MITSUBISHI ELECTRIC

Changes for the Better

AIR CONDITIONER

2019

R32

Service Handbook

Model

PUHY-M200, M250, M300, M350, M400, M450, M500YNW-A1
PUHY-EM200, EM250, EM300, EM350, EM400, EM450, EM500YNW-A1

CMH-WM250, 350, 500V-A

Safety Precautions

- Read and observe the safety precautions below and the instructions provided on the labels affixed to the unit.
- Retain this manual for future reference. Make sure that this manual is passed on to the end users.
- All refrigerant piping work, electrical work, air-tightness test, and brazing work must be performed by qualified personnel.
- Incorrect use may result in serious injury.

⚠ WARNING	**indicates a hazardous situation which, if not avoided, could result in death or serious injury.**
⚠ CAUTION	**indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.**
CAUTION	**addresses practices not related to personal injury, such as product and/or property damage.**

General Precautions

⚠ WARNING

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

- Doing so will cause the unit or pipes to burst, or result in an explosion or fire during use, during repairs, 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.

Do not use the unit in an unusual environment.

- If the unit is used in areas exposed to large amounts of oil, steam, organic solvents, or corrosive gases (such as ammonia, sulfuric compounds, or acids), or areas where acidic/alkaline solutions or special chemical sprays are used frequently, it may significantly reduce the performance and corrode the internal parts, resulting in refrigerant leakage, water leakage, injury, electric shock, malfunction, smoke, or fire.

Do not change the settings of the safety or protection devices.

- Forcing the unit to operate by disabling the safety devices, such as the pressure switch or the thermal switch, may result in bursting, fire, or explosion.
- Operating the unit with a safety device whose settings have been changed may result in bursting, fire, or explosion.
- Using safety devices other than those specified by Mitsubishi Electric may result in bursting, fire, or explosion.

Do not alter or modify the unit.

- Doing so will result in refrigerant leakage, water leakage, serious injury, electric shock, or fire.

Do not wet the electrical parts.

- Doing so may result in current leakage, electric shock, malfunction, or fire.

Do not touch the electrical parts, switches, or buttons with wet fingers.

- Doing so may result in electric shock, malfunction, or fire.

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

- The refrigerant in the pipes will be very hot or very cold, resulting in frostbite or burns.

Do not touch the electrical parts with bare hands during and immediately after operation.

- Doing so may result in burns.

Ventilate the room while servicing the unit.

- If the refrigerant leaks, oxygen deficiency may result. If the leaked refrigerant comes in contact with a heat source, toxic gas will be generated.

If you notice any abnormality (e.g., a burning smell), stop the operation, turn off the power switch, and consult your dealer.

- Continuing the operation may result in electric shock, malfunction, or fire.

Properly install all required covers and panels on the terminal box and the control box.

- If dust or water enters the unit, this may result in electric shock or fire.

Periodically check the unit base for damage.

- If the damage is left uncorrected, the unit will fall and cause serious injury.

Consult your dealer for the proper disposal of the unit.

- The refrigerant oil and the refrigerant in the unit will pose a risk of environmental pollution, fire, or explosion.

Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

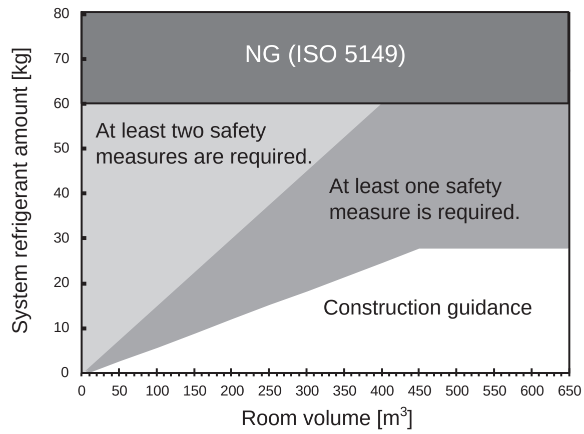
The unit shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater.)

Do not pierce or burn.

Be aware that refrigerants may not contain an odour.

Install, operate, and store the unit in a space with as much floor area as indicated in the figure at right, and be sure to take safety measures.

The Hydro unit shall not be installed in a condition with certain floor area and the refrigerant amount as shown in the figure below.



The unit shall be properly stored to prevent mechanical damage.

⚠ CAUTION

Children should be supervised to ensure that they do not play with the appliance.

Do not operate the unit with the panels and guards removed.

- Rotating, hot, or high-voltage parts may cause injury, electric shock, or fire.

Do not touch fans, heat exchanger fins, or the sharp edges of components with bare hands.

- Doing so may result in injury.

Wear protective gloves when working on the unit.

- Failure to do so may result in injury.
- High-pressure pipes poses a risk of burns if touched with bare hands while the unit is in operation.

Check that markings of the unit are not illegible.

- Illegible warning or caution markings may cause damage to the unit, resulting in injury.

If the ambient temperature can drop below freezing while the heat-source unit is not in use, blow the water out of the pipes or fill them with anti-freeze solution.

- Failure to do so may cause the water in the pipes to freeze and damage the unit.
- Water from burst pipes may result in water-damage to the furnishings.

Make sure the supply-water flow rate falls within the specified range.

- Failure to maintain the adequate flow rate can result in corrosion of the heat-source unit.
- Water from corroded pipes can result in water-damage to the furnishings.

Transportation and Installation

⚠ WARNING

When lifting the unit, pass the slings through the four designated sling holes.

- Improper lifting will cause the unit to topple or fall, resulting in serious injury.

⚠ CAUTION

Do not lift the unit with the PP bands that are used on some products.

- Doing so may result in injury.

Observe the restrictions on the maximum weight that a person can lift, which is specified in local regulations.

- Failure to do so may result in injury.

Installation

⚠ WARNING

Do not install the unit where combustible gas may leak.

- If combustible gas accumulates around the unit, fire or explosion may result.

Do not allow children to play with the packing materials.

- Suffocation or serious injury may result.

Cut up the packing materials before disposal.

All installation work must be performed by qualified personnel in accordance with this manual.

- Improper installation may result in refrigerant leakage, water leakage, serious injury, electric shock, or fire.

When performing work involving possible refrigerant leakage, carry a portable refrigerant-leak sensor at all times.

- The refrigerant used for the unit is slightly flammable and may result in fire in the presence of an ignition source.

If the air conditioner is installed in a small room, take measures to prevent the refrigerant concentration from exceeding the safety limit in the event of refrigerant leakage.

- Consult your dealer regarding the appropriate measures to prevent the allowable concentration from being exceeded. If the refrigerant leaks and the allowable concentration is exceeded, hazards due to a lack of oxygen in the room will result.

Install the unit in accordance with the instructions to minimize the risk of damage from earthquakes and strong winds.

- Improper installation will cause the unit to topple, resulting in serious injury.

The unit must be securely installed on a structure that can sustain its weight.

- Failure to do so will cause the unit to fall, resulting in serious injury.

Do not open the control box cover when charging refrigerant.

- Doing so may cause sparks, resulting in fire.

⚠ CAUTION

Seal all openings around pipes and wires to keep out small animals, rainwater, or snow.

- Failure to do so may result in current leakage, electric shock, or damage to the unit.

Do not install the unit where corrosive gas may be generated.

- Doing so can corrode the pipes, resulting in refrigerant leakage and fire.

Piping Work

⚠ WARNING

Piping work shall be kept to a minimum.

The pipes shall be protected from physical damage.

Before heating the brazed sections, remove the gas and oil that are trapped in the pipes.

- Failure to do so may generate fire, resulting in serious injury.

Do not purge the air using refrigerant. Use a vacuum pump to evacuate the system.

- Residual gas in the refrigerant lines will cause bursting of the pipes or an explosion.

Do not use oxygen, flammable gas, or a refrigerant containing chlorine for air-tightness testing.

- Doing so may result in an explosion. Chlorine will deteriorate the refrigerant oil.

When installing or relocating the unit, do not allow air or any substance other than the specified refrigerant to enter the refrigerant lines.

- Any substance other than the specified refrigerant may cause abnormally high pressure in the refrigerant lines, resulting in bursting of the pipes or an explosion.

After the installation has been completed, check for refrigerant leaks.

- If the refrigerant leaks, oxygen starvation may result. If the leaked refrigerant comes in contact with a heat source, toxic gas will be generated.

Have a fire extinguisher nearby before brazing work.

- If the refrigerant leaks while brazing work is being performed, fire may result.

Provide no-smoking signs at the brazing workplace.

- If the refrigerant leaks when an ignition source is present, fire may result.

Wiring Work

⚠ WARNING

Include some slack in the power cables.

- Failure to do so may break or overheat the cables, resulting in smoke or fire.

Connections must be made securely and without tension on the terminals.

- Improperly connected cables may break, overheat, or cause smoke or fire.

Tighten all terminal screws to the specified torque.

- Loose screws and contact failure may result in smoke or fire.

Electrical work must be performed by qualified personnel in accordance with local regulations and the instructions provided in this manual. Only use the specified cables and dedicated circuits.

- Inadequate power source capacity or improper electrical work will result in electric shock, malfunction, or fire.

Install an inverter circuit breaker on the power supply of each unit.

- Failure to do so may result in electric shock or fire.

Only use properly rated breakers (an earth leakage breaker, local switch <a switch + fuse that meets local electrical codes>, or overcurrent breaker).

- Failure to do so may result in electric shock, malfunction, smoke, or fire.

Only use standard power cables of sufficient capacity.

- Failure to do so may result in current leakage, overheating, smoke, or fire.

Proper grounding must be provided by qualified personnel.

- Improper grounding may result in electric shock, fire, explosion, or malfunction due to electrical noise. Do not connect the ground wire to gas or water pipes, lightning rods, or telephone ground wires.

⚠ CAUTION

After the wiring work has been completed, measure the insulation resistance, and make sure that it reads at least 1 MΩ.

- Failure to do so may result in electric leakage, malfunction, or fire.

Relocation and Repairs

⚠ WARNING

Only qualified personnel must relocate or repair the unit. Do not attempt to disassemble or alter the unit.

- Failure to do so will result in refrigerant leakage, water leakage, serious injury, electric shock, or fire.

Do not service the unit in the rain.

- Doing so may result in electric leakage, electric shock, wire shorting, malfunction, smoke, or fire.

Check for refrigerant leaks before service.

- If the refrigerant leaks, fire may result.

Do not open the control box cover when recovering, charging, or purging refrigerant.

- Doing so may cause sparks, resulting in fire.

Additional Precautions

CAUTION

Do not turn off the power immediately after stopping operation.

- Wait for at least five minutes after the unit has stopped before turning off the power. Failure to do so may result in drain water leakage or the mechanical failure of sensitive parts.

The unit must be periodically inspected by a dealer or qualified personnel.

- If dust or dirt accumulates inside the unit, the drain pipes may become clogged, and water leakage from the pipes may wet the surroundings and generate odours.

Turn on the power at least 12 hours before starting operation. Keep the power turned on throughout the operating season.

- Insufficient energizing will result in malfunction.

Do not use the air conditioner for special purposes (e.g. keeping food, animals, plants, precision devices, or art objects in a room).

- Such items could be damaged or deteriorated.

Collect the refrigerant and properly dispose of it in accordance with local regulations.

Do not install the unit on or over items that are subject to water damage.

- When the room humidity exceeds 80% or if the drain pipe is clogged, condensation may collect and drip from the indoor unit onto the ceiling or floor.

Drain piping must be installed by a dealer or qualified personnel to ensure proper drainage.

- Improper drain piping may cause water leakage, resulting in damage to furniture and other surroundings.

Take appropriate measures against electrical noise interference when installing the unit in hospitals or radio communication facilities.

- Inverter, high-frequency medical, or wireless communication equipment as well as power generators may cause the air conditioning system to malfunction. The air conditioning system may also adversely affect the operation of these types of equipment by creating electrical noise.

Insulate pipes to prevent condensation.

- Condensation may collect and drip from the unit onto the ceiling or floor.

Keep the service valves closed until refrigerant charging is completed.

- Failure to do so will damage the unit.

Place a wet towel on the service valves before brazing the pipes to keep the temperature of the valves from rising above 120ºC (248ºF).

- Failure to do so may result in equipment damage.

Keep the flame out of contact with the cables and metal sheet when brazing the pipes.

- Failure to do so may result in burnout or malfunction.

Use the following tools specifically designed for use with the specified refrigerant: Gauge manifold, charge hose, gas leak detector, check valve, refrigerant charge base, vacuum gauge, and refrigerant recovery equipment.

- Gas leak detectors for conventional refrigerants will not react to a refrigerant that does not contain chlorine.
- If the specified refrigerant is mixed with water, refrigerant oil, or another refrigerant, the refrigerant oil will deteriorate and the compressor will malfunction.

Use a vacuum pump with a check valve.

- If the vacuum pump oil flows back into the refrigerant lines, the refrigerant oil may deteriorate and the compressor may malfunction.

Keep tools clean.

- If dust, dirt, or water accumulates on the charging hose or the flare processing tool, the refrigerant will deteriorate and the compressor will malfunction.

Use refrigerant piping made of phosphorus deoxidized copper (copper and copper alloy seamless pipes) that meets local requirements. Pipe joints should also meet local requirements. Keep the inner and outer surfaces of the pipes clean and free of sulphur, oxides, dust/dirt, shaving particles, oils, moisture, or any other contaminants.

- Contaminants on the inside of the refrigerant piping will cause the refrigerant oil to deteriorate and cause the compressor to malfunction.

Store pipes indoors, and keep both ends of the pipes sealed until just before making a flare connection or brazing. (Store elbows and other joints in plastic bags.)

- If dust, dirt, or water enters the refrigerant lines, the refrigerant oil will deteriorate and the compressor will malfunction.

Braze the pipes with a nitrogen purge to avoid oxidation.

- Oxidized flux inside the refrigerant pipes will cause the refrigerant oil to deteriorate and cause the compressor to malfunction.

Do not use existing refrigerant piping.

- The old refrigerant and refrigerant oil in the existing piping contain a large amount of chlorine, which will cause the refrigerant oil in the new unit to deteriorate and cause the compressor to malfunction.

If a large electric current flows due to a malfunction or faulty wiring, earth-leakage breakers on the unit side and on the upstream side of the power supply system could both operate. Depending on the importance of the system, separate the power supply system or take protective coordination of breakers.

This appliance is intended to be used by expert or trained users in shops, in light industry and on farms, or for commercial use by lay persons.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Store the unit in a room large enough to allow clearance in the event of refrigerant leakage.

Refrigerant R32 is flammable. Do not use a naked-flame type detector.

Use circulation and makeup water that meet the water-quality standards.

- Degradation of water quality can result in water leakage.

Only qualified personnel may touch the USB port in the control box.

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Chapter 1 Check Before Servicing

1-1 Preparation for Piping Work

1-1-1 Read before Servicing

1. **Check the type of refrigerant used in the system to be serviced.**
   Refrigerant Type
   Multi air conditioner for building application CITY MULTI:R32

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.**
   For information about the correct use of tools, refer to the following page(s). [1-1-2 Tool Preparation]

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. **Toxic hydrofluoric acid gas will form or refrigerant will ignite if leaked refrigerant is exposed to an open flame. Be sure to keep the work area 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.

1-1-2 Tool Preparation

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

Tools for use with R32 (Adaptability of tools that are for use with R410A, R22, or R407C)

1. To be used exclusively with R32 (not to be used if used with R410A, 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 light blue.
Charging Port on the Refrigerant Cylinder	Refrigerant charging	The charge port diameter is larger than that of the current port.

2. Tools and materials that may be used with R32 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.
Refrigerant Recovery Equipment	Refrigerant recovery	May be used if compatible with R32.

3. Tools and materials that are used with R22, R407C, or R410A that may also be used with R32

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 ø12.7 (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 R32

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

Tools for R32 must be handled with special care to keep moisture and dust from infiltrating the cycle.

1-2 Handling and Characteristics of Piping Materials, Refrigerant, and Refrigerant Oil

1-2-1 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, R32 etc.

3. Piping materials/Radial thickness

Use refrigerant pipes made of phosphorus deoxidized copper.
The operation pressure of the units that use R32 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	
ø34.93	[1-3/8"]	1.2t	
ø41.28	[1-5/8"]	1.4t	

- Annealed pipes have been used for older model units when a diameter of the pipe is up to φ19.05 (3/4"). For a system that uses R410A or R32, use pipes that are made with 1/2H-material (Drawn). (Annealed pipes may be used for pipes with a diameter of φ19.05 (3/4") and a radial thickness of 1.2 t).
- 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

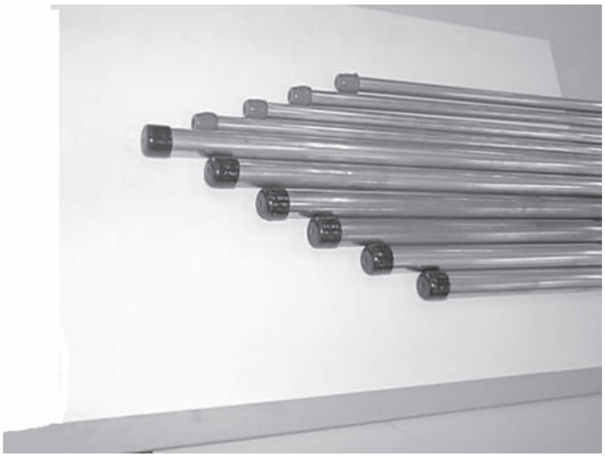
Ask the pipe manufacturer for the symbols indicated on the piping material for new refrigerant.

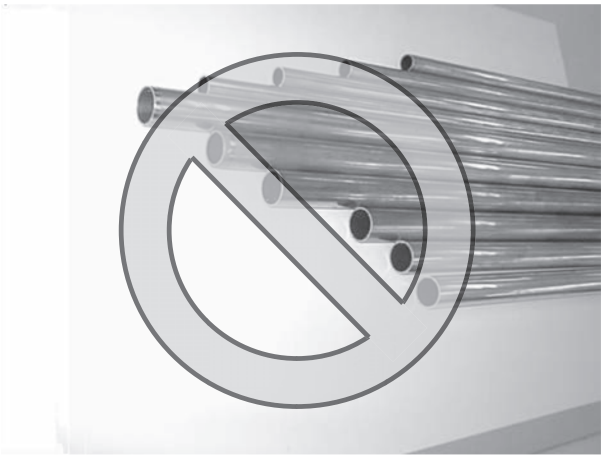
1-2-2 Storage of Piping Materials

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.

1-2-3 Characteristics of the New and Conventional Refrigerants

1. Chemical property

The new refrigerant R32 is as low in toxicity and slightly flammable 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.
Because the refrigerant is slightly flammable, do not perform installation or service work in a confined area.

	New Refrigerant (HFC type)			Conventional Refrigerant (HCFC type)
	R32	R410A	R407C	R22
	R32	R32/R125	R32/R125/R134a	R22
Composition (wt%)	(100)	(50/50)	(23/25/52)	(100)
Type of Refrigerant	Single Refrigerant	Pseudo-azeotropic Refrigerant	Non-azeotropic Refrigerant	Single Refrigerant
Chloride	Not included	Not included	Not included	Included
Safety Class	A2L	A1/A1	A1/A1	A1
Molecular Weight	52.0	72.6	86.2	86.5
Boiling Point (°C/°F)	-51.7/-61.0	-51.4/-60.5	-43.6/-46.4	-40.8/-41.4
Steam Pressure (25°C,MPa/77°F,psi) (gauge)	1.588/230	1.557/226	0.9177/133	0.94/136
Saturated Steam Density (25°C,kg/m^3/77°F,psi)	47.4	64.0	42.5	44.4
Flammability	Slightly flammable	Nonflammable	Nonflammable	Nonflammable
Ozone Depletion Coefficient (ODP)*1	0	0	0	0.055
Global Warming Coefficient (GWP)*2	675	2088	1774	1810
Refrigerant Charging Method	Refrigerant charging in the liquid state/refrigerant charging in the gaseous state	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	Available

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

2. Refrigerant composition

R32 is a single refrigerant and can be handled in a similar manner as with other single refrigerants, such as R22.
If the refrigerant leaks out, it may be replenished.

3. Pressure characteristics

The pressure in the system using R32 is 1.6 times as great as that in the system using R22.

Temperature (°C/°F)	Pressure (gauge)			
	R32	R410A	R407C	R22
	MPa/psi	MPa/psi	MPa/psi	MPa/psi
-20/-4	0.30/44	0.30/44	0.18/26	0.14/20
0/32	0.71/103	0.70/102	0.47/68	0.40/58
20/68	1.37/199	1.34/194	0.94/136	0.81/117
40/104	2.38/345	2.31/335	1.44/209	1.44/209
60/140	3.83/555	3.73/541	2.44/354	2.33/338
65/149	4.28/621	4.17/605	2.75/399	2.60/377

1-2-4 Precautions for handling equipment using R32

When handling the units that use R32 refrigerant, observe the following notes. (The notes are based on the precautions regarding R32 refrigerant contained in IEC 60335-2-40.)

1. Transportation

1) Additional transportation regulations may exist with respect to equipment containing slightly flammable gas. The maximum number of pieces of equipment or the configuration of the equipment, permitted to be transported together will be determined by the applicable transport regulations.

2. Disposal

1) Follow the local regulations on proper disposal of equipment using R32.

3. Storage

1) Store the unit in a sufficiently large space so that leaked refrigerant will not stagnate in a small confined area.
2) The maximum number of pieces of equipment permitted to be stored together will be determined local regulations.

4. Servicing information

1) Checks to the area
Prior to beginning work on systems containing slightly flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimised. For repair to the refrigerating system, 3) to 7) shall be completed prior to conducting work on the system.

2) Work procedure
Work shall be undertaken under a controlled procedure so as to minimise the risk of a slightly flammable gas being present while the work is being performed.

3) General work area
All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided. The area around the workspace shall be sectioned off. Ensure that the conditions within the area have been made safe by control of flammable material.

4) Checking for presence of refrigerant
The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially slightly flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants.

5) Presence of fire extinguisher
If any hot work is to be conducted on the refrigeration equipment or any associated parts, appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO_2 fire extinguisher adjacent to the charging area.

6) No ignition sources
No person carrying out work, such as brazing, in relation to a refrigeration system which involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removing and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. "No Smoking" signs shall be displayed in a conspicuous place in the work area.

7) Ventilated area
Ensure that the area is in the open or that it is adequately ventilated before replacing parts or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the atmosphere.

8) Checks to the refrigeration equipment
Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times the MITSUBISHI ELECTRIC's Installation Manual and Service Handbook shall be followed. If in doubt, consult the dealer's technical department for assistance.
The following checks shall be applied to installations using slightly flammable refrigerants:
- the amount of refrigerant charge depends on the size of the area in which products containing refrigerant are to be installed;
- the ventilation machinery and outlets are operating adequately and are not obstructed;
- if an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant;
- marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected;
- refrigeration pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode components containing refrigerant, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected being so corroded.

9) Checks to electrical devices
Repair and maintenance to electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until it is satisfactorily dealt with. If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. This shall be reported to the owner of the equipment so all parties are advised.

10) Initial safety checks shall include:
- that capacitors are discharged: this shall be done in a safe manner to avoid possibility of sparking;
- that no live electrical components and wiring are exposed while charging, recovering or purging the system;
- that there is continuity of earth bonding.

5. Repairing sealed components

1) During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being worked upon prior to any removal of sealed covers, etc. If it is absolutely necessary to have an electrical supply to equipment during servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.

2) Particular attention shall be paid to the following to ensure that by working on electrical components, the casing is not altered in such a way that the level of protection is affected. This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc.

3) Ensure that the apparatus is mounted securely.

4) Ensure that seals or sealing materials have not degraded to the point that they no longer serve the purpose of preventing the ingress of flammable atmospheres. Replacement parts shall be in accordance with the MITSUBISHI ELECTRIC's specifications.

5) The use of silicon sealant can inhibit the effectiveness of some types of leak detection equipment. Intrinsically safe components do not have to be isolated prior to working on them.

6. Refrigerant leakage detection

The following leak detection methods are deemed acceptable for all refrigerant systems.

1) Electronic leak detectors may be used to detect refrigerant leaks but, in the case of slightly flammable refrigerants, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used.

2) If a leak is suspected, all naked flames shall be removed/extinguished.

3) If a leakage of refrigerant is found which requires brazing, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak. Because R32 is slightly flammable, oxygen free nitrogen (OFN) shall be poured through the system both before and during the brazing process to purge R32.

7. Refrigerant removal and vacuum drying for service

1) R32 is slightly flammable. Follow the procedures below to reduce the risk of R32 from catching fire:
   1. Remove refrigerant;
   2. Purge the circuit with inert gas;
   3. Evacuate;
   4. Purge again with inert gas;
   5. Open the circuit by cutting or brazing.

2) The charged refrigerant shall be recovered into the recovery cylinders designated for use with R32. For appliances containing slightly flammable refrigerants, the system shall be "flushed" with OFN to render the unit safe. This process may need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems.

3) Because R32 is slightly flammable, flushing shall be achieved by breaking the vacuum in the system with OFN and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. This process shall be repeated until no refrigerant is within the system. When the final OFN charge is used, the system shall be vented down to atmospheric pressure to enable work to take place. This operation is absolutely vital if brazing operations on the pipe-work are to take place.

4) Ensure that the outlet for the vacuum pump is not close to any ignition sources and that ventilation is available.

8. Decommissioning

1) Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended good practice that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of reclaimed refrigerant. It is essential that electrical power is available before the task is commenced.

2) Become familiar with the equipment and its operation.

3) Isolate system electrically.

4) Before attempting the procedure, ensure that:
   - mechanical handling equipment is available, if required, for handling refrigerant cylinders;
   - all personal protective equipment is available and being used correctly;
   - the recovery process is supervised at all times by a competent person;
   - recovery equipment and cylinders conform to the appropriate standards.

5) Pump down refrigerant system, if possible.

6) Make sure that cylinder is situated on the scales before recovery takes place.

7) Start the recovery machine and operate in accordance with MITSUBISHI ELECTRIC's instructions.

8) Do not overfill cylinders. (No more than 80% volume liquid charge)

9) Do not exceed the maximum working pressure of the cylinder, even temporarily.

10) When the cylinders have been filled correctly and the process completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.

11) Recovered refrigerant shall not be charged into another refrigeration system unless it has been cleaned and checked.

9. Labelling

1) Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. Because R32 is slightly flammable, ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.

10. Appropriate refrigerant recovery method

1) When removing refrigerant from a system, either for repairing or decommissioning, it is recommended good practice that all refrigerants are removed safely.

2) When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge are available. All cylinders to be used are designated for recovering refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery starts.

3) The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of all appropriate refrigerants including, when applicable, slightly flammable refrigerants. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition. Before using the recovery machine, check that it is in satisfactory working order, has been properly maintained and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult dealer if in doubt.

4) The recovered refrigerant shall be returned to the refrigerant supplier in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants with different properties in recovery units and especially not in cylinders.

5) If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that slightly flammable refrigerant does not remain within the lubricant. The evacuation process shall be carried out prior to returning the compressor to the suppliers. Only electric heating to the compressor body shall be employed to accelerate this process. When oil is drained from a system, it shall be carried out safely.

11. Competence of service personnel

(1) General

Special training additional to usual refrigerating equipment repair procedures is required when equipment with slightly flammable refrigerants is affected.

(2) Training

The training should include the substance of the following:
Information about the explosion potential of slightly flammable refrigerants to show that flammables may be dangerous when handled without care.

(3) Information about the correct working procedures

Commissioning

1) Ensure that the floor area is sufficient for the refrigerant charge or that the ventilation duct is assembled in a correct manner.

2) Connect the pipes and carry out a leak test before charging with refrigerant.

3) Check safety equipment before putting into service.

Maintenance

1) Portable equipment shall be repaired outside or in a workshop specially equipped for servicing units with slightly flammable refrigerants.

2) Ensure sufficient ventilation at the repair place.

3) Be aware that malfunction of the equipment may be caused by refrigerant loss and a refrigerant leak is possible.

4) Discharge capacitors in a way that won't cause any spark. The standard procedure to short circuit the capacitor terminals usually creates sparks.

5) Reassemble sealed enclosures accurately. If seals are worn, replace them.

6) Check safety equipment before putting into operation.

7) Carry a portable refrigerant-leak sensor when entering a space with a risk of refrigerant leakage.

Repair

1) Portable equipment shall be repaired outside or in a workshop specially equipped for servicing units with slightly flammable refrigerants.

2) Ensure sufficient ventilation at the repair place.

3) Be aware that malfunction of the equipment may be caused by refrigerant loss and a refrigerant leak is possible.

4) Discharge capacitors in a way that won't cause any spark.

5) When brazing is required, the following procedures shall be carried out in the right order:
   1. Remove the refrigerant. If the recovery is not required by national regulations, drain the refrigerant to the outside. Take care that the drained refrigerant will not cause any danger. In doubt, one person should guard the outlet. Take special care that drained refrigerant will not float back into the building.
   2. Evacuate the refrigerant circuit.
   3. Purge the refrigerant circuit with nitrogen for 5 min.
   4. Evacuate again.
   5. Remove parts to be replaced by cutting, not by flame.
   6. Purge the braze point with nitrogen during the brazing procedure.
   7. Carry out a leak test before charging with refrigerant.

6) Reassemble sealed enclosures accurately. If seals are worn, replace them.

7) Check safety equipment before putting into operation.

Decommissioning

1) If the safety is affected when the equipment is putted out of service, the charged refrigerant shall be removed before decommissioning.

2) Ensure sufficient ventilation at the equipment location.

3) Be aware that malfunction of the equipment may be caused by refrigerant loss and a refrigerant leak is possible.

4) Discharge capacitors in a way that won't cause any spark.

5) Remove the refrigerant. If the recovery is not required by national regulations, drain the refrigerant to the outside. Take care that the drained refrigerant will not cause any danger. In doubt, one person should guard the outlet. Take special care that drained refrigerant will not float back into the building.

6) Evacuate the refrigerant circuit.

7) Purge the refrigerant circuit with nitrogen for 5 min.

8) Evacuate again.

9) Fill with nitrogen up to atmospheric pressure.

10) Put a label on the equipment that the refrigerant is removed.

Disposal

1) Ensure sufficient ventilation at the working place.

2) Remove the refrigerant. If the recovery is not required by national regulations, drain the refrigerant to the outside. Take care that the drained refrigerant will not cause any danger. In doubt, one person should guard the outlet. Take special care that drained refrigerant will not float back into the building.

3) Evacuate the refrigerant circuit.

4) Purge the refrigerant circuit with nitrogen for 5 min.

5) Evacuate again.

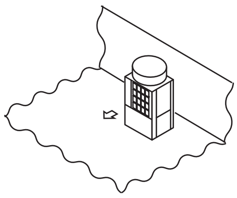
6) Cut out the compressor and drain the oil.

12. Installation restrictions for outdoor units

Do not install the unit where combustible gas may leak.
- If combustible gas accumulates around the unit, fire or explosion may result.

- Provide sufficient space around the unit for effective operation, efficient air movement, and ease of access for maintenance.
- Note that refrigerant gas is heavier than air and will therefore tend to collect in low spots such as basements.
- When an indoor unit that draws in outside air exits near the outdoor unit, be careful not to affect the normal operation of the indoor unit.
- When the amount of drain water is excessive, drain water comes out of the outdoor unit along the panel during heating operation. Provide sufficient space around the unit.
- R32 is heavier than air—as well as other refrigerants—so tends to accumulate at the base (in the vicinity of the floor). If R32 accumulates around the base, it may reach a flammable concentration in case the room is small. To avoid ignition, maintain a safe work environment by ensuring appropriate ventilation. If the refrigerant leaks in a room or an area that has insufficient ventilation, refrain from using flames until the work environment is improved by ensuring appropriate ventilation.
- Do not install the outdoor unit in a basement or machinery room, where the refrigerant stagnates.
- Install the outdoor unit in a place where at least one of the four sides is open.

Good



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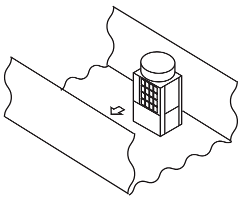

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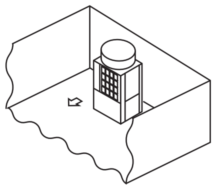

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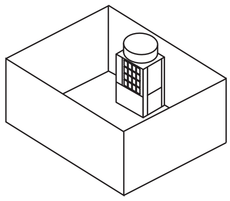
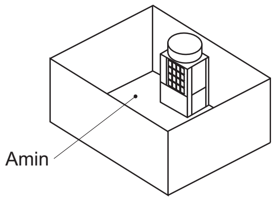
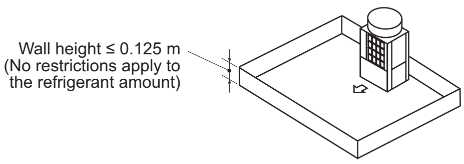


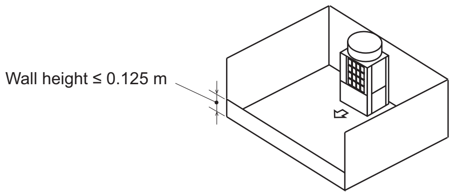
- If the unit needs to be installed in a space where all four sides are blocked, confirm that one of these situations (A, B, or C) is satisfied.
  A: Secure sufficient installation space (minimum installation area: Amin).
  Install the unit in a space with an installation area of Amin or more, corresponding to the refrigerant amount (M). (M = factory-charged refrigerant + refrigerant to be added on site)

M (kg)	Amin (m^2)
10	112
20	223
30	334
40	445
50	556
60	667



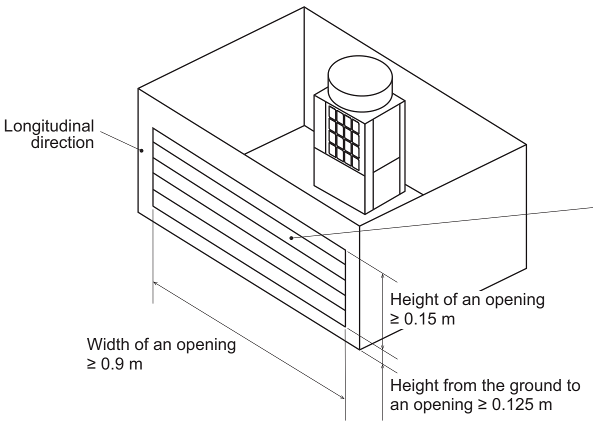
  B: Install the unit in a space with a wall height of ≤ 0.125 m.





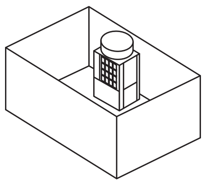
C: Create an appropriate ventilation open area.

Good



(Example: space with a louver)

NG



(Example: basement)

13. Installation restrictions for Hydro units

Observe the following restrictions that apply to the installation of Hydro unit.

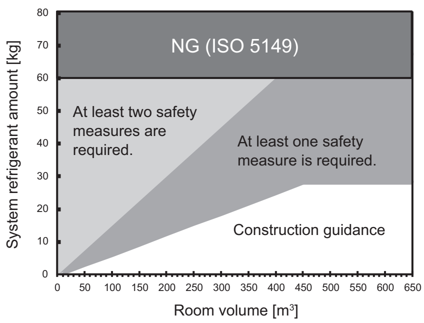
[Restrictions for Hydro unit installation]

WARNING

- **Do not place an ignition source in a space where a Hydro unit is installed or adjacent spaces not shielded by firewalls.**
  Examples: Lighters, combustion heaters, combustion boilers, and combustion cookers
- **Figure 2 shows the minimum floor areas required for given amounts of refrigerant in various refrigerant systems. Make sure the installation conditions meet the requirements shown in the figure. Take appropriate safety measures in accordance with the instructions provided in Figure 2.**
- **When installing a Hydro unit in a machine room or a riser, minimum floor area requirements shown in Figure 2 (system refrigerant amount / minimum floor area ≤ 0.11) must be observed, and the Hydro unit must be installed at a height of 1.8 meters or higher.**
- **All of the above-mentioned restrictions apply not only to new installations but also to relocations and layout changes.**

Figure 2

In addition to what is listed below, floor-standing units will require an agitator.



1-2-5 Refrigerant 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.
Different types of oil are used for R407C/R410A and for R32.
When charging the units with refrigerant oil, be sure to use the tools for designated use with refrigerant oil for R32.

Refrigerant	Refrigerating machine oil
R22	Mineral oil
R407C	Ester oil
R410A	Ester oil
R32	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.

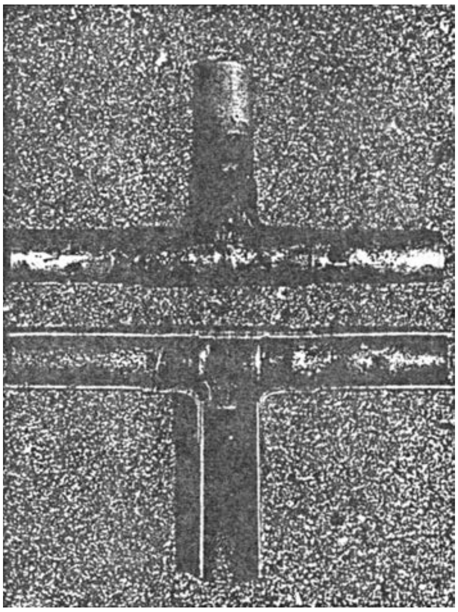
1-3 Working with Refrigerant Piping

1-3-1 Pipe Brazing

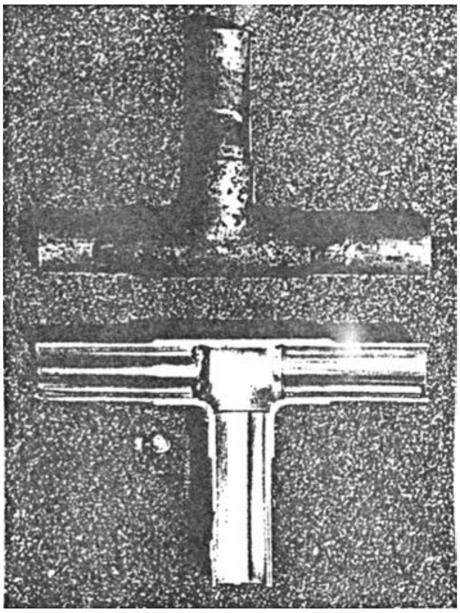
No changes have been made in the brazing procedures. Perform brazing with special care to keep foreign objects (such as oxide scale, water, and dust) out of the refrigerant system.

Example: Inside the brazed connection

Use of no inert gas during brazing



Use of inert gas during brazing



1. Items to be strictly observed

- Do not conduct refrigerant piping work outdoors if raining.
- Use inert gas during brazing.
- 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

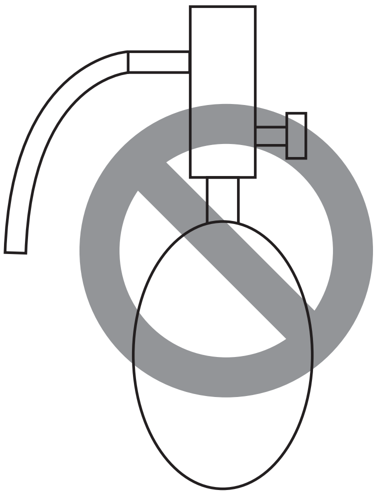
- The new refrigerating machine oil is 10 times as hygroscopic as the conventional oil and is more likely to cause unit failure if water infiltrates into the system.
- Flux generally contains chloride. Residual flux in the refrigerant circuit will cause sludge to form.

3. Notes

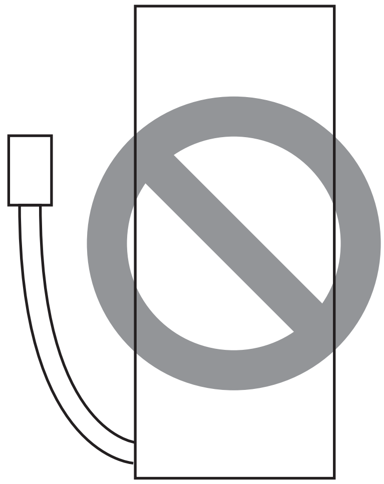
Do not use commercially available antioxidants because they may cause the pipes to corrode or refrigerating machine oil to deteriorate.

1-3-2 Air Tightness Test

No changes have been made in the detection method. Note that a refrigerant leak detector for R22 will not detect an R32 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.

2. Reasons

- Oxygen, if used for an air tightness test, poses a risk of explosion. (Only use nitrogen to check air tightness.)

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(R32) leak.

1-3-3 Vacuum Drying

(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

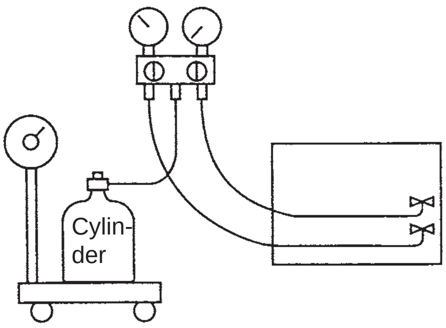
- When 5Torr(650Pa) or lower degree of vacuum cannot be attained after 3 hours of evacuation, it is likely that water has penetrated the system or that there is a leak.
- If water infiltrates the system, break the vacuum with nitrogen. Pressurize the system with nitrogen gas to 0.5kgf/cm^{2}G(0.05MPa) 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.)

7. Notes

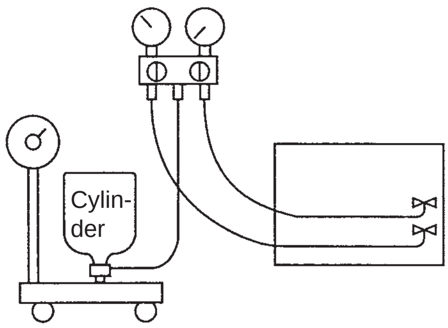
- **To evacuate air from the entire system**
  Applying a vacuum through the check joints at the refrigerant service valve on the high and low pressure sides (BV1 and 2) is not enough to attain the desired vacuum pressure.
  Be sure to apply a vacuum through the check joints at the refrigerant service valve on the high and low pressure sides (BV1 and 2) and also through the check joints on the high and low pressure sides (CJ1 and 2).
- **To evacuate air only from the outdoor units**
  Apply a vacuum through the check joints on the high and low pressure sides (CJ1, and 2).
- **To evacuate air from the hydro units and extension pipes**
  Apply a vacuum through the check joints at the refrigerant service valve on the high and low pressure sides (BV1 and 2).

1-3-4 Refrigerant Charging

Cylinder with a siphon

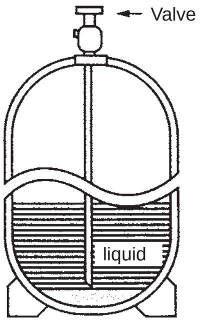


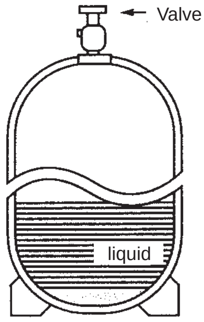
Cylinder without a siphon



Cylinder color R32 is light blue.

Refrigerant charging in the liquid state





1. Reasons

R32 is a single refrigerant with a boiling point of -52°C (-62°F) and can be handled in a similar manner as with other single refrigerants, such as R22.

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.

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 the following page(s).[8-12 Measures for Refrigerant Leakage]

1-4 Water piping

1. Precautions for water piping

Consider the following when installing a water piping system.

(1) Design pressure of the water piping

Use a water pipe that can withstand pressure of at least 0.8 MPa.

(2) Water pipe type

Use copper, plastic, steel, or stainless steel pipes for the water circuit. Do not use chloride plastic pipes.
When using copper pipes, be sure to braze the pipes under a nitrogen purge. (Oxidation during may shorten the life of the pump.)
When using iron or stainless-steel pipework, ensure that rust from the pipework does not enter the unit.

(3) Expansion tank

Install an expansion tank to accommodate expanded water.

(4) Drain piping

Install the drain pipe with a downward inclination of between 1/100 and 1/200. To prevent drain water from freezing in winter, install the drain pipe as steep an angle as practically possible and minimize the straight line. For cold climate installation, take an appropriate measure (e.g., drain heater) to prevent the drain water from freezing.

(5) Insulation

Cover the water pipe with insulating materials with the specified thickness or more to prevent thermal loss or condensation from collecting.

(6) Air vent valve

Install air vent valves to the highest places where air can accumulate.

(7) Maintenance valve

It is recommended to install valves on the inlet/outlet for each indoor unit for maintenance.

(8) Water pressure gauge

Install a water pressure gauge to check the charged pressure.

(9) Water pipe connection

When connecting to water pipe, be sure to make the connection in accordance with the relevant local laws and regulations.

2. Notes on corrosion

(1) Water quality

It is important to check the water quality beforehand. See table below (Circulating water/Makeup Water Quality Standards).

Items		Lower mid-range temperature water system: Recirculating water [20<T<60°C] [68<T<140°F]	Lower mid-range temperature water system: Make-up water	Tendency: Corrosive	Tendency: Scale-forming
Standard items	pH (25°C[77°F])	7.0 ~ 8.0	7.0 ~ 8.0	○	○
	Electric conductivity (mS/m) (25°C[77°F]) (μS/cm) (25°C[77°F])	30 or less [300 or less]	30 or less [300 or less]	○	○
	Chloride ion (mg Cl^-/ ℓ)	50 or less	50 or less	○	
	Sulfate ion (mg SO_4^{2-}/ ℓ)	50 or less	50 or less	○	
	Acid consumption (pH4.8) (mg $CaCO_3$/ ℓ)	50 or less	50 or less		○
	Total hardness (mg $CaCO_3$/ ℓ)	70 or less	70 or less		○
	Calcium hardness (mg $CaCO_3$/ ℓ)	50 or less	50 or less		○
	Ionic silica (mg SiO_2/ ℓ)	30 or less	30 or less		○
Reference items	Iron (mg Fe/ ℓ)	1.0 or less	0.3 or less	○	○
	Copper (mg Cu/ ℓ)	1.0 or less	0.1 or less	○	
	Sulfide ion (mg S^{2-}/ ℓ)	not to be detected	not to be detected	○	
	Ammonium ion (mg NH_4^+/ ℓ)	0.3 or less	0.1 or less	○	
	Residual chlorine (mg Cl/ ℓ)	0.25 or less	0.3 or less	○	
	Free carbon dioxide (mg CO_2/ ℓ)	0.4 or less	4.0 or less	○	
	Ryzner stability index	–	–	○	○

Reference : Guideline of Water Quality for Refrigeration and Air Conditioning Equipment. (JRA GL02E-1994)

(2) Debris in the water

Sand, pebbles, suspended solids, and corrosion products in water can damage the metal pipe and heat exchanger on the Hydro unit and may cause corrosion. When installing, prevent debris from entering the water. If there is debris in the water, perform debris removal operation after test run by cleaning the strainers inside the Hydro unit. (Refer to other sections for how to perform a test run.)

(3) Residual air

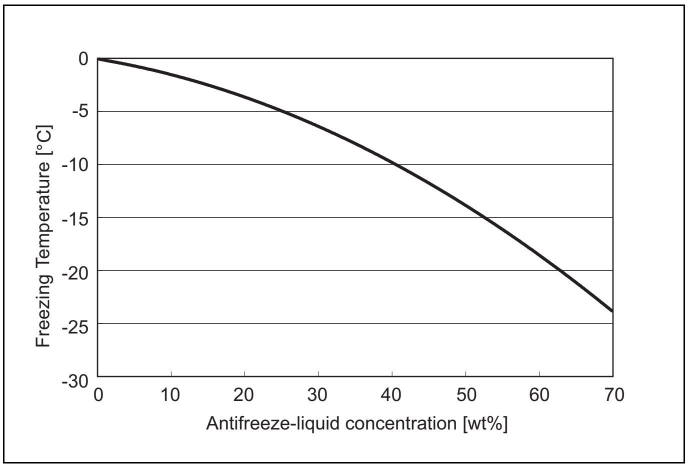
Residual air in the pipe results in water pump malfunction, noise, or water pipe corrosion in the water circuit. Ensure air is purged before use. (Refer to other sections for how to perform air vent operation.)

3. Correction by antifreeze-liquid concentration

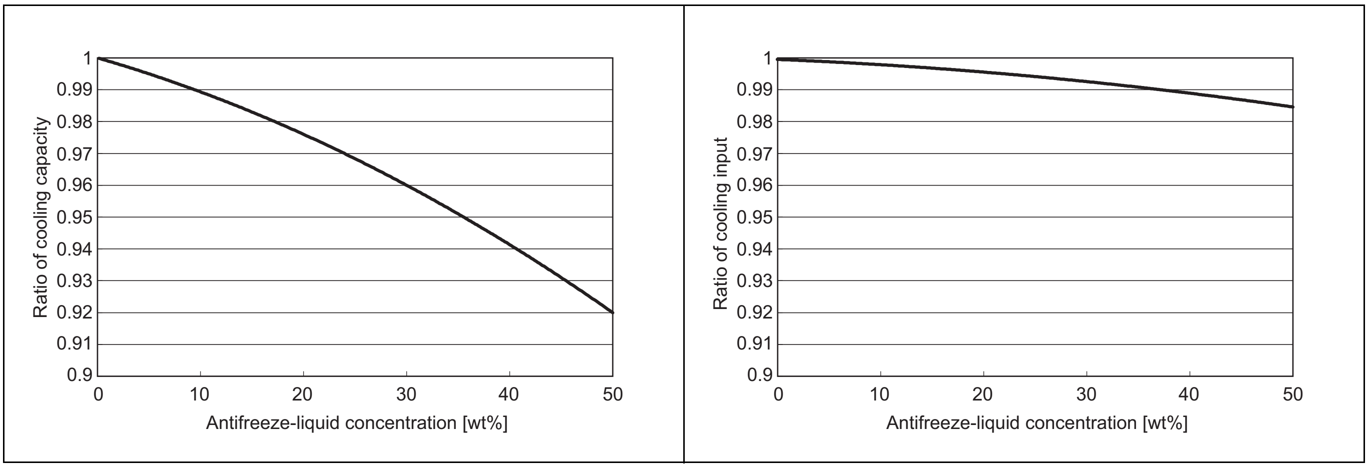
In HYBRID CITY MULTI system, antifreeze-liquid should be used to prevent the system from freezing. Refer to the following graphs for the capacity correction by antifreeze-liquid. Refer to (1) for antifreeze-liquid concentration, (2) and (3) for capacity correction by antifreeze-liquid concentration.
When adding antifreeze-liquid, be sure to perform the process in accordance with the relevant local laws and regulations.

(1) Antifreeze-liquid concentration

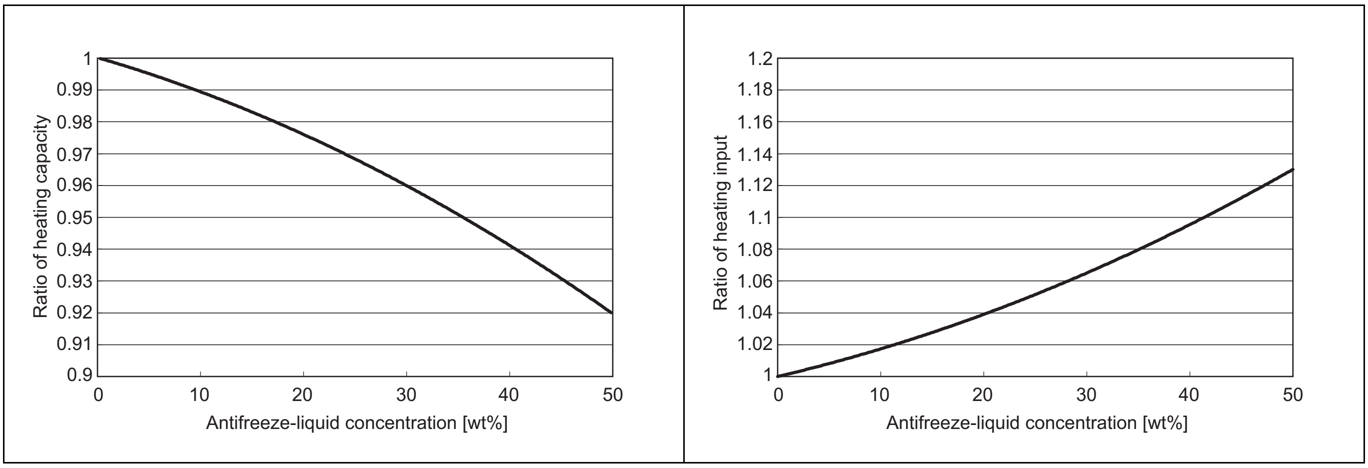
Use propylene glycol solution for antifreeze.
Refer to the following graph to estimate the antifreeze-liquid concentration required for freeze protection.



(2) Capacity correction by antifreeze-liquid concentration (cooling)



(3) Capacity correction by antifreeze-liquid concentration (heating)



1-5 Precautions for Wiring

- Control boxes house high-voltage and high-temperature electrical parts.
- They may still remain energized or hot after the power is turned off.
- When opening or closing the front cover of the control box, keep out of contact with the internal parts.
  Before inspecting the inside of the control box, turn off the power, leave the unit turned off for at least 10 minutes, and check that the voltage across pins 1 and 5 of connector RYPN has dropped to 20 VDC or less.
  It will take approximately 10 minutes until the voltage is discharged after power off.
- Disconnect the relay connector (RYFAN 1, RYFAN 2) on the outdoor unit fan before performing maintenance work.
  Before connecting or disconnecting the connector, check that the outdoor unit fan is stopped and that the voltage across pins 1 and 5 of connector RYPN has dropped to 20 VDC or less.
  If the outdoor unit fan is rotated by external forces such as strong winds, the main circuit capacitor can be charged and cause an electric shock.
  Refer to the wiring nameplate for details.
  Reconnect the relay connector (RYFAN 1, RYFAN 2) after completion of maintenance work.
- Before turning on the power, make sure the power-supply wire is properly connected. Also, perform a voltage check at the power-supply terminal block. (Refer to item (5) in section [6-1 Read before Test Run])
- When the power is on, the compressor is energized even while the compressor is stopped.
  It is energized to evaporate the liquid refrigerant that has accumulated in the compressor.
- Before connecting wiring to TB7, check that the voltage has dropped below 20 VDC.
- When a system controller is connected to the centralized control transmission cable to which power is supplied from the outdoor unit (power jumper on the outdoor unit is connected to CN40), be aware that power can be supplied to the centralized control transmission and the system controller may detect an error and send an error notice if the outdoor unit fan is rotated by external forces, such as strong winds, even when power to the outdoor unit is turned off.
- Do not keep turning on and off the power in a short period.
- Turn on the power after the power-supply voltage and frequency have stabilized.
- Distortion in the power supply voltage waveform can cause a malfunction.
- When replacing the internal electrical components of the control box, tighten the screws to the recommended tightening torque as specified below.
  Recommended tightening torque for the internal electrical components of the control box

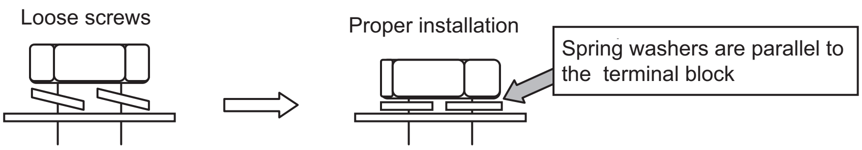
Screw	Recommended tightening torque (N·m)
M3	0.69
M4	1.47
M5	2.55
M6	2.75
M8	6.20

*1 When replacing semiconductor modules (e.g., INV board, fan board), apply heatsink silicone evenly to the semiconductor module on the back of the circuit board. Next, tighten the screws holding the semiconductor module to one-third of the specified torque, and then tighten the screws to the specified torque.

*2 Deviating from the recommended tightening torque may cause damage to the unit or its parts.

Take the following steps to ensure that the screws are properly tightened.

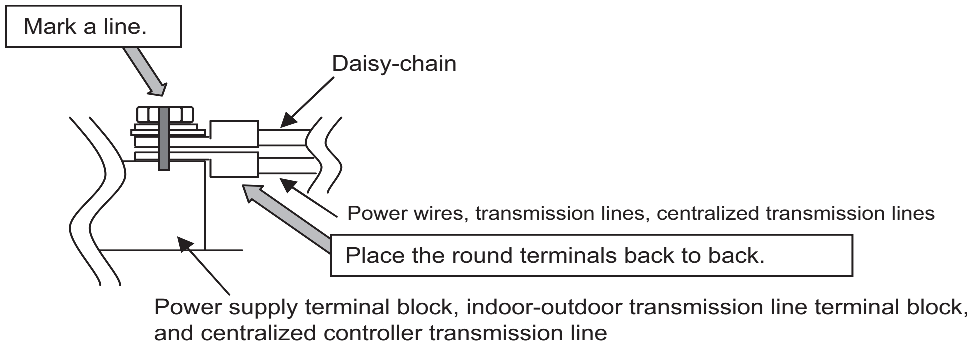
1) Ensure that the spring washers are parallel to the terminal block.
   Even if the tightening torque is observed, if the washers are not parallel to the terminal block, then the semiconductor module is not installed properly.



2) Check the wires are securely fastened to the screw terminals.

- **Screw the screws straight down so as not to damage the screw threads.**
  Hold the two round terminals back to back to ensure that the screw will screw down straight.
- **After tightening the screw, mark a line through the screw head, washer, and terminals with a permanent marker.**

Example



Poor contact caused by loose screws may result in overheating and fire.
Continued use of the damaged circuit board may cause overheating and fire.

1-6 Cautionary notes on installation environment and maintenance

Salt-resistant unit is resistant to salt corrosion, but not salt-proof. Please note the following when installing and maintaining outdoor units in marine atmosphere.

1) Install the salt-resistant unit out of direct exposure to sea breeze, and minimize the exposure to salt water mist.
2) Avoid installing a sun shade over the outdoor unit, so that rain will wash away salt deposits off the unit.
3) Install the unit horizontally to ensure proper water drainage from the base of the unit. Accumulation of water in the base of the outdoor unit will significantly accelerate corrosion.
4) Periodically wash salt deposits off the unit, especially when the unit is installed in a coastal area.
5) Repair all noticeable scratches after installation and during maintenance.
6) Periodically check the unit, and apply anti-rust agent and replace corroded parts as necessary.

Chapter 2 Restrictions

2-1 System Configurations

1. Table of compatible indoor units

The table below summarizes the types of indoor units that are compatible with different types of outdoor units.

(1) Standard series

Outdoor units		Composing units			Maximum total capacity of connectable indoor units	Maximum number of connectable indoor units	Types of connectable indoor units
M200	YNW-A1	-	-	-	100 - 260	26	W10 - W125 models R32 series indoor units
M250	YNW-A1	-	-	-	125 - 325	32	
M300	YNW-A1	-	-	-	150 - 390	39	
M350	YNW-A1	-	-	-	175 - 455	45	
M400	YNW-A1	-	-	-	200 - 520	50	
M450	YNW-A1	-	-	-	225 - 585	50	
M500	YNW-A1	-	-	-	250 - 650	50	

Note

1) "Maximum total capacity of connectable indoor units" refers to the sum of the numeric values in the indoor unit model names.
2) If the total capacity of the indoor units that are connected to a given outdoor unit exceeds the capacity of the outdoor unit, the indoor units will not be able to perform at the rated capacity when they are operated simultaneously. Select a combination of units so that the total capacity of the connected indoor units is at or below the capacity of the outdoor unit whenever possible.
3) WP model units cannot be connected.

(2) High COP series

Outdoor units		Composing units			Maximum total capacity of connectable indoor units	Maximum number of connectable indoor units	Types of connectable indoor units
EM200	YNW-A1	-	-	-	100 - 260	26	W10 - W125 models R32 series indoor units
EM250	YNW-A1	-	-	-	125 - 325	32	
EM300	YNW-A1	-	-	-	150 - 390	39	
EM350	YNW-A1	-	-	-	175 - 455	45	
EM400	YNW-A1	-	-	-	200 - 520	50	
EM450	YNW-A1	-	-	-	225 - 585	50	
EM500	YNW-A1	-	-	-	250 - 650	50	

Note

1) "Maximum total capacity of connectable indoor units" refers to the sum of the numeric values in the indoor unit model names.
2) If the total capacity of the indoor units that are connected to a given outdoor unit exceeds the capacity of the outdoor unit, the indoor units will not be able to perform at the rated capacity when they are operated simultaneously. Select a combination of units so that the total capacity of the connected indoor units is at or below the capacity of the outdoor unit whenever possible.
3) WP model units cannot be connected.

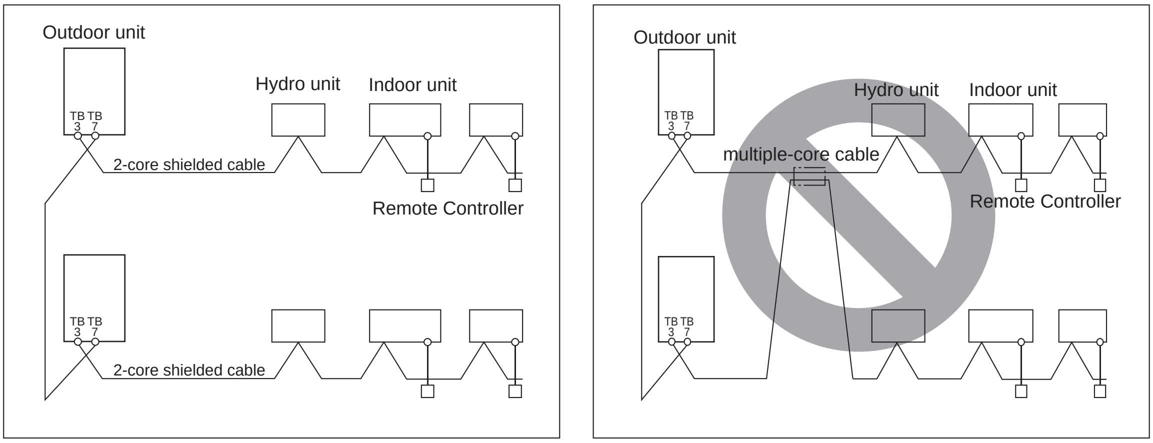
2-2 Types and Maximum Allowable Length of Cables

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 cable. Doing so will damage the electronic components on the terminal block.
6) Use 2-core shielded cables as transmission cables.

   Do not use a single multiple-core cable to connect indoor units that belong to different refrigerant systems. Doing so may result in signal transmission errors and malfunctions..



TB3: Terminal block for indoor-outdoor transmission line TB7: Terminal block for centralized control

7) When extending the transmission cable, be sure to extend the shield wire.

(2) Control wiring

Different types of control wiring are used for different systems. Before performing wiring work, refer to the following page(s).
[2-7 Example System with an MA Remote Controller]
[2-8 Example System with an ME Remote Controller]
[2-9 Example System with an MA and an ME Remote Controller]

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		200 m [656ft] max.
Maximum transmission line distance for centralized control and Indoor/ outdoor transmission line (Maximum line distance via outdoor unit)		1000 m [3280ft] (500 m [1640ft]) max. *1 *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. *1 If a given system includes one or more unit or remote controller that does not support the maximum allowable cable distance of 1,000 m [3280 ft], the maximum allowable cable distance in the system will be 500 m [1640 ft]. Refer to the latest catalog for information on which units and remote controllers support the maximum allowable cable distance of 1,000 m [3280 ft].

2) Remote controller wiring

		MA remote controller*1	ME remote controller*2
Cable type	Type	VCTF, VCTFK, CVV, CVS, VVR, VVF, VCT	Shielded cables CVVS, CPEVS, and MVVS
	Number of cores	2-core cable	2-core cable
	Cable size	0.3 to 1.25mm^2 *3 *5 [AWG22 to 16]	0.3 to 1.25mm^2 *3 [AWG22 to 16] (0.75 to 1.25mm^2) *4 [AWG18 to 16]
Maximum overall line length		200 m [656ft] max.	The section of the cable that exceeds 10m [32ft] must be included in the maximum indoor-outdoor transmission line distance.

*1 MA remote controller refers to MA remote controller (PAR-31/32/33MAA, PAR-21MAA), MA simple remote controller, and wireless remote controller.

*2 ME remote controller refers to ME remote controller, Compact ME remote controller, and LOSSNAY remote controller.

*3 The use of cables that are smaller than 0.75mm^2 (AWG18) is recommended for easy handling.

*4 When connected to the terminal block on the Simple remote controller, use cables that meet the cable size specifications shown in the parenthesis.

*5 When connecting PAR-31MAA or MA Simple remote controller, use sheathed cables with a minimum thickness of 0.3 mm^2.

2-3 Switch Settings

1. Switch setting

The necessary switch settings depend on system configuration. Before performing wiring work, refer to the following page(s).
[2-7 Example System with an MA Remote Controller]
[2-8 Example System with an ME Remote Controller]
[2-9 Example System with an MA and an ME Remote Controller]
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.

Units on which to set the switches		Symbol	Units to which the power must be shut off
CITY MULTI indoor unit	Main/sub unit	IC	Outdoor units and Indoor units
LOSSNAY *1		LC	Outdoor units and LOSSNAY
ME remote controller	Main/sub remote controller	RC	Outdoor units
MA remote controller*2	Main/sub remote controller	MA	Indoor units
CITY MULTI outdoor unit		OC	Outdoor units *2
Hydro unit		HU	Outdoor units, Hydro units

*1. Applicable when LOSSNAY units are connected to the indoor-outdoor transmission line.
*2. When setting the switch SW4 of the control board, set it with the outdoor unit power on. Refer to the following page(s).
[5-1-1 Outdoor Unit Switch Functions and Factory Settings]

2-4 M-NET Address Settings

2-4-1 Address Settings List

1. M-NET Address settings

(1) Address settings table

The need for address settings and the range of address setting depend on the configuration of the system.

Unit or controller		Address setting range	Setting method	Factory setting
CITY MULTI indoor unit	Main/sub unit	00, 01 to 50*1*5	Assign the smallest address to the main indoor unit in the group, and assign sequential address numbers to the rest of the indoor units in the same group. *4	00
LOSSNAY		00, 01 to 50*1*5	Assign an arbitrary but unique address to each of these units after assigning an address to all indoor units.	00
ME remote controller	Main remote controller	101 to 150	Add 100 to the smallest address of all the indoor units in the same group.	101
	Sub remote controller	151 to 200*2	Add 150 to the smallest address of all the indoor units in the same group.	
MA remote controller		No address settings required. (The main/sub setting must be made if 2 remote controllers are connected to the system.)		Main
CITY MULTI outdoor unit		00, 51 to 99*1,*3,*5		00
Auxiliary outdoor unit	Hydro unit	00, 52 to 100*1	Assign an address that equals the "address of the outdoor unit in the same refrigerant circuit plus 1" to the unit.	00
System controller	Group remote controller	201 to 250	Assign an address that equals the sum of the smallest group number of the group to be controlled and 200.	201
	System remote controller		Assign an arbitrary but unique address within the range listed on the left to each unit.	
	ON/OFF remote controller		Assign an address that equals the sum of the smallest group number of the group to be controlled and 200.	
	Schedule timer (compatible with M-NET)		Assign an arbitrary but unique address within the range listed on the left to each unit.	202
	Centralized controller AE-200	000, 201 to 250	Assign an arbitrary but unique address within the range listed on the left to each unit. The address must be set to "000" to control the K-control unit.	000
	LM adapter	201 to 250	Assign an arbitrary but unique address within the range listed on the left to each unit.	247

*1. Address setting is not required for a City Multi system that consists of a single refrigerant circuit (with some exceptions).
*2. To set the ME remote controller address to "200", set the rotary switches to "00".
*3. To set the outdoor unit address to "100," set the rotary switches to "50."
*4. Some indoor units have 2 or 3 controller boards that require address settings.
No. 2 controller board address must be equal to the sum of the No. 1 controller board address and 1, and the No.3 controller board address must equal to the No. 1 controller address and 2.
*5. If a given address overlaps any of the addresses that are assigned to other units, use a different, unused address within the setting range.

2-4-2 Outdoor Unit Power Jumper Connector Connection

There are limitations on the total number of units that are connectable to each refrigerant system. Refer to the DATABOOK for details.

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
Single refrigerant system	–	–	–	CN41 (Factory setting)
System with multiple outdoor units (refrigerant circuits)	Not connected	–	Not grouped	
		Not required	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.*2 *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 unit system	Not required	Grouped/not grouped	
	With connection to the centralized control system	Not required*1 (Powered from the outdoor unit)	Grouped/not grouped	
		Required *1	Grouped/not grouped	CN41 (Factory setting)

*1 The need for a power supply unit for transmission lines depends on the system configuration. Some controllers, such as GB-50ADA, have a function to supply power to the transmission lines.
*2 The replacement of the power jumper connector from CN41 to CN40 must be performed on only one outdoor unit in the system.

2-4-3 Outdoor Unit Centralized Controller Switch Setting

System configuration	Centralized control switch (SW5-1) settings *1
Connection to the system controller Not connected	OFF (Factory setting)
Connection to the system controller Connected *2	ON

*1 Set SW5-1 on all outdoor units in the same refrigerant circuit to the same setting.
*2 When only the LM adapter is connected, leave SW5-1 to OFF (as it is).

2-4-4 Room Temperature Detection Position Selection

To stop the fan during heating Thermo-OFF (SW1-7 and 1-8 on the indoor units to be set to ON), use the built-in thermistor on the remote controller or an optional thermistor.

1) To use the built-in sensor on the remote controller, set the SW1-1 to ON.
(Factory setting: SW1-1 set to "OFF".)
- Some models of remote controllers are not equipped with a built-in temperature sensor.
Use the built-in temperature sensor on the indoor unit instead.
- When using the built-in sensor on the remote controller, install the remote controller where room temperature can be detected.
(Note) Factory setting for SW1-1 on the indoor unit of the All-Fresh Models is ON.

2) When an optional temperature sensor is used, set SW1-1 to OFF, and set SW3-8 to ON.
- When using an optional temperature sensor, install it where room temperature can be detected.

2-4-5 Start/Stop Control of Indoor Units

Each indoor unit (or group of indoor units) can be controlled individually by setting SW 1-9 and 1-10.

Function	Operation of the indoor unit when the operation is resumed after the unit was stopped	Setting (SW1)*4 *5	
		9	10
Power ON/OFF by the plug*1,*2,*3	Indoor unit will go into operation regardless of its operation status before power off (power failure). (In approx. 5 minutes)	OFF	ON
Automatic restoration after power failure	Indoor unit will go into operation if it was in operation when the power was turned off (or cut off due to power failure). (In approx. 5 minutes)	ON	OFF
	Indoor unit will remain stopped regardless of its operation status before power off (power failure).	OFF	OFF

*1. Do not shut off power to the outdoor units. Doing so will cut off the power supply to the compressors and the heater on the outdoor units and may result in compressor malfunction when operation is restored after a power failure.
*2. Not applicable to units with a built-in drain pump or humidifier.
*3. Models with a built-in drain pump cannot be turned on/off by the plug individually. All the units in the same refrigerant circuits will be turned on or off by the plug.
*4. Requires that the dipswitch settings for all the units in the group be made.
*5. To control the external input to and output from the air conditioners with the PLC software for general equipment via the AE-200, set SW1-9 and SW1-10 to ON. With these settings made, the power start-stop function becomes disabled. To use the auto recovery function after power failure while these settings are made, set SW1-5 to ON.

2-4-6 Miscellaneous Settings

Cooling-only setting for the indoor unit: Cooling only model (Factory setting: SW3-1 "OFF.")
When using indoor unit as a cooling-only unit, set SW3-1 to ON.

2-4-7 Various Control Methods Using the Signal Input/Output Connector on Outdoor Unit

(1) 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 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	
	The operation mode of the unit can be changed from normal cooling operation (performance priority) to energy-saving cooling mode by an external signal input.	Energy-saving mode	CN3K	
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	CN51	Adapter for external output (PAC-SC37SA-E)
		Error status*6		

*1 For details, refer to section (2) Example of wiring connection.

*2 For details, refer to section (2) Example of wiring connection and other relevant sections in the manual. [2-5 Demand Control Overview]

*3 Low-noise mode is valid when Dip SW6-8 on the outdoor unit is set to OFF. When DIP SW6-8 is set to ON, 4 levels of on-DEMAND are possible, using different configurations of low-noise mode input and DEMAND input settings.

*4 By setting Dip SW6-7, the Low-noise mode can be switched between the Capacity priority mode and the Low-noise priority mode.
When SW6-7 is set to ON: The Low-noise mode always remains effective.
When SW6-7 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 If the formula TH7>5°C holds true, the fan will not go into operation when the contact receives signal input.

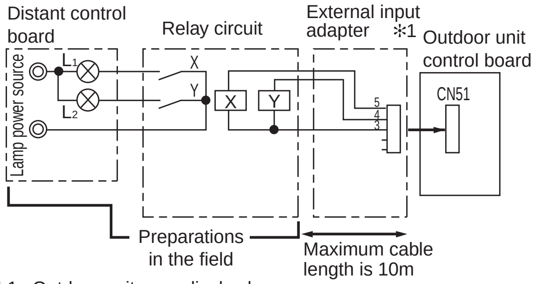
*6 When using a base heater, change the setting using SW4. When using a base heater, error output will not be available.

(2) Example of wiring connection

⚠ **CAUTION**

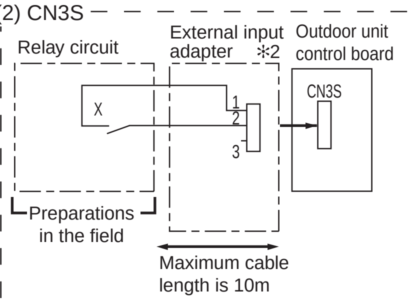
1) Wiring should be covered by insulation tube with supplementary insulation.
2) Use relays or switches with IEC or equivalent standard.
3) The electric strength between accessible parts and control circuit should have 2750V or more.

(1) CN51



L1 : Outdoor unit error display lamp✻3
L2 : Compressor operation lamp (compressor running state)
X, Y : Relay (coil =<0.9W : DC12V)
✻1. Optional part : PAC-SC37SA-E or field supply.
✻3. When using a base heater, error output will not be available.

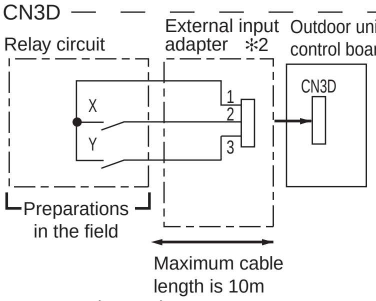
(2) CN3S



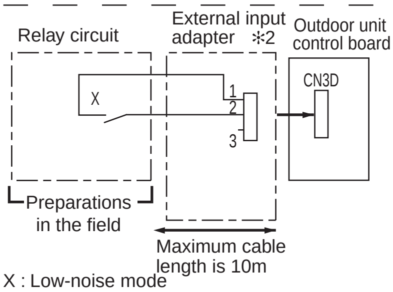
X : Relay Contact rating voltage >= DC15V
Contact rating current >= 0.1A
Minimum applicable load =< 1mA at DC

Snow sensor : The outdoor fan runs when X is closed in stop mode or thermostat mode.
✻2. Optional part : PAC-SC36NA-E or field supply.

(3) CN3D

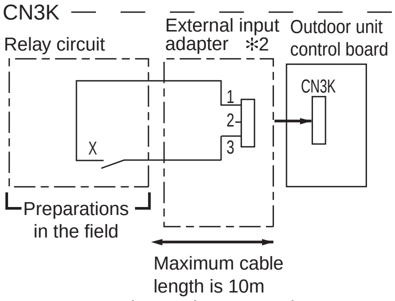


X : Low-noise mode
Y : Compressor ON/OFF
X,Y : Relay Contact rating voltage >= DC15V
Contact rating current >= 0.1A
Minimum applicable load =< 1mA at DC
✻2. Optional part : PAC-SC36NA-E or field supply.



X : Low-noise mode
X : Relay Contact rating voltage >= DC15V
Contact rating current >= 0.1A
Minimum applicable load =< 1mA at DC
✻2. Optional part : PAC-SC36NA-E or field supply.
Low-noise mode : The noise level is reduced by controlling the maximum fan frequency and maximum compressor frequency.

(4) CN3K



X : Energy-saving mode command
X : Relay Contact rating voltage >= DC15V
Contact rating current >= 0.1A
Minimum applicable load =< 1mA at DC
✻2. Optional part : PAC-SC36NA-E or field supply.

2-5 Demand Control Overview

(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). Between 2 and 4 steps of demand control is possible by setting DIP SW6-8 on the outdoor units (OC).

No	Demand control switch	DipSW6-8	Input to CN3D *2
		OC	
(a)	2 steps(0-100%)	OFF	OC
(b)	4 steps(0-50-75-100%)	ON	OC

*1. Available demand functions
(E)M200-(E)M500YNW models (single-outdoor-unit system): 2 and 4 steps shown in the rows (a) and (b) in the table above only.

*2. External signal is input to CN3D on the outdoor unit.

*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 SW6-8 is set to OFF.
When SW6-8 is set to ON on the 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.

(2) Contact input and control content

1) SW6-8: OFF (Compressor ON/OFF, Low-noise mode)

CN3D 1-3P	Compressor ON/OFF *1
Open	Compressor ON
Close	Compressor OFF

CN3D 1-2P	Low-noise mode
Open	OFF
Close	ON

*1. When SW6-8 on the outdoor unit in one refrigerant circuit system is set to ON , this function cannot be used.

2) When SW6-8 on one outdoor unit in one refrigerant circuit system is set to ON (4 levels of on-DEMAND) (*3)

	CN3D 1-2P	
CN3D 1-3P	Open	Short-circuit
Open	100% (No DEMAND)	75%
Short-circuit	0% (Compressor OFF)	50%

*3. Input the order to CN3D on the outdoor unit whose SW6-8 is set to ON.

Note the following steps to be taken when using the STEP DEMAND
(Example) When switching from 100% to 50%

Demand control steps						
	(Wrong)	100%	→	0%	→	50%
	(Correct)	100%	→	75%	→	50%

If the step listed as the wrong example above is taken, thermo may go off.
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 capacity.
When this function is enabled, the night mode cannot be enabled.

2-6 System Connection Example

Examples of typical system connection are shown below.
Refer to the Installation Manual that came with each device or controller for details.

(1) An example of a system to which an MA remote controller is connected

	System configuration	Connection to the system controller	Address start up for indoor and outdoor units	Notes
1	System with single refrigerant system	NO	Automatic address setup	
2	System with single refrigerant system	NO	Manual address setup	Connection of multiple LOSSNAY units
3	Grouping of units in different refrigerant systems	NO	Manual address setup	
4	System with single refrigerant system	With connection to transmission line for centralized control	Manual address setup	
5	System with single refrigerant system	With connection to indoor-outdoor transmission line	Manual address setup	

(2) An example of a system to which an ME remote controller is connected

	System configuration	Connection to the system controller	Address start up for indoor and outdoor units	Notes
1	System with single refrigerant system	With connection to transmission line for centralized control	Manual address setup	

(3) An example of a system to which both MA remote controller and ME remote controller are connected

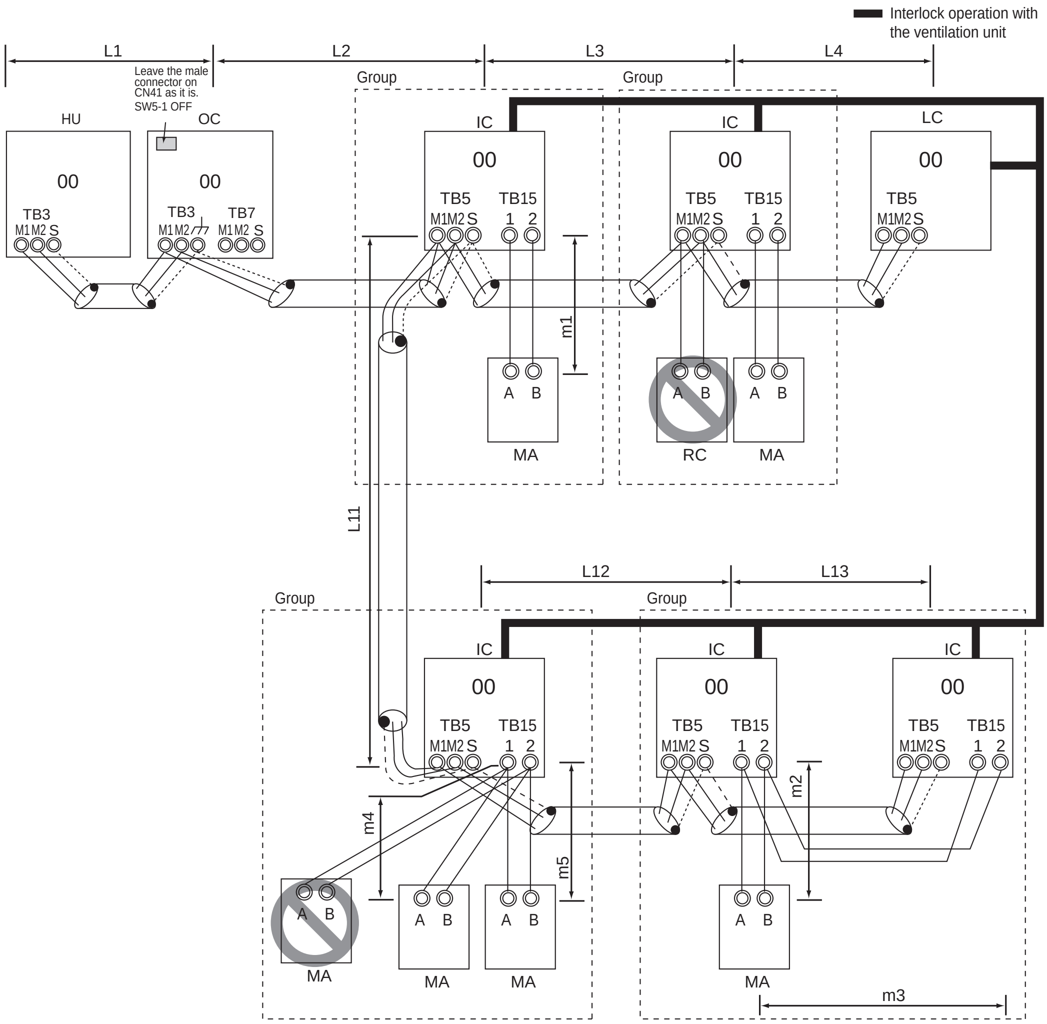
	System configuration	Connection to the system controller	Address start up for indoor and outdoor units	Notes
1	System with single refrigerant system	With connection to transmission line for centralized control	Manual address setup	

*MA remote controller and ME remote controller cannot both be connected to the same group.

2-7 Example System with an MA Remote Controller

2-7-1 Single Refrigerant System (Automatic Indoor/Outdoor Address Startup)

(1) Sample control wiring



(2) Cautions

1) ME remote controller and MA remote controller cannot both be connected to the same group of indoor units.
2) No more than 2 MA remote controllers can be connected to a group of indoor units.
3) A transmission booster is required in a system to which more than 32 indoor units (26 units if one or more indoor units of the 200 model or above is connected) are connected.
4) Automatic address setup is not available if start-stop input (CN32, CN51, CN41) is used for a group operation of indoor units or when multiple indoor units with different functions are grouped in the same group. Refer to the following page(s). [2-7-2 Single Refrigerant System with Two or More LOSSNAY Units]
5) For information about connecting two or more LOSSNAY units to a system, refer to the following page(s). [2-7-2 Single Refrigerant System with Two or More LOSSNAY Units]

(3) Maximum allowable length

1) Indoor/outdoor transmission line
   Maximum distance (1.25mm^2 [AWG16] or larger)
   L1 +L2+L3+L4$\leq$200m[656ft]
   L1 +L2+L11+L12+L13$\leq$200m[656ft]
2) Transmission line for centralized control
   No connection is required.
3) MA remote controller wiring
   Maximum overall line length
   (0.3 to 1.25mm^2 [AWG22 to 16])
   m1$\leq$200m [656ft]
   m2+m3$\leq$200m [656ft]
   m4+m5$\leq$200m [656ft]
   *When connecting PAR-31MAA or MA remote controller, use sheathed cables with a minimum thickness of 0.3 mm^2.

(4) Wiring method

1) Indoor/outdoor transmission line

Daisy-chain terminals M1 and M2 of the terminal block for indoor-outdoor transmission line (TB3) on the outdoor unit (OC), of the terminal block for indoor-outdoor transmission line (TB3) on the Hydro unit (HU), and of the terminal block for indoor-outdoor transmission line (TB5) on each indoor unit (IC). (Non-polarized two-wire)

- Only use shielded cables.

Note

Shielded cable connection
Daisy-chain the ground terminal (⏚) on the outdoor unit (OC), the S terminal of the terminal block (TB3) on the Hydro unit (HU), and the S terminal of the terminal block (TB5) on the indoor unit (IC) with the shield of the shielded cable.

2) Transmission line for centralized control

No connection is required.

3) MA remote controller wiring

Connect terminals 1 and 2 on the terminal block for MA remote controller line (TB15) on the indoor unit (IC) to the terminal block on the MA remote controller (MA). (Non-polarized two-wire)

When 2 remote controllers are connected to the system

When 2 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 two MA remote controllers.

- Set one of the MA remote controllers to sub. (Refer to MA remote controller function selection or the installation manual for the MA remote controller for the setting method.)

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) in the same group, and then connect terminals 1 and 2 on the terminal block (TB15) on the indoor unit on one end to the terminal block on the MA remote controller. (Non-polarized two-wire)

- When performing a group operation of indoor units that have different functions, "Automatic indoor/outdoor address setup" is not available.

4) LOSSNAY connection

Connect terminals M1 and M2 on the terminal block (TB5) on the indoor unit (IC) to the appropriate terminals on the terminal block (TB5) on LOSSNAY (LC). (Non-polarized two-wire)

- Interlock operation setting with all the indoor units in the same system will automatically be made. (It is required that the Lossnay unit be turned on before the outdoor unit.)
- For information about certain types of systems (1. Systems in which the LOSSNAY unit is interlocked with only part of the indoor units, 2. Systems in which the LOSSNAY unit is operated independently from the indoor units, 3. Systems in which more than 16 indoor units are interlocked with the LOSSNAY unit, and 4. Systems to which two ore more LOSSNAY units are connected), refer to the following page(s). [2-7-2 Single Refrigerant System with Two or More LOSSNAY Units]

5) Switch setting

No address settings required.

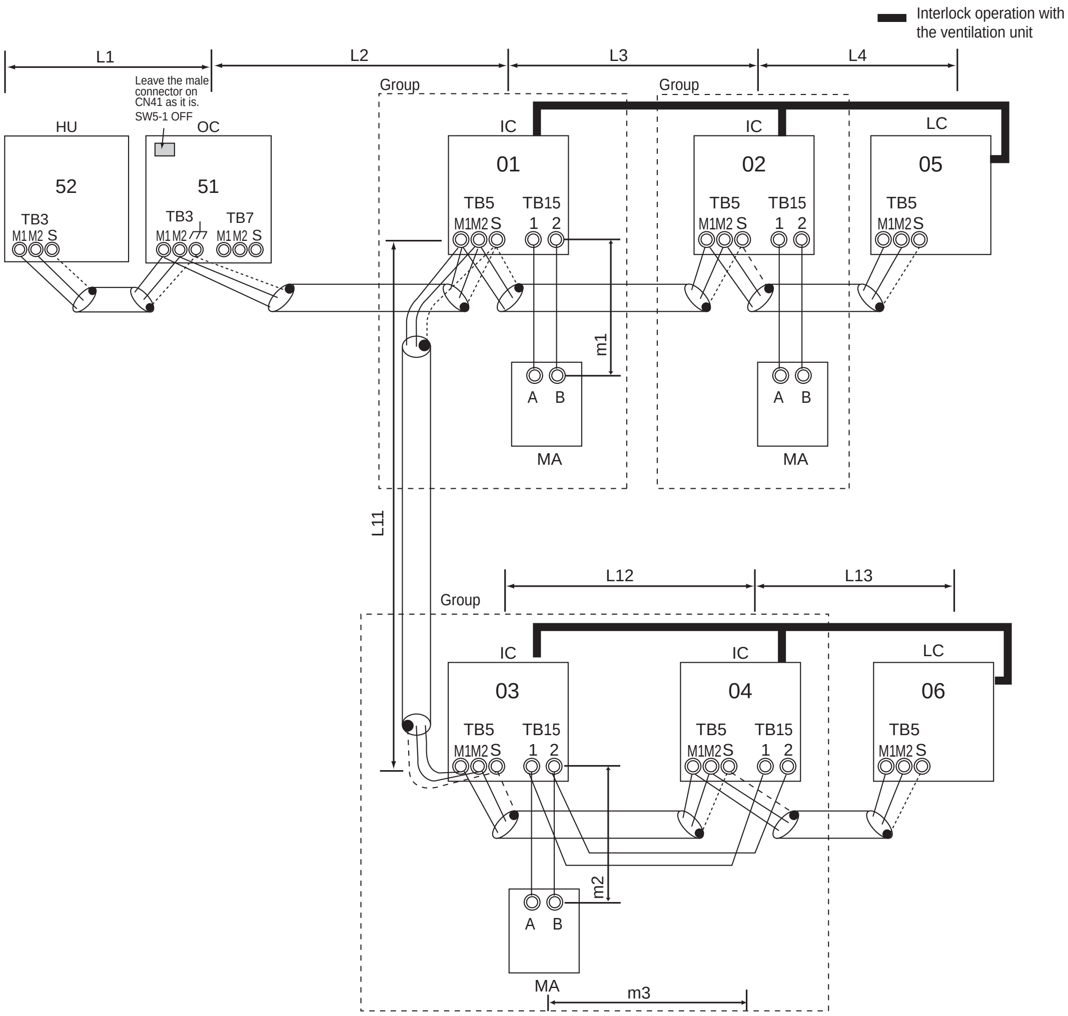
6) When replacing the control board on only some of the outdoor units, delete all connection information. (Refer to [5-1-1 Outdoor Unit Switch Functions and Factory Settings] for information on switch functions.)

(5) Address setting method

Procedures	Unit or controller			Address setting range	Setting method	Notes	Factory setting
1	Indoor unit	Main unit	IC	No settings required.	-	For information about how to perform a group operation of indoor units that feature different functions, refer to the following page(s). [2-7-2 Single Refrigerant System with Two or More LOSSNAY Units]	00
		Sub unit	IC				
2	LOSSNAY		LC	No settings required.	-		00
3	MA remote controller	Main remote controller	MA	No settings required.	-		Main
		Sub remote controller	MA	Sub remote controller	Settings to be made according to the remote controller function selection		
4	Outdoor unit		OC	No settings required.	-		00
5	Auxiliary outdoor unit	Hydro unit	HU	No settings required.	-		00

2-7-2 Single Refrigerant System with Two or More LOSSNAY Units

(1) Sample control wiring



(2) Cautions

1) ME remote controller and MA remote controller cannot both be connected to the same group of indoor units.
2) No more than 2 MA remote controllers can be connected to a group of indoor units.
3) A transmission booster is required in a system to which more than 32 indoor units (26 units if one or more indoor units of the 200 model or above is connected) are connected.
   - Refer to the DATABOOK for further information about how many booster units are required for a given system.

(3) Maximum allowable length

1) Indoor/outdoor transmission line
   Same as 2-7-1
2) Transmission line for centralized control
   No connection is required.
3) MA remote controller wiring
   Same as 2-7-1

(4) Wiring method

1) Indoor/outdoor transmission line

   Same as 2-7-1

   Shielded cable connection

   Same as 2-7-1

2) Transmission line for centralized control

   No connection is required.

3) MA remote controller wiring

   Same as 2-7-1

   When 2 remote controllers are connected to the system

   Same as 2-7-1

   Group operation of indoor units

   Same as 2-7-1

4) LOSSNAY connection

   Connect terminals M1 and M2 on the terminal block (TB5) on the indoor unit (IC) to the appropriate terminals on the terminal block (TB5) on LOSSNAY (LC). (Non-polarized two-wire)

   ⬩Interlock setting between the indoor units and LOSSNAY units must be entered on the remote controller. For information about how to interlock the operation of indoor and LOSSNAY units, refer to the remote controller installation manual.

5) Switch setting

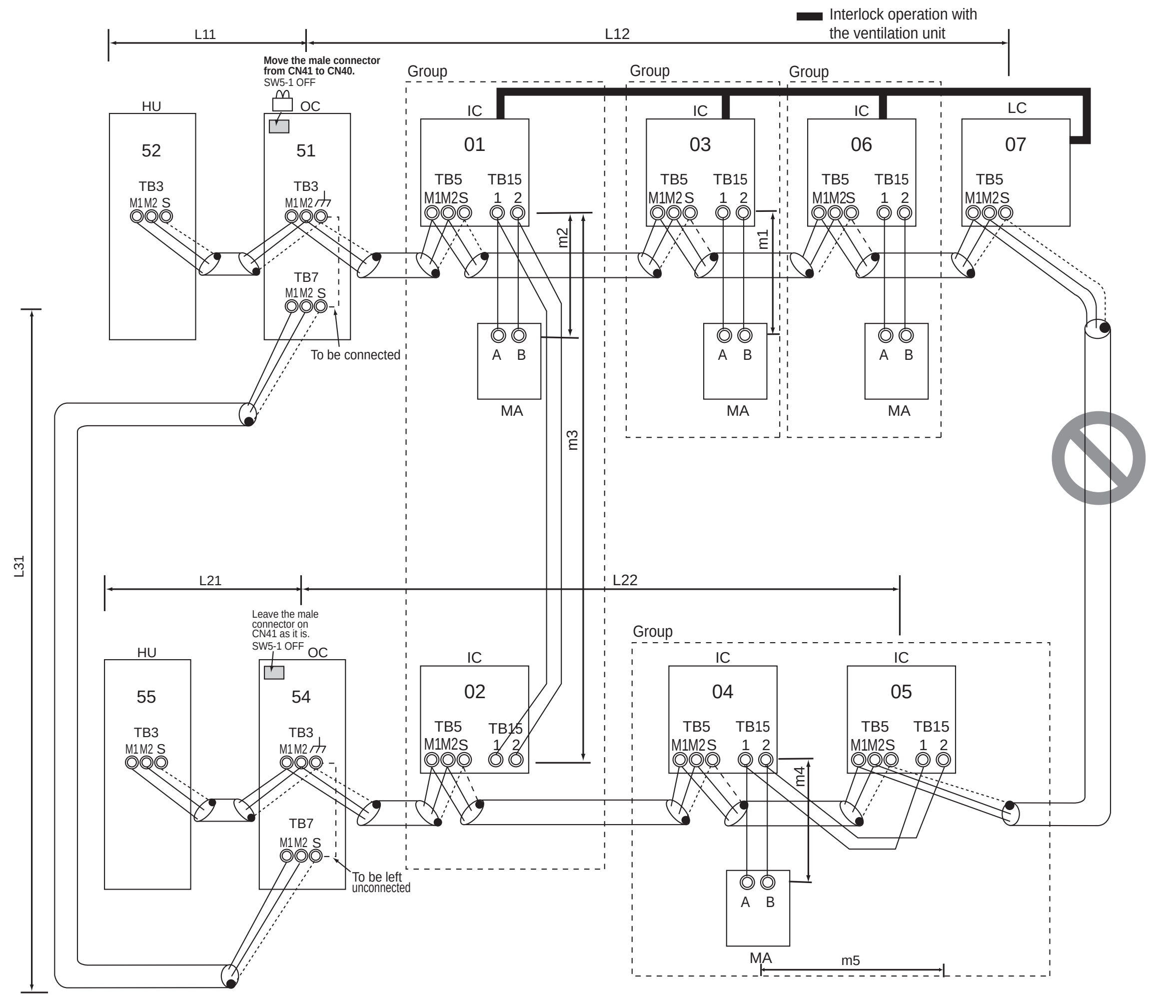
   Address setting is required as follows.

