	A	The unit is [rps] Output frequency of the inverter depends on the type of compressor and equals the integer multiples (x1, x2 etc.) of the operating frequency of the compressor
92	0011101000												
93	1011101000	All AK (OC+OS)	0000 to 9999								B		

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Current data

No.	SW1	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
94	0111101000	AK	0000 to 9999								A	A	
95	1111101000	FAN	0000 to 9999								A	A	Fan output [%]
96	0000011000	Fan inverter output frequency	0000 to 9999								A	A	Twice the actual output frequency
97	1000011000												
98	0100011000												
99	1100011000												
100	0010011000												
101	1010011000												
102	0110011000												
103	1110011000	LEV1	0 to 480								A	A	Outdoor LEV opening (Fully open: 480)
104	0001011000	LEV2	41 to 3000								A	A	Outdoor LEV opening (Fully open: 3000)
105	1001011000												
106	0101011000												
107	1101011000												
108	0011011000												
109	1011011000												
110	0111011000												
111	1111011000	COMP bus voltage	00.0 to 999.9								A	A	The unit is [V]
112	0000111000												
113	1000111000												
114	0100111000												
115	1100111000												
116	0010111000	Number of times the unit went into the mode to remedy wet vapor suction	0000 to 9999								B		

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Current data

No.	SW1	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
117	1010111000	COMP Operation time Upper 4 digits	0000 to 9999								A	A	The unit is [h]
118	0110111000	COMP Operation time Lower 4 digits	0000 to 9999								A	A	
119	1110111000												
120	0001111000												
121	1001111000	Backup mode	Abnormal pressure rise	High-pressure drop	Low-pressure drop	Abnormal Td rise					A	A	Stays lit for 90 seconds after the completion of backup control
122	0101111000												
123	1101111000	COMP number of start-stop events Upper 4 digits	0000 to 9999								A	A	Count-up at start-up The unit is [Time]
124	0011111000	COMP number of start-stop events Lower 4 digits	0000 to 9999								A	A	
125	1011111000												
126	0111111000												
127	1111111000												
128	0000000100												
129	1000000100	Integrated operation time of compressor (for rotation purpose)	0000 to 9999								B		The unit is [h]
130	0100000100												
131	1100000100												
132	0010000100												
133	1010000100												
134	0110000100												
135	1110000100												
136	0001000100												
137	1001000100												
138	0101000100												

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Current data

No.	SW1	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
139	1101000100												
140	0011000100												
141	1011000100												
142	0111000100												
143	1111000100												
144	0000100100												
145	1000100100												
146	0100100100												
147	1100100100												
148	0010100100												
149	1010100100												
150	0110100100												
151	1110100100												
152	0001100100												
153	1001100100												
154	0101100100												
155	1101100100												
156	0011100100												
157	1011100100												
158	0111100100												
159	1111100100												
160	0000010100												
161	1000010100												
162	0100010100												
163	1100010100												
164	0010010100												
165	1010010100												
166	0110010100												

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Current data

No.	SW1	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
167	1110010100												
168	0001010100												
169	1001010100												
170	0101010100												
171	1101010100												
172	0011010100												
173	1011010100												
174	0111010100												
175	1111010100												
176	0000110100												
177	1000110100												