(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 the smallest address to the main unit in the group.	To perform a group operation of indoor units that have different functions, designate the indoor unit in the group with the greatest number of functions as the main unit.	00
		Sub unit			Assign sequential numbers starting with the address of the main unit in the same group +1. (Main unit address +1, main unit address +2, main unit address +3, etc.)		
2	LOSSNAY		LC	01 to 50	Assign an arbitrary but unique address to each of these units after assigning an address to all indoor units.	None of these addresses may overlap any of the indoor unit addresses.	00
3	MA remote controller	Main remote controller	MA	No settings required.	-		Main
		Sub remote controller	MA	Sub remote controller	Settings to be made according to the remote controller function selection		
4	Outdoor unit		OC	51 to 99	Assign the smallest address to the outdoor unit (OC) in the same refrigerant circuit.	To set the address to 100, set the rotary switches to 50. If the address assigned to the hydro unit overlaps any of the addresses assigned to the outdoor units, use a different, unused address in the specified setting range.	00
5	Auxiliary outdoor unit	Hydro unit	HU	52 to 100	Assign an address that equals the "address of the outdoor unit in the same refrigerant circuit plus 1" to the unit.		00

2-7-3 Grouped Operation of Units in Separate Refrigerant Circuits

(1) Sample control wiring



(2) Cautions

1) ME remote controller and MA remote controller can not both be connected to the same group of indoor units.
2) No more than 2 MA remote controllers can be connected to a group of indoor units.
3) Do not connect the terminal blocks (TB5) on the indoor units that are connected to different outdoor units with each other.
4) Replacement of male power jumper connector (CN41) must be performed only on one of the outdoor units.
5) Provide grounding to S terminal on the terminal block for transmission line for centralized control (TB7) on only one of the outdoor units.
6) A transmission booster is required in a system to which more than 32 indoor units (26 units if one or more indoor units of the 200 model or above is connected) are connected.

   •Refer to the DATABOOK for further information about how many booster units are required for a given system.

(3) Maximum allowable length

1) Indoor/outdoor transmission line

   Maximum distance (1.25mm^2 [AWG16] or larger)
   L11+L12≤200m [656ft]
   L21+L22≤200m [656ft]
2) Transmission line for centralized control

   L21+L31≤200m [656ft]
3) MA remote controller wiring

   Same as 2-7-1
4) Maximum line distance via outdoor unit (1.25mm^2 [AWG16] or larger)

   L12(L11)+L31+L22(L21)≤1000 m [3280ft] (500 m [1640ft]) *1

   *1 If a given system includes one or more unit or remote controller that does not support the maximum allowable cable distance of 1,000 m [3280 ft], the maximum allowable cable distance in the system will be 500 m [1640 ft]. Refer to the latest catalog for information on which units and remote controllers support the maximum allowable cable distance of 1,000 m [3280 ft].

2 Restrictions

(4) Wiring method

1) Indoor/outdoor transmission line

   Same as 2-7-1

   ♦Only use shielded cables.

   Shielded cable connection

   Same as 2-7-1

2) Transmission line for centralized control

   Daisy-chain terminals M1 and M2 on the terminal block for transmission line for centralized control (TB7) on the outdoor units (OC) in different refrigerant circuits.

Note

a) When connecting TB7, only commence after checking that the voltage is below 20 VDC.

   ♦Only use shielded cables.

   Shielded cable connection

   Daisy-chain the S terminal on the terminal block (TB7) on the outdoor units (OC) with the shield wire of the shielded cable. Short-circuit the earth terminal (⏚) and the S terminal on the terminal block (TB7) on the outdoor unit whose power jumper connector is mated with CN40.

3) MA remote controller wiring

   Same as 2-7-1

   When 2 remote controllers are connected to the system

   Same as 2-7-1

   Group operation of indoor units

   Same as 2-7-1

4) LOSSNAY connection

   Same as 2-7-2

5) Switch setting

   Address setting is required as follows.

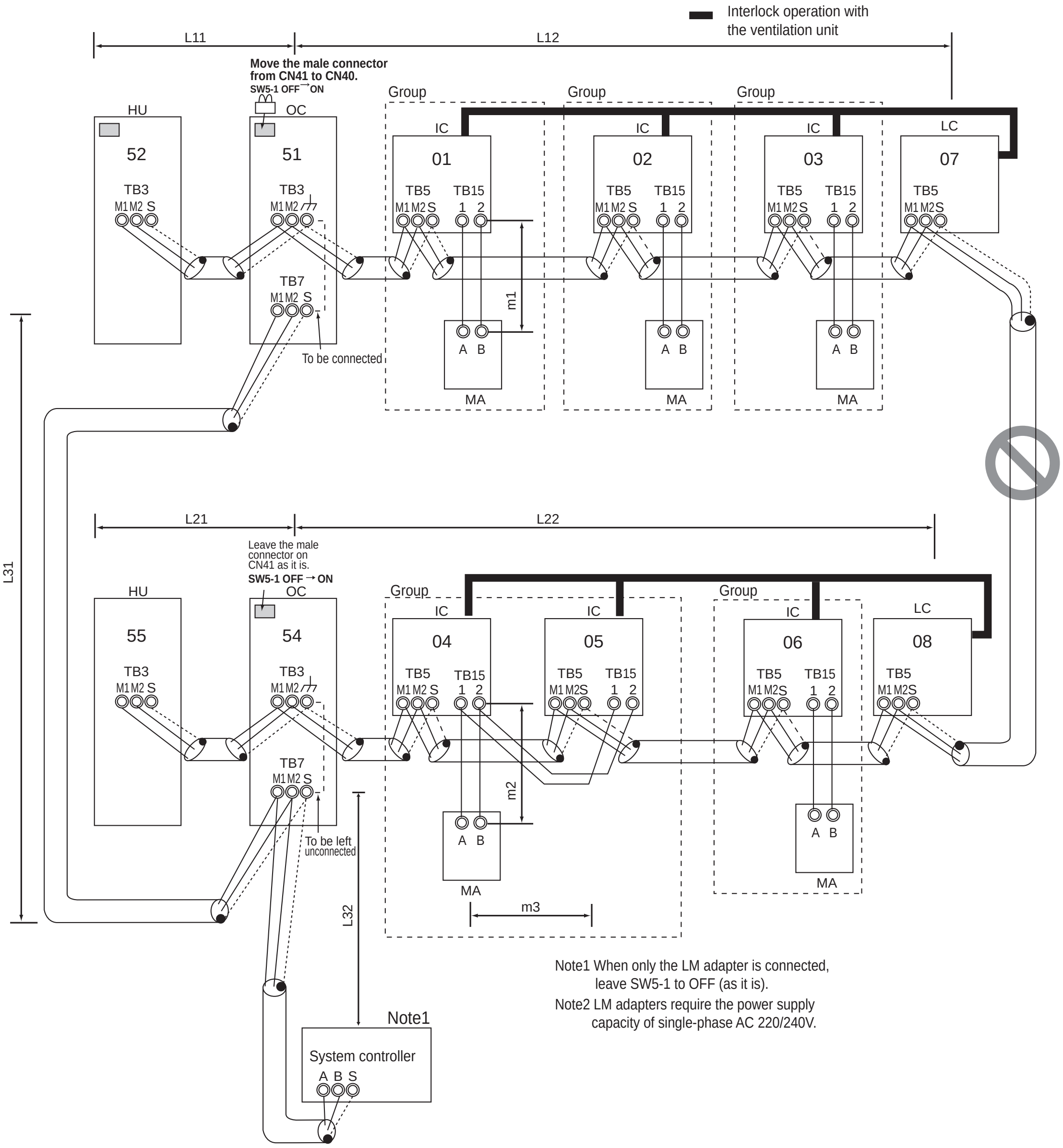
(5) Address setting method

Procedures	Unit or controller			Address setting range	Setting method	Notes	Factory setting
1	Indoor unit	Main unit	IC	01 to 50	Assign the smallest address to the main unit in the group.	To perform a group operation of indoor units that have different functions, designate the indoor unit in the group with the greatest number of functions as the main unit.	00
		Sub unit			Assign sequential numbers starting with the address of the main unit in the same group +1. (Main unit address +1, main unit address +2, main unit address +3, etc.)		
2	LOSSNAY		LC	01 to 50	Assign an arbitrary but unique address to each of these units after assigning an address to all indoor units.	None of these addresses may overlap any of the indoor unit addresses.	00
3	MA remote controller	Main remote controller	MA	No settings required.	-		Main
		Sub remote controller	MA	Sub remote controller	Settings to be made according to the remote controller function selection		
4	Outdoor unit		OC	51 to 99	Assign the smallest address to the outdoor unit (OC) in the same refrigerant circuit.	To set the address to 100, set the rotary switches to 50. If the address assigned to the hydro unit overlaps any of the addresses assigned to the outdoor units, use a different, unused address in the specified setting range.	00
5	Auxiliary outdoor unit	Hydro unit	HU	52 to 100	Assign an address that equals the "address of the outdoor unit in the same refrigerant circuit plus 1" to the unit.		00

2-7-4 System with a Connection of System Controller to Centralized Control Transmission Line

(1) Sample control wiring

An example of a system in which a system controller is connected to the transmission cable for the centralized control system and the power is supplied from the outdoor unit



(2) Cautions

1) ME remote controller and MA remote controller cannot both be connected to the same group of indoor units.
2) No more than 2 MA remote controllers can be connected to a group of indoor units.
3) Do not connect the terminal blocks (TB5) on the indoor units that are connected to different outdoor units with each other.
4) Replacement of male power jumper connector (CN41) must be performed only on one of the outdoor units (not required if power to the transmission line for centralized control is supplied from a controller with a power supply function, such as GB-50ADA).
5) Short-circuit the shield terminal (S terminal) and the earth terminal (⏚) on the terminal block for transmission line for centralized control (TB7) on the outdoor unit whose power jumper connector is mated with CN40.
6) A transmission booster is required in a system to which more than 32 indoor units (26 units if one or more indoor units of the 200 model or above is connected) are connected.
   - Refer to the DATABOOK for further information about how many booster units are required for a given system.
7) When a power supply unit is connected to the transmission line for centralized control, leave the power jumper connector on CN41 as it is (factory setting).

(3) Maximum allowable length

1) Indoor/outdoor transmission line
   Same as 2-7-3
2) Transmission line for centralized control
   L31+L32(L21) ≤ 200m [656ft]
3) MA remote controller wiring
   Same as 2-7-1
4) Maximum line distance via outdoor unit
   (1.25mm^2 [AWG16] or larger)
   L32+L31+L12(L11) ≤ 1000 m [3280ft] (500 m [1640ft])*1
   L32+L22(L21) ≤ 1000 m [3280ft] (500 m [1640ft])*1
   L12(L11)+L31+L22(L21) ≤ 1000 m [3280ft] (500 m [1640ft])*1

   *1 If a given system includes one or more unit or remote controller that does not support the maximum allowable cable distance of 1,000 m [3280 ft], the maximum allowable cable distance in the system will be 500 m [1640 ft]. Refer to the latest catalog for information on which units and remote controllers support the maximum allowable cable distance of 1,000 m [3280 ft].

(4) Wiring method

1) Indoor/outdoor transmission line

Same as 2-7-1

Shielded cable connection

Same as 2-7-1

2) Transmission line for centralized control

Daisy-chain terminals A and B on the system controller, terminals M1 and M2 on the terminal block for transmission line for centralized control (TB7) on the outdoor units (OC) in different refrigerant circuits.
If a system controller is connected, set the central control switch (SW5-1) on the control board of all outdoor units to "ON."

Note

a) When connecting TB7, only commence after checking that the voltage is below 20 VDC.

♦Only use shielded cables.

Shielded cable connection

Daisy-chain the S terminal on the terminal block (TB7) on the outdoor units (OC) with the shield wire of the shielded cable. Daisy-chain the S-terminal of the system controller and the S-terminals on TB7 (terminal block for centralized control transmission lines) of the outdoor units (OC) in different refrigerant circuits. Short-circuit the earth terminal (⏚) and the S terminal on the terminal block (TB7) on the outdoor unit whose power jumper connector is mated with CN40.

3) MA remote controller wiring

Same as 2-7-1

When 2 remote controllers are connected to the system

Same as 2-7-1

Group operation of indoor units

Same as 2-7-1

4) LOSSNAY connection

Connect terminals M1 and M2 on the terminal block (TB5) on the indoor unit (IC) to the appropriate terminals on the terminal block for indoor-outdoor transmission line (TB5) on LOSSNAY (LC). (Non-polarized 2-core cable)

♦Indoor units must be interlocked with the LOSSNAY unit using the system controller. (Refer to the operation manual for the system controller for the setting method.) Interlock setting from the remote controller is required if the ON/OFF remote controller alone or the LM adapter alone is connected.

5) Switch setting

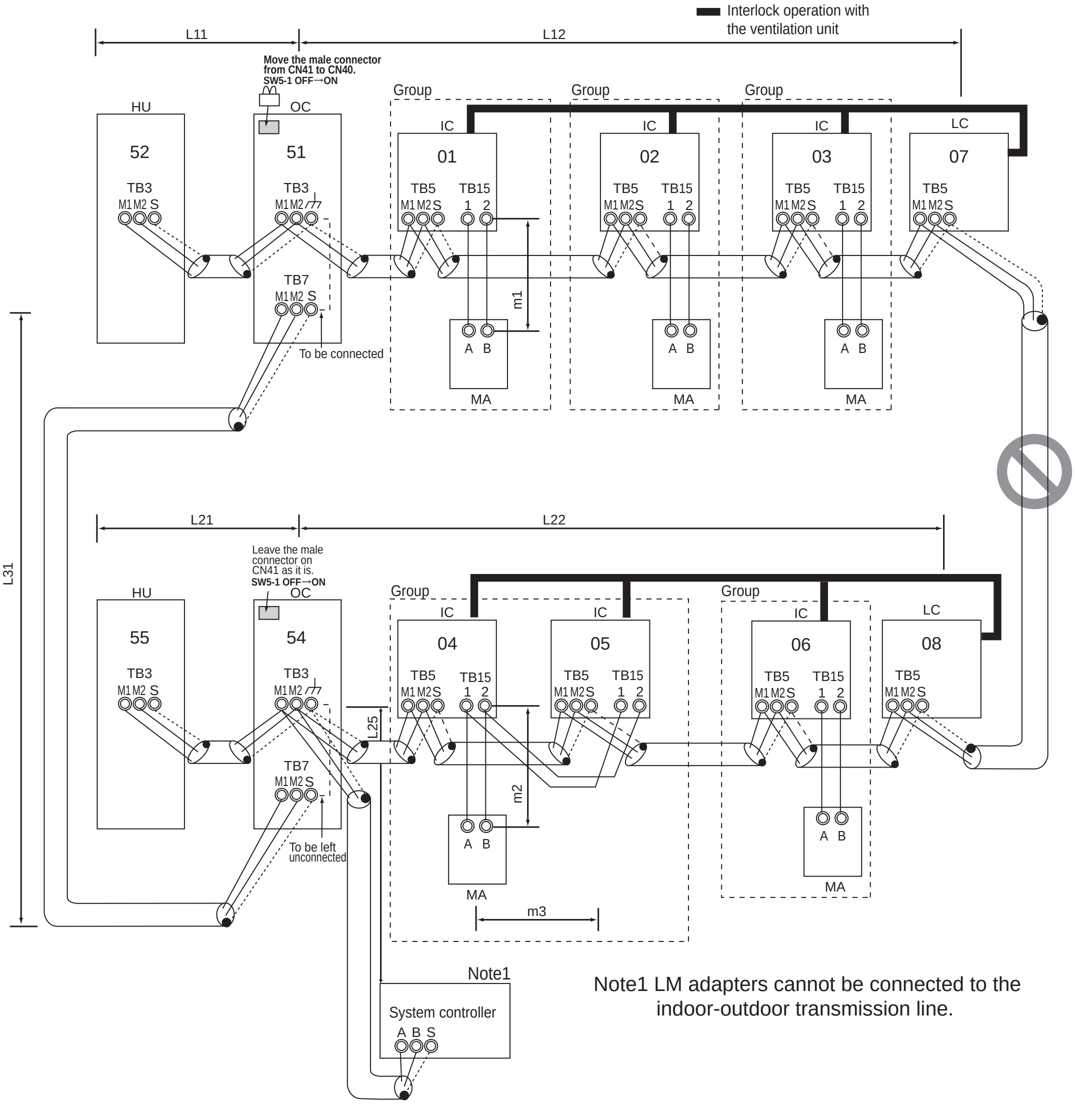
Address setting is required as follows.

(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 the smallest address to the main unit in the group.	To perform a group operation of indoor units that have different functions, designate the indoor unit in the group with the greatest number of functions as the main unit.	00
		Sub unit			Assign sequential numbers starting with the address of the main unit in the same group +1. (Main unit address +1, main unit address +2, main unit address +3, etc.)		
2	LOSSNAY		LC	01 to 50	Assign an arbitrary but unique address to each of these units after assigning an address to all indoor units.	None of these addresses may overlap any of the indoor unit addresses.	00
3	MA remote controller	Main remote controller	MA	No settings required.	-	Enter the same indoor unit group settings on the system controller as the ones that were entered on the MA remote controller.	Main
		Sub remote controller	MA	Sub remote controller	Settings to be made according to the remote controller function selection		
4	Outdoor unit		OC	51 to 99	Assign the smallest address to the outdoor unit (OC) in the same refrigerant circuit.	To set the address to 100, set the rotary switches to 50. If the address assigned to the hydro unit overlaps any of the addresses assigned to the outdoor units, use a different, unused address in the specified setting range.	00
5	Auxiliary outdoor unit	Hydro unit	HU	52 to 100	Assign an address that equals the "address of the outdoor unit in the same refrigerant circuit plus 1" to the unit.		00

2-7-5 System with a Connection of System Controller to Indoor-Outdoor Transmission Line

(1) Sample control wiring



(2) Cautions

1) ME remote controller and MA remote controller cannot both be connected to the same group of indoor units.
2) No more than 2 MA remote controllers can be connected to a group of indoor units.
3) Do not connect the terminal blocks (TB5) on the indoor units that are connected to different outdoor units with each other.
4) Replacement of male power jumper connector (CN41) must be performed only on one of the outdoor units (not required if power to the transmission line for centralized control is supplied from a controller with a power supply function, such as GB-50ADA).
5) Provide grounding to S terminal on the terminal block for transmission line for centralized control (TB7) on only one of the outdoor units.
6) A maximum of three system controllers can be connected to the indoor-outdoor transmission line. (AE-200, AG-150A, GB-50ADA, or G(B)-50A are not connectable.)
7) When the total number of indoor units exceeds 26, it may not be possible to connect a system controller on the indoor-outdoor transmission line.

   In a system to which more than 18 indoor units including one or more indoor units of 200 model or above are connected, there may be cases in which the system controller cannot be connected to the indoor-outdoor transmission line.

   •Refer to the DATABOOK for further information about how many booster units are required for a given system.

(3) Maximum allowable length

1) Indoor/outdoor transmission line

   Maximum distance (1.25mm^2 [AWG16] or larger)
   L11+L12≤200m [656ft]
   L21+L22≤200m [656ft]
   L25≤200m [656ft]
2) Transmission line for centralized control

   L31+L21≤200m [656ft]
3) MA remote controller wiring

   Same as 2-7-1
4) Maximum line distance via outdoor unit
   (1.25mm^2 [AWG16] or larger)

   L25+L31+L12(L11)≤1000 m [3280ft] (500 m [1640ft])*1
   L12(L11)+L31+L22(L21)≤1000 m [3280ft] (500 m [1640ft])*1

   *1 If a given system includes one or more unit or remote controller that does not support the maximum allowable cable distance of 1,000 m [3280 ft], the maximum allowable cable distance in the system will be 500 m [1640 ft]. Refer to the latest catalog for information on which units and remote controllers support the maximum allowable cable distance of 1,000 m [3280 ft].

(4) Wiring method

1) Indoor/outdoor transmission line

Daisy-chain terminals M1 and M2 of the terminal block for indoor-outdoor transmission line (TB3) on the outdoor unit (OC), of the terminal block for indoor-outdoor transmission line (TB3) on the Hydro unit (HU), of the terminal block for indoor-outdoor transmission line (TB5) on each indoor unit (IC), and the S terminal of the system controller.(Non-polarized two-wire)

⬩Only use shielded cables.

Note

Shielded cable connection

Daisy-chain the ground terminal (⏚) on the outdoor unit (OC), the S terminal of the terminal block (TB3) on the HU, and the S terminal of the terminal block (TB5) on the indoor unit (IC) with the shield of the shielded cable.

2) Transmission line for centralized control

Daisy-chain terminals M1 and M2 on the terminal block for transmission line for centralized control (TB7) on the outdoor units (OC) in different refrigerant circuits.
Set the central control switch (SW5-1) on the control board of all outdoor units to "ON."

Note

a) When connecting TB7, only commence after checking that the voltage is below 20 VDC.

⬩Only use shielded cables.

Shielded cable connection

Daisy-chain the S terminal on the terminal block (TB7) on the outdoor units (OC) with the shield wire of the shielded cable. Short-circuit the earth terminal (⏚) and the S terminal on the terminal block (TB7) on the outdoor unit whose power jumper connector is mated with CN40.

3) MA remote controller wiring

Same as 2-7-1

When 2 remote controllers are connected to the system

Same as 2-7-1

Group operation of indoor units

Same as 2-7-1

4) LOSSNAY connection

Connect terminals M1 and M2 on the terminal block (TB5) on the indoor units (IC) to the appropriate terminals on the terminal block for indoor-outdoor transmission line (TB5) on LOSSNAY (LC). (Non-polarized two-wire)

⬩Indoor units must be interlocked with the LOSSNAY unit using the system controller. (Refer to the operation manual for the system controller for the setting method.) Interlock setting from the remote controller is required if the ON/OFF remote controller alone is connected.

5) Switch setting

Address setting is required as follows.

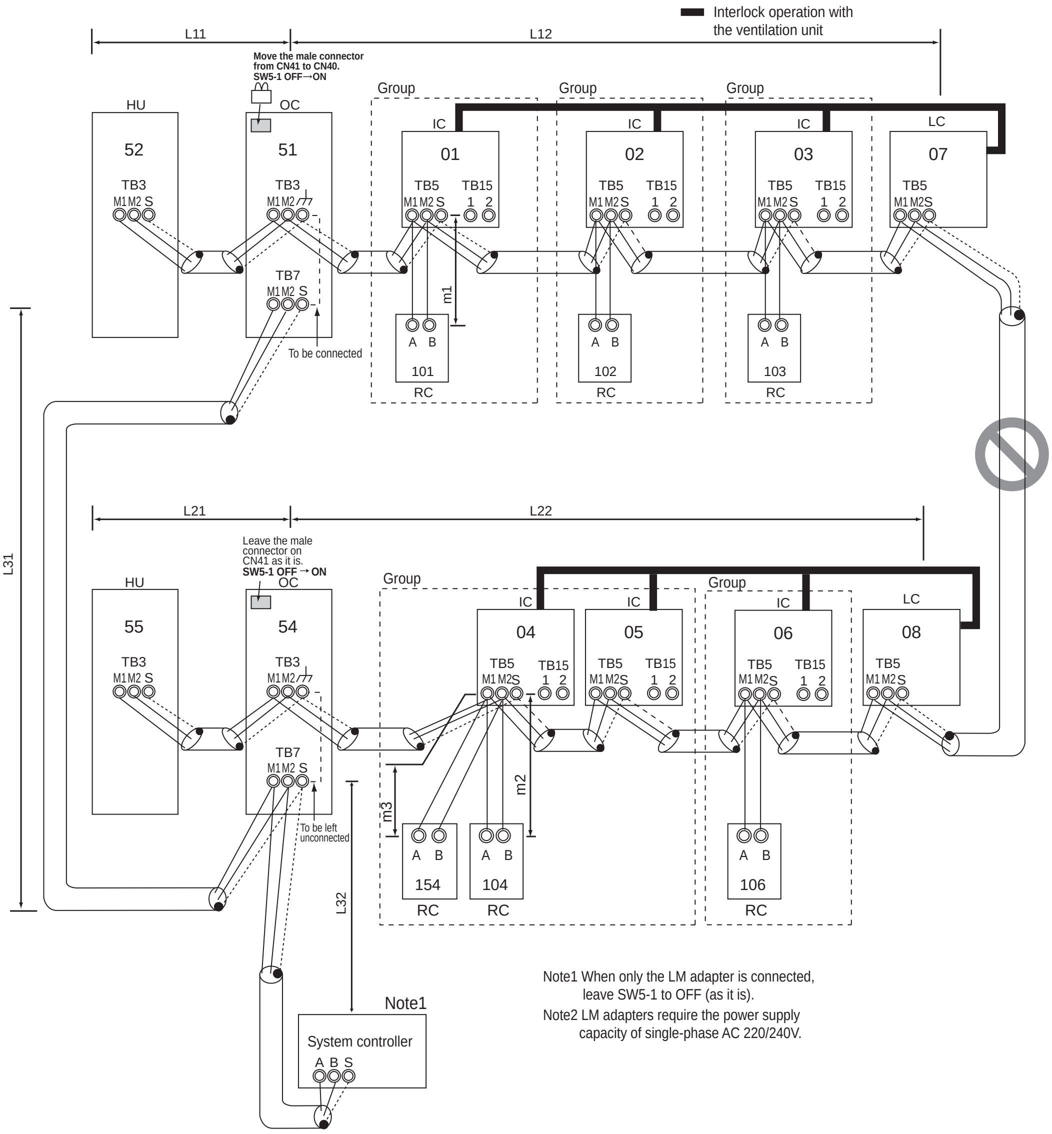
(5) Address setting method

Procedures	Unit or controller			Address setting range	Setting method	Notes	Factory setting
1	Indoor unit	Main unit	IC	01 to 50	Assign the smallest address to the main unit in the group.	To perform a group operation of indoor units that have different functions, designate the indoor unit in the group with the greatest number of functions as the main unit.	00
		Sub unit			Assign sequential numbers starting with the address of the main unit in the same group +1. (Main unit address +1, main unit address +2, main unit address +3, etc.)		
2	LOSSNAY		LC	01 to 50	Assign an arbitrary but unique address to each of these units after assigning an address to all indoor units.	None of these addresses may overlap any of the indoor unit addresses.	00
3	MA remote controller	Main remote controller	MA	No settings required.	-	Enter the same indoor unit group settings on the system controller as the ones that were entered on the MA remote controller.	Main
		Sub remote controller	MA	Sub remote controller	Settings to be made according to the remote controller function selection		
4	Outdoor unit		OC	51 to 99	Assign the smallest address to the outdoor unit (OC) in the same refrigerant circuit.	To set the address to 100, set the rotary switches to 50. If the address assigned to the hydro unit overlaps any of the addresses assigned to the outdoor units, use a different, unused address in the specified setting range.	00
5	Auxiliary outdoor unit	Hydro unit	HU	52 to 100	Assign an address that equals the "address of the outdoor unit in the same refrigerant circuit plus 1" to the unit.		00

2-8 Example System with an ME Remote Controller

2-8-1 System with a Connection of System Controller to Centralized Control Transmission Line

(1) Sample control wiring



(2) Cautions

1) ME remote controller and MA remote controller cannot both be connected to the same group of indoor units.
2) No more than 2 ME remote controllers can be connected to a group of indoor units.
3) Do not connect the terminal blocks (TB5) on the indoor units that are connected to different outdoor units with each other.
4) Replacement of male power jumper connector (CN41) must be performed only on one of the outdoor units (not required if power to the transmission line for centralized control is supplied from a controller with a power supply function, such as AE-200E).
5) Provide an electrical path to ground for the S terminal on the terminal block for centralized control (TB7) on only one of the outdoor units.
6) A transmission booster must be connected to a system in which the total number of connected indoor units exceeds 20.
7) A transmission booster is required in a system to which more than 16 indoor including one or more indoor units of the 200 model or above are connected.

   •Refer to the DATABOOK for further information about how many booster units are required for a given system.
8) When a power supply unit is connected to the transmission line for centralized control, leave the power jumper connector on CN41 as it is (factory setting).

(3) Maximum allowable length

1) Indoor/outdoor transmission line

   Same as 2-7-3
2) Transmission line for centralized control

   Same as 2-7-4
3) M-NET remote controller wiring

   Maximum overall line length
   (0.3 to 1.25mm^2 [AWG22 to 16])
   m1$\leq$10m [32ft]
   m2+m3$\leq$10m [32ft]
   If the standard-supplied cable must be extended, use a cable with a diameter of 1.25mm^2 [AWG16]. The section of the cable that exceeds 10m [32ft] must be included in the maximum indoor-outdoor transmission line distance described in 1).
   *When connected to the terminal block on the Simple remote controller, use cables that meet the following cable size specifications: 0.75 - 1.25 mm^2 [AWG18-14].
4) Maximum line distance via outdoor unit

   (1.25 mm^2 [AWG16] min.)
   Same as 2-7-4

(4) Wiring method

1) Indoor/outdoor transmission line

   Same as 2-7-1

   Shielded cable connection

   Same as 2-7-1
2) Transmission line for centralized control

   Same as 2-7-4

   Shielded cable connection

   Same as 2-7-4
3) ME remote controller wiring

   ME remote controller is connectable anywhere on the indoor-outdoor transmission line.

   When 2 remote controllers are connected to the system

   Refer to the section on Switch Setting.

   Performing a group operation (including the group operation of units in different refrigerant circuits).

   Refer to the section on Switch Setting.
4) LOSSNAY connection

   Same as 2-7-4
5) Switch setting

   Address setting is required as follows.

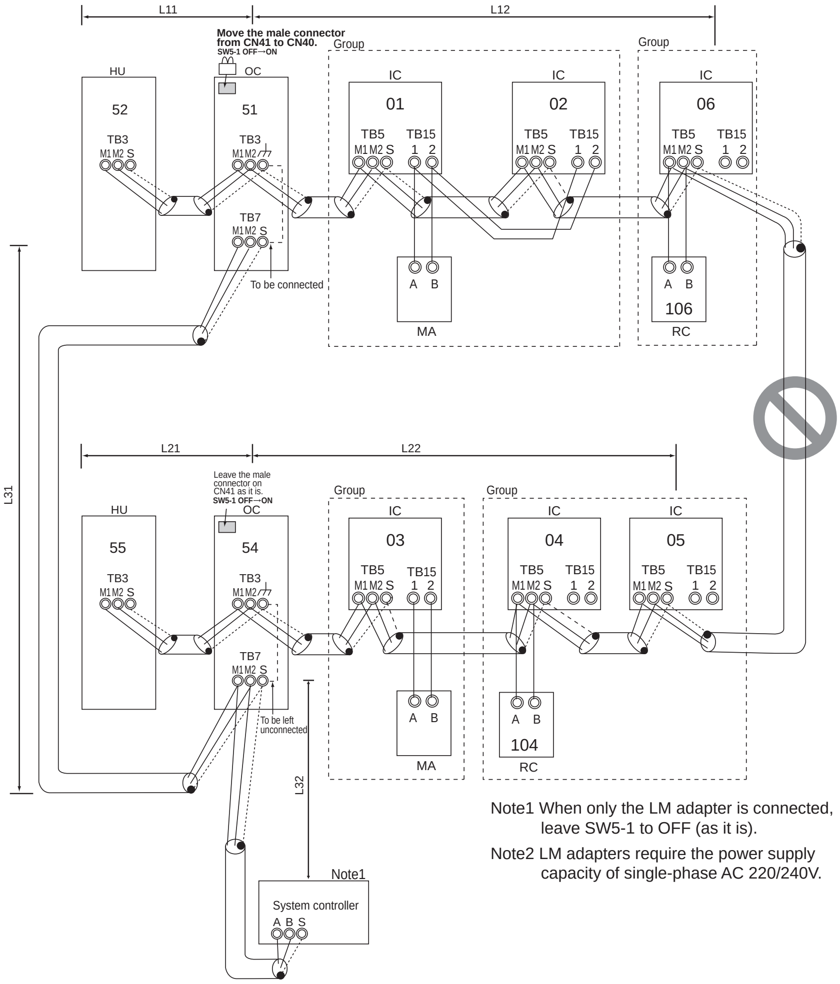
(5) Address setting method

Procedures	Unit or controller			Address setting range	Setting method	Notes	Factory setting
1	Indoor unit	Main unit	IC	01 to 50	Assign the smallest address to the main unit in the group.	To perform a group operation of indoor units that have different functions, designate the indoor unit in the group with the greatest number of functions as the main unit.	00
		Sub unit			Assign sequential numbers starting with the address of the main unit in the same group +1. (Main unit address +1, main unit address +2, main unit address +3, etc.)		
2	LOSSNAY		LC	01 to 50	Assign an arbitrary but unique address to each of these units after assigning an address to all indoor units.	None of these addresses may overlap any of the indoor unit addresses.	00
3	ME remote controller	Main remote controller	RC	101 to 150	Add 100 to the main unit address in the group	♦It is not necessary to set the 100s digit. ♦To set the address to 200, set the rotary switches to 00.	101
		Sub remote controller	RC	151 to 200	Add 150 to the main unit address in the group		
4	Outdoor unit		OC	51 to 99	Assign the smallest address to the outdoor unit (OC) in the same refrigerant circuit.	To set the address to 100, set the rotary switches to 50. If the address assigned to the hydro unit overlaps any of the addresses assigned to the outdoor units, use a different, unused address in the specified setting range.	00
5	Auxiliary outdoor unit	Hydro unit	HU	52 to 100	Assign an address that equals the "address of the outdoor unit in the same refrigerant circuit plus 1" to the unit.		00

2-9 Example System with an MA and an ME Remote Controller

2-9-1 System with a Connection of System Controller to Centralized Control Transmission Line

(1) Sample control wiring



(2) Cautions

1) Be sure to connect a system controller.
2) ME remote controller and MA remote controller cannot both be connected to the same group of indoor units.
3) Assign to the indoor units connected to the MA remote controller addresses that are smaller than those of the indoor units that are connected to the ME remote controller.
4) No more than 2 ME remote controllers can be connected to a group of indoor units.
5) No more than 2 MA remote controllers can be connected to a group of indoor units.
6) Do not connect the terminal blocks (TB5) on the indoor units that are connected to different outdoor units with each other.
7) Replacement of male power jumper connector (CN41) must be performed only on one of the outdoor units (not required if power to the transmission line for centralized control is supplied from a controller with a power supply function, such as AE-200E).
8) Provide an electrical path to ground for the S terminal on the terminal block for centralized control (TB7) on only one of the outdoor units.
9) A transmission booster must be connected to a system in which the total number of connected indoor units exceeds 20.
10) A transmission booster is required in a system to which more than 16 indoor including one or more indoor units of the 200 model or above are connected.
   - Refer to the DATABOOK for further information about how many booster units are required for a given system.
11) When a power supply unit is connected to the transmission line for centralized control, leave the power jumper connector on CN41 as it is (factory setting).

(3) Maximum allowable length

1) Indoor/outdoor transmission line
   Same as 2-7-3
2) Transmission line for centralized control
   Same as 2-7-4
3) MA remote controller wiring
   Same as 2-7-1
4) M-NET remote controller wiring
   Same as 2-8-1
5) Maximum line distance via outdoor unit ($1.25\ mm^2$ [AWG16] min.)
   Same as 2-7-4

(4) Wiring method

1) Indoor/outdoor transmission line

   Same as 2-7-1

   Shielded cable connection

   Same as 2-7-1

2) Transmission line for centralized control

   Same as 2-7-4

   Shielded cable connection

   Same as 2-7-4

3) MA remote controller wiring

   Same as 2-7-1

   When 2 remote controllers are connected to the system

   Same as 2-7-1

   Group operation of indoor units

   Same as 2-7-1

4) ME remote controller wiring

   Same as 2-8-1

   When 2 remote controllers are connected to the system

   Same as 2-7-1

   Group operation of indoor units

   Same as 2-7-1

5) LOSSNAY connection

   Same as 2-7-4

6) Switch setting

   Address setting is required as follows.

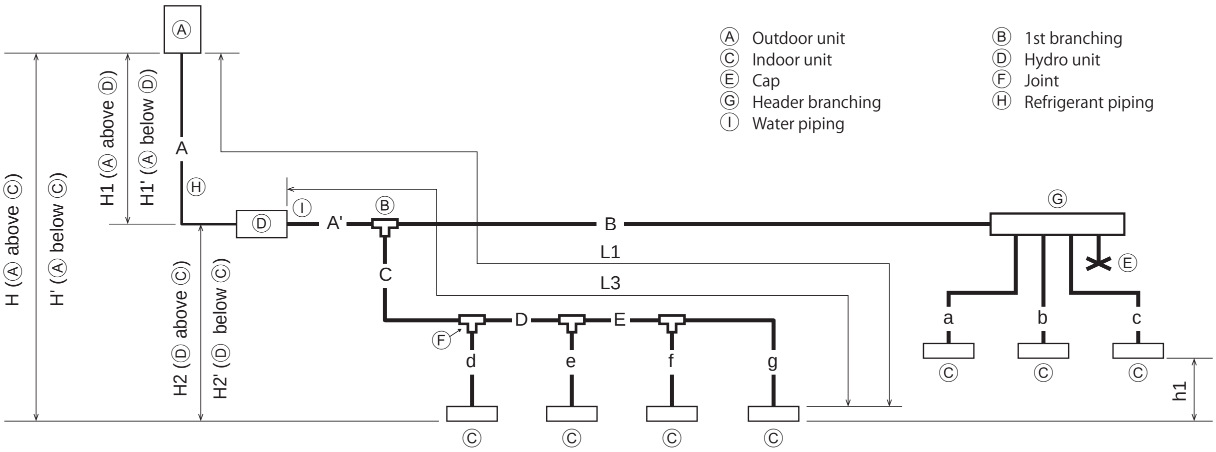
(5) Address setting method

Procedures	Unit or controller				Address setting range	Setting method	Notes	Factory setting
1	Operation with the MA remote controller	Indoor unit	Main unit	IC	01 to 50	Assign the smallest address to the main unit in the group.	♦Assign an address smaller than that of the indoor unit that is connected to the ME remote controller. ♦Enter the same indoor unit group settings on the system controller as the ones that were entered on the MA remote controller. ♦To perform a group operation of indoor units that have different functions, designate the indoor unit in the group with the greatest number of functions as the main unit.	00
			Sub unit			Assign sequential numbers starting with the address of the main unit in the same group +1. (Main unit address +1, main unit address +2, main unit address +3, etc.)		
		MA remote controller	Main remote controller	MA	No settings required.	-		Main
			Sub remote controller	MA	Sub remote controller	Settings to be made according to the remote controller function selection		
2	Operation with the ME remote controller	Indoor unit	Main unit	IC	01 to 50	Assign the smallest address to the main unit in the group.	♦Enter the indoor unit group settings on the system controller (MELANS). ♦Assign an address larger than those of the indoor units that are connected to the MA remote controller. ♦To perform a group operation of indoor units that have different functions, designate the indoor unit in the group with the greatest number of functions as the main unit.	00
			Sub unit			Assign sequential numbers starting with the address of the main unit in the same group +1. (Main unit address +1, main unit address +2, main unit address +3, etc.)		
		ME remote controller	Main remote controller	RC	101 to 150	Add 100 to the main unit address in the group.	♦It is not necessary to set the 100s digit. ♦To set the address to 200, set the rotary switches to 00.	101
			Sub remote controller	RC	151 to 200	Add 150 to the main unit address in the group.		
3	LOSSNAY			LC	01 to 50	Assign an arbitrary but unique address to each of these units after assigning an address to all indoor units.	None of these addresses may overlap any of the indoor unit addresses.	00
4	Outdoor unit			OC	51 to 99	Assign the smallest address to the outdoor unit (OC) in the same refrigerant circuit.	To set the address to 100, set the rotary switches to 50. If the address assigned to the hydro unit overlaps any of the addresses assigned to the outdoor units, use a different, unused address in the specified setting range.	00
5	Auxiliary outdoor unit		Hydro unit	HU	52 to 100	Assign an address that equals the "address of the outdoor unit in the same refrigerant circuit plus 1" to the unit.		00

2-10 Restrictions on Refrigerant Pipes

2-10-1 Restrictions on Refrigerant Pipe Length

(1) (E)M200 - (E)M500YNW models (Connection to the hydro unit (including water piping))



Unit: m

Item	Piping in the figure	Max. length	Max. equivalent length
Total piping length	A+A'+B+C+D+E +a+b+c+d+e+f+g	1000	-
Farthest indoor unit from outdoor unit (L1)	A+A'+C+D+E+g/ A+B+c	165	190
Between outdoor unit and hydro unit (refrigerant pipework)	A	110	-
Farthest indoor unit from hydro unit (L3)	A'+C+D+E+g/ A'+B+c	60	60
Height between outdoor unit and indoor unit (outdoor unit above indoor unit)	H	90	-
Height between outdoor unit and indoor unit (outdoor unit below indoor unit)	H'	60	-
Height between outdoor unit and hydro unit (outdoor unit above hydro unit)	H1	50*1	-
Height between outdoor unit and hydro unit (outdoor unit below hydro unit)	H1'	40*2	-
Height between hydro unit and indoor unit (hydro unit above indoor unit)	H2	50	-
Height between hydro unit and indoor unit (hydro unit below indoor unit)	H2'	40	-
Height between indoor units	h1	30	-

*1. The maximum length is 90 m, depending on the unit model and installation conditions. For more detailed information, contact your local distributor.

*2. The maximum length is 60 m, depending on the unit model and installation conditions. For more detailed information, contact your local distributor.

2-10-2 Restrictions on 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]
200 model	ø9.52 [3/8"]	ø22.2 [7/8"]
250 model	ø9.52 [3/8"]	ø22.2 [7/8"]
300 model	ø9.52 [3/8"]	ø22.2 [7/8"]*1
350 model	ø12.7 [1/2"]	ø28.58 [1-1/8"]
400 model	ø12.7 [1/2"]	ø28.58 [1-1/8"]
450 model	ø15.88 [5/8"]	ø28.58 [1-1/8"]
500 model	ø15.88 [5/8"]	ø28.58 [1-1/8"]

*1. Use ø28.58 [1-1/8"] pipes for EM300 models.

2-10-3 Restrictions on Refrigerant Pipe and Water Pipe Size

(1) Refrigerant pipe between outdoor unit and Hydro unit (Part A)

1) Hydro units connectable to outdoor units

Standard models

	Unit model		Hydro unit Model name
Outdoor unit side	PUHY-M200		CMH-WM250V-A
	PUHY-M250	*1	
		*2	
	PUHY-M300	*3	CMH-WM350V-A
		*4	
	PUHY-M350		
	PUHY-M400	*5	CMH-WM500V-A
	PUHY-M450		
	PUHY-M500		

High-efficient models

	Unit model		Hydro unit Model name
Outdoor unit side	PUHY-EM200		CMH-WM250V-A
	PUHY-EM250	*1	
		*2	
	PUHY-EM300	*3	CMH-WM350V-A
		*4	
	PUHY-EM350		
	PUHY-EM400	*5	CMH-WM500V-A
	PUHY-EM450		
	PUHY-EM500		

2) Connecting pipe diameter of outdoor unit

Standard models

	Unit model		Liquid	Gas
Outdoor unit side	PUHY-M200		ø9.52 (ø3/8)	ø22.2 (ø7/8)
	PUHY-M250	*1	ø9.52 (ø3/8)	
		*2	ø12.7 (ø1/2)	
	PUHY-M300	*3	ø9.52 (ø3/8)	
		*4	ø12.7 (ø1/2)	
	PUHY-M350		ø12.7 (ø1/2)	ø28.58 (ø1-1/8)
	PUHY-M400	*5	ø12.7 (ø1/2)	
	PUHY-M450		ø15.88 (ø5/8)	
	PUHY-M500		ø15.88 (ø5/8)	

High-efficient models

	Unit model		Liquid	Gas
Outdoor unit side	PUHY-EM200		ø9.52 (ø3/8)	ø22.2 (ø7/8)
	PUHY-EM250	*1	ø9.52 (ø3/8)	
		*2	ø12.7 (ø1/2)	
	PUHY-EM300	*3	ø9.52 (ø3/8)	ø28.58 (ø1-1/8)
		*4	ø12.7 (ø1/2)	
	PUHY-EM350		ø12.7 (ø1/2)	
	PUHY-EM400	*5	ø12.7 (ø1/2)	
	PUHY-EM450		ø15.88 (ø5/8)	
	PUHY-EM500		ø15.88 (ø5/8)	

3) Connecting pipe diameter of hydro unit

	Liquid	Gas
CMH-WM250V-A	ø9.52 (ø3/8)	ø22.2 (ø7/8)
CMH-WM350V-A	ø12.7 (ø1/2)	ø25.4 (ø1)
CMH-WM500V-A	ø15.88 (ø5/8)	ø25.4 (ø1)

If the connecting pipe diameter of hydro unit differs from that of outdoor unit, expand or reduce the pipe diameter at the inlet of the hydro unit.

*1. When the piping length from the outdoor unit to the hydro unit is less than 90 m (295 ft)
*2. When the piping length from the outdoor unit to the hydro unit is 90 m (295 ft) or more
*3. When the piping length from the outdoor unit to the hydro unit is less than 40 m (131 ft)
*4. When the piping length from the outdoor unit to the hydro unit is 40 m (131 ft) or more
*5. When the unit is used alone

(2) Water pipe between Hydro unit and indoor units

1) Hydro unit's header pipe (Part A')

	Hydro unit		
	Model name	Inlet pipe size	Outlet pipe size
Hydro unit side	CMH-WM250V-A	40A (housing joint)	40A (housing joint)
	CMH-WM350V-A	40A (housing joint)	40A (housing joint)
	CMH-WM500V-A	50A (housing joint)	50A (housing joint)

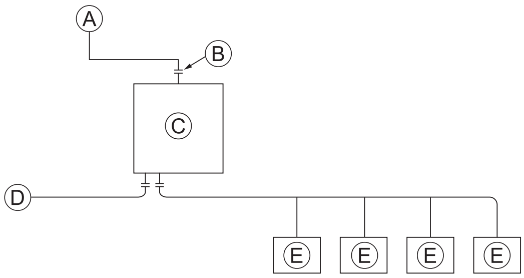
2) Water pipe between Hydro unit's header pipe to indoor unit (Sections a, b, c, d, e, f, g)

Indoor unit	Connection size		Pipe size	
	Water inlet	Water outlet	Water return	Water out
PEFY-W·VMA	O.D. 22.0 mm	O.D. 22.0 mm	I.D. 20 mm	I.D. 20 mm

* For other indoor units, refer to the indoor unit installation manual.
* The pipe diameter depends on the capacity of indoor units.
Refer to the indoor unit installation manual for details.

2-10-4 Hydro Unit Connection Method

(1) Size of the pipe that fits the standard Hydro unit ports



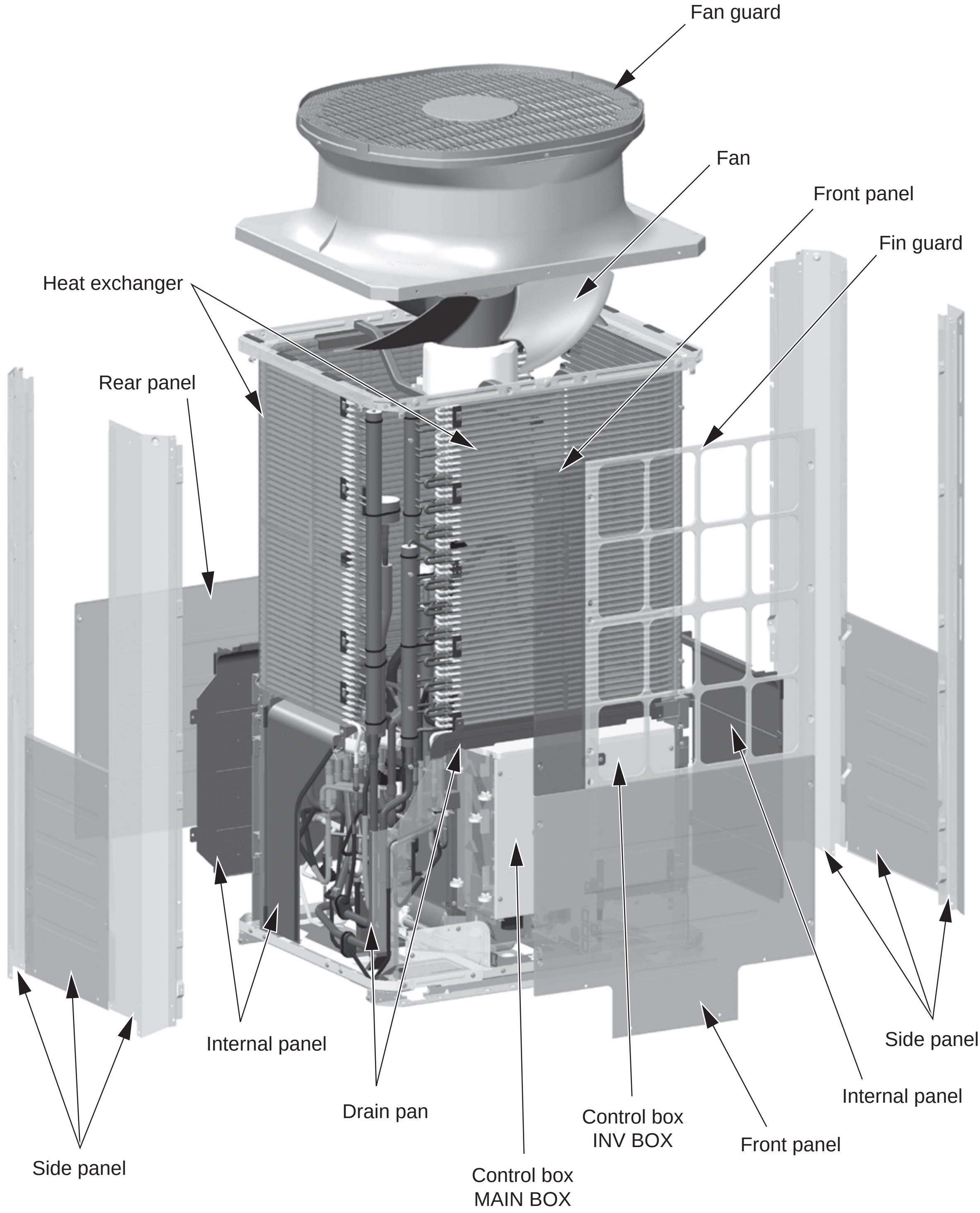
Ⓐ To outdoor unit
Ⓑ End connection (brazing)
Ⓒ Hydro unit
Ⓓ To main piping
Ⓔ Indoor unit

Chapter 3 Major Components, Their Functions and Refrigerant Circuits

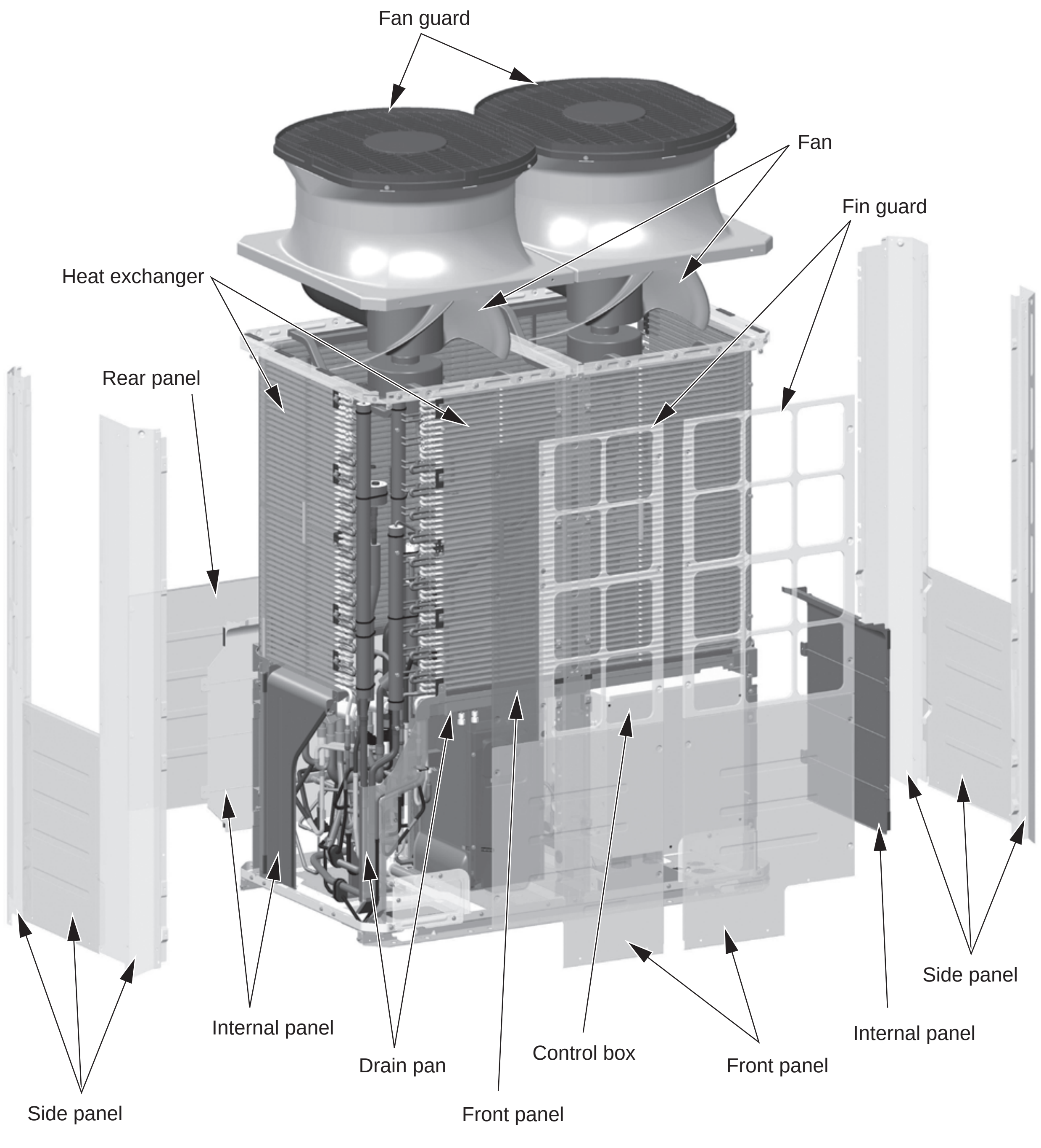
3-1 External Appearance and Refrigerant Circuit Components of Outdoor Unit

3-1-1 External Appearance of Outdoor Unit

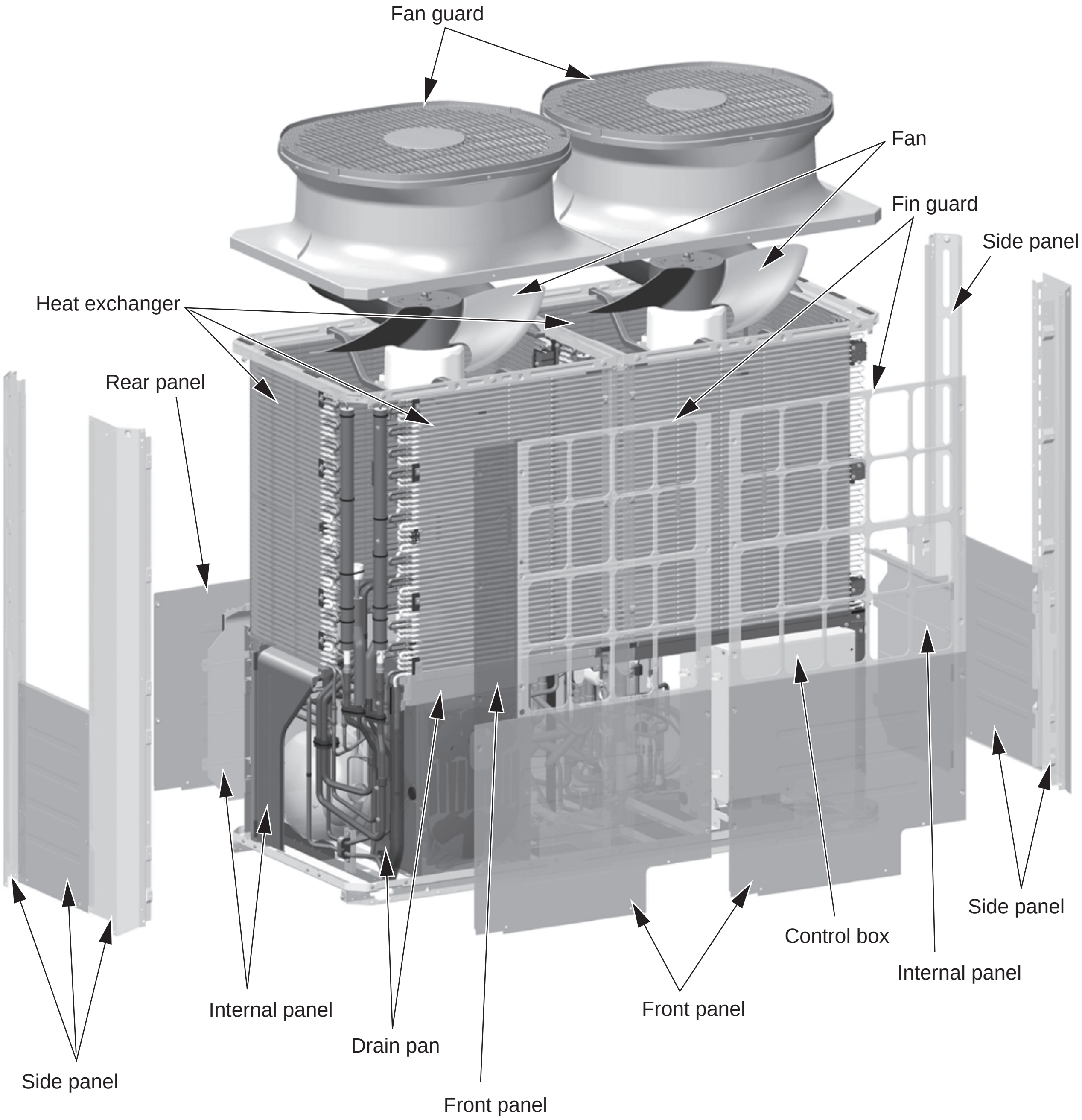
(1) PUHY-M200, M250, M300YNW-A1
PUHY-EM200, EM250, EM300YNW-A1



(2) PUHY-M350, M400, M450YNW-A1
PUHY-EM350, EM400, EM450YNW-A1

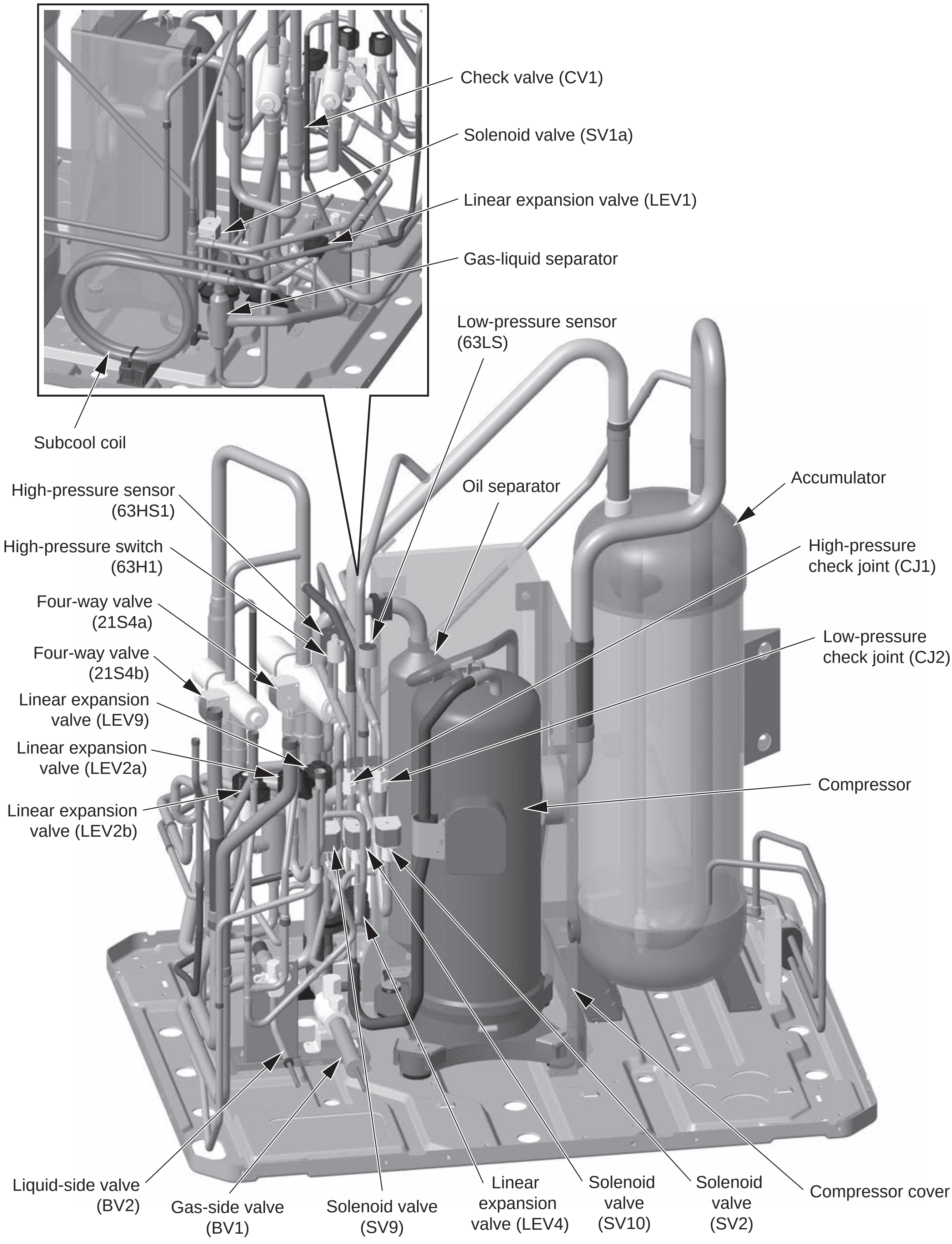


(3) PUHY-M500YNW-A1
PUHY-EM500YNW-A1

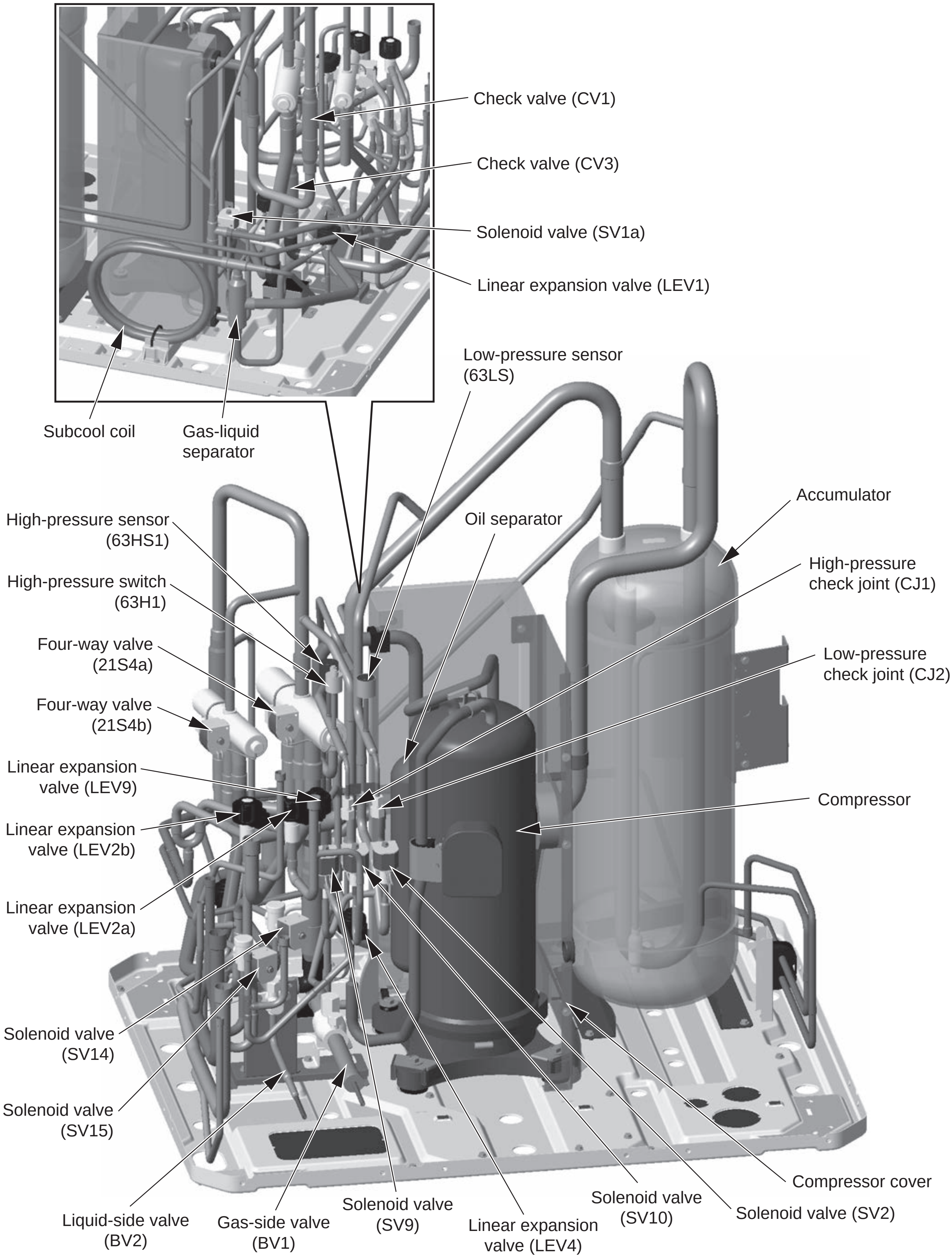


3-1-2 Outdoor Unit Refrigerant Circuits

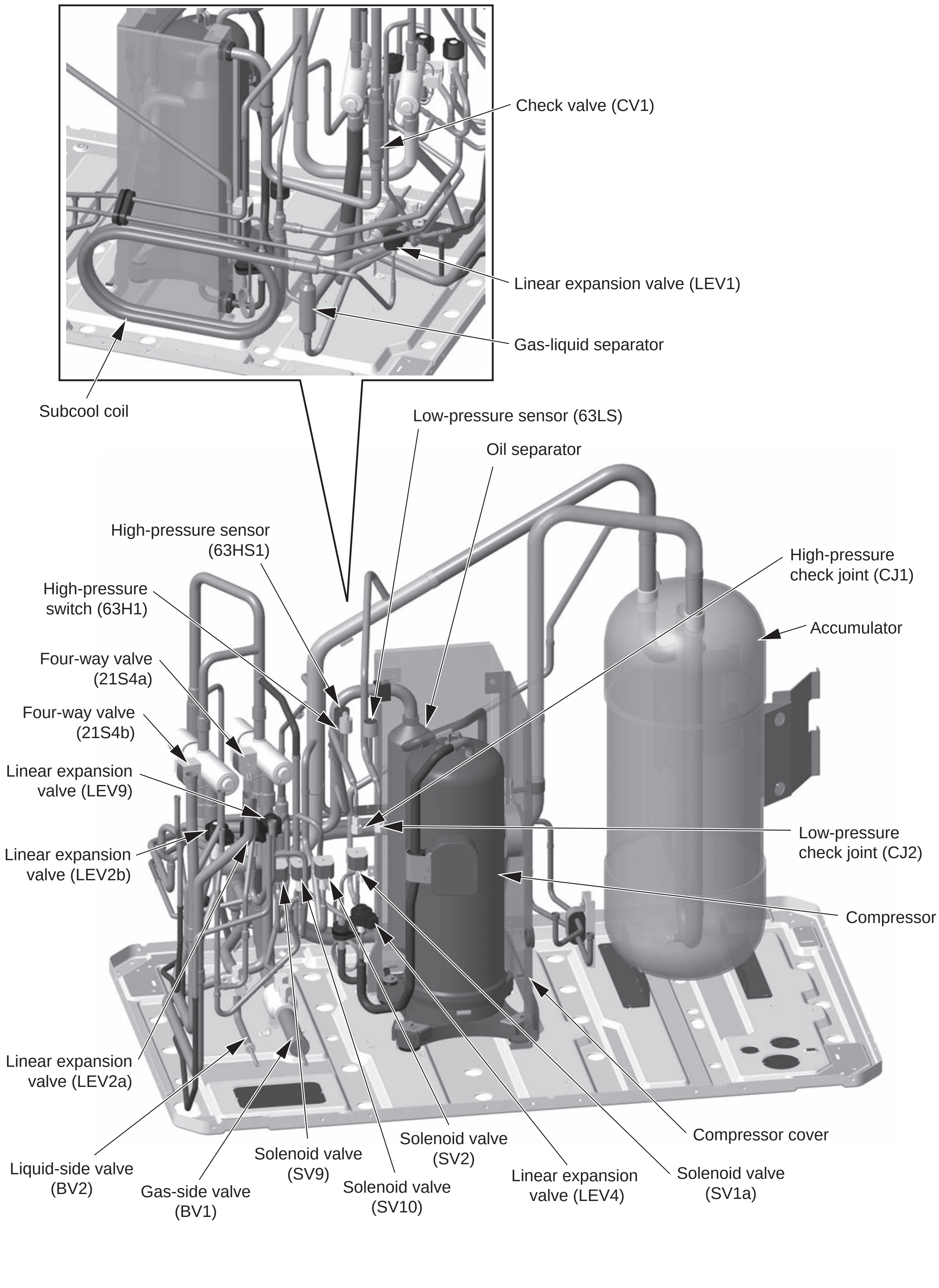
(1) PUHY-M200, M250, M300YNW-A1



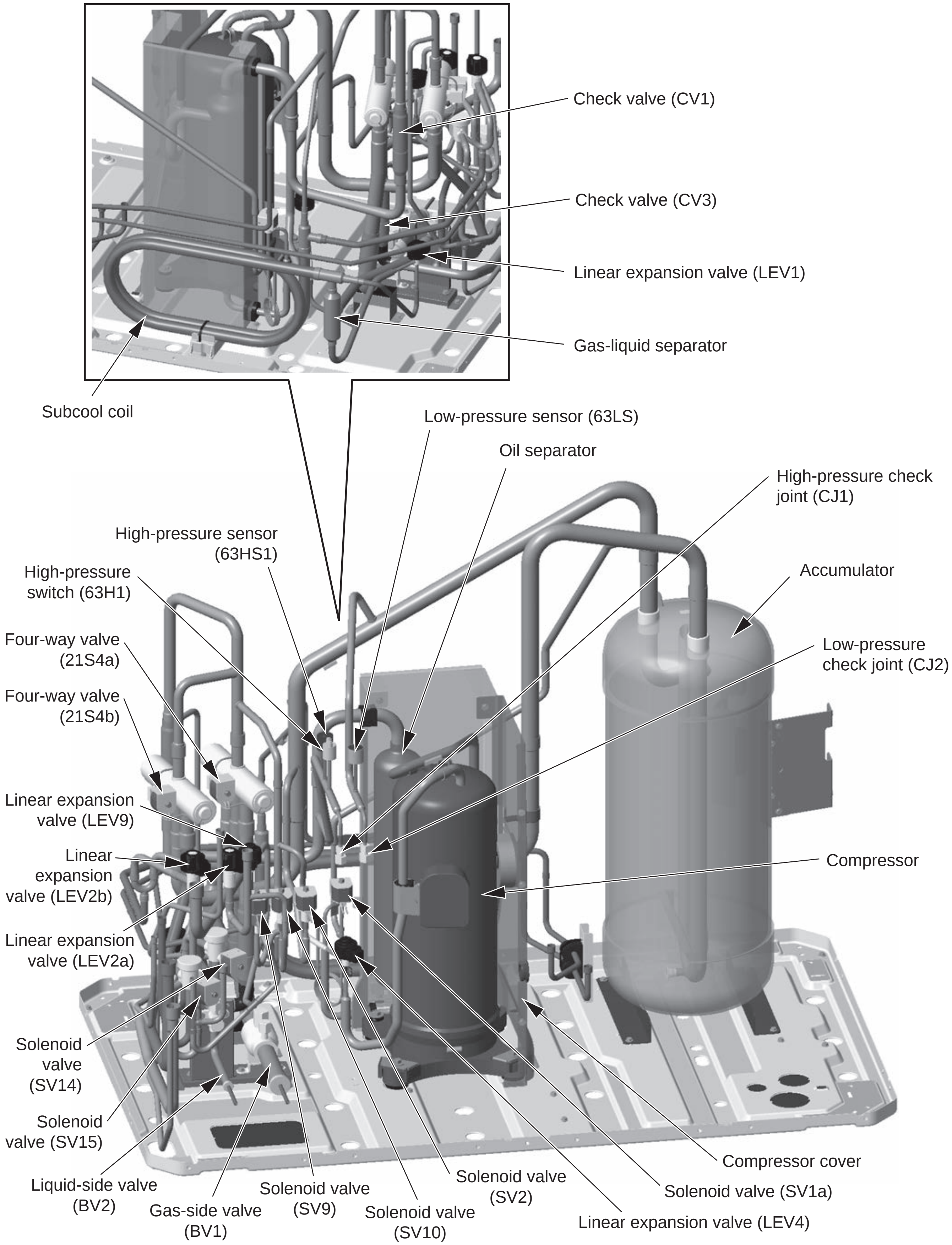
(2) PUHY-EM200, EM250, EM300YNW-A1



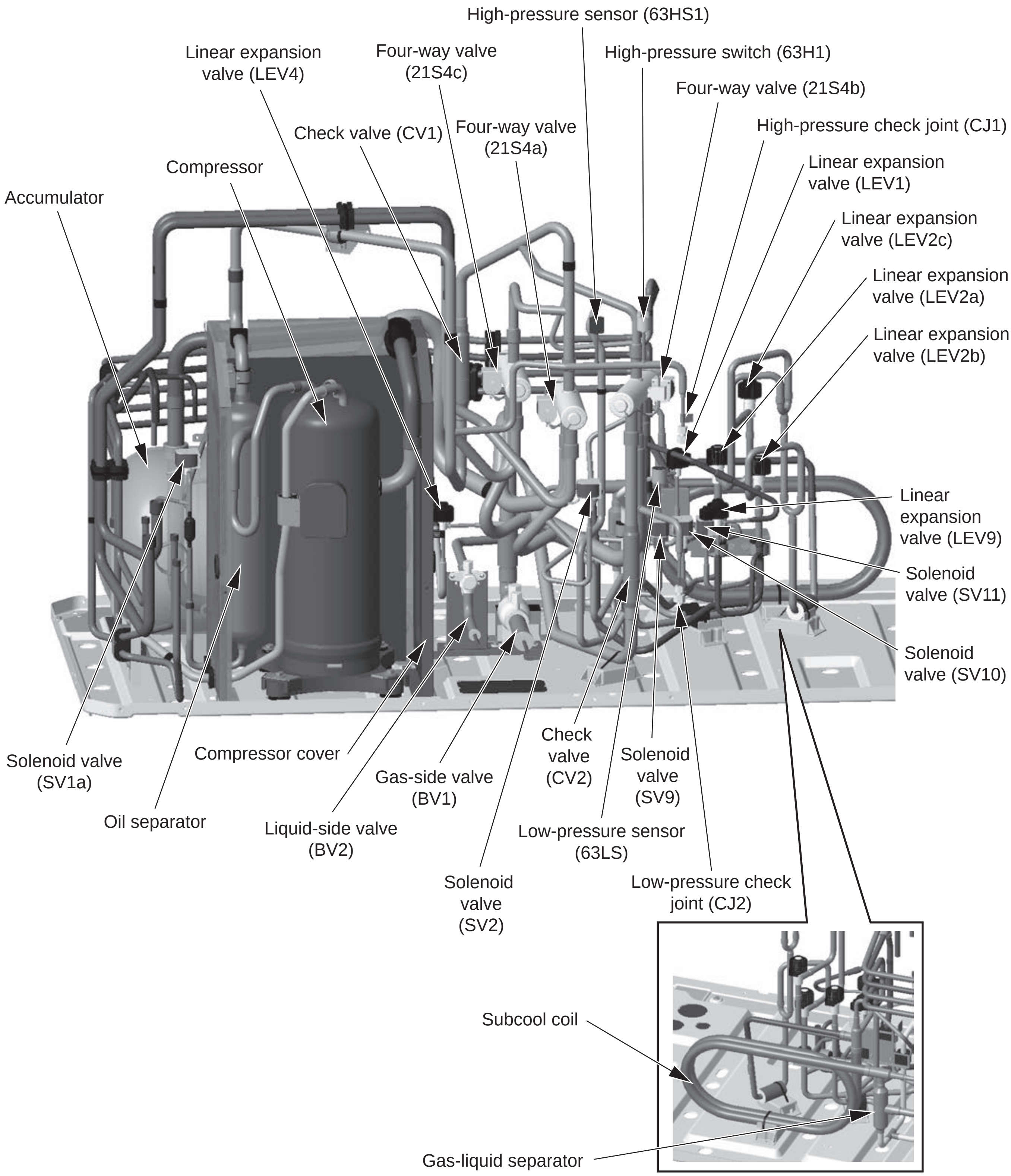
(3) PUHY-M350, M400, M450YNW-A1



(4) PUHY-EM350, EM400, EM450YNW-A1

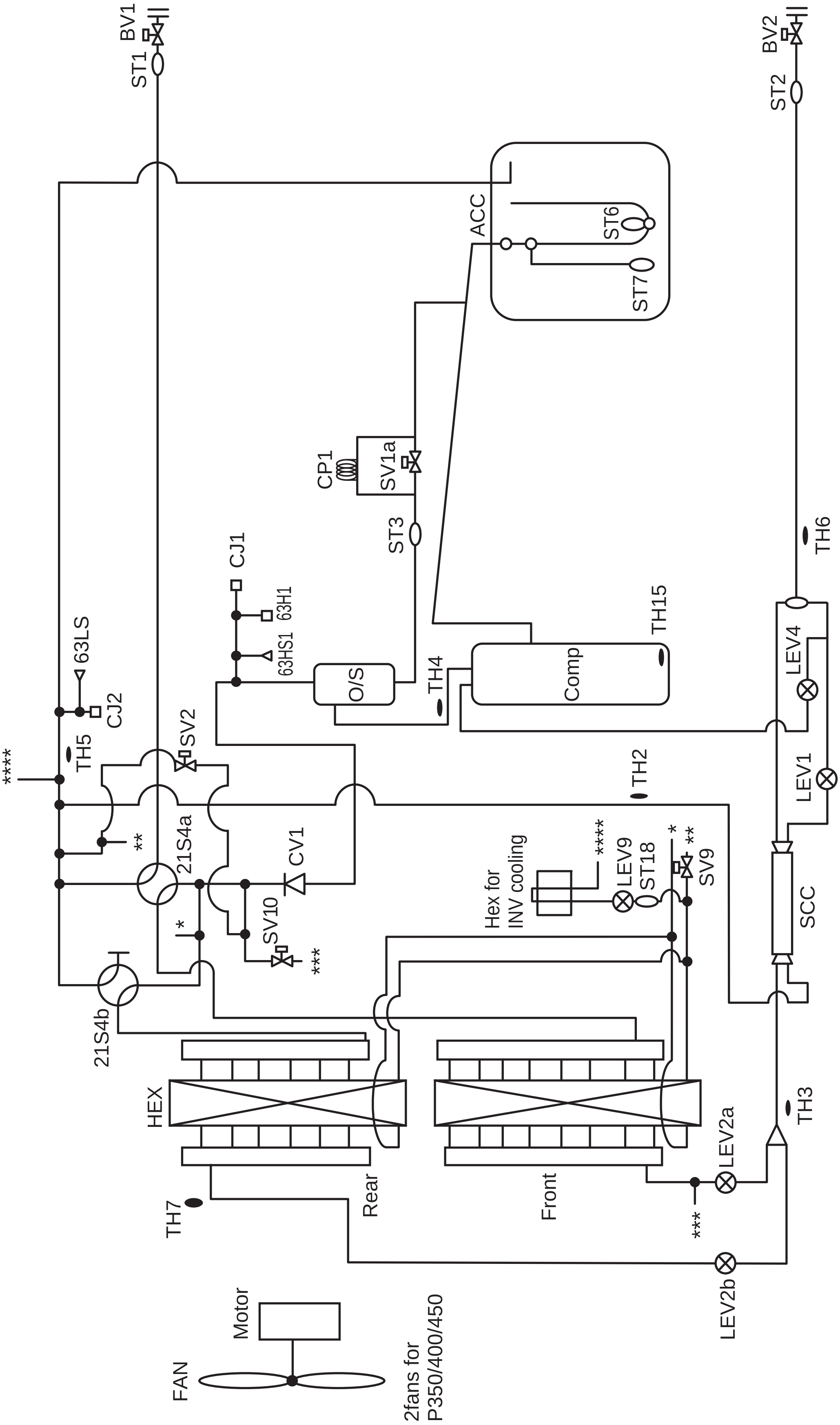


(5) PUHY-(E)M500YNW-A1

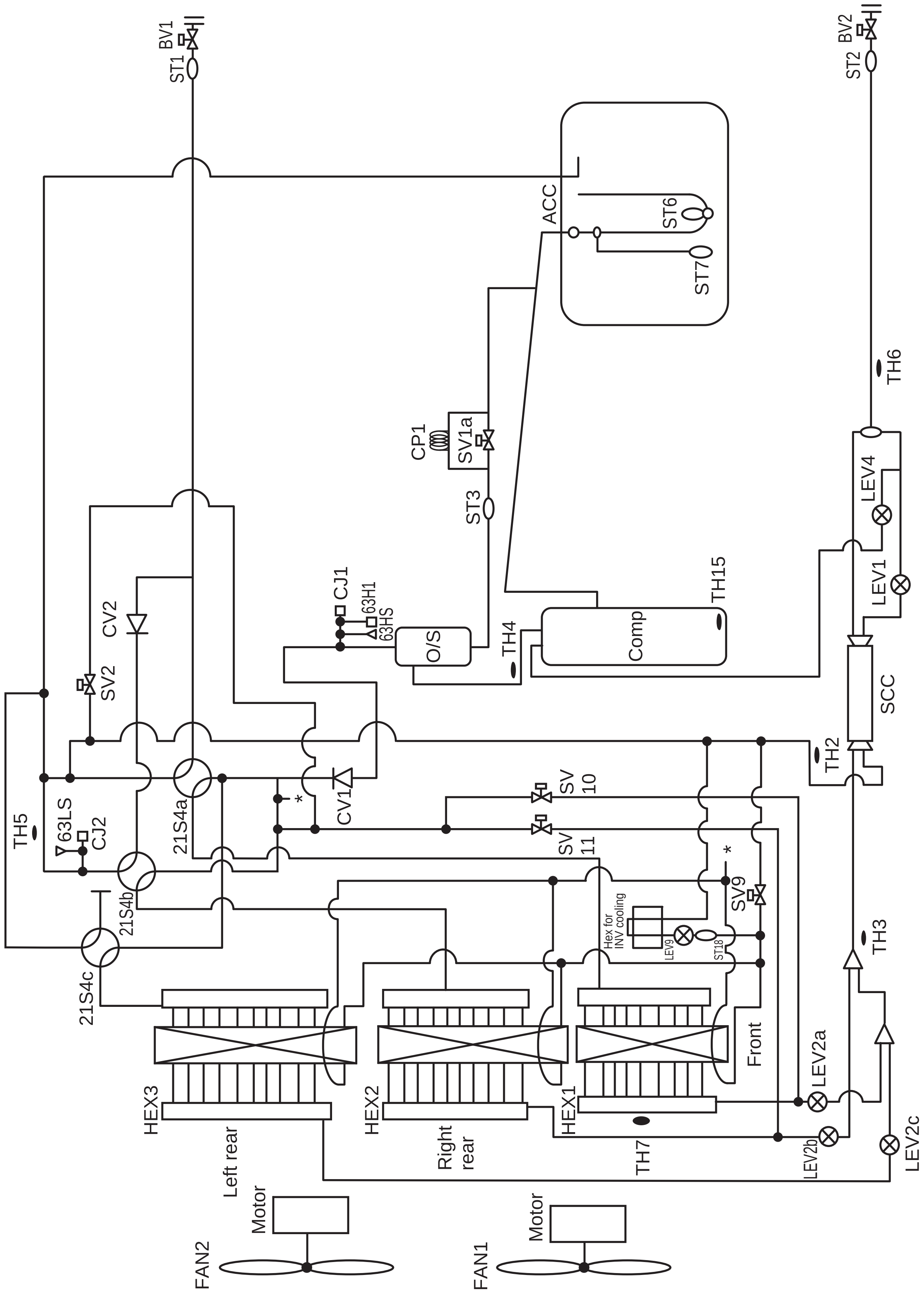


3-2 Outdoor Unit Refrigerant Circuit Diagrams

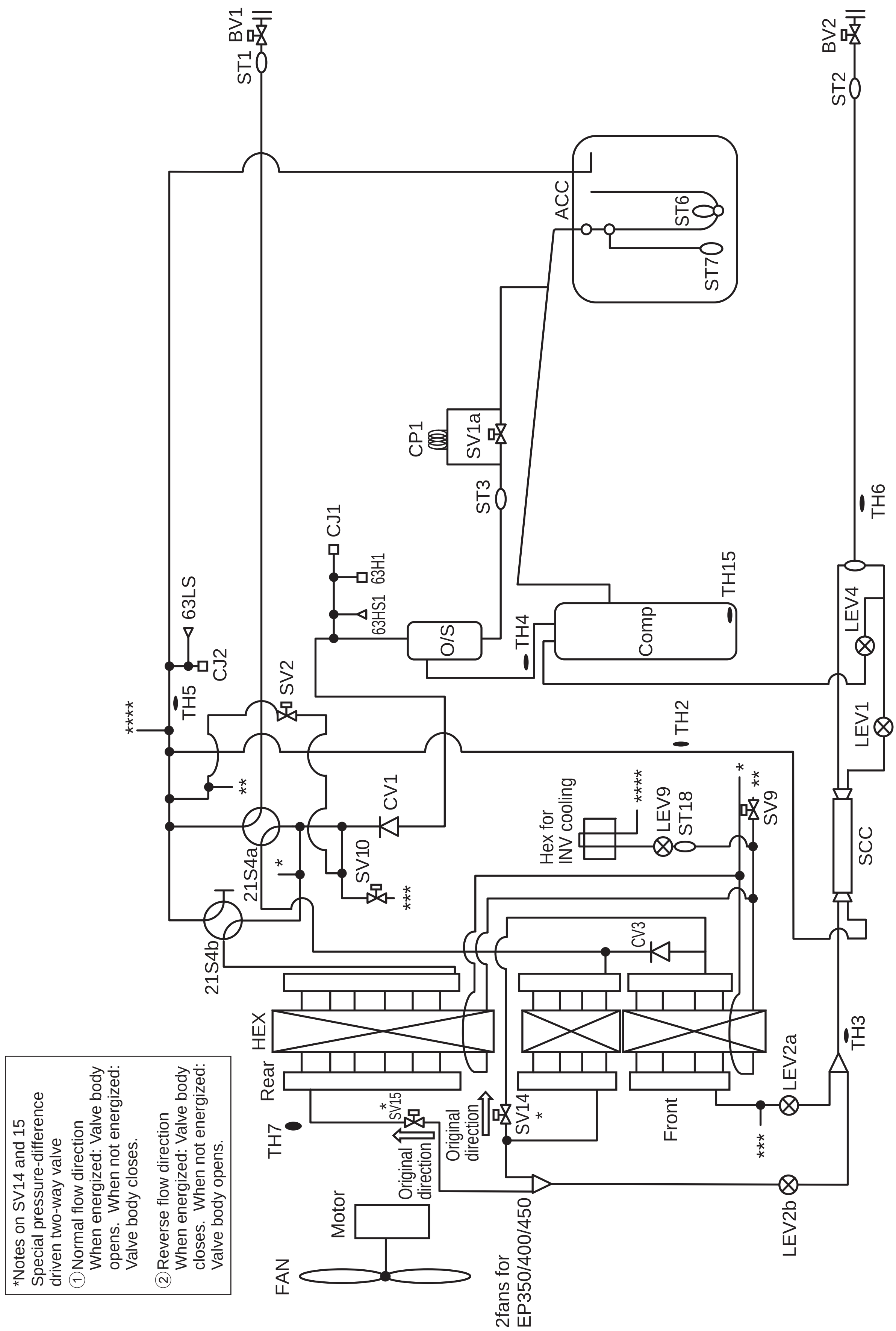
(1) PUHY-M200-M450YNW-A1



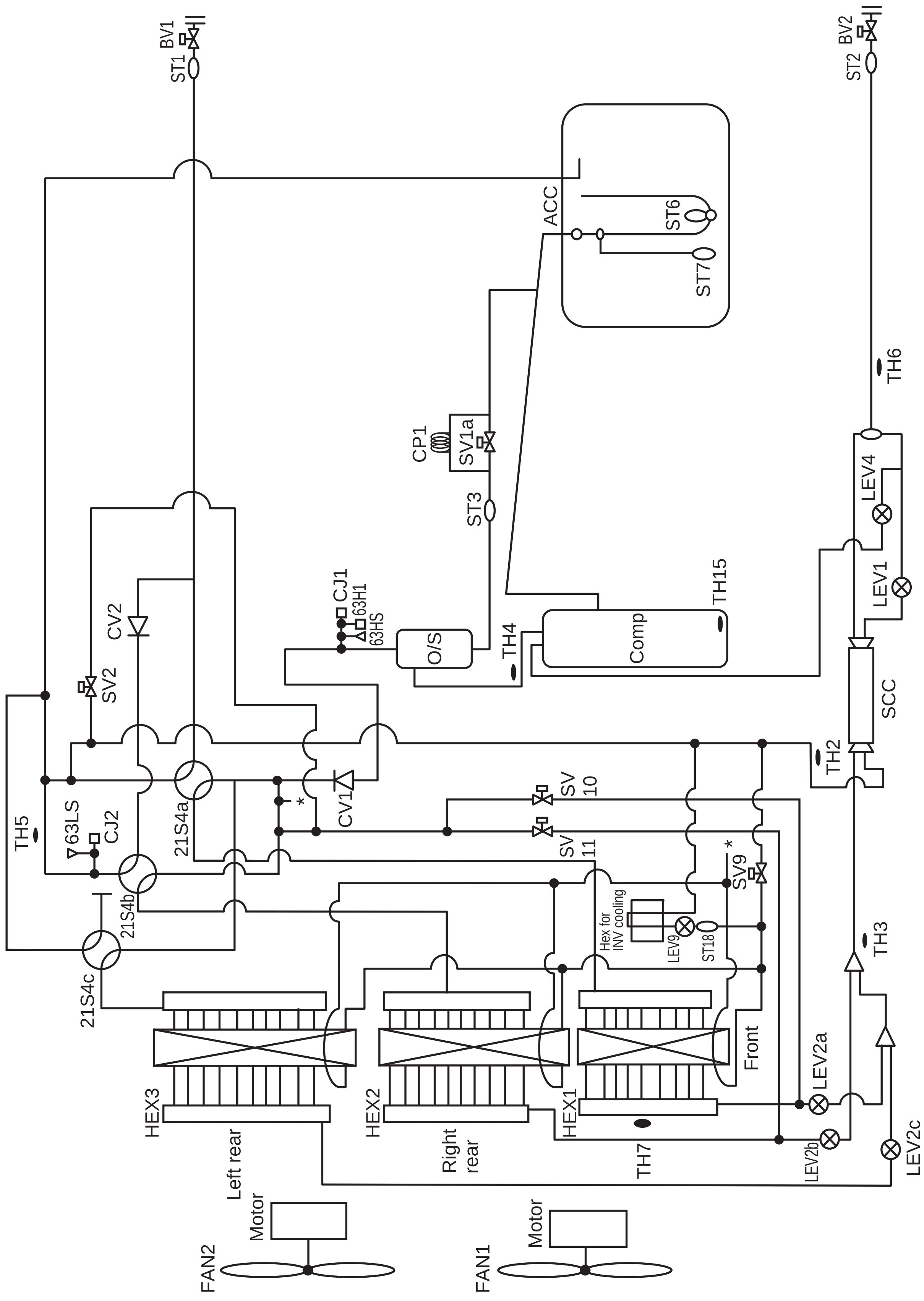
(2) PUHY-M500YNW-A1



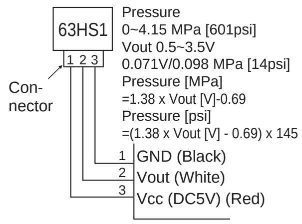
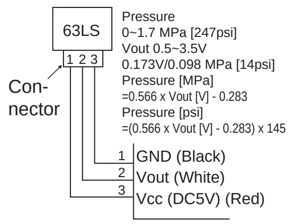
(3) PUHY-EM200-EM450YNW-A1



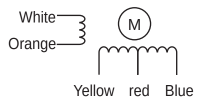
(4) PUHY-EM500YNW-A1



3-3 Functions of the Major Components of Outdoor Unit

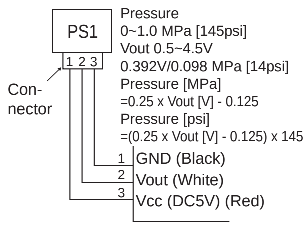
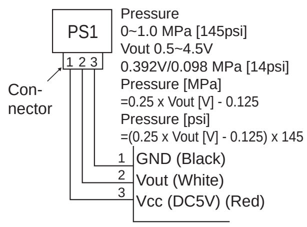
Part name	Symbols (functions)	Notes	Usage	Specifications	Check method
Com-pressor	MC1 (Comp1)		Adjusts the amount of circulating refrigerant by adjusting the operating frequency based on the operating pressure data	(E)M200 - (E)M350 models Low-pressure shell scroll compressor wirewound resistance 20°C [68°F]: 0.192 Ω (E)M400 - (E)M500 models Low-pressure shell scroll compressor wirewound resistance 20°C [68°F]: 0.219 Ω	
High pres-sure sensor	63HS1		1) Detects high pressure 2) Regulates frequency and provides high-pressure protection		
Low pres-sure sensor	63LS		1) Detects low pressure 2) Provides low-pressure protection 3) Defrost control during heating operation		
Pres-sure 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 temperature)		1) Detects discharge air temperature 2) Provides high-pressure protection 0°C[32°F]: 698 kΩ 10°C[50°F]: 413 kΩ 20°C[68°F]: 250 kΩ 30°C[86°F]: 160 kΩ 40°C[104°F]: 104 kΩ 50°C[122°F]: 70 kΩ 60°C[140°F]: 48 kΩ 70°C[158°F]: 34 kΩ 80°C[176°F]: 24 kΩ 90°C[194°F]: 17.5 kΩ 100°C[212°F]: 13.0 kΩ 110°C[230°F]: 9.8 kΩ	Degrees Celsius $R_{120} = 7.465k\Omega$ $R_{25/120} = 4057$ $R_t = 7.465\exp\{4057(\frac{1}{273+t} - \frac{1}{393})\}$	Resistance check
	TH2 (Pipe temperature)		LEV 1 is controlled based on the TH2, TH3, and TH6 values.	Degrees Celsius $R_0 = 15k\Omega$ $R_{0/80} = 3460$ $R_t = 15\exp\{3460(\frac{1}{273+t} - \frac{1}{273})\}$ 0°C[32°F]: 15 kΩ 10°C[50°F]: 9.7 kΩ 20°C[68°F]: 6.4 kΩ 25°C[77°F]: 5.3 kΩ 30°C[86°F]: 4.3 kΩ 40°C[104°F]: 3.1 kΩ	Resistance check
	TH3 (Pipe temperature)		1) Controls frequency 2) LEV1 is controlled based on the subcool at heat exchange outlet that is obtained based on the HPS data and TH3 value.		
	TH7 (Outdoor temperature)		1) Detects outdoor air temperature 2) Controls fan operation		
	TH5 (Pipe temperature)		LEV2 are controlled based on the 63LS and TH5 values.		
	TH6 (Pipe temperature)		Controls LEV1 based on TH2, TH3, and TH6 data.		
	TH15 (Compressor shell bottom temperature)		Detects compressor shell bottom temperature		
	THHS Inverter heat sink temperature		Inverter overheating protection	Degrees Celsius $R_{50} = 17k\Omega$ $R_{25/120} = 4016$ $R_t = 17\exp\{4016(\frac{1}{273+t} - \frac{1}{323})\}$ 0°C[32°F]: 161 kΩ 10°C[50°F]: 97 kΩ 20°C[68°F]: 60 kΩ 25°C[77°F]: 48 kΩ 30°C[86°F]: 39 kΩ 40°C[104°F]: 25 kΩ	
	THL DCL temperature		DCL overheat protection	Degrees Celsius $R_{100} = 3.3k\Omega$ $B_{0/100} = 3970$ $R_t = 3.3\exp\{3970(\frac{1}{273+t} - \frac{1}{373})\}$ 0°C[32°F]: 162.2 kΩ 10°C[50°F]: 98.3 kΩ 25°C[77°F]: 49.1 kΩ 50°C[122°F]: 17.6 kΩ 100°C[212°F]: 3.3 kΩ	

Part name	Symbols (functions)	Notes	Usage	Specifications	Check method
Sole-noid 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
	SV2		Makes excessive refrigerant in the accumulator evaporate	Open while being powered/ closed while not being powered	
	SV9		High-pressure-rise prevention	Open while being powered/ closed while not being powered	
	SV10		Continuous heating cycle mode	Open while being powered/ closed while not being powered	
	SV11		Continuous heating cycle mode	Open while being powered/ closed while not being powered	
	SV14, 15	EM200-EM450 models only	Controls outdoor unit heat exchanger capacity	(1) Normal direction flow Open while being powered/ closed while not being powered (2) Reverse direction flow Closed while being powered/ open while not being powered	
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	Refer to the following page(s). [8-8 Troubleshooting LEV, FCV Problems]
	LEV9 (Refrigerant flow adjustment)		Adjusts the flow of refrigerant bypassed from the pipe for cooling the control board when the control board temperature rises		
	LEV4		Injection amount control	DC12V Opening of stepping motor driving valve 0-480 pulses (direct driven type)	Continuity Test with a Tester. Continuity between white and orange. Continuity between yellow, red, and blue. 
	LEV2a (Refrigerant flow adjustment)		Adjusts refrigerant flow during heating Cut off the refrigerant flow during continuous heating cycle	DC12V Opening of a valve driven by a stepping motor 2100 pulses (Max. 3000 pulses)	
	LEV2b (Refrigerant flow adjustment)				
	LEV2c (Refrigerant flow adjustment)	(E)M500 model only			
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 25%, 50% or heating cycle	
	21S4c	(E)M500 models only			

Part name	Symbols (functions)	Notes	Usage	Specifications	Check method
Fan motor	FAN motor 1,2	FAN motor 2 is only on the (E)M350-(E)M500 models.	Regulates the heat exchanger capacity by adjusting the operating frequency and operating the propeller fan based on the operating pressure.	AC380-400V, 920W *The (E)M200-300/500 models and (E)M350-450 models are equipped with different types of fan motors.	

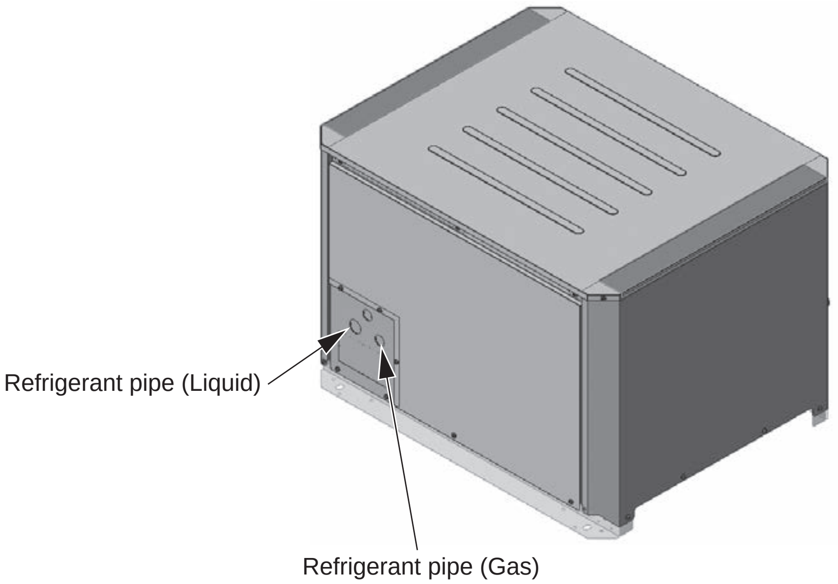
3-4 Functions of the Major Components of Indoor Unit

Part Name	Symbol (functions)	Notes	Usage	Specification	Check method
Flow control valve	FCV		Controls the rate of water flow to the indoor unit.	DC12V Opening of stepping motor driving valve 85-(770) pulses	Refer to the section [8-8-4 General Overview on FCV Operation (Indoor unit)].
Thermistor	TH1 (Suction air temperature)		Indoor unit control (Thermo)	$R_0=15k\Omega$ $R_{0/80}=3460$ $Rt = 15\exp\{3460(\frac{1}{273+t}-\frac{1}{273})\}$ 0°C [32°F]:15 kΩ 10°C [50°F]: 9.7 kΩ 20°C [68°F]: 6.4 kΩ 25°C [77°F]: 5.3 kΩ 30°C [86°F]: 4.3 kΩ 40°C [104°F]: 3.1 kΩ	Resistance check
	TH2 (Inlet pipe temperature)		1) Indoor unit control (Hot adjust)		
	TH3 (Outlet pipe temperature)		Indoor unit control (Error detection)		
	TH4 (Outdoor air temperature)		Indoor unit control (Thermo)		
	Temperature sensor (Indoor air temperature)		Indoor unit control (Thermo)		
Pressure sensor (inner water)	PS1		1) Detects inner water pressure 2) Check flow rate		
Pressure sensor (outlet water)	PS2		1) Detects outlet water pressure 2) Check flow rate		

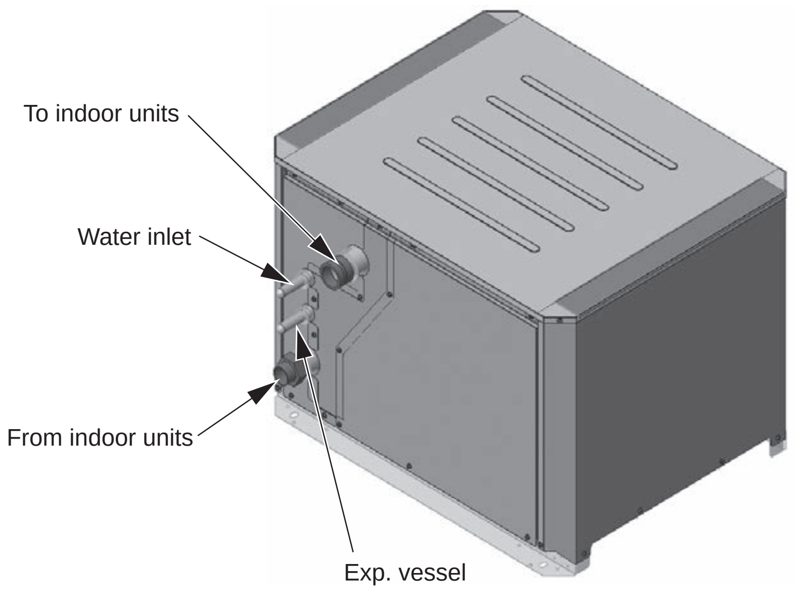
Component	Symbol	
Room temperature thermistor	TH21	Resistance 0°C/15k Ω, 10°C/9.6k Ω, 20°C/6.3k Ω, 25°C/5.4k Ω, 30°C/4.3k Ω, 40°C/3.0k Ω
Water inlet pipe thermistor	TH22	Resistance 0°C/15k Ω, 10°C/9.6k Ω, 20°C/6.3k Ω, 25°C/5.4k Ω, 30°C/4.3k Ω, 40°C/3.0k Ω
Water outlet pipe thermistor	TH23	Resistance 0°C/15k Ω, 10°C/9.6k Ω, 20°C/6.3k Ω, 25°C/5.4k Ω, 30°C/4.3k Ω, 40°C/3.0k Ω

3-5 External Appearance and Refrigerant Circuit Components of Hydro Unit

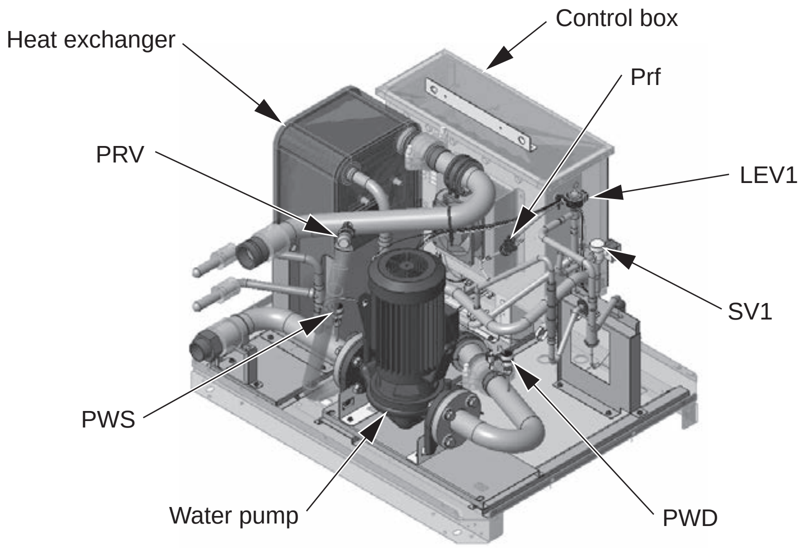
1. Front



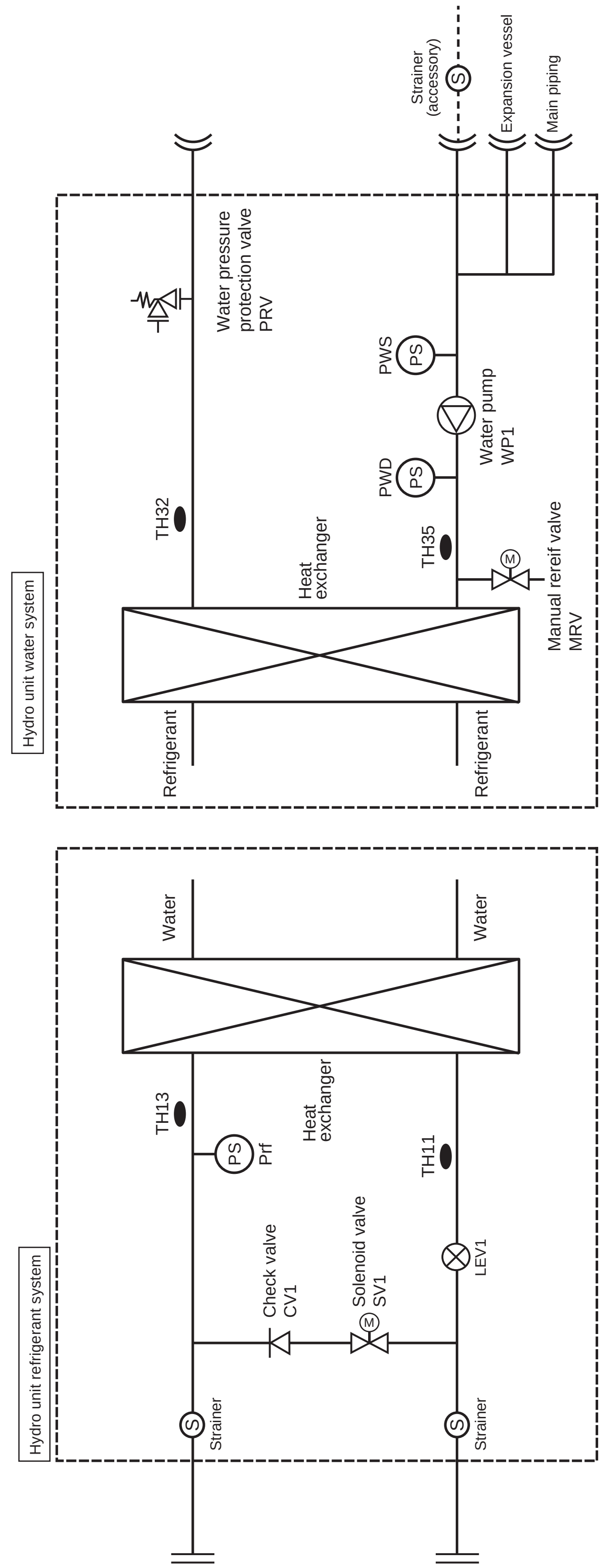
2. Rear



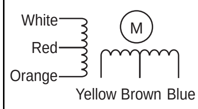
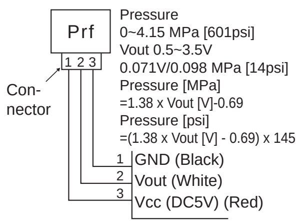
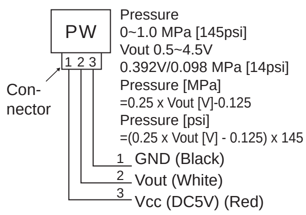
3. Rear right side



3-6 Hydro Unit Refrigerant Circuit Diagrams



3-7 Functions of the Major Components of Hydro Unit

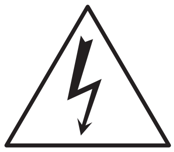
Part name	Symbols	Notes	Usage	Specifications	Check method
Solenoid valve	SV1	Refriger-ant side	Opens when the heat exchanger is not in operation (during freeze protection, bypass defrost)	AC220-240V Open when energized/ closed when defrost	Continuity check with a tester
LEV	LEV1	Refriger-ant side	Supplies refrigerant to Heat ex-change	DC12V Opening of a valve driven by a stepping motor 0~3000 pulses	Continuity check with a tester Continuity be-tween white, red, and orange. Continuity be-tween yellow, brown, and blue. 
Thermistor	TH11,13	Refriger-ant side	Compressor frequency control	Degree Celsius $R_{120} = 7.465k\Omega$ $R_{25/120} = 4057$ $R_t = 7.465\exp\{4057(\frac{1}{273+t} - \frac{1}{393})\}$ 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
	TH32,35	Water side	Water pump discharge/suction water temperature		
Pressure sensor	Prf	Refriger-ant side	1) Detects refrigerant pressure 2) LEV control		
	PWD	Water side	1) Detects water discharge pres-sure 2) Water control		
	PWS	Water side	1) Detects water suction pres-sure 2) Water control		
Pump	WP1	Water side	Temperature difference control Controls the water flow to each indoor unit	200V (3 phase) Frequency: 30-60Hz	
Water pressure protection valve	PRV	Water side	Trips when the internal pressure in the water circuit rises	Operating pressure: 800kPa	

Chapter 4 Electrical Components and Wiring Diagrams

4-1 Outdoor Unit Circuit Board Arrangement

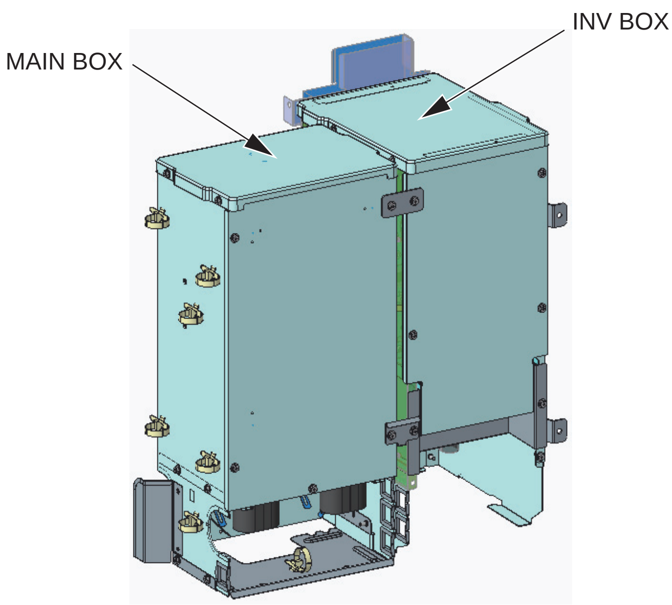
4-1-1 Outdoor Unit Control Box

<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 of the capacitor in the main circuit has dropped to 20 VDC or less.

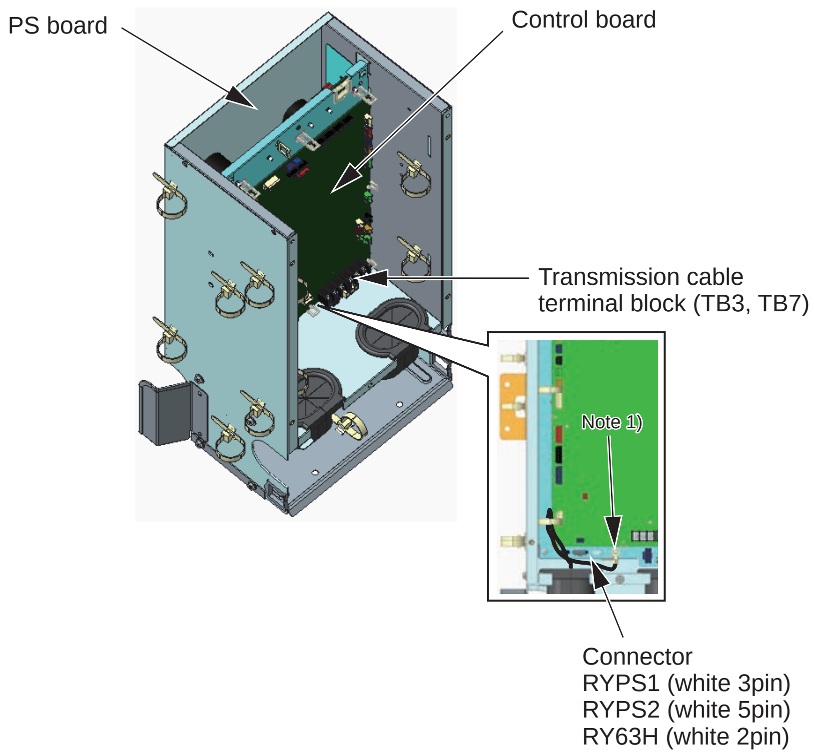
(1) PUHY-(E)M200, (E)M250, (E)M300YNW-A1



Note

1) Exercise caution not to damage the front panel of the control box. Damage to this part affect the waterproof 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) Control box houses high temperature parts. Be well careful even after turning off the power source.
4) **Perform the service after disconnecting the relay connector in the INV box (RYFAN1). Before plugging in or unplugging connectors, check that the outdoor unit fan is not rotating and that the voltage across Pin 1 (+) and Pin 5 (-) of connector RYPN in the INV box is 20 VDC or less. The capacitor may collect a charge and cause an electric shock when the outdoor unit fan rotates in windy conditions.** Refer to the wiring nameplate for details.
5) To connect wiring to TB7 in the MAIN BOX, check that the voltage is 20 VDC or below.
6) After servicing, reconnect the relay connector (RYFAN1) in the INV box as it was.
7) When opening or closing the front panel of the control box, do not touch any of the internal components. Before inspecting inside the control box, turn off the power to the unit, leave it turned off for at least 10 minutes, and check that the voltage across Pin 1 (+) and Pin 5 (-) of connector RYPN in the INV box is 20 VDC or less. It takes about 10 minutes to discharge electricity after the power supply is turned off.
8) When the power is on, the compressor is energized even while it is stopped. Before turning on the power, disconnect all power supply wires from the compressor terminal block, and measure the insulation resistance of the compressor. Check the compressor for a ground fault. If the insulation resistance is 1.0 MΩ or below, connect all power supply wires to the compressor and turn on the power to the outdoor unit. It is energized to evaporate the liquid refrigerant that has accumulated in the compressor.

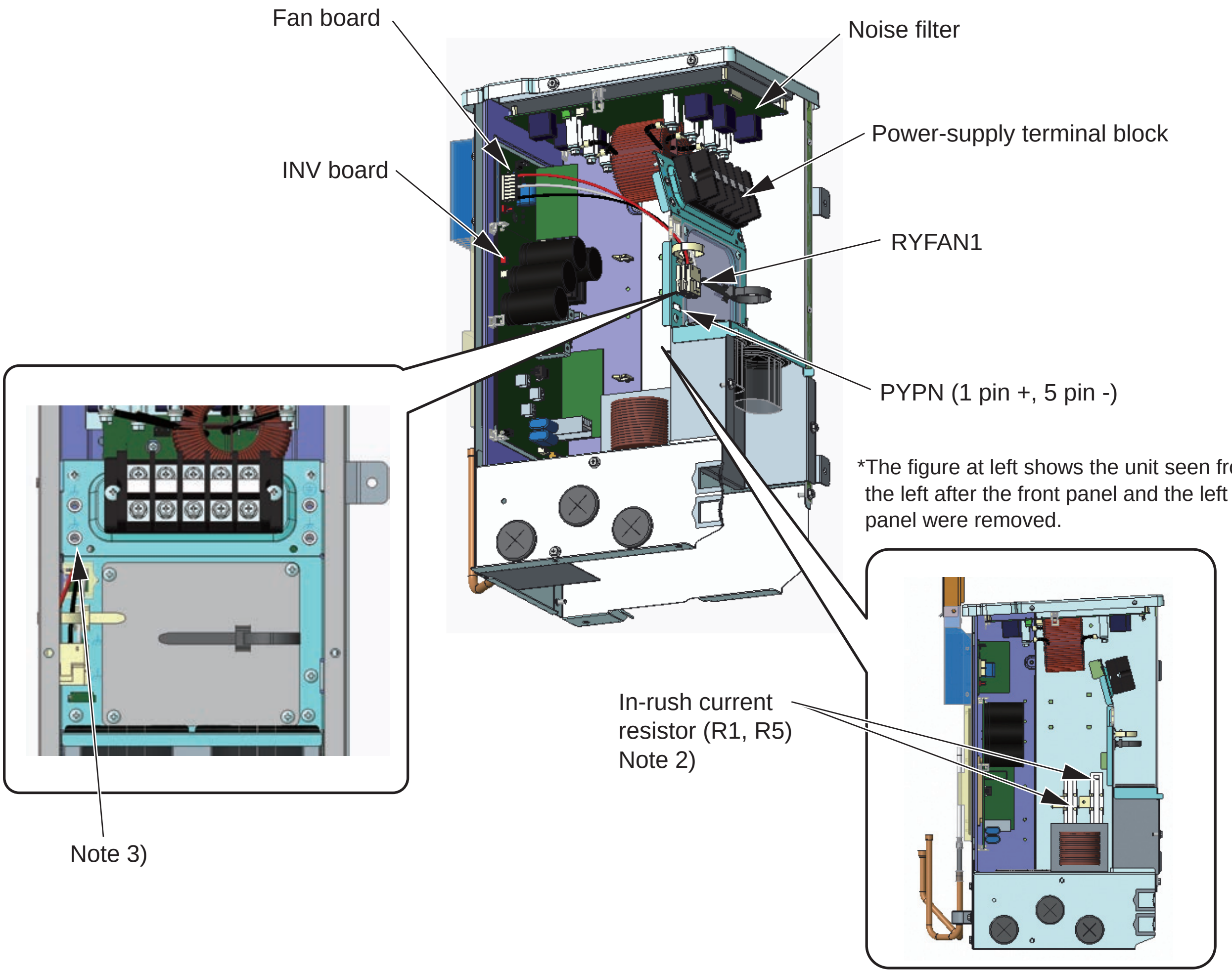
MAIN BOX



Note

1) Leave the grounding connected during maintenance.

INV BOX

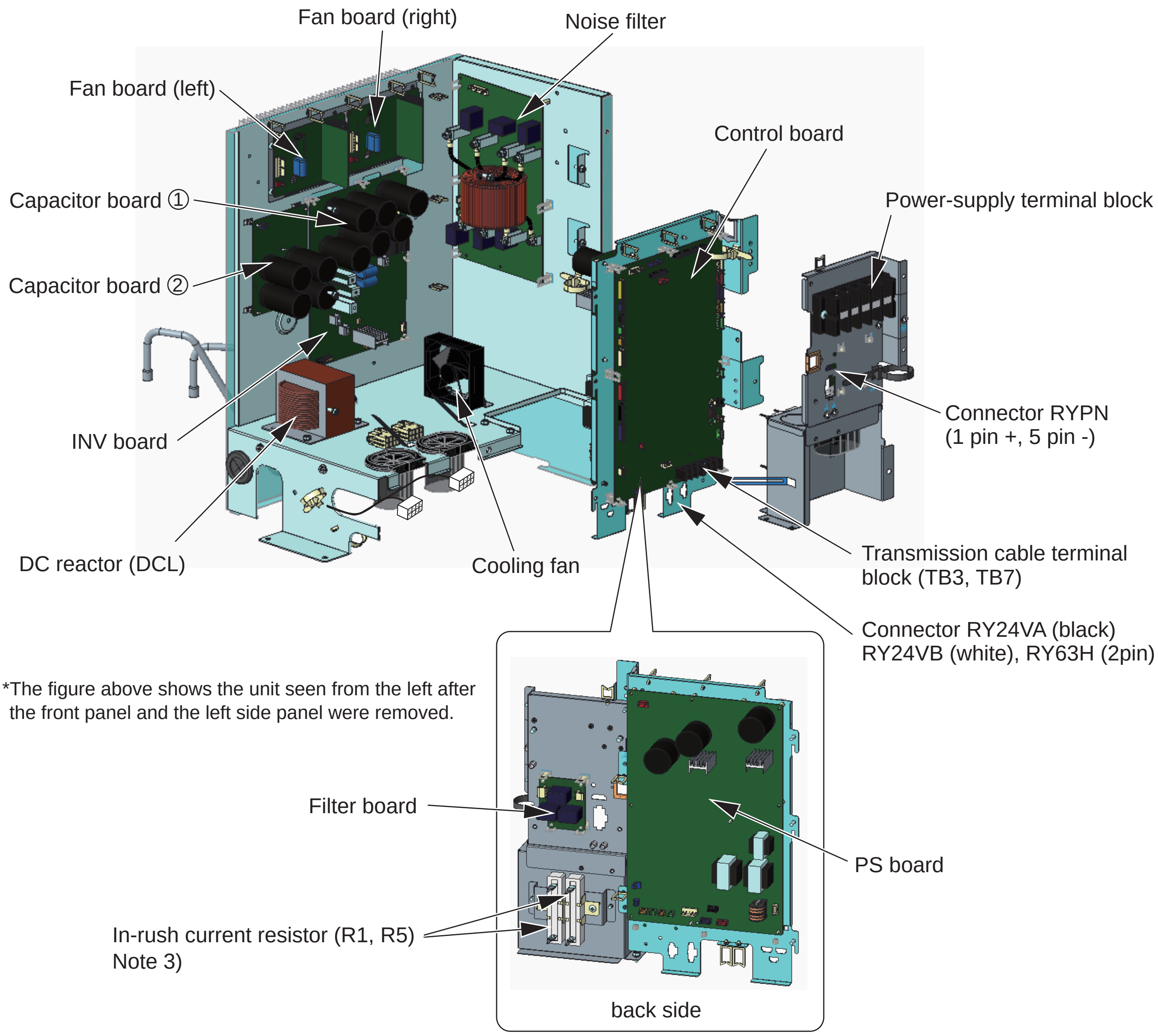


*The figure at left shows the unit seen from the left after the front panel and the left side panel were removed.

Note

1) Refrigerant pipes are connected to the back of the INV box. Do not forcibly pull out the INV box. Doing so may result in deformation of the pipe.
2) A Faston terminal on the inrush current resistor has a locking function. Check that the terminal is securely locked in place. Press the tab in the middle of the terminal to remove it.
3) Leave the grounding connected during maintenance.

(2) PUHY-(E)M350, (E)M400, (E)M450YNW-A1

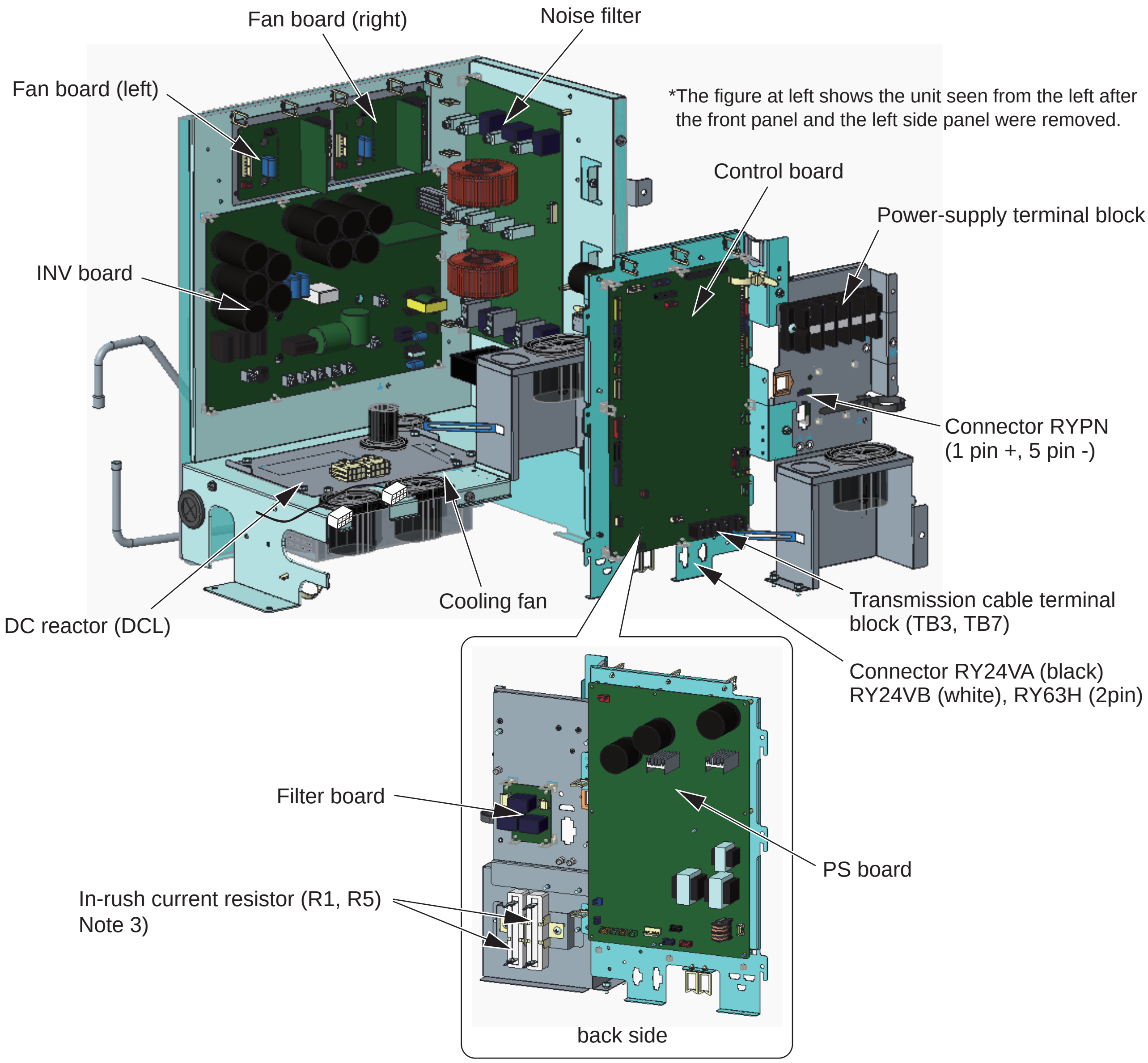


*The figure above shows the unit seen from the left after the front panel and the left side panel were removed.

Note

1) Refrigerant pipes are connected to the back of the control box. Do not forcibly pull out the control box. Doing so may result in deformation of the pipe.
2) Exercise caution not to damage the front panel of the control box. Damage to this part affect the waterproof and dust proof properties of the control box and may result in damage to its internal components.
3) A Faston terminal on the inrush current resistor has a locking function. Check that the terminal is securely locked in place. Press the tab in the middle of the terminal to remove it.
4) Control box houses high temperature parts. Be well careful even after turning off the power source.
5) **Perform the service after disconnecting the relay connector in the INV box (RYFAN1 and RYFAN2). Before plugging in or unplugging connectors, check that the outdoor unit fan is not rotating and that the voltage across Pin 1 (+) and Pin 5 (-) of connector RYPN in the INV box is 20 VDC or less. The capacitor may collect a charge and cause an electric shock when the outdoor unit fan rotates in windy conditions.** Refer to the wiring nameplate for details.
6) To connect wiring to TB7, check that the voltage is 20 VDC or below.
7) After servicing, reconnect the relay connector (RYFAN1 and RYFAN2) in the INV box as it was.
8) When opening or closing the front panel of the control box, do not touch any of the internal components. Before inspecting inside the control box, turn off the power to the unit, leave it turned off for at least 10 minutes, and check that the voltage across Pin 1 (+) and Pin 5 (-) of connector RYPN in the INV box is 20 VDC or less. It takes about 10 minutes to discharge electricity after the power supply is turned off.
9) When the power is on, the compressor is energized even while it is stopped. Before turning on the power, disconnect all power supply wires from the compressor terminal block, and measure the insulation resistance of the compressor. Check the compressor for a ground fault. If the insulation resistance is 1.0 MΩ or above, connect all power supply wires to the compressor and turn on the power to the outdoor unit. It is energized to evaporate the liquid refrigerant that has accumulated in the compressor.

(3) PUHY-(E)M500YNW-A1

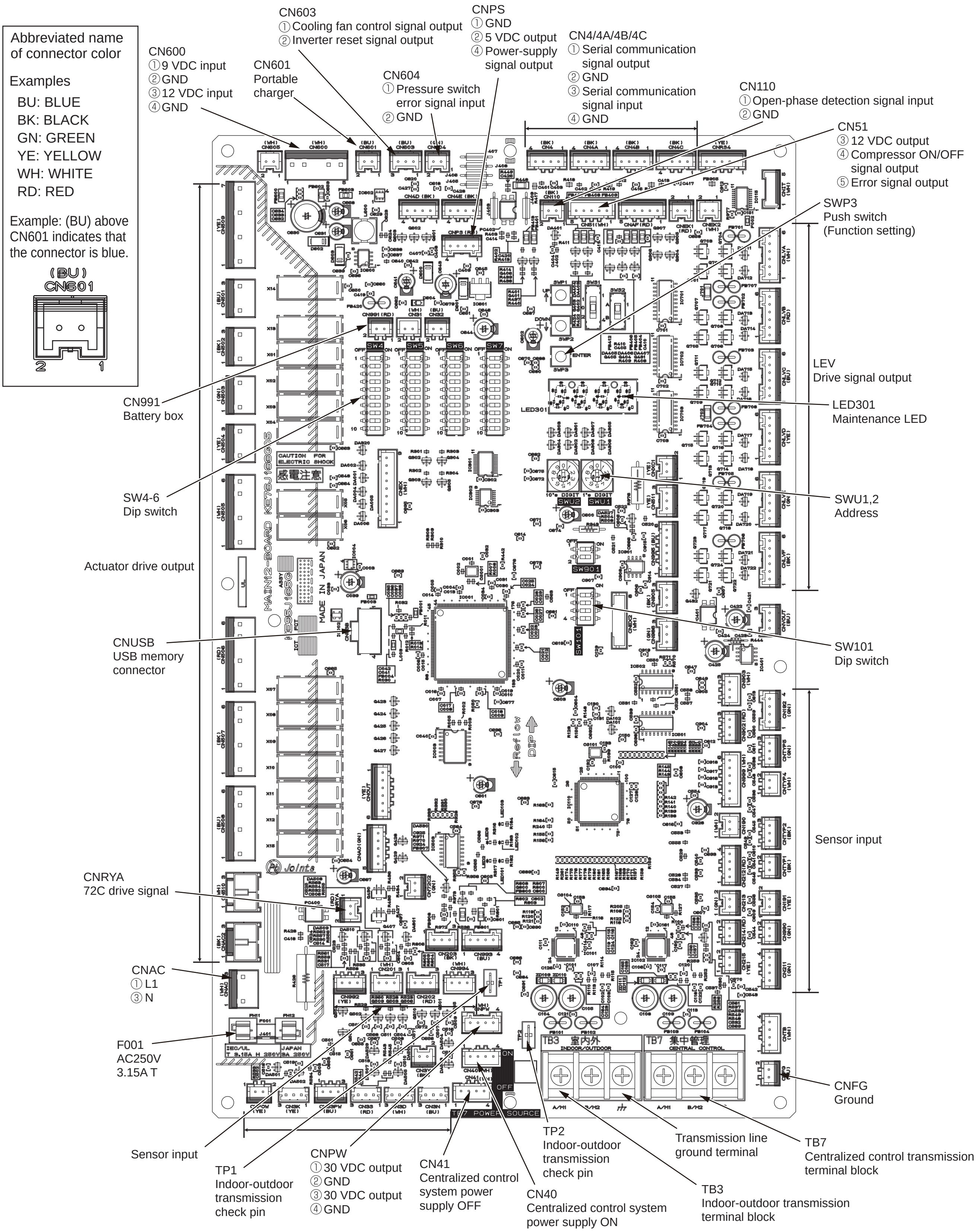


Note

1) Refrigerant pipes are connected to the back of the control box. Do not forcibly pull out the control box. Doing so may result in deformation of the pipe.
2) Exercise caution not to damage the front panel of the control box. Damage to this part affect the waterproof and dust proof properties of the control box and may result in damage to its internal components.
3) A Faston terminal on the inrush current resistor has a locking function. Check that the terminal is securely locked in place. Press the tab in the middle of the terminal to remove it.
4) Control box houses high temperature parts. Be well careful even after turning off the power source.
5) **Perform the service after disconnecting the relay connector in the INV box (RYFAN1 and RYFAN2). Before plugging in or unplugging connectors, check that the outdoor unit fan is not rotating and that the voltage across Pin 1 (+) and Pin 5 (-) of connector RYPN in the INV box is 20 VDC or less. The capacitor may collect a charge and cause an electric shock when the outdoor unit fan rotates in windy conditions.** Refer to the wiring nameplate for details.
6) To connect wiring to TB7, check that the voltage is 20 VDC or below.
7) After servicing, reconnect the relay connector (RYFAN1 and RYFAN2) in the INV box as it was.
8) When opening or closing the front panel of the control box, do not touch any of the internal components. Before inspecting inside the control box, turn off the power to the unit, leave it turned off for at least 10 minutes, and check that the voltage across Pin 1 (+) and Pin 5 (-) of connector RYPN in the INV box is 20 VDC or less. It takes about 10 minutes to discharge electricity after the power supply is turned off.
9) When the power is on, the compressor is energized even while it is stopped. Before turning on the power, disconnect all power supply wires from the compressor terminal block, and measure the insulation resistance of the compressor. Check the compressor for a ground fault. If the insulation resistance is 1.0 MΩ or above, connect all power supply wires to the compressor and turn on the power to the outdoor unit. It is energized to evaporate the liquid refrigerant that has accumulated in the compressor.

4-2 Outdoor Unit Circuit Board Components

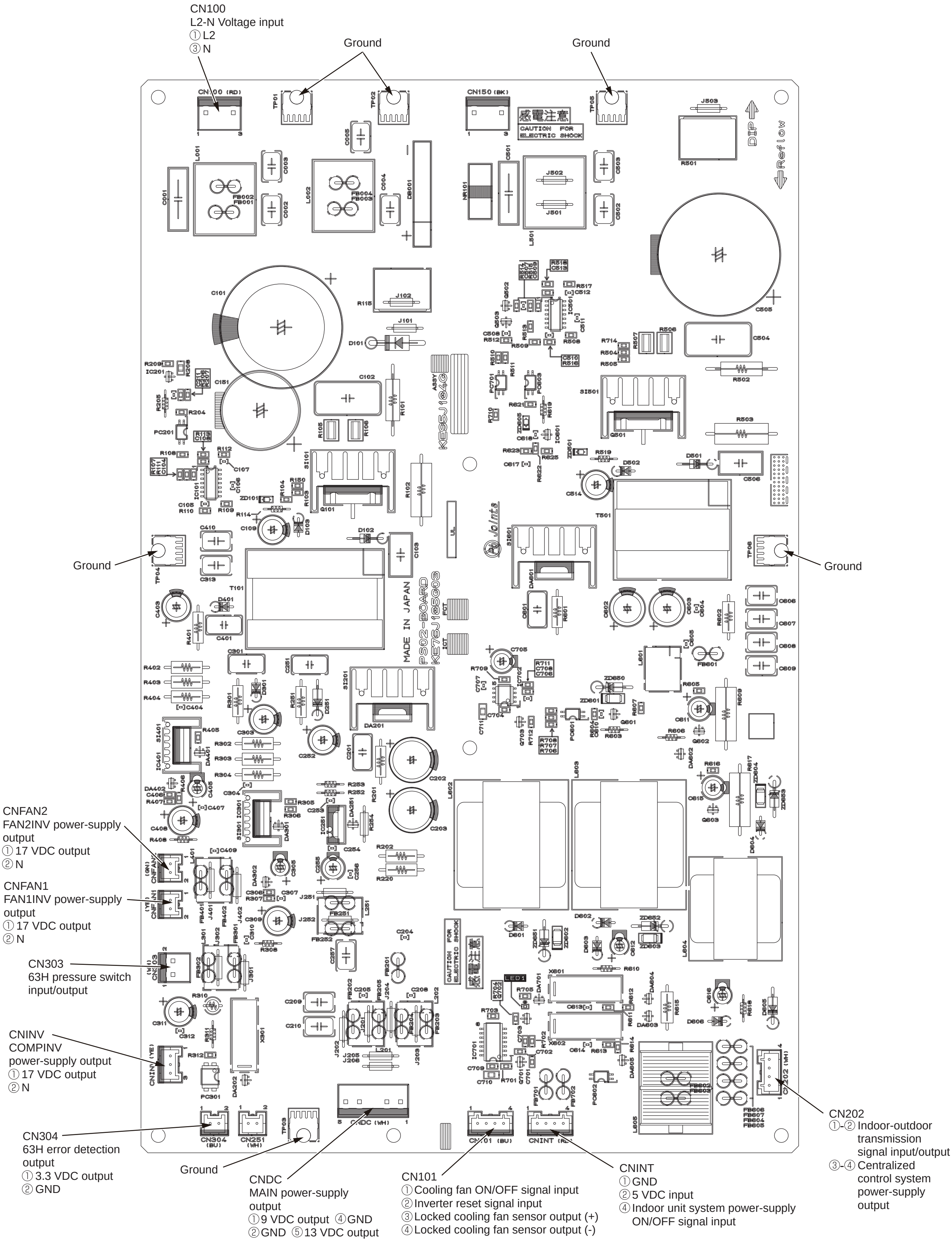
4-2-1 Control Board



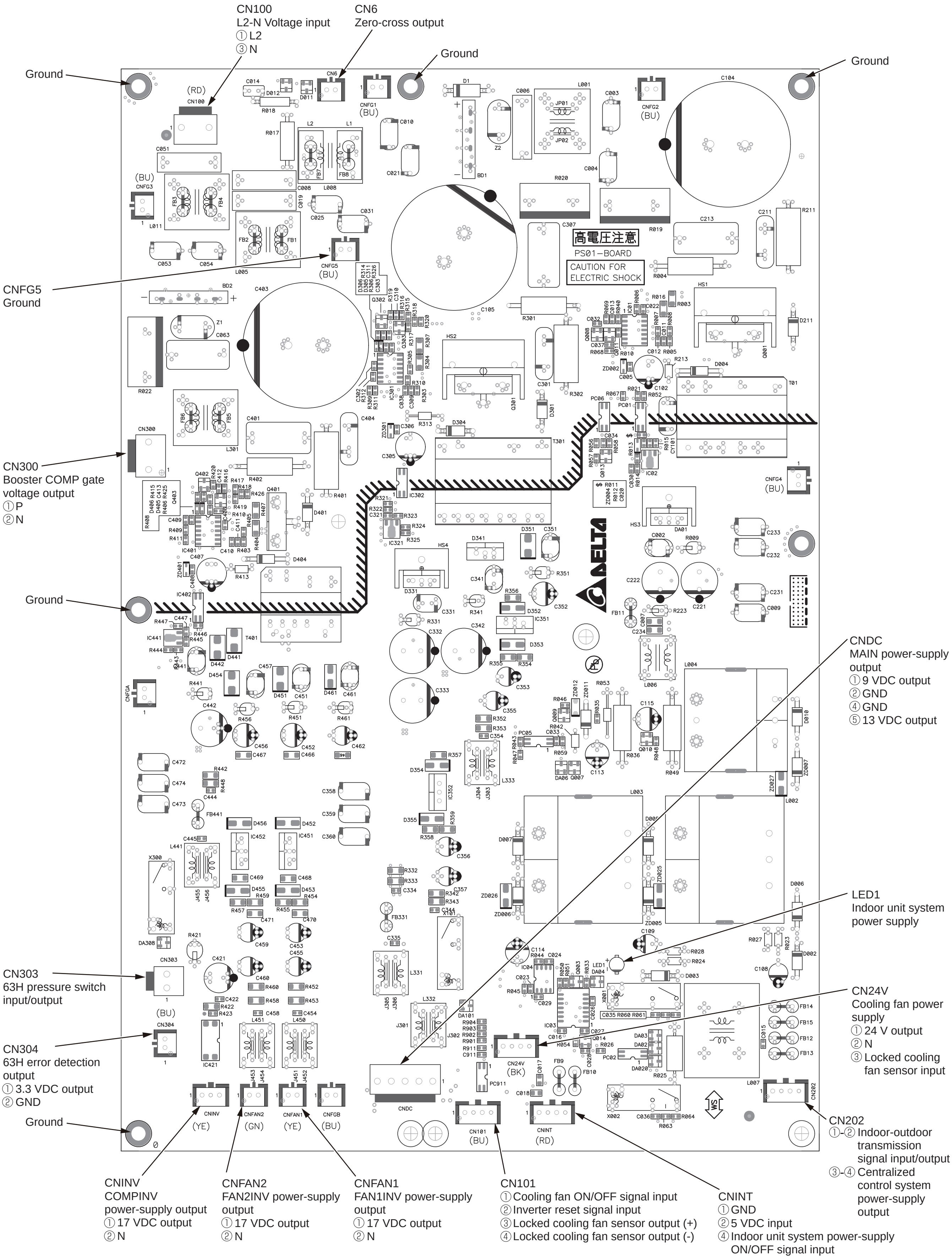
*For information about the display of SW4 function settings, refer to the following page(s). [5-1-1 Outdoor Unit Switch Functions and Factory Settings]

4-2-2 Power-supply board (PS Board)

(1) PUHY-(E)M200, (E)M250, (E)M300YNW-A1

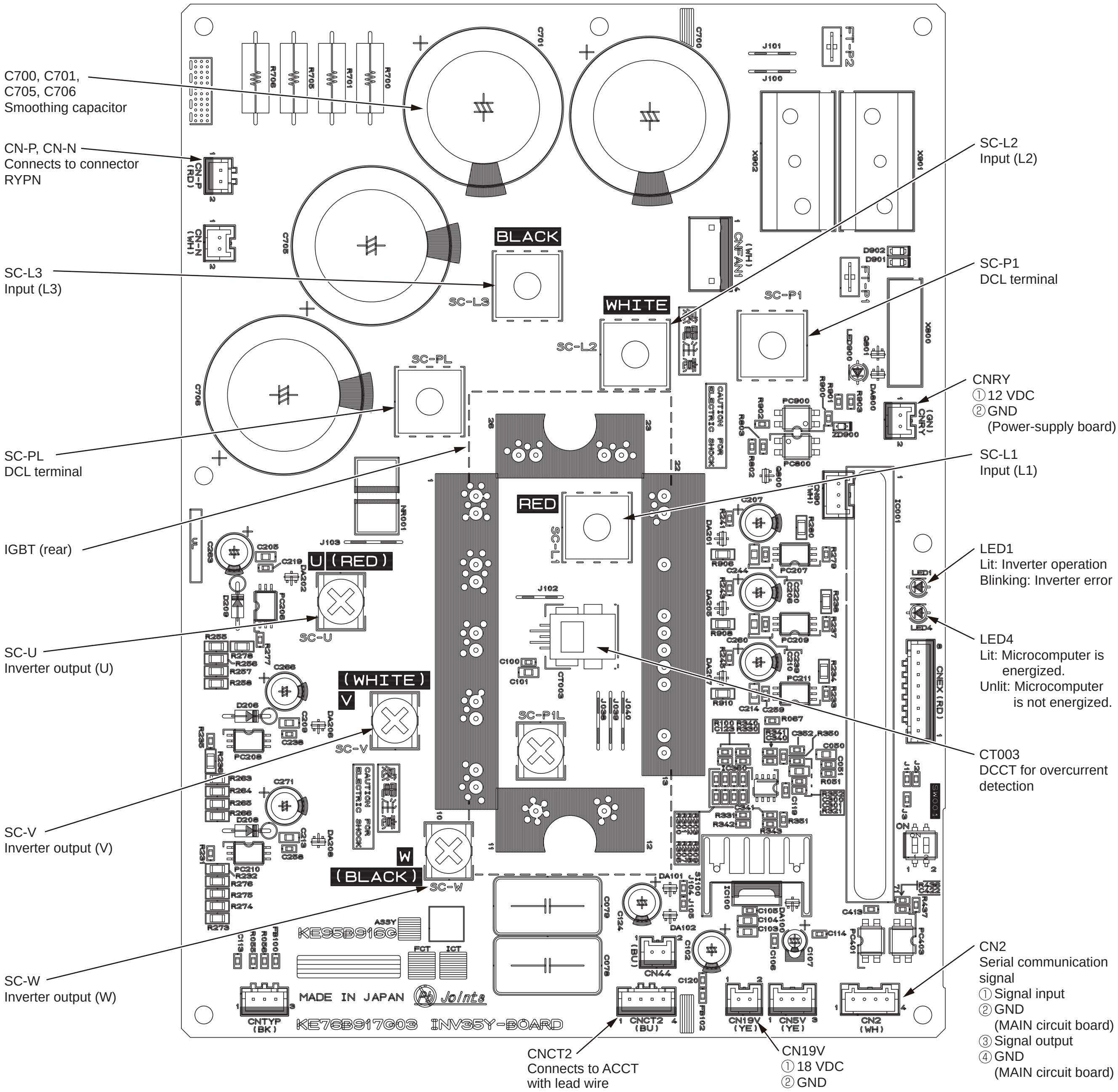


(2) PUHY-(E)M350, (E)M400, (E)M450, (E)M500YNW-A1



4-2-3 Inverter Board (INV Board)

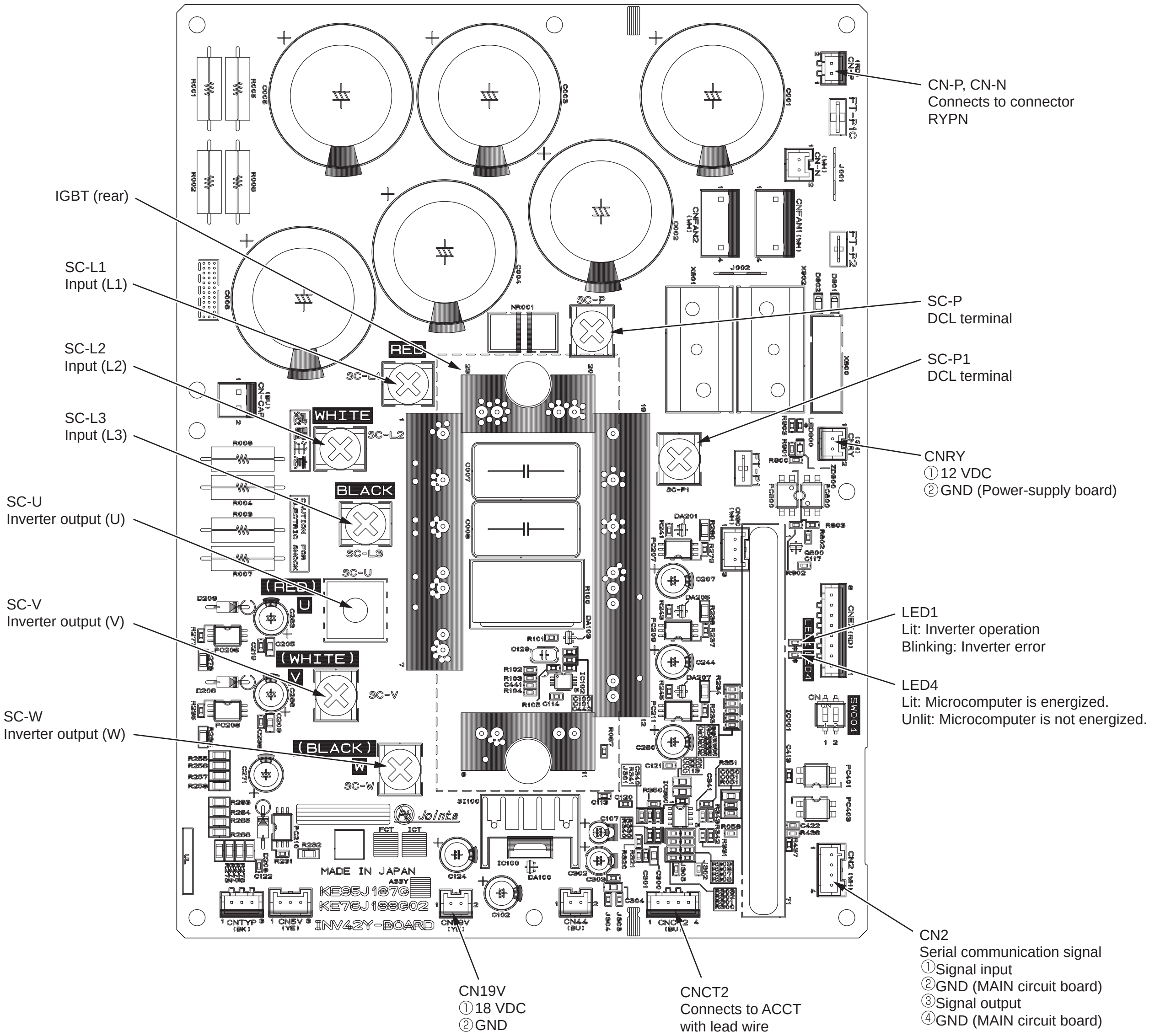
(1) PUHY-(E)M200, (E)M250, (E)M300YNW-A1



Note

1) 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 across pins 1 and 5 of connector RYPN has dropped to 20 VDC or less. It takes about 10 minutes to discharge electricity after the power supply is turned off.
2) A Faston terminal on the inrush current resistor has a locking function. Make sure the cable heads are securely locked in place. Press the tab on the terminals to remove them.
3) Control box houses high temperature parts. Be well careful even after turning off the power source.
4) **Perform the service after disconnecting the relay connector (RYFAN1). Before plugging in or unplugging connectors, check that the outdoor unit fan is not rotating and that the voltage across pins 1 and 5 of connector RYPN is 20 VDC or less. The capacitor may collect a charge and cause an electric shock when the outdoor unit fan rotates in windy conditions.** Refer to the wiring nameplate for details.
5) After servicing, reconnect the relay connector (RYFAN1) of the fan as it was.
6) When the power is turned on, the compressor is energized even while it is not operating. Before turning on the power, disconnect all power supply wires from the compressor terminal block, and measure the insulation resistance of the compressor. Check the compressor for a ground fault. If the insulation resistance is 1.0 MΩ or above, connect all power supply wires to the compressor and turn on the power to the outdoor unit. The liquid refrigerant in the compressor will evaporate by energizing the compressor.

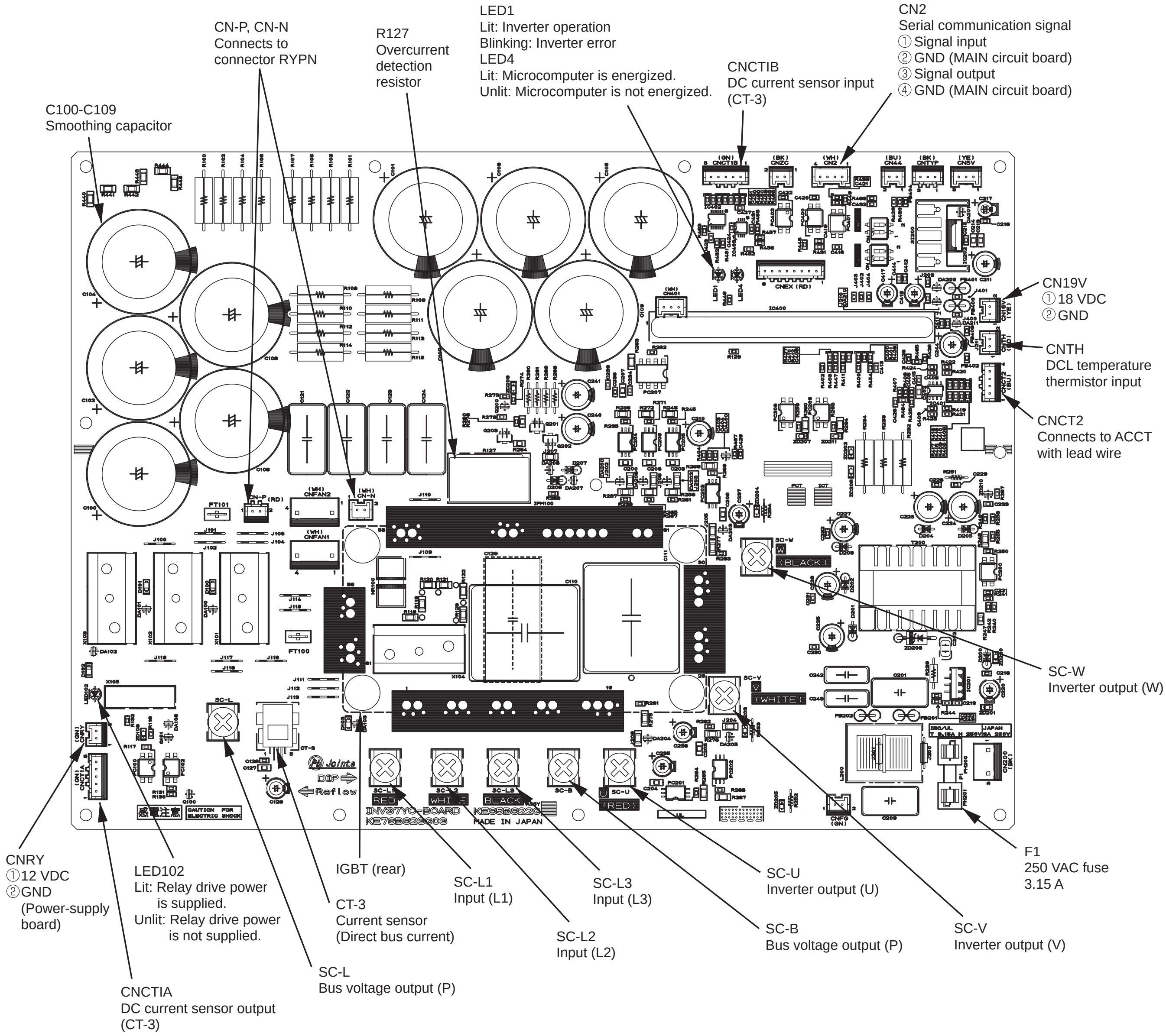
(2) PUHY-(E)M350, (E)M400, (E)M450YNW-A1



Note

1) 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 across pins 1 and 5 of connector RYPN has dropped to 20 VDC or less. It takes about 10 minutes to discharge electricity after the power supply is turned off.
2) A Faston terminal on the inrush current resistor has a locking function. Make sure the cable heads are securely locked in place. Press the tab on the terminals to remove them.
3) Control box houses high temperature parts. Be well careful even after turning off the power source.
4) **Perform the service after disconnecting the relay connector (RYFAN1, RYFAN2). Before plugging in or unplugging connectors, check that the outdoor unit fan is not rotating and that the voltage across pins 1 and 5 of connector RYPN is 20 VDC or less. The capacitor may collect a charge and cause an electric shock when the outdoor unit fan rotates in windy conditions.** Refer to the wiring nameplate for details.
5) After servicing, reconnect the relay connector (RYFAN1, RYFAN2) of the fan as it was.
6) When the power is on, the compressor or heater is energized even while the compressor is stopped. Before turning on the power, disconnect all power supply wires from the compressor terminal block, and measure the insulation resistance of the compressor. Check the compressor for a ground fault. If the insulation resistance is 1.0 MΩ or above, connect all power supply wires to the compressor and turn on the power to the outdoor unit. It is energized to evaporate the liquid refrigerant that has accumulated in the compressor.

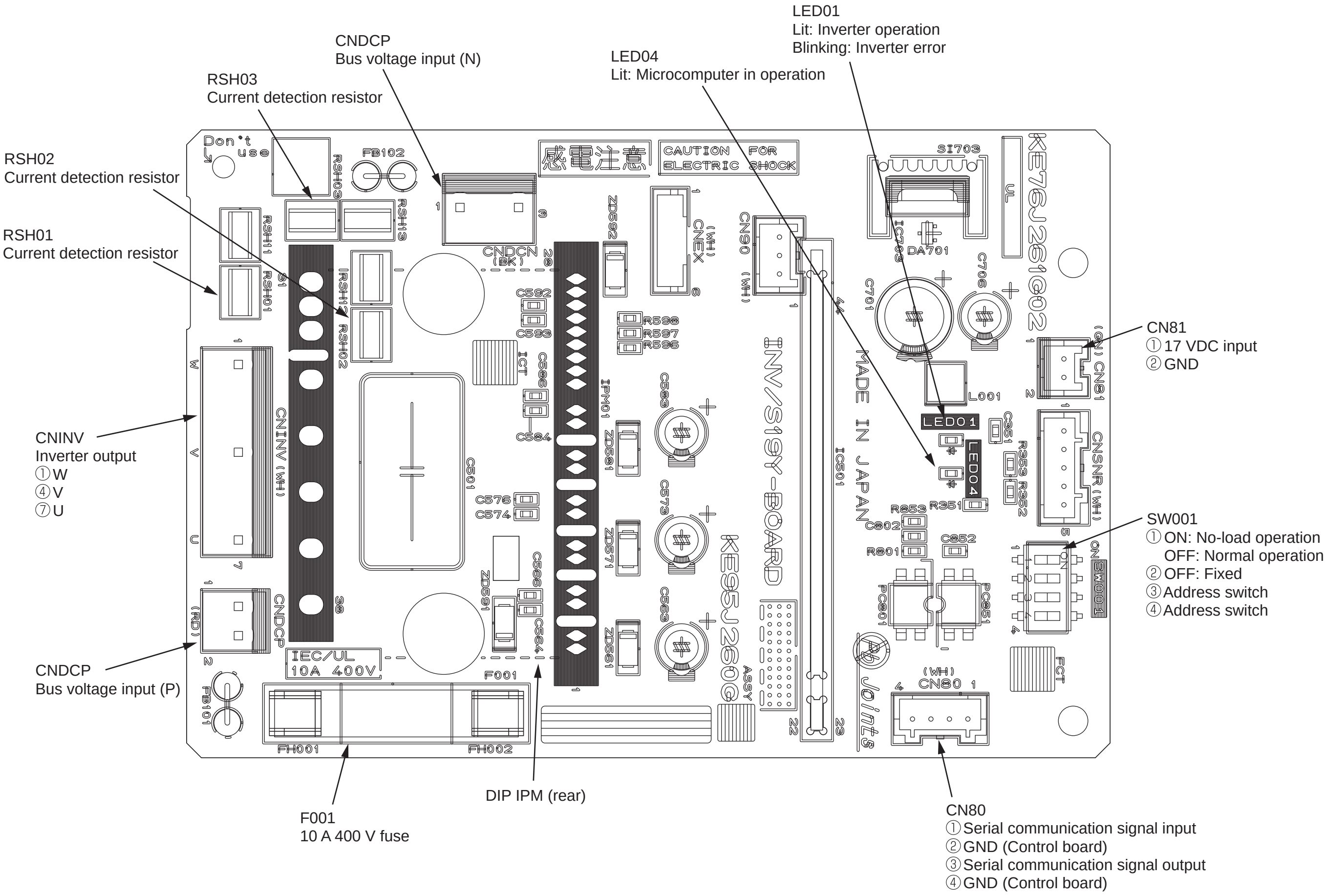
(3) PUHY-(E)M500YNW-A1



Note

1) 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 across pins 1 and 5 of connector RYPN has dropped to 20 VDC or less. It takes about 10 minutes to discharge electricity after the power supply is turned off.
2) A Faston terminal on the inrush current resistor has a locking function. Make sure the cable heads are securely locked in place. Press the tab on the terminals to remove them.
3) Control box houses high temperature parts. Be well careful even after turning off the power source.
4) **Perform the service after disconnecting the relay connector (RYFAN1, RYFAN2). Before plugging in or unplugging connectors, check that the outdoor unit fan is not rotating and that the voltage across pins 1 and 5 of connector RYPN is 20 VDC or less. The capacitor may collect a charge and cause an electric shock when the outdoor unit fan rotates in windy conditions.** Refer to the wiring nameplate for details.
5) After servicing, reconnect the relay connector (RYFAN1, RYFAN2) of the fan as it was.
6) When the power is turned on, the compressor is energized even while it is not operating. Before turning on the power, disconnect all power supply wires from the compressor terminal block, and measure the insulation resistance of the compressor. Check the compressor for a ground fault. If the insulation resistance is 1.0 MΩ or above, connect all power supply wires to the compressor and turn on the power to the outdoor unit. The liquid refrigerant in the compressor will evaporate by energizing the compressor.

4-2-4 Fan Board

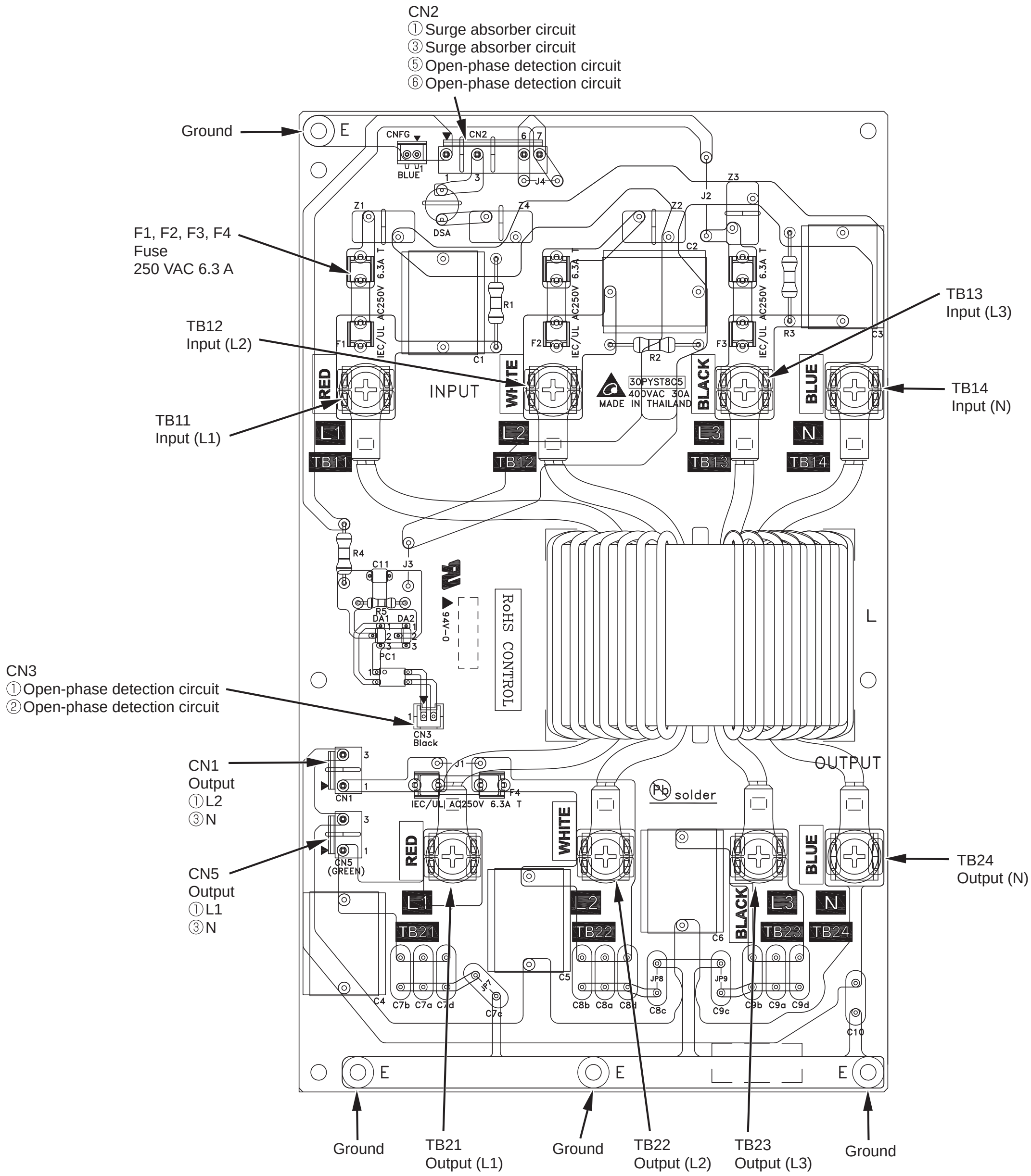


Note

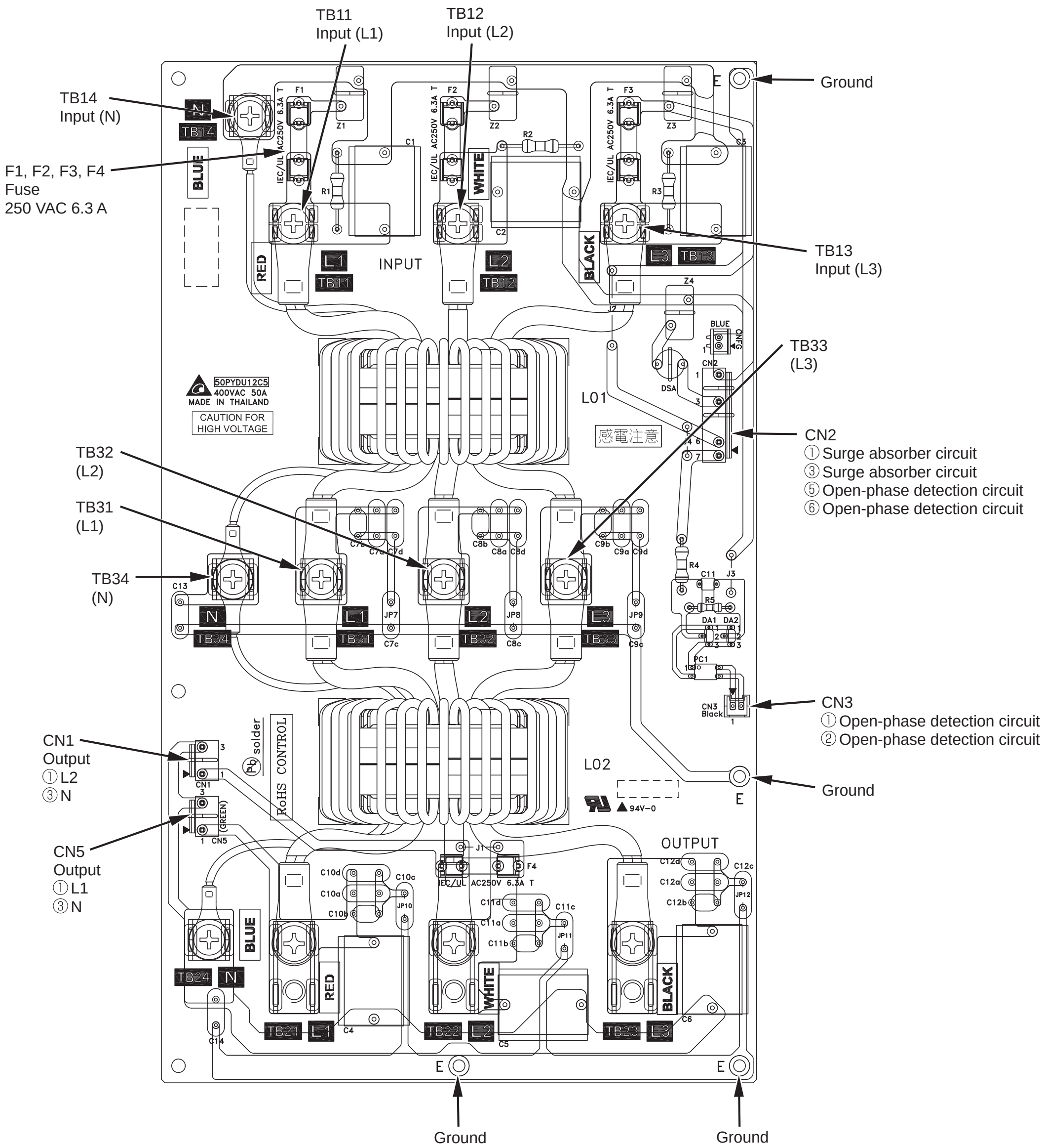
1) When opening or closing the front panel of the control box, do not let it come into contact with any of the internal components. Before inspecting the inside of the control box, turn off the power, keep the unit off for at least 10 minutes, and confirm that the capacitor voltage (inverter main circuit) has dropped to 20 VDC or less. It takes about 10 minutes to discharge electricity after the power supply is turned off.
2) Control box houses high temperature parts. Be well careful even after turning off the power source.
3) **Perform the service after disconnecting the relay connector (RYFAN1, RYFAN2). Before plugging in or unplugging connectors, check that the outdoor unit fan is not rotating and that the voltage across pins 1 and 5 of connector RYPN is 20 VDC or less. The capacitor may collect a charge and cause an electric shock when the outdoor unit fan rotates in windy conditions.** Refer to the wiring nameplate for details.
4) To connect wiring to TB7, check that the voltage is 20 VDC or below.
5) After servicing, reconnect the relay connector (RYFAN1, RYFAN2) of the fan as it was.

4-2-5 Noise Filter

(1) PUHY-(E)M200, (E)M250, (E)M300, (E)M350, (E)M400, (E)M450YNW-A1

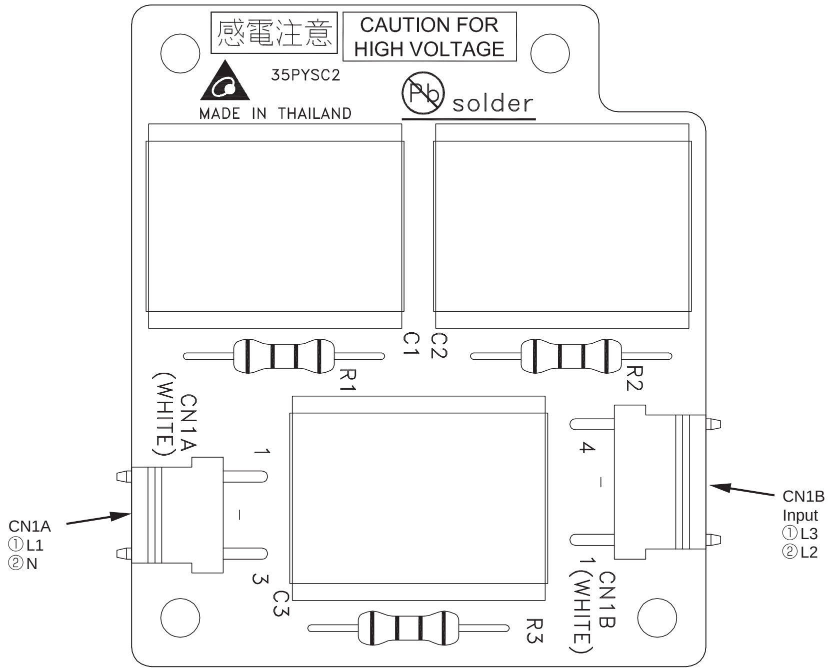


(2) PUHY-(E)M500YNW-A1



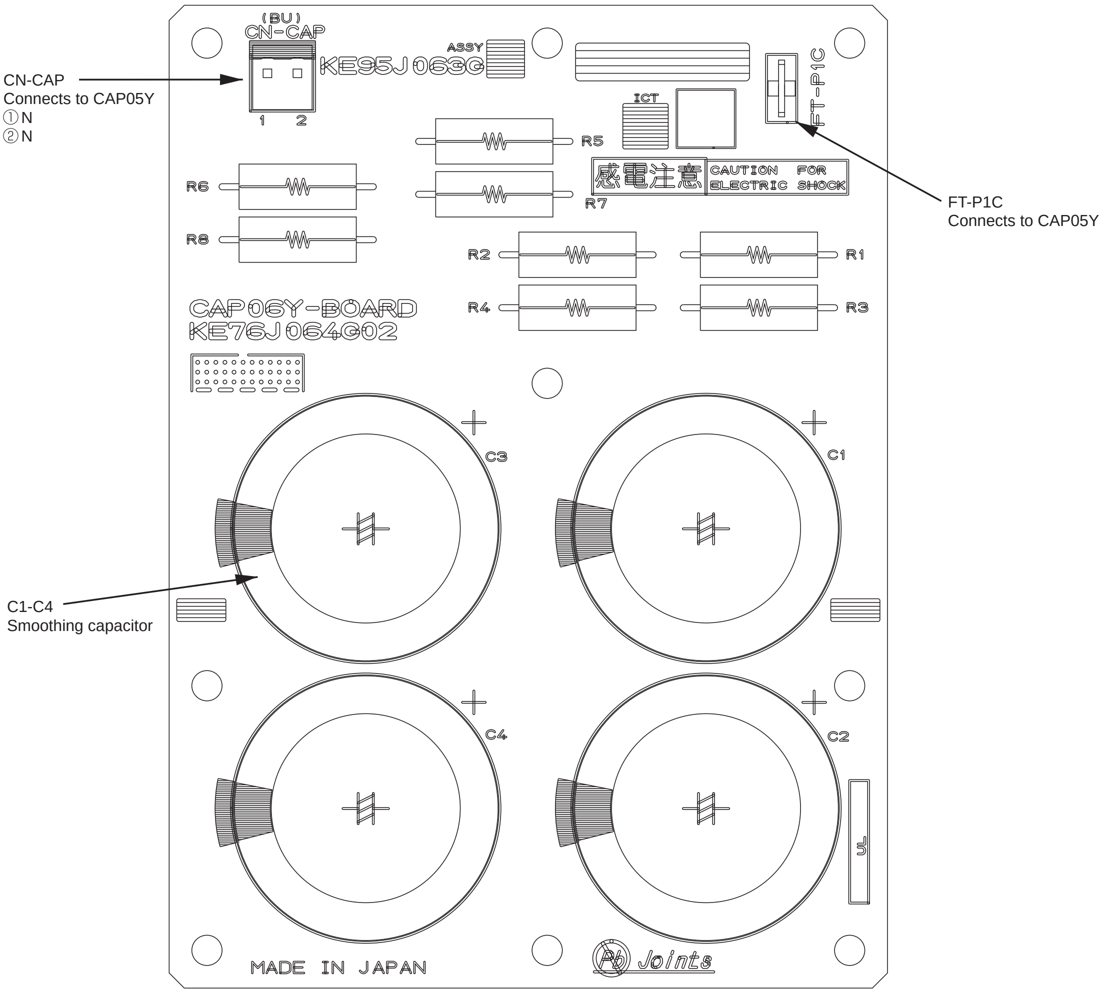
4-2-6 Filter Board

(1) PUHY-(E)M500YNW-A1



4-2-7 Capacitor Board (CAP Board)

(1) PUHY-(E)M350, (E)M400, (E)M450YNW-A1

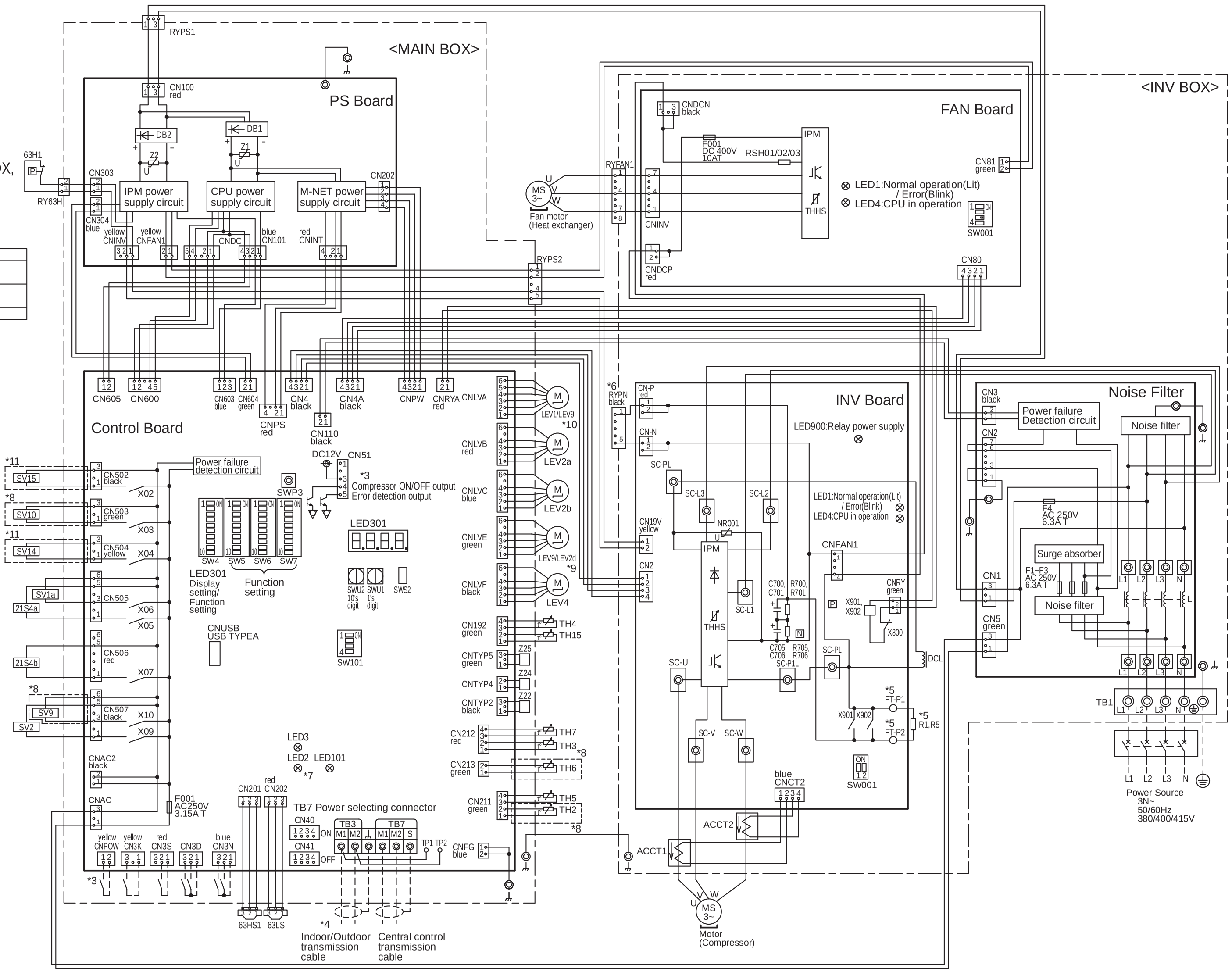


Note

1) 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 capacitor voltage (inverter main circuit) has dropped to 20 VDC or less. It takes about 10 minutes to discharge electricity after the power supply is turned off.
2) A Faston terminal on the inrush current resistor has a locking function. Make sure the cable heads are securely locked in place. Press the tab on the terminals to remove them.
3) Control box houses high temperature parts. Be well careful even after turning off the power source.
4) **Perform the service after disconnecting the relay connector (RYFAN1, RYFAN2). Before plugging in or unplugging connectors, check that the outdoor unit fan is not rotating and that the voltage across pins 1 and 5 of connector RYPN is 20 VDC or less. The capacitor may collect a charge and cause an electric shock when the outdoor unit fan rotates in windy conditions.** Refer to the wiring nameplate for details.
5) After servicing, reconnect the relay connector (RYFAN1, RYFAN2) of the fan as it was.

4-3 Outdoor Unit Electrical Wiring Diagrams

(1) PUHY-(E)M200, (E)M250, (E)M300YNW-A1



*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 removed them.
*6.Control box houses high-voltage parts. Before inspecting the inside of the MAIN BOX or INV BOX, turn off the power,keep the unit off for at least 10 minutes, and confirm that the voltage of the connector RYPN on INV BOX has dropped to DC20V or less.
*7.Control board LED display.

LED2	Normal operation(Lit)/Error(Blink)	
LED3	SW6-10 is OFF and SW4-1~10 are OFF	In operation(Lit)/In stop(Unlit)
	SW6-10 is ON	Function setting by SW4 enable(Lit)/disable(Unlit)
LED101	Normal operation(Lit)/IC Error(Unlit)	

*8.Difference of appliance.

Model name	Appliance
PUHY	*8 exist
PURY	*8 do not exist

*9.Difference of appliance.

Model name	Appliance
PUHY	LEV9
PURY	LEV2d

*10.Difference of appliance.

Model name	Appliance
PUHY	LEV1
PURY	LEV9

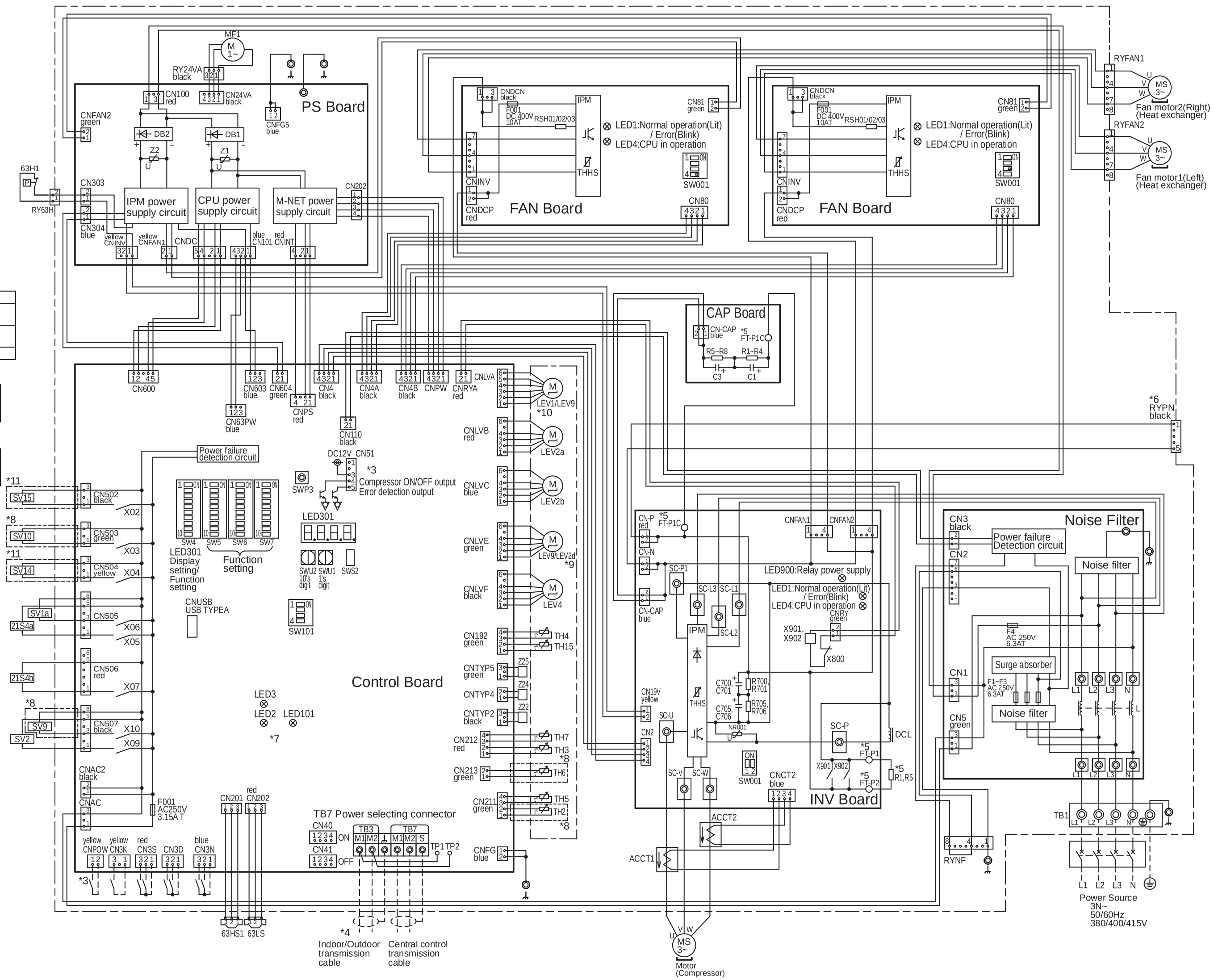
*11.Difference of appliance.

Model name	Appliance
PUHY-M,PURY	*11 do not exist
PUHY-EM	*11 exist

<Symbol explanation>

Symbol	Explanation	
21S4a	4-way valve	Cooling/Heating switching
21S4b		Heat exchanger capacity control(only PUHY model). Cooling/Heating switching
63H1	Pressure switch	High pressure protection for the outdoor unit
63HS1	Pressure sensor	Discharge pressure
63LS		Low pressure
ACCT1,ACCT2	Current sensor(AC)	
C700,C701, C705,C706	Capacitor(inverter main circuit)	
DCL	DC reactor	
L	Choke coil (for high frequency noise reduction)	
LEV1 *10	Linear expansion valve	HIC bypass,Controls refrigerant flow in HIC circuit
LEV2a,b		Pressure control,Refrigerant flow rate control
LEV2d *9		Pressure control,Refrigerant flow rate control
LEV4		For opening/closing the injection circuit
LEV9 *9,10		Heat exchanger for inverter
R1,5	Resistor	For inrush current prevention
RSH01/02/03		For current detection
SV1a	Solenoid valve	For opening/closing the bypass circuit under the O/S
SV2		For opening/closing the discharge suction bypass
SV9 *8		For opening/closing the bypass circuit
SV10 *8		For continuous heating
SV14,15 *11		For changing refrigerant flow (cooling/heating)
TB1	Terminal block	Power supply
TB3		Indoor/Outdoor transmission line
TB7		Central control transmission line
TH2 *8	Thermistor	Subcool bypass outlet temperature
TH3		Pipe temperature
TH4		Discharge pipe temperature
TH5		ACC inlet pipe temperature
TH6 *8		Subcooled liquid refrigerant temperature
TH7		OA temperature
TH15		Compressor shell bottom temperature
THHS		IPM temperature
X901,902	Magnetic relay(inverter main circuit)	
Z22,24,25	Function setting connector	

(2) PUHY-(E)M350, (E)M400, (E)M450YNW-A1



*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 removed 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 of the connector RYPN has dropped to DC20V or less.
*7.Control board LED display.

LED2	Normal operation(Lit)/Error(Blink)	
LED3	SW6-10 is OFF and SW4-1~10 are OFF	In operation(Lit)/In stop(Unlit)
	SW6-10 is ON	Function setting by SW4 enable(Lit)/disable(Unlit)
LED101	Normal operation(Lit)/IC Error(Unlit)	

*8.Difference of appliance.

Model name	Appliance
PUHY	*8 exist
PURY	*8 do not exist

*10.Difference of appliance.

Model name	Appliance
PUHY	LEV1
PURY	LEV9

*9.Difference of appliance.

Model name	Appliance
PUHY	LEV9
PURY	LEV2d

*11.Difference of appliance.

Model name	Appliance
PUHY-M,PURY	*11 do not exist
PUHY-EM	*11 exist

<Symbol explanation>

Symbol	Explanation	
21S4a	4-way valve	Cooling/Heating switching
21S4b		Heat exchanger capacity control(only PUHY model). Cooling/Heating switching
63H1	Pressure switch	High pressure protection for the outdoor unit
63HS1	Pressure sensor	Discharge pressure
63LS		Low pressure
ACCT1,ACCT2	Current sensor(AC)	
C1,3,700,701, 705,706	Capacitor (inverter main circuit)	
DCL	DC reactor	
L	Choke coil (for high frequency noise reduction)	
LEV1 *10	Linear expansion valve	HIC bypass,Controls refrigerant flow in HIC circuit
LEV2a,b		Pressure control,Refrigerant flow rate control
LEV2d *9		Pressure control,Refrigerant flow rate control
LEV4		For opening/closing the injection circuit
LEV9 *9,10		Heat exchanger for inverter
MF1	Fan motor(for cooling in control box)	
R1,5	Resistor	For inrush current prevention
RSH01/02/03		For current detection
SV1a	Solenoid valve	For opening/closing the bypass circuit under the O/S
SV2		For opening/closing the discharge suction bypass
SV9 *8		For opening/closing the bypass circuit
SV10 *8		For continuous heating
SV14,15 *11		For changing refrigerant flow (cooling/heating)
TB1	Terminal block	Power supply
TB3		Indoor/Outdoor transmission line
TB7		Central control transmission line
TH2 *8	Thermistor	Subcool bypass outlet temperature
TH3		Pipe temperature
TH4		Discharge pipe temperature
TH5		ACC inlet pipe temperature
TH6 *8		Subcooled liquid refrigerant temperature
TH7		OA temperature
TH15		Compressor shell bottom temperature
THHS		IPM temperature
X901,X902	Magnetic relay(inverter main circuit)	
Z22,24,25	Function setting connector	

(3) PUHY-(E)M500YNW-A1

*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 removed 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 of the connector RYPN has dropped to DC20V or less.
*7.Control board LED display.