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Current data

No.	SW1	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
178	0100110100	Error history 1	0000 to 9999								B	B	Address and error codes highlighted If no errors are detected, "---- " appears on the display. Preliminary error information of the OS does not appear on the OC. Neither preliminary error information of the OC nor error information of the IC appears on the OS.
179	1100110100	Error details of inverter	Error details of inverter (0001-0120)								A	A	
180	0010110100	Error history 2	0000 to 9999								B	B	
181	1010110100	Error details of inverter	Error details of inverter (0001-0120)								A	A	
182	0110110100	Error history 3	0000 to 9999								B	B	
183	1110110100	Error details of inverter	Error details of inverter (0001-0120)								A	A	
184	0001110100	Error history 4	0000 to 9999								B	B	
185	1001110100	Error details of inverter	Error details of inverter (0001-0120)								A	A	
186	0101110100	Error history 5	0000 to 9999								B	B	
187	1101110100	Error details of inverter	Error details of inverter (0001-0120)								A	A	
188	0011110100	Error history 6	0000 to 9999								B	B	
189	1011110100	Error details of inverter	Error details of inverter (0001-0120)								A	A	
190	0111110100	Error history 7	0000 to 9999								B	B	
191	1111110100	Error details of inverter	Error details of inverter (0001-0120)								A	A	
192	0000001100	Error history 8	0000 to 9999								B	B	
193	1000001100	Error details of inverter	Error details of inverter (0001-0120)								A	A	
194	0100001100	Error history 9	0000 to 9999								B	B	
195	1100001100	Error details of inverter	Error details of inverter (0001-0120)								A	A	
196	0010001100	Error history 10	0000 to 9999								B	B	
197	1010001100	Error details of inverter	Error details of inverter (0001-0120)								A	A	
198	0110001100	Error history of inverter (At the time of last data backup before error)	0000 to 9999								B	B	
199	1110001100	Error details of inverter	Error details of inverter (0001-0120)								A	A	
200	0001001100												

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Data before error

No.	SW1	Item		Display								Unit (A, B) *1		Remarks
	1234567890			LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
201	1001001100	Outdoor unit operation status				20-second restart mode	Compressor in operation	Preliminary error	Error	20-second restart after instantaneous power failure	Preliminary low pressure error	A	A	
202	0101001100	OC/OS identification		OC/OS-1								A	A	
203	1101001100													
204	0011001100													
205	1011001100	Outdoor unit Operation mode		Permissible stop	Standby	Cooling		Heating			Dehumidifying operation	B		
206	0111001100													
207	1111001100													
208	0000101100	Outdoor unit control mode		Stop	Thermo OFF	Abnormal stop	Scheduled control	Initial start up	Defrost	Oil balance	Low frequency oil recovery	A	A	
209	1000101100				Refrigerant recovery							A	A	
210	0100101100													
211	1100101100	Relay output display 1 Lighting		Comp in operation				72C		OC	Always lit	A	A	
212	0010101100	Relay output display 2 Lighting	Top	21S4a		CH11		SV1a				A	A	
			Bottom			21S4b	SV5b							
213	1010101100	Relay output display 3 Lighting	Top								Lit while power to the indoor units is being supplied	A	A	
			Bottom							SV9				
214	0110101100													
215	1110101100													

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Data before error

No.	SW1	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
216	0001101100	TH4	-99.9 to 999.9								A	A	The unit is [°C]
217	1001101100	TH3	-99.9 to 999.9								A	A	
218	0101101100	TH7	-99.9 to 999.9								A	A	
219	1101101100	TH6	-99.9 to 999.9								A	A	
220	0011101100	TH2	-99.9 to 999.9								A	A	
221	1011101100	TH5	-99.9 to 999.9								A	A	
222	0111101100												
223	1111101100												
224	0000011100												
225	1000011100												
226	0100011100												
227	1100011100	THHS1	-99.9 to 999.9								A	A	The unit is [°C]
228	0010011100												
229	1010011100	High-pressure sensor data	-99.9 to 999.9								A	A	The unit is [kgf/cm^2]
230	0110011100	Low-pressure sensor data	-99.9 to 999.9								A	A	
231	1110011100												
232	0001011100												
233	1001011100												
234	0101011100												
235	1101011100												
236	0011011100												
237	1011011100												
238	0111011100												
239	1111011100												
240	0000111100												
241	1000111100												
242	0100111100												