LED2	Normal operation(Lit)/Error(Blink)	
LED3	SW6-10 is OFF and SW4-1~10 are OFF	In operation(Lit)/In stop(Unlit)
	SW6-10 is ON	Function setting by SW4 enable(Lit)/disable(Unlit)
LED101	Normal operation(Lit)/IC Error(Unlit)	

*8.Difference of appliance.

Model name	Appliance
PUHY	*8 exist
PURY	*8 do not exist

*9.Difference of appliance.

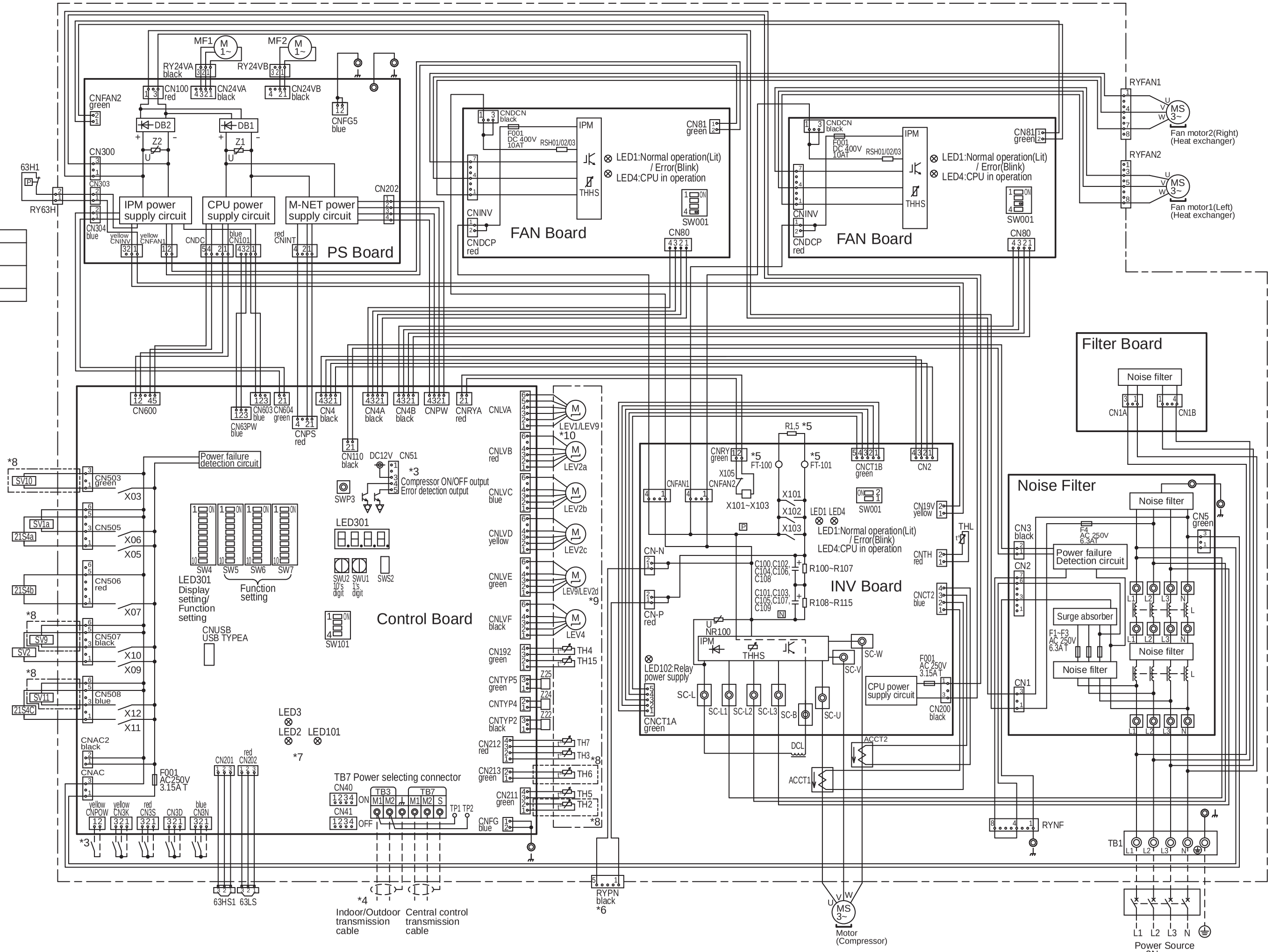
Model name	Appliance
PUHY	LEV9
PURY	LEV2d

*10.Difference of appliance.

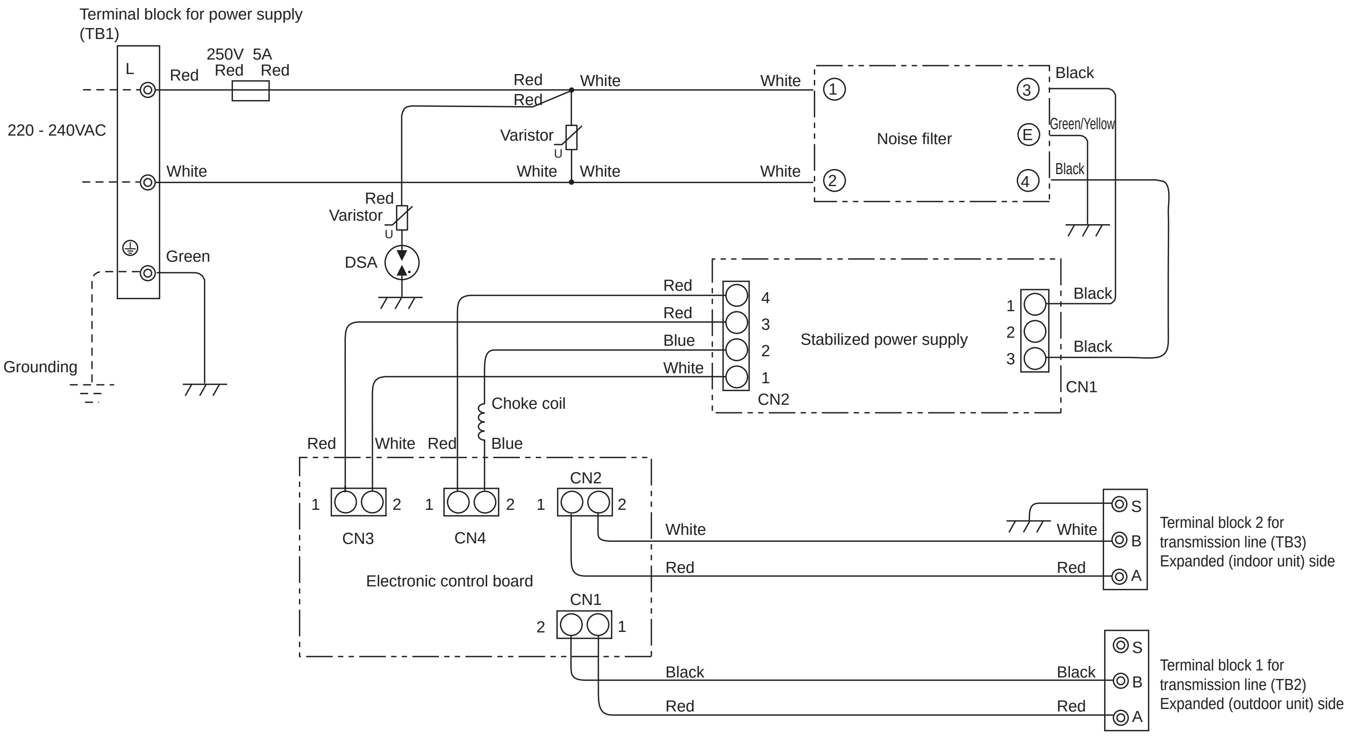
Model name	Appliance
PUHY	LEV1
PURY	LEV9

<Symbol explanation>

Symbol	Explanation	
21S4a	4-way valve	Cooling/Heating switching
21S4b,c		Heat exchanger capacity control(only PUHY model). Cooling/heating switching
63H1	Pressure switch	High pressure protection for the outdoor unit
63HS1	Pressure sensor	Discharge pressure
63LS		Low pressure
ACCT1,ACCT2	Current sensor(AC)	
C100~C109	Capacitor (inverter main circuit)	
DCL	DC reactor	
L	Choke coil (for high frequency noise reduction)	
LEV1 *10	Linear expansion valve	HIC bypass,Controls refrigerant flow in HIC circuit
LEV2a,b,c		Pressure control,Refrigerant flow rate control
LEV2d *9		Pressure control,Refrigerant flow rate control
LEV4		For opening/closing the injection circuit
LEV9 *9,10		Heat exchanger for inverter
MF1,2	Fan motor(for cooling in control box)	
R1,5	Resistor	For inrush current prevention
RSH01/02/03		For current detection
SV1a	Solenoid valve	For opening/closing the bypass circuit under the O/S
SV2		For opening/closing the discharge suction bypass
SV9 *8		For opening/closing the bypass circuit
SV10,11 *8		For continuous heating
TB1	Terminal block	Power supply
TB3		Indoor/Outdoor transmission line
TB7		Central control transmission line
TH2 *8	Thermistor	Subcool bypass outlet temperature
TH3		Pipe temperature
TH4		Discharge pipe temperature
TH5		ACC inlet pipe temperature
TH6 *8		Subcooled liquid refrigerant temperature
TH7		OA temperature
TH15		Compressor shell bottom temperature
THHS		IPM temperature
X101~X103	Magnetic relay(inverter main circuit)	
Z22,24,25	Function setting connector	



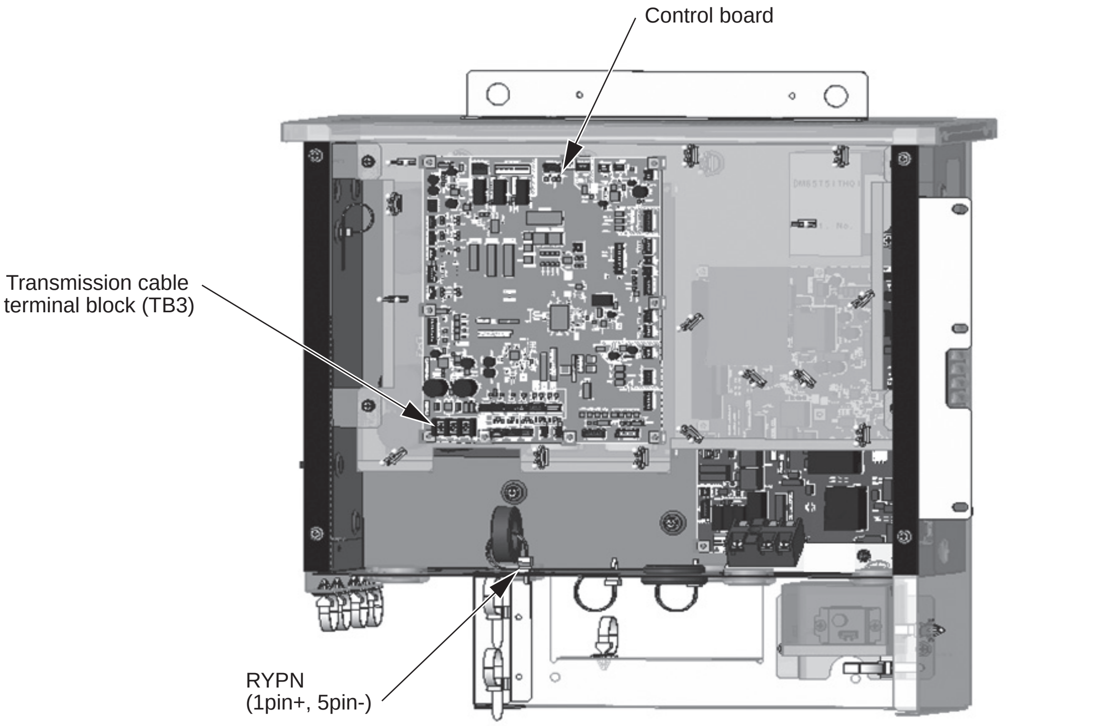
4-4 Transmission Booster Electrical Wiring Diagrams

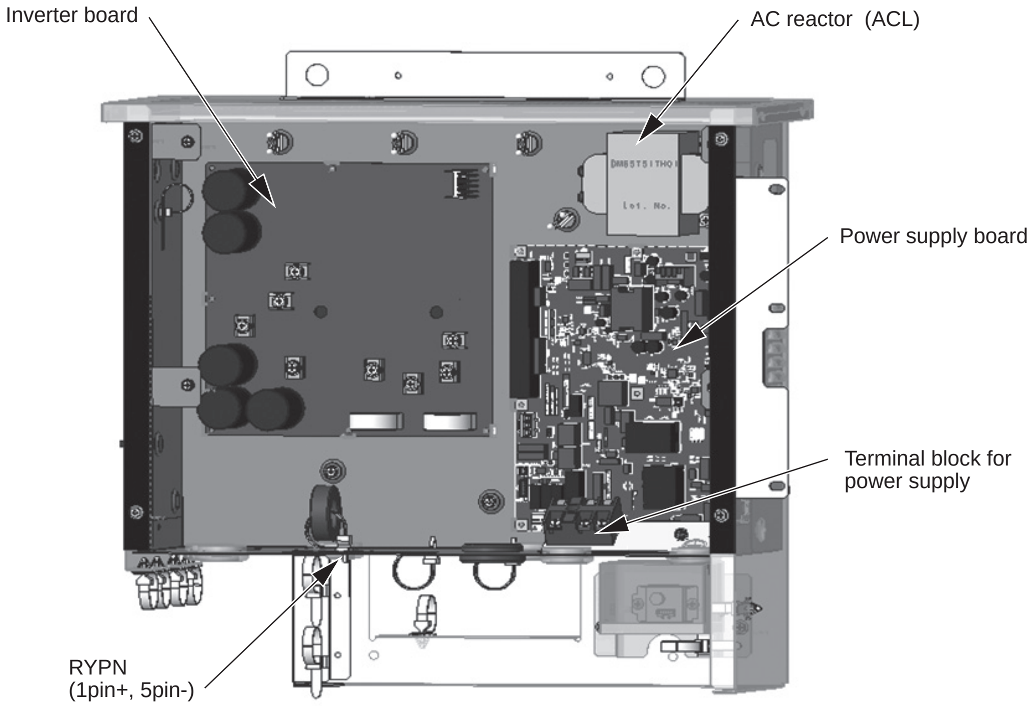


4-5 Hydro Unit Circuit Board Arrangement

4-5-1 Hydro Unit Control Box

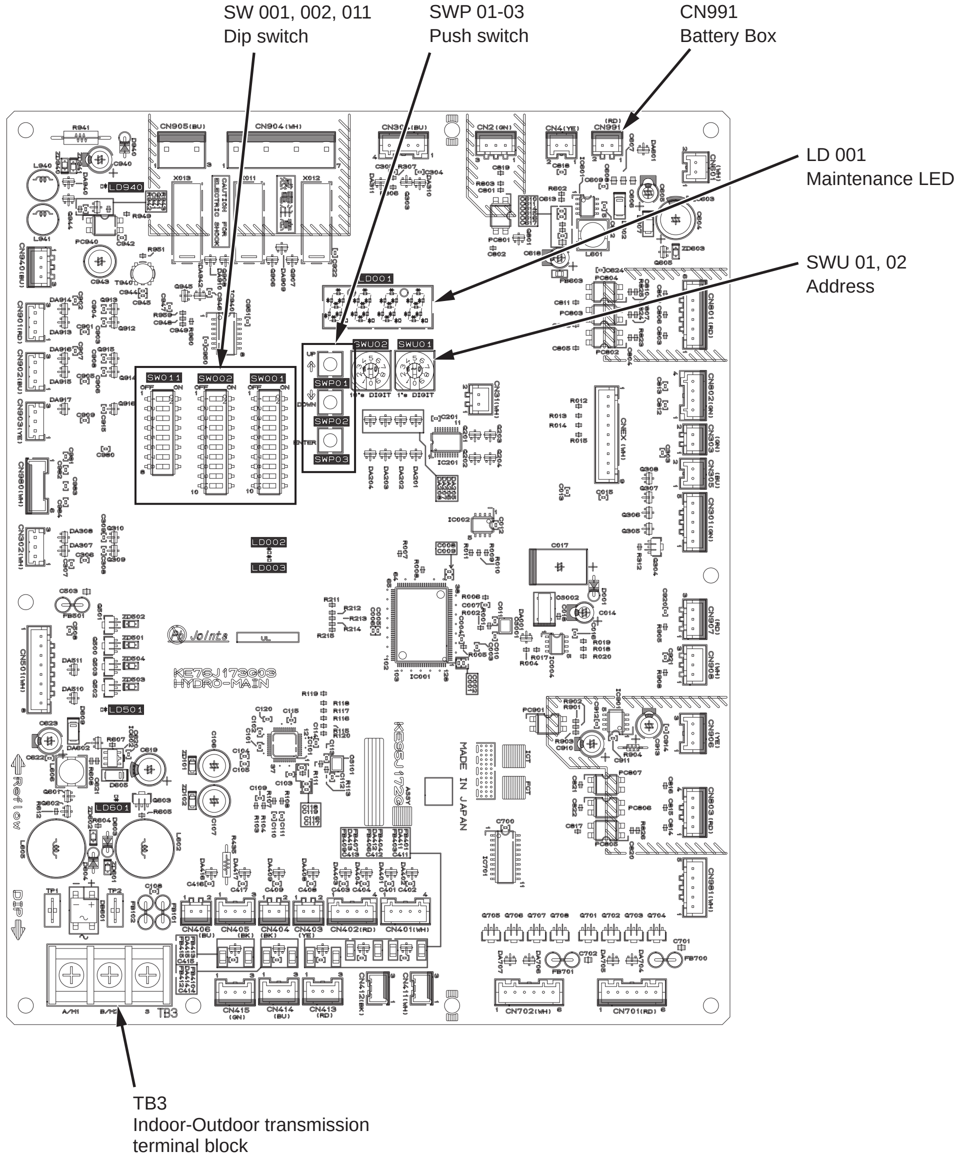
1. CMH-WM250, 350, 500V-A



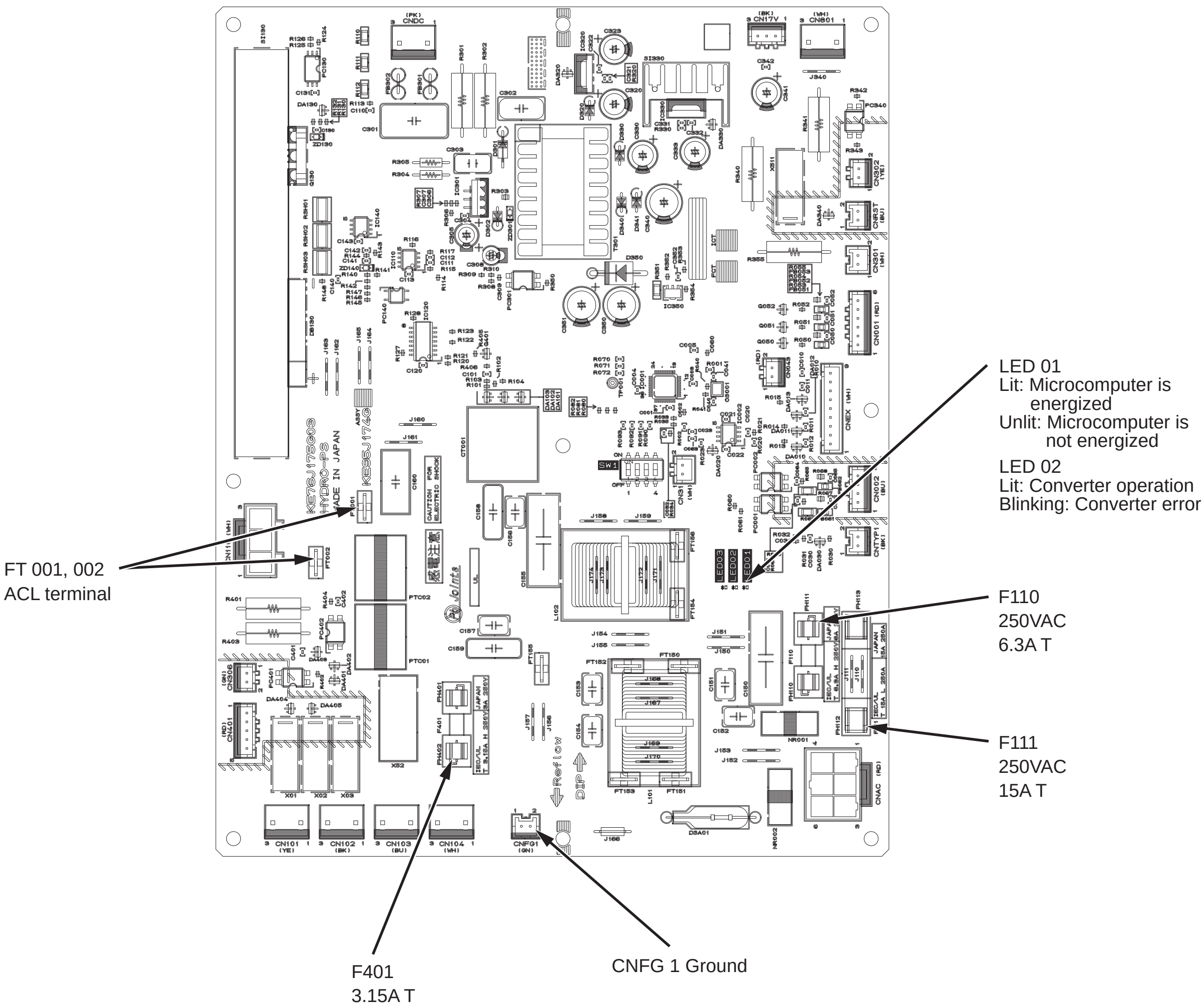


4-6 Hydro Unit Circuit Board Components

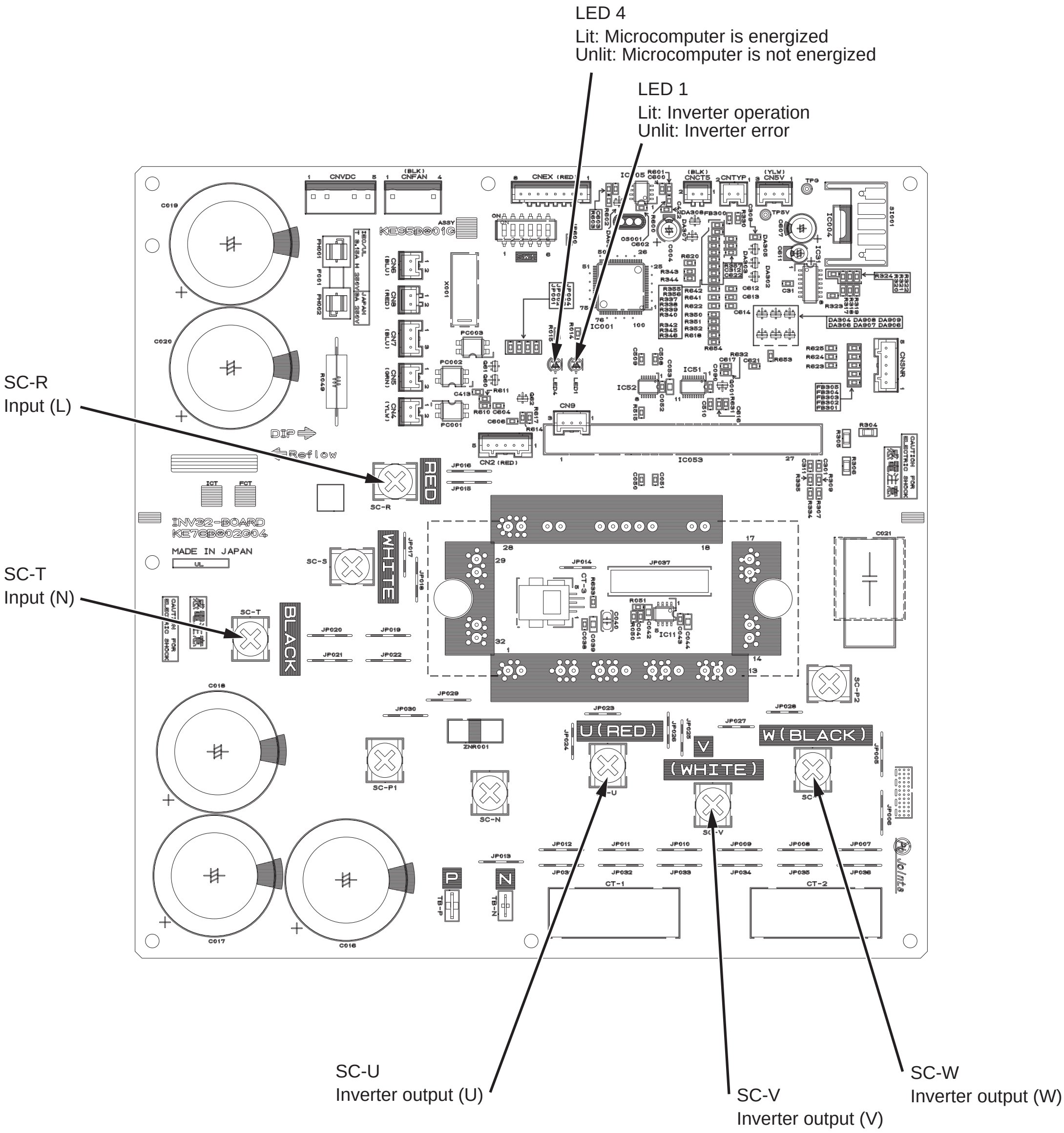
4-6-1 Control Board



4-6-2 Power supply board (PS Board)



4-6-3 Inverter Board (INV Board)

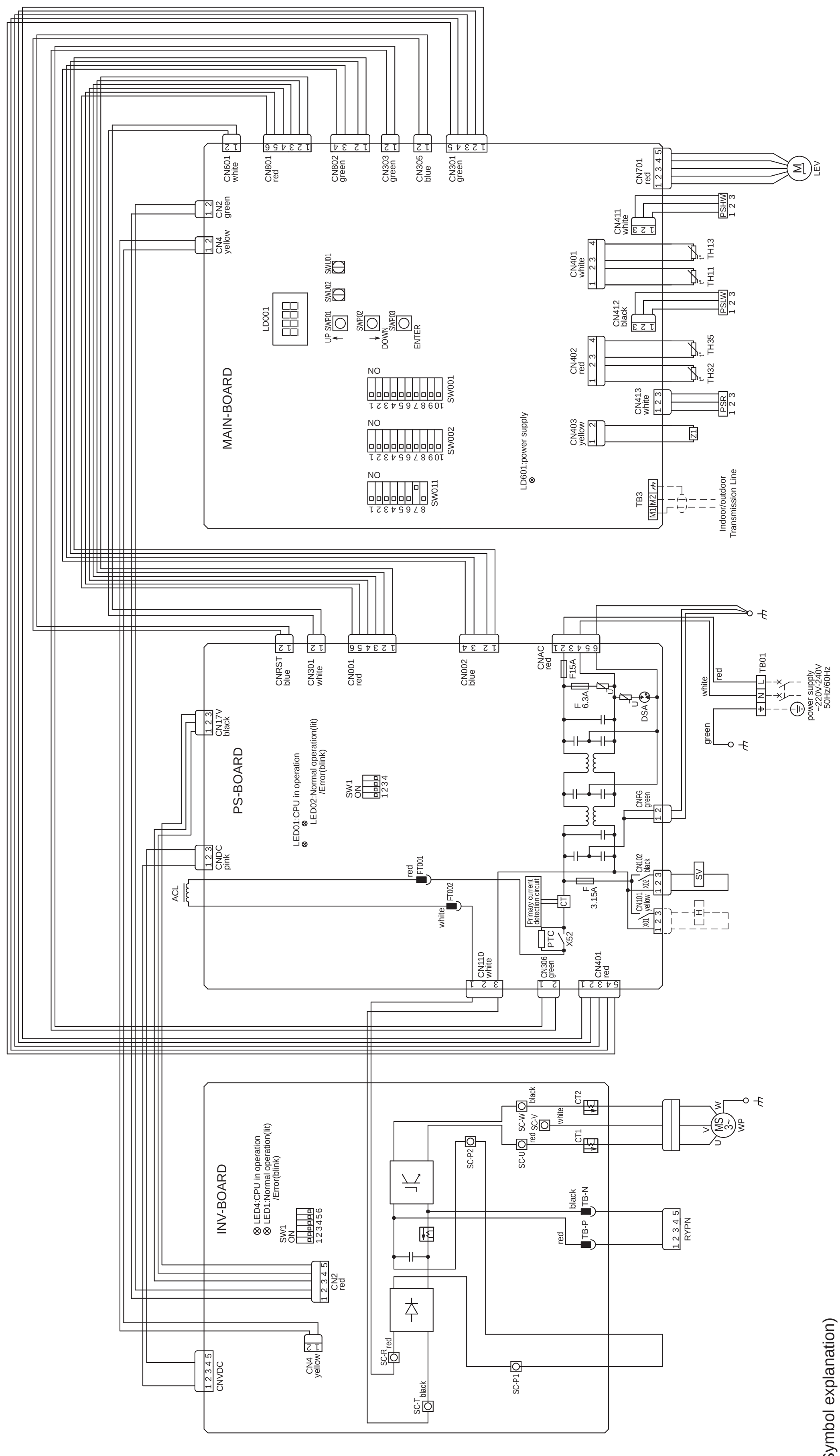


Note

1) 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 across pins 1 and 5 of connector RYPN has dropped to 20 VDC or less. It takes about 10 minutes to discharge electricity after the power supply is turned off.
2) A Faston terminal has a locking function.
   Make sure the cable heads are securely locked in place. Press the tab on the terminals to remove them.
3) Control box houses high temperature parts. Be well careful even after turning off the power source.
4) When the power is turned on, the water pump is energized even while it is not operating. Before turning on the power, disconnect all power supply wires from the water pump connector, and measure the insulation resistance of the water pump. Check the water pump for a ground fault. If the insulation resistance is 1.0 MΩ or above, connect all power supply wires to the water pump and turn on the power to the hydro unit.

4-7 Hydro Unit Electrical Wiring Diagrams

(1) CMH-WM250, 350, 500V-A models



(Symbol explanation)

Symbol	Name	Symbol	Name
ACL	AC reactor	TB01	Terminal block (for power source)
F	Fuse		
H	Electric heater (Antifreeze)	TB3	Terminal block (for Transmission)
LEV	Expansion valve	TH11,TH12, TH32,TH35	Thermister sensor
PSHW,PSLW	Pressure sensor(water)		
PSR	Pressure sensor (refrigerant)	WP	Pump
		Z1	Function setting connector
SV	Solenoid valve		

Note:1. The broken lines indicate the field-supplied parts,and field work.
2. TB3 is transmission terminal block.
Never connect power line to it.
3. 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 of the connector RYPN on INV-BOARD has dropped to DC20V or less.
4. The initial set values of switch on MAIN BOARD are as follows.
SWU01:0
SWU02:0

Chapter 5 Control

5-1 Dipswitch Functions and Factory Settings

5-1-1 Outdoor Unit Switch Functions and Factory Settings

(1) Control board

Switch		Function	Function according to switch setting		Switch setting timing
			OFF	ON	
SWU	1-2	Unit address setting	Set to 00 or 51-100 with the dial switch		Before power on
SW5	1	Centralized control switch	Without connection to the centralized controller	With connection to the centralized controller	Before power on
	2	Deletion of connection information	Normal control	Deletion	Before power on
	3	-	Preset before shipment (Varies with unit type and model)		
	4	-			
	5	-			
	6	-			
	7	-			
	8	-			
SW6	1	-	-	-	-
	2	COP priority setting (at low outside temperature)	Heating COP priority mode	Heating capacity priority control mode	Before power on
	3	-	-	-	-
	4	Model setting (outdoor unit/ high static pressure setting)	Function depends on the setting combination with the SW6-5 setting (Note 5). (Factory setting: OFF)		Before power on
	5	Model setting (outdoor unit/ high static pressure setting)	Function depends on the setting combination with the SW6-4 setting (Note 5). (Factory setting: OFF)		Before power on
	6	-	-	-	-
	7	Performance-priority/low-noise mode setting	Performance-priority mode (Note 2)	Quiet-priority mode (Note 4)	Anytime after power on
	8	Low-noise mode/step demand switching	Low-noise mode (Note 3)	Step demand mode	Before power on
	9	-	-	-	-
	10	Self-diagnosis monitor display / SW4 function setting mode switching	Self-diagnosis monitor display	SW4 function setting mode	Anytime after power on

Switch		Function	Function according to switch setting		Switch setting timing
			OFF	ON	
SW7	1	Enables or disables the detection of the following types of inverter compressor errors ACCT, DCCT sensor error (5301 Detail code 115, 116) ACCT, DCCT sensor circuit error (5301 Detail code 117, 118) IPM open-phase/CNCT2 connection error (5301 Detail code 119) Wiring connection error (5301 Detail code 120)	Error detection enabled	Error detection disabled (no-load operation allowed)	Any time after power on
	2	Enables or disables no-load operation of the left fan inverter The unit continues no-load operation for 30 seconds and comes to an error stop. See the relevant pages for details: [8-10-10 Checking the Fan Board for Damage with Load]	No-load operation disabled	No-load operation enabled	Any time after power on
	3				
	4	Enables or disables no-load operation of the right fan inverter The unit continues no-load operation for 30 seconds and comes to an error stop. See the relevant pages for details: [8-10-10 Checking the Fan Board for Damage with Load]	No-load operation disabled	No-load operation enabled	Any time after power on
	5	-	-	-	-
	6	-	-	-	-
	7	-	-	-	-
	8	-	-	-	-
	9	Switches between the normal startup mode and the USB writer rewrite mode	Normal startup mode	USB writer rewrite mode	Before power on

Note

1) Unless otherwise specified, leave the switch to OFF where indicated by "-," which may be set to OFF for a reason.
2) When set to the performance-priority mode, the low-noise mode will be terminated, and the units will operate in the normal mode.
Cooling: Ambient temperature or the high pressure is high.
Heating: When the outside air temperature is low or when the low pressure is low. Refer to the following page(s). [2-4-7 Various Control Methods Using the Signal Input/Output Connector on Outdoor Unit]
3) Operation noise is reduced by controlling the compressor frequencies and the rotation speed of the outdoor unit fans.
CN3D needs to be set. Refer to the following page(s). [2-4-7 Various Control Methods Using the Signal Input/Output Connector on Outdoor Unit]
4) Operation noise is reduced by limiting the frequency of the compressor and rotation speed of the outdoor unit fan.
5) External static pressure setting depends on the setting combination of SW6-5 and SW6-4 settings as shown in the table below.

		SW6-5	
		OFF	ON
SW6-4	OFF	0Pa	30Pa
	ON	60Pa	80Pa

6) Keep SW7-1, -2, and -4 set to OFF during normal operation. Leaving these switches to ON will disable the error-detection function and can lead to equipment damage.
7) Shaded areas ( ) indicate factory settings.

(2) Additional dipswitch settings at time of shipment

Switch			Function		Function according to switch setting: OFF (LED3 Unlit)	Function according to switch setting: ON (LED3 Lit)	Switch setting timing
SW4 SW6-10: OFF	1-10 1:ON, 0:OFF		Self-diagnosis/operation monitor				Anytime after power on
SW4 1-10 [0:OFF, 1:ON] (Note 1) SW6-10:ON	No.769	1000000011	Test run mode: ON/OFF		Stops all ICs	Sends a test-run signal to all IC	Anytime after power on
	No.817	1000110011	Starts up drive recorder		Enabled	Disabled	Anytime after power on
	No.832	0000001011	Cumulative compressor operation time deletion		Retained	Cleared	Any time after being energized (When changed from OFF to ON)
	No.848	0000101011	Continuous heating cycle function		Disabled	Enabled	After being energized and while the compressor is stopped
	No.891	1101111011	Smooth auto-shift startup mode		Disabled	Enabled	After being energized and while the compressor is stopped
	No.896	0000000111	Clearance of error history	OC	Retained (IC/OC)	Deleted (IC/OC)	Anytime after power on (OFF→ON)
				OS	Retained (OS)	Deleted (OS)	
	No.897	1000000111	High sensible heat operation setting		Depends on the combined setting with No. 900 (Note 3) (Factory setting: OFF)		After being energized and while the compressor is stopped
	No.900	0010000111	High sensible heat operation setting		Depends on the combined setting with No. 897 (Note 3) (Factory setting: OFF)		After being energized and while the compressor is stopped
	No.912	0000100111	Pump down function		Normal control	Pump down operation	After being energized and while the compressor is stopped
	No.913	1000100111	Forced defrost (Note 2)		Normal control	Forced defrost starts	Anytime after power on 10 minutes after the completion of defrost operation (OFF→ON) or 10 minutes after compressor start-up (OFF→ON)
	No.915	1100100111	Defrost start temperature (Note 2)		(E)P200 - 300: -13°C [9°F] (E)P350 - 500: -11°C [12°F]	-8°C [18°F]	Anytime after power on
	No.916	0010100111	Defrost end temperature (Note 2)		(E)P200 - 300: 10°C [50°F] (E)P350 - 500: 7°C [45°F]	5°C [41°F]	Anytime after power on
	No.918	0110100111	Changes the defrost timer setting (Note 2)		50 minutes	90 minutes	Anytime after power on (OFF→ON)
	No.921	1001100111	Temperature unit display		°C	°F	Anytime after power on
	No.922	0101100111	Refrigerant amount adjustment		Normal control	Refrigerant amount adjust mode	Anytime after power on (except during initial startup/becomes ineffective 90 minutes after compressor started up.)
	No.933	1010010111	Snow sensor setting		Effective only when TH7 ≤ 5 is true or the snow sensor contact input is on.	Effective when TH7 ≤ 5 is true	Anytime after power on
	No.934	0110010111	Snow sensor setting		Continuous fan operation (FAN=50%)	Intermittent fan operation (The fan operates in the cycle of being in operation at 100% capacity for 5 minutes and then stops and remains stopped for 30 minutes.)	Anytime after power on
	No.964	0010001111	Target evaporation temperature setting		Depends on the setting combination with No. 982 (Note 4) (Factory setting: OFF)		Anytime after power on
	No.982	0110101111	Target evaporation temperature setting		Depends on the setting combination with No. 964 (Note 4) (Factory setting: OFF)		Anytime after power on
	No.988	0011101111	Refrigerant recovery/Evacuation (LEV2, LEV1, SV2 open)		Disabled	Enabled	After being energized and when units are stopped
	No.997	1010011111	Multiple-stage low-noise setting		See note 7 below. (Factory setting: OFF)		After power on and while the compressor is stopped
	No.1006	0111011111					

Note

1) To change the settings, set SW6-10 to ON, set SW4, and press and hold SWP3 for 2 seconds or longer (OFF↔ON).
LED3 will light up when the switch setting is ON, and lights off when OFF.
Use the LED3 display to confirm that the settings are properly made.
The settings will need to be set again when the control board is replaced. Write down the settings on the electrical wiring drawing label.
2) For details, refer to the following page(s).[5-2-6 Defrost Operation Control]
3) The table below shows the combinations of the settings for items No. 897 and No. 900 and the target evaporating temperature setting that corresponds to each combination.

Switch		No.900	
		OFF	ON
No.897	OFF	0°C [32°F]	9°C [48°F]
	ON	6°C [43°F]	14°C [57°F]

4) The table below shows the combinations of the settings for items No. 964 and No. 982 and the target evaporating temperature setting that corresponds to each combination.

Switch		No.982	
		OFF	ON
No.964	OFF	0°C [32°F]	-4°C [25°F]
	ON	-2°C [28°F]	-6°C [21°F]

5) Unless otherwise specified, leave the switch to OFF where indicated by "-," which may be set to OFF for a reason.
6) The settings that are configured with SW4 (SW6-10: ON) will automatically be stored on the indoor units that support the new function*. The stored settings will automatically be restored when the outdoor unit control board is replaced.
If none of the connected indoor units supports the new function, no configuration information will be saved. If this is the case, manually record the settings configuration on the control box panel.
*The new function is supported on most units that are manufactured in December of 2012 and later. Depending on the model, this function may be added on later date. Ask your dealer for further details.
7) The multiple-stage low-noise function controls the fan by targeting the capacities shown in the table below.

Switch		No.1006	
		OFF	ON
No.997	OFF	50%	60%
	ON	85%	70%

8) Shaded areas ( ) indicate factory settings.

(3) Fan board

Switch		Function	Function according to switch setting		Switch setting timing
			OFF	ON	
SW1	1	Enabling/Disabling no-load operation No-load operation will continue for approximately 30 seconds, and then the unit will come to an abnormal stop. For details, refer to the following page(s). [8-10-10 Checking the Fan Board for Damage with Load]	No-load operation disabled	No-load operation enabled	Anytime after power on
	2	-	-	-	-
	3	Address setting. See the notes below.	0	5	Before power on
	4	Address setting. See the notes below.	0	6	Before power on

Note

- Only the addresses are preset before shipment (All other switches are set to OFF.) Unless otherwise specified, leave the switch to OFF where indicated by "-," which may be set to OFF for a reason.
- To set the address for a unit with one fan, only set SW1-3 to ON (= address 5). To set the addresses for a unit with two fans, set SW1-3 on the fan board on the right side (when seen from the front of the control box) to ON (= address 5) and set SW1-4 on the left fan board to ON (= address 6).
- Leave SW1-1 to OFF during normal operation. Setting this switch to ON will disable the error detection function and may result in equipment damage.

5-1-2 Indoor Unit Switch Functions and Factory Settings

(1) Dipswitches

1) SW1,3

Switch		Function	Function according to switch setting		Switch setting timing	Notes
			OFF	ON		
	1	Room temperature detection position	Indoor unit inlet	Built-in sensor on the remote controller		
	2	Clogged filter detection	Not available	Available		
	3	Filter check reminder time setting	100h	2500h		
	4	Outside air intake	Disabled	Enabled		
	5	Remote display option	Fan output	Thermo-ON signal		
SW1	6	Humidifier control	During heating operation	Always on while in the heating mode		
	7	Fan speed setting for Heating Thermo-OFF	Very Low	Low		
		-	-	-		
	8	Fan speed setting for Heating Thermo-OFF	According to the SW1-7 setting	Preset speed		
		-	-	-		
	9	Self-recovery after power failure	Disabled	Enabled	While the unit is stopped (Remote controller OFF)	
	10	Power source start-stop	Disabled	Enabled		
	1	Unit model selection	Heat pump	Cooling only		
	2	Louver	Not available	Available		PLFY-W-VBM model only
	3	Vane	Not available	Available		PLFY-W-VBM model only
	4	Vane swing function	Not available	Available		PLFY-W-VBM model only
		Setting i-See sensor installation position	Setting pattern①*1	Setting pattern③*1		PLFY-W-VFM model only
	5	Vane horizontal angle①*1	First setting*2	Second setting*2		PLFY-W-VBM, PLFY-W-VFM model only
SW3	6	Vane horizontal angle②*1	Depends on SW3-5	Third setting*2		PLFY-W-VBM model only
	7	-	-	-		
	8	Heating 4°C [7.2°F] up	Enabled	Disabled		Set to OFF on floor-standing (PFFY) type units
	9	-	-	-		The setting depends on the model and type.
	10	-	-	-		

Note 1. Settings in the shaded areas are factory settings.
Note 2. If both SW1-7 and SW1-8 are set to ON, the fan remains stopped during heating Thermo-OFF.
To prevent incorrect temperature detection due to a build-up of warm air around the indoor unit, use the built-in temperature sensor on the remote controller (SW1-1) instead of the one on the indoor unit inlet thermistor.

*1. Refer to the Installation Manual.

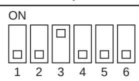
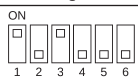
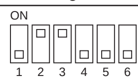
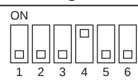
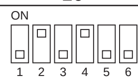
*2.

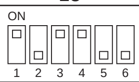
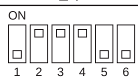
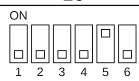
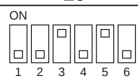
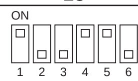
SW3-5	SW3-6	Vane setting	Initial setting	Setting	Vane position
OFF	OFF	Set up①*1		Standard	Standard
ON	OFF	Set up②*1	●	Less draft*3	Upward position than the standard
OFF	ON	Set up③*1		Less smudging	Downward position than the standard
ON	ON	unused		—	—

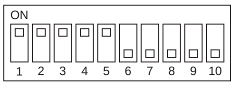
*3. Be careful of smudge on ceiling.

The switch setting may vary depending on the indoor unit’s type. Refer to relevant Service Handbook for details.

2) SW2

Model	W10	W15	W20	W25	W32	W40	W50
Capacity (model) code	2	3	4	5	6	8	10
SW2 setting							

Model	W63	W71	W80	W100	W125
Capacity (model) code	13	14	16	20	25
SW2 setting					



The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

Note

The setting timing for SW2 is before power is turned on.

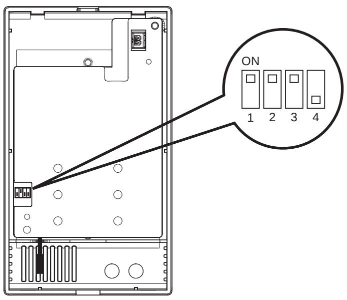
(2) Address switch

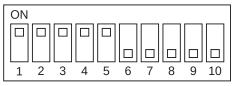
Actual indoor unit address setting varies in different systems. Refer to the installation manual for the outdoor unit for details on how to make the address setting.
Each address is set with a combination of the settings for the 10's digit and 1's digit.
(Example)
When setting the address to "3", set the 1's digit to 3, and the 10's digit to 0.
When setting the address to "25", set the 1's digit to 5, and the 10's digit to 2.

5-1-3 Remote Controller Switch Functions and Factory Settings

(1) MA simple remote controller (PAC-YT52CRA)

There are switches on the back of the top case. Remote controller Main/Sub and other function settings are performed using these switches. Ordinarily, only change the Main/Sub setting of SW1. (The factory settings are ON for SW1, 2, and 3 and OFF for SW4.)





The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

SW No.	SW contents Main	ON	OFF	Comment	Switch setting timing
1	Remote controller Main/Sub setting	Main	Sub	Set one of the two remote controllers at one group to “ON”.	Before power on
2	Temperature display units setting	Celsius	Fahrenheit	When the temperature is displayed in [Fahrenheit], set to “OFF”.	Before power on
3	Cooling/heating display in AUTO mode	Yes	No	When you do not want to display “Cooling” and “Heating” in the AUTO mode, set to “OFF”.	Before power on
4	Indoor temperature display	Yes	No	When you want to display the indoor temperature, set to “ON”.	Before power on

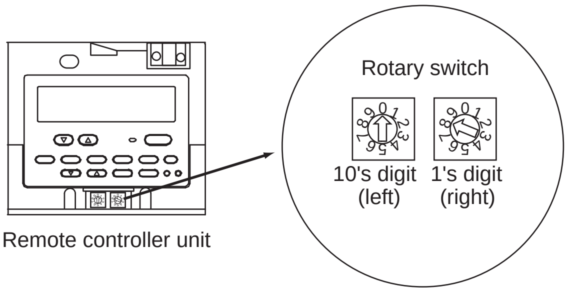
Note

The MA remote controllers (PAR-31/32/33MAA, PAR-21MAA) do not have the switches listed above. Refer to the installation manual for the function setting.

5 Control

(2) ME remote controller (PAR-F27MEA)

Set the address of the remote controller with the rotary switch.



Example: In case of address 108

	Address setting range	Setting method
Main remote controller	101-150	Add 100 to the smallest address of all the indoor units in the same group.
Sub remote controller	151-200	Add 150 to the smallest address of all the indoor units in the same group.

Setting of rotary switch	Address No.
01-99*1	101-199 with the 100's digit automatically being set to 1*2
00	200

*1. At factory shipment, the rotary switch is set to 01.

*2. The address range that can be set with the ME remote controller is between 101 and 200. When the dials are set to a number between 01 and 99, the 100's digit is automatically set to [1]. When the dials are set to 00, the 100's digit is automatically set to [2].

Note

To set addresses, use a precision slotted screw driver [(-), 2.0 mm [0.08 in] (w)], and do not apply than 19.6N.
The use of any other tool or applying too much load may damage the switch.

Note

The ME remote controllers (PAR-U02MEDA) do not have the switches listed above. Refer to the installation manual for the function setting.

5 Control

5-1-4 Switch Functions <Hydro Unit>

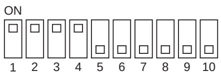
Switch		Function	Function according to switch setting		Switch setting timing
			OFF	ON	
SW001	1	-	-	-	-
	2	-	-	-	-
	3	-	-	-	-
	4	-	-	-	-
	5	Availability of freeze-up protection heater	Not available	Available	Any time after being energized
	6	Pressure sensor back-up control selection	Error codes are sent to outdoor units.	Error codes are not sent to outdoor units	Any time after being energized
	7	-	-	-	-
	8	-	-	-	-
	9	-	-	-	-
	10	Heat recovery defrost	Available	Not available	Before being energized
SW002	1	Commissioning mode start SW 1	Not available	Available	Any time after being energized
	2	-	Refer to the Databook		
	3	Commissioning mode start SW 2			
	4	Commissioning mode forced termination	Not available	Available	
	5	Commissioning mode start SW 3 (Detection of installation error - initial setting)	Not available	Available	
	6	-	-	-	Before being energized
	7	-	-	-	Any time after being energized
	8	-	-	-	
	9	-	-	-	
	10	-	-	-	

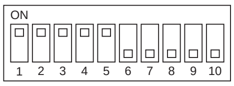
Switch		Function	Function according to switch setting		Switch setting timing
			OFF	ON	
SW011	1	Water valve setting for water charge	According to the stop mode	Opening of the flow control valve is fixed on all indoor units. (Full open: 85 pulses)	Any time after being energized
	2	-	-	-	Before being energized
	3	-	-	-	-
	4	Freeze-up backup threshold selection 1 (for brine)	Refer to the Databook		Any time after being energized
	5	Freeze-up backup threshold selection 2 (for brine)			
	6	-	-	-	Any time after being energized
	7	Water temperature adjustment in stop mode (heating)	Not available	Available	
	8	-	-	-	

5-2 Outdoor Unit Control

5-2-1 Overview

- The outdoor units are designated as OC 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 (SW4).

SW4 (SW6-10:OFF)	Display
	The unit is designated as the OC: "OC" appears on the display.



The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

- The OC determines the operation mode and the control mode, and it also communicates with the indoor units.

5-2-2 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 5 minutes.)
- During the initial processing, the LED monitor on the outdoor unit's control board displays S/W version → refrigerant type → Model and capacity → and communication address in turn every second.

5-2-3 Startup Control

- 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).

5-2-4 Refrigerant 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), (SV2) (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 3 minutes 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].
The following conditions are met during the heating mode: Compressor frequency after power on is greater than 0. The low pressure (63LS) drops (One or more minutes after compressor startup if the cumulative compressor operation time is one hour or less; three or more minutes if the cumulative compressor operation time is one hour or more)	When the low pressure (63LS) drops below 0.12 MPa [17 psi]	When the low pressure (63LS) rises above 0.16 MPa [23 psi]
When high pressure (63HS1) rises	When 63HS1 exceeds 3.62 MPa [525 psi]	When 63HS1 is 3.43MPa [497 psi] or below in 30 seconds

Operation	SV2	
	ON	OFF
During defrost	Always ON	
When returning to normal operation after completion of the defrost cycle	ON for 5 minutes	After 5 minutes have passed
At startup	When TH7<= -20, SV2 stays on for 5 minutes after startup or until the condition 63HS < 1.96 MPa (284 psi) is met	Other than on the left
Others	Always OFF	

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]
During defrost	Always ON	
Others	Always OFF	

5 Control

Operation	SV10	
	ON	OFF
When Continuous heating mode	(E)M200-450: Front part of heat exchanger is being defrosted. (E)M500: Front part of heat exchanger is being defrosted.	Other than on the left *(E)M200-450: When the rear part of heat exchanger is being defrosted, 21S4b will be OFF. *(E)M500: When the left part of heat exchanger is being defrosted, 21S4c will be OFF.

Operation	SV11	
	ON	OFF
When Continuous heating mode	(E)M500: Right part of heat exchanger is being defrosted.	Other than on the left *(E)M500: When the left part of heat exchanger is being defrosted, 21S4c will be OFF.

5-2-5 Frequency Control

- Depending on the capacity required, the frequency of the compressor is controlled to keep constant evaporation temperature (0°C [32°F] = 0.71 MPa [103 psi]) during cooling operation, and condensing temperature (49°C [120°F] = 2.88 MPa [418 psi]) during heating operation.
- The table below summarizes the operating frequency ranges of the inverter compressor during normal operation.
- The OS in the multiple-outdoor-unit system operates at the actual compressor frequency value that is calculated by the OS based on the preliminary compressor frequency value that the OC determines.

Model	Frequency/cooling (Hz)		Frequency/heating (Hz)	
	Max	Min	Max	Min
200 model	52	14	56	27
250 model	65	14	71	27
300 model	74	14	88	27
350 model	91	14	105	27
400 model	97	19	110	37
450 model	111	19	122	37
500 model	123	19	129	37

Note

The maximum frequency during heating operation is affected by the outdoor air temperature to a certain extent.

(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).

5-2-6 Defrost Operation Control

(1) Starting the defrost operation

- The defrost cycle will start when all of the three conditions (outside temperature, cumulative compressor operation time, and pipe temperature) under <Condition 1>, <Condition 2>, or <Condition 3> are met.

	Condition 1	Condition 2	Condition 3
Outside temperature (TH7)	-5ºC [23ºF] or above	-5ºC [23ºF] or below	
Cumulative compressor operation time	50 minutes or more 90 minutes or more if the defrost prohibit timer is set to 90.		250 minutes or more
Evaporating temperature (Te)	The evaporating temperature has stayed below the temperature in the table below (Note1) for 3 minutes	$(Te \le 1.1 \times TH7 - 7.5)$ continued for 3 minutes or [{1.5 + 0.02 x (20+TH7)} > 63LS] continued for 3 minutes	The evaporating temperature has stayed below the temperature in the table below (Note1) for 3 minutes

Note

1) Evaporating temperature (Te)

	(E)M200 - 300	(E)M350 - 500
SW4 (915) OFF	-13 ºC	-11 ºC
SW4 (915) ON	-8 ºC	-8 ºC

- The defrost cycle will not start if other outdoor units are in the defrost cycle or until a minimum of 10 minutes have passed since the completion of the last defrost cycle.
- If 10 minutes have passed since compressor startup or since the completion of a defrost cycle, a forced defrost cycle can be started by setting DIP SW4(913) to ON.
- Even if the defrost-prohibit timer is set to 90 minutes, the actual defrost-prohibit time for the next defrost cycle is 50 minutes if the last defrost cycle took 12 minutes.
- All units in the heating mode will simultaneously go into the defrost cycle in a system with multiple units. The units that are not in operation may or may not go into the defrost cycle, depending on the cumulative operation time of their compressors.

(2) Defrost operation

Compressor frequency		Model	Compressor frequency
	Standard	M200 model	100 Hz
		M250-300 models	100 Hz
		M350-400 models	121 Hz
		M450 model	147 Hz
		M500 model	147 Hz
	High COP	EM200-300 models	100 Hz
		EM350 model	121 Hz
		EM400-450 models	147 Hz
		EM500 model	147 Hz
Outdoor unit fan		Stopped	
SV1a		ON	
21S4a		OFF	
21S4b, 21S4c		OFF	
SV2		ON	
SV9		ON	
SV10,SV11		OFF (Closed)	
SV14*1		ON (Open)	
SV15*1		OFF (Open)	
LEV1		0 pulses*2	
LEV2a		1500 pulses (M200–300) 3000 pulses (M350–500, EM200–500)	
LEV2b		3000 pulses (M200–500, EM500) 41 pulses (EM200–450)	
LEV2c		3000 pulses (M500, EM500)	
LEV4		0 pulse	

*1. Only the EM200 through 450 models have SV14 and SV15.

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

5 Control

(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) has been continuously detected for 4 minutes (when SW4 (916) is set to OFF) or 2 minutes (when SW4 (916) 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 SW4 (916) is set to OFF or α*1 =25+TH7°C [77°F+TH7] and SW4 (916) is set to ON.
  *1 (5°C [41°F] $\leq \alpha \leq$ 25°C [77°F]).
- In the multiple-outdoor-unit system, defrosting is stopped on all units at the same time.

Model	TH3	
	SW4 (916) OFF	SW4 (916) ON
(E)M200 - (E)M300 models	10°C [50°F]	5°C [41°F]
(E)M350 - (E)M500 models	7°C [45°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.

(5) Change in the number of operating indoor units during defrost operation

- Even when there is a change in the number of operating indoor units during defrost operation, the operation will continue, and an adjustment will be made after the completion of the defrost operation.
- Defrost operation will be continued, even if the indoor units stop or under the Thermo-OFF conditions until it has run its course.

5-2-7 Continuous heating mode control

(1) Continuous heating mode start conditions

- Continuous heating mode will start when all the conditions listed in the table below are met (outside temperature, cumulative compressor operation time, and piping temperature).
- SW4 (848) must be set to ON to perform Continuous heating mode.

Outside temperature (TH7)	2.0 °C [35.6 °F] to 7.0 °C [44.6 °F]
Cumulative compressor operation time	After 10 minutes at 2.0 °C [35.6 °F] to 3.5 °C [38.3 °F] has elapsed After 20 minutes at 3.6 °C [38.5 °F] to 7.0 °C [44.6 °F] has elapsed
Evaporating temperature (Te)	After 3 minutes at 0°C [32°F] to -25 °C [-13°F] has elapsed

(2) Valve operation during Continuous heating cycle

1) (E)M200-450

	Front (bottom) HEX in defrost cycle	Rear (front) HEX in defrost cycle
Outdoor unit fan*1	Left fan: Fixed time control Right fan: 0%	Right fan: 0% Left fan: Fixed time control
SV1a	OFF	
SV2	OFF	
SV9	ON	
SV10	ON	OFF
21S4a	ON	ON
21S4b	ON	OFF
SV14*2	OFF (Closed)	OFF (Closed)
SV15*2	ON (Open)	OFF (Open)

*1. Only the fixed-time control is available on (E)M200-300 models.

*2. SV14 and SV15 are only on EM200-450 models.

2) (E)M500

	Front (right) HEX in defrost cycle	Left HEX in defrost cycle
Outdoor unit fan	Left fan: Fixed time control Right fan: 0%	Left fan: 0% Right fan: Fixed time control
SV1a	In operation	
SV2	OFF	
SV9	ON	
SV10	ON	OFF
SV11	ON	OFF
21S4a	ON	ON
21S4b	ON	ON
21S4c	ON	OFF

5-2-8 Refrigerant Recovery Control

Recovery of refrigerant is performed during cooling operation to prevent an excessive amount of refrigerant from accumulating in the outdoor heat exchanger.

(1) 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 [50°F]

Refrigerant recovery

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

5-2-9 Outdoor Unit Fan Control

(1) Control method

- Depending on the capacity required, the rotation speed of the outdoor unit fan is controlled by the inverter, targeting a constant evaporation temperature of (0°C [32°F]= 0.71 MPa [103 psi]) during cooling operation and constant condensing temperature of (49°C [120°F]= 2.88 MPa [418 psi]) 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.

5 Control

5-2-10 Subcool Coil Control (Linear Expansion Valve <LEV1>)

- The OC controls 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). In a single-outdoor-unit system, the LEV is closed (0) in the heating mode, while the compressor is stopped, and during cooling Thermo-OFF. In a multiple-outdoor-unit system, the LEV closes (0) during heating operation, while the compressor is stopped, or during cooling Thermo-OFF. The LEV opens to a specified position when 15 minutes have passed after Thermo-OFF. (65 pulses)
- During the defrost cycle, normally, the valve initially operates at 0 pulses, although it may operate at higher pulses depending on the 63LS and TH4 status.

5-2-11 Refrigerant Flow Control (Linear Expansion Valves <LEV2a, LEV2b, and LEV2c>)

- 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.

5-2-12 Control of Controller Cooling Function (Electronic Expansion Valve <LEV9>)

- Control of controller cooling function is performed individually for OC.
- The opening of LEV9 is adjusted every three seconds to keep the controller heatsink temperature (THHS) below the threshold value, which is determined by the setting of the outside temperature (TH7).

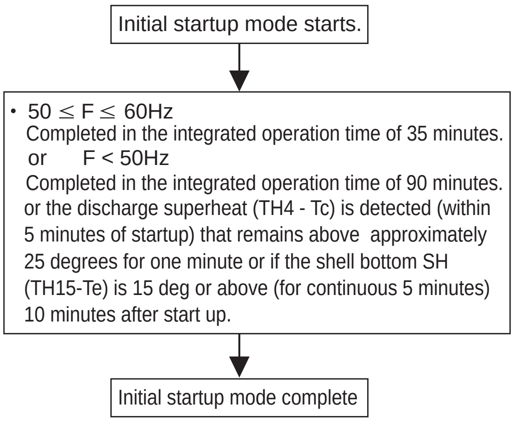
5-2-13 Injection Control (Linear Expansion Valve <LEV4>)

- LEV4 opening is adjusted every 30 seconds to keep the discharge temperature (TH4) within the predetermined range.

5-2-14 Control at Initial Startup

- When started up for the first time before 12 hours have elapsed after power on, the unit goes into the initial startup mode.
- At the completion of the initial operation mode on the OC, they will go into the normal control mode.

(1) (E)M200 - (E)M500YNW models



5-2-15 Operation Mode

(1) Indoor unit operation mode

The operation mode can be selected from the following 5 modes using the remote controller.

1	Cooling mode
2	Heating mode
3	Dry mode
4	Fan mode
5	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

When the outdoor unit is performing a cooling operation, the operation mode of the connected indoor units that are not in the cooling mode (Stopped, Fan, Thermo-OFF) cannot be changed to heating from the remote controller. If this attempt is mode, "Heating" will flash on the remote controller. The opposite is true when the outdoor unit is performing a heating operation. (The first selection has the priority.)

5-2-16 Demand Control

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

Note

When DIP SW6-8 is set to ON, the 4-step DEMAND control is enabled.
Eight-step demand control is possible in the system with two outdoor units.
Twelve-step demand control is possible in the system with three outdoor units.

For details, refer to the following page(s). [2-4-7 Various Control Methods Using the Signal Input/Output Connector on Outdoor Unit]

5-2-17 Control of IH energization without the compressor in operation

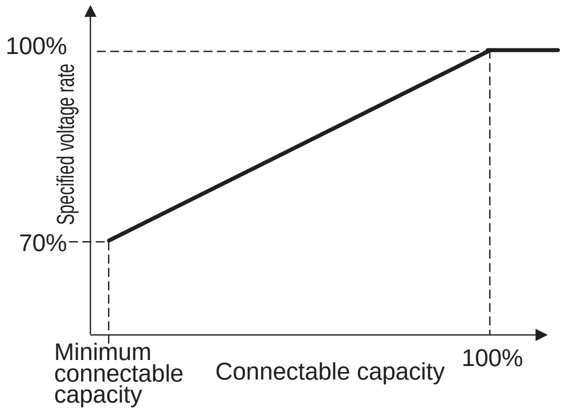
IH is used to heat the compressor motor on the stopped outdoor unit to make liquid refrigerant in the compressor evaporate or to keep liquid refrigerant from flooding the compressor.

- Initial power on after power is turned on: Stays on for 12 hours, and then transitions to the operation that is performed while the compressor is stopped
- When the compressor is stopped: Stays on for 30 minutes after the compressor stopped, and then repeats the on-off cycle at 30-minute intervals
- Lit LED1 on the INV board indicates that the INV board is energized by an IH.

5-3 Hydro Unit Control

5-3-1 Water Pump Control

Depending on the capacity required, temperature difference on the indoor units is controlled so as to be within a certain range. During normal operation, the changes in specified voltage of the water pump corresponding to the capacity of connectable indoor units are shown in the graph below.



Note

The specified voltage changes with the load on the indoor unit side. (A sample is shown in the graph above.)

(1) Periodic specified voltage control

1) Periodic control cycle

Specified voltage control is performed after the following times have elapsed.

- Thirty seconds after either compressor startup or the completion of the defrost cycle

2) The amount of frequency change

The amount of specified voltage change is controlled to approximate the target value based on the target temperature difference.

5-3-2 Bypass Control

Solenoid valve (SV1) that bypass the high- and low- pressure sides. It performs the following functions.

(1) Bypass solenoid valve (SV1) (ON: open)

Operation mode	SV1	
Cooling Thermo-ON	Always OFF	
Heating Thermo-ON	Always OFF	
Defrost	Always OFF during heat recovery defrost	ON except to perform heat recovery defrost
Stop	Always OFF	
Thermo-OFF	Always OFF	
Test run for Stop	Always OFF	

5-3-3 Plate Heat Exchanger Control

(1) Cooling Thermo-ON and Cooling test run

- When three minutes have passed after the LEV operates with initial opening, the LEV opening is adjusted every 1 minute to keep the amount of superheat before and after the plate heat exchanger constant.

(2) Heating Thermo-ON

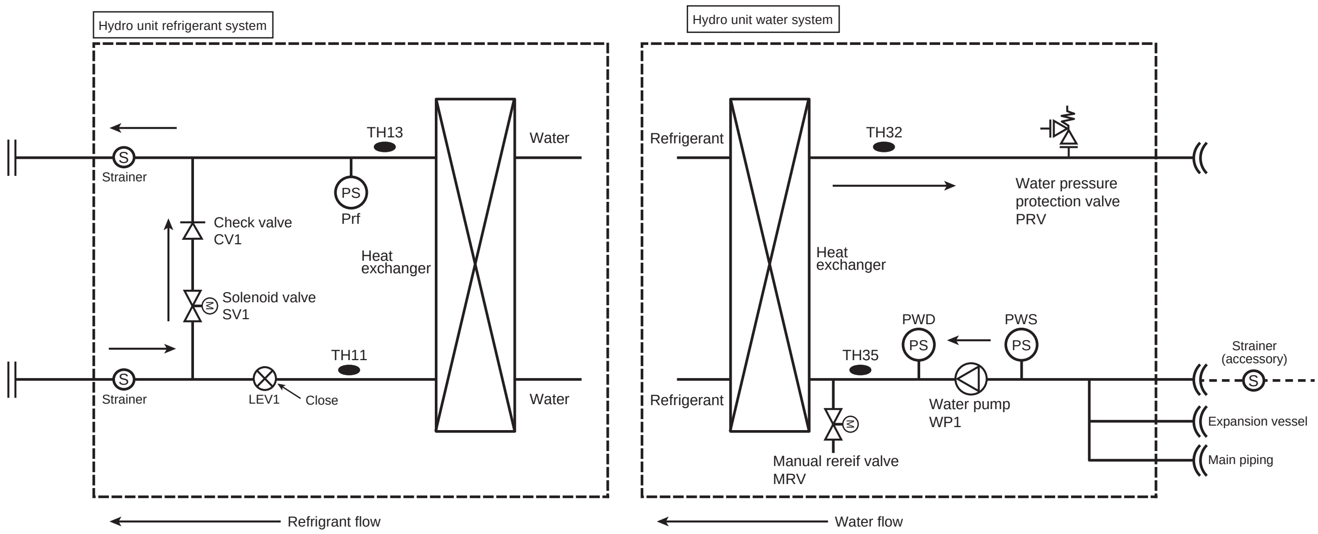
- When three minutes have passed after the LEV operates with initial opening, the LEV opening is adjusted every 1 minute to keep the amount of subcool before and after the plate heat exchanger constant.

5-3-4 Defrost Operation Control

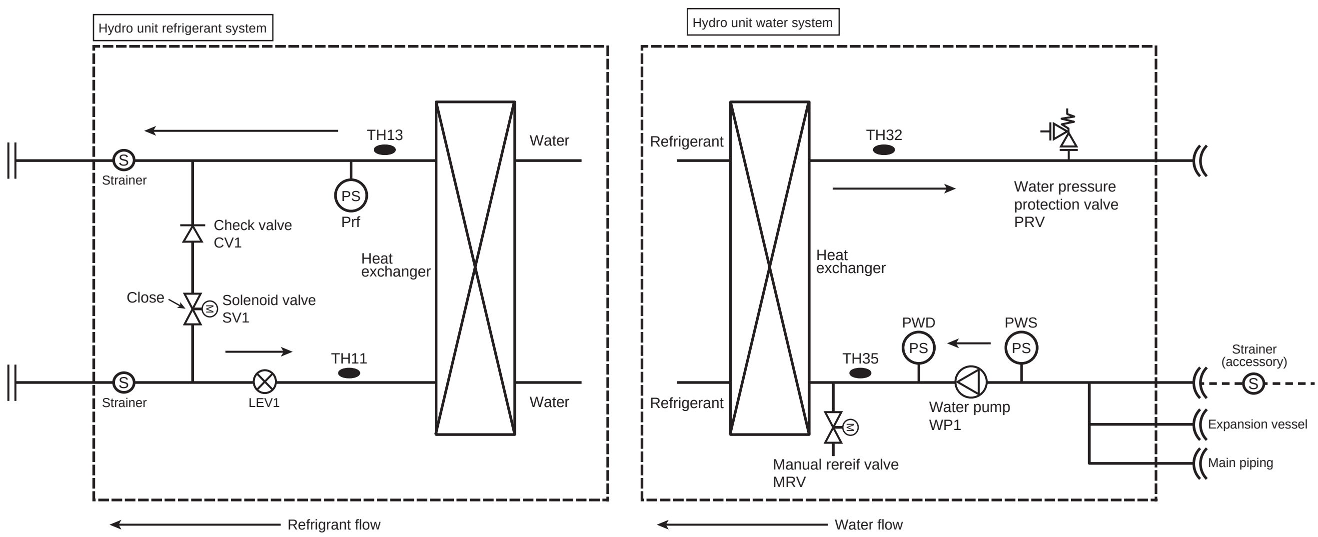
(1) Defrost cycle type

- The defrost cycle has following two types: Bypass defrost that is the same method as that used in a CITY MULTI series system and heat recovery defrost (default) that the heat is collected from the water circuit and the defrost cycle ends early.
  The following figures shows the refrigerant flow for the bypass defrost and the heat recovery defrost. In the bypass defrost method, LEV1 is closed and the heat is not exchanged between the refrigerant and water. In the heat recovery defrost method, the defrost cycle ends early because the heat is caught from the water.
  The basic defrost method is the heat recovery defrost with the dip switch 001-10 on the Hydro unit turned OFF (default). The bypass defrost may be performed depending on the water temperature. Setting the dip switch 001-10 to ON performs the bypass defrost.

- The bypass defrost



- The heat recovery defrost



(2) Starting the defrost operation

- The defrost cycle will start when all of the three conditions (outside temperature, cumulative compressor operation time, and pipe temperature) under <Condition 1>, <Condition 2>, or <Condition 3> are met.

	Condition 1	Condition 2	Condition 3
Outside temperature (TH7)	-5ºC [23ºF] or above	-5ºC [23ºF] or below	
Cumulative compressor operation time	50 minutes or more 90 minutes or more if the defrost prohibit timer is set to 90.		250 minutes or more
Evaporating temperature (Te)	The evaporating temperature has stayed below the temperature in the table below (Note1) for 3 minutes	($Te \leq 1.1 \times TH7 - 7.5$) continued for 3 minutes or [{1.5 + 0.02 x (20+TH7)} > 63LS] continued for 3 minutes	The evaporating temperature has stayed below the temperature in the table below (Note1) for 3 minutes

Note

1) Evaporating temperature (Te)

	(E)M200 - 300	(E)M350 - 500
SW4 (915) OFF	-13 ºC	-11 ºC
SW4 (915) ON	-8 ºC	-8 ºC

- The defrost cycle will not start if other outdoor units are in the defrost cycle or until a minimum of 10 minutes have passed since the completion of the last defrost cycle.
- If 10 minutes have passed since compressor startup or since the completion of a defrost cycle, a forced defrost cycle can be started by setting DIP SW4(913) to ON.
- Even if the defrost-prohibit timer is set to 90 minutes, the actual defrost-prohibit time for the next defrost cycle is 50 minutes if the last defrost cycle took 12 minutes.
- All units in the heating mode will simultaneously go into the defrost cycle in a system with multiple units. The units that are not in operation may or may not go into the defrost cycle, depending on the cumulative operation time of their compressors.

(3) Defrost cycle

Outdoor unit fan	Stopped
SV1a	ON
21S4a	OFF
21S4b, 21S4c	OFF
SV2	ON
SV9	ON
SV10,SV11	OFF (Closed)
SV14*1	ON (Open)
SV15*1	OFF (Open)
LEV1	0 pulses*2
LEV2a	1500 pulses (M200–300), 3000 pulses (M350–500, EM200–500)
LEV2b	3000 pulses (M200–500, EM500), 41 pulses (EM200–450)
LEV2c	3000 pulses (M500, EM500)
LEV4	0 pulses

*1. Only the EM200 through 450 models have SV14 and SV15.

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

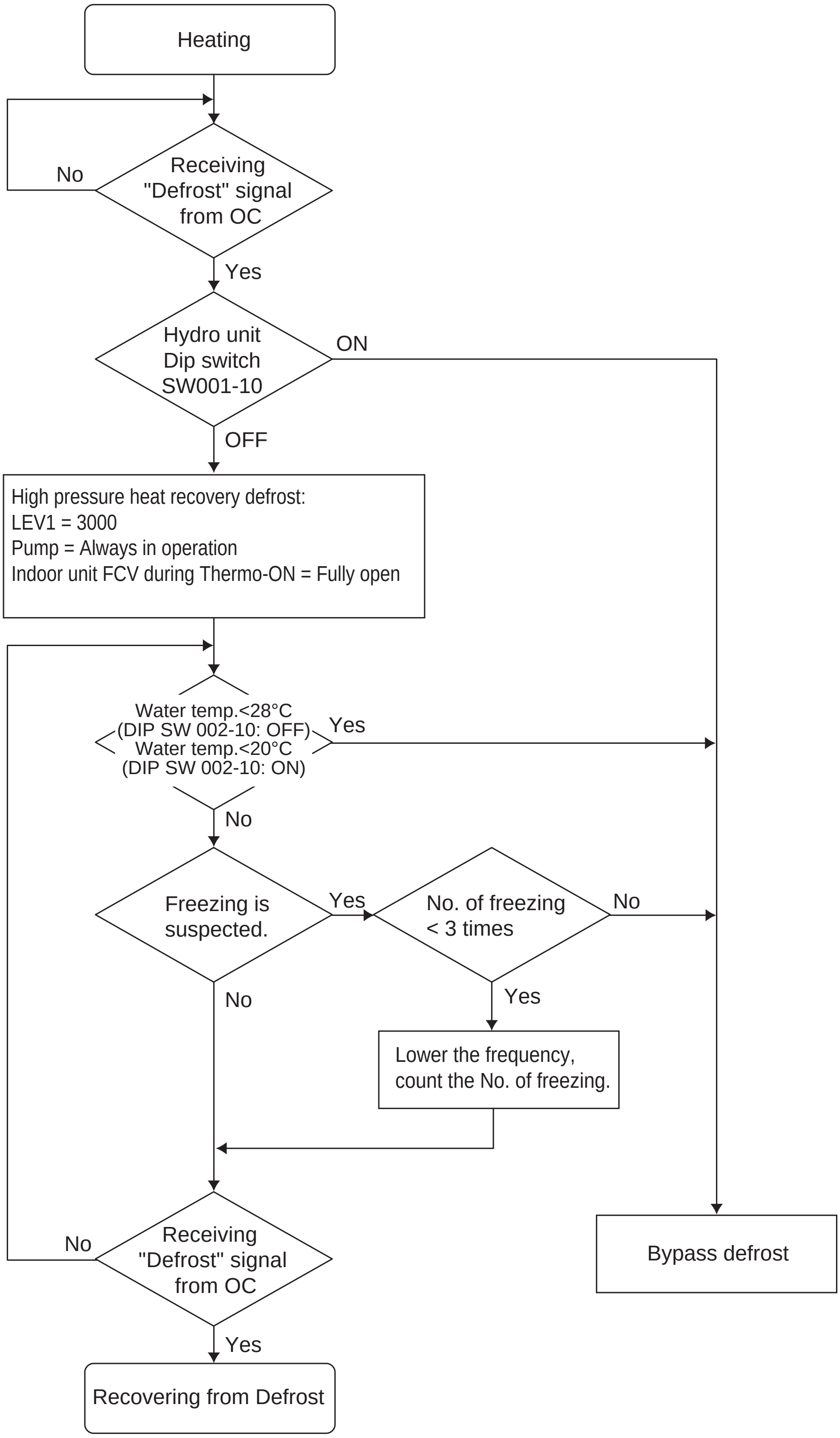
		DIP SW 001-10	
		ON (Bypass defrost)	OFF (Heat recovery defrost)
Hydro unit	LEV1	41	3000
	SV1	ON	OFF
	WP1	Normal control	Command value 100%

*The indoor unit fan will stop during defrost.

5 Control

(4) Recovering from Defrost

- The setting of the dip switch 001-10 determines the defrost method (bypass defrost or heat recovery defrost).
  As shown in the following flow chart, the bypass defrost may be performed during the heat recovery defrost depending on the operation status.



5-3-5 Refrigerant Recovery Control

The refrigerant recovery control function controls the refrigerant flow at the Hydro unit during heating operation to keep the refrigerant from collecting inside the Hydro unit.
It is also performed during cooling operation to prevent an excessive amount of refrigerant from accumulating in the outdoor heat exchanger.

Starting criteria for the refrigerant recovery cycle (during Cooling or Heating mode)

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

1) When 5 minutes have passed in the Heating mode or 30 seconds have passed in the Cooling mode since the completion of the previous refrigerant recovery cycle AND the when following conditions are met.
Outdoor unit TH4 > 105°C [221°F]
2) When the port is not in the 4-minute restart delay mode

Starting criteria for the refrigerant recovery cycle (during Cooling or Heating mode)
The opening of LEV1 on the Hydro unit is increased.

5-3-6 Backup Control

The following backup control is started on the Hydro unit as necessary.

(1) Backup mode for plate heat exchanger protection

- The following control is performed depending on the outlet pipe temperature of the plate heat exchanger for freeze-up protection.

1) Outdoor unit (Heat source unit)
Cooling Thermo-off
2) Hydro unit

		Control mode
		Cooling
Outdoor unit (Heat source unit)	Operation mode	Cooling Thermo-OFF
Hydro unit	LEV1	Opening during Cooling Thermo-OFF
	SV1	Open
	WP1	Continues the cooling-only operation
Indoor unit	FCV	The opening depending on the indoor unit operation mode

(2) Heating water temperature backup mode

- When the heating operation can be continued without receiving heat from the refrigerant due to water temperature rise during heating operation (the outlet pipe temperature of the plate heat exchanger is 50ºC or above), the outdoor unit goes into the Thermo-OFF mode, and the heating operation is performed only by circulating the hot water by the water pump. When the water temperature decreases to a certain level (the outlet temperature of the plate heat exchanger is 45ºC or below), the outdoor unit starts up.

5-3-7 Water Pump Protection Control

When the circuit is clogged or air enters the water circuit, the protection control starts on the Hydro unit to protect the water pump and the system is stopped depending on the situation.

(1) When the internal temperature of the water pump increases

- When the detection temperature of the water pump outlet pipe is above a certain level, the water pump is stopped to protect it from the heat.

(2) When the revolutions of the water pump increases

- When the revolutions of the water pump is above a certain level (The value changes depending on the specified voltage.), the water pump is stopped to reduce the risk of air infiltration and water leaks.

Chapter 6 Test Run

6-1 Read before Test Run

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

(2) When opening or closing the front panel of the control box, do not let it come into contact with any of the internal components.

Note

- Before inspecting the inside of the control box, turn off the power, leave the unit turned off for at least 10 minutes, and check that the voltage across pins 1 and 5 of connector RYPN has dropped to 20 VDC or less. (It takes approximately 10 minutes to discharge electricity after the power is turned off.)
- Control box houses high temperature parts. Be well careful even after turning off the power source.
- Disconnect the relay connectors (RYFAN 1 and RYFAN 2) on the outdoor unit fan before performing maintenance work. (Before connecting or disconnecting the connector, check that the outdoor unit fan is stopped and that the voltage across pins 1 and 5 of connector RYPN has dropped to 20 VDC or less. If the outdoor unit fan is turned by strong winds, the main circuit capacitor will be energized and poses an electric shock hazard. Refer to the wiring diagram name plate for details.
- To connect wiring to TB7, check that the voltage is 20 VDC or below.
- Reconnect the relay connectors (RYFAN 1 and RYFAN 2) on the outdoor unit fan after completion of maintenance work.

(3) 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 is 1 MΩ or below, by turning on the main power and keeping it on 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.

(4) When the power is turned on, the compressor is energized even while it is not operating.

Note

- Before turning on the power, disconnect all power supply wires from the compressor terminal block, and measure the insulation resistance of the compressor.
- Check the compressor for a ground fault. If the insulation resistance is 1.0 MΩ or below, connect all power supply wires to the compressor and turn on the power to the outdoor unit. (The liquid refrigerant in the compressor will evaporate by energizing the compressor.)
- Make sure both the gas and liquid valves are fully opened.

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

When the voltage is out of the ±10% range, or when the phase voltage difference is more than 2%, please discuss the countermeasure with the customer.

(6) [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.

(7) Turn on the main power at least 12 hours before test run.

Note

Insufficient powering time may result in compressor damage.

(8) 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

6 Test Run

6-2 Operation Characteristics and Refrigerant Charge

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.

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.

6-3 Evaluating and Adjusting Refrigerant Charge

6-3-1 Refrigerant Overcharge and undercharge

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.	

6-3-2 Checking the Refrigerant Charge 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].)	

6-3-3 Maximum refrigerant charge

There is a limit to the amount of refrigerant that can be charged into a unit. Observe the maximum refrigerant charge in the table below.

♦M200-500YNW-A1

Total index of the outdoor units	M200	M250	M300	M350	M400	M450	M500
Factory charge (kg)	6.5	6.5	6.5	9.8	9.8	10.8	10.8
Maximum additional refrigerant charge on site (kg)	8.5	8.5	8.5	14.0	14.0	19.0	19.0
Maximum refrigerant charge (kg)	15.0	15.0	15.0	23.8	23.8	29.8	29.8

♦EM200-500YNW-A1

Total index of the outdoor units	EM200	EM250	EM300	EM350	EM400	EM450	EM500
Factory charge (kg)	6.5	6.5	6.5	9.8	10.8	10.8	10.8
Maximum additional refrigerant charge on site (kg)	8.5	8.5	8.5	14.0	15.0	19.0	19.0
Maximum refrigerant charge (kg)	15.0	15.0	15.0	23.8	29.8	29.8	29.8

6-3-4 Refrigerant Charge Adjustment Mode

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

When the function switch (SW4 (922)) on the main board on the outdoor unit is turned to ON, the unit goes into the refrigerant amount adjust mode, and operation <A> below is followed.

Note

The unit will not go into the refrigerant amount adjust mode when the switch on the OS is set to ON.

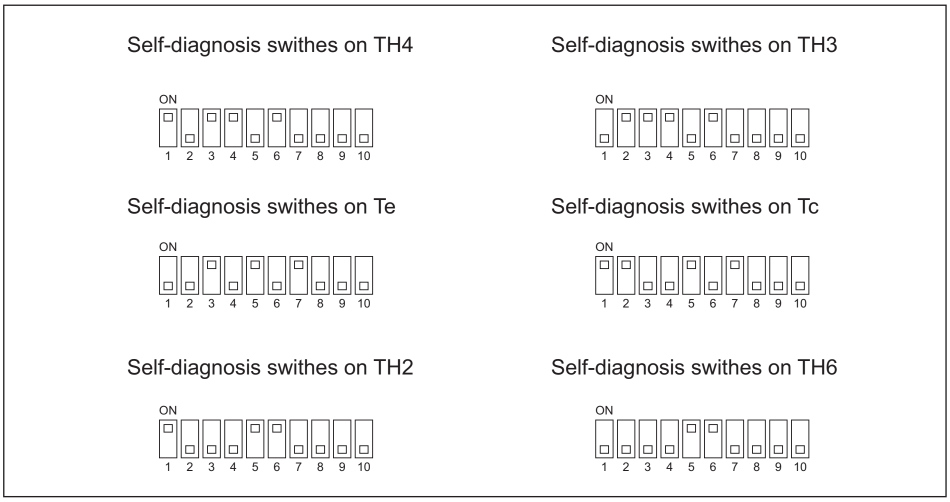
Operation <A>
When the unit is in the refrigerant amount adjust mode, the LEV on the Hydro unit does not open as fully as it normally does during cooling operation to secure subcooling.

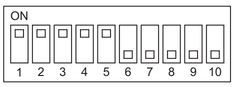
Note

1) Using the flowchart on the next page, adjust the refrigerant charge. Check the TH4, TH3, TH2, TH6, Te, and Tc values by setting the diagnostic switch (SW4 (SW6-10: OFF) first, and use these values to diagnose the refrigerant charge.
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).

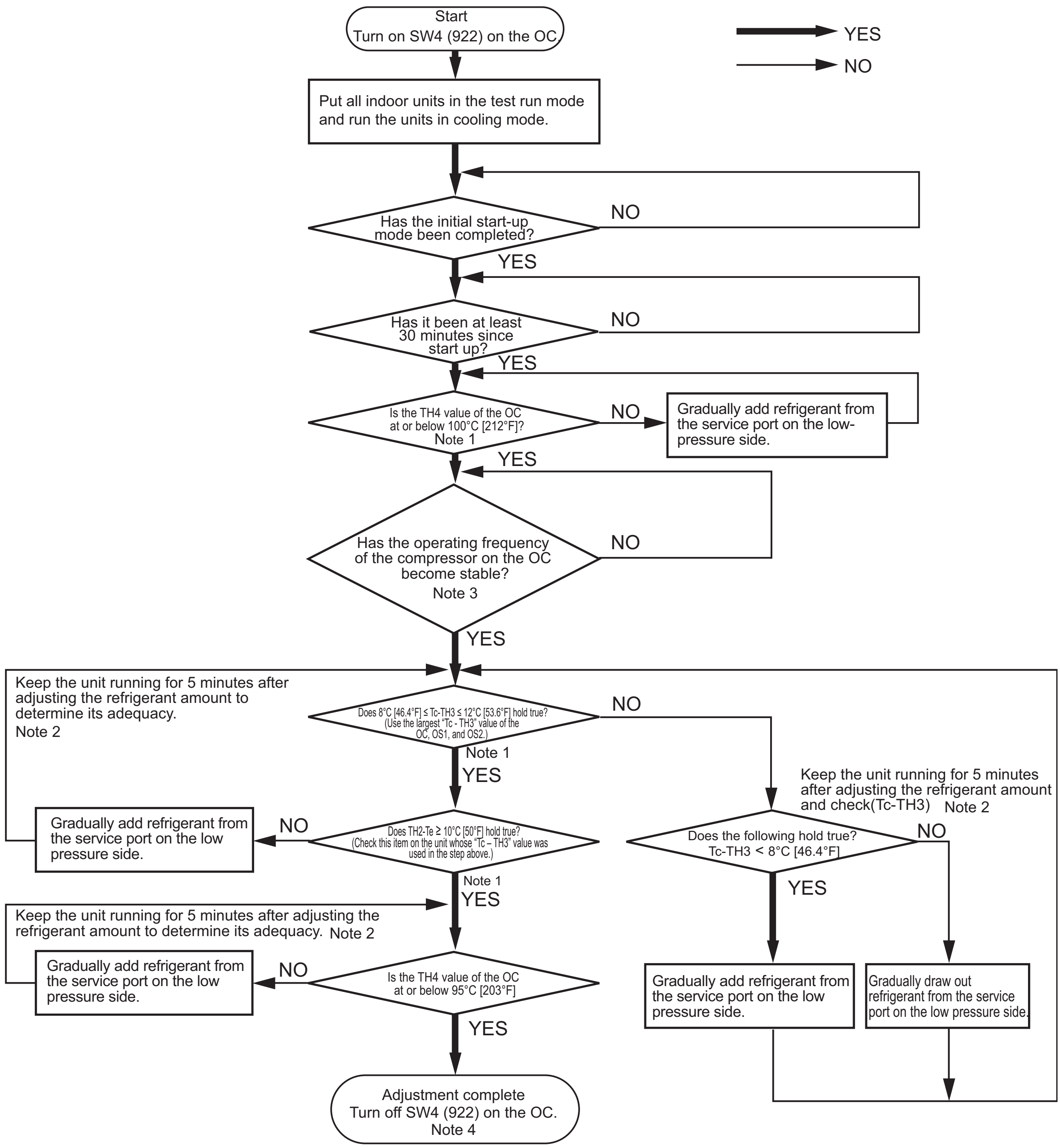
   When the amount of refrigerant is truly adequate.
   TH3-TH6 on the outdoor unit is 5°C [41°F] or above and SH on the indoor unit is between 5 and 15°C [41 and 59°F].
   The refrigerant amount may seem adequate at the moment, but may turn out to be inadequate later on.
   TH3-TH6 on the outdoor unit is 5°C [41°F] or less and SH on the indoor unit is 5°C [41°F] or less.
   Wait until the TH3-TH6 reaches 5°C [41°F] or above and the SH of the indoor unit is between 5 and 15°C [41 and 59°F] to determine that the refrigerant amount is adequate.
3) If the high pressure is not at least 2.0 MPa [290 psi], a correct judgment will not be possible for refrigerant adjustment. Perform the adjustment when the outdoor air temperature is at least 20°C [68°F].
4) Refrigerant amount adjust mode automatically ends 90 minutes after beginning. When this happens, by turning off the SW4 (922) and turning them back on, the unit will go back into the refrigerant amount adjust mode.

SW4 settings





The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.



For information about Notes 1 through 4 in the flowchart, refer to items 1) through 4) on the previous page.

⚠ CAUTION
Do not release the extracted refrigerant into the air.

6-3-5 Calculation of the Amount of Additional Refrigerant

- The amount of refrigerant to be added depends on the size and the total length of the liquid piping.
- Calculate the amount of refrigerant to be charged according to the formula below.
- Round up the calculation result to the nearest 0.1 kg (0.1 oz).

(1) Units "m" and "kg"

<Formula>

- When the piping length from the outdoor unit to the farthest hydro unit is 10 m (32 ft) or shorter

Amount of additional charge (kg)	=	ø19.05 total length × 0.29 (kg/m)	+	ø15.88 total length × 0.2 (kg/m)	+	ø12.7 total length × 0.12 (kg/m)	+	ø9.52 total length × 0.06 (kg/m)	+	ø6.35 total length × 0.024 (kg/m)

\+

Outdoor unit model	Amount (kg)
(E)M200	0
(E)M250	0
(E)M300	0
(E)M350	0
(E)M400	0
(E)M450	0
(E)M500	0

* Amount of refrigerant to be charged for single-module units

\+

Hydro unit model	Amount (kg)
WM250	3.0
WM350	3.0
WM500	3.0

- When the piping length from the outdoor unit to the farthest hydro unit is longer than 10 m (32 ft)

Amount of additional charge (kg)	=	ø19.05 total length × 0.24 (kg/m)	+	ø15.88 total length × 0.16 (kg/m)	+	ø12.7 total length × 0.10 (kg/m)	+	ø9.52 total length × 0.050 (kg/m)	+	ø6.35 total length × 0.019 (kg/m)

\+

Outdoor unit model	Amount (kg)
(E)M200	0
(E)M250	0
(E)M300	0
(E)M350	0
(E)M400	0
(E)M450	0
(E)M500	0

* Amount of refrigerant to be charged for single-module units

\+

Hydro unit model	Amount (kg)
WM250	3.0
WM350	3.0
WM500	3.0

(2) Units "ft" and "oz"

<Formula>

- When the piping length from the outdoor unit to the farthest hydro unit is 10 m (32 ft) or shorter

Amount of additional charge (oz)	=	ø3/4 total length × 3.1 (oz/ft)	+	ø5/8 total length × 2.15 (oz/ft)	+	ø1/2 total length × 1.29 (oz/ft)	+	ø3/8 total length × 0.65 (oz/ft)	+	ø1/4 total length × 0.26 (oz/ft)

\+

Outdoor unit model	Amount (oz)
(E)M200	0
(E)M250	0
(E)M300	0
(E)M350	0
(E)M400	0
(E)M450	0
(E)M500	0

* Amount of refrigerant to be charged for single-module units

\+

Hydro unit model	Amount (oz)
WM250	106
WM350	106
WM500	106

- When the piping length from the outdoor unit to the farthest hydro unit is longer than 10 m (32 ft)

Amount of additional charge (oz)	=	ø3/4 total length × 2.59 (oz/ft)	+	ø5/8 total length × 1.73 (oz/ft)	+	ø1/2 total length × 1.08 (oz/ft)	+	ø3/8 total length × 0.54 (oz/ft)	+	ø1/4 total length × 0.21 (oz/ft)

\+

Outdoor unit model	Amount (oz)
(E)M200	0
(E)M250	0
(E)M300	0
(E)M350	0
(E)M400	0
(E)M450	0
(E)M500	0

* Amount of refrigerant to be charged for single-module units

\+

Hydro unit model	Amount (oz)
WM250	106
WM350	106
WM500	106

6-4 The Following Symptoms Are Normal

Symptoms	Remote controller display	Cause
The indoor unit does not start after starting cooling (heating) operation.	"Cooling (heating)" icon blinks on the display.	The unit cannot perform a heating (cooling) operation when other indoor units on the same refrigerant system, are performing a cooling (heating) operation.
The auto vane adjusts its position by itself.	Normal display	After an hour of cooling operation with the auto vane in the vertical position, the vane may automatically move into the horizontal position. Louver blades will automatically move into the horizontal position while the unit is in the defrost mode, pre-heating stand-by mode, or when the thermostat triggers unit off.
The fan speed changes during heating.	Normal display	Very Low fan speed when "Thermo-OFF.' Changes from Very Low to preset fan speed when "Thermo-ON" depending on pipe temperature.
The fan stops during heating operation.	Defrost	The fan remains stopped during defrost operation.
The fan keeps running after the unit has stopped.	Unlit	When the auxiliary heater is turned on, the fan operates for one minute after stopping to dissipate heat.
The fan speed does not reach the set speed when operation switch is turned on.	STAND BY	The fan operates at extra low speed for 5 minutes after it is turned on or until the pipe temperature reaches 35°C[95°F], then it operates at low speed for 2 minutes, and finally it operates at the set speed. (Pre-heating stand-by)
When the main power is turned on, the display shown on the right appears on the indoor unit remote controller for 5 minutes.	"HO" or "PLEASE WAIT" icons blink on the display.	The system is starting up. Wait until the blinking display of "HO" or "PLEASE WAIT" go off.
The drain pump keeps running after the unit has stopped.	Unlit	The drain pump stays in operation for three minutes after the unit in the cooling mode is stopped.
The drain pump is running while the unit is stopped.	Unlit	When drain water is detected, the drain pump goes into operation even while the unit is stopped.
Indoor units and hydro units make noise during cooling/heating changeover.	Normal display	This noise is made when the refrigerant circuit is reversed and is normal.
Warm air sometimes comes out of the indoor units that are not in the heating mode.	Normal display	This is due to the fact that the LEVs on some of the indoor units are kept slightly open to prevent the refrigerant in the indoor units that are not operating in the heating mode from liquefying and accumulating in the compressor. It is part of a normal operation.

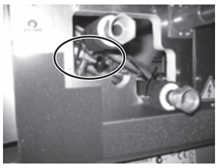
6-5 Hydro Unit Replacement Instructions

6-5-1 Debris removal operation

This operation removes the debris that may have been introduced during installation from the water circuit.
Perform this operation **after completion of water- and refrigerant-piping work, air tightness test, evacuation of refrigerant circuits, refrigerant charging, and electrical work.**

1.Preparation for debris removal operation

1.Turn on the breaker, and then open the auto air vent valve (accessary) on the water piping and the air vent valves on the indoor units.
Refer to the Installation Manual for the location of air vent valves.
(If there are air vent valves on the field-installed pipes, open the valves as well.)



Indoor unit (Example: PEFY-W-VMA-E)

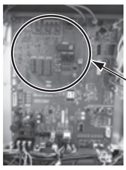
2.Set DIPSW 011-1 to ON. (→Opens the flow control valve and facilitates water flow)
3.Supply water from the suction pipe on the Hydro unit.

Install a non-return valve to prevent water in the water circuit flowing back to the water supply pipe, or remove the water supply hose after the air vent operation.

4.**Check that water comes from each air vent valve, and set DIPSW 011-4 to OFF to perform the debris removal operation.**

2.Debris removal operation

1.If there are a large amount of debris in the water in the field-installed pipes, set DIPSW 002-1 from OFF to ON.
(Refer to the flowchart for debris removal operation for details.)
Perform the debris removal operation. (Each air vent valve should stay open.)



LED and DIPSW positions

2.Forty minutes after the completion of debris removal operation, the LED will indicate "AirE." The LED indication will change to "Air0," "Air1," and "AirE" in order. Then, the water pump will stop.
3.Stop the water supply, and check that no water is coming out of the air vent valves.
4.Open the water-vent valve.
Slowly open the strainer. (Note that if it is opened fast, water may blast out.)
Remove the strainer, clean its inside, and refit it.

5.Make sure the strainers are re-installed.

Flowchart for debris removal operation (DIPSW2-1 is ON.)

Step 1 Intermittent operation of water pump (20 min) — The operation is performed while air is discharged from the water pipe. [Air0]

↓

Step 2 Operation of all indoor units (20 min) — Debris in the pipe will accumulate into the strainer by operating all indoor units. [Air1 to AirE]

(1) The operation can be forced to stop by setting DIPSW 002-4 from OFF to ON.
(2) If it is found during any step that debris removal operation has not been completed to the desired degree, start over at Step 2-1.

<General cautions>
(1) To avoid malfunction, do not connect or disconnect the power connector of the water pump being powered on.
(2) Check for water leaks from the field-installed pipe joint during operation.
(3) Do not pull the housing joint on the connection of the water pipe with pliers so that undue force is applied.
(4) If Error appears on the LED, turn off the breaker, turn it back on, and start over at step 2-1.

3.End processing

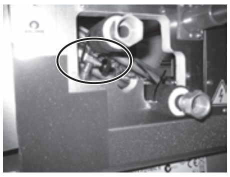
Set the dipswitche 002-1 to OFF after completion of debris removal operation.

6-5-2 The air vent operation

This operation removes the air that remains after water is supplied to the water circuit.
Perform this operation **after completion of water- and refrigerant-piping work, air tightness test, evacuation of refrigerant circuits, and refrigerant charging (and debris removal, if performed).**

1.Preparation for the air vent operation

1.Turn on the breaker, and then open the auto air vent valve (accessary) on the water piping and the air vent valves on the indoor units.
Refer to the Installation Manual for the location of air vent valves.
(If there are air vent valves on the field-installed pipes, open the valves as well.)



Indoor unit (Example: PEFY-W-VMA-E)

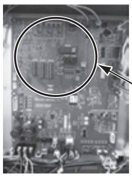
2.Supply water from the suction pipe on the Hydro unit.

Install a non-return valve to prevent water in the water circuit flooding back to the water supply pipe, or remove the water supply hose after the air vent operation.

3.**Check that water comes from each air vent valve, and perform the air vent operation.**

2.Air vent operation

1.Set DIPSW 002-3 from OFF to ON.
2.Set DIPSW 002-1 from OFF to ON (If system checking is unnecessary, this step can be skipped).
3.The LED will indicate "Air0," "Air1," "Air2," "Co-1," "Co-2," "Co-3," and "AirE" in order over a period of up to maximum minutes, and after maximum minutes have passed, the water pump will stop.



LED and DIPSW positions

4.Set the dipswitch 002-1, 002-3 from ON to.OFF
5.Close the all air vent valves and auto air vent valves.
6.Stop the water supply.

3.Checking for the presence of residual air

1.If there is residual air in the circuit, it will be noisy. Check for water leaks from the pipe, and then, perform the air vent operation again.

Flowchart for air vent operation (Set DIPSW 002-3 to ON first, and then DIPSW 002-1 to ON.)

Step 1	Intermittent operation of water pump (20 min)	The operation is performed while air is discharged from the water pipe. [Air0]
Step 2	Operation of all indoor units (20 min)	The residual air will be roughly removed by operating all indoor units. [Air1]
Step 3	Operation of individual indoor unit (10 min per one connected indoor unit)	The residual air will be removed by operating indoor units for each branch. [Air2]
Step 4	Heating operation of all indoor units (20 min)	The saturated air in the circulating water will be removed by performing heating operation for all indoor units and raising the temperature of the circulating water. [Co-2]
Step 5	System check (18 min + 30 sec per one connected indoor unit)	The following system check will be performed. • Water pressure checking [Co-1] • Water piping length checking [Co-2, Co-3 to AirE]

(1)The operation can be forced to stop by setting DIPSW 002-4 from OFF to ON.
(2) If it is found during any step that air ventilation has not been completed to the desired degree, go back to Step 2-1.
(3)If Error appears on the LED, turn off the breaker, turn it back on, and start over at step 2-1.
Be sure to perform this operation when changing the system configuration.

4.End processing

Set the dipswitches 002-1 and 002-3 to OFF after completion of air vent operation.

Chapter 7 Troubleshooting Using Error Codes

7-1 Error Code and Preliminary Error Code Lists

Error Code	Prelimi-nary error code	Error (prelim-inary) detail code	Error code definition	Searched unit: Outdoor unit	Searched unit: Indoor unit	Searched unit: Hydro unit	Searched unit: LOSSNAY	Searched unit: Remote controller	Notes
0403	4300 4305 4306 4308	1 5 6 8 (Note)	Serial communication error/Panel communication error	O		O			(page 8)
0404	-	-	Indoor unit control-related errors		O				(page 9)
0900	-	-	Test run				O		
1102	1202	-	Discharge temperature fault	O					(page 10)
1301	-	-	Low pressure fault	O					(page 11)
1302	1402	-	High pressure fault	O					(page 12)
1500	1600	-	Refrigerant overcharge	O					(page 13)
-	1605	-	Preliminary vacuum protection	O					
2500	-	-	Drain sensor submergence		O				(page 14)
2501	-	-	Water pump error			O			(page 16)
2502	-	-	Drain pump fault		O				(page 17)
2503	-	-	Drain sensor (Thd) fault		O		O		(page 19)
2512	-	-	Control valve failure		O				(page 20)
2519	2619		Abnormal water pressure drop			O			(page 20)
2520	2620		Abnormal water pressure rise			O			(page 21)
2600	-	-	Water leakage				O		(page 22)
2601	-	-	Water supply cutoff				O		(page 22)
3121	-	-	Out-of-range outside air temperature	O					(page 23)
3511	3611	-	Refrigerant overcooling	O					(page 24)
3512	3612	-	Locked cooling fan	O					(page 25)
4102	4152	-	Open phase	O					(page 26)
4106	-	-	Transmission power supply fault	O					(page 27)
4109	-	-	Fan operation status detection error		O				(page 27)
4114	-	-	Indoor unit fan motor error		O				(page 28)
4115	4165	[101] [102]	Power supply signal sync error	O		O			(page 29)
4116	-	-	RPM error/Motor error		O		O		(page 30)
4121	4171	-	Function setting error	O					(page 30)
4124	-	-	Electric system not operate due to damper abnormality		O				(page 31)
4129	4179	[101]	Converter error			O			(page 32)
		[102]	Power supply signal sync error			O			(page 32)
4130	-	-	Control power supply error			O			(page 33)
4131	-	[101] - [150]	Slightly open indoor unit valve during power cut			O			(page 34)

Error Code	Prelimi-nary error code	Error (prelim-inary) detail code	Error code definition		Searched unit: Outdoor unit	Indoor unit	Hydro unit	LOSSNAY	Remote controller	Notes
4220 4225 4226 (Note)	4320 4325 4326 (Note)	[0]	Backup operation		O					
		[108]	Abnormal bus voltage drop (Software detection)		O		O			(page 35)
		[109]	Abnormal bus voltage rise (Software detection)		O		O			(page 37)
		[110]	BUS voltage error (Hardware detection)		O					(page 37)
		[111]	Logic error		O		O			(page 38)
		[112]	Logic error		O					(page 38)
		[123]	Voltage boost control error		O					(page 38)
		[129]	Control power-supply fault		O					(page 39)
		[131]	Low bus voltage at startup		O		O			(page 39)
4228	4328	[101]	BUS voltage error (Software detection)				O			(page 40)
4230 4235 4236	4330 4335 4336	[125]	Heatsink overheat protection		O		O			(page 41)
4230	4330	[126]	DCL temperature fault		O					(page 42)
4240 4245 4246	4340 4345 4346	-	Overload protection		O		O			(page 43)
4250 4255 4256 (Note)	4350 4355 4356 (Note)	[0]	Backup operation		O					
		[101]	IPM error		O		O			(page 44)
		[104]	Short-circuited IPM/Ground fault		O		O			(page 45)
		[105]	Overcurrent error due to short-circuited motor		O		O			(page 46)
		[106]	Instantaneous overcurrent breaker error (S/W detection)		O		O			(page 47)
		[107]	Overcurrent breaker error (effective value) (S/W detection)		O		O			(page 47)
		[121]	DCL overcurrent breaker error (hardware detection)		O					(page 48)
		[122]	DCL overcurrent breaker error (software detection)		O					(page 48)
4250	4350	[128]	DCL overcurrent breaker error (hardware detection)		O					(page 48)
4255 4256	4355 4356	[137]	Step-out fault		O					(page 48)
4260	-	-	Heatsink overheat protection at startup		O		O			(page 49)
5101	1202	-	Temperature sensor fault	Return air temperature (TH21)		O				(page 50)
				OA processing unit inlet temperature (TH4)				O		(page 50)
5102	1217	-	Temperature sensor fault	Indoor unit pipe temperature (TH22)		O				(page 50)
				OA processing unit pipe temperature (TH2)				O		(page 50)
				HIC bypass circuit outlet temperature (TH2)	O					(page 51)

Error Code	Prelimi-nary error code	Error (prelim-inary) detail code	Error code definition		Searched unit					Notes
					Outdoor unit	Indoor unit	Hydro unit	LOSSNAY	Remote controller	
5103	1205	00	Temperature sensor fault	Indoor unit gas-side pipe temperature (TH23)		O				(page 50)
				OA processing unit gas-side pipe temperature (TH3)				O		(page 50)
				Pipe temperature at heat-exchanger outlet (TH3)	O					(page 51)
5104	1202	-	Temperature sensor fault	OA processing unit intake air temperature (TH1)				O		(page 50)
				Outside temperature (TH24)		O				(page 50) Detectable only by the All-Fresh type indoor units
				Outdoor unit discharge temperature (TH4)	O					(page 51)
5105	1204	-	Temperature sensor fault	Accumulator inlet temper-ature (TH5)	O					(page 51)
5106	1216	-	Temperature sensor fault	HIC circuit outlet tempera-ture (TH6)	O					(page 51)
5107	1221	-	Temperature sensor fault	Outside temperature (TH7)	O					(page 51)
5115			Temperature sensor fault	Shell bottom temperature (TH15)	O					(page 51)
5110	1214	[0]	Backup operation		O					
		01	Temperature sensor fault	Heatsink temperature (THHS)	O		O			(page 52)
5111	-	-	Temperature sensor fault (Hydro unit)	Liquid-side refrigerant temp. of heat exchanger (TH11)			O			(page 53)
5113	-	-		Gas-side refrigerant temp. of heat exchanger (TH13)			O			(page 53)
5120	1248	[0]	Backup operation		O					
		01	Temperature sensor fault	DCL(THL)	O					(page 53)
5132	-	-	Temperature sensor fault (Hydro unit)	Water-side outlet temp. of heat exchanger (TH32)			O			(page 53)
5135	-	-		Water pump WP1 outlet temperature (TH35)			O			(page 53)
5201	1402	-	Refrigerant pressure sensor fault (Outdoor unit HPS/Hydro unit Prf)		O		O			(page 54)
5201	-	-	Water pressure sensor fault (indoor unit)			O				(page 54)
5202	-	-	Water pressure sensor fault (indoor unit)			O				(page 55)
5202	-	-	Water pressure sensor fault (Hydro unit Pw1)				O			(page 55)
5203	-	-	Water pressure sensor fault (Hydro unit Pw2)				O			(page 55)

Error Code	Prelimi-nary error code	Error (prelim-inary) detail code	Error code definition	Searched unit					Notes
				Outdoor unit	Indoor unit	Hydro unit	LOSSNAY	Remote controller	
5301	4300	[0]	Backup operation	O					
		[115]	ACCT sensor fault	O		O			(page 56)
		[116]	DCCT sensor fault						(page 56)
		[117]	ACCT sensor circuit fault	O		O			(page 57)
		[118]	DCCT sensor circuit fault						(page 57)
		[119]	Open-circuited IPM/Loose ACCT connector	O		O			(page 58)
		[120]	Faulty ACCT wiring	O		O			(page 59)
		[127]	DCL electric current circuit error	O					(page 59)
5305 5306	4305 4306	[0]	Backup operation	O					
		[135]	Current sensor fault	O					(page 60)
		[136]	Current sensor circuit fault	O					(page 60)
5701	-	-	Loose float switch connector		O				(page 60)
6201	-	-	Remote controller board fault (nonvolatile memory error)					O	(page 61)
6202	-	-	Remote controller board fault (clock IC error)					O	(page 61)
6600	-	[001]	Detection of overlapped address in centralized control system	O	O	O	O	O	(page 62)
		[002]	Detection of overlapped address in indoor unit system	O	O	O	O	O	(page 62)
6601	-	[001]	Detection of polarity setting error in centralized control system					O	(page 62)
		[002]	Detection of polarity setting error in indoor unit system					O	(page 62)
6602	-	[001]	Transmission processor hardware error in centralized control system	O	O	O	O	O	(page 63)
		[002]	Transmission processor hardware error in indoor unit system	O	O	O	O	O	(page 63)
6603	-	[001]	Transmission Bus-Busy error in centralized control system	O	O	O	O	O	(page 64)
		[002]	Transmission Bus-Busy error in indoor unit system	O	O	O	O	O	(page 64)
6606	-	[003]	Communication error between device processor on circuit board and M-NET processor	O	O	O	O	O	(page 64)
6607	-	-	No-Ack error	O	O	O	O	O	(page 65)
6608	-	-	No response error	O	O	O	O	O	(page 74)
6831	-	-	MA remote controller signal reception error (No signal reception)		O			O	(page 75)
6832	-	-	MA remote controller signal transmission error (Synchronization error)		O			O	(page 76)
6833	-	-	MA remote controller signal transmission error (Hardware error)		O			O	(page 77)
6834	-	-	MA remote controller signal reception error (Start bit detection error)		O			O	(page 78)
6840	-	-	Indoor-outdoor communication: Reception error		O				(page 79)
6841	-	-	A control communication synchronism not recover		O				(page 79)

Error Code	Prelimi-nary error code	Error (prelim-inary) detail code	Error code definition	Searched unit					Notes
				Outdoor unit	Indoor unit	Hydro unit	LOSSNAY	Remote controller	
6842	-	-	Indoor-outdoor communication: Transmission error		O				(page 80)
6843	-	-	A control communication start bit detection error		O				(page 81)
6846	-	-	Start-up time over		O				(page 82)
7100	-	-	Total capacity error	O					(page 83)
7101	-	-	Capacity code setting error	O	O	O	O		(page 84)
7102	-	-	Wrong number of connected units	O		O			(page 85)
7105	-	-	Address setting error	O					(page 86)
7106	-	-	Attribute setting error				O		(page 86)
7110	-	-	Connection information signal transmission/reception error	O					(page 87)
7111	-	-	Remote controller sensor fault		O		O		(page 87)
7113	-	-	Function setting error (improper connection of CNTYP)	O		O			(page 88)
7117	-	-	Model setting error	O		O			(page 89)
7130	-	-	Incompatible unit combination	O					(page 90)

Note

Outdoor unit

- 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 or 6	Fan inverter system

<Compressor inverter>

<table>
<tr><th>INV board</th><th>Outdoor units</th><th>Overload protection Imax (Arms)</th><th>Current effective value error (Arms)</th><th>Current peak value error (Apeak)</th><th>Temperature protection TOL (°C)</th></tr>
<tr><td rowspan="3">INV35Y</td><td>(E)M200</td><td rowspan="3">19</td><td rowspan="3">23</td><td rowspan="2">39</td><td rowspan="7">95</td></tr>
<tr><td>(E)M250</td></tr>
<tr><td>(E)M300</td><td rowspan="5">56</td></tr>
<tr><td rowspan="3">INV42Y</td><td>(E)M350</td><td rowspan="4">27</td><td rowspan="4">33</td></tr>
<tr><td>(E)M400</td></tr>
<tr><td>(E)M450</td></tr>
<tr><td>INV37YC</td><td>(E)M500</td></tr>
</table>

<Fan inverter>

<table>
<tr><th>INV board</th><th>Outdoor units</th><th>Overload protection Imax (Arms)</th><th>Current effective value error (Arms)</th><th>Current peak value error (Apeak)</th><th>Temperature protection TOL (°C)</th></tr>
<tr><td rowspan="7">INVS/19Y</td><td>(E)M200</td><td rowspan="3">3.9</td><td rowspan="7">Off</td><td rowspan="3">7.0</td><td rowspan="7">Off</td></tr>
<tr><td>(E)M250</td></tr>
<tr><td>(E)M300</td></tr>
<tr><td>(E)M350</td><td rowspan="3">4.5</td><td rowspan="3">8.5</td></tr>
<tr><td>(E)M400</td></tr>
<tr><td>(E)M450</td></tr>
<tr><td>(E)M500</td><td>3.9</td><td>7.0</td></tr>
</table>

Hydro unit

- Which errors in the 4000's range apply to the pump inverter or the power-supply board can be determined by the lowest digit of the two-digit detail code.

Example
4300 (Detail 01) code→Serial communication error   Pump-inverter
4308 (Detail 08) code→Serial communication error   Power-supply board

The last digit	Inverter system
0 or 1	Pump inverter
8	Power-supply board

<Pump inverter>

INV board	Outdoor units	Overload protection Imax (Arms)	Current effective value error (Arms)	Current peak value error (Apeak)	Temperature protection TOL (°C)
INV32	CMH-WM250V	2.3	5.0	8.0	100
	CMH-WM350V	2.8			
	CMH-WM500V	3.2			

7 Troubleshooting Using Error Codes

7-2 Error Code Definitions and Solutions: Codes [0 - 999]

7-2-1 Error Code [0403]

1. Error code definition

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 1: Between the control board and the INV board
Detail code 5, 6: Between the control board and the Fan board
Detail code 8: Between the control board and power-supply board (hydro unit)

3. Cause, check method and remedy

Outdoor unit

(1) Faulty wiring

Check the following wiring connections.

1) Between Control board and Fan board

Control board	FAN board
CN4A	CN80
CN4B	CN80

2) Between control board and INV board

Control board	INV board
CN4	CN2

3) Between power-supply board and INV board

Power-supply board	INV board
CNINV	CN19V

4) Between power-supply board and Fan board

Power-supply board	FAN board
CNFAN1	CN81
CNFAN2	CN81

(2) PS board failure

Replace the PS board if the LED on the INV board, Fan board, or control board is not lit.

Using the detail codes, check the status of the LEDs on the circuit boards below.

Detail code 1: LED on the INV board
Detail code 5: LED on the right Fan board
Detail code 6: LED on the left Fan board

*When the power-supply board is normal, all LEDs will be lit.

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

If the problem persists after a power reset, replace the INV board, FAN board, or control board.

(4) Incorrect DIPSW setting on the Fan board

Make sure the DIPSW on the Fan board are set as follows.

- Models with a single fan
  DIPSW 1-3: ON
  (All other switches: OFF)
- Models with two fans
  DIPSW 1-3 on the right Fan board: ON (All other switches: OFF)
  DIPSW 1-4 on the left Fan board: ON (All other switches: OFF)

Hydro unit

(1) Faulty wiring

Check the following wiring connections.

1) Between the control board and the inverter board (Detail code 1)

Control board	Inverter board	Power-supply board
CN4	CN4	-
CN2	CN2	CN17V
CN305	-	CNRST

2) Between the control board and the power-supply board (Detail code 8)

Control board	Power-supply board
CN801	CN001
CN802	CN002

(2) Power-supply board fault

Replace the power-supply board if any of the LEDs on the following is unlit: Inverter board, control board, or power-supply board.

(3) Inverter board fault and control board fault

If the problem persists after a power reset, replace the inverter board or the control board.

7-2-2 Error Code [0404]

1. Error code definition

Indoor unit control-related errors

2. Error definition and error detection method

Indoor controller board
Abnormal if data cannot be read normally from the nonvolatile memory of the indoor controller board.

3. Cause, check method and remedy

Cause	Check method and remedy
Defective indoor controller board	Replace indoor controller board.

Note: Refer also to the Service Handbook for the indoor units.

7-3 Error Code Definitions and Solutions: Codes [1000 - 1999]

7-3-1 Error Code [1102]

1. Error code definition

Discharge temperature fault

2. Error definition and error detection method

1) If the discharge temperature of 120 °C [248°F] or more is detected during the operation (the first detection), the outdoor unit stops once, turns to anti-restart mode for 3 minutes, and restarts after 3 minutes automatically.
2) If the discharge temperature of 120° C [248°F] or more is detected again (the second detection) within 30 minutes after the second stop of the outdoor unit described above, the mode will be changed to 3 - minute restart mode, then the outdoor unit will restart in 3 minutes.
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 following page(s). [6-3 Evaluating and Adjusting Refrigerant Charge]
(2)	Overload operation	Check operating conditions and operation status of indoor/ outdoor units.
(3) (4)	LEV failure on the Hydro unit Outdoor unit LEV1 actuation failure Outdoor unit LEV2 actuation failure	Perform a cooling or heating operation to check the operation. Cooling: Hydro unit LEV1 Heating: Hydro unit LEV1 Refer to the following page(s). [8-8 Troubleshooting LEV, FCV Problems]
(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 following page(s). [8-7 Troubleshooting Outdoor Unit Fan Problems]
(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)	Refer to the following page(s). [7-7-2 Error Codes [5102,5103,5104,5105,5106,5107,5115]]
(9)	Input circuit failure on the controller board thermistor	Check the inlet air temperature on the LED monitor.

7-3-2 Error Code [1301]

1. Error code definition

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. (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	Refer to the following page(s). [8-5-3 Comparing the Low-Pressure Sensor Measurement and Gauge Pressure]

7-3-3 Error Code [1302] (during operation)

1. Error code definition

High pressure fault 1 (Outdoor unit)

2. Error definition and error detection method

1) If the pressure of 3.78MPa [548psi] or higher is detected by the pressure sensor during operation (the first detection), the outdoor stops once, turns to antirestart mode for 3 minutes, and restarts after 3 minutes automatically.
2) If the pressure of 3.78MPa [548psi] or higher is detected by the pressure sensor again (the second detection) within 30 minutes after the first stop of the outdoor unit, the outdoor unit stops once, turns to anti-restart mode for 3 minutes, and restarts after 3 minutes automatically.
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)	Hydro unit LEV1 actuation failure -> Cooling Hydro unit LEV1 actuation failure -> Heating	Perform a cooling or heating operation to check the operation. Cooling: Hydro unit LEV1 Heating: Hydro unit LEV1 Refer to the following page(s). [8-8 Troubleshooting LEV, FCV Problems]
(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 following page(s). [8-7 Troubleshooting Outdoor Unit Fan Problems]
(11)	Solenoid valve (SV1a) malfunction (The by-pass valve (SV1a) can not control rise in high pressure).	Refer to the following page(s). [8-6 Troubleshooting Solenoid Valve Problems]
(12)	Thermistor failure (TH3, TH7)	Refer to the following page(s). [7-7-2 Error Codes [5102,5103,5104,5105,5106,5107,5115]]
(13)	Pressure sensor failure	Refer to the following page(s). [8-5-1 Comparing the High-Pressure Sensor Measurement and Gauge Pressure]
(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).

(18) Open phase in the power-supply due to improper power-supply wiring	Refer to item (5) in section [6-1 Read before Test Run].

7-3-4 Error Code [1302] (at startup)

1. Error code definition

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. (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	Refer to the following page(s). [8-5-1 Comparing the High-Pressure Sensor Measurement and Gauge Pressure]
(7) Open phase in the power-supply due to improper power-supply wiring	Refer to item (5) in section [6-1 Read before Test Run].

7-3-5 Error Code [1500]

1. Error code definition

Refrigerant overcharge

2. Error definition and error detection method

An error can be detected by the discharge temperature superheat.

1) If the formula "ToilSH (shell bottom SH) ≤10°C [50°F]" is satisfied during operation (first detection), the outdoor unit stops, goes into the 3-minute restart mode, and starts up in three minutes.
2) If the formula "TdSH ≤10°C [50°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 "ToilSH (shell bottom SH) ≤10°C [50°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 following page(s). [6-3 Evaluating and Adjusting Refrigerant Charge]
(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 (TH15)	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 following page(s). [8-8 Troubleshooting LEV, FCV Problems]

7-4 Error Code Definitions and Solutions: Codes [2000 - 2999]

7-4-1 Error Code [2500] (Models with a drain sensor)

1. Error code definition
Drain sensor submergence

2. Error definition and error detection method
1) If an immersion of the drain sensor in the water is detected while the unit is in any mode other than the Cool/Dry mode and when the drain pump goes from OFF to ON, this condition is considered preliminary water leakage. While this error is being detected, humidifier output cannot be turned on.
2) If the immersion of the sensor in the water is detected four consecutive times at an hour interval, this is considered water leakage, and "2500" appears on the monitor.
3) Detection of water leakage is also performed while the unit is stopped.
4) Preliminary water leakage is cancelled when the following conditions are met:

- One hour after the preliminary water leakage was detected, it is not detected that the drain pump goes from OFF to ON.
- The operation mode is changed to Cool/Dry.
- The liquid pipe temperature minus the inlet temperature is -10°C [-18°F] or less.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Drain water drainage problem • Clogged drain pump • Clogged drain piping • Backflow of drain water from other units	Check for proper drainage.
(2) Adhesion of water drops to the drain sensor • Trickling of water along the lead wire • Rippling of drain water caused by filter clogging	1) Check for proper lead wire installation. 2) Check for clogged filter.
(3) Failure of the relay circuit for the solenoid valve	Replace the relay.
(4) Indoor unit control board failure • Drain sensor circuit failure	If the above item checks out OK, replace the indoor unit control board.

7-4-2 Error Code [2500] (Models with a float switch)

1. Error code definition

Drain sensor submergence

2. Error definition and error detection method

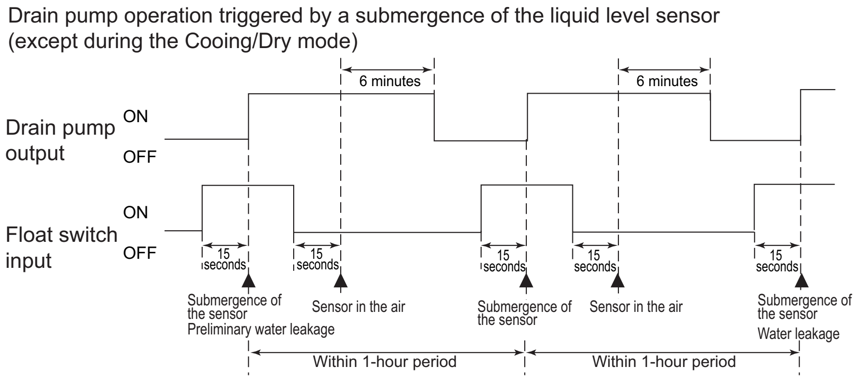
1) If an immersion of the float switch in the water is detected while the unit is in any mode other than the Cool/Dry mode and when the drain pump goes from OFF to ON, this condition is considered preliminary water leakage. While this error is being detected, humidifier output cannot be turned on.
2) If the drain pump turns on within one hour after preliminary water leakage is detected and the above-mentioned condition is detected two consecutive times, water leakage error water leakage is detected, and "2500" appears on the monitor.
3) Detection of water leakage is also performed while the unit is stopped.
4) Preliminary water leakage is cancelled when the following conditions are met:

- One hour after the preliminary water leakage was detected, it is not detected that the drain pump goes from OFF to ON.
- The operation mode is changed to Cool/Dry.
- The liquid pipe temperature minus the inlet temperature is - 10°C [-18°F] or less.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Drain water drainage problem • Clogged drain pump • Clogged drain piping • Backflow of drain water from other units	Check for proper drainage.
(2) Stuck float switch Check for slime in the moving parts of the float switch.	Check for normal operation of the float switch.
(3) Float switch failure	Check the resistance with the float switch turned on and turned off.

<Reference>



7-4-3 Error Code [2501] (Water pump fault)

1. Error code definition

Water pump fault

2. Error definition and error detection method

- When clogged water circuit or water leaks from the water circuit is detected, the water pump is stopped for protection.
- When the following statuses are detected, the pump will be stopped.

Pw2-Pw1 < 10
TH32 ≥ 60°C
TH35 ≥ 53°C

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Water circuit is clogged.	1) Check for tightened water flow rate control valves or field-installed valves.
(2) Water leaks from the water circuit	2) Check the pump for proper sound. If there is air in the circuit, it makes a noise.
(3) Air infiltration through the air vent valve	3) Check that any air vent valves are not installed in the water circuit on the suction side water pump. If an air vent valve is installed in the water circuit on the suction side water pump, it will cause the air infiltration.
(4) Broken or semi-broken thermistor wire	4) Check for a broken thermistor wire.
(5) Thermistor failure	5) Check the resistance of the thermistor. 0°C [32°F] : 15kΩ 10°C [50°F] : 9.7kΩ 20°C [68°F]: 6.4kΩ 30°C [86°F] : 4.3kΩ 40°C [104°F] : 3.1kΩ
(6) Semi-broken pump wire	6) Check for semi-broken pump wires.

- If a sudden water leak occurs, replace the water pressure protection valves because they may be the cause.

7-4-4 Error Code [2502] (Models with a drain sensor)

1. Error code definition

Drain pump fault

2. Error definition and error detection method

1) Make the drain sensor thermistor self-heat by passing current through it. If the temperature rise is small, it is interpreted that the sensor is immersed in water. This condition is considered to be a preliminary error, and the unit goes into the 3-minute restart delay mode.
2) If another episode of the above condition is detected during the preliminary error, this is considered a drain pump error, and "2502" appears on the monitor.
3) This error is always detected while the drain pump is in operation.
4) The following criteria are met when the criteria for the forced stoppage of outdoor unit (system stoppage) are met.
   ∗"Liquid pipe temperature-inlet temperature ≤ -10°C [-18°F]" has been detected for 30 minutes.
   ∗The immersion of drain sensor is detected 10 consecutive times.
   ∗The conditions that are listed under items 1) through 3) above are always met before the criteria for the forced stoppage of the outdoor unit.
5) The indoor unit that detected the conditions that are listed in item 4) above brings the outdoor unit in the same refrigerant circuit to an error stop (compressor operation prohibited), and the outdoor unit brings all the indoor units in the same refrigerant circuit that are in any mode other than Fan or Stop to an error stop. "2502" appears on the monitor of the units that came to an error stop.
6) Forced stoppage of the outdoor unit
   Detection timing: The error is detected whether the unit is in operation or stopped.
7) Ending criteria for the forced stoppage of outdoor unit
   Power reset the indoor unit that was identified as the error source and the outdoor unit that is connected to the same refrigerant circuit.
   Forced stoppage of the outdoor unit cannot be cancelled by stopping the unit via the remote controller.
   (Note) Items 1) - 3) and 4) - 7) are detected independently from each other.

Note

The address and attribute that appear on the remote controller are those of the indoor unit (or OA processing unit) that caused the error.

3. Cause, check method and remedy

	Cause		Check method and remedy
(1)	Drain pump failure		Check for proper functioning of the drain pump.
(2)	Drain water drainage problem ⬩Clogged drain pump ⬩Clogged drain piping		Check for proper drainage.
(3)	Adhesion of water drops to the drain sensor ⬩Trickling of water along the lead wire ⬩Rippling of drain water caused by filter clogging	1) 2)	Check for proper lead wire installation. Check for clogged filter.
(4)	Indoor unit control board failure ⬩Drain pump drive circuit failure ⬩Drain heater output circuit failure		If the above item checks out OK, replace the indoor unit control board.
(5)	Wrong dipswitch setting on the indoor unit controller board ⬩Dipswitch for the new indoor unit controller board was wrongly set to "unit model without drain pump" instead of "unit model with drain pump" when the board was replaced.		Check for proper dipswitch model setting on the indoor unit controller board.
(6)	Items (1) through (4) above and an indoor unit electronic valve closure failure (leaky valve) occurred simultaneously.		Check the solenoid valves on the indoor unit for leaks.

7-4-5 Error Code [2502] (Models with a float switch)

1. Error code definition

Drain pump fault

2. Error definition and error detection method

1) The immersion of sensor tip in water is detected by the ON/OFF signal from the float switch.
   ∗Submergence of the sensor
   When it is detected that the float switch has been ON for 15 seconds, it is interpreted that the sensor tip is immersed in water.
   ∗Sensor in the air
   When it is detected that the float switch has been OFF for 15 seconds, it is interpreted that the sensor tip is not immersed in water.
2) If it is detected that the float switch has been ON for 3 minutes after the immersion of the sensor tip was detected, this is considered a drain pump failure, and "2502" appears on the monitor.
   ∗The total time it takes for this error to be detected is 3 minutes and 15 seconds, including the time it takes for the first immersion of the sensor tip to be detected.
3) Detection of drain pump failure is performed while the unit is stopped.
4) The following criteria are met when the criteria for the forced stoppage of outdoor unit (system stoppage) are met.
   ∗"Liquid pipe temperature-inlet temperature ≤ -10°C [-18°F]" has been detected for 30 minutes.
   ∗It is detected by the float switch that the sensor tip has been immersed in water for 15 minutes or more.
   ∗The conditions that are listed under items 1) through 3) above are always met before the criteria for the forced stoppage of the outdoor unit.
5) The indoor unit that detected the conditions that are listed in item 4) above brings the outdoor unit in the same refrigerant circuit to an error stop (compressor operation prohibited), and the outdoor unit brings all the indoor units in the same refrigerant circuit that are in any mode other than Fan or Stop to an error stop. "2502" appears on the monitor of the units that came to an error stop.
6) Forced stoppage of the outdoor unit
   Detection timing: The error is detected whether the unit is in operation or stopped.
7) Ending criteria for the forced stoppage of outdoor unit
   Power reset the indoor unit that was identified as the error source and the outdoor unit that is connected to the same refrigerant circuit.
   Forced stoppage of the outdoor unit cannot be cancelled by stopping the unit via the remote controller.
   (Note) Items 1) - 3) and 4) - 7) are detected independently from each other.

Note

The address and attribute that appear on the remote controller are those of the indoor unit (or OA processing unit) that caused the error.

3. Cause, check method and remedy

	Cause	Check method and remedy
(1)	Drain pump failure	Check for proper functioning of the drain pump mechanism
(2)	Drain water drainage problem ⬩Clogged drain pump ⬩Clogged drain piping	Check for proper drainage.
(3)	Stuck float switch Check for slime in the moving parts of the float switch.	Check for normal operation of the float switch.
(4)	Float switch failure	Check the resistance with the float switch turned on and turned off.
(5)	Indoor unit control board failure ⬩Drain pump drive circuit failure ⬩Float switch input circuit failure	Replace indoor unit control board.
(6)	Wrong dipswitch setting on the indoor unit controller board ⬩Dipswitch for the new indoor unit controller board was wrongly set to "unit model without drain pump" instead of "unit model with drain pump" when the board was replaced.	Check for proper dipswitch model setting on the indoor unit controller board.
(7)	Items (1) through (5) above and an indoor unit electronic valve closure failure (leaky valve) occurred simultaneously.	Check the solenoid valves on the indoor unit for leaks.

7 Troubleshooting Using Error Codes

7-4-6 Error Code [2503]

1. Error code definition

Drain sensor (Thd) fault

2. Error definition and error detection method

- If the open or short circuit of the thermistor has been detected for 30 seconds, this condition is considered to be a preliminary error, and the unit goes into the 3-minute restart delay mode.
- If another episode of the above condition is detected during the preliminary error, this is considered a drain sensor error.(If the short or open circuit of the thermistor is no longer detected, normal operation will be restored in 3 minutes.)
- This error is detected when one of the following conditions are met.
  - ∗During Cool/Dry operation
  - ∗Liquid pipe temperature minus inlet temperature is equal to or smaller than -10°C [-18°F] (except during the defrost cycle)
  - ∗When the liquid temperature thermistor or suction temperature thermistor or short or open circuited.
  - ∗Drain pump is in operation.
  - ∗One hour has elapsed since the drain sensor went off.

Short: 90°C [194 °F] or above
Open: - 20°C [-4 °F] or below

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 semi-broken thermistor wire	2)	Check for a broken thermistor wire.
(3)	Thermistor failure	3)	Check the resistance of the thermistor. 0°C[32 °F]:6.0 kΩ 10°C[50 °F]:3.9 kΩ 20°C[68°F]:2.6 kΩ 30°C[86°F]:1.8 kΩ 40°C[104 °F]:1.3 kΩ
(4)	Indoor unit control board (error detection circuit) failure	4)	Replace the indoor unit control board if the problem recurs when the unit is operated with the No.-1 and No.-2 pins on the drain sensor connector (CN31) being short-circuited. If the above item checks out OK, there are no problems with the drain sensor. Turn off the power and turn it back on.

7-4-7 Error Code [2512] (Control valve failure) (Indoor unit)

1. Error code definition
Flow control valve fault (indoor unit)

2. Error definition and error detection method
- Limit signal that is output from flow control valve is not detected or is not reset after it is detected.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Loose connectors, wiring fault (2) Flow control valve fault	Check that the flow control valve wiring is properly connected to CN8A, and check the connectors for loose contact. If these are not the cause of the problem, replace the flow control valve.
(3) Control board fault	If no problems are found with the above items, replace the control board.

7-4-8 Error Code [2519]

1. Error code definition
Abnormal water pressure drop

2. Error definition and error detection method
1) If the pressure of 10kPa [1.45psi] or lower is detected by the water pressure sensor during operation (the first detection), the outdoor stops once, turns to antirestart mode for 3 minutes, and restarts after 3 minutes automatically.
2) If the pressure of 10kPa [1.45psi] or lower is detected by the water pressure sensor again (the second detection) within 5 minutes after the first stop of the outdoor unit, the outdoor unit will make an error stop, and the error code "2519" will be displayed.
3) If the pressure of 10kPa [1.45psi] or lower is detected more than 5 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.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Clogged pipe (2) Water leakage (3) Water supply cutoff	Check the strainer for clogging. Check the flow rate in the water circuit.
(4) Water pressure sensor error (5) Circuit board error on indoor unit (6) Water pressure sensor disconnection	Check the pressure sensor value on the LED.
(7) Pump failure	Check the pump for problems. See [8-10-11 Checking the Pump Motor for Ground Fault and Coil Resistance Problems] for the check procedure.
(8) Use of wrong expansion tank (9) Use of wrong pipe (10) Installation failure	Check the on-site circuit components for proper selection. For the circuit restrictions, see the related sections. Check the water feed pressure.

7-4-9 Error Code [2520]

1. Error code definition

Abnormal water pressure rise

2. Error definition and error detection method

1) If any of the following is detected for the first time during operation, the water pump turns to antirestart mode for 3 minutes, and automatically restarts after 3 minutes:
   - Indoor unit water pressure of 950 kPa [138 psi] or higher
   - Hydro unit PWD of 650 kPa [94 psi] or higher
   - Hydro unit PWS of 700 kPa [101 psi] or higher
2) If the above-mentioned pressure is detected again within 5 minutes after the first stop, the outdoor unit will make an error stop, and the error code "2520" will be displayed.
3) If the pressure rise is detected again during operation after 5 minutes or longer from the first stop, the detection is regarded as the first detection, and the operation described in step 1 above will start.

3. Cause, check method and remedy

<table>
<tr><th colspan="2">Cause</th><th>Check method and remedy</th></tr>
<tr><td>(1)</td><td>Clogged pipe</td><td>Check the strainer for clogging. Check the flow rate in the water circuit.</td></tr>
<tr><td>(2)</td><td>Water pressure sensor error</td><td rowspan="2">Check the pressure sensor value on the LED.</td></tr>
<tr><td>(3)</td><td>Circuit board error on indoor unit</td></tr>
<tr><td>(4)</td><td>Failure in the indoor unit flow control valve</td><td>Check the operation of the flow rate control valve.
See [8-8-4 General Overview on FCV Operation (Indoor unit)] for the valve operation.</td></tr>
<tr><td>(5)</td><td>Use of wrong expansion tank</td><td rowspan="3">Check the on-site circuit components for proper selection. For the circuit restrictions, see the related sections.
Check the water feed pressure.</td></tr>
<tr><td>(6)</td><td>Use of wrong pipe</td></tr>
<tr><td>(7)</td><td>Installation failure</td></tr>
</table>

7-4-10 Error Code [2600]

1. Error code definition

Water leakage

2. Cause, check method and remedy

Check that water does not leak from the pipes in such as the humidifier.

7-4-11 Error Code [2601]

1. Error code definition

Water supply cutoff

2. Cause, check method and remedy

Cause	Check method and remedy
(1) The water tank of the humidifier is empty.	Check the amount of supply water. Check for the solenoid valve and for the connection.
(2) The solenoid valve for humidification is OFF.	Check the connector.
(3) Disconnected float switch	Check the connecting part.
(4) Poor operation of float switch	Check for the float switch.
(5) Frozen water tank	Turn off the power source of the water tank to defrost, and turn it on again.

7-5 Error Code Definitions and Solutions: Codes [3000 - 3999]

7-5-1 Error Code [3121]

1. Error code definition

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)

7 Troubleshooting Using Error Codes

7-5-2 Error Code [3511]

1. Error code definition
Refrigerant overcooling

2. Error definition and error detection method
1) If the condition "THHS ≤ A[*1] °C remains true for continuous 6 minutes and 30 seconds" is met (for the first time) during operation, the outdoor unit will stop, go into the three-minute restart delay mode, and then automatically resume operation after three minutes have passed.
2) If the condition "THHS ≤ A[*1] °C remains true for continuous 6 minutes and 30 seconds" is met again (for the second time) within 30 minutes of the first stoppage of the outdoor unit explained above, the outdoor unit will stop, go into the three-minute restart delay mode, and then automatically resume operation after three minutes have passed.
3) If the condition "THHS ≤ A[*1] °C remains true for continuous 6 minutes and 30 seconds" is met again (for the third time) within 30 minutes of the second stoppage of the outdoor unit explained above and before the condition "THHS > A[*1] °C remains true for continuous 2 minutes" has been met, the unit will come to an abnormal stop, and this error will be indicated as "3511."
4) If the condition "THHS ≤ A[*1] °C remains true for continuous 6 minutes and 30 seconds" is met (regardless of the first or second time) after 30 minutes of the first occurrence or after the condition "THHS > A[*1] °C remains true for continuous 2 minutes" has been met, it is considered as the first occurrence, and the unit will follow the same behavior as the one described in item 1) above.
5) For 30 minutes after the stoppage of the outdoor unit, or the period up to the time when the condition "THHS > A[*1] °C remains true for continuous 2 minutes" has been met is considered as a preliminary error, and this state will be indicated on the LED.

*1 During cooling: A = Outside temperature TH7; During heating: A = Evaporation temperature Te

3. Cause, check method and remedy

	Cause		Check method and remedy
(1)	Outdoor unit LEV9 malfunction		Check the operation of unit in the Cooing or in the Heating mode. LEV9 Refer to [8-8 Troubleshooting LEV, FCV Problems].
(2)	THHS failure	1)	Check the IGBT on the INV board for proper mounting.
		2)	Check the THHS sensor reading on the LED. → Replace the INV board if the THHS value is abnormal.
(3)	Thermistor failure (TH7)		Resistance value of the thermistor
(4)	Low-pressure sensor fault		Refer to [8-5 Pressure Sensor Circuit Configuration and Troubleshooting Pressure Sensor Problems]

7-5-3 Error Code [3512]

1. Error code definition

Cooling fan locking

2. Error definition and error detection method

- The motor on the cooling fan locks during operation.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Locked cooling fan motor	Check the fan blades for objects obstructing the rotation of the cooling fan.
(2)	Cooling fan motor trouble	Disconnect the wiring from the cooling fan motor, and check the insulation resistance and the coil resistance of the motor. Replace the motor if problems are found. Criteria for insulation failure: Insulation failure if below 1 MΩ Wire disconnection: Normal if coil resistance is between 56 and 65 Ω
(3)	Contact failure	Check the wiring between CN101 and CN63PW. Check the wiring between CN24V and RY24V. Check the RY24V terminal block for problems.
(4)	Circuit board fault	If no problems are found with the items above, replace the control board and the PS board.

7-6 Error Code Definitions and Solutions: Codes [4000 - 4999]

7-6-1 Error Code [4102]

1. Error code definition

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.
- When an open phase is detected (L3-phase or N-phase in the power supply) is detected at the start of operation.

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. • Possible open phase in the power-supply due to improper power-supply wiring. (Refer to item (5) in section [6-1 Read before Test Run].)
(2)	Noise filter problem • Coil problem • Circuit board failure	• Check the coil connections. • Check for coil burnout.
(3)	Wiring failure	Check the wiring between CN5 on the noise filter and CNAC on the control board. Check the wiring between CN3 on the noise filter and CN110 on the control board.
(4)	Blown fuse	Check for a blown fuse (F001) on the control board. →If a blown fuse is found, check for a short-circuiting or earth fault of the actuator. Check for a blown fuse (F3) on the noise filter. →If a blown fuse is found, check for a short-circuiting or earth fault of the actuator.
(5)	Control board failure	Replace the control board if none of the above is causing the problem.

7-6-2 Error Code [4106]

1. Error code definition

<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 transmission power supply circuit on all outdoor units in a given refrigerant circuit for problems. [8-11-2 Trouble-shooting Problems with Outdoor Unit Transmission Power Supply Circuit]

1. Error code definition

<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 transmission power supply circuit on all outdoor units in a given refrigerant circuit for problems. [8-11-2 Trouble-shooting Problems with Outdoor Unit Transmission Power Supply Circuit]

7-6-3 Error Code [4109]

1. Error code definition

Indoor unit fan operation error

2. Error definition and error detection method

1) Connector CN28 has remained open-circuited for 100 consecutive secondsduring operation.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Auxiliary relay fault	The coil or the wiring of the auxiliary relay connected to CN28 is faulty.
(2)	Connector (CN28) is disconnected.	Check the connector for proper connection.
(3)	Blown fuse	Check the fuse on the control circuit board.
(4)	Motor error (thermistor error inside the motor)	Check the unit fan for proper operation in the test run mode. If no problems are found with items 1 through 3 above and the fan does not operate, replace the motor.

7-6-4 Error Code [4114]

1. Error code definition

Indoor unit fan motor error

2. Error definition and error detection method

When the fan motor output from the indoor unit circuit board is ON and when the rotation speed input from the fan motor cannot be detected for 30 seconds or more

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Fan motor connector contact failure	Check the fan motor connector CNMF for proper connection.
(2) Indoor unit circuit board failure	Remove the fan motor connector CNMF and check the voltage at the indoor unit circuit board. Testing point 1. 280 VDC (Between CNMF1 (+) and CNMF4 (-)) 2. 15 VDC (Between CNMF5 (+) and CNMF4 (-)) Replace the indoor unit circuit board if the voltage is abnormal. If the 4114 error persists after the indoor unit circuit board is replaced, replace the fan motor as well.
(3) Fan motor fault	Replace the fan motor if the voltage is normal in step (2) above. If the 4114 error persists after the fan motor is replaced, replace the indoor unit circuit board as well.

7-6-5 Error Code [4115] Detail Code 101, 102

1. Error code definition

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

Outdoor unit

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.

Hydro unit

Cause	Check method and remedy
(1) Power supply error	⬩Check for an occurrence of a(n) (instantaneous) power failure at the time of error detection. ⬩Check that the power-supply voltage is 198 V or above (TB01). ⬩Check to see if the power-supply frequency is in the range between 45 and 54 Hz (55 and 64 Hz) (TB01). ⬩Check the power supply voltage waveform for distortion.
(2) Coil problem	Check for coil burnout. (L101 and L102 mounted on the PS board)
(3) Faulty wiring	Check fuse F111, F401 (PS board)
(4) Wiring failure Between TB01 and PS board CNAC	Confirm that the voltage at the PS board connector CNAC (2-4 pin) is 198 V or above.
(5) PS 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 PS board.

7-6-6 Error Code [4116]

1. Error code definition

RPM error/Motor error

2. Error definition and error detection method

- LOSSNAY
  - ∗The motor keep running even if the power is OFF.
  - ∗The thermal overload relay is ON. (Only for the three-phase model)
- Indoor unit

If detected less than 180rpm or more than 2000rpm, the indoor unit will restart and keep running for 3 minutes.If detected again, the display will appear.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Board failure	Replace the board.
(2) Motor malfunction	Check for the motor and the solenoid switch.
(3) Solenoid switch malfunction	

7-6-7 Error Code [4121]

1. Error code definition

Function setting error

2. Error source, cause, check method and remedy

Error source	Cause	Check method and remedy
Outdoor unit	(1) Dip switch setting error on the control board	Check the SW6-1 setting on the control board
	(2) Connector connection error on the control board	Check that nothing is connected to the connector CNAF on the control board.
	(3) Control board failure	Replace the control board if no problems are found with the two items above.

7-6-8 Error Code [4124]

1. Error code definition

Electric system not operate due to damper abnormality

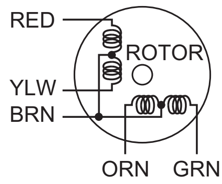
2. Error definition and error detection method

When the damper is not located at the designated position.

3. Cause, check method and remedy

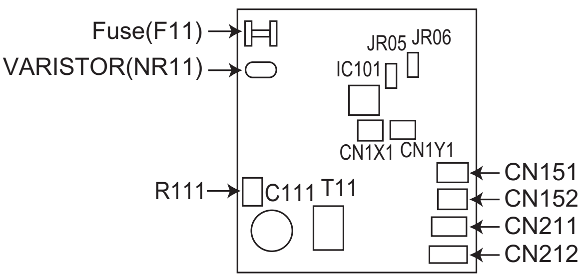
When the damper is not located at the designated position.

1) Check there is something that interferes the opening or closing movement of the damper.
2) If damper does not open or close, turn OFF the power supply and measure the resistance of the damper lock motors (ML1, ML2) and the damper motor (MV2).
   The resistance value is normal each. →Replace the indoor electronic control P.C. board.
   The resistance value is not normal each. →Replace the motor that indicates the abnormal value.

Part name	Check method and criteria	Figure
Damper lock motor Right(ML1) Damper lock motor Left(ML2)	Measure the resistance between the terminals with a tester. (Part temperature: 10°C ~ 30°C) Color of the lead wire: BRN-other one — Normal: 235Ω~255Ω	
Damper motor (MV2)	Measure the resistance between the terminals with a tester. (Part temperature: 10°C ~ 30°C) Color of the lead wire: BRN-other one — Normal: 282Ω~306Ω	

3) If damper opens or closes, measure the voltage between CN1X1 (+) and (-) and the voltage between CN1Y1 (+) and (-) during the damper open by pressing VANE CONTROL button.
   There is not 0V DC between CN1X1 (+) and (-). →Replace the damper limit switch (open)
   There is not 5V DC between CN1X1 (+) and (-). →Replace the damper limit switch (close)
4) If damper opens or closes and voltages in 3) are normal, measure the voltage between CN1X1 (+) and (-) and the voltage between CN1Y1 (+) and (-) during the damper close by pressing VANE CONTROL button.
   There is not 5V DC between CN1X1 (+) and (-). →Replace the damper limit switch (open)
   There is not 0V DC between CN1X1 (+) and (-). →Replace the damper limit switch (close)
   There is 5V DC between CN1X1 (+) and (-) and 0V DC between CN1X1 (+) and (-). →Replace the indoor electronic control P.C. board.

Indoor electronic control P.C. Board



Note: Refer also to the Service Handbook for the indoor units.

7-6-9 Error Code [4129] Detail Code 101

1. Error code definition
Converter error (Detail code 101)

2. Error definition and error detection method
Vdc ≥ 420 V or an overcurrent through the converter was detected during inverter operation.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Power-supply environment	◆Check for an occurrence of a(n) (instantaneous) power failure at the time of error detection. ◆Check that the power-supply voltage is between 198 V and 264 V (TB01). ◆Check the power supply voltage waveform for distortion.
(2)	Wiring problem	Between FT001, FT002 (Terminal mounted on PS board), and AC reactor (ACL)
(3)	Power-supply 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 PS board.

7-6-10 Error Code [4129] Detail Code 102

1. Error code definition
Power supply signal sync error

2. Error definition and error detection method
Power supply sync signal cannot be detected during inverter operation.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Power supply error	◆Check for an occurrence of a(n) (instantaneous) power failure at the time of error detection. ◆Check that the power-supply voltage is 198 V or above (TB01). ◆Check to see if the power-supply frequency is in the range between 45 and 54 Hz (55 and 64 Hz) (TB01). ◆Check the power supply voltage waveform for distortion.
(2)	Coil problem	Check for coil burnout. (L101 and L102 mounted on the PS board)
(3)	Faulty wiring	Check fuse F111, F401
(4)	Wiring failure Between TB01 and PS board CNAC	Confirm that the voltage at the PS board connector CNAC (2-4 pin) is 198 V or above.
(5)	PS 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 PS board.

7-6-11 Error Code [4130]

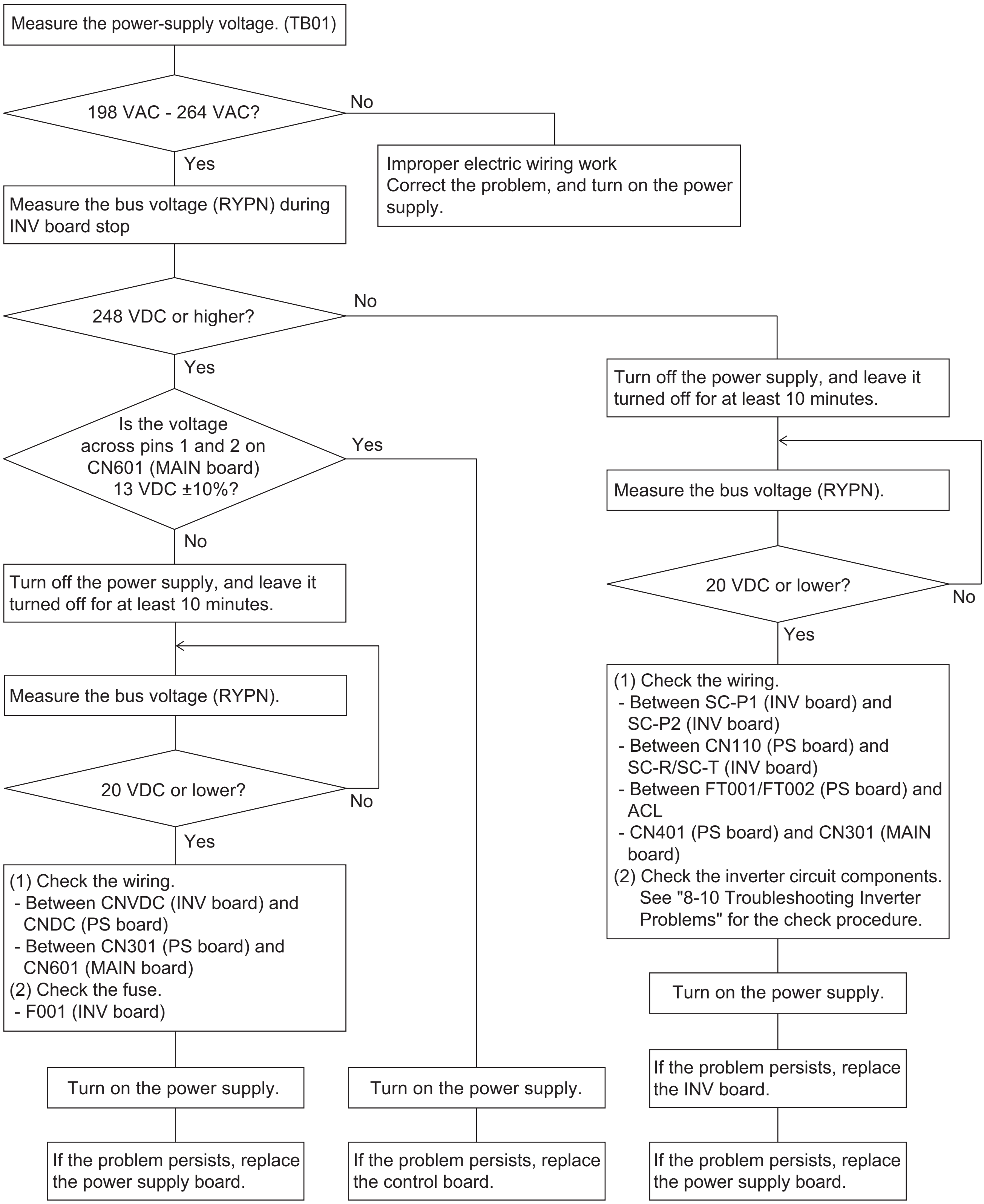
1. Error code definition

Control power supply error

2. Error definition and error detection method

No power is supplied to the control board from the power board.

3. Cause, check method and remedy



7-6-12 Error Code [4131]

1. Error code definition

Slightly open indoor unit valve during power cut

2. Error definition and error detection method

On the indoor units to which no power is supplied, when a temperature difference of 10°C or greater is detected between the return air temperature (TH1) and the inlet water temperature (TH2) continuously for 5 minutes during cooling operation, the error code [4131] will be displayed, and the system will come to an abnormal stop.

3. Cause, check method and remedy

	Cause	Check method and remedy
(1)	Slightly open indoor unit flow control valve due to power cut	Turn on the power supply.
(2)	Thermistor failure	Check the thermistor value on the LED.
(3)	Failure in the indoor unit flow control valve	Check the operation of the flow rate control valve. See [8-8-4 General Overview on FCV Operation (Indoor unit)] for the valve operation.

7-6-13 Error Codes [4220, 4225, 4226] Detail Code 108

1. Error code definition

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) (Outdoor unit)
If Vdc 150V or less is detected during Inverter operation. (S/W detection) (Hydro unit)

3. Cause, check method and remedy

Outdoor unit

(1) Power supply environment

Check the power-supply wiring for an open phase. Refer to item (5) in section [6-1 Read before Test Run].
Find out if there was a (momentary) power failure.
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

INV35Y and INV37YC

- Check the voltage at relay connector RYPN while the inverter is stopped.

If the voltage is 420 V or above, check the following items.
1) Check the LED monitor to see if the bus voltage is above 289 V, and replace the inverter board if it is 289 V or below.
2) Check the coil (L) connections and for broken wiring.
3) Check the wiring connections between noise filter board and INV board.
4) If the problem persists after reboot, replace the INV board.

If the voltage is below 420 V, check the following items.
1) Check the coil (L) connections and for broken wiring.
2) Check the wiring connections between noise filter board and INV board and between INV board and R1 through R5.
3) Check the in-rush current resistor. Refer to the following page(s). [8-10-18 Simple Check on Inverter Circuit Components]
4) If the problem persists after reboot, replace the INV board.

INV42Y

- Check the voltage at relay connector RYPN while the inverter is stopped.

If the voltage is 420 V or above, check the following items.
1) Check the LED monitor to see if the bus voltage is above 289 V, and replace the inverter board if it is 289 V or below.
2) Check the coil (L) connections and for broken wiring.
3) Check the wiring connections between noise filter board and INV board and between INV board and capacitor board.
4) If the problem persists after reboot, replace the INV board.

If the voltage is below 420 V, check the following items.
1) Check the coil (L) connections and for broken wiring.
2) Check the wiring connections between noise filter board and INV board, between INV board and capacitor board, and between INV board and R1 through R5.
3) Check the in-rush current resistor. Refer to the following page(s). [8-10-18 Simple Check on Inverter Circuit Components]
4) If the problem persists after reboot, replace the INV board.

4225, 4226

- Check the voltage at relay connector RYPN while the inverter is stopped. If the voltage is below 420 V, check the following items.
  1) Check for proper connections of noise filter coil and DC reactor, and for broken wiring.
  2) Check the wiring connections between INV board and FAN board.
  3) Check item for 4220

  Replace the FAN board if no problems are found.
- Check the voltage at connector RYPN while the inverter is stopped. If the voltage is 420 V or above, 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

Check that 12VDC is applied to connector CN72 on the control board while the inverter is operating. If voltage is absent or the wrong voltage is applied, check the fuse F01. Replace the control board if no problems are found with the fuse.

Hydro unit

(1) Power supply environment

Find out if there was a (momentary) power failure.
Check that the power-supply voltage between L and N is 198 V or greater.
Check the power supply voltage waveform for distortion.

(2) Voltage drop detected

- Check the voltage at relay connector RYPN while the inverter is stopped.

If the voltage is 248 VDC or above, check the following items.

1) Check the inverter's main circuit components for problems. See [8-10-18 Simple Check on Inverter Circuit Components].
2) If the problem persists after reboot, replace the INV board.

If the voltage is 248 VDC or below, check the following items.

1) Check the wiring between the following.
   - SC-P1 (INV) and SC-P2 (INV)
   - CN110 (PS), SC-R (INV), and SC-T (INV)
   - FT001(PS), FT002 (PS), and ACL
   - CN301 (PS) and CN601 (MAIN)
2) Check the inverter's main circuit components for problems. See [8-10-18 Simple Check on Inverter Circuit Components].
3) Control board failure.
   Check that 12 VDC is applied to connector CN601 (pins 1 and 2) on the control board while the inverter is operating.
   Replace the control board if the voltage is absent or a wrong voltage is applied.

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-6-14 Error Codes [4220, 4225, 4226] Detail Code 109

1. Error code definition

Abnormal bus voltage rise (Detail code 109)

2. Error definition and error detection method

If Vdc ≥830V is detected during inverter operation. (Outdoor unit)
If Vdc ≥425V is detected during inverter operation. (Hydro unit)

3. Cause, check method and remedy

Outdoor unit

(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 or fan board.
In the case of 4220: INV board
In the case of 4225 and 4226: Fan board

Hydro unit

(1) Different voltage connection

Check that the power-supply voltage between 198 and 264 VAC is applied to the power-supply terminal block (TB01).
Check the power supply voltage waveform for distortion.

(2) INV board failure

If the problem persists, replace the INV board.

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-6-15 Error Code [4220] Detail Code 110

1. Error code definition

VDC error (Detail code 110)

2. Error definition and error detection method

BUS voltage error When Vdc is equal to or greater than 814 volts (hardware detection)

3. Cause, check method and remedy

Details of 4220 error: See No. 108 and 109.
Also see error details No. 129 of 4220 error (applicable to INV37YC only).

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-6-16 Error Codes [4220, 4225, 4226] Detail Code 111, 112

1. Error code definition

Logic error (Detail code 111, 112)

2. Error definition and error detection method

Hardware error
If only the hardware 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	Refer to the following page(s). [8-10-2 Checking the Inverter Board Error Detection Circuit]
(2) INV board failure	

In the case of 4225 and 4226

Cause	Check method and remedy
(1) External noise	Refer to the following page(s). [8-10-8 Checking the Fan Board Error Detection Circuit at No Load] [8-10-9 Checking the Fan Board for Damage at No Load] [8-10-10 Checking the Fan Board for Damage with Load]
(2) Fan board failure	

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-6-17 Error Code [4220] Detail Code 123

1. Error code definition

Voltage boost control error (Detail code 123)(outdoor unit)

2. Error definition and error detection method

When a drop in power supply voltage or a malfunction in the booster circuit is detected

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Inverter-output-related items	Refer to the following page(s). [8-10-2 Checking the Inverter Board Error Detection Circuit] Refer to the following page(s). [8-10-3 Checking the Compressor for Ground Fault and Coil Resistance Problems] Refer to the following page(s). [8-10-4 Checking the Inverter for Damage at No-Load] Refer to the following page(s). [8-10-5 Checking the Inverter for Damage during Compressor Operation] Refer to the following page(s). [8-10-15 Checking the Installation Conditions]

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-6-18 Error Code [4220] Detail Code 129

1. Error code definition

Control power supply error (Detail code 129)(outdoor unit)

2. Error definition and error detection method

INV35Y and INV42Y
Detection of insufficient drive voltage for relays on INV board

INV37YC
Detection of insufficient drive voltage for relays on INV board or for IGBT

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Contact failure	<INV35Y and INV42Y> Check the connectors CNRY on INV board and CNRYA on MAIN board for proper connections. <INV37YC> Check the connectors CNRY on INV board and CNRYA on MAIN board for proper connections. Check the connectors CN200 on INV board and CN300 on PS board for proper connections.
(2) Voltage check	Disconnect the connector CNRYA from the control board and check the voltage at the connector CNRYA. If a voltage of 13 V is not output, replace the control board and the PS board.
(3) Inverter board failure	If the problem persists after reboot, replace the INV board.

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-6-19 Error Codes [4220, 4225, 4226] Detail Code 131

1. Error code definition

Low bus voltage at startup (Detail code 131)

2. Error definition and error detection method

When Vdc $\leq$ 289 V is detected just before the inverter operation. (Outdoor unit)
When Vdc $\leq$ 160 V is detected just before the inverter operation. (Hydro unit)

3. Cause, check method and remedy

(1) Inverter main circuit failure

Same as detail code 108 of 4220 error

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-6-20 Error Code [4228] Detail Code 101

1. Error code definition

BUS voltage error (Software detection)

2. Error definition and error detection method

"Vdc ≥ 425V" or "Vdc≤150V" was detected during inverter operation.

3. Cause, check method and remedy

(1) Power supply environment

Find out if there was a (momentary) power failure.
Check that the voltage across L and N is between 198 and 264 V.
Check the power supply voltage waveform for distortion.

(2) Voltage drop detected

- Check the voltage at relay connector RYPN while the inverter is stopped.

If the voltage is 248 VDC or above, check the following items.

1) Check the inverter's main circuit components for problems. See [8-10-18 Simple Check on Inverter Circuit Components].
2) If the problem persists after reboot, replace the PS board.

If the voltage is 248 VDC or below, check the following items.

1) Check the wiring between the following.
   - SC-P1 (INV) and SC-P2 (INV)
   - CN110 (PS), SC-R (INV), and SC-T (INV)
   - FT001(PS), FT002 (PS), and ACL
   - CN301 (PS) and CN601 (MAIN)
2) Check the inverter's main circuit components for problems. See [8-10-18 Simple Check on Inverter Circuit Components].
3) Control board failure.
   Check that 12 VDC is applied to connector CN601 (pins 1 and 2) on the control board while the inverter is operating.
   Replace the control board if the voltage is absent or a wrong voltage is applied.

7-6-21 Error Code [4230] Detail Code 125

1. Error code definition

Heatsink overheat protection (Detail code 125)

2. Error definition and error detection method

Outdoor unit

When the heat sink temperature (THHS) remains at or above TOH is detected.

models	TOH
INV35Y, 42Y	100°C
INV37YC	94°C

Hydro unit

When the heat sink temperature (THHS) remains at or above 100°C is detected.

3. Cause, check method and remedy

Outdoor unit

Cause		Check method and remedy	
(1)	Fan board failure		Refer to the following page(s). [8-10-8 Checking the Fan Board Error Detection Circuit at No Load] [8-10-9 Checking the Fan Board for Damage at No Load] [8-10-10 Checking the Fan Board for Damage with Load]
(2)	THHS failure	1)	Check for proper installation of the INV board and FAN 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.
(3)	Outdoor unit LEV9 malfunction		Check the operation of the unit in the Cooing or in the Heating mode. LEV9 Refer to the following page(s). [8-8 Troubleshooting LEV, FCV Problems]
(4)	Low-pressure sensor fault		Refer to the following page(s). [8-5 Pressure Sensor Circuit Configuration and Troubleshooting Pressure Sensor Problems]

Hydro unit

Cause		Check method and remedy	
(1)	THHS failure	1)	Check the IGBT on the INV board for proper installation. (Check for proper installation of the IGBT heatsink.)

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-6-22 Error Codes [4235, 4236] Detail Code 125

1. Error code definition

Heatsink overheat protection (Detail code 125) (outdoor unit)

2. Error definition and error detection method

Detection of fan INV heatsink temperature (THHS) ≥ 100°C

3. Cause, check method and remedy

Cause	Check method and remedy
(1) FAN board fault	Refer to the following page(s). [8-10-8 Checking the Fan Board Error Detection Circuit at No Load] [8-10-9 Checking the Fan Board for Damage at No Load] [8-10-10 Checking the Fan Board for Damage with Load]
(2) Outdoor unit fan failure	1) Check the outdoor unit fan for proper operation. Check the fan motor if problems are found with the operation of the fan. Refer to the following page(s). [8-10-7 Checking the Fan Motor for Ground Fault and Coil Resistance Problems]
(3) Air passage blockage	1) Check the heatsink and the duct for blockage. Refer to the following page(s). [8-10-20 Checking the Fan Inverter Heatsink for Clogging]
(4) THHS failure	1) Check the IGBT heatsink for proper mounting. 2) Check the THHS sensor reading on the LED. → Replace the INV board if the THHS value is abnormal.

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-6-23 Error Code [4230] Detail Code 126

1. Error code definition

DCL temperature fault (Detail code 126)(outdoor unit)

2. Error definition and error detection method

When DCL temperature that equals or exceeds 150˚C is detected (applicable to INV37YC only)

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Contact failure	Check the connector CNTH on the INV board for proper connection.
(2) DCL temperature sensor fault	Disconnect the connector (CNTH), and measure the resistance of the DCL temperature sensor. Replace the DCL temperature sensor if the value is abnormal. Refer to [3-3 Functions of the Major Components of Outdoor Unit].
(3) INV board failure	Replace the INV board if the problem persists after the operation is resumed.

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-6-24 Error Codes [4240, 4245, 4246]

1. Error code definition
Overload protection

2. Error definition and error detection method
If the output current of "(Iac) >Imax (Arms)" or "THHS > TOL" is continuously detected for 10 minutes during inverter operation.
Refer to the following page(s). [7-1 Error Code and Preliminary Error Code Lists]

3. Cause, check method and remedy
Outdoor unit

Cause	Check method and remedy
(1) IPM contact failure	Check the IPM and cooling plate for proper contact. (Remove the inverter board, and check the IPM heatsink grease.)
(2) Air passage blockage	Check that the heat sink cooling air passage is not blocked
(3) Power supply environment	Power supply voltage is 342 V or above.
(4) Inverter, FAN board failure	Refer to the following page(s). [8-10 Troubleshooting Inverter Problems]
(5) Compressor failure	Check that the compressor has not overheated during operation. → Check the refrigerant circuit (oil return section). Refer to the following page(s). [8-10-3 Checking the Compressor for Ground Fault and Coil Resistance Problems]
(6) The model selection switches (SW5-3 - 5-8) on the outdoor unit are set incorrectly.	Check the setting for the model selection switch on the outdoor unit (Dipswitches SW5-3 - 5-8 on the outdoor unit control board). For switch settings, refer to the following page(s). [7-9-2 Error Code [7101]]

Hydro unit

Cause	Check method and remedy
(1) IPM contact failure	Check the IPM and cooling plate for proper contact. (Remove the inverter board, and check the IPM heatsink grease.)
(2) Air passage blockage	Check that the heat sink cooling air passage is not blocked
(3) Power supply environment	Power supply voltage is 198 V or above.
(4) Inverter failure	Refer to the following page(s). [8-10 Troubleshooting Inverter Problems]
(5) Pump failure	Refer to the following page(s). [8-10-11 Checking the Pump Motor for Ground Fault and Coil Resistance Problems]

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7 Troubleshooting Using Error Codes

7-6-25 Error Codes [4250, 4255, 4256] Detail Code 101

1. Error code definition

IPM error (Detail code 101)

2. Error definition and error detection method

In the case of 4250
If an overcurrent is detected by the overcurrent detection circuit CT003 (R127 when INV37YC) on the INV board.

In the case of 4255 and 4256
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 the following page(s). [8-10-2 Checking the Inverter Board Error Detection Circuit] [8-10-3 Checking the Compressor for Ground Fault and Coil Resistance Problems] [8-10-4 Checking the Inverter for Damage at No-Load] [8-10-5 Checking the Inverter for Damage during Compressor Operation] [8-10-15 Checking the Installation Conditions] Check the IGBT module resistance value of the INV board, if no problems are found. [8-10-19 Troubleshooting Problems with IGBT Module]
(2) The model selection switches (SW5-3 - 5-8) on the outdoor unit are set incorrectly.	Check the setting for the model selection switch on the outdoor unit (Dipswitches SW5-3 - 5-8 on the outdoor unit control board). For switch settings, refer to the following page(s). [7-9-2 Error Code [7101]]
(3) Open phase in the power-supply due to improper power-supply wiring.	Refer to item (5) in section [6-1 Read before Test Run].

In the case of 4255 and 4256

Cause	Check method and remedy
(1) Fan motor abnormality	Refer to the following page(s). [8-10-7 Checking the Fan Motor for Ground Fault and Coil Resistance Problems]
(2) Fan board failure	Refer to the following page(s). [8-10-8 Checking the Fan Board Error Detection Circuit at No Load] [8-10-9 Checking the Fan Board for Damage at No Load] [8-10-10 Checking the Fan Board for Damage with Load]

Note
For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-6-26 Error Codes [4250, 4255, 4256] Detail Code 104

1. Error code definition

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 the following page(s). [8-10-3 Checking the Compressor for Ground Fault and Coil Resistance Problems]
(2) Inverter output related	Refer to the following page(s). [8-10-2 Checking the Inverter Board Error Detection Circuit] [8-10-3 Checking the Compressor for Ground Fault and Coil Resistance Problems] [8-10-4 Checking the Inverter for Damage at No-Load] [8-10-5 Checking the Inverter for Damage during Compressor Operation] [8-10-15 Checking the Installation Conditions]

In the case of 4255 and 4256

Cause	Check method and remedy
(1) Grounding fault of fan motor	Refer to the following page(s). [8-10-7 Checking the Fan Motor for Ground Fault and Coil Resistance Problems]
(2) Fan board failure	Refer to the following page(s). [8-10-8 Checking the Fan Board Error Detection Circuit at No Load] [8-10-9 Checking the Fan Board for Damage at No Load] [8-10-10 Checking the Fan Board for Damage with Load]

Hydro unit

Cause	Check method and remedy
(1) Grounding fault of the pump	Refer to the following page(s). [8-10-11 Checking the Pump Motor for Ground Fault and Coil Resistance Problems]
(2) Inverter output related	Refer to the following page(s). [8-10-2 Checking the Inverter Board Error Detection Circuit] [8-10-11 Checking the Pump Motor for Ground Fault and Coil Resistance Problems] [8-10-13 Checking the Pump INV Board for Damage (Without load)] [8-10-14 Checking the Pump INV Board for Damage (During pump operation)] [8-10-15 Checking the Installation Conditions]

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-6-27 Error Codes [4250, 4255, 4256] Detail Code 105

1. Error code definition

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 the following page(s). [8-10-3 Checking the Compressor for Ground Fault and Coil Resistance Problems]
(2) Output wiring	Check for a short circuit.

In the case of 4255 and 4256

Cause	Check method and remedy
(1) Short - circuited fan motor	Refer to the following page(s). [8-10-7 Checking the Fan Motor for Ground Fault and Coil Resistance Problems]
(2) Output wiring	Check for a short circuit.

Hydro unit

Cause	Check method and remedy
(1) Short-circuited pump	Refer to the following page(s). [8-10-11 Checking the Pump Motor for Ground Fault and Coil Resistance Problems]

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-6-28 Error Codes [4250, 4255, 4256] Detail Codes 106 and 107

1. Error code definition

Instantaneous overcurrent breaker error (Detail code 106)
Overcurrent breaker error (effective value) (Detail code 107)

2. Error definition and error detection method

When a current above the specified value is detected by the electric current sensor.
Refer to the relevant pages for the details of model names and the specified values.

3. Cause, check method and remedy

In the case of 4250

Cause	Check method and remedy
(1) Inverter output related	Refer to the following page(s). [8-10-2 Checking the Inverter Board Error Detection Circuit] [8-10-3 Checking the Compressor for Ground Fault and Coil Resistance Problems] [8-10-4 Checking the Inverter for Damage at No-Load] [8-10-5 Checking the Inverter for Damage during Compressor Operation] [8-10-15 Checking the Installation Conditions] Check the IGBT module resistance value of the INV board, if no problems are found. [8-10-19 Troubleshooting Problems with IGBT Module]
(2) The model selection switches (SW5-3 - 5-8) on the outdoor unit are set incorrectly.	Check the setting for the model selection switch on the outdoor unit (Dipswitches SW5-3 - 5-8 on the outdoor unit control board). For switch settings, refer to the following page(s). [7-9-2 Error Code [7101]]

In the case of 4255 and 4256

Cause	Check method and remedy
(1) Fan board failure	Refer to the following page(s). [8-10-8 Checking the Fan Board Error Detection Circuit at No Load] [8-10-9 Checking the Fan Board for Damage at No Load] [8-10-10 Checking the Fan Board for Damage with Load]
(2) Outdoor unit fan failure	Check the outdoor unit fan for proper operation. Check the fan motor if problems are found with the operation of the fan. Refer to the following page(s). [8-10-7 Checking the Fan Motor for Ground Fault and Coil Resistance Problems]
(3) Air passage blockage	Check that the heat sink cooling air passage is not blocked
(4) The model selection switches (SW5-3 - 5-8) on the outdoor unit are set incorrectly.	Check the setting for the model selection switch on the outdoor unit (Dipswitches SW5-3 - 5-8 on the outdoor unit control board). For switch settings, refer to the following page(s). [7-9-2 Error Code [7101]]

Hydro unit

Cause	Check method and remedy
(1) Inverter output related	Refer to the following page(s). [8-10-2 Checking the Inverter Board Error Detection Circuit] [8-10-11 Checking the Pump Motor for Ground Fault and Coil Resistance Problems] [8-10-13 Checking the Pump INV Board for Damage (Without load)] [8-10-14 Checking the Pump INV Board for Damage (During pump operation)] [8-10-15 Checking the Installation Conditions]

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-6-29 Error Code [4250] Detail Codes 121, 128, and 122

1. Error code definition

DCL overcurrent error (H/W) (Detail code 121 and 128)(outdoor unit) DCL overcurrent error (S/W) (Detail code 122) (outdoor unit)

2. Error definition and error detection method

When a DCL overcurrent is detected by the electric current sensor

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Inverter-output-related items	Refer to the following page(s). [8-10-2 Checking the Inverter Board Error Detection Circuit] Refer to the following page(s). [8-10-3 Checking the Compressor for Ground Fault and Coil Resistance Problems] Refer to the following page(s). [8-10-4 Checking the Inverter for Damage at No-Load] Refer to the following page(s). [8-10-5 Checking the Inverter for Damage during Compressor Operation] Refer to the following page(s). [8-10-15 Checking the Installation Conditions]

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-6-30 Error Codes [4255, 4256] Detail Code 137

1. Error code definition

Motor synchronization loss (Detail code 137)

2. Error definition and error detection method

Fan motor locking was detected during operation.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Fan motor locking	Check the fan blades for objects obstructing fan rotation.
(2) Fan motor failure	Refer to the following page(s). [8-10-7 Checking the Fan Motor for Ground Fault and Coil Resistance Problems]
(3) Fan board failure	Refer to the following page(s). [8-10-8 Checking the Fan Board Error Detection Circuit at No Load] [8-10-9 Checking the Fan Board for Damage at No Load] [8-10-10 Checking the Fan Board for Damage with Load]

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-6-31 Error Code [4260]

1. Error code definition

Heatsink overheat protection at startup

2. Error definition and error detection method

Outdoor unit

When heatsink temperature (THHS) remains at or above TOH for 10 minutes or longer after inverter startup

models	TOH
INV35Y, 42Y	100˚C
INV37YC	94˚C

Hydro unit

When heatsink temperature (THHS) remains at or above 100°C for 10 minutes or longer after inverter startup

3. Cause, check method and remedy

Same as 4230 error

7-7 Error Code Definitions and Solutions: Codes [5000 - 5999]

7-7-1 Error Codes [5101, 5102, 5103, 5104]

1. Error code definition

5101
Return air temperature sensor (TH21) fault (Indoor unit)
Return air temperature sensor (TH4) fault (OA processing unit)

5102
Pipe temperature sensor (TH22) fault (Indoor unit)
Pipe temperature sensor (TH2) fault (OA processing unit)

5103
Gas-side pipe temperature sensor (TH23) fault (Indoor unit)
Gas-side pipe temperature sensor (TH3) fault (OA processing unit)

5104
Intake air temperature sensor (TH1) fault (OA processing unit)
Intake air temperature sensor (TH24) fault (All-fresh (100% outdoor air) type indoor unit)

2. Error definition and error detection method

- If a short or an open is detected during thermostat ON, the outdoor unit turns to anti-restart mode for 3 minutes. When the error is not restored after 3 minutes (if restored, the outdoor unit runs normally), the outdoor unit makes an error 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 kΩ 10°C [50°F]: 9.7 kΩ 20°C [68°F] : 6.4 kΩ 30°C [86°F] : 4.3 kΩ 40°C [104°F] : 3.1 kΩ
(5) Indoor board (detection circuit) failure	Check the connector contact. When no fault is found, the indoor board is a failure.

7-7-2 Error Codes [5102,5103,5104,5105,5106,5107,5115]

1. Error code definition

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)

5115
Shell bottom temperature sensor (TH15) error (outdoor unit)

2. Error definition and error detection method

- When a short (high temperature intake) or an open (low temperature intake) of the thermistor is detected (the first detection), the outdoor unit stops, turns to anti-restart mode for 3 minutes, and restarts when the detected temperature of the thermistor.
- When a short or an open is detected again (the second detection) after the first restart of the outdoor unit, the outdoor unit stops, turns to anti-restart mode for 3 minutes, and restarts in 3 minutes when the detected temperature is within the normal range.
- 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", "5107" or "5115" will appear.
- During 3-minute 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°C [158°F] and above (0.4kΩ)	-40°C [-40°F] and below (130kΩ)
TH3	110°C [230°F] and above (0.4kΩ)	-40°C [-40°F] and below (130kΩ)
TH4	240°C [464°F] and above (0.57kΩ)	0°C [32°F] and below (698kΩ)
TH5	70°C [158°F] and above (0.4kΩ)	-40°C [-40°F] and below (130kΩ)
TH6	70°C [158°F] and above (1.14kΩ)	-40°C [-40°F] and below (130kΩ)
TH7	110°C [230°F] and above (0.4kΩ)	-40°C [-40°F] and below (130kΩ)
TH15	110°C [230°F] and above (0.4kΩ)	-40°C [-40°F] and below (130kΩ)

7-7-3 Error Code [5110]

1. Error code definition

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

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-7-4 Error Code [5111, 5113, 5132, 5135]

1. Error code definition

5111 - 5113
Temperature sensor fault (Hydro unit) (TH11, TH13)

5132 - 5135
Temperature sensor fault (Hydro unit) (TH32, TH35)

2. Error definition and error detection method

- If a shorted (high temperature intake) or open (low temperature intake) thermistor (TH11, TH13, TH32, TH35) is detected during operation, the unit comes to an abnormal stop, and an error code "5111," "5113," "5132," "5135" appears on the display.
- Detection of a short- or open-circuit as described above is suspended during the defrost cycle and for 3 minutes after the operation mode is changed.

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.

<Reference>

	Short detection	Open detection
TH11	110°C [230°F] and above (0.4kΩ)	-40°C [-40°F] and below (130kΩ)
TH13	110°C [230°F] and above (0.4kΩ)	-40°C [-40°F] and below (130kΩ)
TH32	110°C [230°F] and above (0.4kΩ)	-40°C [-40°F] and below (130kΩ)
TH35	110°C [230°F] and above (0.4kΩ)	-40°C [-40°F] and below (130kΩ)

7-7-5 Error Code [5120]

1. Error code definition

DCL temperature sensor circuit fault (Detail code 01)(outdoor unit)

2. Error definition and error detection method

When an open phase or a short circuit of the temperature sensor is detected immediately before inverter startup or during operation (applicable to INV37YC only)

3. Cause, check method and remedy

INV37YC

Cause		Check method and remedy
(1)	Contact failure	Check the connector (CNTH) on the inverter board for proper connection.
(2)	DCL temperature sensor	Disconnect the connector (CNTH), check the resistance value of the DCL temperature sensor. Replace the DCL if the resistance is as follows: 0.5 kΩ or below (short-circuit) or 1963 kΩ or above (open-circuit).
(3)	INV board failure	If the problem persists after restart operation, replace the inverter board.

Note
For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7 Troubleshooting Using Error Codes

7-7-6 Error Code [5201]

1. Error code definition

5201
Refrigerant pressure sensor fault (Outdoor unit 63HS1/Hydro unit Prf)

2. Error definition and error detection method

When a pressure sensor reading of 4.06 MPa [589 psi] or above is detected, error code "5201" will appear.
The unit will continue its operation by using other sensors as a backup.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	High pressure sensor failure	Refer to the following page(s). [8-9-1 Pressure Sensor]
(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	

7-7-7 Error Code [5201]

1. Error code definition

5201
Water pressure sensor fault (indoor unit)

2. Error definition and error detection method

When a pressure sensor reading of 1.05 MPa [153 psi] or above OR -0.05 MPa [7.3 psi] or below is detected, error code "5201" will appear.

3. Cause, check method and remedy

Cause		Check method and remedy	
(1)	The water inner pressure sensor is open- or short-circuited. (Regardless of the indoor unit operation status)	1)	Check that the water inner pressure sensor is connected. Reset the indoor unit error.
		2)	Check the water inner pressure sensor wiring for breakage. Reset the indoor unit error.

7-7-8 Error Code [5202]

1. Error code definition

5202
Water pressure sensor fault (indoor unit)

2. Error definition and error detection method

When a pressure sensor reading of 1.05 MPa [153 psi] or above OR -0.05 MPa [7.3 psi] or below is detected, error code "5202" will appear.

3. Cause, check method and remedy

Cause		Check method and remedy	
(1)	The water outlet pressure sensor is open- or short-circuited. (Regardless of the indoor unit operation status)	1)	Check that the water outlet pressure sensor is connected. Reset the indoor unit error.
		2)	Check the water outlet pressure sensor wiring for breakage. Reset the indoor unit error.

7-7-9 Error Code [5202, 5203]

1. Error code definition

5202, 5203
Water pressure sensor fault (Hydro unit Pw1, Pw2)

2. Error definition and error detection method

When a pressure sensor reading of Pw1, Pw2 < -50kPa or 1050kPa ≤ Pw1, Pw2 is detected, error codes "5202" and "5203" will appear.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	High pressure sensor failure	Refer to the following page(s). [8-9-1 Pressure Sensor]
(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	

7-7-10 Error Code [5301] Detail Code 115

1. Error code definition

ACCT sensor fault (Detail code 115)

2. Error definition and error detection method

When the formula "output current < 1.8 Arms" remains satisfied for 10 seconds while the inverter is in operation.
When the formula "output current < 0.2 Arms" remains satisfied for 10 seconds while the inverter is in operation. (Hydro unit)

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Contact failure	Check the connector (CNCT2) on the INV board for proper connection.
(2) INV output phase loss	Check the output wire for proper connection.
(3) ACCT sensor failure	Refer to the following page(s). [8-10-18 Simple Check on Inverter Circuit Components]
(4) Compressor failure	Refer to the following page(s). [8-10-3 Checking the Compressor for Ground Fault and Coil Resistance Problems]
(5) INV board failure	Replace the INV board if the problem persists after the operation is resumed.

Hydro unit

Cause	Check method and remedy
(1) INV output phase loss	Check the output wire for proper connection.
(2) ACCT sensor failure	Refer to the following page(s). [8-10-18 Simple Check on Inverter Circuit Components]
(3) Pump failure	Refer to the following page(s). [8-10-11 Checking the Pump Motor for Ground Fault and Coil Resistance Problems]
(4) INV board failure	Replace the INV board if the problem persists after the operation is resumed.

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-7-11 Error Code [5301] Detail Code 117

1. Error code definition

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 the following page(s). [8-10-2 Checking the Inverter Board Error Detection Circuit] [8-10-4 Checking the Inverter for Damage at No-Load] [8-10-5 Checking the Inverter for Damage during Compressor Operation]
(2) Compressor failure	Refer to the following page(s). [8-10-3 Checking the Compressor for Ground Fault and Coil Resistance Problems]

Hydro unit

Cause	Check method and remedy
(1) INV board failure	Refer to the following page(s). [8-10-2 Checking the Inverter Board Error Detection Circuit] [8-10-4 Checking the Inverter for Damage at No-Load] [8-10-5 Checking the Inverter for Damage during Compressor Operation]
(2) Pump failure	Refer to the following page(s). [8-10-11 Checking the Pump Motor for Ground Fault and Coil Resistance Problems]

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-7-12 Error Code [5301] Detail Code 119

1. Error code definition

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) ACCT sensor disconnection	Check the connector CNCT2 on the INV board for proper connection. Check the ACCT for proper connection.
(2) ACCT sensor failure	Refer to the following page(s). [8-10-18 Simple Check on Inverter Circuit Components]
(3) Inverter failure	Refer to the following page(s). [8-10-4 Checking the Inverter for Damage at No-Load] [8-10-5 Checking the Inverter for Damage during Compressor Operation]
(4) Compressor failure	Refer to the following page(s). [8-10-3 Checking the Compressor for Ground Fault and Coil Resistance Problems]

Hydro unit

Cause	Check method and remedy
(1) ACCT sensor failure	Refer to the following page(s). [8-10-18 Simple Check on Inverter Circuit Components]
(2) Inverter failure	Refer to the following page(s). [8-10-4 Checking the Inverter for Damage at No-Load] [8-10-5 Checking the Inverter for Damage during Compressor Operation]
(3) Pump failure	Refer to the following page(s). [8-10-11 Checking the Pump Motor for Ground Fault and Coil Resistance Problems]

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-7-13 Error Code [5301] Detail Code 120

1. Error code definition

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.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) ACCT sensor connection error	Check the ACCT for proper connection. Refer to the following page(s). [8-10-18 Simple Check on Inverter Circuit Components]
(2) ACCT sensor failure	Refer to the following page(s). [8-10-18 Simple Check on Inverter Circuit Components]
(3) Inverter failure	Refer to the following page(s). [8-10-4 Checking the Inverter for Damage at No-Load] [8-10-5 Checking the Inverter for Damage during Compressor Operation]
(4) Compressor failure	Refer to the following page(s). [8-10-3 Checking the Compressor for Ground Fault and Coil Resistance Problems]

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-7-14 Error Code [5301] Detail Code 127

1. Error code definition

DCL electric current circuit error (Detail code 127)(outdoor unit)

2. Error definition and error detection method

When an abnormal value in the DCL electric current sensor detection circuit is detected

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Contact failure	Check the wiring between CNCT1A and CNCT1B.
(2) Incorrect installation	Check the wiring on the SC-L terminal.
(3) INV board failure	If the problem persists after restart operation, replace the inverter board.

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-7-15 Error Codes [5305, 5306] Detail Code 135

1. Error code definition

Current sensor fault (Detail code 135)

2. Error definition and error detection method

Detection of output current below 0.2 Arms for 10 continuous seconds while fan motor is in operation

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Open output phase of fan board	Check the output wiring from the fan board for proper connection.
(2)	Fan motor error	Refer to the following page(s). [8-10-7 Checking the Fan Motor for Ground Fault and Coil Resistance Problems]
(3)	Fan board failure	Refer to the following page(s). [8-10-8 Checking the Fan Board Error Detection Circuit at No Load] [8-10-9 Checking the Fan Board for Damage at No Load] [8-10-10 Checking the Fan Board for Damage with Load]

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-7-16 Error Codes [5305, 5306] Detail Code 136

1. Error code definition

Current sensor/circuit fault (Detail code 136)

2. Error definition and error detection method

Detection of abnormal value by the current detection circuit before the startup of fan motor

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Fan board fault	Refer to the following page(s). [8-10-8 Checking the Fan Board Error Detection Circuit at No Load] [8-10-9 Checking the Fan Board for Damage at No Load] [8-10-10 Checking the Fan Board for Damage with Load]

Note

For inverter-related error codes, refer to the following page(s). [8-10 Troubleshooting Inverter Problems]

7-7-17 Error Code [5701]

1. Error code definition

Loose float switch connector

2. Error definition and error detection method

Detection of the disconnected float switch (open-phase condition) during operation

3. Cause, check method and remedy

(1) CN4F disconnection or contact failure

Check for disconnection of the connector (CN4F) on the indoor unit control board.