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Data before error

No.	SW1	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
243	1100111100												
244	0010111100												
245	1010111100												
246	0110111100												
247	1110111100												
248	0001111100												
249	1001111100	∑ Qj	0000 to 9999								B	B	
250	0101111100	∑ Qjc	0000 to 9999								B	B	
251	1101111100	∑ Qjh	0000 to 9999								B	B	
252	0011111100	Target Tc	-99.9 to 999.9								B		The unit is [°C]
253	1011111100	Target Te	-99.9 to 999.9								B		
254	0111111100	Tc	-99.9 to 999.9								A	A	The unit is [°C]
255	1111111100	Te	-99.9 to 999.9								A	A	
256	0000000010												
257	1000000010	Total frequencies (OC+OS)	0000 to 9999								B		Control data [Hz]
258	0100000010	Total frequency of each unit	0000 to 9999								A	A	
259	1100000010	COMP frequency	0000 to 9999								A	A	
260	0010000010												
261	1010000010												
262	0110000010	COMP operating frequency	0000 to 9999								A	A	The unit is [rps]
263	1110000010												
264	0001000010	All AK (OC+OS)	0000 to 9999								B		
265	1001000010	AK	0000 to 9999								A	A	
266	0101000010	FAN	0000 to 9999								A	A	Fan inverter output [%]
267	1101000010	Fan inverter output frequency	0000 to 9999								A	A	Twice the actual output frequency

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Data before error

No.	SW1	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
268	0011000010												
269	1011000010												
270	0111000010												
271	1111000010												
272	0000100010												
273	1000100010												
274	0100100010	LEV1	0 to 480								A	A	Outdoor unit LEV opening (Fully open: 480)
275	1100100010	LEV2	41 to 3000								A	A	Outdoor unit LEV opening (Fully open: 3000)
276	0010100010												
277	1010100010												
278	0110100010												
279	1110100010												
280	0001100010												
281	1001100010												
282	0101100010	COMP bus voltage	00.0 to 999.9								A	A	The unit is [V]
283	1101100010												
284	0011100010												
285	1011100010												
286	0111100010												
287	1111100010												
288	0000010010	COMP Operation time Upper 4 digits	0000 to 9999								A	A	The unit is [h]
289	1000010010	COMP Operation time Lower 4 digits	0000 to 9999								A	A	
290	0100010010												
291	1100010010												
292	0010010010												

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Data before error

No.	SW1	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
293	1010010010												
294	0110010010	COMP number of start-stop events Upper 4 digits	0000 to 9999								A	A	Count-up at start-up The unit is [Time]
295	1110010010	COMP number of start-stop events Lower 4 digits	0000 to 9999								A	A	
296	0001010010												
297	1001010010												
298	0101010010												
299	1101010010												
300	0011010010	Integrated operation time of compressor (for rotation purpose)	0000 to 9999								B		The unit is [h]

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Current data

No.	SW1	Item	Display								Unit (A, B)*1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
301	1011010010	Power supply unit	OC/OS-1 <-> Address								B		
302	0111010010	Start-up unit	OC/OS-1 <-> Address								B		
303	1111010010	System rotation composing unit address	51 to 100 (The addresses of units in the group are displayed one by one every second, starting with the main OC address.)										Displayed only on the control unit
304	0000110010	Address of the current backup unit on rotation	51 to 100										Displayed only on the control unit
305	1000110010	Stoppage time of unit on rotation	0000 to 9999										Displayed only on the control unit
306	0100110010												
307	1100110010												
308	0010110010												
309	1010110010												
310	0110110010												
311	1110110010												
312	0001110010												
313	1001110010												
314	0101110010												
315	1101110010												
316	0011110010												
317	1011110010												
318	0111110010												
319	1111110010												
320	0000001010												
321	1000001010												
322	0100001010												
323	1100001010												
324	0010001010												
325	1010001010												

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Current data

No.	SW1	Item	Display								Unit (A, B)*1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
326	0110001010												
327	1110001010												
328	0001001010												
329	1001001010												
330	0101001010												
331	1101001010												
332	0011001010												
333	1011001010												
334	0111001010												
335	1111001010												
336	0000101010												
337	1000101010												
338	0100101010												
339	1100101010												
340	0010101010												
341	1010101010												
342	0110101010												
343	1110101010												
344	0001101010												
345	1001101010												
346	0101101010												
347	1101101010												
348	0011101010												
349	1011101010												
350	0111101010												

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Data on indoor unit system

No.	SW1	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
351	1111101010	IC1 Address/capacity code	0000 to 9999				0000 to 9999				B		Displayed alternately every 5 seconds
352	0000011010												
353	1000011010												
354	0100011010												
355	1100011010												
356	0010011010												
357	1010011010												
358	0110011010												
359	1110011010												
360	0001011010												
361	1001011010												
362	0101011010												
363	1101011010												
364	0011011010												
365	1011011010												
366	0111011010												
367	1111011010												
368	0000111010												
369	1000111010												
370	0100111010												
371	1100111010												
372	0010111010												
373	1010111010												
374	0110111010												
375	1110111010												
376	0001111010												

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Data on indoor unit system

No.	SW1	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
377	1001111010												
378	0101111010												
379	1101111010												
380	0011111010												
381	1011111010												
382	0111111010												
383	1111111010												
384	0000000110												
385	1000000110												
386	0100000110												
387	1100000110												
388	0010000110												
389	1010000110												
390	0110000110												
391	1110000110												
392	0001000110												
393	1001000110												
394	0101000110												
395	1101000110												
396	0011000110												
397	1011000110												
398	0111000110												
399	1111000110												
400	0000100110												
401	1000100110												
402	0100100110												
403	1100100110												

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Data on indoor unit system

No.	SW1	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
404	0010100110												
405	1010100110												
406	0110100110												
407	1110100110												
408	0001100110	IC1 Suction temperature	-99.9 to 999.9								B		The unit is [°C]
409	1001100110												
410	0101100110												
411	1101100110												
412	0011100110												
413	1011100110												
414	0111100110												
415	1111100110												
416	0000010110												
417	1000010110												
418	0100010110												
419	1100010110												
420	0010010110												
421	1010010110												
422	0110010110												
423	1110010110												
424	0001010110												
425	1001010110												
426	0101010110												
427	1101010110												
428	0011010110												
429	1011010110												
430	0111010110												

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Data on indoor unit system

No.	SW1	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
431	1111010110												
432	0000110110												
433	1000110110												
434	0100110110												
435	1100110110												
436	0010110110												
437	1010110110												
438	0110110110												
439	1110110110												
440	0001110110												
441	1001110110												
442	0101110110												
443	1101110110												
444	0011110110												
445	1011110110												
446	0111110110												
447	1111110110												
448	0000001110												
449	1000001110												
450	0100001110												
451	1100001110												
452	0010001110												
453	1010001110												
454	0110001110												
455	1110001110												
456	0001001110												
457	1001001110												

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Data on indoor unit system

No.	SW1	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
458	0101001110	IC1 Liquid pipe temperature	-99.9 to 999.9								B		The unit is [°C]
459	1101001110												
460	0011001110												
461	1011001110												
462	0111001110												
463	1111001110												
464	0000101110												
465	1000101110												
466	0100101110												
467	1100101110												
468	0010101110												
469	1010101110												
470	0110101110												
471	1110101110												
472	0001101110												
473	1001101110												
474	0101101110												
475	1101101110												
476	0011101110												
477	1011101110												
478	0111101110												
479	1111101110												
480	0000011110												
481	1000011110												
482	0100011110												
483	1100011110												
484	0010011110												

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Data on indoor unit system

No.	SW1	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
485	1010011110												
486	0110011110												
487	1110011110												
488	0001011110												
489	1001011110												
490	0101011110												
491	1101011110												
492	0011011110												
493	1011011110												
494	0111011110												
495	1111011110												
496	0000111110												
497	1000111110												
498	0100111110												
499	1100111110												
500	0010111110												
501	1010111110												
502	0110111110												
503	1110111110												
504	0001111110												
505	1001111110												
506	0101111110												
507	1101111110												
508	0011111110												
509	1011111110												
510	0111111110												
511	1111111110												