7-8 Error Code Definitions and Solutions: Codes [6000 - 6999]

7-8-1 Error Code [6201]

1. Error code definition

Remote controller board fault (nonvolatile memory error)

2. Error definition and error detection method

This error is detected when the data cannot be read out from the built-in nonvolatile memory on the remote controller.

3. Cause, check method and remedy

(1) Remote controller failure

Replace the remote controller.

7-8-2 Error Code [6202]

1. Error code definition

Remote controller board fault (clock IC error)

2. Error definition and error detection method

This error is detected when the built-in clock on the remote controller is not properly functioning.

3. Cause, check method and remedy

(1) Remote controller failure

Replace the remote controller.

7-8-3 Error Code [6600]

1. Error code definition

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
Detail code 001: Detection of overlapped address in centralized control system
Detail code 002: Detection of overlapped address in indoor unit system

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, hydro units, LOSSNAY units, controllers such as ME remote 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.	♦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, indoor units, hydro units, and LOSSNAY units, keep them all turned off for at least five minutes, and turn them back on.**
(2) Signals are distorted by the noise on the transmission line.	♦When air conditioning units are operating normally despite the address overlap error Check the transmission wave shape and noise on the transmission line. Refer to the following page(s). [8-4 Checking Transmission Waveform and for Electrical Noise Interference]

7-8-4 Error Code [6601]

1. Error code definition

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.
Detail code 001: Detection of polarity setting error in centralized control system
Detail code 002: Detection of polarity setting error in indoor unit system

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.	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.
(2) M-NET transmission line to which AG-150A/GB-50ADA/PAC-YG50ECA/BAC-HD150 are connected is short-circuited.	
(3) When two or more power supplies are connected to the M-NET	

7-8-5 Error Code [6602]

1. Error code definition

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.
Detail code 001: Transmission processor hardware error in centralized control system
Detail code 002: Transmission processor hardware error in indoor unit system

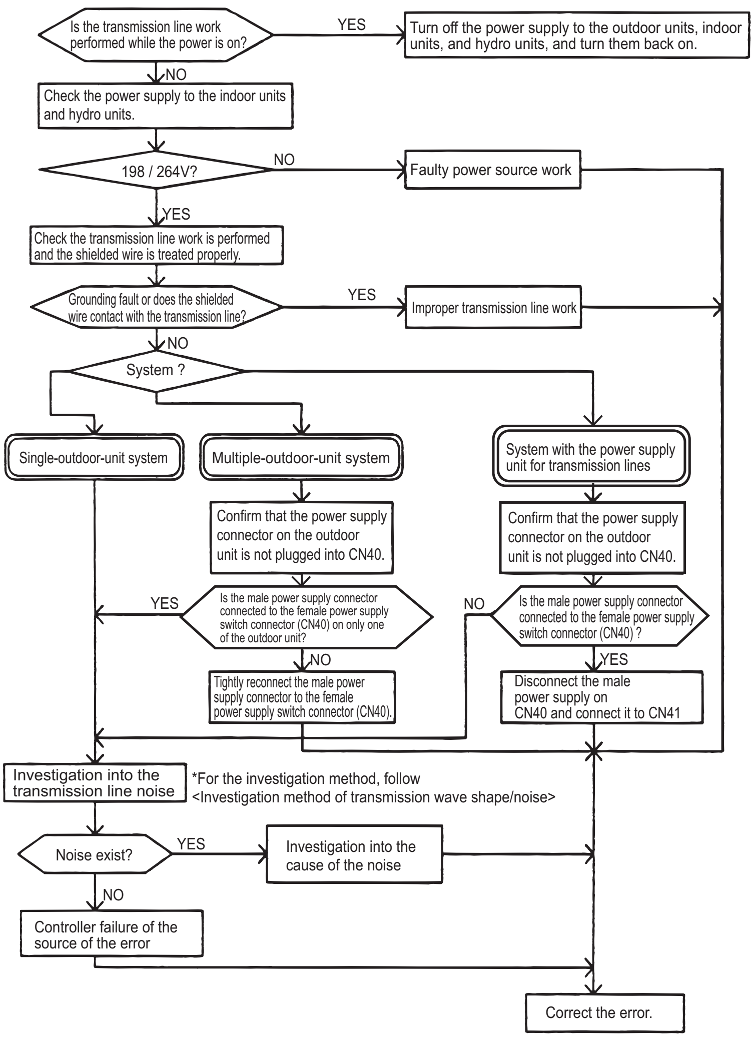
Note

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

3. Cause

1) If wiring work is performed on the transmission lines of indoor units, outdoor units, or hydro units, or if the polarities of these lines are changed with the power being turned on, collision of the transmitted data will occur and cause the transmission wave shape to change, which will be detected as an error.
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



7-8-6 Error Code [6603]

1. Error code definition

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

Detail code 001: Transmission Bus-Busy error in centralized control system
Detail code 002: Transmission Bus-Busy error in indoor unit system

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. Refer to the following page(s). [8-4 Checking Transmission Waveform and for Electrical Noise Interference] → No noise indicates that the error source controller is a failure. → If noise exists, investigate the noise.
(2)	Error source controller failure	

7-8-7 Error Code [6606]

1. Error code definition

Communication error between device processor and transmission processor or M-NET processor

2. Error definition and error detection method

Communication error between device processor on circuit board and transmission processor or M-NET processor
Detail code 003: Communication error between device processor on circuit board and M-NET processor

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 supply to the outdoor units, indoor units, and hydro 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	

7 Troubleshooting Using Error Codes

7-8-8 Error Code [6607] Error Source Address = Outdoor Unit (OC)

1. Error code definition

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. Cause, check method and remedy

Cause	Check method and remedy
(1) Incidental cause	1) Turn off the power source of the outdoor unit, and turn it on again.
(2) Contact failure of transmission line of OC or IC	2) If the error is accidental, it will run normally. If not, check the causes (2) - (5).
(3) 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	
(4) Erroneous sizing of transmission line (Not within the range below). Wire diameter: 1.25mm^2 [AWG16] or more	
(5) Outdoor unit control board failure	

7 Troubleshooting Using Error Codes

7-8-9 Error Code [6607] Error Source Address = Indoor Unit (IC)

1. Error code definition

No ACK error

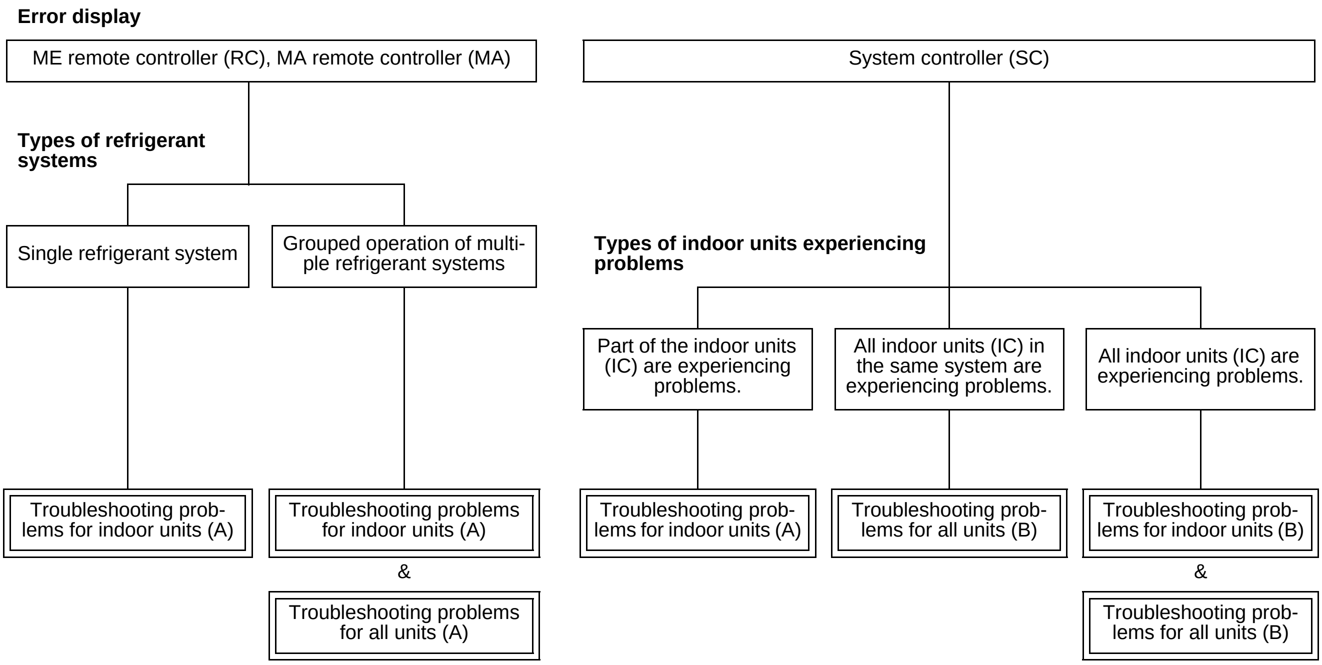
2. Error definition and error detection method

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. Cause, check method and remedy



(1) Troubleshooting problems for indoor units (A)

Cause	Check method and remedy
(1) Incidental cause	1) Turn off the outdoor/indoor units for 5 or more minutes, and turn them on again.
(2) When IC unit address is changed or modified during operation.	2) If the error is accidental, it will run normally. If not, check the causes (2) - (6).
(3) Faulty or disconnected IC transmission wiring	
(4) Disconnected IC connector (CN2M)	
(5) Indoor unit controller failure	
(6) ME remote controller failure	

(2) Troubleshooting problems for indoor units (B)

Cause	Check method and remedy
(1) 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 (2) Disconnection or shutdown of the power source of the power supply unit for transmission line (3) System controller (MELANS) malfunction	1) Check voltage of the transmission line for centralized control. ♦20 V or more: Check (1) on the left. ♦Less than 20 V: Check (2) on the left. 2) Check the causes of the error indicated by the error codes listed in items (1) through (3) in the "Cause" column.

7-8-10 Error Code [6607] Error Source Address = Hydro unit (HU)

1. Error code definition

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. Cause, check method and remedy

Cause	Check method and remedy
(1) Incidental cause	1) Turn off the power to the outdoor unit and the Hydro unit, leave them turned off for at least 5 minutes, and then turn them back on.
(2) When Hydro unit address is changed or modified during operation.	2) If the error is accidental, it will run normally. If not, check the causes (2) - (4).
(3) Faulty or disconnected transmission wiring of Hydro unit	
(4) Faulty control board of Hydro unit	

7-8-11 Error Code [6607] Error Source Address = LOSSNAY (LC)

1. Error code definition

No ACK error

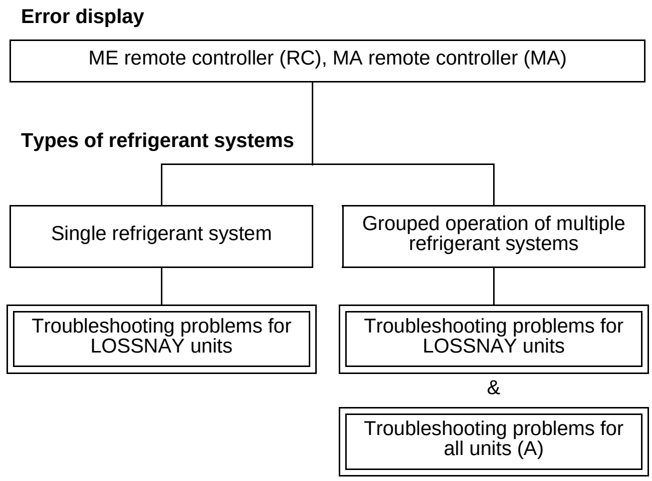
2. Error definition and error detection method

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. Cause, check method and remedy



(1) Troubleshooting problems for LOSSNAY units

Cause	Check method and remedy
(1) Incidental cause (2) The power source of LOSSNAY has been shut off. (3) When the address of LOSSNAY is changed in the middle of the operation (4) Faulty or disconnected transmission wiring of LOSSNAY (5) Disconnected connector (CN1) on LOSSNAY (6) Controller failure of LOSSNAY	1) Turn off the power source of LOSSNAY and turn it on again. 2) If the error is accidental, it will run normally. If not, check the causes (2) - (6).

7-8-12 Error Code [6607] Error Source Address = ME Remote Controller

1. Error code definition

No ACK error

2. Error definition and error detection method

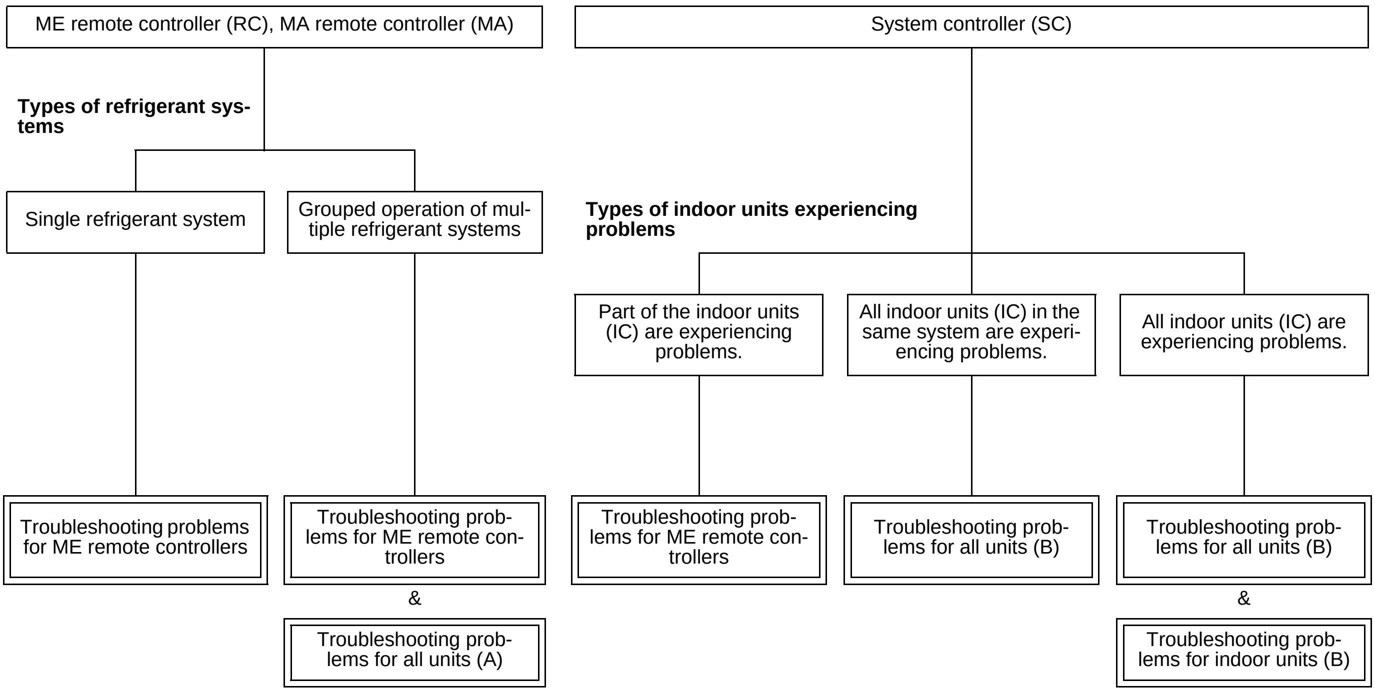
The error is detected when no acknowledgement (ACK signal) is received after the transmission. (eg. When the data is transmitted six times in a row with 30 seconds interval, the error is detected on the transmission side.)

Note

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

3. Cause, check method and remedy

Error display



(1) Troubleshooting problems for ME remote controllers

Cause	Check method and remedy
(1) Incidental cause	1) Turn off the power source of the outdoor unit for 5 minutes or more, and turn it on again.
(2) Faulty transmission wiring at IC unit side.	2) If not, check the causes (2) - (5).
(3) Faulty wiring of the transmission line for ME remote controller	
(4) When the address of ME remote controller is changed in the middle of the operation	
(5) ME remote controller failure	

7-8-13 Error Code [6607] Error Source Address = System Controller

1. Error code definition

No ACK error

2. Error definition and error detection method

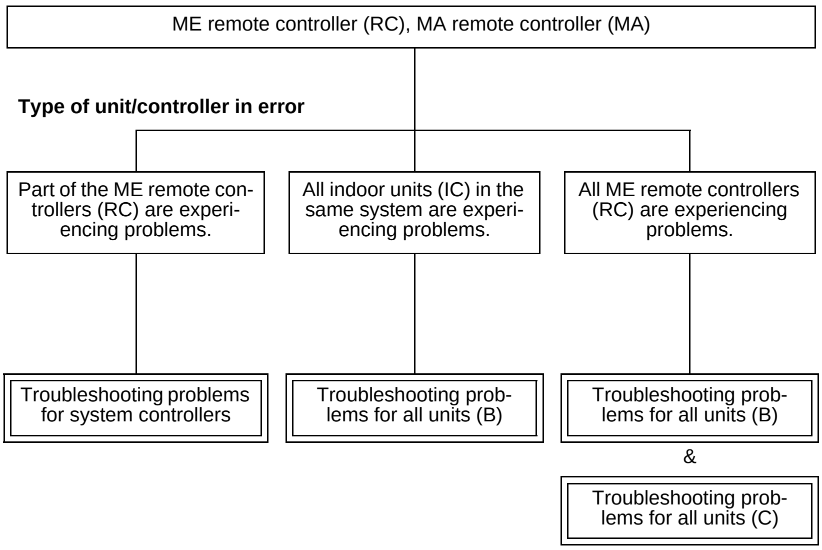
The error is detected when no acknowledgement (ACK signal) is received after the transmission. (eg. When the data is transmitted six times in a row with 30 seconds interval, the error is detected on the transmission side.)

Note

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

3. Cause, check method and remedy

Error display



(1) Troubleshooting problems for system controllers

Cause	Check method and remedy
(1) Incidental cause	1) Turn off the power source of the outdoor unit for 5 minutes or more, and turn it on again.
(2) Faulty wiring of the transmission line for ME remote controller	2) If not, check the causes (2) - (4).
(3) When the address of ME remote controller is changed in the middle of the operation	
(4) ME remote controller failure	

7-8-14 Error Code [6607] All Error Source Addresses

1. Error code definition

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. Cause, check method and remedy

(1) Troubleshooting problems for all units (A)

Cause	Check method and remedy
(1) Disconnection or short circuit of the transmission line for the outdoor unit on the terminal block for centralized control line connection (TB7) (2) When multiple outdoor units are connected and the power source of one of the outdoor units has been shut off. (3) The male power supply connector of the outdoor unit is not connected to the female power supply switch connector (CN40). (4) 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) Check the causes of (1) - (4). If the cause is found, correct it. If no cause is found, check 2). 2) Check the LED displays for troubleshooting on other remote controllers whether an error occurs. ♦When an error is present Check the causes of the error indicated by the error codes listed in item (4) in the "Cause" column. ♦When no errors are present Indoor unit circuit board failure

(2) Troubleshooting problems for all units (B)

Cause	Check method and remedy
(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. ♦When an error is present Check the causes of the error indicated by the error codes listed in items (1) through (4) in the "Cause" column. ♦When no errors are present Check the causes of the error indicated by the error codes listed in items (5) through (7) in the "Cause" column.

(3) Troubleshooting problems for all units (C)

Cause	Check method and remedy
(1) 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 (2) Disconnection or shutdown of the power source of the power supply unit for transmission line (3) System controller (MELANS) malfunction	Check the causes of the error indicated by the error codes listed in items (1) through (3) in the "Cause" column.

7-8-15 Error Code [6607] No Error Source Address

1. Error code definition

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. Cause, check method and remedy

Cause	Check method and remedy
(1) Although the address of ME remote controller has been changed after the group is set using ME remote controller, the indoor unit is keeping the memory of the previous address. The same symptom will appear for the registration with SC. (2) Although the address of LOSSNAY has been changed after the interlock registration of LOSSNAY is made using ME remote controller, the indoor unit is keeping the memory of the previous address.	Delete unnecessary information of non-existing address which some indoor units have. Use either of the following two methods for deletion. 1) Address deletion by ME remote controller Delete unnecessary address information using the manual setting function of ME remote controller. Refer to the ME remote controller instructions manual for detail. 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 ME remote controller and all the interlock settings between LOSSNAY units and indoor units. Procedures 1) Turn off the power source of the outdoor unit, and wait for 5 minutes. 2) Turn on the dip switch (SW5-2) on the outdoor unit control board. 3) Turn on the power source of the outdoor unit, and wait for 5 minutes. 4) Turn off the power source of the outdoor unit, and wait for 5 minutes. 5) Turn off the dip switch (SW5-2) on the outdoor unit control board. 6) Turn on the power source of the outdoor unit.

7-8-16 Error Code [6608]

1. Error code definition

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
   Remote controller wiring: 12m [39ft] 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 an error occurs during commissioning, turn off the power supply to the outdoor units, indoor units, hydro units, and LOSSNAYs for 5 minutes or longer, and then turn them 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 the transmission waveform, and check the transmission line for electrical noise. For details, refer to the following page(s). [8-4 Checking Transmission Waveform and for Electrical Noise Interference]
   Noise is the most possible cause of the error "6608".

7-8-17 Error Code [6831]

1. Error code definition

MA remote 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 the transmission waveform, and check the MA remote controller line for electrical noise. For details, refer to the following page(s). [8-4 Checking Transmission Waveform and for Electrical Noise Interference]
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.

7-8-18 Error Code [6832]

1. Error code definition

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 the transmission waveform, and check the MA remote controller line for electrical noise. For details, refer to the following page(s). [8-4 Checking Transmission Waveform and for Electrical Noise Interference]
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.

7-8-19 Error Code [6833]

1. Error code definition

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 the transmission waveform, and check the MA remote controller line for electrical noise. For details, refer to the following page(s). [8-4 Checking Transmission Waveform and for Electrical Noise Interference]
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.

7-8-20 Error Code [6834]

1. Error code definition

MA remote 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 the transmission waveform, and check the MA remote controller line for electrical noise. For details, refer to the following page(s). [8-4 Checking Transmission Waveform and for Electrical Noise Interference]
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.

7-8-21 Error Code [6840]

1. Error code definition

Indoor-outdoor communication: Reception error

2. Error definition and error detection method

- Abnormal if indoor controller board could not receive any signal normally for 6 minutes after turning the power on
- Abnormal if indoor controller board could not receive any signal normally for 3 minutes.
- Consider the unit as abnormal under the following condition. When 2 or more indoor units are connected to an outdoor unit, indoor controller board could not receive a signal for 3 minutes from outdoor controller circuit board, a signal which allows outdoor controller circuit board to transmit signals.

3. Cause, check method and remedy

	Cause	Check method and remedy
(1)	Contact failure, short circuit or miswiring (converse wiring) of indoor/outdoor unit connecting wire.	Check disconnecting or looseness of indoor /outdoor unit connecting wire of indoor unit or outdoor unit. Check all the units in case of twin/triple/quadruple indoor unit system.
(2)	Defective transmitting receiving circuit of outdoor controller circuit board.	Turn the power off, and on again to check. If abnormality generates again, replace indoor controller board or outdoor controller circuit board.
(3)	Defective transmitting receiving circuit of indoor controller board.	
(4)	Noise has entered into indoor/outdoor unit connecting wire.	
(5)	Defective fan motor	Turn the power off, and detach fan motor from connector (CNF1, 2). Then turn the power on again. If abnormality is not displayed, replace fan motor. If abnormality is displayed, replace outdoor controller circuit board.
(6)	Defective rush current resistor of outdoor power circuit board	Check the rush current resistor on outdoor power circuit board with tester. If open is detected, replace the power circuit board.

Note: Refer also to the Service Handbook for the indoor units.

7-8-22 Error Code [6841]

1. Error code definition

A control communication synchronism not recover

2. Error definition and error detection method

Indoor/outdoor unit communication error (Outdoor unit)

- Abnormal if "0" receiving is detected 30 times continuously though outdoor controller circuit board has transmitted "1".
- Abnormal if outdoor controller circuit board could not find blank of transmission path for 3 minutes.

3. Cause, check method and remedy

	Cause	Check method and remedy
(1)	Indoor/outdoor unit connecting wire has contact failure.	Check disconnection or looseness of indoor/ outdoor unit connecting wire.
(2)	Defective communication circuit of outdoor controller circuit board.	Turn the power off, and on again to check. Replace outdoor controller circuit board if abnormality is displayed again.
(3)	Noise has entered power supply.	
(4)	Noise has entered indoor/outdoor unit connecting wire.	

Note: Refer also to the Service Handbook for the indoor units.

7-8-23 Error Code [6842]

1. Error code definition

Indoor-outdoor communication: Transmission error

2. Error definition and error detection method

Indoor/outdoor unit communication error (Transmitting error)
Abnormal if "1" receiving is detected 30 times continuously though indoor controller board has transmitted "0".

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Defective transmitting receiving circuit of indoor controller board	Turn the power off, and on again to check. If abnormality generates again, replace indoor controller board.
(2)	Noise has entered into power supply.	
(3)	Noise has entered into outdoor control wire.	

Note: Refer also to the Service Handbook for the indoor units.

7-8-24 Error Code [6843]

1. Error code definition

A control communication start bit detection error

2. Error definition and error detection method

Indoor/outdoor unit communication error

- Abnormal if indoor controller board could not receive any signal normally for 6 minutes after turning the power on.
- Abnormal if indoor controller board could not receive any signal normally for 3 minutes.
- Consider the unit as abnormal under the following condition. When 2 or more indoor units are connected to an outdoor unit, indoor controller board could not receive a signal for 3 minutes from outdoor controller circuit board, a signal which allows outdoor controller circuit board to transmit signals.

3. Cause, check method and remedy

	Cause	Check method and remedy
(1)	Contact failure, short circuit or miswiring (converse wiring) of indoor/outdoor unit connecting wire	Check disconnecting or looseness of indoor /outdoor unit connecting wire of all indoor units or outdoor units.
(2)	Defective transmitting receiving circuit of outdoor controller circuit board.	Turn the power off, and on again to check. If abnormality generates again, replace indoor controller board or outdoor controller circuit board. Note: other indoor controller board may have defect.
(3)	Defective transmitting receiving circuit of indoor controller board.	
(4)	Noise has entered into indoor/outdoor unit connecting wire.	
(5)	Defective fan motor	Turn the power off, and detach fan motor from connector (CNF1, 2). Then turn the power on again. If abnormality is not displayed, replace fan motor. If abnormality is displayed, replace outdoor controller circuit board.
(6)	Defective rush current resistor of outdoor power circuit board	Check the rush current resistor on outdoor power circuit board with tester. If open is detected, replace the power circuit board.

1. Error code definition

A control communication start bit detection error

2. Error definition and error detection method

Indoor/outdoor unit communication error (Outdoor unit)
Abnormal if outdoor controller circuit board could not receive anything normally for 3 minutes.

3. Cause, check method and remedy

	Cause	Check method and remedy
(1)	Contact failure of indoor/outdoor unit connecting wire	Check disconnection or looseness of indoor/ outdoor unit connecting wire of indoor or outdoor units.
(2)	Defective communication circuit of outdoor controller circuit board	Turn the power off, and on again to check. Replace indoor controller board or outdoor controller circuit board if abnormality is displayed again.
(3)	Defective communication circuit of indoor controller board	
(4)	Noise has entered into indoor/outdoor unit connecting wire.	

Note: Refer also to the Service Handbook for the indoor units.

7-8-25 Error Code [6846]

1. Error code definition

Start-up time over

2. Error definition and error detection method

Start-up time over The unit cannot finish start-up process within 4 minutes after power on.

3. Cause, check method and remedy

	Cause	Check method and remedy
(1)	Contact failure of indoor/outdoor unit connecting wire	Check disconnection or looseness or polarity of indoor/outdoor unit connecting wire of indoor and outdoor units.
(2)	Diameter or length of indoor/outdoor unit connecting wire is out of specified capacity.	Check the following: Diameter of the cables used for indoor-outdoor lines; maximum line distance between indoor and outdoor units (max. 50 m); maximum line distance between indoor units (daisy-changed cables) (max. 30 m); and if flat cables such as VVF is used, make sure they are connected in the order of S1, S2, and S3.
(3)	2 or more outdoor units have refrigerant address "0". (In case of group control)	When units are controlled as groups, check the refrigerant address (SW1 (3-6) on the outdoor unit control board settings) for duplicates.
(4)	Noise has entered into power supply or indoor/outdoor unit connecting wire.	Check the transmission lines for problems.

Note: Refer also to the Service Handbook for the indoor units.

7-9 Error Code Definitions and Solutions: Codes [7000 - 7999]

7-9-1 Error Code [7100]

1. Error code definition

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 Total</th></tr>
<tr><td>200 model</td><td>53</td></tr>
<tr><td>250 model</td><td>69</td></tr>
<tr><td>300 model</td><td>86</td></tr>
<tr><td>350 model</td><td>96</td></tr>
<tr><td>400 model</td><td>108</td></tr>
<tr><td>450 model</td><td>121</td></tr>
<tr><td>500 model</td><td>138</td></tr>
</table></td><td>1) Check the Qj total (capacity code total) of indoor units connected.

2) Check the Qj setting (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).

3) Indoor unit Qj table

<table>
<tr><th>Model</th><th>Qj</th></tr>
<tr><td>10</td><td>2</td></tr>
<tr><td>15</td><td>3</td></tr>
<tr><td>20</td><td>4</td></tr>
<tr><td>25</td><td>5</td></tr>
<tr><td>32</td><td>6</td></tr>
<tr><td>40</td><td>8</td></tr>
<tr><td>50</td><td>10</td></tr>
<tr><td>63</td><td>13</td></tr>
<tr><td>71</td><td>14</td></tr>
<tr><td>80</td><td>16</td></tr>
<tr><td>100</td><td>20</td></tr>
<tr><td>125</td><td>25</td></tr>
<tr><td>140</td><td>28</td></tr>
<tr><td>200</td><td>40</td></tr>
<tr><td>250</td><td>50</td></tr>
</table></td></tr>
<tr><td>(2) The model selection switches (SW5-3 - 5-8) on the outdoor unit are set incorrectly.

<table>
<tr><th rowspan="2">Model</th><th colspan="6">SW5</th></tr>
<tr><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th></tr>
<tr><td>M200 model</td><td>OFF</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td><td rowspan="7">*1</td></tr>
<tr><td>M250 model</td><td>ON</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td></tr>
<tr><td>M300 model</td><td>OFF</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>M350 model</td><td>OFF</td><td>ON</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>M400 model</td><td>ON</td><td>ON</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>M450 model</td><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td>M500 model</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr>
</table>
*1 ON: EM model; OFF: M model</td><td>Check the setting for the model selection switch on the outdoor unit (Dipswitches SW5-3 - 5-8 on the outdoor unit control board).</td></tr>
</table>

7 Troubleshooting Using Error Codes

7-9-2 Error Code [7101]

1. Error code definition

Capacity code setting error

2. Error definition and error detection method

Connection of incompatible (wrong model or capacity code) outdoor units, indoor units, or hydro units.

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>Indoor unit</td><td>(1) The model name (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.</td><td>1) Check the model name (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.</td></tr>
<tr><td>Outdoor unit</td><td>(2) The model selection switches (SW5-3 - 5-8) on the outdoor unit are set incorrectly.

<table>
<tr><th rowspan="2">Model</th><th colspan="6">SW5</th></tr>
<tr><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th></tr>
<tr><td>M200 model</td><td>OFF</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td><td rowspan="7">*1</td></tr>
<tr><td>M250 model</td><td>ON</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td></tr>
<tr><td>M300 model</td><td>OFF</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>M350 model</td><td>OFF</td><td>ON</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>M400 model</td><td>ON</td><td>ON</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>M450 model</td><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td>M500 model</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr>
</table>
*1 ON: EM model; OFF: M model</td><td>Check the setting for the model selection switch on the outdoor unit (Dipswitches SW5-3 - 5-8 on the outdoor unit control board).</td></tr>
<tr><td>Hydro unit</td><td>(3) The model name (capacity code) setting is wrong.
Correct combinations of outdoor units and hydro units

<table>
<tr><th>Outdoor unit</th><th>Hydro unit</th></tr>
<tr><td>M200 model
M250 model</td><td>WM250 model</td></tr>
<tr><td>M300 model
M350 model</td><td>WM350 model</td></tr>
<tr><td>M400 model
M450 model
M500 model</td><td>WM500 model</td></tr>
</table></td><td>Check the setting for the model selection switch on the outdoor unit (Dipswitches SW5-3 - 5-8 on the outdoor unit control board).</td></tr>
</table>

7-9-3 Error Code [7102]

1. Error code definition

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.

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 rowspan="6">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>26 : 200 model
32 : 250 models
39 : 300 models
45 : 350 models
50 : 400 models
50 : 450 models
50 : 500 models</td></tr>
<tr><td>Total number of LOSSNAY units (During auto address start-up only)</td><td>0 or 1</td></tr>
<tr><td>Total number of outdoor units</td><td>1 : (E)M200 - (E)M500YNW models</td></tr>
<tr><td>Total number of hydro units</td><td>1</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>(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>(3)</td><td>Short-circuited transmission line
When (2) and (3) apply, the following display will appear.
♦ME remote controller
Nothing appears on the remote controller because it is not powered.
♦MA remote controller
"HO" or "PLEASE WAIT" blinks.</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>(4)</td><td>The model selection switch (SW5-7) on the outdoor unit is set to OFF. (Normally set to ON)</td><td rowspan="3">4)</td><td rowspan="3">Check the setting for the model selection switch on the outdoor unit (Dipswitches SW5-7 on the outdoor unit control board).</td></tr>
<tr><td>(5)</td><td>Outdoor unit address setting error
The outdoor units in the same refrigerant circuit do not have sequential address numbers.</td></tr>
<tr><td>(6)</td><td>Incorrect type of indoor units are connected.</td></tr>
</table>

7-9-4 Error Code [7105]

1. Error code definition
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.

7-9-5 Error Code [7106]

1. Error code definition
Attribute setting error

2. Error definition and error detection method

<table>
<tr><th>Error source</th><th>Cause</th><th>Check method and remedy</th></tr>
<tr><td>-</td><td>A remote controller for use with indoor units, such as the MA remote controller, is connected to the OA processing unit whose attribute is FU.</td><td>To operate the OA processing unit directly via a remote controller for use with indoor units, such as the MA remote controller, set the DIP SW 3-1 on the OA processing unit to ON.
<table>
<tr><th>Operation Method</th><th>SW3-1</th></tr>
<tr><td>Interlocked operation with the indoor unit</td><td>OFF</td></tr>
<tr><td>Direct operation via the MA remote controller</td><td>ON</td></tr>
</table>
</td></tr>
</table>

7-9-6 Error Code [7110]

1. Error code definition

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) The model selection switch (SW5-7) on the outdoor unit is set to OFF. (Normally set to ON)	2) Check the model selection switch on the outdoor unit (Dipswitch SW5-7 on the control board.).

7-9-7 Error Code [7111]

1. Error code definition

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.

7-9-8 Error Code [7113]

1. Error code definition

Function setting error (improper connection of CNTYP)

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. 2) Check the connector CNTYP4 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 settings of SW5-3 through SW5-6 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 settings of SW5-3 through SW5-6 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 settings of SW5-3 through SW5-6 on the control board. 4) Check the wiring between the control board and INV board. Refer to the following page(s). [7-2-1 Error Code [0403]]
		(Detail code 0, 1, 5, 6) 1) Check the wiring between the control board and INV board. Refer to the following page(s). [7-2-1 Error Code [0403]] 2) Check the settings of SW5-3 through SW5-6 on the control board. 3) Check the connector CNTYP5 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.
Hydro unit	Loose connectors, short-circuit, contact failure	Check the connector CN403 on the control board for proper connection.

7-9-9 Error Code [7117]

1. Error code definition

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 wiring between the control board and INV board. Refer to the following page(s). [7-2-1 Error Code [0403]]
		(Detail code 0, 1, 5, 6) 1) Check the wiring between the control board and INV board. Refer to the following page(s). [7-2-1 Error Code [0403]] 2) Check the settings of SW5-3 through SW5-6 on the control board. 3) Check the connector CNTYP5 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.
Hydro unit	Loose connectors, short-circuit, contact failure	Check the connector CN403 on the control board for proper connection.

7-9-10 Error Code [7130]

1. Error code definition

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	The connected indoor unit is for use with R22, R407C, or R410A. The M-NET connection adapter is connected to the indoor unit system in a system in which the Slim Model (A control) of units are connected to the M-NET. Indoor units that are incompatible with the HVRF system are connected.	Check the connected indoor unit model. Check whether the connecting adapter for M-NET is not connected to the indoor unit. (Connect the M-NET adapter to the centralized control system.)

Chapter 8 Troubleshooting Based on Observed Symptoms

8-1 MA Remote Controller Problems

8-1-1 The LCD Does Not Light Up.

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 (◎) is unlit and no lines appear on the remote controller.)

2. 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 220-240 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

3. Check method and remedy

1) Check the voltage at the MA remote controller terminals.
   - 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) Disconnect the remote controller cable from TB15 (MA remote controller terminal) on the indoor unit, and check the voltage across the terminals on TB15.
   - 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.

8-1-2 The LCD Momentarily Lights Up and Then Goes Off.

1. Phenomena

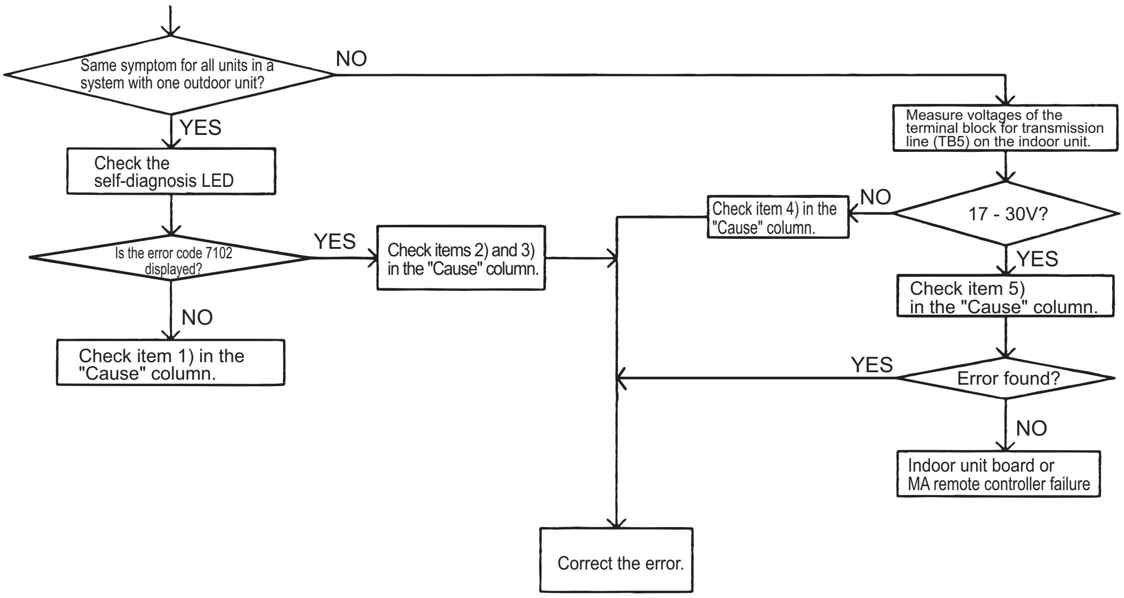
When the remote controller operation SW is turned on, the operation status briefly appears on the display, then it goes off, and the display lights out immediately, and the unit stops.

2. Cause

1) The power for the M-NET transmission line is not supplied from the outdoor unit. For details, refer to the following page(s).[8-11-2 Troubleshooting Problems with Outdoor Unit Transmission Power Supply Circuit]
2) Short circuit of the 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 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.

3. Check method and remedy

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



8-1-3 "HO" and "PLEASE WAIT" Do Not Go Off the Screen.

1. Phenomena

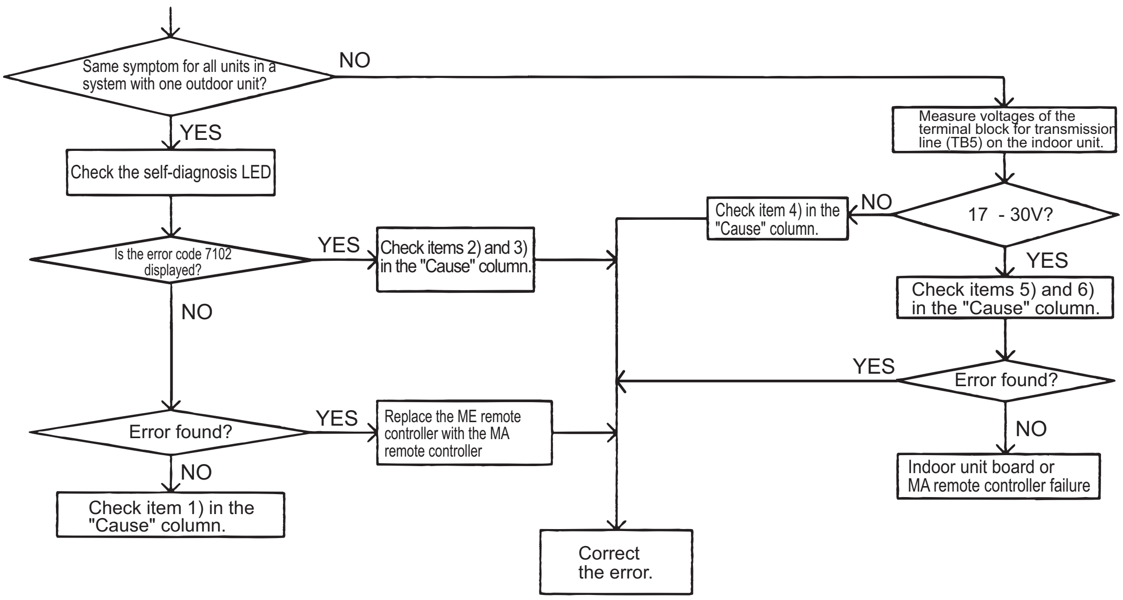
"HO" or "PLEASE WAIT" display on the remote controller does not disappear, and no operation is performed even if the button is pressed. ("HO" or "PLEASE WAIT" display will normally turn off 5 minutes later after the power on.)

2. Cause

1) The power for the M-NET transmission line is not supplied from the outdoor unit. For details, refer to the following page(s). [8-11-2 Troubleshooting Problems with Outdoor Unit Transmission Power Supply Circuit]
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 (TB15) 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 the following page(s). [8-15 Troubleshooting Problems Using the LED Status Indicators on the Outdoor Unit])

3. Check method and remedy

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



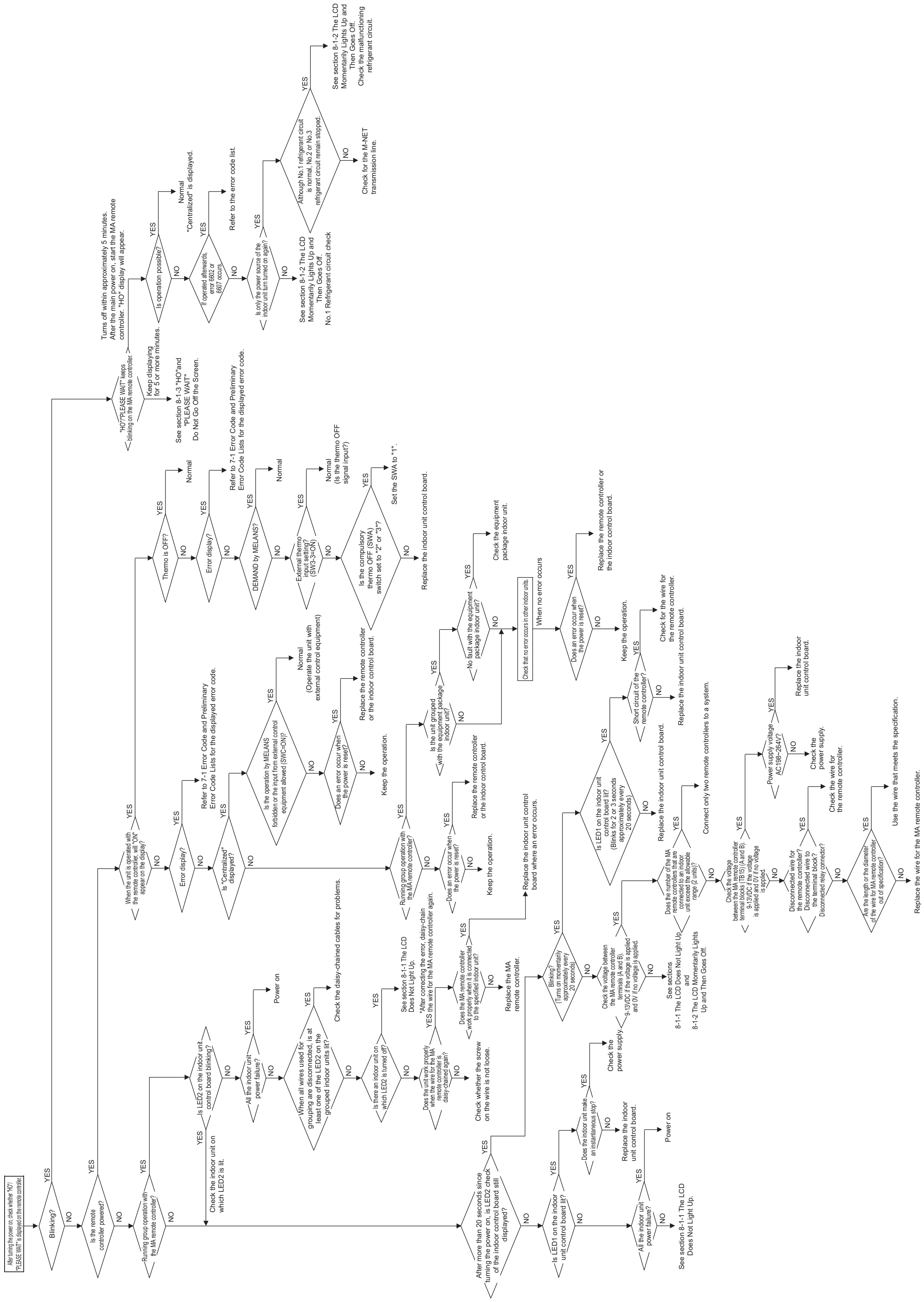
8 Troubleshooting Based on Observed Symptoms

8-1-4 Air Conditioning Units Do Not Operate When the ON Button Is Pressed.

1. Phenomena

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

2. Check method and remedy



8-2 ME remote Controller Problems

8-2-1 The LCD Does Not Light Up.

1. Phenomena

Even if the operation button on the remote controller is pressed, the display remains unlit and the unit does not start running. (Remote controller is not powered.)

2. 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-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).
4) Disconnected transmission line on the remote controller.
5) Remote controller failure
6) Outdoor unit failure (For details, refer to the following page(s). [8-15 Troubleshooting Problems Using the LED Status Indicators on the Outdoor Unit])

3. Check method and remedy

1) Check voltage of the transmission terminal block for of the ME remote controller.
   - If voltage between is 17V and 30V → ME remote controller failure
   - When voltage is 17V or less → For details, refer to the following page(s). [8-11-2 Troubleshooting Problems with Outdoor Unit Transmission Power Supply Circuit]
2) **When 2) and 3) above apply, check code 7102 will be displayed on the self-diagnosis LED.**

8 Troubleshooting Based on Observed Symptoms

8-2-2 The LCD Momentarily Lights Up and Then Goes Off.

1. Phenomena

When the remote controller operation SW is turned on, a temporary operation display is indicated, and the display lights out immediately.

2. Cause

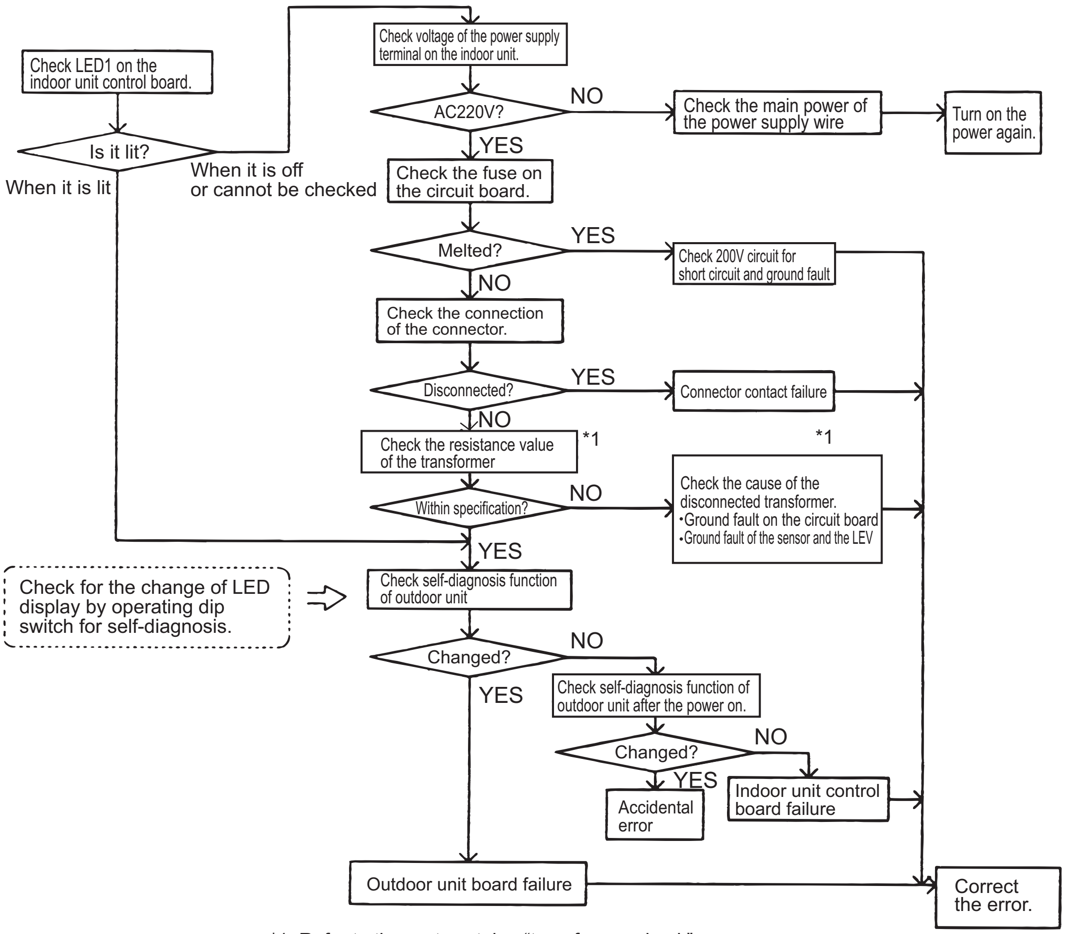
1) The power is not supplied to the indoor unit.

- The main power of the indoor unit (AC220V) 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
- The indoor unit board failure

2) The outdoor control board failure

As the indoor unit does not interact with the outdoor unit, the outdoor unit model cannot be recognized.

3. Check method and remedy



*1. Refer to the parts catalog “transformer check”.

8-2-3 "HO" or "Waiting for ···" Does Not Go Off the Screen.

1. Phenomena

"HO" or "Waiting for ···" display on the remote controller does not disappear, and no operation is performed even if the button is pressed.

2. Cause

Without using MELANS

1) Outdoor unit address is set to "00"
2) A wrong address is set.
   - The address of the indoor unit that is connected to the remote controller is incorrect. (It should equal the ME remote controller address minus 100.)
   - A wrong address is set to the ME remote controller. (100 must be added to the address of the indoor unit.)
3) Faulty wiring of the terminal block for transmission line (TB5) of the indoor unit in the same group with the remote controller.
4) The centralized control switch (SW5-1) on the outdoor unit is set to ON.
5) Disconnection or faulty wiring of indoor unit transmission line.
6) Disconnection between the terminal block for M-NET line connection (TB5) of the indoor unit and the male connector (CN2M)
7) 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.
8) Outdoor unit control board failure
9) Indoor unit control board failure
10) Remote controller failure

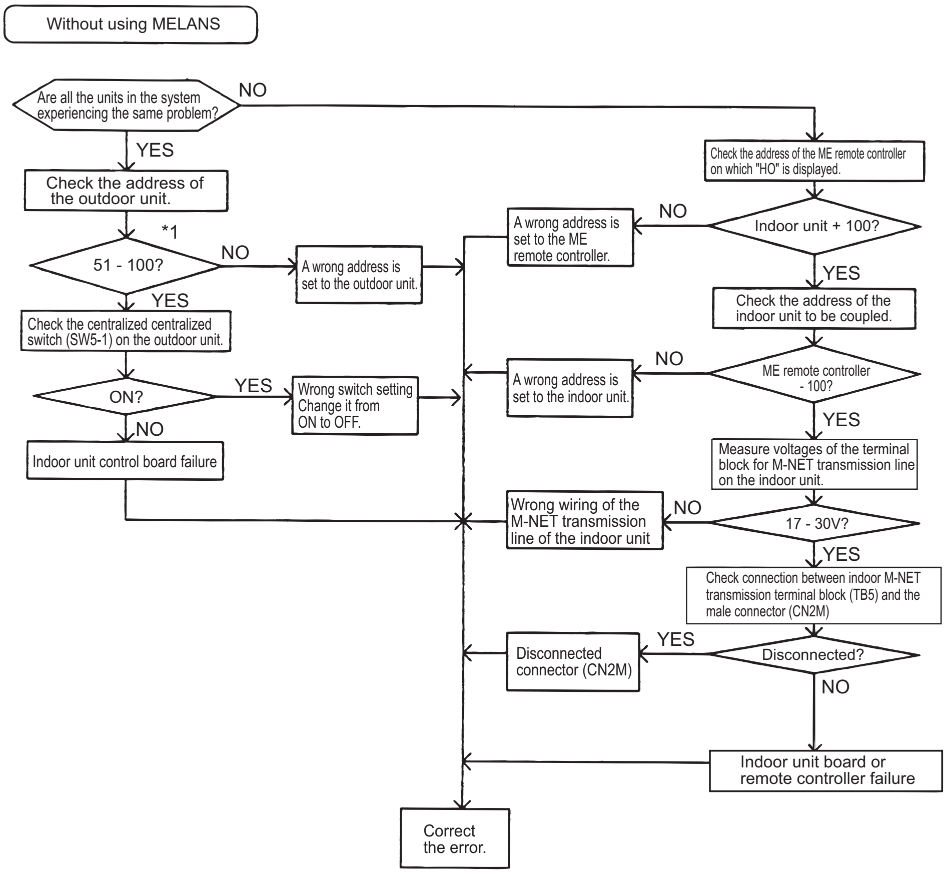
Interlocking control with MELANS

1) No group registration is made using MELANS. (The indoor unit and the ME remote controller are not grouped.)
2) Disconnected transmission line for centralized control (TB7) of the outdoor unit
3) The male power supply connector is connected to CN40 on more than one outdoor unit, or the connector is connected to CN40 on the outdoor unit in the system to which a power supply unit for transmission line is connected.

Using MELANS

1) When MELANS is used, "HO" or "Waiting for ···" display on the remote controller will disappear when the indoor unit and the local remote controller (ME remote controller) are grouped.
   If "HO" does not disappear after the registration, check items 1) through 3) in the "Cause" column of the section on interlocked control with MELANS.

3. Check method and remedy



*1. When the outdoor unit address is set to 1 - 50, the address will be forcibly set to 100.

8 Troubleshooting Based on Observed Symptoms

8-2-4 "88", "Request denied." Appears on the LCD.

1. Phenomena

"88", "Request denied." appears on the remote controller when the address is registered or confirmed.

2. Cause, check method and remedy

Cause	Check method and remedy
An error occurs when the address is registered or confirmed. (common)	
1. A wrong address is set to the unit to be coupled.	(1) Confirm the address of unit to be coupled.
2. The transmission line of the unit to be coupled is disconnected or is not connected.	(2) Check the connection of transmission line.
3. Circuit board failure of the unit to be coupled	(3) Check voltage of the terminal block for transmission line of the unit to be coupled. 1) Normal if voltage is between 17 and 30 VDC.
4. Improper transmission line work	2) Check (5) in case other than 1).
Generates at interlocking registration between LOSSNAY and the indoor unit	
5. The power of LOSSNAY is OFF.	(4) Check for the main power of LOSSNAY.
Generates at confirmation of controllers used in the system in which the indoor units connected to different outdoor units are grouped	
6. The power of the outdoor unit to be confirmed has been cut off.	(5) Check the power supply of the outdoor unit which is coupled with the unit to be confirmed.
7. Transmission line is disconnected from the terminal block for central control system connection (TB7) on the outdoor unit.	(6) Check that the transmission line for centralized control (TB7) of the outdoor unit is not disconnected.
8. When the indoor units connected to different outdoor units are grouped without MELANS, the male power supply connector is not connected to the female power supply switch connector (CN40) for the transmission line for centralized control.	(7) Check voltage of the transmission line for centralized control.
9. 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.	1) Normal when voltage is between 10V and 30V
10. In the system to which MELANS is connected, the male power supply connector is connected to the female power supply switch connector (CN40) for the transmission line for centralized control.	2) Check 8 - 11 described on the left in case other than 1).
11. Short circuit of the transmission line for centralized control	

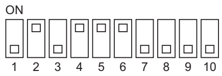
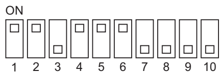
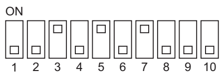
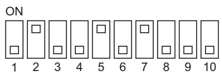
8-3 Refrigerant Control Problems

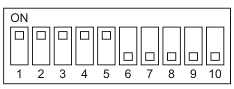
8-3-1 Units in the Cooling Mode Do Not Operate at Expected Capacity.

1. Phenomena

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

2. 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 •Pressure drops excessively.	(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 following page(s). [8-5-1 Comparing the High-Pressure Sensor Measurement and Gauge Pressure] Note: Lower inlet pressure by the low pressure sensor than the actual pressure causes insufficient capacity. SW4 setting (SW6-10: OFF) High pressure sensor SW4  Low pressure sensor SW4  (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. SW4 setting (SW6-10: OFF) Evaporating temperature Te SW4  Target evaporating temperature Tem SW4  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 the following page(s). [7-3-1 Error Code [1102]] At high pressure: Refer to the following page(s). [7-3-3 Error Code [1302] (during operation)]



The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

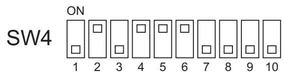
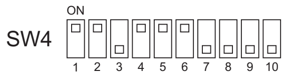
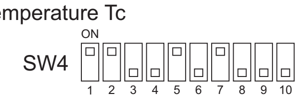
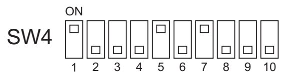
Cause		Check method and remedy
2.	Actuation failure of the flow-control valve on the indoor unit •Failure of the flow-control valve (not sufficiently open) causes a drop in the water flow rate, triggering the protection mechanism and keeps the water-pump frequency down. •Refrigerant leak from the flow-control valve on the stopping unit causes refrigerant shortage on the running unit.	Refer to the following page(s). [8-8 Troubleshooting LEV, FCV Problems]
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 following page(s). [8-7 Troubleshooting Outdoor Unit Fan Problems] [7-3-3 Error Code [1302] (during operation)]
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 item 1 (Compressor frequency does not rise sufficiently.) on the previous page. Refer to the following page(s). [6-3 Evaluating and Adjusting Refrigerant Charge]
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 temperature is excessively low. (Less than 15°C [59°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 following page(s). [8-8 Troubleshooting LEV, FCV Problems] It most likely happens when there is little difference or no difference between TH3 and TH6.
11.	TH3, TH6 and 63HS1 sensor failure or damaged 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 following page(s).[8-8 Troubleshooting LEV, FCV Problems]
13.	LEV9 malfunction Not enough refrigerant is provided to the indoor or outdoor unit due to high-low pressure bypass that results from the malfunction of LEV9.	Refer to the following page(s). [8-8 Troubleshooting LEV, FCV Problems]
14.	Open phase in the power-supply due to improper power-supply wiring.	Make sure that the power-supply wiring is properly connected. (Refer to item (5) in section [6-1 Read before Test Run].) Possible open phase.

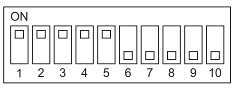
8-3-2 Units in the Heating Mode Do Not Operate at Expected Capacity.

1. Phenomena

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

2. 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 following page(s). [8-5-1 Comparing the High-Pressure Sensor Measurement and Gauge Pressure] Note: Higher inlet pressure by the high pressure sensor than the actual pressure causes insufficient capacity. SW4 setting (SW6-10: OFF) High pressure sensor  Low pressure sensor  (2) Check the difference between the condensing temperature (Tc) and the target condensing temperature (Tcm) with self-diagnosis LED. Note: Higher Tc than Tcm causes insufficient capacity. SW4 setting (SW6-10: OFF) 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 discharge temperature and high pressure. At high discharge temperature: Refer to the following page(s). [7-3-1 Error Code [1102]] At high pressure: Refer to the following page(s). [7-3-3 Error Code [1302] (during operation)]



The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

Cause	Check method and remedy
2. Actuation failure of the flow-control valve on the indoor unit Insufficient refrigerant flows due to actuation failure of the flow-control valve.	Refer to the following page(s). [8-8 Troubleshooting LEV, FCV Problems]
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 following page(s). [8-7 Troubleshooting Outdoor Unit Fan Problems]
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 item 1 (Compressor frequency does not rise sufficiently.) on the previous page. Refer to the following page(s). [6-3 Evaluating and Adjusting Refrigerant Charge]
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 following page(s). [8-8 Troubleshooting LEV, FCV Problems]
13. LEV9 malfunction Not enough refrigerant is provided to the indoor or outdoor unit due to high-low pressure bypass that results from the malfunction of LEV9.	Refer to the following page(s). [8-8 Troubleshooting LEV, FCV Problems]
14. Open phase in the power-supply due to improper power-supply wiring.	Make sure that the power-supply wiring is properly connected. (Refer to item (5) in section [6-1 Read before Test Run].) Possible open phase.

8-3-3 Outdoor Units Stop at Irregular Times.

1. Phenomena

Outdoor unit stops at times during operation.

2. 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 3 minutes as a preliminary error.	(1)	Check the mode operated in the past by displaying preliminary error history on LED display with SW4.
	Error mode		
1.	Abnormal high pressure	(2)	Reoperate the unit to find the mode that stops the unit by displaying preliminary error history on LED display with SW4.
2.	Abnormal discharge air temperature		
3.	Heatsink thermistor failure		→ Refer to the reference page for each error mode. *Display the indoor piping temperature table with SW4 to check whether the freeze proof operation runs properly, and check the temperature.
4.	Thermistor failure		
5.	Pressure sensor failure		Refer to the following page(s). [10 LED Status Indicators]
6.	Over-current break		
7.	Refrigerant overcharge		
8.	Refrigerant cooling error		
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.)		

8-4 Checking Transmission Waveform and for Electrical Noise Interference

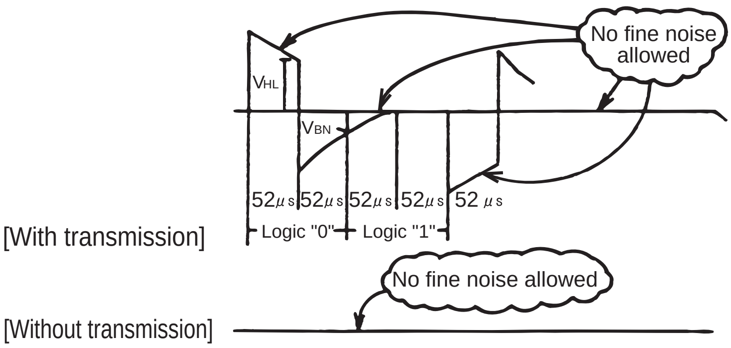
8-4-1 M-NET

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

8 Troubleshooting Based on Observed Symptoms

(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).

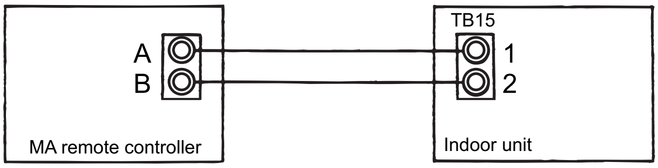
8-4-2 MA Remote Controller

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

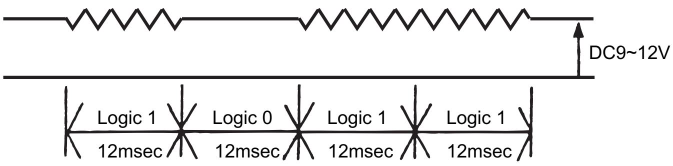
If noise is generated on the transmission line, and the communication between the MA remote controller and the indoor unit is interrupted for 3 minutes in a row, MA transmission error (6831) will occur.

(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)



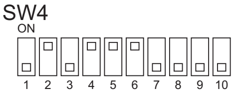
① Satisfies the formula
12 msec/bit ± 5%
② Voltage among terminals must be between DC9 and 12 V.

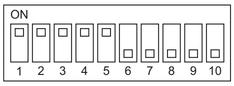
8-5 Pressure Sensor Circuit Configuration and Troubleshooting Pressure Sensor Problems

8-5-1 Comparing the High-Pressure Sensor Measurement and Gauge Pressure

By configuring the digital display setting switch (SW4 (when SW6-10 is set to OFF)) as shown in the figure below, the pressure as measured by the high-pressure sensor appears on the LED1 on the control board.

SW4





The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

(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.

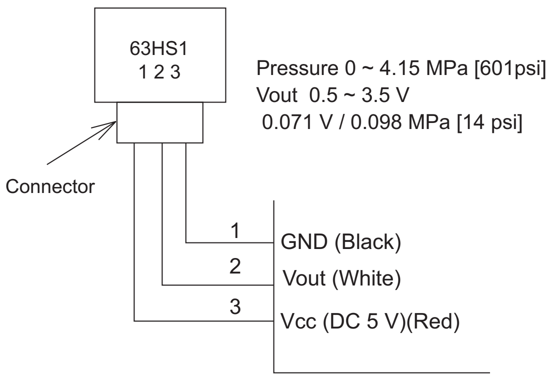
8-5-2 High-Pressure Sensor Configuration (63HS1)

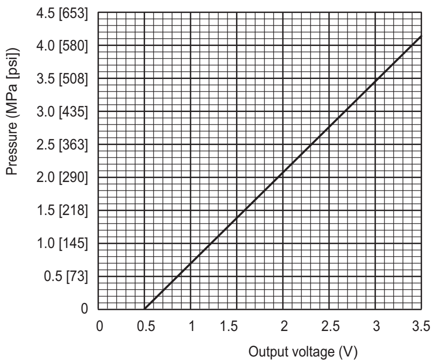
The high pressure sensor consists of the circuit shown in the figure below. If DC 5V is applied between the red and the black wires, voltage corresponding to the pressure between the white and the black wires will be output, and the value of this voltage will be converted by the microcomputer. The output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

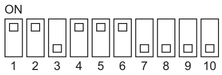


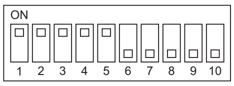


8-5-3 Comparing the Low-Pressure Sensor Measurement and Gauge Pressure

By configuring the digital display setting switch (SW4 (when SW6-10 is set to OFF)) as shown in the figure below, the pressure as measured by the low-pressure sensor appears on the LED1 on the control board.

SW4





The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

(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 low-pressure sensor has a problem.

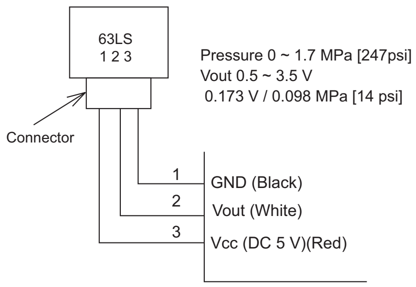
8-5-4 Low-Pressure Sensor Configuration (63LS)

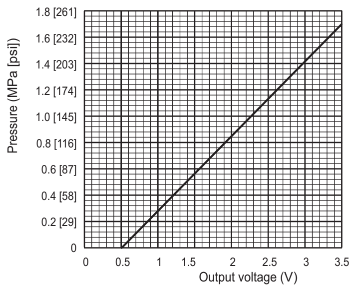
The low pressure sensor consists of the circuit shown in the figure below. If DC5V is applied between the red and the black wires, voltage corresponding to the pressure between the white and the black wires will be output, and the value of this voltage will be converted by the microcomputer. The output 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





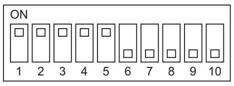
8-6 Troubleshooting Solenoid Valve Problems

Check whether the output signal from the control board and the operation of the solenoid valve match.
Setting the self-diagnosis switch (SW4) 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.

SW4 (SW6-10:OFF)		Display							
		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8
SW4 	Upper	21S4a	SV10			SV1a		SV2	SV11
	Lower			21S4b					
SW4 	Upper					21S4c		SV9	
	Lower			SV14		SV15			


The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

- 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) 21S4a (4-way switching valve)

About this 4-way valve
When not powered:
Conducts electricity between the oil separator outlet and heat exchanger 1 (front 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) 21S4b (4-way switching valve), 21S4c (4-way switching valve) (21S4c is only on the (E)M500 models.)

About this 4-way valve
When not powered:
Conducts electricity between the oil separator outlet and heat exchanger 2 (rear or right heat exchanger) (<21S4b>), and between the oil separator outlet and heat exchanger 3 (left exchanger) (<21S4c>) 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) 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 open, 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) SV2 (solenoid valve)

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

(5) 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.

(6) SV10 (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.

(7) SV11 (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.

(8) SV14 (solenoid valve)

This solenoid valve is a switching valve that opens when energized if the refrigerant flow is forward. It is closed when energized if the refrigerant flow is reversed. Proper operation of this valve can be checked on the LED and by the switching sound.

(9) SV15 (solenoid valve)

This solenoid valve is a switching valve that opens when energized if the refrigerant flow is forward. It is closed when energized if the refrigerant flow is reversed. Proper operation of this valve can be checked on the LED and by the switching sound.

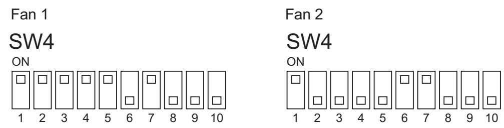
Note

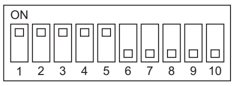
Do not give an impact from outside, as the outer hull will be deformed leading to the malfunction of the inner valve.

8-7 Troubleshooting Outdoor Unit Fan Problems

(1) Fan motor (common items)

- 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 SW4 (when SW6-10 is set to OFF) as shown in the figure below, the inverter output [%] will appear. 100% indicates the full speed and 0% indicates the stopping. (Fan No.2 is only on the (E)P350 - (E)P500 models.)





The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

- 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. When checking the fan motor for problems by shutting down the power, be sure to disconnect the motor wire from the fan board. (If a short-circuited fan board malfunctions, it will keep the fan motor from rotating smoothly.) For details, refer to the following page(s).

[8-10-7 Checking the Fan Motor for Ground Fault and Coil Resistance Problems]
[8-10-8 Checking the Fan Board Error Detection Circuit at No Load]
[8-10-9 Checking the Fan Board for Damage at No Load]
[8-10-10 Checking the Fan Board for Damage with Load]

8-8 Troubleshooting LEV, FCV Problems

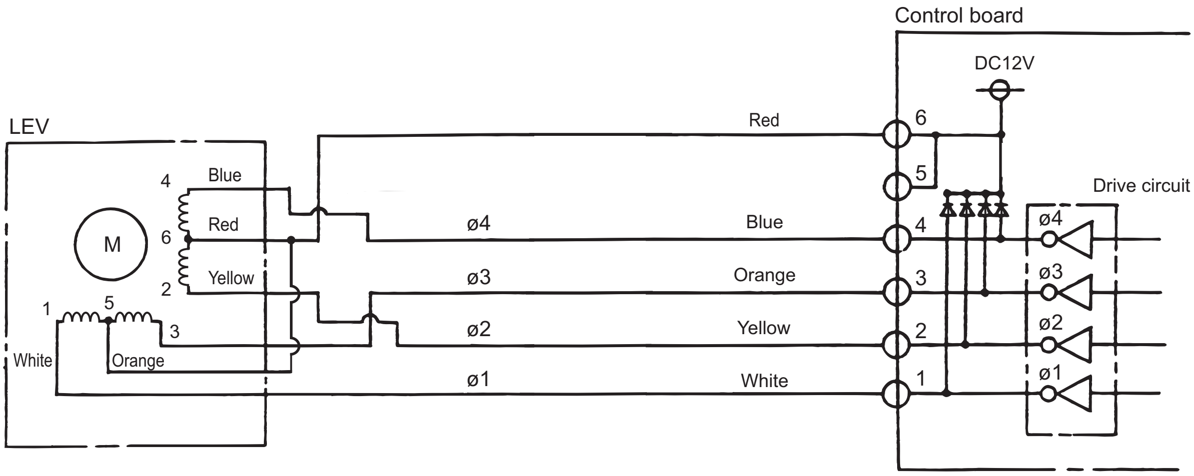
8-8-1 General Overview on LEV Operation

LEV2 (Outdoor unit: Linear expansion valve) is stepping-motor-driven valves that operate by receiving the pulse signals from the outdoor unit control board.

(1) Outdoor LEV (LEV2)

The valve opening changes according to the number of pulses.

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



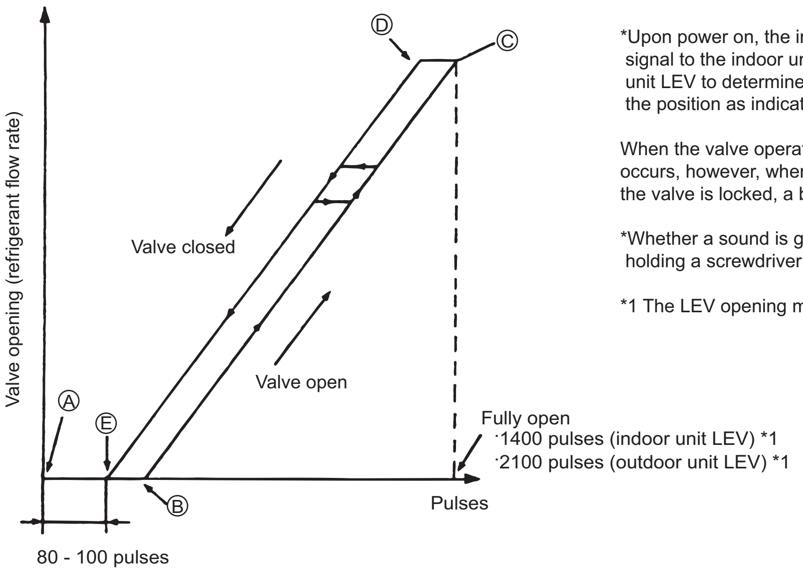
2) Pulse signal output and valve operation

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.

3) LEV closing and opening operation



*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 "A" in the diagram.

When the valve operates smoothly, no sound from LEV or no vibration occurs, however, when the pulses change from E to A in the chart or the valve is locked, a big sound occurs.

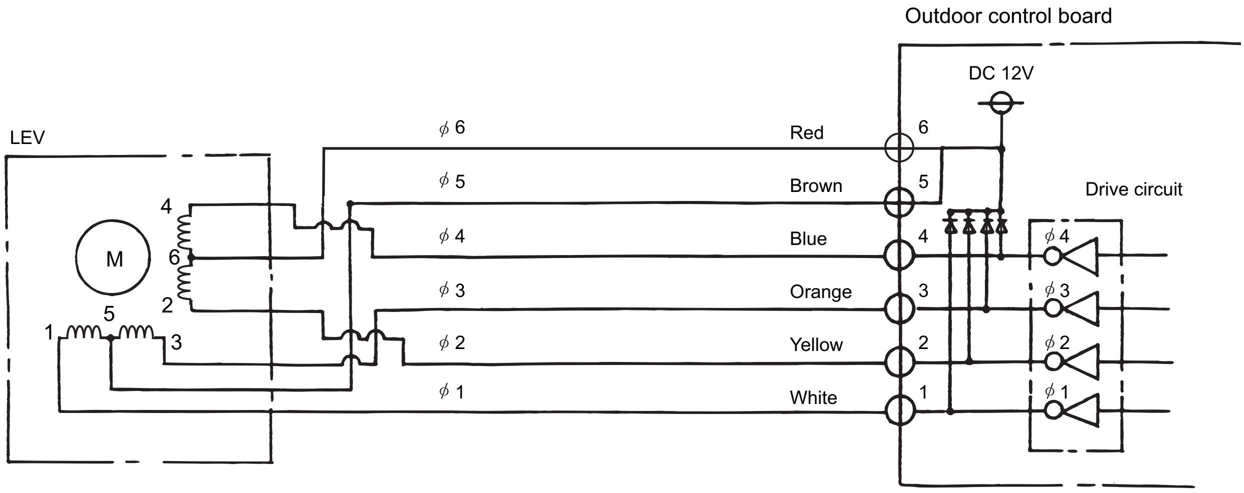
*Whether a sound is generated or not can be determined by holding a screwdriver against it, then placing your ear against the handle.

*1 The LEV opening may become greater depending on the operation status.

(2) Outdoor LEV (LEV1, LEV4, and LEV9)

The valve opening changes according to the number of pulses.

1) Connections between the outdoor control board and LEV1 (outdoor expansion valve)



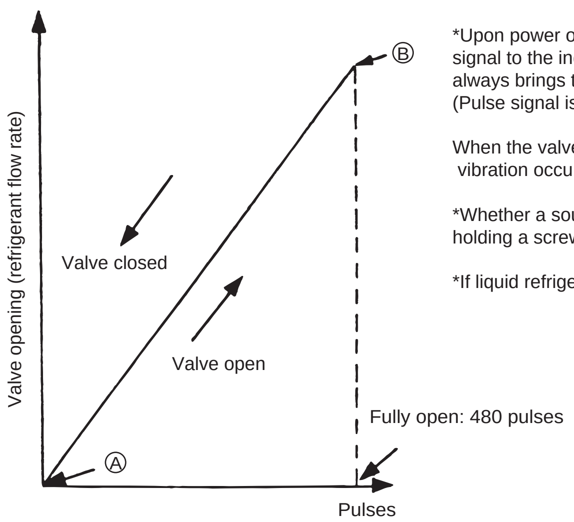
2) Pulse signal output and valve operation

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



*Upon power on, the indoor unit circuit board sends a 520 pulse signal to the indoor unit LEV to determine the valve position and always brings the valve to the position as indicated by "Ⓐ" in the diagram. (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.

8-8-2 General Overview on LEV Operation (Hydro unit)

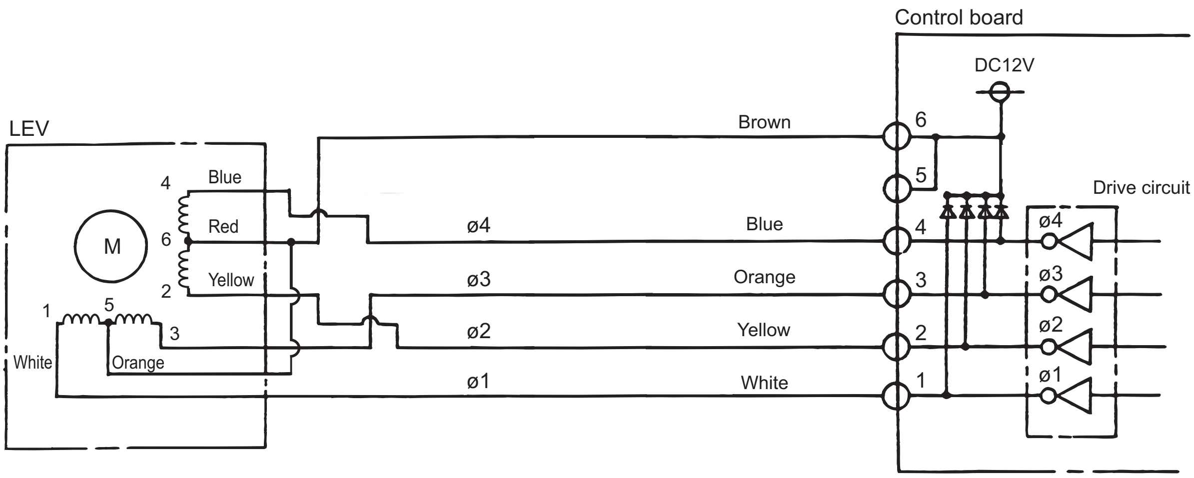
LEV operation

Hydro unit LEV1 (linear expansion valves) is driven by the pulse signal from the control board and are controlled by a stepping motor.

(1) Hydro unit LEV

The valve opening changes according to the number of pulses.

1) Control boards and the LEV (Hydro unit LEV1)



2) Pulse signal output and valve operation

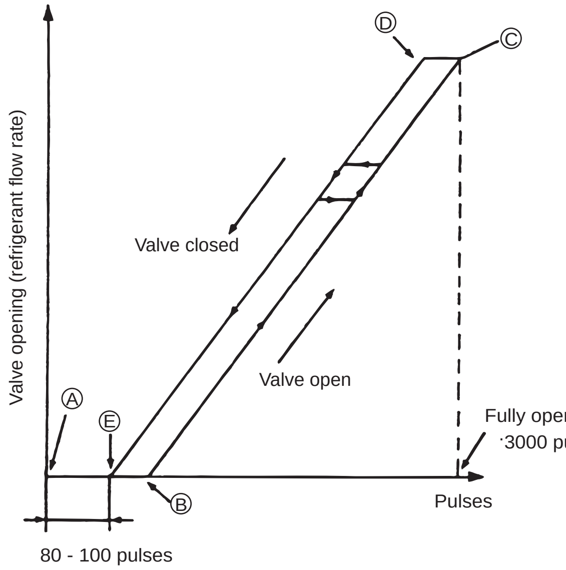
Output (phase) number	Output state			
	1	2	3	4
ϕ1	ON	OFF	OFF	ON
ϕ2	ON	ON	OFF	OFF
ϕ3	OFF	ON	ON	OFF
ϕ4	OFF	OFF	ON	ON

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.

3) LEV valve closing and opening operation



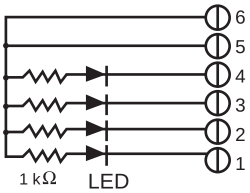
* Upon power on, the Hydro unit circuit board sends 3200 Hz pulse signals to the LEV (Hydro unit LEV1) to determine the valve position and bring the valve to the position as indicated by Ⓐ in the diagram.

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.

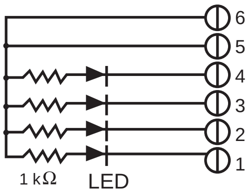
(2) Judgment methods and possible failure mode

Malfunction mode	Judgment method	Remedy
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. 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.
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.
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.
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.

8-8-3 Possible Problems and Solutions

Note

The specifications of the outdoor unit (outdoor LEV) and the Hydro unit (Hydro LEV) differ. Therefore, remedies for each failure may vary. Check the remedy specified for the appropriate LEV as indicated in the below 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 Hydro unit circuit board outputs pulse signals to the Hydro 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.	Hydro 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.	Hydro Outdoor
Disconnected or short-circuited LEV motor coil	Measure the resistance between coils (red-white, red-orange, brown-yellow, brown-blue) with a tester. When the resistance is in the range of 150Ω ± 10%, the LEV is normal.	Replace the LEV coils.	Hydro
	Measure the resistance between coils (red-white, red-orange, red-yellow, red-blue) with a tester. When the resistance is in the range of 100Ω ± 10%, the LEV is normal.	Replace the LEV coils.	Outdoor (LEV2a, LEV2b, LEV2c)
	Measure the resistance between coils (red - white, red - orange, brown - yellow, brown - blue) with a tester. When the resistance is in the range of 46Ω ± 3%, the LEV is normal.	Replace the LEV coils.	Outdoor (LEV1, LEV4, LEV9)
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.	Hydro Outdoor

8-8-4 General Overview on FCV Operation (Indoor unit)

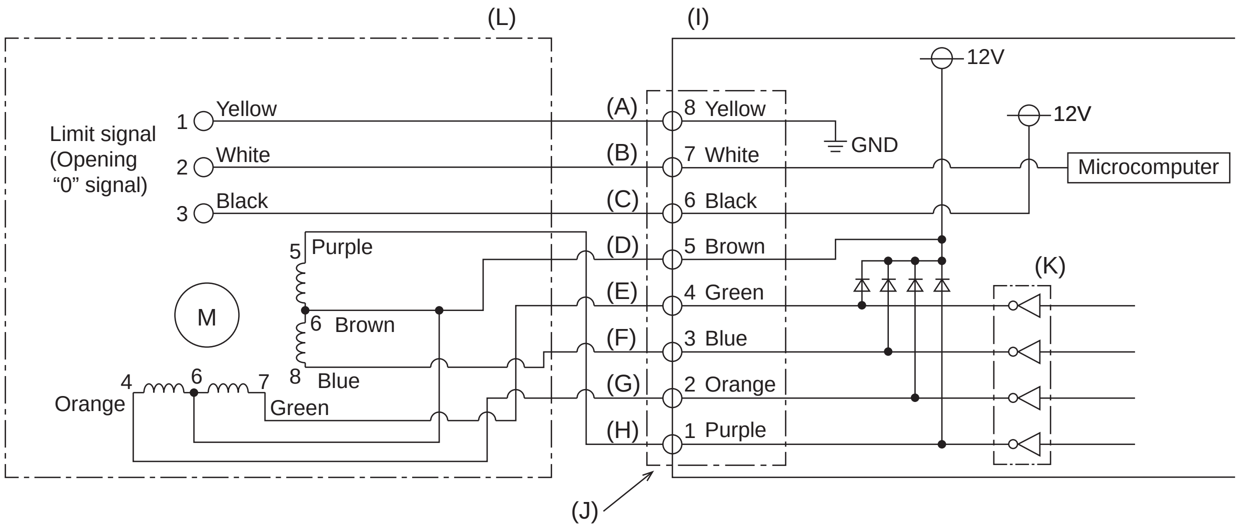
Flow control valve (FCV) operation

The FCV is operated by a stepping motor, which operates by receiving a pulse signal from the indoor control board.

(1) Indoor FCV

The FCV position changes in response to the pulse signal.

1) Indoor control board and FCV connection



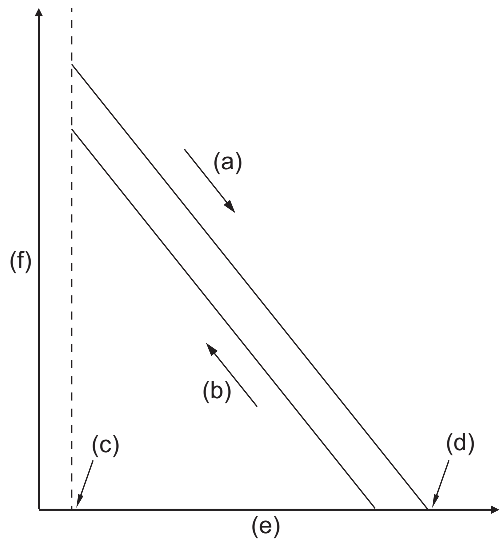
(A)	Yellow	(G)	Orange
(B)	White	(H)	Purple
(C)	Black	(I)	Control board
(D)	Brown	(J)	Connection (CN60)
(E)	Green	(K)	Drive circuit
(F)	Blue	(L)	Flow control valve

2) Pulse signal output and valve operation

Output (phase) number	Output status			
	1	2	3	4
4	ON	ON	OFF	OFF
5	OFF	ON	ON	OFF
7	OFF	OFF	ON	ON
8	ON	OFF	OFF	ON

The output pulse changes in the following order:
When the valve closes 1 -> 2 -> 3 -> 4 -> 1
When the valve opens 4 -> 3 -> 2 -> 1 -> 4

3) FCV operation



(a) Close
(b) Open
(c) Fully open valve (85 pulses)
(d) Fully close valve (770 pulses)
(e) No. of pulses
(f) Valve opening degree

(2) Judgment methods and possible failure mode

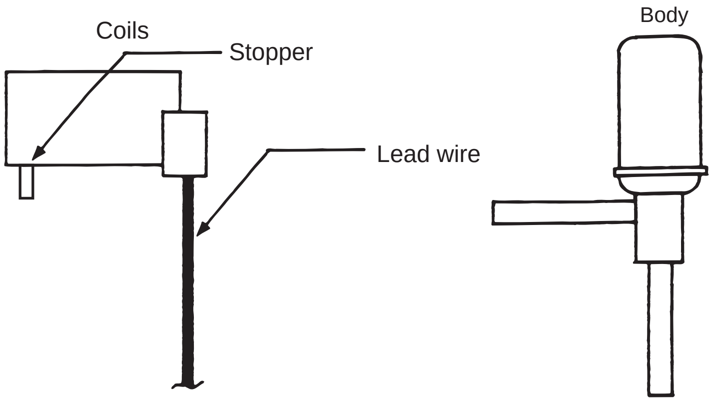
Malfunction mode	Judgment method	Remedy
(1) Loose connector	Check for connector connection failure.	Reinsert the connector, restart the operation, and check for proper operation.
(2) Wiring fault, flow control valve fault	Check for a broken wiring, and check the resistance of the flow control valve.	Replace the flow control valve.
(3) Control board fault	If no problems are found with the above items, replace the control board.	Replace the control board.

8-8-5 Coil Removal Instructions

(1) Outdoor unit LEV (LEV1, LEV4, and LEV9)

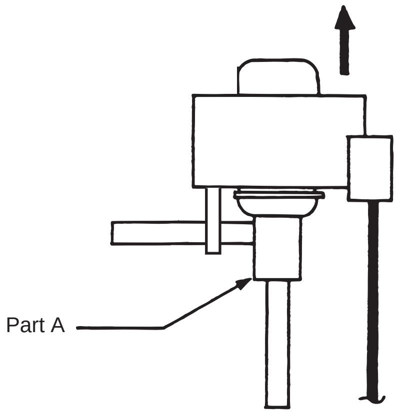
1) LEV component

As shown in the figure, the outdoor LEV is made in such a way that the coils and the body can be separated.



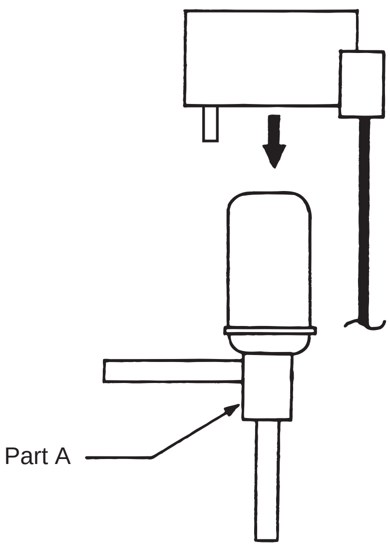
2) Removing the coils

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

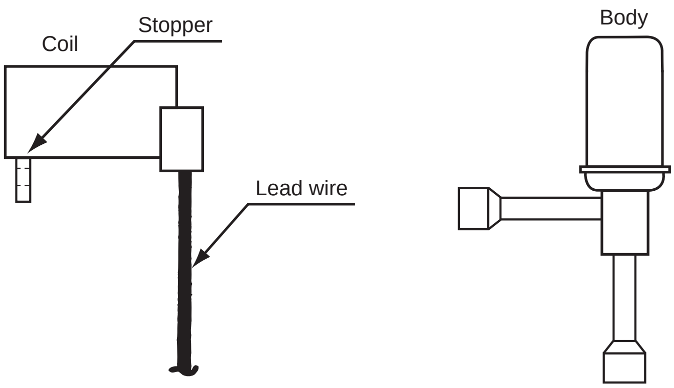
Fix the body tightly at the bottom (Part A in the figure) so that the body will not move, then insert the coils from the top, and insert the coil stopper securely in the pipe on the body.
If the coils are pushed without the body gripped, undue force will be applied and the pipe will be bent. Hold the body when pulling out the coils to prevent so that the pipe will not be bent.



(2) Outdoor unit LEV (LEV2a, LEV2b, LEV2c)

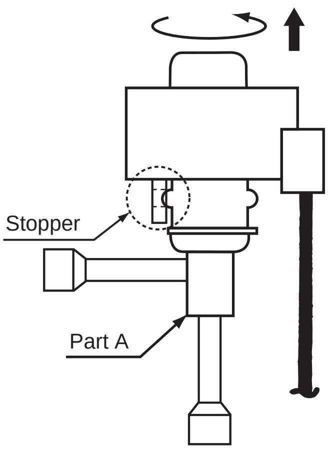
1) Components

The outdoor unit LEV consists of a coil and a valve body that can be separated from each other.