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Setting data

No.	SW1	Item	Display								Unit (A, B)*1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
512	0000000001	Self-address	Alternate display of self address and unit model								A	A	
513	1000000001	IC address	Count-up display of number of connected units								B		
514	0100000001												
515	1100000001												
516	0010000001	OS address	Count-up display of number of connected units								B		
517	1010000001	Version/Capacity	S/W version -> Refrigerant type -> Model and capacity -> Communication address								A	A	
518	0110000001	OC address	OC address display									B	
519	1110000001												
520	0001000001												
521	1001000001												
522	0101000001												

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Data on indoor unit system

No.	SW1	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
523	1101000001	IC1 Gas pipe temperature	-99.9 to 999.9								B		The unit is [°C]
524	0011000001												
525	1011000001												
526	0111000001												
527	1111000001												
528	0000100001												
529	1000100001												
530	0100100001												
531	1100100001												
532	0010100001												
533	1010100001												
534	0110100001												
535	1110100001												
536	0001100001												
537	1001100001												
538	0101100001												
539	1101100001												
540	0011100001												
541	1011100001												
542	0111100001												
543	1111100001												
544	0000010001												
545	1000010001												
546	0100010001												
547	1100010001												
548	0010010001												

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Data on indoor unit system

No.	SW1	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
549	1010010001												
550	0110010001												
551	1110010001												
552	0001010001												
553	1001010001												
554	0101010001												
555	1101010001												
556	0011010001												
557	1011010001												
558	0111010001												
559	1111010001												
560	0000110001												
561	1000110001												
562	0100110001												
563	1100110001												
564	0010110001												
565	1010110001												
566	0110110001												
567	1110110001												
568	0001110001												
569	1001110001												
570	0101110001												
571	1101110001												
572	0011110001												

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Data on indoor unit system

No.	SW1	Item	Display								Unit (A, B)*1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
573	1011110001	IC1SH	-99.9 to 999.9								B		The unit is [°C]
574	0111110001												
575	1111110001												
576	0000001001												
577	1000001001												
578	0100001001												
579	1100001001												
580	0010001001												
581	1010001001												
582	0110001001												
583	1110001001												
584	0001001001												
585	1001001001												
586	0101001001												
587	1101001001												
588	0011001001												
589	1011001001												
590	0111001001												
591	1111001001												
592	0000101001												
593	1000101001												
594	0100101001												
595	1100101001												
596	0010101001												
597	1010101001												
598	0110101001												
599	1110101001												

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Data on indoor unit system

No.	SW1	Item	Display								Unit (A, B)*1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
600	0001101001												
601	1001101001												
602	0101101001												
603	1101101001												
604	0011101001												
605	1011101001												
606	0111101001												
607	1111101001												
608	0000011001												
609	1000011001												
610	0100011001												
611	1100011001												
612	0010011001												
613	1010011001												
614	0110011001												
615	1110011001												
616	0001011001												
617	1001011001												
618	0101011001												
619	1101011001												
620	0011011001												
621	1011011001												
622	0111011001												

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Data on indoor unit system

No.	SW1	Item	Display								Unit (A, B)*1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
623	1111011001	IC1SC	-99.9 to 999.9								B		The unit is [°C]
624	0000111001												
625	1000111001												
626	0100111001												
627	1100111001												
628	0010111001												
629	1010111001												
630	0110111001												
631	1110111001												
632	0001111001												
633	1001111001												
634	0101111001												
635	1101111001												
636	0011111001												
637	1011111001												
638	0111111001												
639	1111111001												
640	0000000101												
641	1000000101												
642	0100000101												
643	1100000101												
644	0010000101												
645	1010000101												
646	0110000101												
647	1110000101												
648	0001000101												

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Data on indoor unit system

No.	SW1	Item	Display								Unit (A, B)*1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
649	1001000101												
650	0101000101												
651	1101000101												
652	0011000101												
653	1011000101												
654	0111000101												
655	1111000101												
656	0000100101												
657	1000100101												
658	0100100101												
659	1100100101												
660	0010100101												
661	1010100101												
662	0110100101												
663	1110100101												
664	0001100101												
665	1001100101												
666	0101100101												
667	1101100101												
668	0011100101												
669	1011100101												
670	0111100101												
671	1111100101												
672	0000010101												
673	1000010101												
674	0100010101												
675	1100010101												