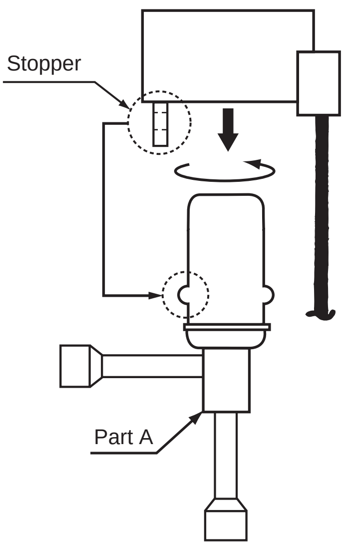
2) Removing the coil

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

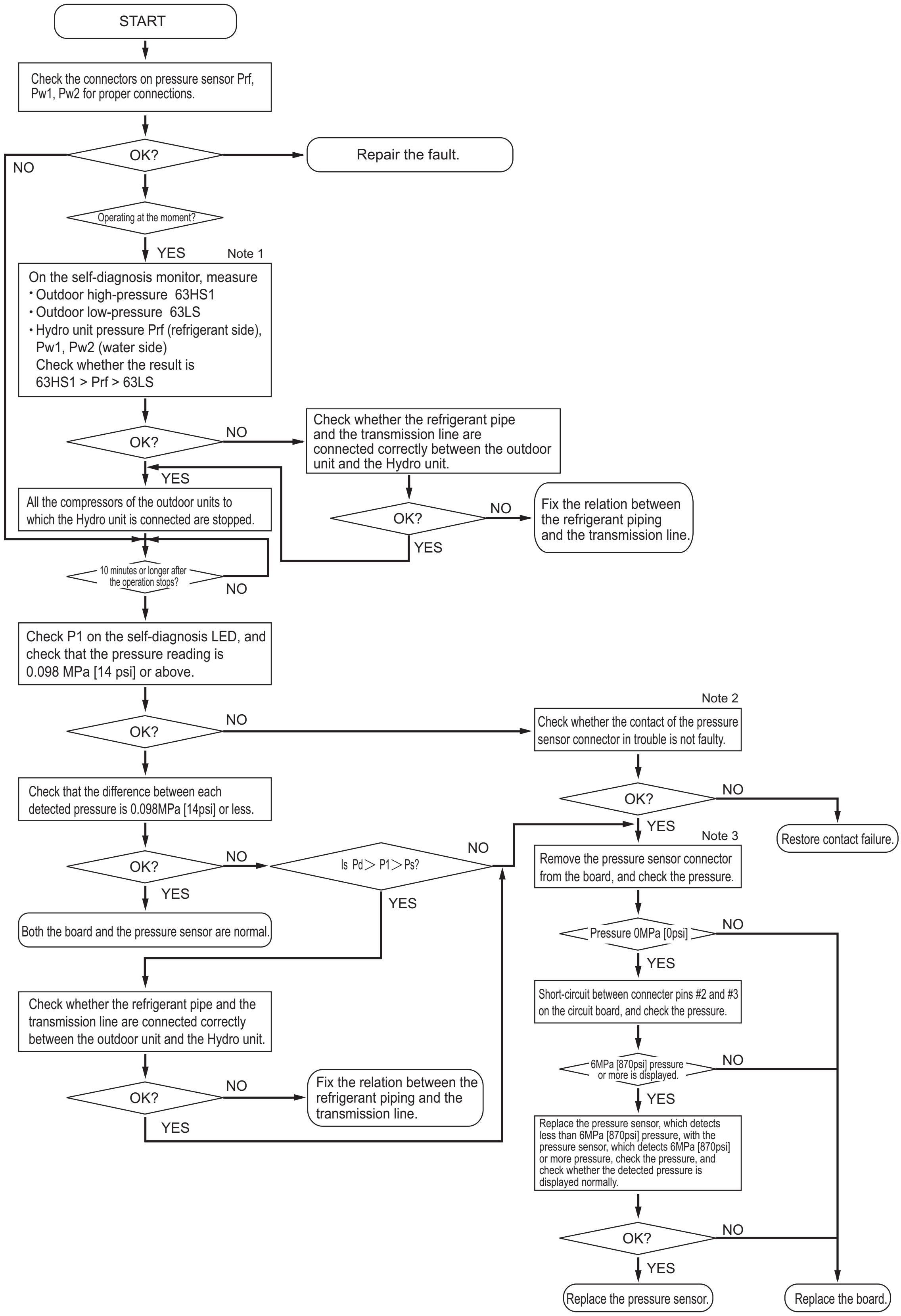
Securely hold the bottom of the LEV (Part A in the figure), insert the coil from above, and turn the coil until the coil stopper is properly installed on the LEV body.
When removing the coil, hold the LEV body securely to prevent undue force from being placed on the pipe and bending the pipe.



8-9 Troubleshooting Problems with Major Components on Hydro unit

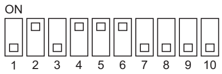
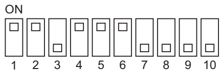
8-9-1 Pressure Sensor

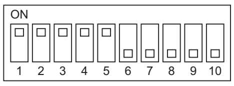
Troubleshooting flow chart for pressure sensor



Note

1) Check the self-diagnosis switch (Outdoor control board SW4 (SW6-10:OFF)).

Measurement data	Symbol	SW4 setting value
Outdoor high pressure	63HS1	
Outdoor low pressure	63LS	



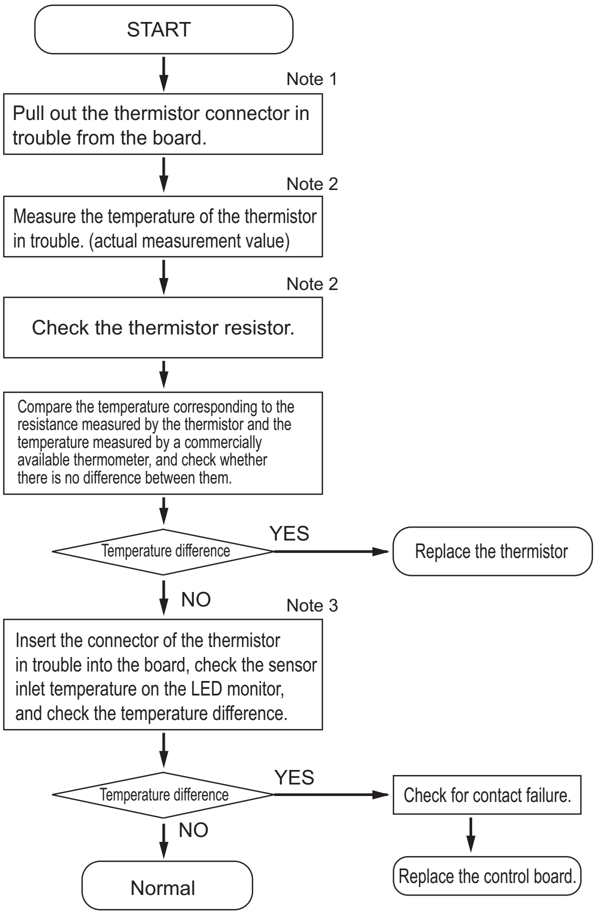
The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

Note

2) Check CNP1 connector on the Hydro unit control board for proper connections.
3) Check the pressure value on the self-diagnosis switch (same as note 2) with the connector of the applied pressure sensor is disconnected from the board.

8-9-2 Temperature Sensor

Troubleshooting instructions for thermistor



Note

1) Connectors on the circuit board are connected to the sensors as follows. Unplug the corresponding connectors before checking each sensor.

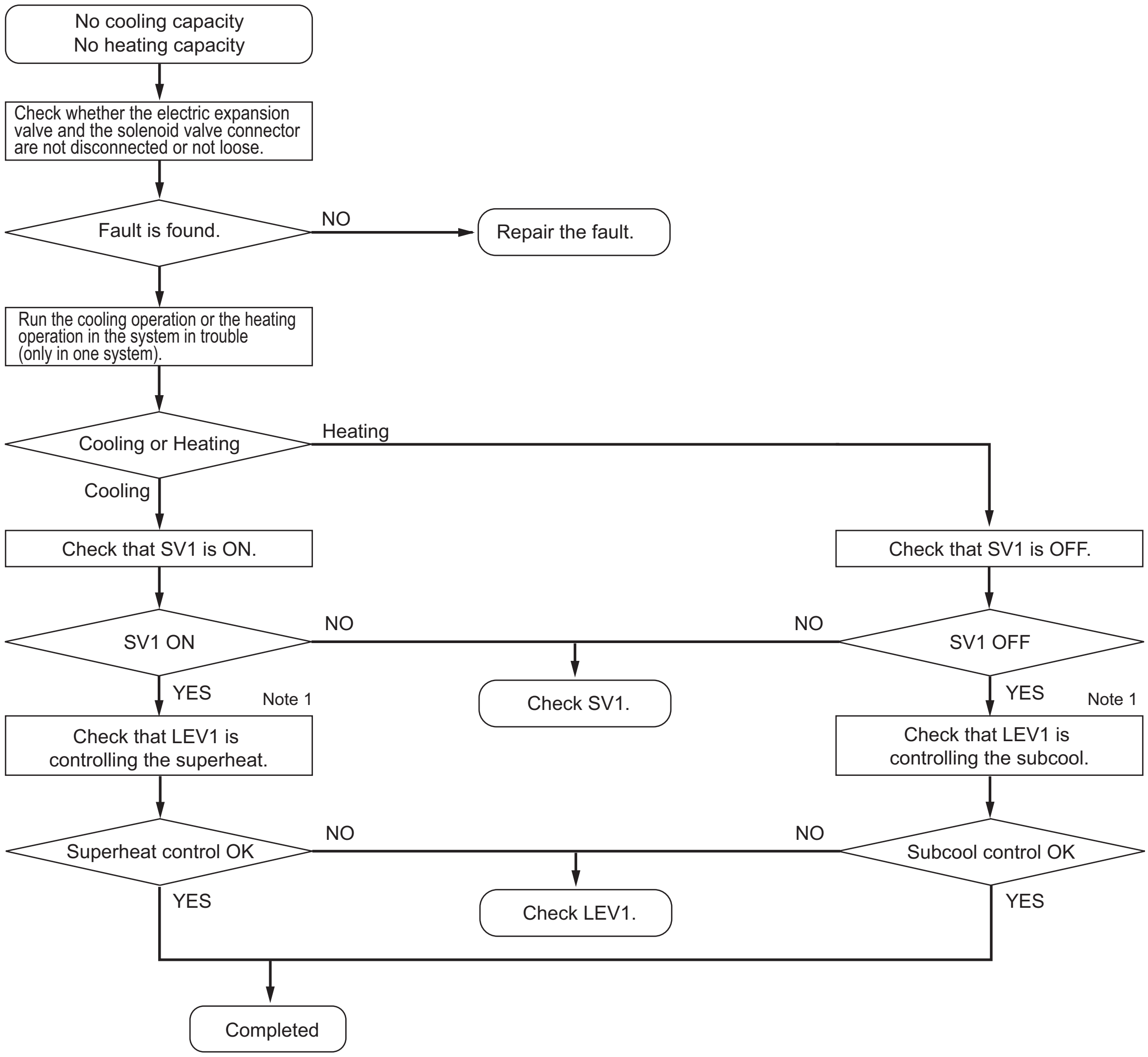
Sensor	Connectable connector
TH11, TH13	CN401
TH32, TH35	CN402

2)

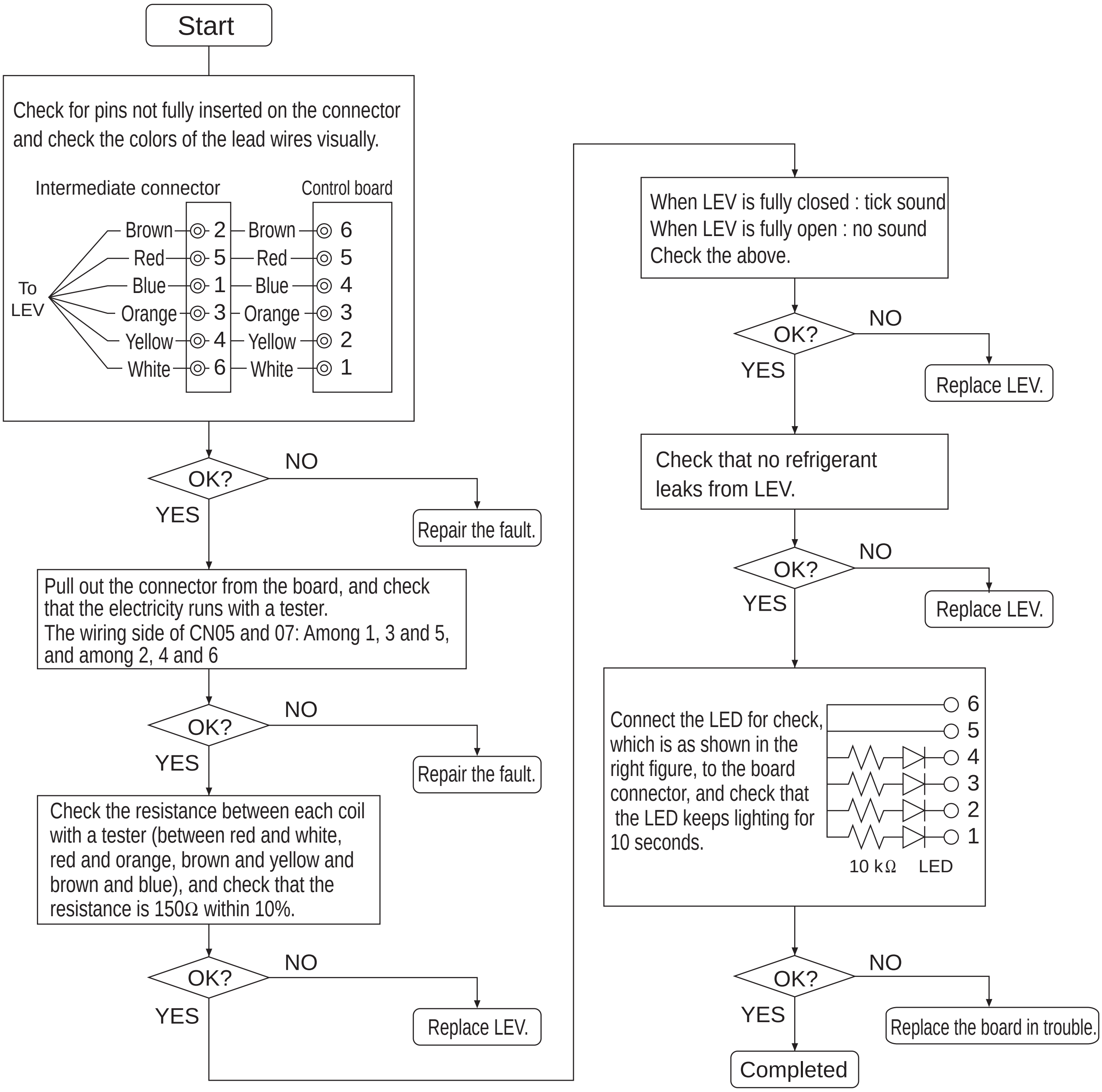
- Pull out the sensor connector from the I/O board, Do not pull the sensor by holding the lead wire.
- Measure the resistance with such as a tester.
- Compare the measured value with that of shown in the figure below. When the result is ± 10%, it is normal.

8-9-3 Troubleshooting Flowchart for LEV and Solenoid Valves

(1) LEV



Troubleshooting flow chart for solenoid valve body



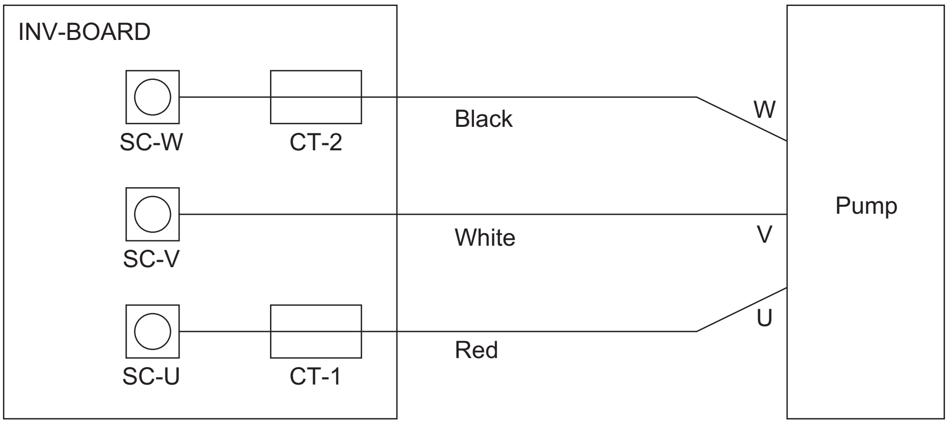
8-9-4 Water Pump

Check the connector and make sure that it is connected properly.

If the supply voltages are correct, and the control signal is being sent and the pump will still not operate the likely causes are:

- Coil failure - replace pump. If the windings have been damaged the pump will require replacing.
- Internal mechanical failure such as bearing failure, turbine failure, magnet degradation. This will require pump replacement.

Before replacement the causes must be investigated and resolved. The pump shaft bearings and magnets can be easily damaged by overheating due to dry running or water system blockage. Check the strainer for blockage, investigate the water circuit for blockage and or foreign material, and that there is no air in the system or an uncontrolled leak.



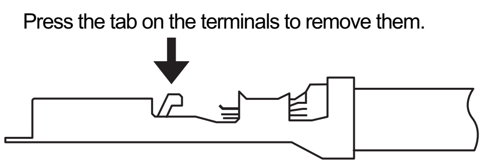
8-10 Troubleshooting Inverter Problems

8-10-1 Inverter-Related Problems and Solutions

- Replace only the compressor if only the compressor is found to be defective. (Overcurrent will flow through the inverter if the compressor is damaged, however, the power supply is automatically cut when overcurrent is detected, protecting the inverter from damage. Make sure that the model selection switches on the outdoor unit (Dip switches SW5-3 through 5-8 on the outdoor unit control board) are set correctly. For switch settings, refer to the following page(s). [7-9-2 Error Code [7101]])
- Replace only the fan motor if only the fan motor is found to be defective. (Overcurrent will flow through the inverter if the fan motor is damaged, however, the power supply is automatically cut when overcurrrent is detected, protecting the inverter from damage.)
- 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) Inside the inverter is a large capacity electrolytic capacitor, and the residual voltage that remains after the main power is turned off presents a risk of electric shock. Before inspecting the inside of the control box, turn off the power, leave the unit turned off for at least 10 minutes, and check that the voltage across pins 1 (+) and 5 (-) of relay connector RYPN has dropped to 20 VDC or less. (It takes approximately 10 minutes to discharge electricity after the power is turned off.)
2) Perform the service after disconnecting the relay connectors of the outdoor unit fan (RYFAN1 and RYFAN2). Before plugging in or unplugging connectors, check that the outdoor unit fan is not rotating and that the voltage across Pin 1 (+) and Pin 5 (-) of connector RYPN is 20 VDC or less. The capacitor may collect a charge and cause an electric shock when the outdoor unit fan rotates in windy conditions. Refer to the wiring nameplate for details.
3) Reconnect the relay connectors (RYFAN 1 and RYFAN 2) after completion of maintenance work.
4) 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.
5) To avoid damage to the circuit board, do not connect or disconnect the inverter-related connectors with the main power turned on.
6) Faston terminals have a locking function. Make sure the terminals are securely locked in place after insertion.



7) 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.
8) Faulty wiring to the compressor damages the compressor. Connect the wiring in the correct phase sequence.
9) When the power is turned on, the compressor is energized even while they are not operating. Before turning on the power, disconnect all power supply wires from the compressor terminal block, and measure the insulation resistance of the compressor. Check the compressor for a ground fault. If the insulation resistance is 1.0 MΩ or above, connect all power supply wires to the compressor, and turn on the power to the outdoor unit. (The liquid refrigerant in the compressor will evaporate by energizing the compressor.)

	Error display/failure condition	Measure/inspection item
[1]	Inverter related errors 4250, 4255, 4256, 4220, 4225, 4226, 4230, 4240, 4260, 5301, 5305, 5306, 0403	Implement solutions that correspond to the error codes or preliminary error codes. [7-1 Error Code and Preliminary Error Code Lists]
[2]	Main power breaker trip	Refer to the following page(s). [8-10-16 Solutions for the Main Breaker Trip]
[3]	Main power earth leakage breaker trip	Refer to the following page(s). [8-10-17 Solutions for the Main Earth Leakage Breaker Trip]
[4]	Only the compressor does not operate.	Check the inverter frequency on the LED monitor. If the frequency indicates that the units are in operation, refer to the following page(s). [8-10-5 Checking the Inverter for Damage during Compressor Operation]
[5]	The compressor vibrates violently at all times or makes an abnormal sound.	Refer to the following page(s). [8-10-5 Checking the Inverter for Damage during Compressor Operation]
[6]	Compressor rotation speed does not reach the specified speed.	<1> Check for problems with compressor current and heatsink temperature.
		<2> Check for imbalance in power supply voltage. *Approximate target: 3% or less.
[7]	Only the fan motor does not operate.	Check the inverter frequency on the LED monitor. If the frequency indicates that the units are in operation, refer to the following page(s). [8-10-8 Checking the Fan Board Error Detection Circuit at No Load] [8-10-9 Checking the Fan Board for Damage at No Load] [8-10-10 Checking the Fan Board for Damage with Load]
[8]	The fan motor shakes violently at all times or makes an abnormal sound.	Check the inverter frequency on the LED monitor. If the frequency indicates that the units are in operation, refer to the following page(s). [8-10-8 Checking the Fan Board Error Detection Circuit at No Load] [8-10-9 Checking the Fan Board for Damage at No Load] [8-10-10 Checking the Fan Board for Damage with Load]
[9]	Only the hydro unit pump does not work.	When the hydro unit is in operation, see related pages. [8-10-12 Checking the Error-Detection Circuit on the Pump INV Board (Without load)] [8-10-13 Checking the Pump INV Board for Damage (Without load)] [8-10-14 Checking the Pump INV Board for Damage (During pump operation)]
[10]	Only the hydro unit pump always vibrates greatly or emits abnormal noise.	
[11]	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 problem suddenly appeared, inverter output may have had a ground fault. For details, refer to the following page(s). [8-10-5 Checking the Inverter for Damage during Compressor Operation]
		*Contact the factory for cases other than those listed above.
[12]	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.

8-10-2 Checking the Inverter Board Error Detection Circuit

Items to be checked	Phenomena	Remedy
(1) Stop the unit. Remove power supply.	1) Overcurrent error Error code: 4250 Detail code: No. 101, 104, 105, 106, and 107	Replace the INV board.
(2) Disconnect the inverter output wires from the compressor terminals (U, V, W).*1	2) Logic error Error code: 4220 Detail code: No. 111	Replace the INV board.
(3) Apply power supply.	3) ACCT sensor circuit failure Error code: 5301 Detail code: No.117	Replace the INV board.
(4) Put the outdoor unit into operation.	4) IPM open Error code: 5301 Detail code: No.119	Normal

*1 Output voltage is present at the inverter output wiring terminal. To avoid short-circuiting and ground fault, do not let the terminal come in contact with the unit or the compressor, and use caution not to damage the terminal.

*2 Compressors on P200, P250, and P300 models are located in the back of the MAIN BOX. To disconnect the inverter output wiring, move the MAIN BOX out of the way first, and then disconnect the wiring from the terminal on the compressor. Refer to [8-13-1 Ensuring Maintenance Space (Preparation for the Maintenance of Refrigerant Circuit Parts)] for how to move the MAIN BOX.

8-10-3 Checking the Compressor for Ground Fault and Coil Resistance Problems

Items to be checked	Phenomena	Remedy
Disconnect the compressor wiring, and check the compressor Meg, and coil resistance.	1) Compressor Meg failure Error if less than 1 MΩ.	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 0.192 Ω (20°C [68°F]): (E)M200 to (E)M350 models Coil resistance value of 0.219 Ω (20°C [68°F]): (E)M400 to (E)M500 model	Replace the compressor.

8-10-4 Checking the Inverter for Damage at No-Load

Items to be checked	Phenomena	Remedy
(1) Stop the unit. Remove power supply.	1) Inverter-related problems are detected.	Set SW7-1 on the MAIN board to ON, and go to [8-10-2 Checking the Inverter Board Error Detection Circuit].
(2) Disconnect the inverter output wires from the compressor terminals (U, V, W).*1	2) Inverter voltage is not output at the terminals (U, V, and W)	Replace the INV board.
(3) Set SW7-1 on the MAIN board to ON. (4) Apply power supply.	3) There is an voltage imbalance between the wires. Greater than 5% imbalance or 5V	Replace the INV board.
(5) Put the outdoor unit into operation. Check the inverter output voltage after the inverter output frequency has stabilized.	4) There is no voltage imbalance between the wires.	Normal *When done checking, set SW7-1 on the MAIN board back to as it was.

*1 Output voltage is present at the inverter output wiring terminal. To avoid short-circuiting and ground fault, do not let the terminal come in contact with the unit or the compressor, and use caution not to damage the terminal.

*2 Compressors on M200, M250, and M300 models are located in the back of the MAIN BOX. To disconnect the inverter output wiring, move the MAIN BOX out of the way first, and then disconnect the wiring from the terminal on the compressor. Refer to [8-13-1 Ensuring Maintenance Space (Preparation for the Maintenance of Refrigerant Circuit Parts)] for how to move the MAIN BOX.

8-10-5 Checking the Inverter for Damage during Compressor Operation

Items to be checked	Phenomena	Remedy
Put the outdoor unit into operation. Check the inverter output voltage (at the compressor terminal) after the inverter output frequency has stabilized. <INV35Y, 42Y>	1) Overcurrent-related problems occur immediately after compressor startup. Error code : 4250 Detail code : 101, 102, 106, 107	a. Check items [8-10-2 Checking the Inverter Board Error Detection Circuit] through [8-10-4 Checking the Inverter for Damage at No-Load] for problems. b. Check that high and low pressures are balanced. c. Check that no liquid refrigerant is present in the compressor and that there is no liquid backflow. →Go to "d." when the problem persists after compressor startup was repeated several times. d. Check that there is a pressure difference between high and low pressures after compressor startup. →Check the high pressure with LED monitor for changes. Replace the compressor if there is no pressure difference. (the compressor may be locked.)
	2) There is a voltage imbalance between the wires after the inverter output voltage is stabilized. Greater than the larger of the following values: imbalance of 5% or 5V	Replace the INV board if there is a voltage imbalance. Check the belt heater for problems if there is no voltage imbalance. →When the error occurred, liquid refrigerant may have been present in the compressor.

Items to be checked	Phenomena	Remedy
<INV37YC>	3) An overcurrent error occurs during operation. Error code : 4250 Detail code : 121,122	[8-10-6 Checking the Converter for Damage during Compressor Operation]
	4) An overcurrent error occurs immediately after compressor startup. Error code : 4250 Detail code :101,106,107,128	a. Check for refrigerant flooding. →When the problem persists after compressor startup was repeated several times, go to "d" after a certain time after energizing the compressor or the heater. If normal operation is restored, check the belt heater for problems. b. Check that there is a pressure difference between high and low pressures after compressor startup. →Check the high pressure with LED monitor for changes. Replace the compressor if there is no pressure difference. (the compressor may be locked.) c. Check for interphase voltage imbalance. d. Replace the INV board if no problems were found with the items a or c. e. If the problem persists after replacing the inverter board, [8-10-3 Checking the Compressor for Ground Fault and Coil Resistance Problems]
	5) An overvoltage error occurs during operation. Error code : 4220 Detail code :109,110,112	[8-10-6 Checking the Converter for Damage during Compressor Operation]
	6) No problems were found with items 1) through 5).	Normal [8-10-6 Checking the Converter for Damage during Compressor Operation]

8 Troubleshooting Based on Observed Symptoms

8-10-6 Checking the Converter for Damage during Compressor Operation

Items to be checked	Phenomena	Remedy
(1) Operate the outdoor unit.	1) BUS voltage does not boost (does not change) BUS voltage does not boost to approximately between 650 and 750 VDC, or the following errors are detected. Error code : 4220 Detail code : 123	Replace the inverter board.
(2) Check the BUS voltage after the converter circuit went into operation and the BUS voltage has boost. *The voltage generally boost at or above 80 rps, depending on the power source voltage.	2) An overcurrent error occurs after converter circuit goes into operation. Error code : 4250 Detail code : 121,122	a. If the problem persists after startup, replace the inverter board. b. If the problem persists after replacing the inverter board, replace the DCL.
	3) An overvoltage error occurs after converter circuit goes into operation. Error code : 4220 Detail code : 109,110,112	a. If the problem persists after startup, replace the inverter board. b. If the problem persists after replacing the inverter board, replace the DCL.
	4) No problems were found with items 1) through 3).	Normal

8-10-7 Checking the Fan Motor for Ground Fault and Coil Resistance Problems

Items to be checked	Phenomena	Remedy
Remove fan motor winding. Check insulation resistance and coil resistance.	1) Fan motor insulation failure. If < 1 MΩ, Defect.	Change fan motor.
	2) Fan motor wire failure. Target coil resistance: Approx. 10 Ω. (Changes with temperature)	Change fan motor.

8-10-8 Checking the Fan Board Error Detection Circuit at No Load

Items to be checked	Phenomena	Remedy
(1) Stop the unit. Turn off the breaker. *Be sure to turn off the power.	1) An error other than current sensor error (5305, 5306: Detail code 135) is detected during operation.	Replace the fan board.
(2) Disconnect the output wiring to the fan motor. Disconnect connector RYFAN1. (On a model with two fan motors, RYFAN1 corresponds to the right fan and RYFAN2 corresponds to the left fan (when seen from the front).) (3) Turn on the breaker. (4) Operate the unit.	2) Current sensor fault Error code: 5305, 5306 Detail code: 135	Normal *When done checking, reconnect all connectors as they were. Unless they are properly reconnected, current sensor fault will not be resolved.

8-10-9 Checking the Fan Board for Damage at No Load

Items to be checked	Phenomena	Remedy
(1) Stop the unit. Turn off the breaker. *Be sure to turn off the power.	1) An error other than the current sensor error (5305, 5306 Detail code 135) is detected within 30 seconds from the startup of operation.	Replace the fan board.
(2) To allow for the disconnection of output wiring from the fan motor, disconnect connector RYFAN1. (On a model with two fan motors, RYFAN1 corresponds to the right fan and RYFAN2 corresponds to the left fan (when seen from the front).)	2) Inter-wire voltage imbalance of 5 V or above	Replace the fan board.
(3) Set SW7-2 on the control board to ON. On a model with two fan motors, set SW7-2 (left fan when seen from the front) or SW7-4 (right fan when seen from the front) to ON. (4) Turn on the breaker. (5) Operate the unit	3) No inter-wire voltage imbalance exists. A current sensor error (Detail code 135) is detected 30 seconds after the startup of operation, and the operation stops.	Normal *When done checking, reconnect all connectors as they were. Unless they are properly reconnected, current sensor fault will not be resolved.

8-10-10 Checking the Fan Board for Damage with Load

Items to be checked	Phenomena	Remedy
(1) Turn off breaker.	1) The operation stops within 20 seconds of startup and a step-out error or an overcurrent error occurs. Check code: 4255, 4256 Detail code: 101, 106, 107, 137	Check for fan motor lock. →If locked, change for fan motor. If the same error is still present after changing fan motor, change Fan board. →If not locked, refer to 3) & 4).
(2) Turn on breaker.	2) Motor synchronization loss or electrical current overload during operation Check code: 4255, 4256 Detail code: 101, 106, 107, 137	a. Check for gusts or windy conditions. b. Go to [8-10-8 Checking the Fan Board Error Detection Circuit at No Load]if not windy. c. After checking [8-10-9 Checking the Fan Board for Damage at No Load], and there is no problem, change Fan board. d. If replacing Fan board doesn't resolve issue, change fan motor.
(3) Operate unit.	3) Sensor error during operation Check code: 5305, 5306 Detail code: 135, 136	a. Check for disconnection of fan inverter output wiring and for broken wiring. b. If the error is not associated with any of the items above, replace the fan board. c. Change fan motor if Fan board change doesn't resolve issue.
	4) Voltage overload error Check code: 4225, 4226 Detail code: 109	a. Check for gusts or windy conditions. b. Change Fan board if it is not windy.
	5) Load short circuit Check code: 4255, 4256. Detail code: 105	a. Check [8-10-7 Checking the Fan Motor for Ground Fault and Coil Resistance Problems] and [8-10-8 Checking the Fan Board Error Detection Circuit at No Load]. If no problem, then check wiring forshort circuit. b. If there is no problem with item a. above, change fan motor. c. If same error after motor change, change Fan board.
	6) After RPM has stabilized, voltage unbalance of 5%, or 5V.	a. If voltage is unbalanced, go to [8-10-8 Checking the Fan Board Error Detection Circuit at No Load] b. After checking [8-10-9 Checking the Fan Board for Damage at No Load], and there is no problem, change Fan board. c. If replacing Fan board doesn't resolve issue, change fan motor.

8-10-11 Checking the Pump Motor for Ground Fault and Coil Resistance Problems

Items to be checked	Phenomena	Remedy
Remove pump motor winding. Check insulation resistance and coil resistance.	1) Pump motor insulation failure. If < 1 MΩ, Defect.	Replace the pump
	2) Pump motor wire failure. Target coil resistance: Approx. 10 Ω. (Changes with temperature)	Replace the pump

8-10-12 Checking the Error-Detection Circuit on the Pump INV Board (Without load)

Items to be checked	Phenomena	Remedy
<INV32>	1) IPM/overcurrent cut-off error occurs. Check code: 4250 Detail code: 101, 104, 105, 106, 107, 128	Replace the INV board.
1) Disconnect the inverter output wiring from the INV board terminals (SC-U, SC-V, SC-W).	2) Logic error occurs. Check code: 4220 Detail code: 111	Replace the INV board.
2) Operate the outdoor unit and the hydro unit.	3) Sensor-related circuit error occurs. Check code: 5301 Detail code: 117, 127	Replace the INV board.
	4) Open-circuited IPM error occurs. Check code: 5301 Detail code: 119	Normal

8-10-13 Checking the Pump INV Board for Damage (Without load)

Items to be checked	Phenomena	Remedy
<INV32>	1) Inverter-related error is detected.	Set SW 1-1 on the INV board to OFF, and go to [8-10-12 Checking the Error-Detection Circuit on the Pump INV Board (Without load)].
1) Disconnect the inverter output wiring from the INV board terminals (SC-U, SC-V, SC-W).	2) Inverter voltage is not output.	Replace the INV board.
2) Set SW 1-1 on the INV board to ON.	3) Line voltage imbalance of at least 5% or 5 V occurs.	Replace the INV board.
3) Operate the outdoor unit and the hydro unit. Wait until the inverter output frequency is stabilized, and then check the inverter output voltage.	4) No line voltage imbalance exists.	Normal *Check the voltage, and set SW 1-1 on the INV board to OFF.

8-10-14 Checking the Pump INV Board for Damage (During pump operation)

Items to be checked	Phenomena	Remedy
Operate the outdoor unit and the hydro unit. Wait until the inverter output frequency is stabilized, and then check the inverter output voltage.	1) Overcurrent-related error occurs immediately after the startup of the pump or during operation of the pump. Check code: 4250 Detail code: 101, 102, 103, 106, 107	a. Check that the results of the check items in [8-10-11 Checking the Pump Motor for Ground Fault and Coil Resistance Problems] through [8-10-13 Checking the Pump INV Board for Damage (Without load)] are OK. →If the error persists after several compressor restarts, go to "b." b. After the startup of the compressor, check the high and low pressures for a proper differential pressure. (Water pressure) If a proper differential pressure does not exist, replace the pump. (The pump may be locked.)
	2) After the inverter output voltage is stabilized, line voltage imbalance of at least 5% or 5 V occurs.	If line voltage imbalance exists: <INV32> Replace the INV board.

8-10-15 Checking the Installation Conditions

Items to be checked	Phenomena	Remedy
(1) Check refrigerant charge.	Overcharge of refrigerant	Return to correct refrigerant charge.
(2) Check outdoor unit branch installation.	The branch approach <500 mm.	Make branch approach >500mm
	Is the branch angle < ±15° to horizontal?	Make branch angle < ±15°

8-10-16 Solutions for the Main Breaker Trip

	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 the following page(s). [8-10-18 Simple Check on Inverter Circuit Components] •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 [8-10-2 Checking the Inverter Board Error Detection Circuit] - [8-10-10 Checking the Fan Board for Damage with Load]
		2) Main power breaker trip	

8-10-17 Solutions for the Main Earth Leakage Breaker Trip

	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 TB1 with a megger.	Failure resistance value	Check each part and wiring. Refer to the following page(s). [8-10-18 Simple Check on Inverter Circuit Components] •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 MΩ 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 MΩ or less.	Replace the fan motor.

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.

8-10-18 Simple Check on Inverter Circuit Components

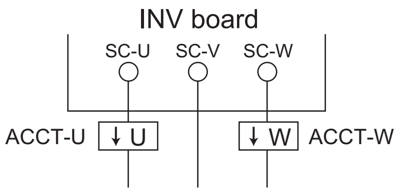
Note

Turn off the power to the unit, and leave it turned off for at least 10 minutes. Check that the voltage across pins 1 (+) and 5 (-) of the connector RYPN1 is 20 VDC or less before removing components from the control box.

<table>
<tr><th>Part name</th><th>Judgment method</th></tr>
<tr><td>IGBT module</td><td>Refer to the following page(s). [8-10-19 Troubleshooting Problems with IGBT Module]</td></tr>
<tr><td>Rush current protection resistor
R1, R5</td><td>Measure the resistance between terminals R1 and R5: 22 Ω±10%</td></tr>
<tr><td>Electromagnetic relay
72C</td><td>This electromagnetic relay is rated at DC12V and is driven by a coil.
Check the resistance between terminals

M200-M450


<table>
<tr><th></th><th>Check point</th><th>Checking criteria</th></tr>
<tr><td>Coil</td><td>INV board
X901, X902
Across pins 1-2</td><td>160Ω ± 10%</td></tr>
<tr><td>Contact</td><td>INV board
FT-P1 and FT-P2
*Faston terminal removed</td><td>INV board CNRY
Open: ∞
INV board CNRY
At a voltage input of 12 VDC: 0Ω</td></tr>
</table>
M500


<table>
<tr><th></th><th>Check point</th><th>Checking criteria</th></tr>
<tr><td>Coil</td><td>INV board
X101, X102, X103
Across pins 1-2</td><td>160Ω ± 10%</td></tr>
<tr><td>Contact</td><td>INV board
FT100 and FT101
*Faston terminal removed</td><td>INV board CNRY
Open: ∞
INV board CNRY
At a voltage input of 12 VDC: 0Ω</td></tr>
</table>
</td></tr>
<tr><td>DC reactor
DCL</td><td>Measure the resistance between terminals: 1Ω or lower (almost 0 Ω)
Measure the resistance between terminals and the chassis: ∞</td></tr>
<tr><td>Current sensor
ACCT</td><td>Disconnect the wiring connector from CNCT2, and measure the inter-teminal resistance: 280Ω±30Ω
Between pins 1 and 2 (U-phase), pins 3 and 4 (W-phase)


*Check ACCT wiring for correct phase and direction.</td></tr>
</table>

8-10-19 Troubleshooting Problems with 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 (∞ Ω) or not shorted (to 0 Ω).
- 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.

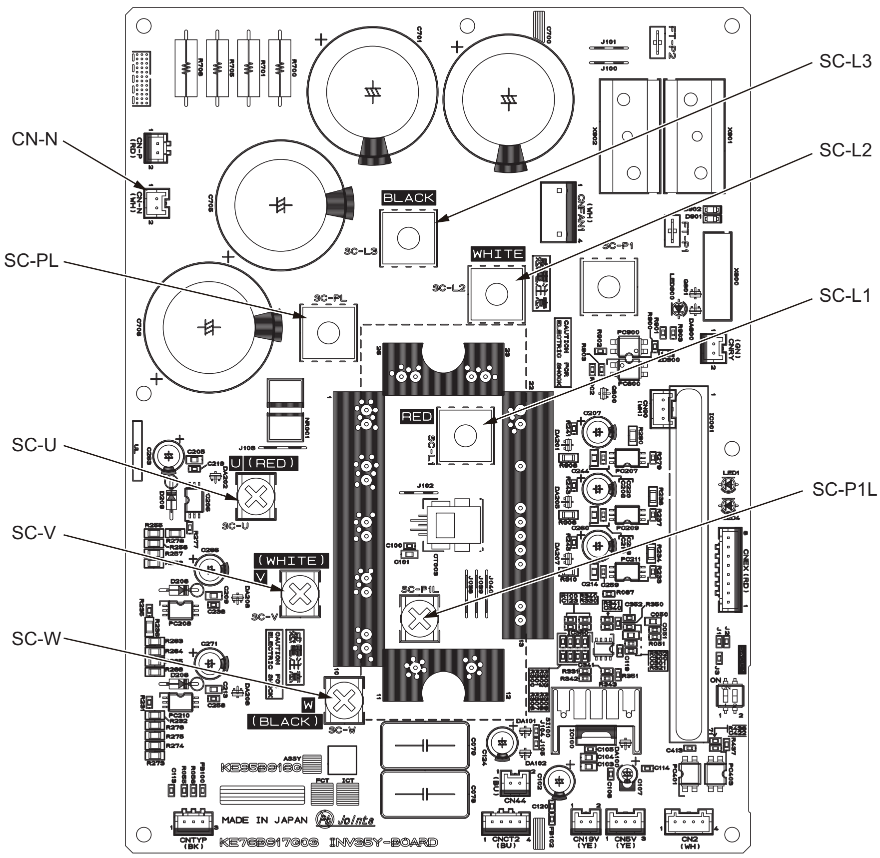
<INV35Y>

Reference resistance value

		Black (+)				
		SC-PL	CN-N	SC-L1	SC-L2	SC-L3
Red (-)	SC-PL	-	-	5-200 Ω	5-200 Ω	5-200 Ω
	CN-N	-	-	∞	∞	∞
	SC-L1	∞	5-200 Ω	-	-	-
	SC-L2	∞	5-200 Ω	-	-	-
	SC-L3	∞	5-200 Ω	-	-	-

		Black (+)				
		SC-P1L	CN-N	SC-U	SC-V	SC-W
Red (-)	SC-P1L	-	-	5-200 Ω	5-200 Ω	5-200 Ω
	CN-N	-	-	∞	∞	∞
	SC-U	∞	5-200 Ω	-	-	-
	SC-V	∞	5-200 Ω	-	-	-
	SC-W	∞	5-200 Ω	-	-	-

INV board outline drawing



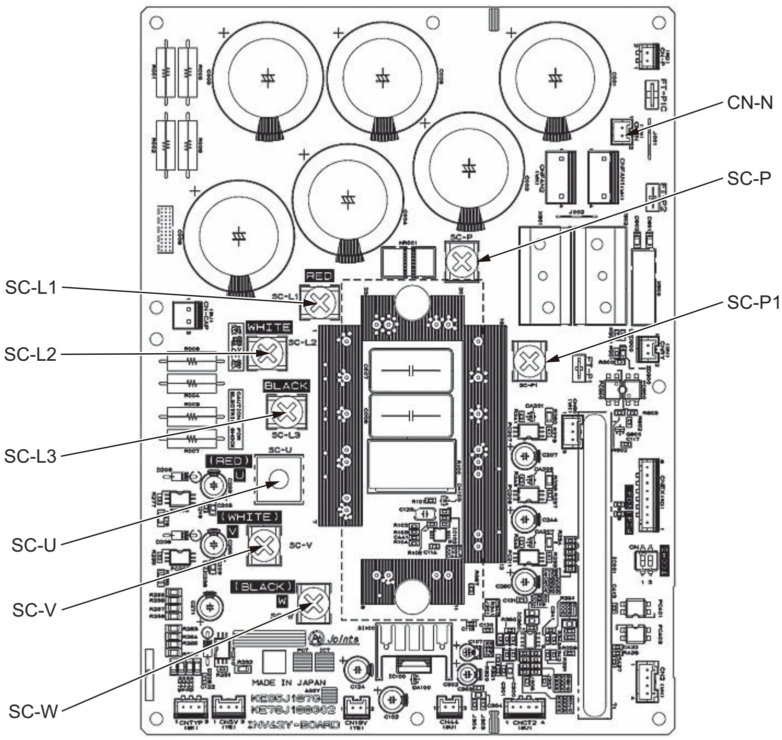
<INV42Y>

Reference resistance value

		Black (+)				
		SC-P	CN-N	SC-L1	SC-L2	SC-L3L
Red (-)	SC-P	-	-	5-200 Ω	5-200 Ω	5-200 Ω
	CN-N	-	-	∞	∞	∞
	SC-L1	∞	5-200 Ω	-	-	-
	SC-L2	∞	5-200 Ω	-	-	-
	SC-L3	∞	5-200 Ω	-	-	-

		Black (+)				
		SC-P1	CN-N	SC-U	SC-V	SC-W
Red (-)	SC-P1	-	-	5-200 Ω	5-200 Ω	5-200 Ω
	CN-N	-	-	∞	∞	∞
	SC-U	∞	5-200 Ω	-	-	-
	SC-V	∞	5-200 Ω	-	-	-
	SC-W	∞	5-200 Ω	-	-	-

INV board outline drawing



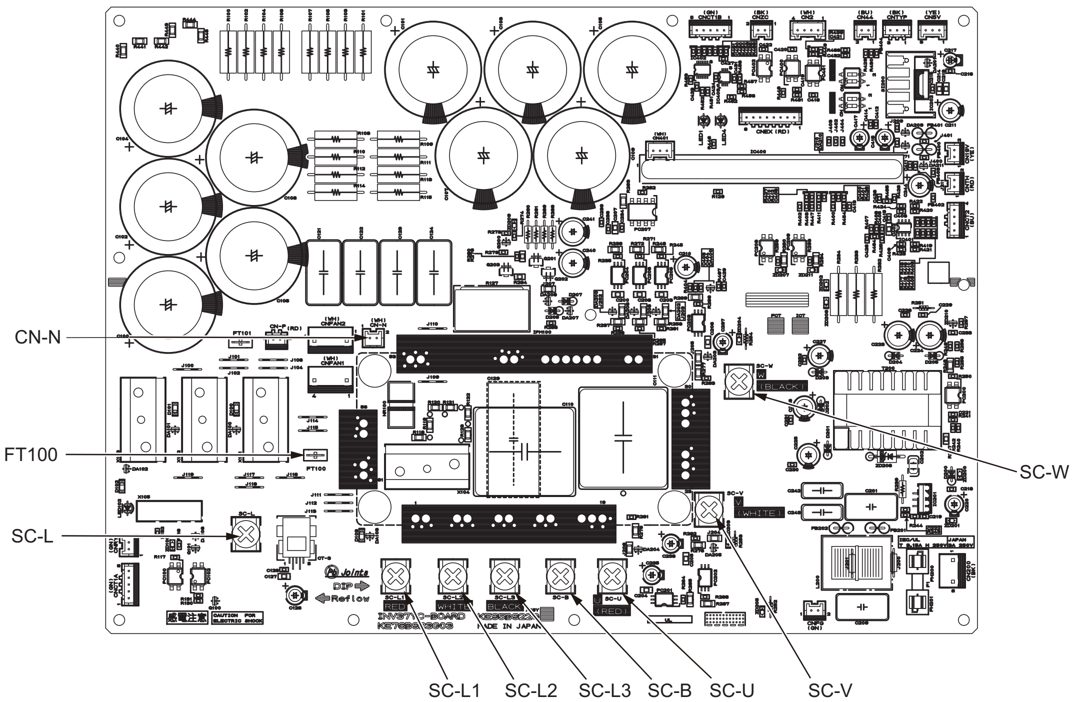
<INV37YC>

Reference resistance value

		Black (+)						
		SC-L1	SC-L2	SC-L3	SC-B	SC-L	FT100	CN-N
Red (-)	SC-L1	-	-	-	-	∞	-	5-200 Ω
	SC-L2	-	-	-	-	∞	-	5-200 Ω
	SC-L3	-	-	-	-	∞	-	5-200 Ω
	SC-B	-	-	-	-	-	∞	-
	SC-L	5-200 Ω	5-200 Ω	5-200 Ω	-	-	-	-
	FT100	-	-	-	5-200 Ω	-	-	-
	CN-N	∞	∞	∞	-	-	-	-

		Black (+)				
		FT100	CN-N	SC-U	SC-V	SC-W
Red (-)	FT100	-	-	5-200 Ω	5-200 Ω	5-200 Ω
	CN-N	-	-	∞	∞	∞
	SC-U	∞	5-200 Ω	-	-	-
	SC-V	∞	5-200 Ω	-	-	-
	SC-W	∞	5-200 Ω	-	-	-

INV board outline drawing



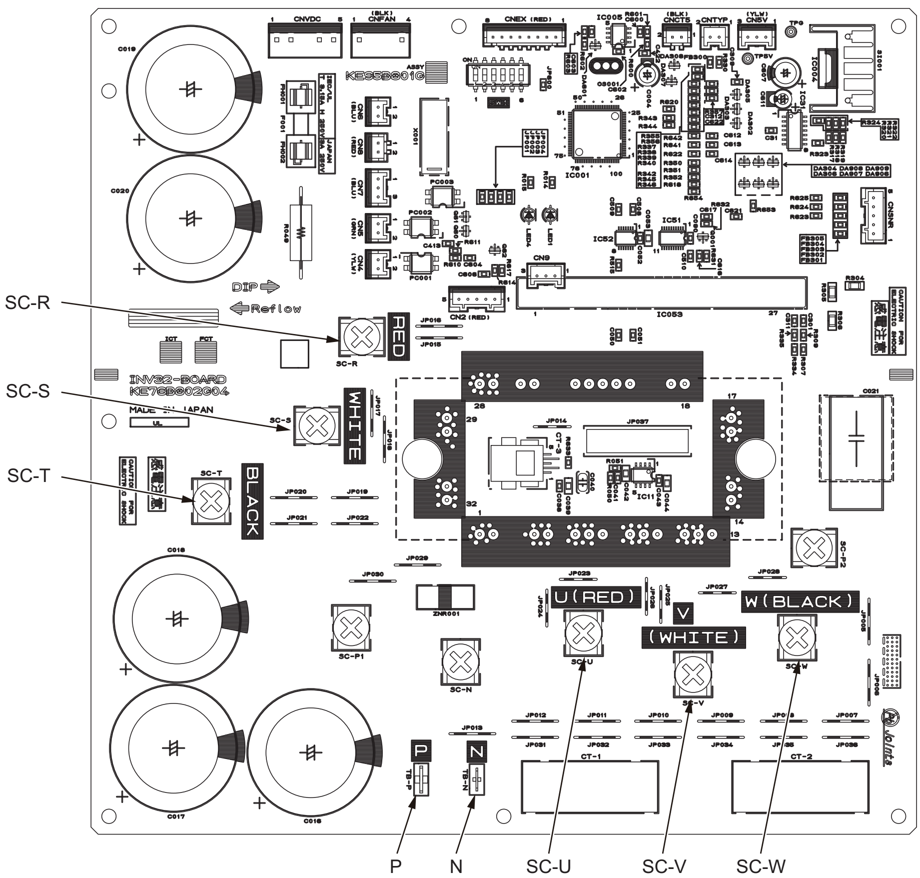
<INV32>

Reference resistance value

		Black (+)			
		P	N	SC-R	SC-T
Red (-)	P	-	-	5-200 Ω	5-200 Ω
	N	-	-	∞	∞
	SC-R	∞	5-200 Ω	-	-
	SC-T	∞	5-200 Ω	-	-

		Black (+)				
		P	N	SC-U	SC-V	SC-W
Red (-)	P	-	-	5-200 Ω	5-200 Ω	5-200 Ω
	N	-	-	∞	∞	∞
	SC-U	∞	5-200 Ω	-	-	-
	SC-V	∞	5-200 Ω	-	-	-
	SC-W	∞	5-200 Ω	-	-	-

INV board outline drawing

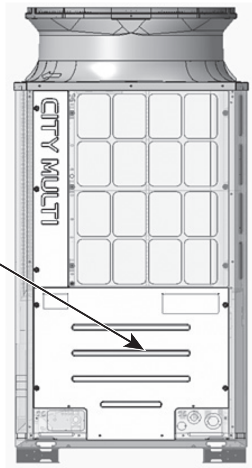


8-10-20 Checking the Fan Inverter Heatsink for Clogging

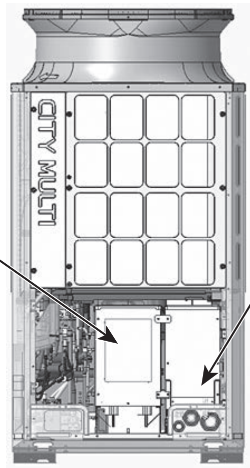
Check the fan inverter heatsink for clogging by removing part of the duct and checking inside the duct.

To remove the duct, follow the procedures 1) through 3) below.
Reassemble the components in the reverse order as they were removed.

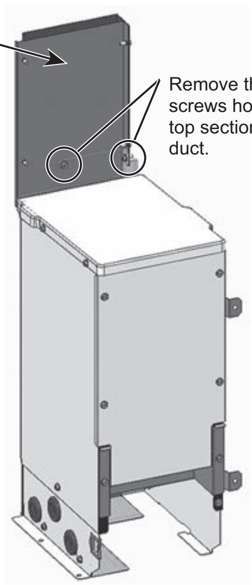
1) Remove the front service panel.



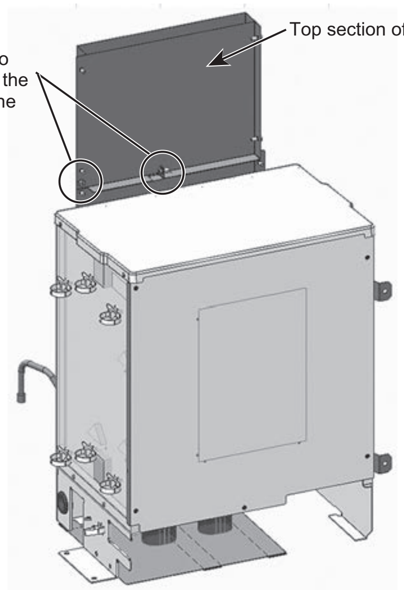
2) Remove the main control box (applicable to the (E)M200-300 models only).
On the (E)M350-500 models, it is not necessary to remove the control box.



3) Remove the upper section of the duct by unscrewing the screws on the control box (on the inverter box on the (E)M200-300 models) shown in the figure below.
Check inside the duct for clogging, and remove any foreign objects found.



(E)M200 - 300

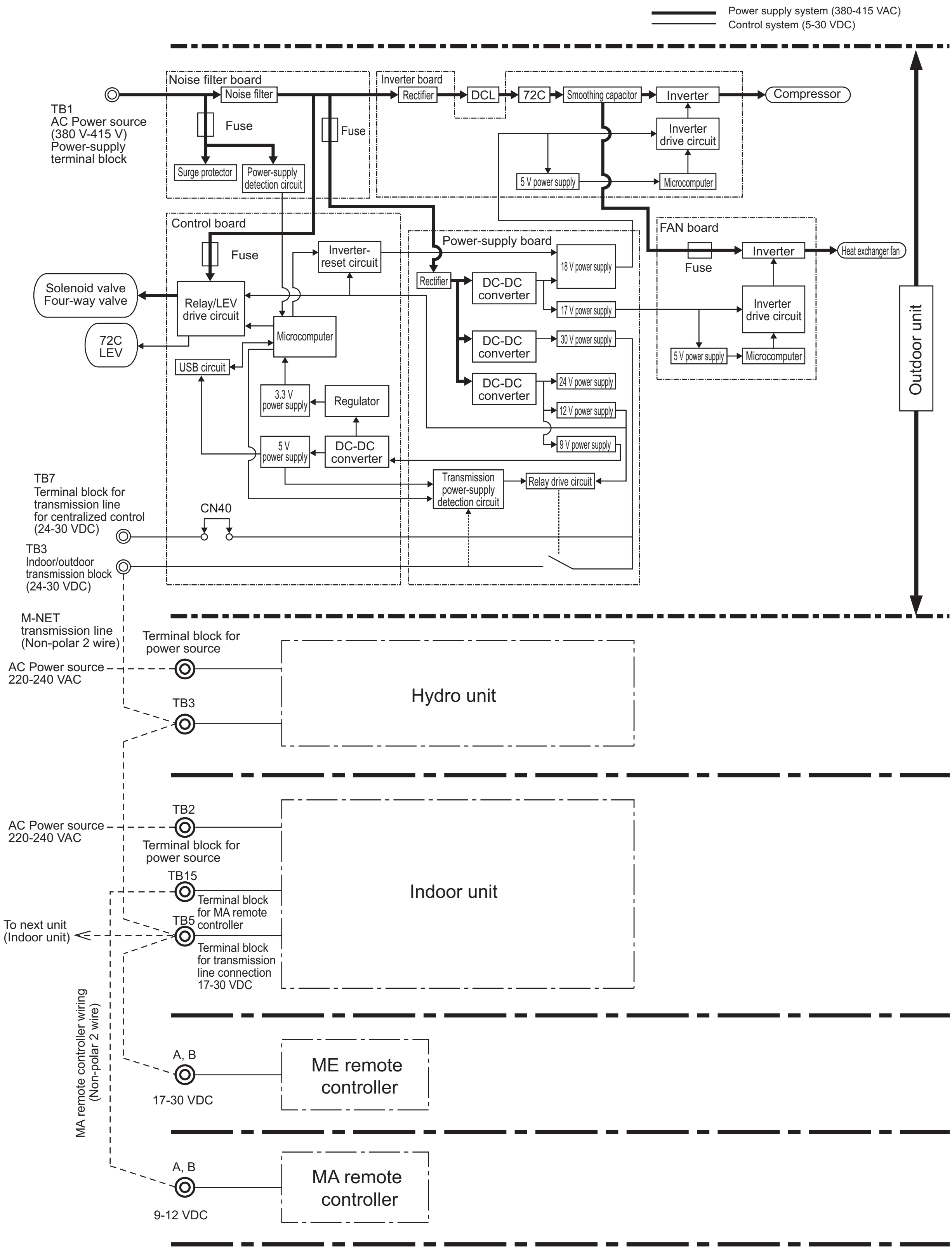


(E)M350 - 500

8-11 Control Circuit

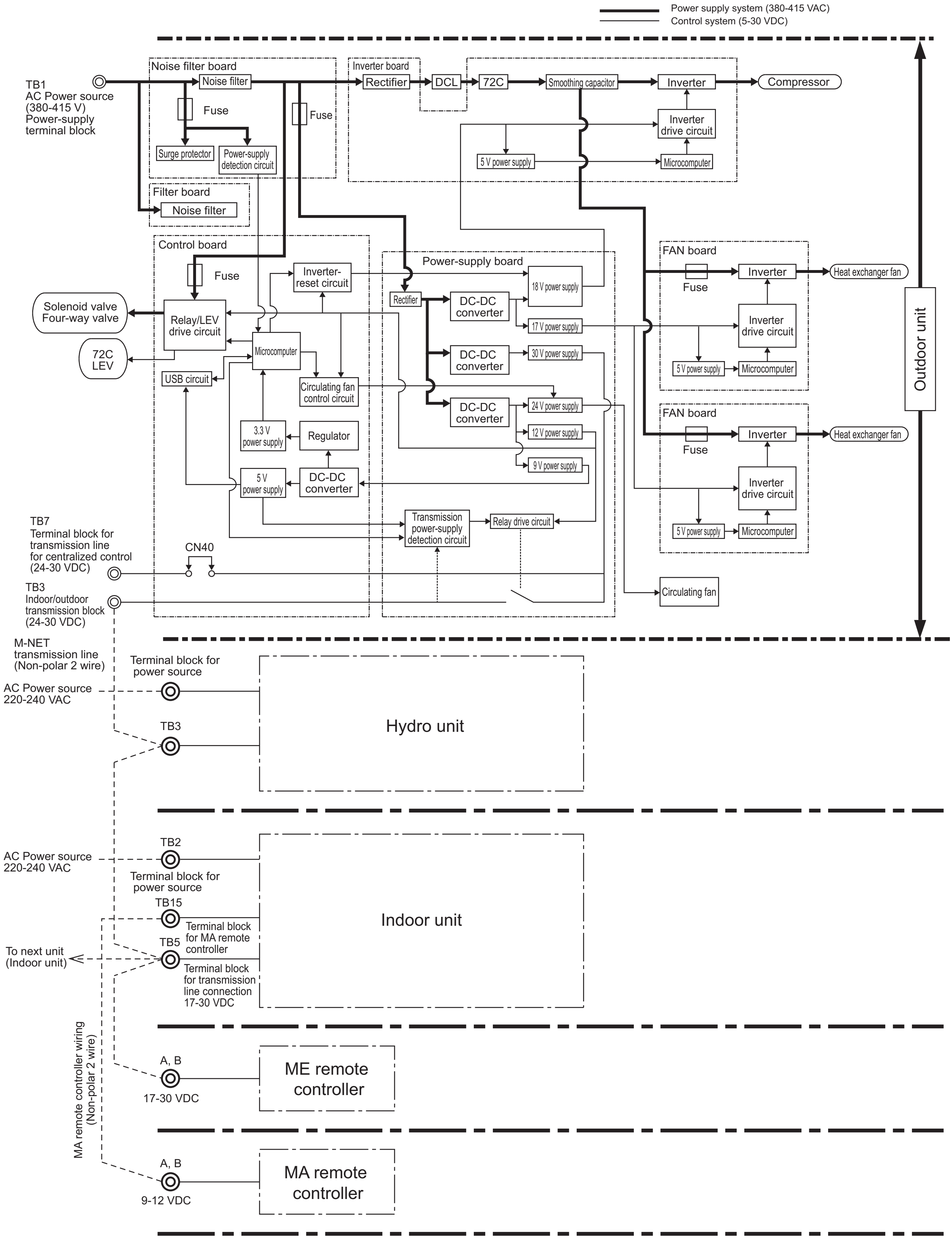
8-11-1 Control Power Supply Function Block

1) PUHY-(E)M200 - (E)M300YNW-A1



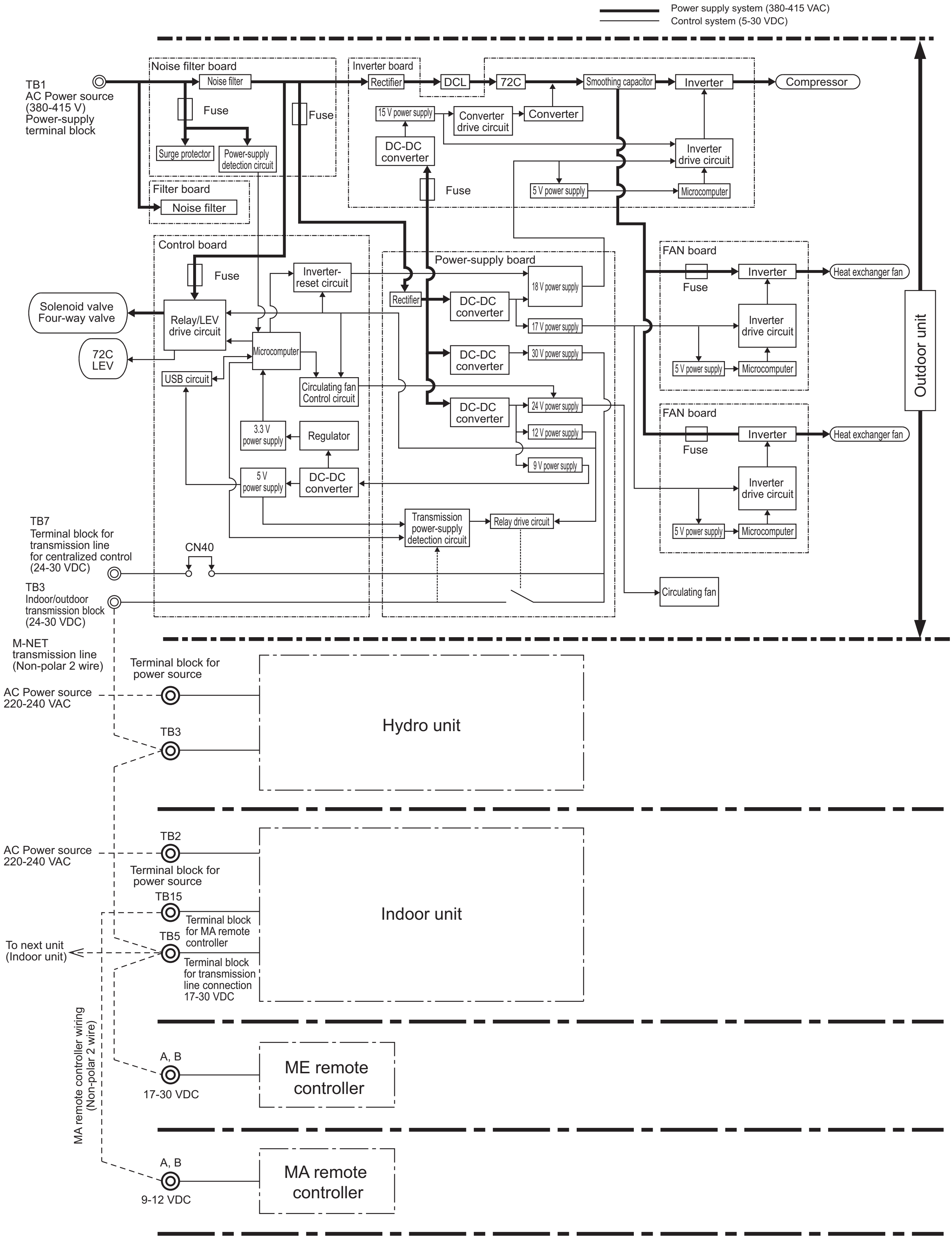
* MA remote controllers and ME remote controllers cannot be used together.
(Both the ME and MA remote controller can be connected to a system with a system controller.)

2) PUHY-(E)M350 - (E)M450YNW-A1



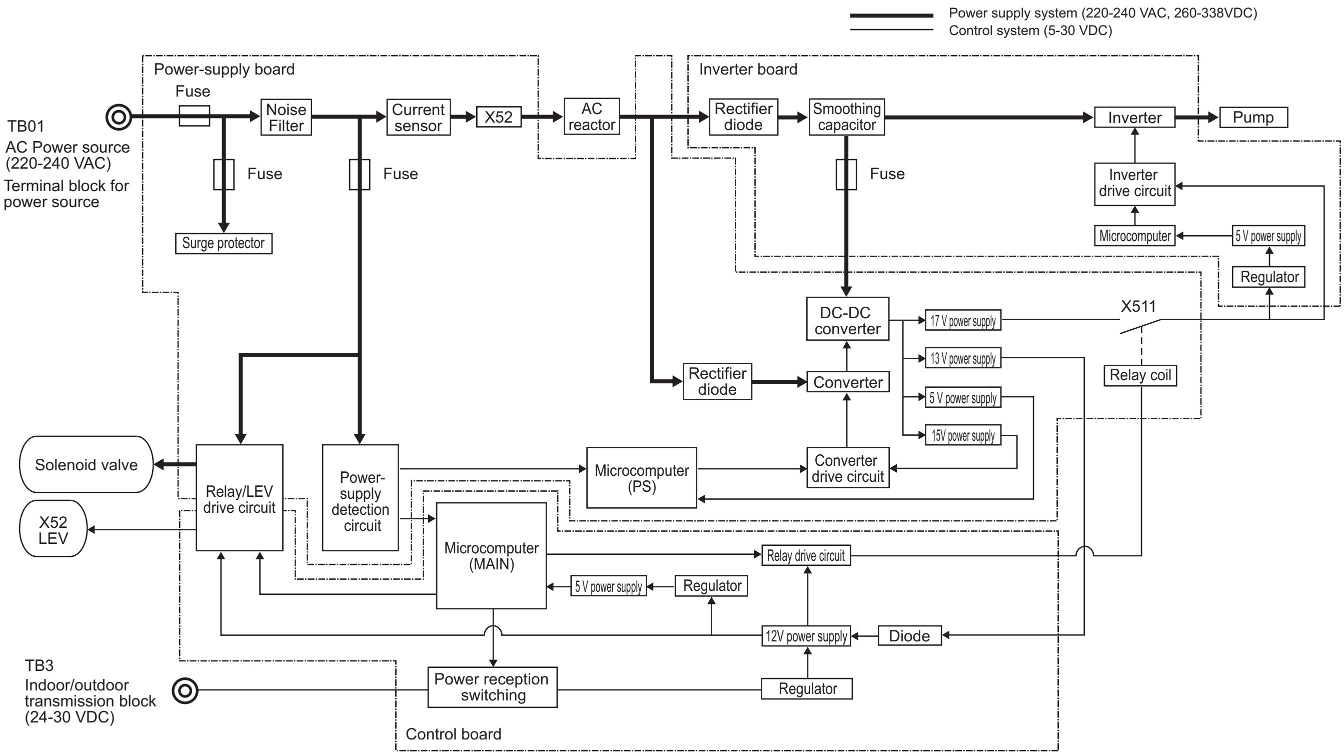
* MA remote controllers and ME remote controllers cannot be used together.
(Both the ME and MA remote controller can be connected to a system with a system controller.)

3) PUHY-(E)M500YNW-A1



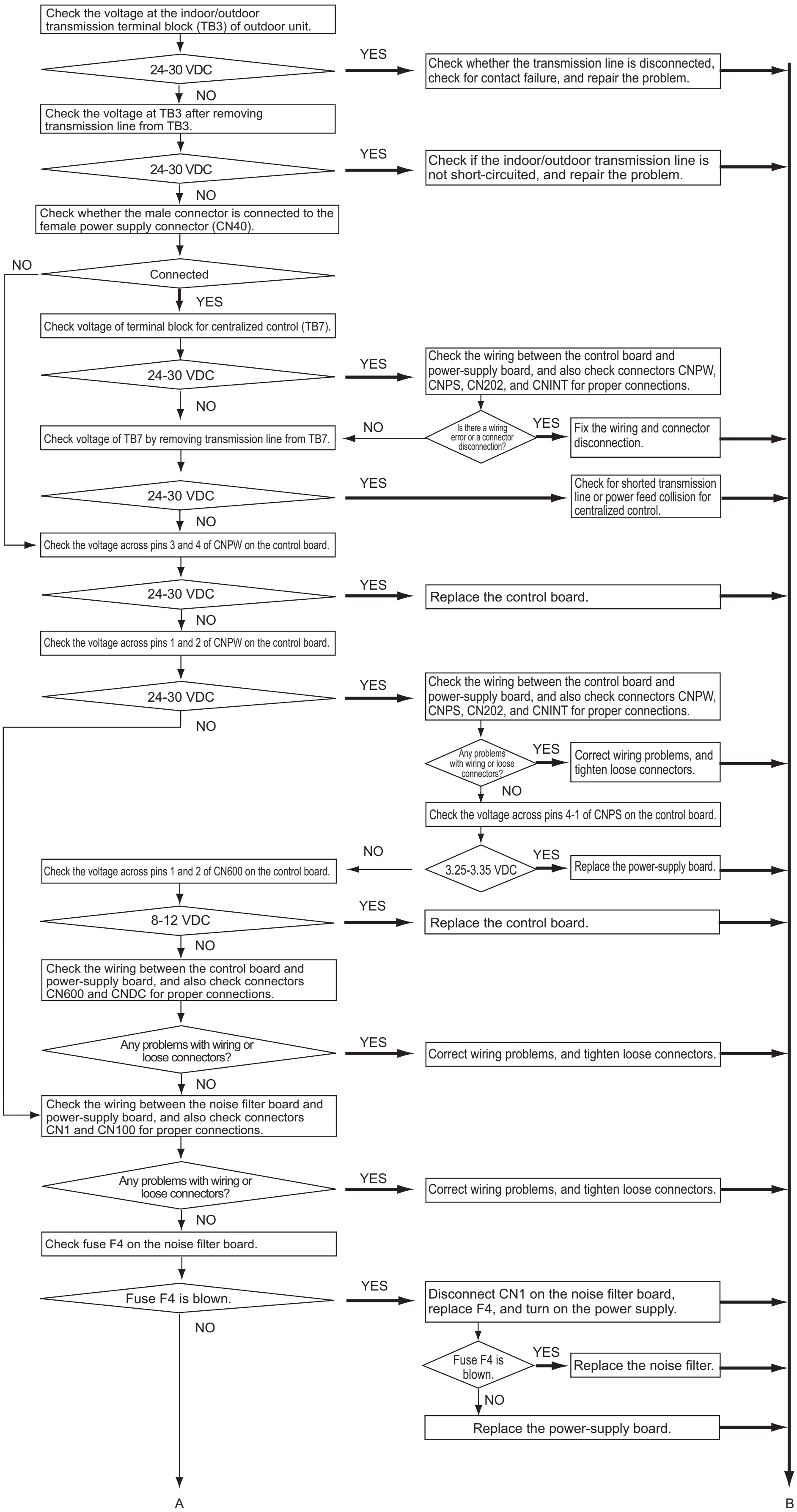
* MA remote controllers and ME remote controllers cannot be used together.
(Both the ME and MA remote controller can be connected to a system with a system controller.)

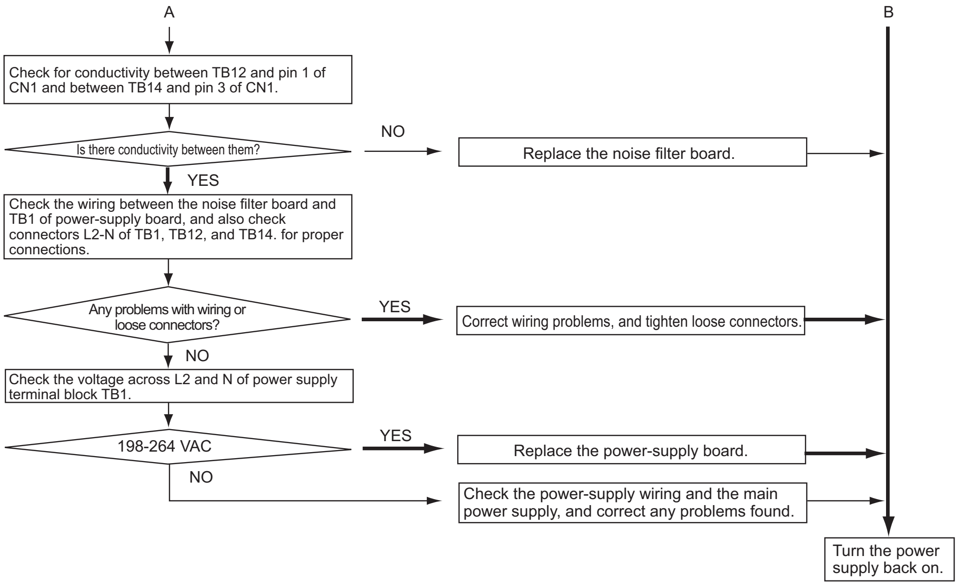
4) CMH-WM250 - WM500V-A



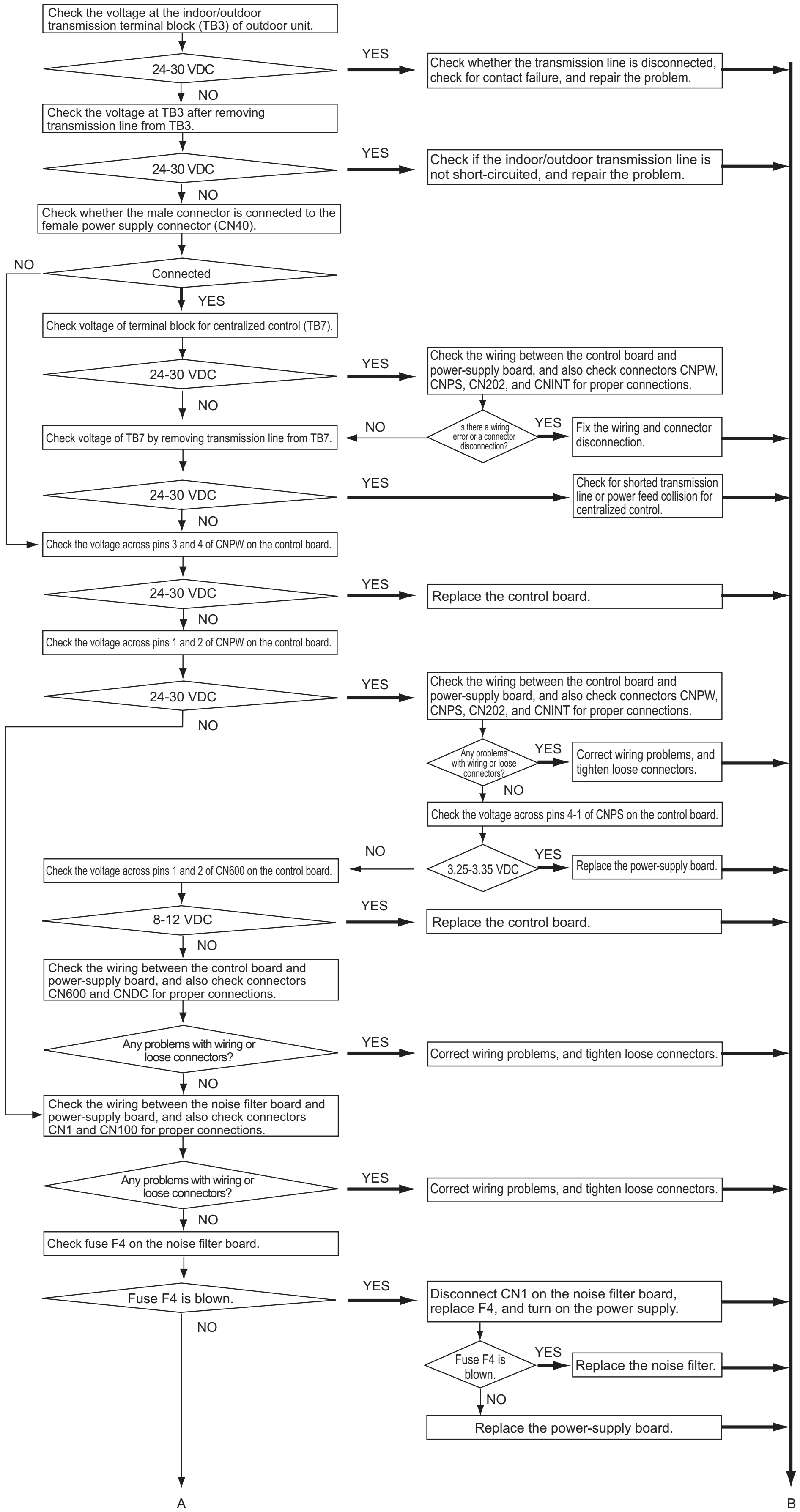
8-11-2 Troubleshooting Problems with Outdoor Unit Transmission Power Supply Circuit

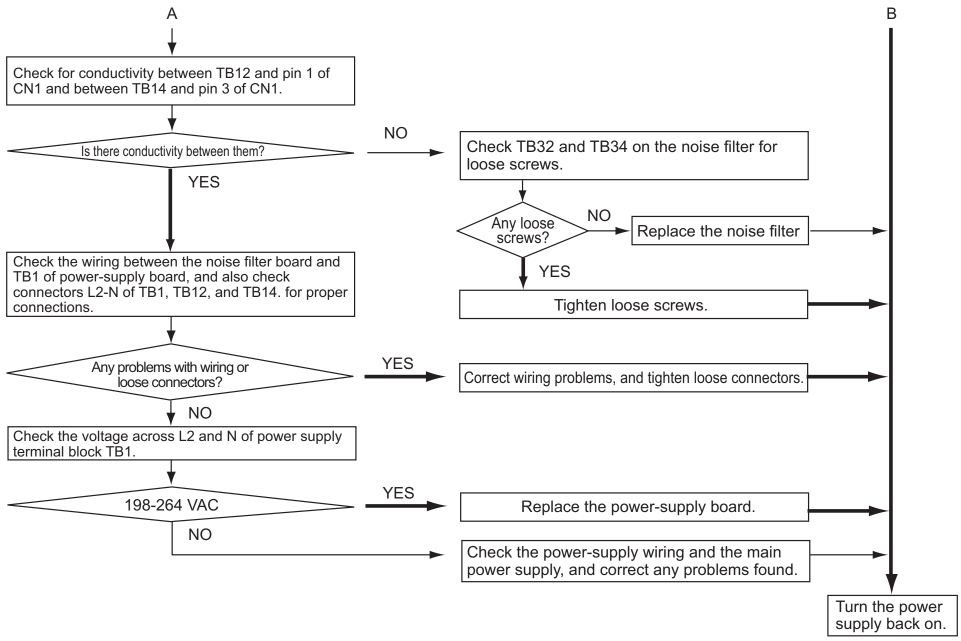
1) PUHY-(E)M200 - (E)M450YNW-A1




A
B
Check for conductivity between TB12 and pin 1 of CN1 and between TB14 and pin 3 of CN1.
Is there conductivity between them?
NO
Replace the noise filter board.
YES
Check the wiring between the noise filter board and TB1 of power-supply board, and also check connectors L2-N of TB1, TB12, and TB14. for proper connections.
Any problems with wiring or loose connectors?
YES
Correct wiring problems, and tighten loose connectors.
NO
Check the voltage across L2 and N of power supply terminal block TB1.
198-264 VAC
YES
Replace the power-supply board.
NO
Check the power-supply wiring and the main power supply, and correct any problems found.
Turn the power supply back on.

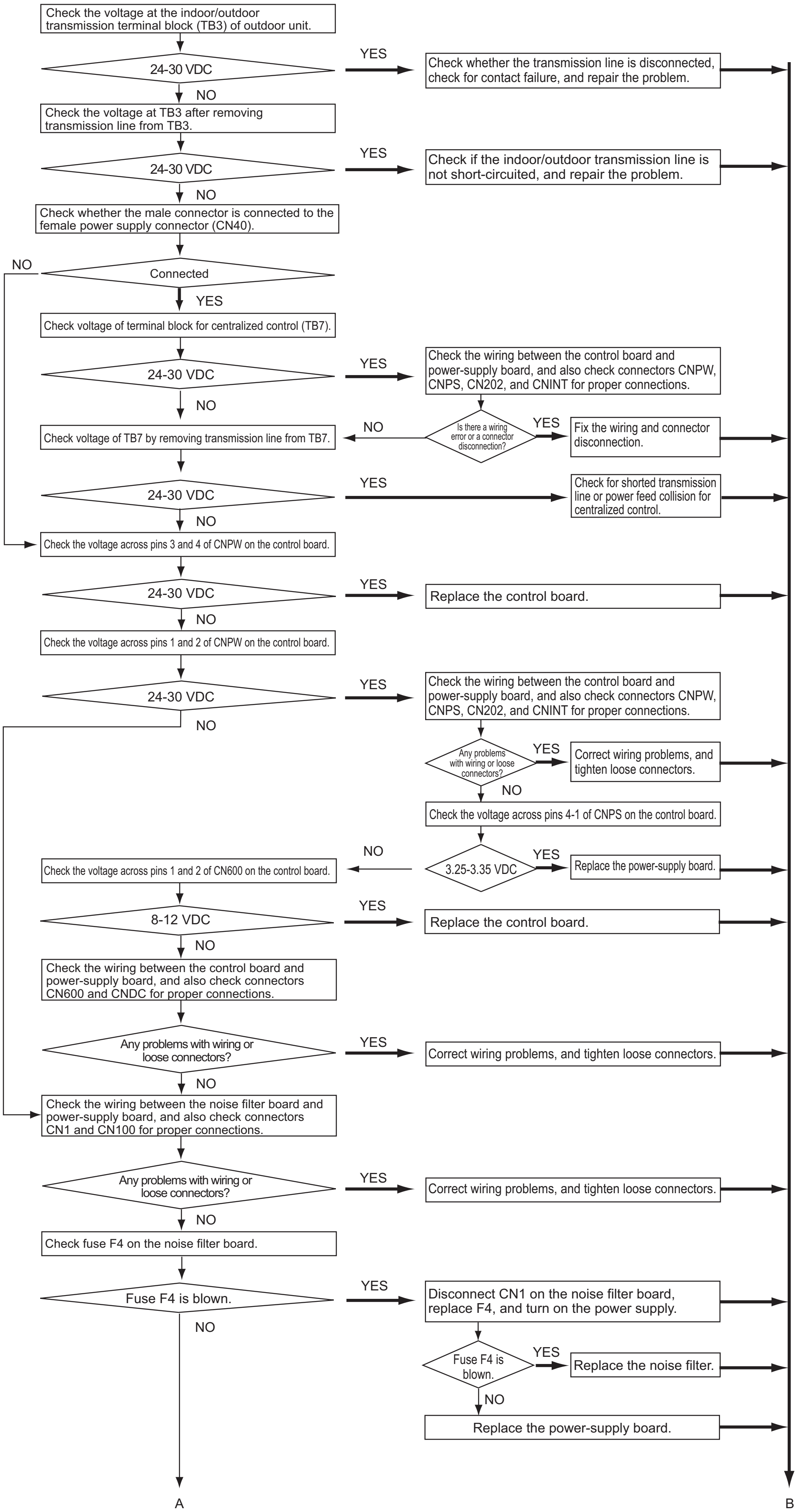
2) PUHY-(E)M500YNW-A1

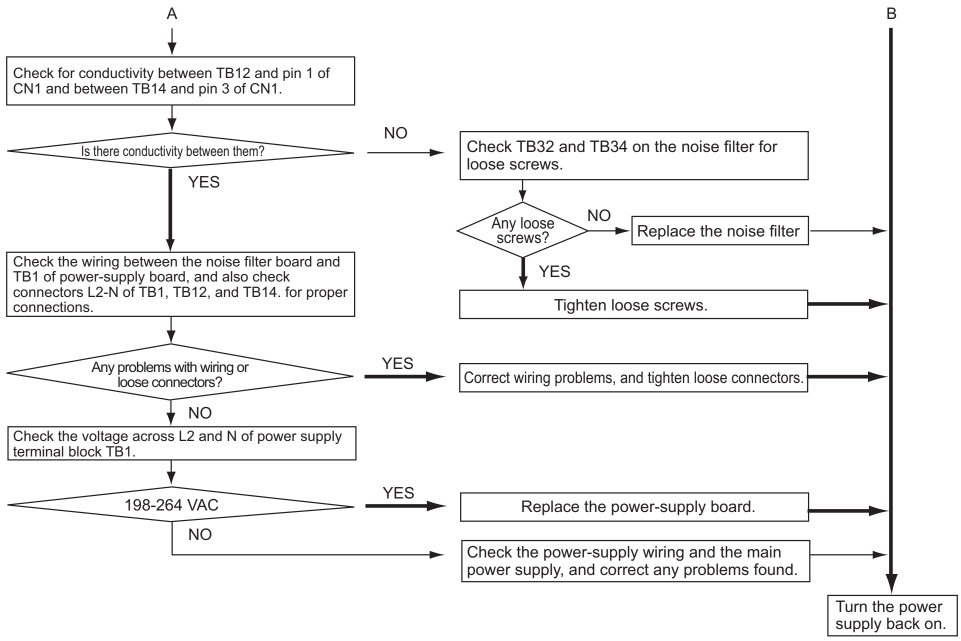




8 Troubleshooting Based on Observed Symptoms

3) CMH-WM250 - WM500V-A




A
B
Check for conductivity between TB12 and pin 1 of CN1 and between TB14 and pin 3 of CN1.
Is there conductivity between them?
NO
YES
Check TB32 and TB34 on the noise filter for loose screws.
Any loose screws?
NO
Replace the noise filter
YES
Tighten loose screws.
Check the wiring between the noise filter board and TB1 of power-supply board, and also check connectors L2-N of TB1, TB12, and TB14. for proper connections.
Any problems with wiring or loose connectors?
YES
Correct wiring problems, and tighten loose connectors.
NO
Check the voltage across L2 and N of power supply terminal block TB1.
198-264 VAC
YES
Replace the power-supply board.
NO
Check the power-supply wiring and the main power supply, and correct any problems found.
Turn the power supply back on.

8-12 Measures for Refrigerant Leakage

1. Leak spot: In the case of extension pipe, hydro unit, or optional 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 stopped.
3) Stop all the indoor units; turn on SW4 (912) 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 (SW4 (912) 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, hydro unit, or optional 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 hydro unit or optional unit.
9) To adjust refrigerant amount, open the service valves (BV1 and BV2) inside the outdoor unit and turn off SW4 (912).

2. Leak spot: In the case of outdoor unit (Cooling season)

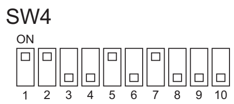
(1) Run all the indoor units in the cooling test run mode.

1) To run the indoor unit in test run mode, turn SW4 (769) 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.

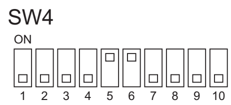
(2) Check the values of Tc and TH6. (To display the values on the LED screen, use the self-diagnosis switch (SW4 (when SW6-10 is set to OFF)) on the outdoor unit control board.)

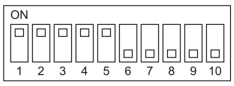
1) When Tc-TH6 is 10°C [18°F] or more: See the next item (3).
2) When Tc-TH6 is less than 10°C [18°F]: After the compressor stops, collect the refrigerant inside the system, repair the leak, perform evacuation, and recharge new refrigerant. (Leak spot: 4. In the case of outdoor unit, handle in the same way as heating season.)

Tc self-diagnosis switch



TH6 self-diagnosis switch





The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

(3) Stop all the indoor units, and stop the compressor.

1) To stop all the indoor units and the compressors, turn SW4 (769) 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.

In the cooling cycle, the section between check valve CV1 and LEV2 will form a closed circuit. Before recovering the refrigerant or evacuating the system, leave the unit in a stopped state for at least 30 minutes and then open LEV2 and switch SW4 (988) from OFF to ON so that LEV1 and LEV2 are in an open state. If this work is not performed, recovering the refrigerant or evacuating the system may not be possible. (After completion of work, set SW4 (988) from ON to OFF.)

(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 and optional unit.

(9) To adjust refrigerant amount, open the service valves (BV1 and BV2 when optional unit is installed) inside the outdoor unit.

Note

When the power to the outdoor/indoor unit must be turned off to repair the leak after closing the service valves specified in **(4)**, turn the power off in approximately one hour after the outdoor/indoor units stop.

1) When 30 minutes have passed after **(4)** on the previous page, the indoor unit lev turns from fully closed to slightly open to prevent the refrigerant seal.
LEV2 open 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.

3. Leak spot: In the case of extension pipe, hydro unit, or optional unit (Heating season)

(1) Run all the indoor units in heating test run mode.

1) To run the indoor unit in test run mode, turn SW4 (769) 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 heating mode.
3) Check that all the indoor units are performing a heating operation.

(2) Stop all the indoor units, and stop the compressor.

1) To stop all the indoor units and the compressors, turn SW4 (769) from ON to OFF when SW3-1 on the outdoor control board is ON.
2) Check that all the indoor units are stopped.

(3) Close the service valves (BV1 and BV2).

(4) Collect the refrigerant that remains inside extension pipe, hydro unit, and optional unit. Do not discharge refrigerant into the atmosphere when it is collected.

(5) Repair the leak.

(6) After repairing the leak, perform evacuation of the extension pipe for the hydro unit and optional unit, and open the service valves (BV1 and BV2) to adjust refrigerant.

4. Leak spot: In the case of outdoor unit (Heating season)

1) Collect the refrigerant in the entire system (outdoor unit, extended pipe, and hydro unit).Do not discharge refrigerant into the atmosphere when it is collected. **In the cooling cycle, the section between check valve CV1 and LEV2 will form a closed circuit. Before recovering the refrigerant or evacuating the system, leave the unit in a stopped state for at least 15 minutes and then open LEV2 and switch SW4 (988) from OFF to ON so that LEV1 and LEV2 are in an open state. If this work is not performed, recovering the refrigerant or evacuating the system may not be possible. (After completion of work, set SW4 (988) from ON to OFF.)**
2) Repair the leak.
3) After repairing the leak, perform evacuation of the entire system, and calculate the standard amount of refrigerant to be added (for the outdoor unit, extension pipe, and hydro unit), and charge the refrigerant. For details, refer to the following page(s). [6-3-3 Maximum refrigerant charge]

Note

If the indoor or outdoor units need to be turned off for repairing leaks during Step 1) above, turn off the power approximately 1 hour after the units came to a stop.
If the power is turned off in less than 15 minutes, LEV2 may close, trapping high-pressure refrigerant in the outdoor unit heat exchanger and creating a highly dangerous situation.

8-13 Parts Replacement Instructions

8-13-1 Ensuring Maintenance Space (Preparation for the Maintenance of Refrigerant Circuit Parts)

1. S-module

Take the following procedures to ensure sufficient maintenance space and good visibility.

(1) Remove the front panel from the unit by unscrewing the eight screws. (See Figure 1.) *Figure 1 shows the unit without the front panel.

(2) Remove the drain pan cover by unscrewing the screw and cutting the cable tie. (See Figures 2 and 3.)
When re-placing the drain pan cover after the completion of maintenance work, make sure that the silicon tube is properly placed on the defrost pipe, and then fix the drain pan cover in place with a cable tie. (Figures 2 and 3 show the cable ties to be cut.)

(3) Remove the drain pan by unscrewing the two screws. (See Figure 2.)
Be sure to remove the two rod holders holding the check joints to the drain pan. (See Figure 3.)

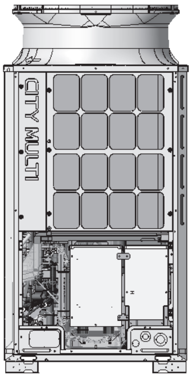


Figure 1

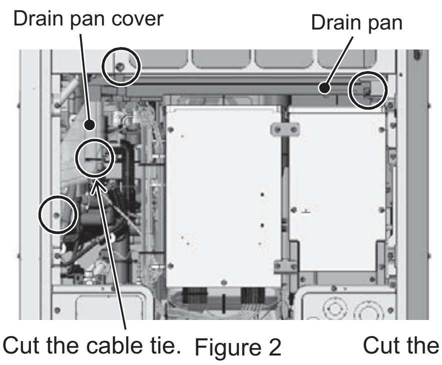


Figure 2

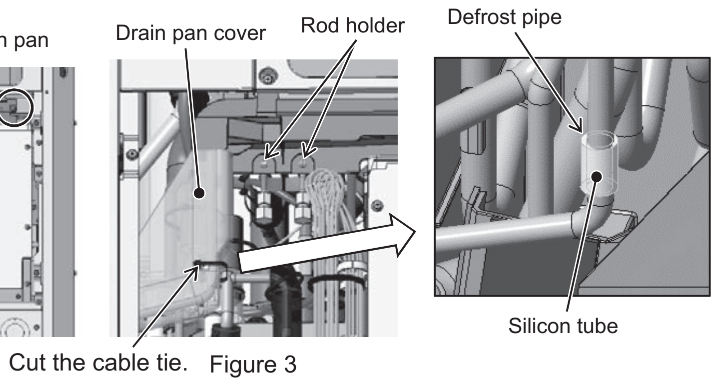


Figure 3

(4) Remove the top attachment connecting the main control box and the inverter control box by unscrewing the two screws. (See Figure 4.)

(5) Remove the bottom attachment connecting the main control box and the inverter control box by unscrewing the two screws. (See Figure 4.)

(6) Remove the cover from the main control box by unscrewing the three screws. (See Figure 5.)

(7) Cut the two cable ties holding the weak electrical wiring inside the main control box in place, and loosen the four cable straps holding the weak and strong electrical wirings. (See Figure 6.)

(8) Cut the two cable ties holding the rubber bush at the bottom of the main control box. (See Figure 6.)

(9) Cut the three cable ties and loosen the two cable straps holding the weak electrical wiring outside the main control box. (See Figure 7.)

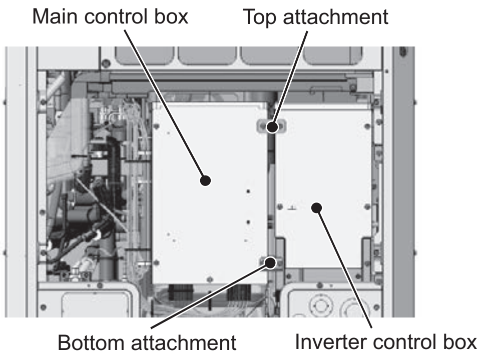


Figure 4

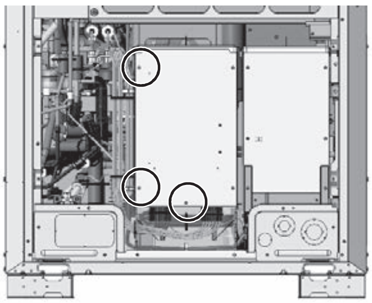


Figure 5

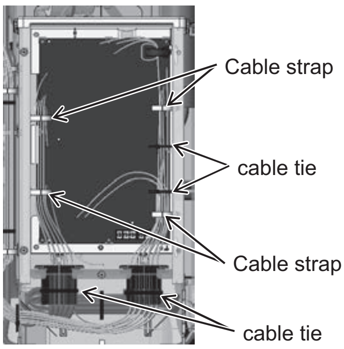


Figure 6

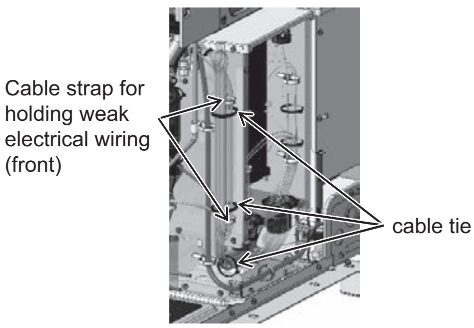


Figure 7

(10) Loosen the three cable straps holding the motor wiring outside and at the bottom of the main control box, and remove the wire from the two wire saddles. (See Figure 8.)
(11) Loosen the two cable straps holding the strong electrical wiring outside the main control box. (See Figure 9.)
(12) Cut the cable tie and loosen the two welding clamps holding the strong electrical wiring at the bottom of the main control box. (See Figure 10.)
(13) Unscrew the two screws holding the main control box. (See Figure 11.)