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Setting data

No.	SW1	Item	Display								Unit (A, B)*1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
676	0010010101	INV board S/W version	0.00 to 99.99								A	A	
677	1010010101												
678	0110010101												
679	1110010101	Fan board S/W version	0.00 to 99.99								A	A	
680	0001010101												
681	1001010101												
682	0101010101												
683	1101010101												
684	0011010101												
685	1011010101												
686	0111010101												
687	1111010101												

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Setting data

No.	SW1	Item	Display								Unit (A, B)* 1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
688	0000110101	Current time	00:00 to 23:59								A	A	Hour: minute
689	1000110101	Current time -2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
690	0100110101	Time of error detection 1	00:00 to 23:59										Hour: minute
691	1100110101	Time of error detection 1-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
692	0010110101	Time of error detection 2	00:00 to 23:59										Hour: minute
693	1010110101	Time of error detection 2-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
694	0110110101	Time of error detection 3	00:00 to 23:59										Hour: minute
695	1110110101	Time of error detection 3-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
696	0001110101	Time of error detection 4	00:00 to 23:59										Hour: minute
697	1001110101	Time of error detection 4-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
698	0101110101	Time of error detection 5	00:00 to 23:59										Hour: minute
699	1101110101	Time of error detection 5-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display

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Setting data

No.	SW1	Item	Display								Unit (A, B)* 1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
700	0011110101	Time of error detection 6	00:00 to 23:59								A	A	Hour: minute
701	1011110101	Time of error detection 6-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
702	0111110101	Time of error detection 7	00:00 to 23:59										Hour: minute
703	1111110101	Time of error detection 7-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
704	0000001101	Time of error detection 8	00:00 to 23:59										Hour: minute
705	1000001101	Time of error detection 8-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
706	0100001101	Time of error detection 9	00:00 to 23:59										Hour: minute
707	1100001101	Time of error detection 9-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
708	0010001101	Time of error detection 10	00:00 to 23:59										Hour: minute
709	1010001101	Time of error detection 10-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
710	0110001101	Time of last data backup before error	00:00 to 23:59										Hour: minute
711	1110001101	Time of last data backup before error -2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
712	0001001101												
713	1001001101												

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Data on indoor unit system

No.	SW1	Item	Display								Unit (A, B)*1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
714	0101001101	IC1 LEV opening	0000 to 9999								B		Fully open: 2000
715	1101001101												
716	0011001101												
717	1011001101												
718	0111001101												
719	1111001101												
720	0000101101												
721	1000101101												
722	0100101101												
723	1100101101												
724	0010101101												
725	1010101101												
726	0110101101												
727	1110101101												
728	0001101101												
729	1001101101												
730	0101101101												
731	1101101101												
732	0011101101												
733	1011101101												
734	0111101101												
735	1111101101												
736	0000011101												
737	1000011101												
738	0100011101												
739	1100011101												

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Data on indoor unit system

No.	SW1	Item	Display								Unit (A, B)* 1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
740	0010011101												
741	1010011101												
742	0110011101												
743	1110011101												
744	0001011101												
745	1001011101												
746	0101011101												
747	1101011101												
748	0011011101												
749	1011011101												
750	0111011101												
751	1111011101												
752	0000111101												
753	1000111101												
754	0100111101												
755	1100111101												
756	0010111101												
757	1010111101												
758	0110111101												
759	1110111101												
760	0001111101												
761	1001111101												
762	0101111101												
763	1101111101												
764	0011111101	IC1 Operation mode	0000 : Stop 0001 : Ventilation 0002 : Cooling 0003 : Heating								B		
765	1011111101												
766	0111111101												

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Data on indoor unit system

No.	SW1	Item	Display								Unit (A, B)* 1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
767	1111111101												
768	0000000011												
769	1000000011												
770	0100000011												
771	1100000011												
772	0010000011												
773	1010000011												
774	0110000011												
775	1110000011												
776	0001000011												
777	1001000011												
778	0101000011												
779	1101000011												
780	0011000011												
781	1011000011												
782	0111000011												
783	1111000011												
784	0000100011												
785	1000100011												
786	0100100011												
787	1100100011												
788	0010100011												
789	1010100011												
790	0110100011												
791	1110100011												
792	0001100011												
793	1001100011												

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Data on indoor unit system

No.	SW1	Item	Display								Unit (A, B)* 1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
794	0101100011												
795	1101100011												
796	0011100011												
797	1011100011												
798	0111100011												
799	1111100011												
800	0000010011												
801	1000010011												
802	0100010011												
803	1100010011												
804	0010010011												
805	1010010011												
806	0110010011												
807	1110010011												
808	0001010011												
809	1001010011												
810	0101010011												
811	1101010011												
812	0011010011												
813	1011010011												
814	0111010011	IC1 filter	0000 to 9999								B		Hours since last maintenance [h]
815	1111010011												
816	0000110011												
817	1000110011												
818	0100110011												
819	1100110011												

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Data on indoor unit system

No.	SW1	Item	Display								Unit (A, B)* 1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
820	0010110011												
821	1010110011												
822	0110110011												
823	1110110011												
824	0001110011												
825	1001110011												
826	0101110011												
827	1101110011												
828	0011110011												
829	1011110011												
830	0111110011												
831	1111110011												
832	0000001011												
833	1000001011												
834	0100001011												
835	1100001011												
836	0010001011												
837	1010001011												
838	0110001011												
839	1110001011												
840	0001001011												
841	1001001011												
842	0101001011												
843	1101001011												
844	0011001011												
845	1011001011												
846	0111001001												

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Data on indoor unit system

No.	SW1	Item	Display								Unit (A, B)* 1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
847	1111001011												
848	0000101011												
849	1000101011												
850	0100101011												
851	1100101011												
852	0010101011												
853	1010101011												
854	0110101011												
855	1110101011												
856	0001101011												
857	1001101011												
858	0101101011												
859	1101101011												
860	0011101011												
861	1011101011												
862	0111101011												
863	1111101011												

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Other types of data

No.	SW1	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
864	0000011011												
865	1000011011												
866	0100011011												
867	1100011011												
868	0010011011												
869	1010011011												
870	0110011011												
871	1110011011	U-phase current effective value 1	-99.9 to 999.9								A	A	The unit is [A]
872	0001011011	W-phase current effective value 1	-99.9 to 999.9								A	A	
873	1001011011	Power factor phase angle 1	-99.9 to 999.9								A	A	The unit is [deg]
874	0101011011												
875	1101011011												
876	0011011011												
877	1011011011												
878	0111011011												
879	1111011011												
880	0000111011	Control board Reset counter	0 to 254								A	A	The unit is [time]
881	1000111011	INV board Reset counter	0 to 254								A	A	
882	0100111011												
883	1100111011												
884	0010111011	Fan board Reset counter	0 to 254								A	A	The unit is [time]
885	1010111011												
886	0110111011												

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Other types of data

No.	SW1	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
887	1110111011												
888	0001111011												
889	1001111011												
890	0101111011												
891	1101111011												
892	0011111011												
893	1011111011												
894	0111111011												
895	1111111011												
896	0000000111												
897	1000000111												
898	0100000111												
899	1100000111												
900	0010000111												
901	1010000111												
902	0110000111												
903	1110000111												
904	0001000111												
905	1001000111												
906	0101000111												
907	1101000111												
1020	0011111111												
1021	1011111111												
1022	0111111111												
1023	1111111111												

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Service Handbook

Model
PUHY-P250YJM-A
PUHY-P500YSJM-A
PFD-P250VM-E
PFD-P500VM-E

MITSUBISHI ELECTRIC CORPORATION

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