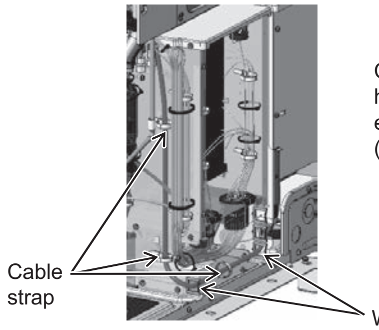


Figure 8

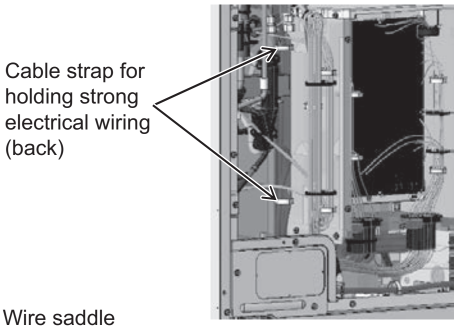


Figure 9

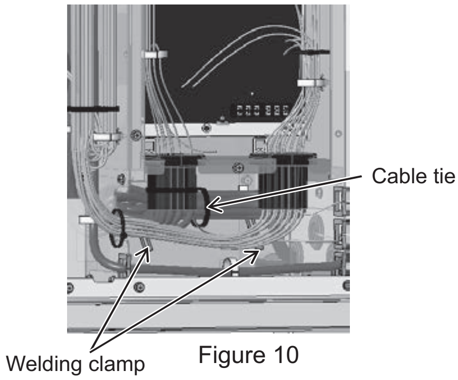


Figure 10

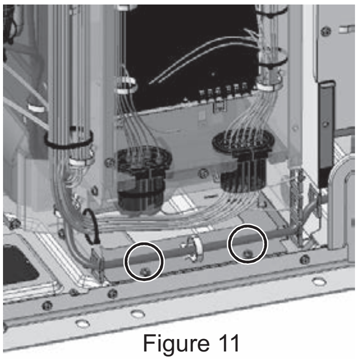


Figure 11

(14) Make sure that no undue force is applied to the wires from which cable straps were removed in steps (7) through (12). Position the bottom attachment that was removed in step (5) above on the fin guard as shown in Figure 13, and then hook the main control box on the attachment as shown in Figure 12.

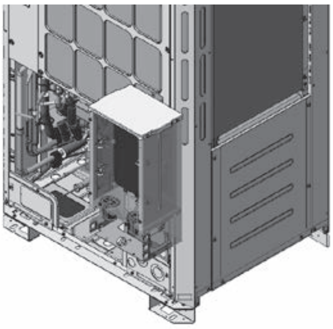


Figure 12

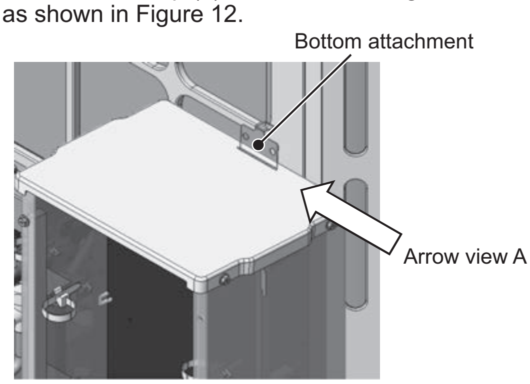
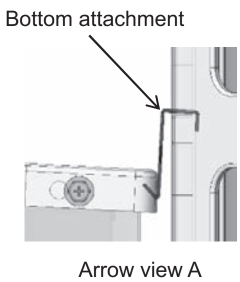


Figure 13



Arrow view A

(15) Place the excess weak and strong electrical wirings in the space at the base legs as shown in Figure 14 to keep them from being caught during maintenance work.

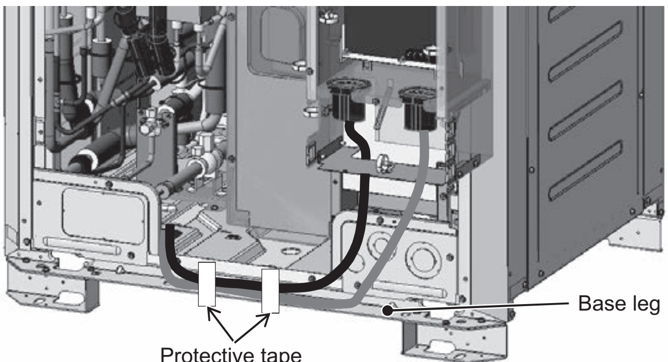


Figure 14

This step completes the procedure for ensuring maintenance space.

2. L-module

(1) Remove the front panel from the unit by unscrewing the 14 screws. (See Figure 1.) *Figure 1 shows the unit without the front panel.
(2) Remove the fin guard by unscrewing the 12 screws. (See Figure 1.)
(3) Remove the cable straps holding the weak and strong electrical wirings. (See Figure 2.)
(4) Remove the center pillar by unscrewing the five screws. (See Figure 1.)
(5) Remove the drain pan cover by unscrewing the screw and cutting the cable tie. (See Figures 2 and 3.)
When re-placing the drain pan cover, make sure that the silicon tube is properly placed on the defrost pipe, and then fix the drain pan cover in place with a cable tie.
(6) Remove the drain pan by unscrewing the two screws. (See Figure 2.)
Be sure to remove the two rod holders holding the check joints to the drain pan. (Figures 2 and 3 show the cable ties to be cut.)
(7) Remove the two cable straps holding the weak electrical wiring and the two cable straps holding the strong electrical wiring from the control box. (See Figure 4.)
(8) Place the excess weak and strong electrical wirings in the space at the base legs as shown in Figure 5 to keep them from being caught during maintenance work.

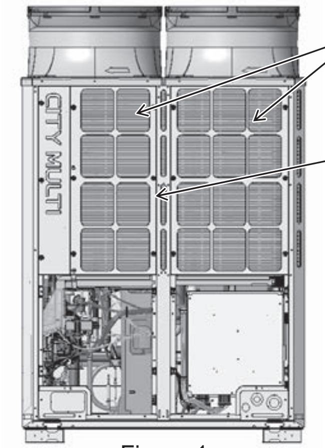


Figure 1

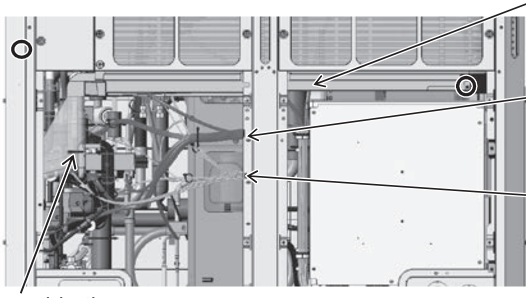


Figure 2

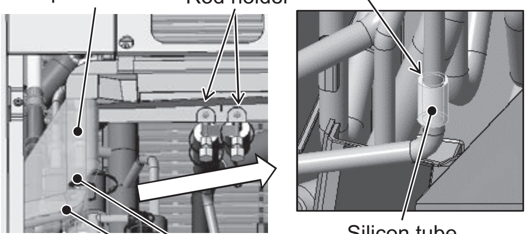


Figure 3

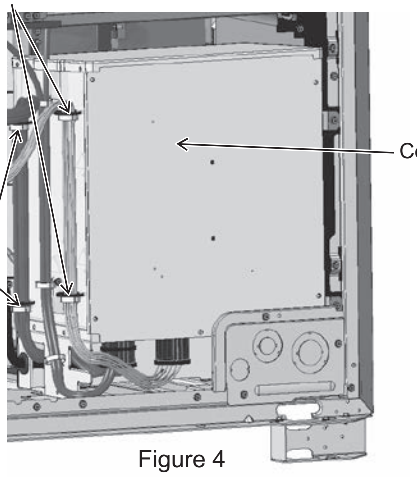


Figure 4

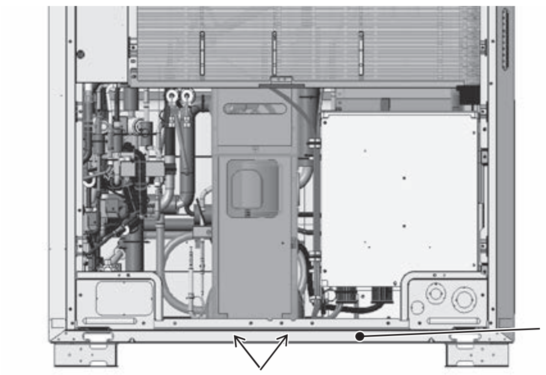


Figure 5

This step completes the procedure for ensuring maintenance space.

3. XL-module

Take the following procedures to ensure sufficient maintenance space and good visibility.

(1) Remove the front panel from the unit by unscrewing the 14 screws. (See Figure 1.)
(2) Remove the external temperature sensor wiring from the left drain pan by cutting the two cable ties.
Unhook the pipe cover from the left drain pan. (See Figure 3.)
(3) Remove the left drain pan by unscrewing the two screws. (See Figure 4.)
(4) Remove the right drain pan by unscrewing the two screws. (See Figure 5.)
(5) Remove the three cable straps from the center pillar. (See Figure 6.)
(6) Remove the right and left fin guards and the center pillar by unscrewing the 18 screws. (See Figure 7.)

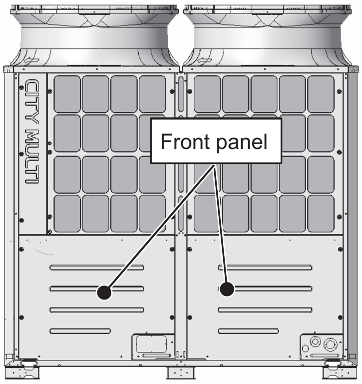


Figure 1

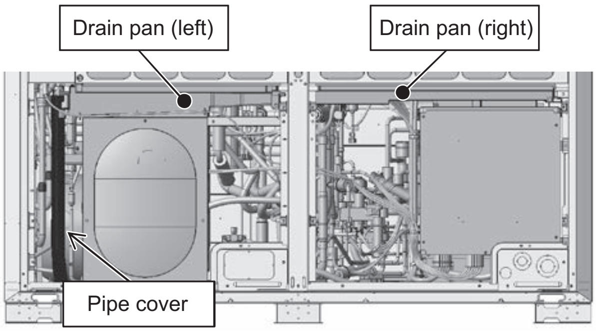


Figure 2

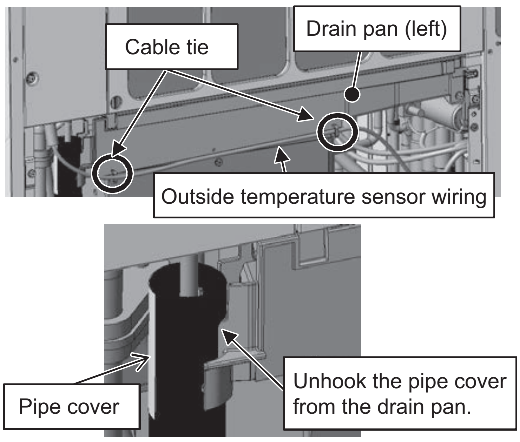


Figure 3

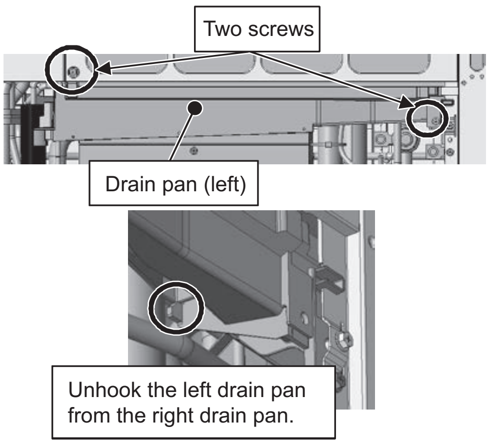


Figure 4

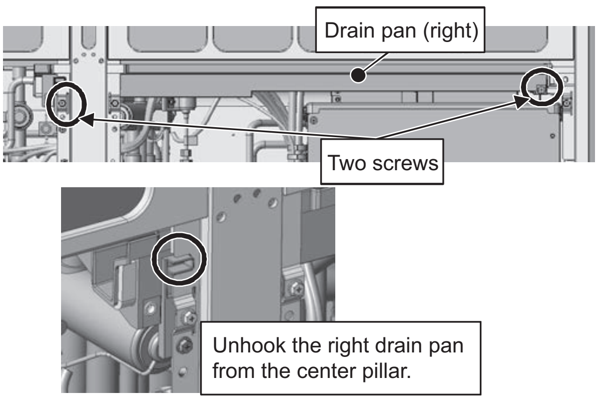


Figure 5

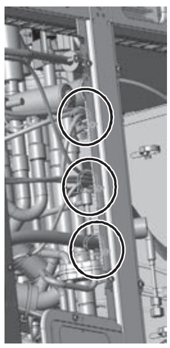


Figure 6

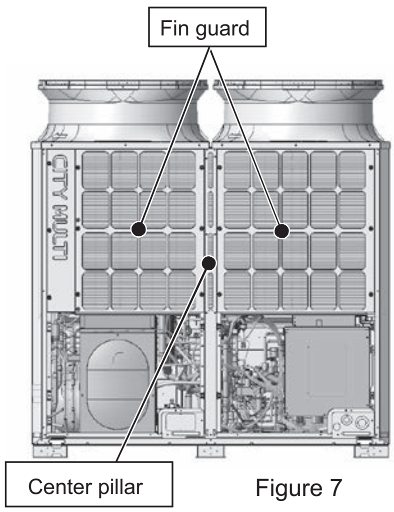


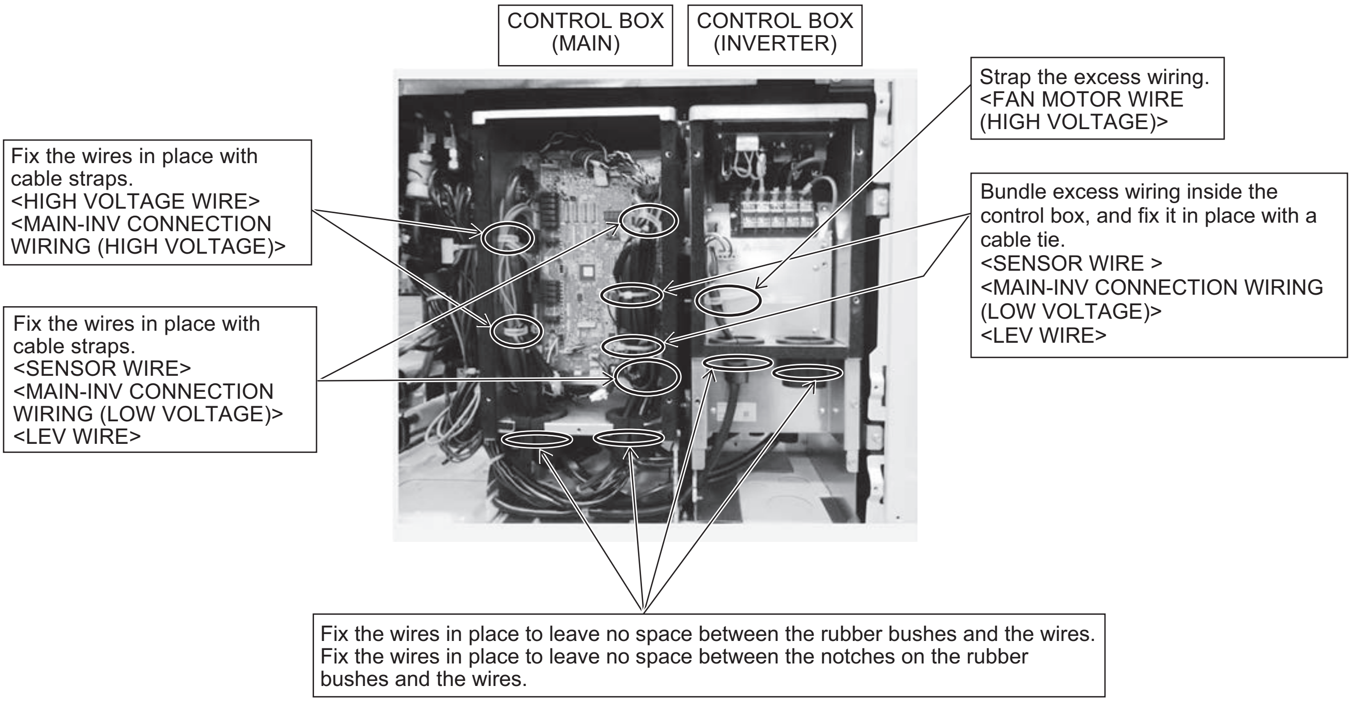
Figure 7

8-13-2 Notes on Wiring Installation

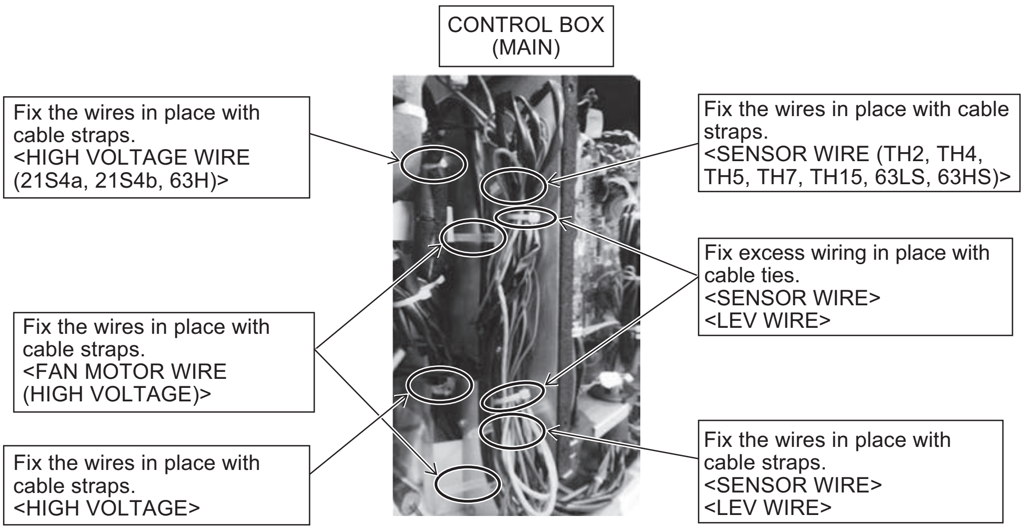
- If wiring was disconnected during maintenance, reconnect the wiring as follows.
- Isolate the strong and the weak electrical wiring to avoid noise interference.

(1) S-module

FRONT VIEW

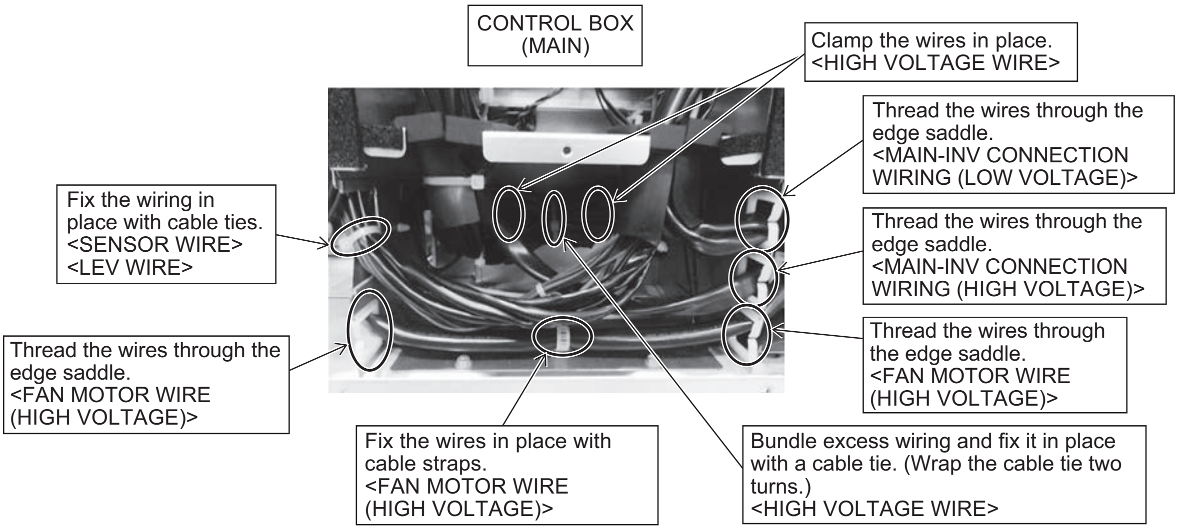


LEFT VIEW



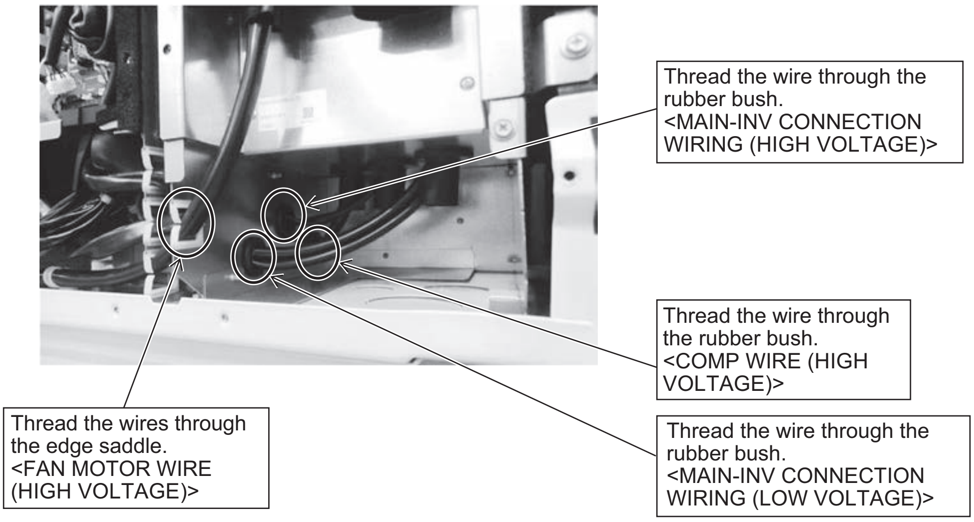
BOTTOM VIEW

CONTROL BOX
(MAIN)



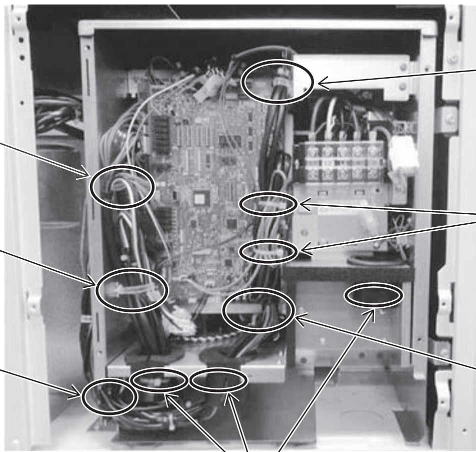
BOTTOM VIEW

CONTROL BOX
(INVERTER)

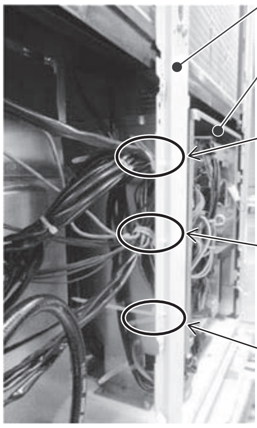


(2) L-module

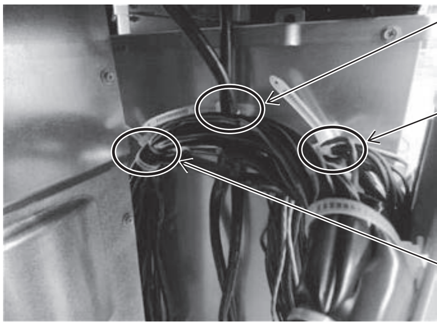
FRONT VIEW



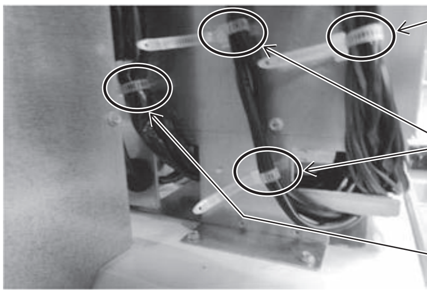
LEFT VIEW



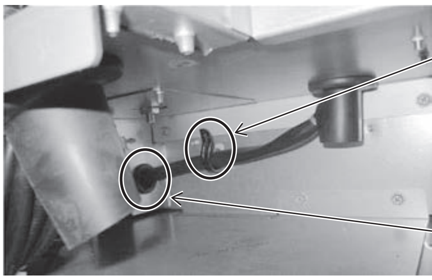
LEFT VIEW (TOP)



LEFT VIEW (BOTTOM)



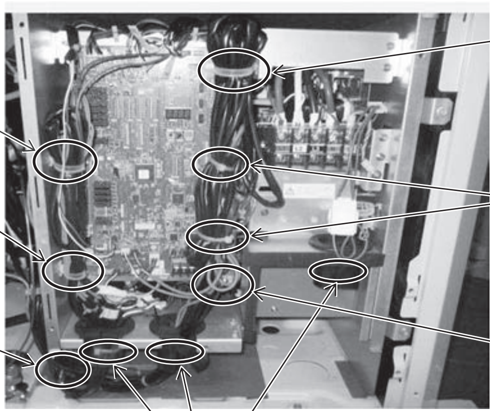
BOTTOM VIEW



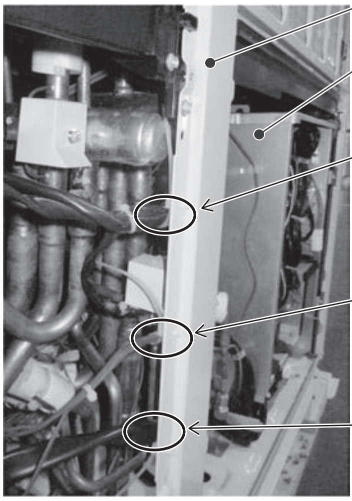
(3) XL-module

FRONT VIEW

CONTROL BOX

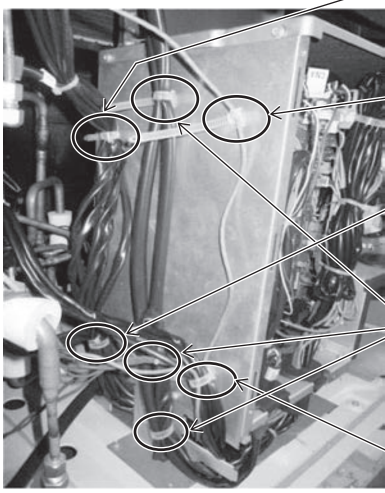


LEFT VIEW



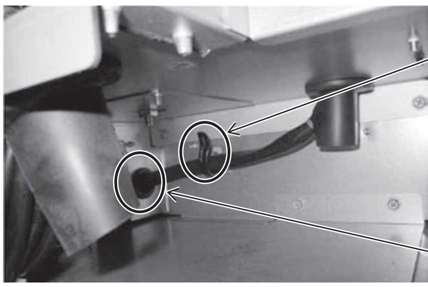
LEFT VIEW

CONTROL BOX



BOTTOM VIEW

CONTROL BOX



8-13-3 Four-way Valve and Check Valve Replacement Procedure

1. S, L-module (four-way valve (21S4a))

Explained below is the procedure for replacing four-way valve (21S4a) (on the right when seen from the front of the unit). Secure sufficient work space before starting maintenance work. (See 8-13-1 Ensuring Maintenance Space (Preparation for the Maintenance of Refrigerant Circuit Parts).)

(1) Remove the top compressor cover by unscrewing the three screws. (See Figure 1.)
Remove the compressor cover by unhooking the hooks on the back.
(2) Remove the front compressor cover by unscrewing the four screws. (See Figure 2.)
(3) Cut the two cable ties holding TH4 and TH15, and remove the wiring from the rubber bush on the left compressor cover. (See Figure 3.)
(4) Remove the left compressor cover by unscrewing the two screws. (See Figure 4.)

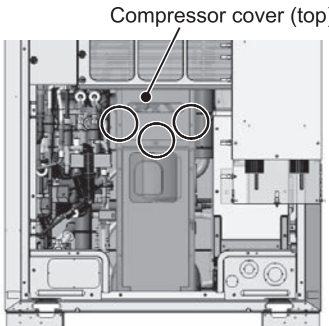


Figure 1

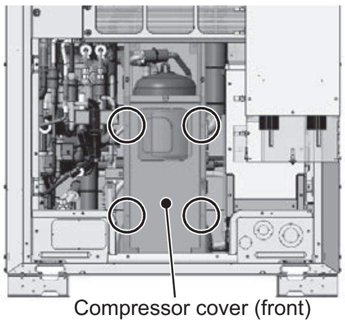


Figure 2

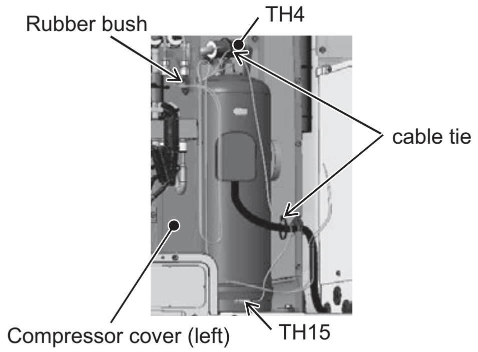


Figure 3

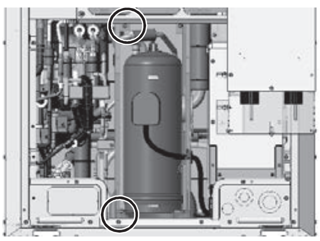


Figure 4

(5) Remove the plastic cover and the coil holding solenoid valves 2, 9, and 10 (SV2, 9, and10). Remove the thermal insulation shown in Figure 5. (See Figure 5.)

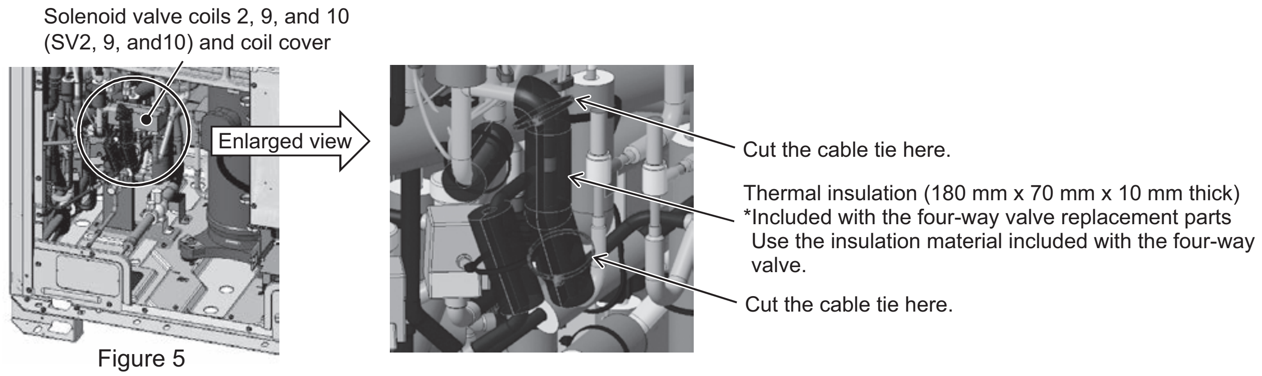


Figure 5

(6) Cut the cable tie on the rubber spacer to remove it. (See Figure 6.)

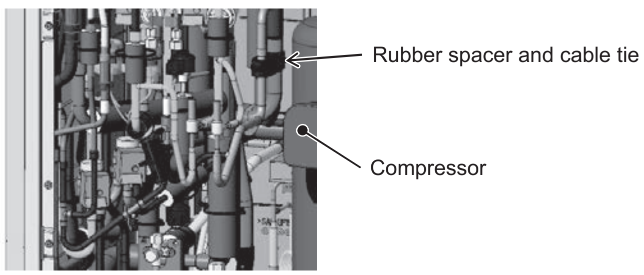


Figure 6

(7) Remove the plastic cover and the coil holding the four-way valve. (See Figure 7.)

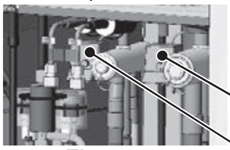


Figure 7

*Notes on replacing refrigerant circuit components (check valve, four-way valve, solenoid valve, and LEV)
· Be sure to perform non-oxidized brazing.
· Before heating the pipes, wrap the refrigerant circuit components with a wet towel to keep the temperature of the components from rising above 120°C.
· After brazing is done, check that the brazing is done properly and check for leaks before vacuum-drying the pipes.
· Direct the brazing torch flame away from the wiring and sheet metals inside the unit not to damage them.
· Wet felt sheets listed below (or its equivalent), and place them around the areas to be brazed to protect the heat exchanger, pipes, and pipe covers from being damaged from the brazing torch flame.
Recommended felt sheets: Spatter felt 50CF-11 (5t x 1 m x 1 m) by TRUSCO Nakayama
Felt sheets that meet the JIS standard (JIS A 1323 type A "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works")

(8) Remove the solenoid valve and the LEV assembly at the front of the four-way valve at the brazed sections to ensure good visibility of the four-way valve.
Either remove or protect the solenoid valve coil, TH and LEV wirings, pipe cover, and plastic components to keep them from being damaged by the torch flame. (Remove the components by removing the braze from the six areas shown in Figure 8.)

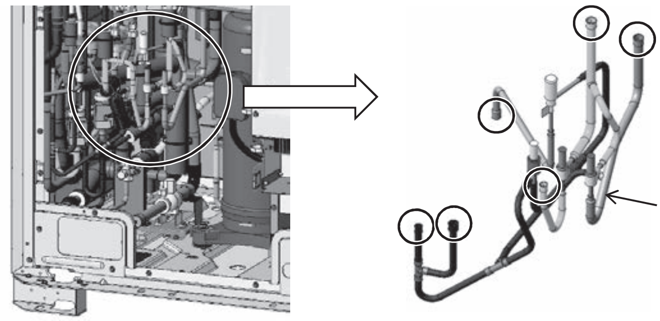


Figure 8

Replacement procedure for four-way valve (21S4a)
(9A) Remove the pipe covers adjacent to four-way valve (21S4a). (See Figure 9.)

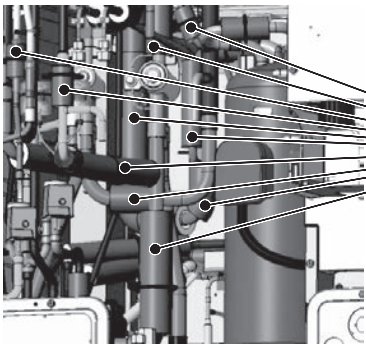


Figure 9

(10A) Remove the sheet metal screwed to the base below four-way valve (21S4a) by unscrewing the two screws.
(See Figure 10.)

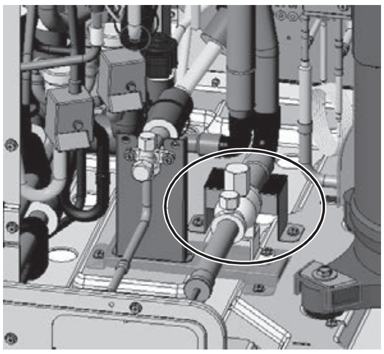


Figure 10

(11A) Remove the pipe below four-way valve (21S4a) and on the front by removing the braze at the four areas shown in Figure 11.

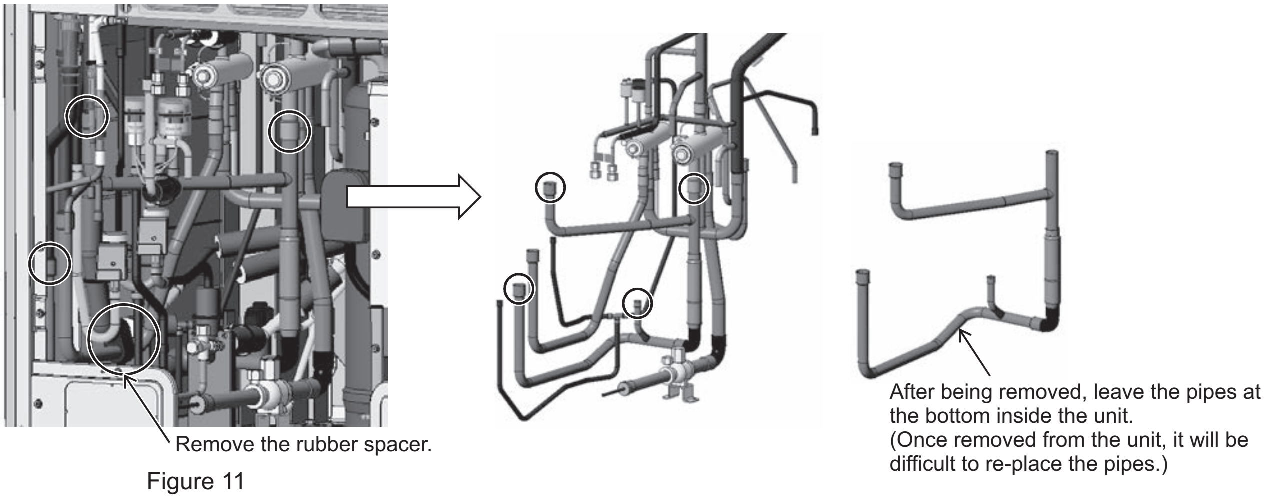


Figure 11

(12A) Cut the pipe below four-way valve (21S4a) and in the middle with a pipe cutter as shown in the figure.
After cutting the pipe where indicated in the figure, remove the braze at the three areas shown in Figure 12.

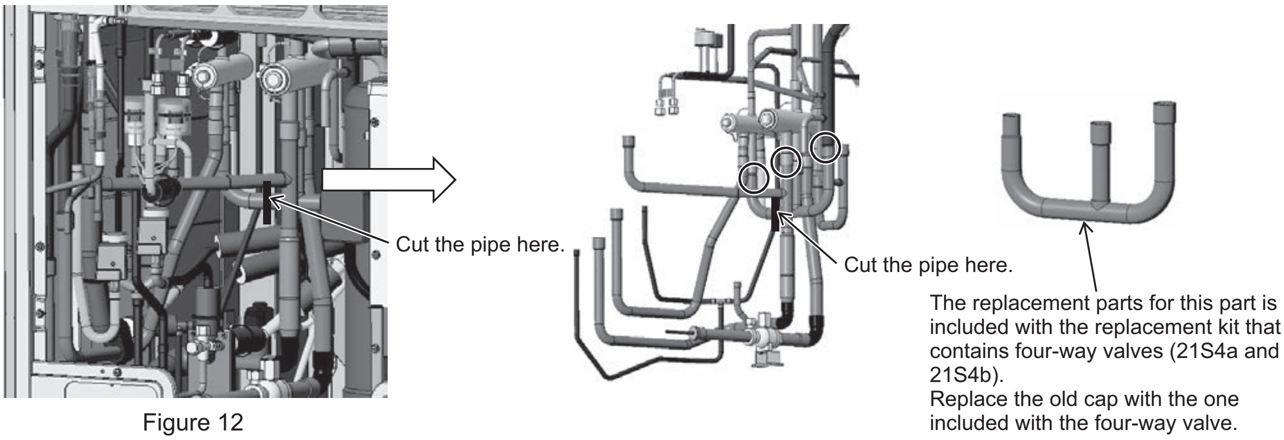


Figure 12

(13A) Remove the pipe below four-way valve (21S4a) and on the back by removing the braze at the two areas on the bottom of the pipe shown in Figure 13. Then, remove the braze at the areas on the top of the pipe.

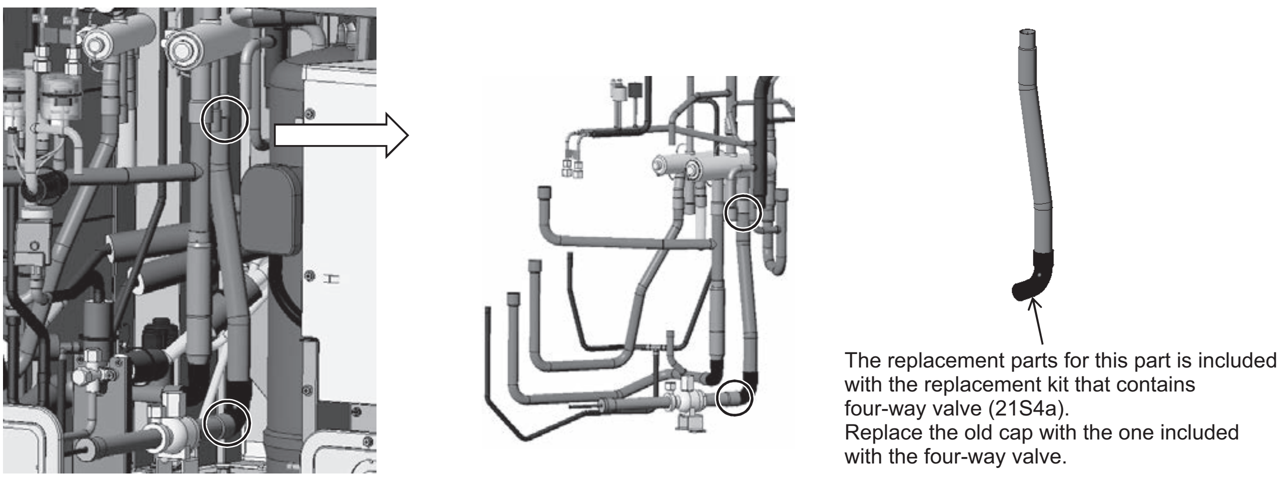


Figure 13

(14A) Remove four-way valve (21S4a) by removing the braze from the area above four-way valve (21S4a) as shown in Figure 14.

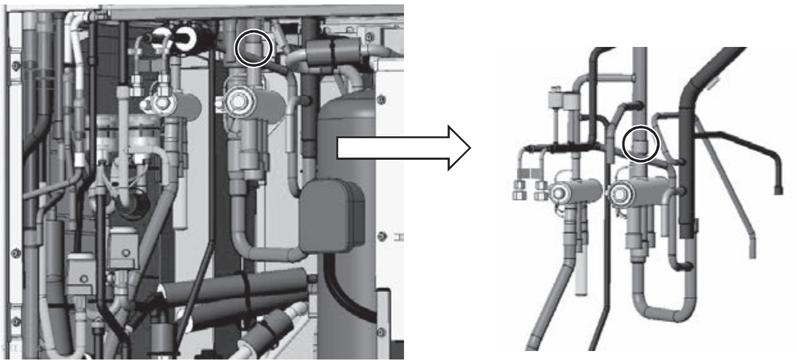
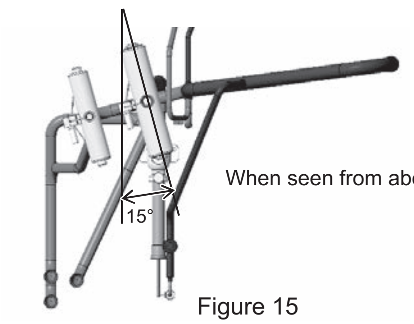


Figure 14

(15A) Mount a new four-way valve (21S4a). Figure 15 shows how to position a new four-way valve.



When seen from above, four-way valves (21S4a and 21S4b) are tilted by 15°.

Figure 15

(16A) To make it easier to connect four-way valve (21S4a), cut the pipe end below the raised hole (cut off the section covered with brazing filler) on the pipe with a pipe cutter. Cut the pipe with an expanded end that is included with four-way valve (21S4a) to the same length as the pipe that was removed from the on-site pipe. (See Figure 16.)

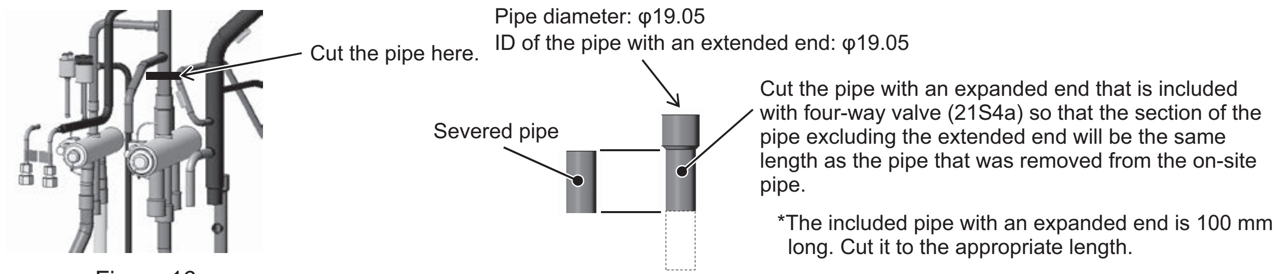


Figure 16

(17A) Mount four-way valve (21S4a) to the pipe below four-way valve (21S4a) and on the back. A total of four areas require brazing, including the area indicated in (16A) and the areas indicated in Figure 17.

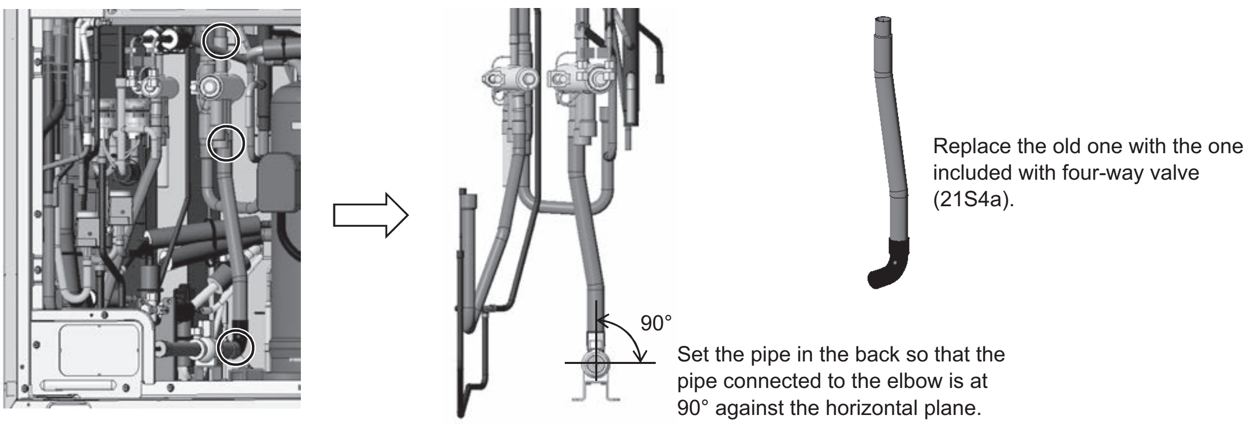


Figure 17

(18A) Mount four-way valve (21S4a) to the pipe below four-way valve A and in the middle by brazing at the three areas. (See Figure 18.)

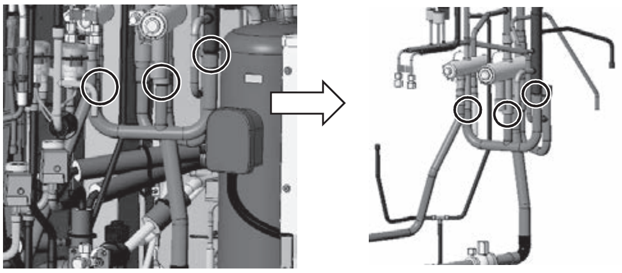


Figure 18

(19A) Mount four-way valve (21S4a) to the pipe below four-way valve (21S4a) and on the front by brazing at the four areas. (See Figure 19.)

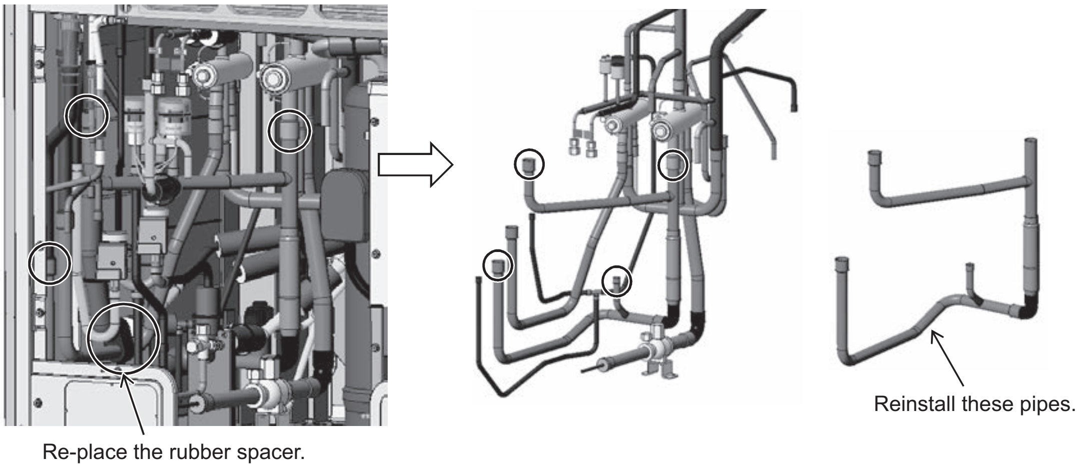


Figure 19

This step completes the replacement procedure for four-way valve (21S4a). Re-place the solenoid valve and LEV assembly that were removed in step (8) and all the pipe covers that were removed during the maintenance work as they were.

2. S, L-module (four-way valve (21S4b))

Explained below is the procedure for replacing four-way valve (21S4b) (on the left when seen from the front of the unit).
Secure sufficient work space before starting maintenance work. (See 8-13-1 Ensuring Maintenance Space (Preparation for the Maintenance of Refrigerant Circuit Parts).)

(20B) Follow the same procedures ((1) through (8), (9A), and (12A)) for replacing four-way valve (21S4a).

(21B) Remove the pipe below four-way valve (21S4b) and on the front by removing the braze at the two areas shown in Figure 20.

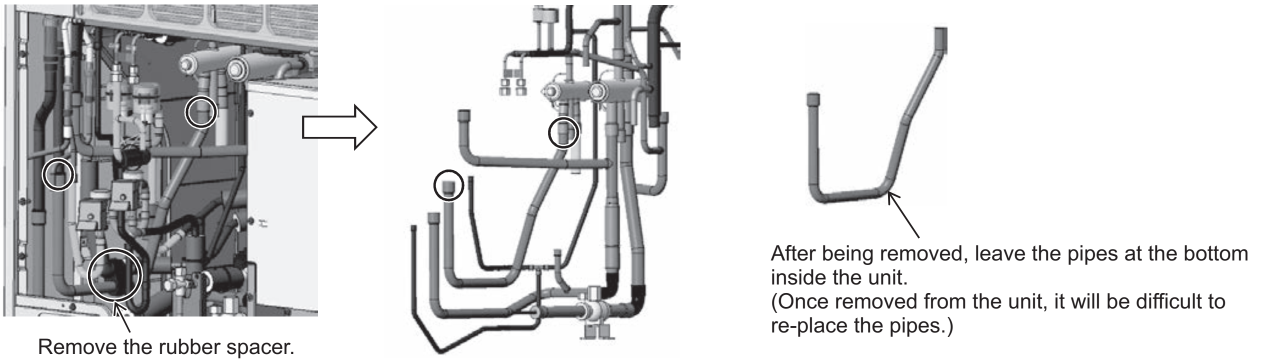


Figure 20

(22B) Remove four-way valve (21S4b) by removing the braze from the area above four-way valve (21S4b) as shown in Figure 21.

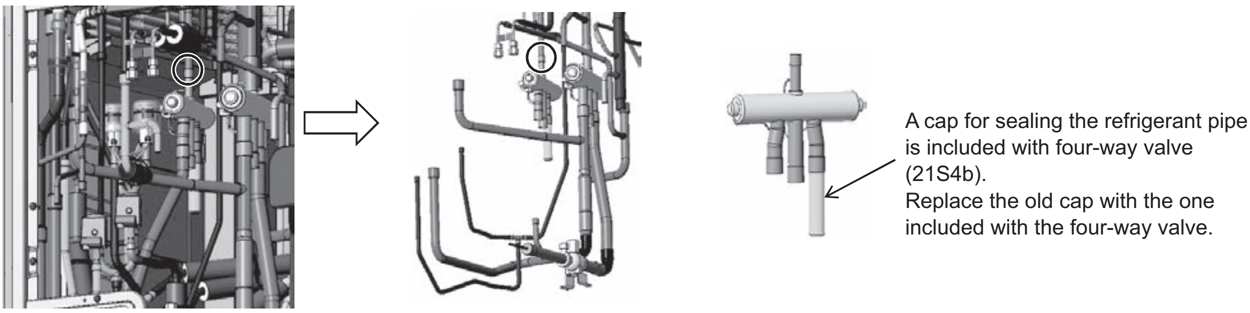


Figure 21

(23B) To make it easier to connect four-way valve (21S4b), cut the pipe end below the raised hole (cut off the section covered with brazing filler) on the pipe with a pipe cutter. Cut the pipe with an expanded end that is included with four-way valve (21S4b) to the same length as the pipe that was removed from the on-site pipe. (See Figure 22.)

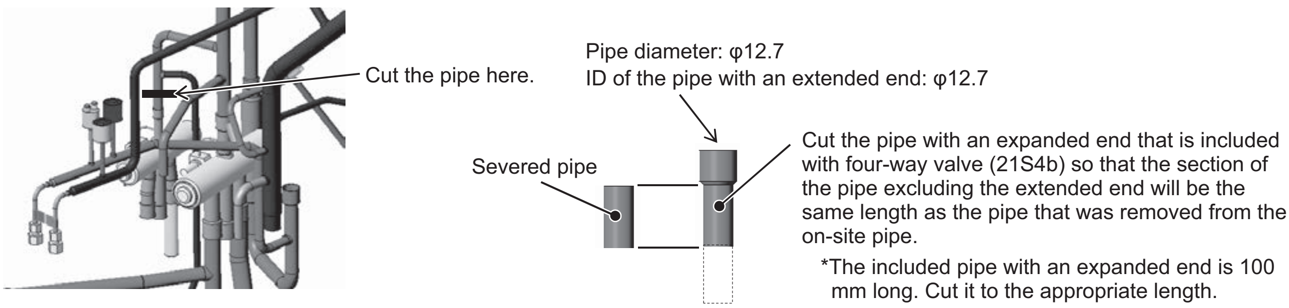
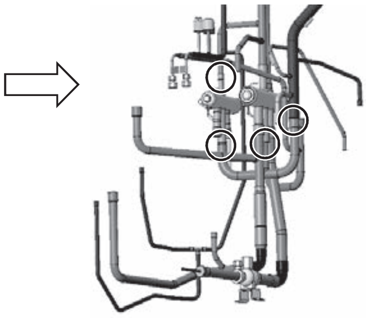


Figure 22

(24B) Mount four-way valve (21S4b) to the pipe below four-way valve (21S4b) and in the middle. A total of five areas require brazing, including the area indicated in (23B) and the areas indicated in Figure 23.
Mount four-way valve (21S4b) horizontal to four-way valve (21S4a) as shown in (15A).



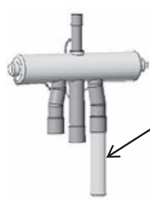
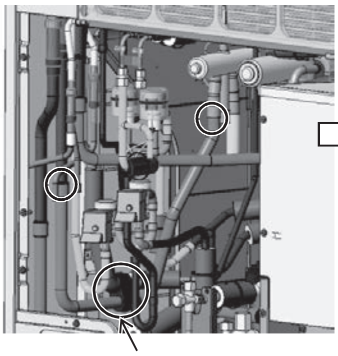


Figure 23

(25B) Install the pipe below four-way valve (21S4b) and on the front by brazing at the two areas shown in Figure 24.



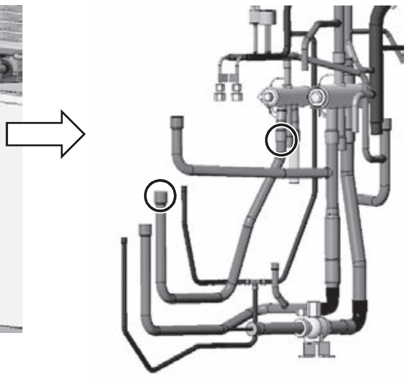


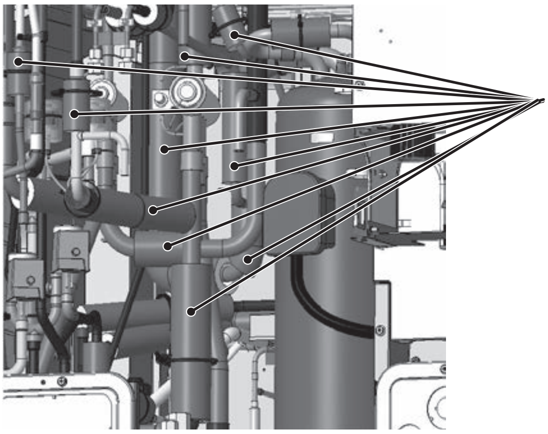
Figure 24

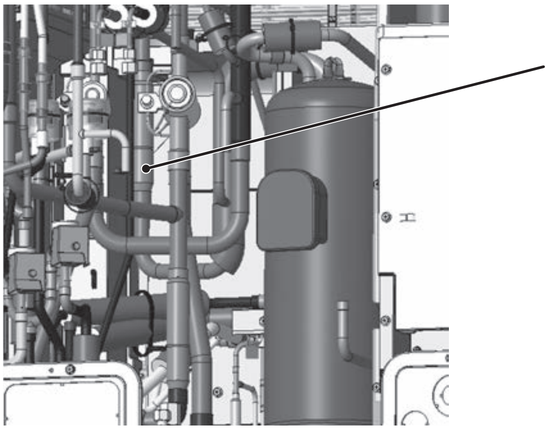
This step completes the replacement procedure for four-way valve (21S4b). Re-place the solenoid valve and LEV assembly that were removed in step (8) and all the pipe covers that were removed during the maintenance work as they were.

3. Replacing check valve (CV1) (S and L modules)

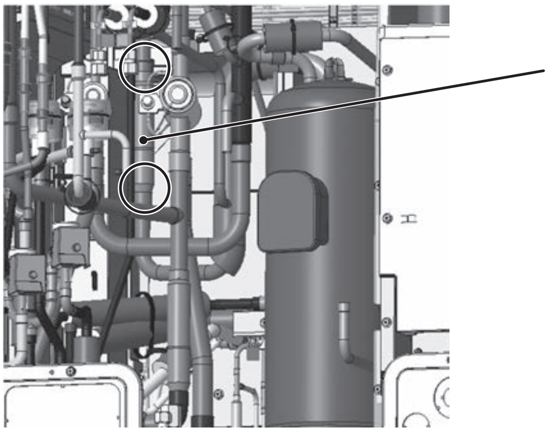
Follow the procedures below to remove check valve (CV1) located in the back of the four-way valve.

(1) Follow the steps (1) through (9A) under item 1. S, L-module under 8-12-3 Four-way Valve and Check Valve Replacement Procedure to Create Access to Check Valve (CV1).





(2) Remove the braze from two areas on check valve (CV1).



The above step completes the check valve (CV1) replacement procedure. Re-place the solenoid valve, LEV assemby, and pipe cover that were removed during maintenance work as they were.

4. XL-module (four-way valve (21S4a, 21S4b, and 21S4c))

Explained below is the procedure for replacing four-way valve (21S4a) (in the center when seen from the front of the unit), four-way valve (21S4b) (on the right when seen from the front of the unit), and four-way valve (21S4c) (on the left when seen from the front of the unit). (See Figure 1.)

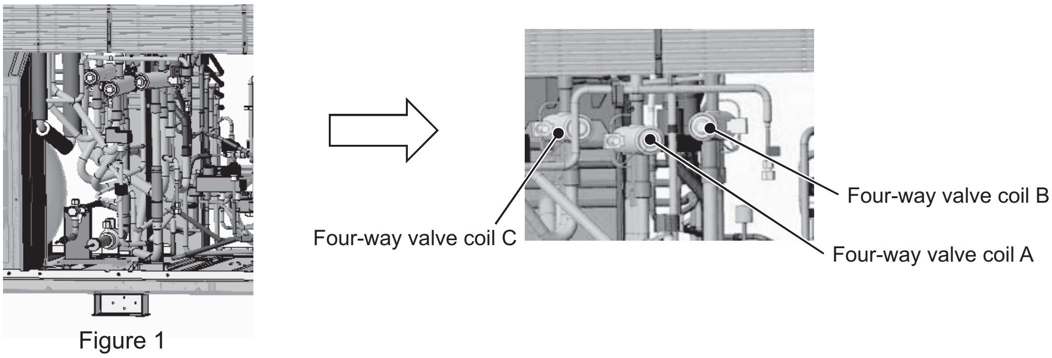


Figure 1

(1) Remove the wiring and sheet metal. (Screwed down with four screws) (See Figure 2.)

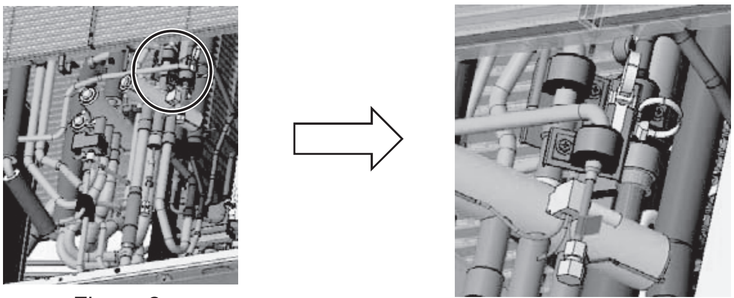


Figure 2

(2) Remove the coil (four-way valves (21S4a, 21S4b, and 21S4c), and solenoid valve (SV2)), coil cover, and wiring. (See Figure 3.)

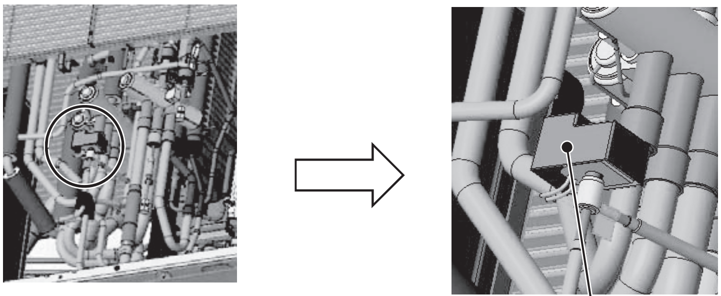


Figure 3

(3) Remove the pipe cover and thermal insulation adjacent to the four-way valves. (See Figure 4.)

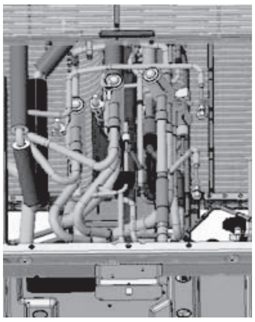
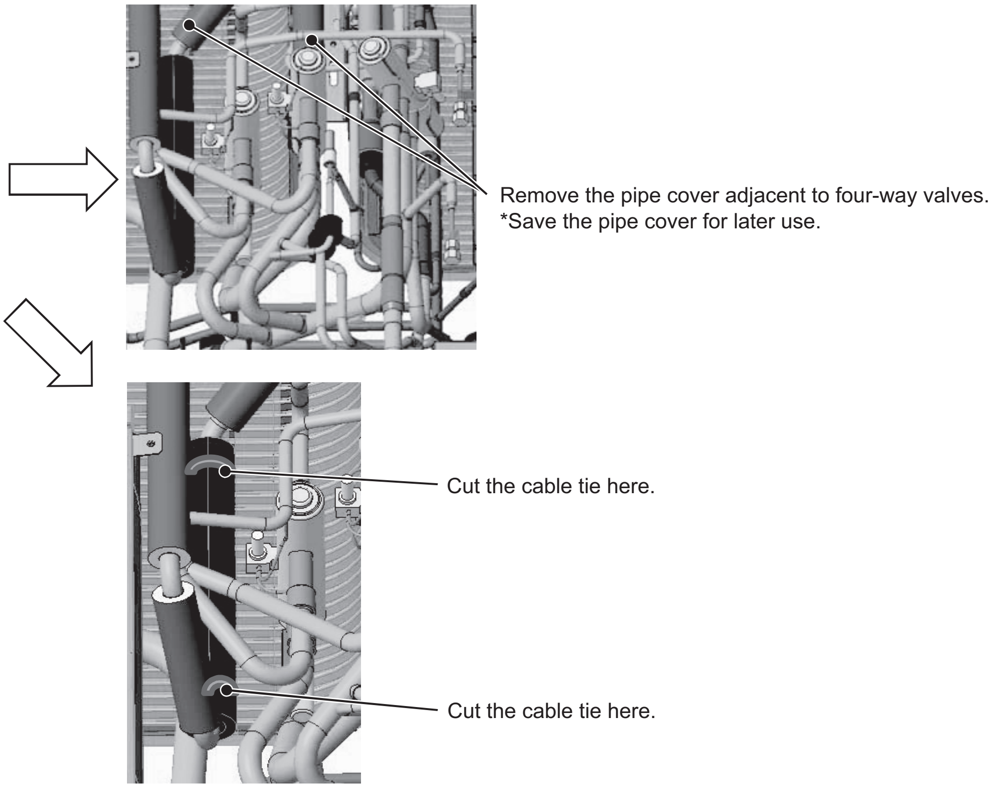


Figure 4



*Notes on replacing refrigerant circuit components (check valve, four-way valve, solenoid valve, and LEV)
- Be sure to perform non-oxidized brazing.
- Before heating the pipes, wrap the refrigerant circuit components with a wet towel to keep the temperature of the components from rising above 120°C.
- After brazing is done, check that the brazing is done properly and check for leaks before vacuum-drying the pipes.
- Direct the brazing torch flame away from the wiring and sheet metals inside the unit not to damage them.
- Wet felt sheets listed below (or its equivalent), and place them around the areas to be brazed to protect the heat exchanger, pipes, and pipe covers from being damaged from the brazing torch flame.
  Recommended felt sheets: Spatter felt 50CF-11 (5t x 1 m x 1 m) by TRUSCO Nakayama
  Felt sheets that meet the JIS standard (JIS A 1323 type A "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works")

(4) Remove the braze from the pipe between four-way valves (21S4a and 21S4b). (See Figure 5.)

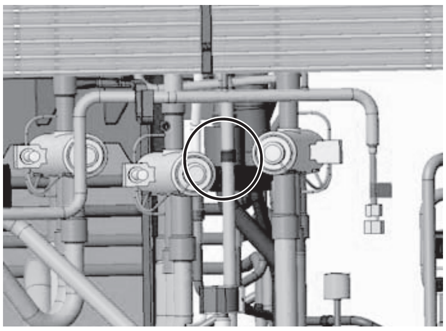


Figure 5

Replacement procedure for four-way valve (21S4a)

(5A) Remove the braze from the area above four-way valve (21S4a) as shown in Figure 6.

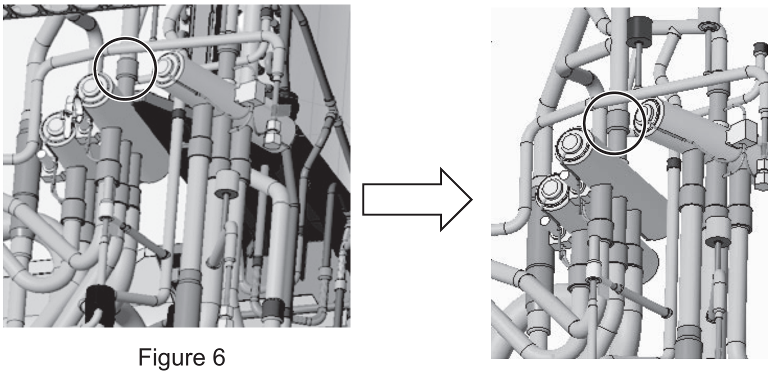


Figure 6

(6A) Remove the braze from the three areas below four-way valve (21S4a) as shown in Figure 7.

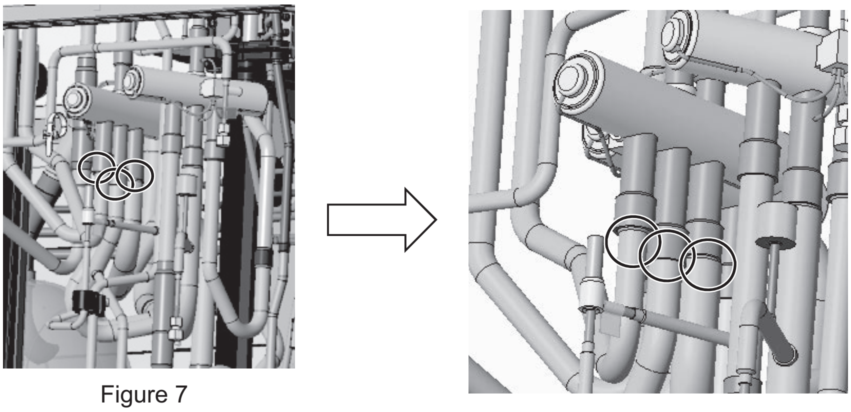


Figure 7

(7A) Mount a new four-way valve (21S4a).

Replacement procedure for four-way valve (21S4b)

(8B) Follow the same procedures as (5A) through (6A).

(9B) Mount a new four-way valve (21S4b). Figure 8 shows how to position a new four-way valve.

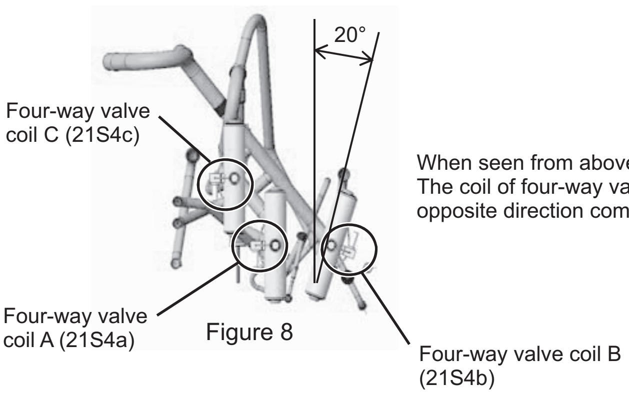


Figure 8

When seen from above, four-way valve (21S4b) is tilted by 20°. The coil of four-way valve (21S4b) is tilted 20 degrees to the opposite direction compared to the other four-way valves.

Replacement procedure for four-way valve (21S4c)

(10C) Install a flame-protection plate. (See Figure 9.)

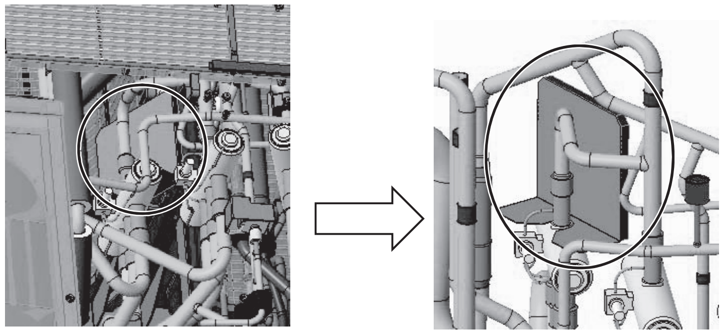


Figure 9

Flame-protection plate
*Included with the replacement kit that contains four-way valve (21S4c)
Remove the plate after replacing four-way valve (21S4c).

(11C) Remove the braze from the area above four-way valve (21S4c) as shown in Figure 10.

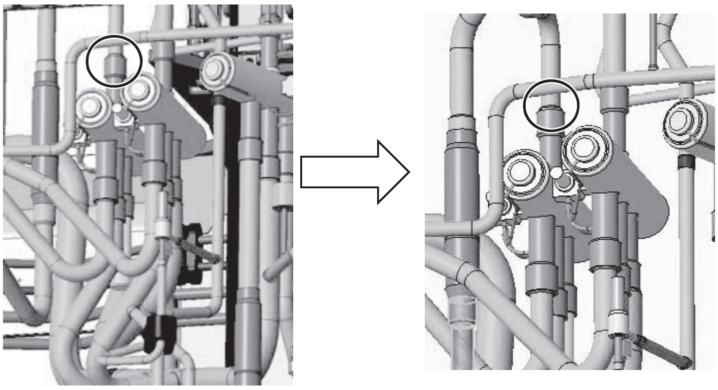


Figure 10

(12C) Remove the braze from the two areas below four-way valve (21S4c) as shown in Figure 11.

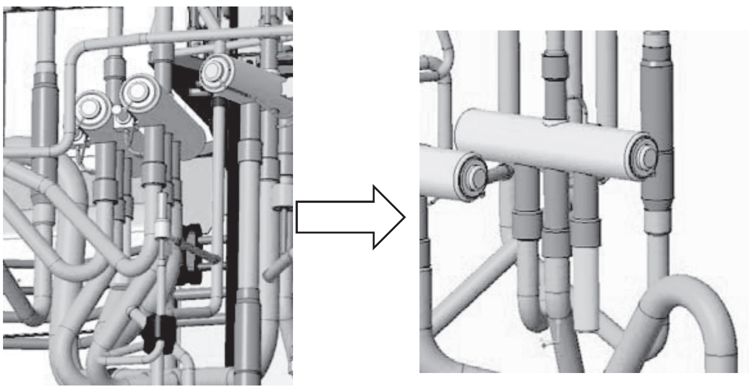


Figure 11

A cap for sealing the refrigerant pipe is included with the replacement kit that contains four-way valve (21S4c).
Replace the old cap with the one included with the four-way valve.

(13C) Mount a new four-way valve (21S4c).

When installing four-way valve (21S4c), first braze the pipe outside the unit and then install it to the unit.

Figure 12

8-13-4 Compressor Replacement Procedure

Explained below are the procedures for replacing the compressor. Secure sufficient work space before starting replacement work. (See 8-13-1 Ensuring maintenance space (Preparation for the Maintenance of Refrigerant Circuit Parts).)

(1) Remove the top compressor cover by unscrewing the three screws. (See Figure 1.)
Remove the compressor cover by unhooking the hooks on the back.
(2) Remove the front compressor cover by unscrewing the four screws. (See Figure 2.)
(3) Cut the two cable ties holding TH4 and TH15, and remove the wiring from the rubber bush on the left compressor cover. (See Figure 3.)
(4) Remove the right and left compressor covers by unscrewing the four screws. (See Figure 4.)
(5) Remove the saddle and the rubber spacers on the compressor by unscrewing the screw. (See Figure 5.)
(6) Remove the cover of the compressor terminal block box, mounting support metal, and the mounting plate by unscrewing the two screws. (See Figure 6.)

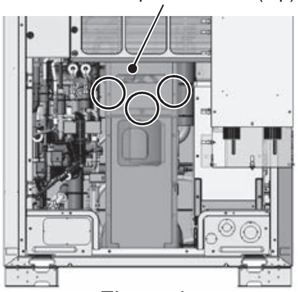


Figure 1

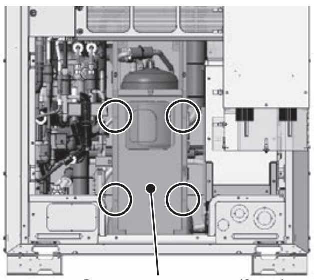


Figure 2

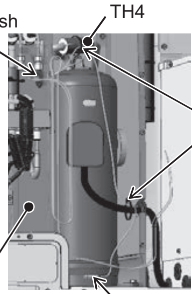


Figure 3

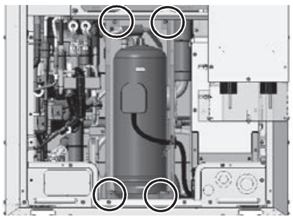


Figure 4

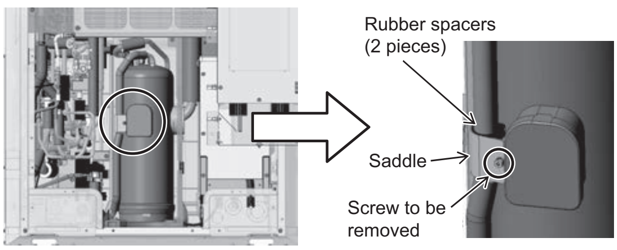


Figure 5

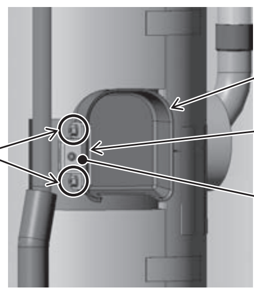


Figure 6

(7) Remove thermal insulation 1 and thermal insulation 2. (See Figure 7.)
(8) Remove the inverter cooling duct by unscrewing the two screws. (See Figure 8. Applicable to the S-module only)

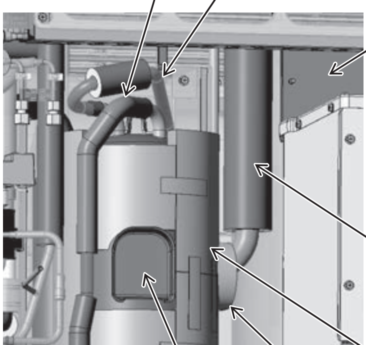


Figure 7

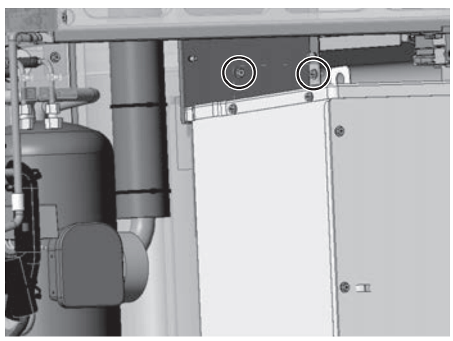


Figure 8

(9) Remove the pipe cover and the damper, and cut the suction pipe where indicated in Figure 9.
(10) Remove the pipe covers, and then remove the braze. (See Figure 10.)
* Do not force the injection pipe to deform.
(11) Remove the compressor discharge pipe by cutting the pipe where indicated in Figure 11 or by removing the braze.

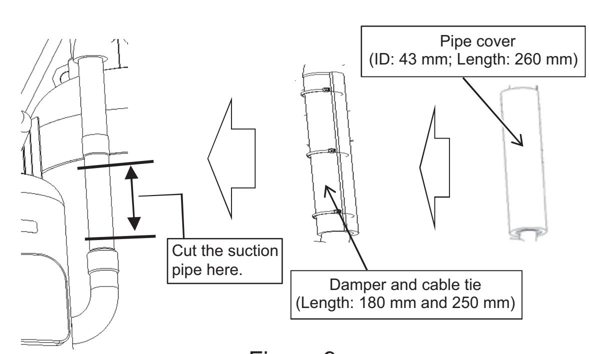


Figure 9

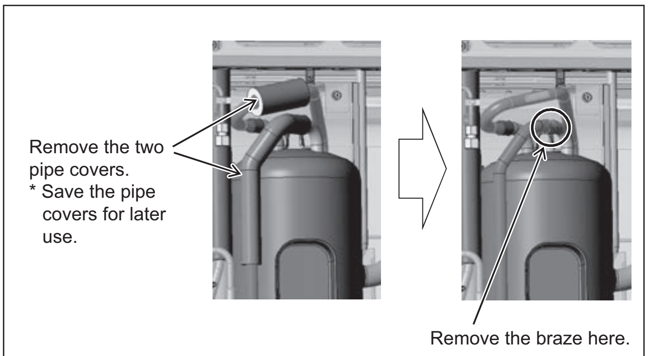


Figure 10

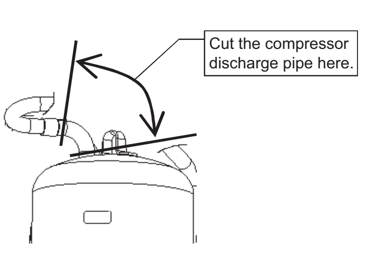


Figure 11

(12) Remove the four bolts holding the compressor down. (See Figure 12.)
The two bolts in the front are also holding down the metal sheets.
(13) Tilting the compressor will cause the refrigerant oil to leak. Seal the pipe where it was cut or removed at the brazed section.
(14) After replacing the compressor, braze the pipes that were removed as they were.
In case of brazing the suction pipe, protect the surrounding components such as the control box, ACC, compressor cover, and damper with a fire protection panel (e.g., recommended felt soaked in water), attach the supplied pipe,and perform brazing. (See Figure 13.)
*Perform brazing, referring to "Notes on replacing refrigerant circuit components (check valve, four-way valve, solenoid valve, and LEV)" in 8-13-3.
(15) The recommended tightening torque for the compressor fixing bolts is 3.0 N·m. Fasten the bolts using a torque wrench or other tool that can apply the specified torque.
(16) Re-place the compressor covers in the reverse order as they were removed.
*Hold the TH15 wiring in place with the bands to keep the wiring from coming in contact with insulation 2. (See Figures 3 and 7.)

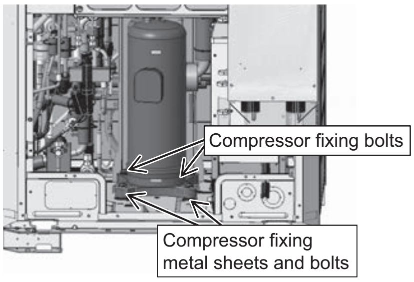


Figure 12

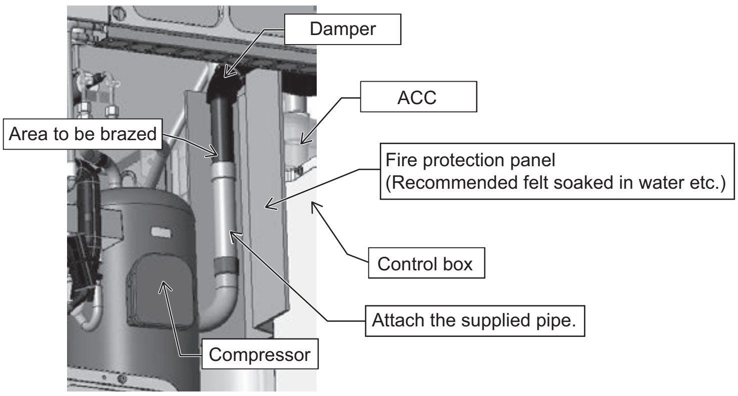
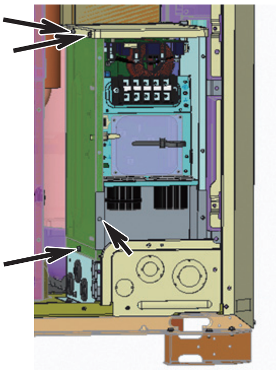


Figure 13

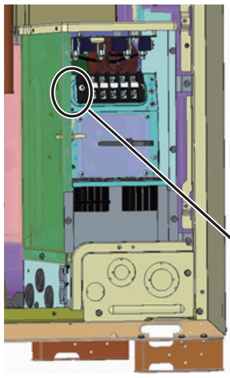
8-13-5 Removal Instructions for the Control Box

1. S module (INV box)

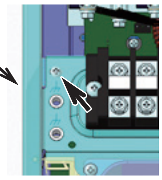


[Figure 1]

[Removing the left outside panel]
Unscrew the four screws indicated with arrows in Figure 1 to remove the left outside panel.



[Figure 2]

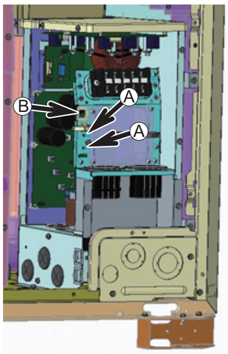


[Figure 2-a]

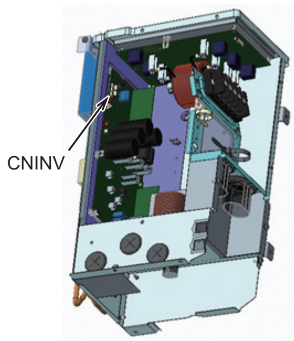
[Removing the left inside panel]
Unscrew the screw indicated with an arrow in Figure 2-a (located to the left of the terminal board) to remove the left panel.

[Removing the ground wire]
Remove the two ground wires (screwed on) indicated by Arrow Ⓐ in Figure 3-a, and unsaddle them from the saddle indicated by Arrow Ⓑ.

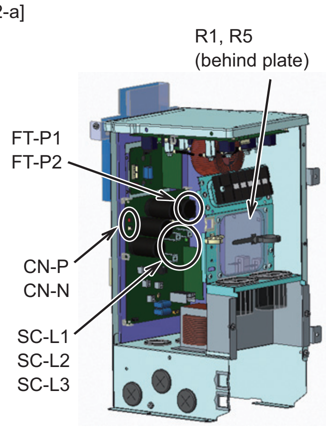
[Removing the wiring]
Remove the following connectors and the screw terminals.
(See Figures 3-b and 3-c.)
CNINV on the FAN INV board
CN-P, CN-N, FT-P1, FT-P2, SC-L1, SC-L2, and SC-L3 on the INV35 board
Terminals on R1 and R5



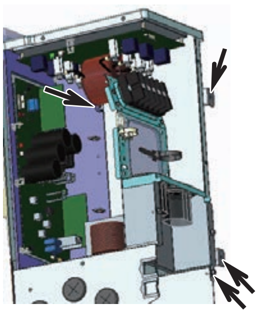
[Figure 3-a]



[Figure 3-b]

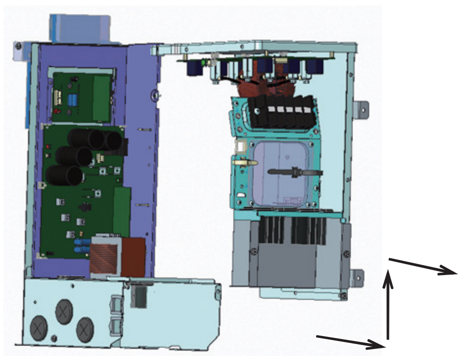


[Figure 3-c]

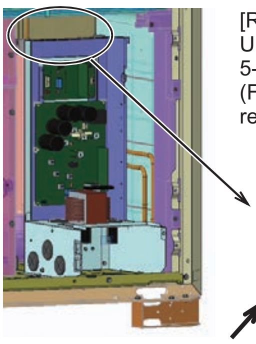


[Figure 4-a]

[Removing the terminal board and top panel (Noise Filter board)]
Unscrew the four screws indicated with arrows in Figure 4-a. Pull the right panel and the top panel forward. Lift the back end of the top panel and pull the terminal board and the top panel (Noise Filter board) together to remove them. (See Figure 4-b.)



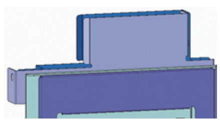
[Figure 4-b]



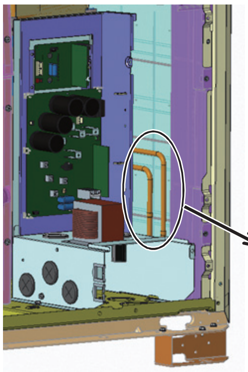
[Figure 5]

[Removing the duct]
Unscrew the screw indicated with arrows in Figure 5-a, and pull up the duct to remove it.
(Figure 5-b shows the unit after the duct was removed.)

[Figure 5-a]

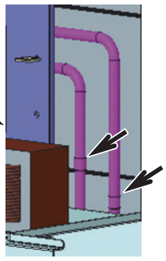


[Figure 5-b]



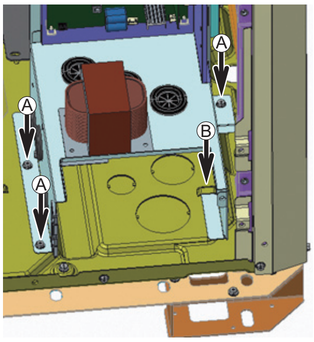
[Figure 6]

[Removing refrigerant cooling pipes]
Remove the braze from the two areas indicated by the arrows in Figure 6-a.
Before removing the pipes, collect the refrigerant.
Protect the surrounding components from the brazing torch flame as necessary.



[Figure 6-a]

[Removing the remaining relevant components]
Unscrew the three screws indicated with arrows Ⓐ in Figure 7.
Pull the unscrewed part forward, and unhook the part indicated with Arrow Ⓑ to remove the part from the base of the unit.

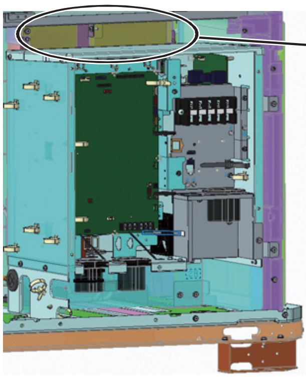


[Figure 7]

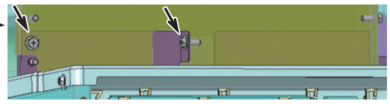
*Notes on replacing the control box (when replacing the refrigerant cooling pipes)
- Be sure to perform non-oxidized brazing.
- Before heating the pipes, wrap the refrigerant circuit components with a wet towel to keep the temperature of the components from rising above 120°C.
- After brazing is done, check that the brazing is done properly and check for leaks before vacuum-drying the pipes.
- Direct the brazing torch flame away from the wiring and sheet metals inside the unit not to damage them.
- Wet felt sheets listed below (or its equivalent), and place them around the areas to be brazed to protect the heat exchanger, pipes, and pipe covers from being damaged from the brazing torch flame.
  Recommended felt sheets: Spatter felt 50CF-11 (5t x 1 m x 1 m) by TRUSCO Nakayama
  Felt sheets that meet the JIS standard (JIS A 1323 type A "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works")

2. L/XL module

[Removing the duct]
Unscrew the two screws indicated with arrows in Figure 1-a, and pull up the duct to remove it.
(Figure 1-b shows the unit after the duct was removed.)
*The same procedures apply to both the L and the XL modules.



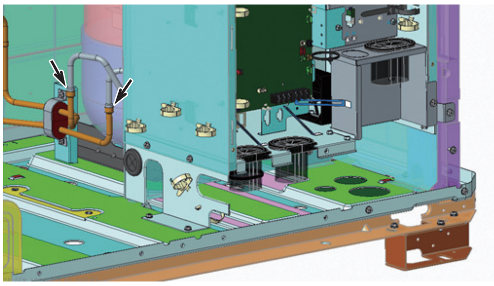
[Figure 1]



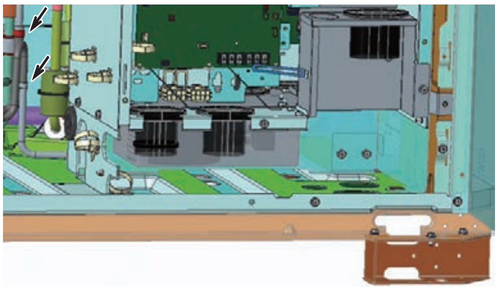
[Figure 1-a]

[Figure 1-b]

[Removing the refrigerant cooling pipes]
Remove the braze at the two areas indicated with arrows in Figure 2-a(L module), Figure 2-b (XL module).
Before removing the pipes, collect the refrigerant.
Refer to "Notes on replacing refrigerant circuit components."

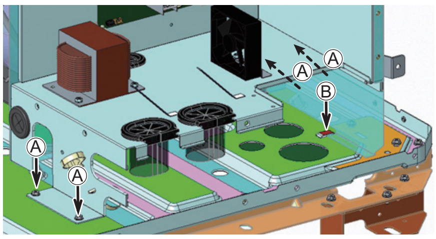


[Figure 2-a]

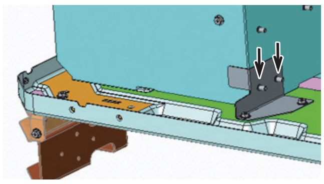


[Figure 2-b]

[Removing the remaining relevant components]
Unscrew the four screws indicated with arrows Ⓐ in Figure 3.
The arrow indicated with dotted lines is located where indicated in Figure 3-a.
Pull the unscrewed part forward, and unhook the part indicated with Arrow Ⓑ to remove the part from the base of the unit.

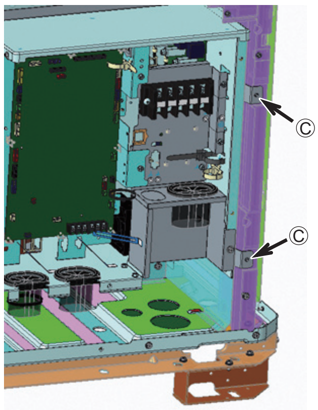


[Figure 3]



[Figure 3-a]

To remove the rest of the components from the pillar, unscrew the two screws indicated with Arrow Ⓒ in Figure 4.
*The same procedures apply to both the L and the XL modules.



[Figure 4]

*Notes on replacing the control box (when replacing the refrigerant cooling pipes)
- Be sure to perform non-oxidized brazing.
- Before heating the pipes, wrap the refrigerant circuit components with a wet towel to keep the temperature of the components from rising above 120°C.
- After brazing is done, check that the brazing is done properly and check for leaks before vacuum-drying the pipes.
- Direct the brazing torch flame away from the wiring and sheet metals inside the unit not to damage them.
- Wet felt sheets listed below (or its equivalent), and place them around the areas to be brazed to protect the heat exchanger, pipes, and pipe covers from being damaged from the brazing torch flame.
  Recommended felt sheets: Spatter felt 50CF-11 (5t x 1 m x 1 m) by TRUSCO Nakayama
  Felt sheets that meet the JIS standard (JIS A 1323 type A "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works")

8-13-6 Maintenance Procedure for the Drain Pan

1. S-module

[Drain pan removal procedure]
(1) Remove the front panel from the unit by unscrewing the eight screws. (See Figure 1.)
(2) Cut the cable tie, unscrew the screw, and pull out the drain pan cover toward the right. (See Figure 3.)
(3) Remove the two rod holders holding the check joints in place, using a wrench. (See Figure 4.)
(4) Remove the drain pan by unscrewing the two screws. (See Figure 5.)
(5) Clean the drain pan and the drain pan cover. (See Figure 6.)
Remove dust and dirt from the drain groove.

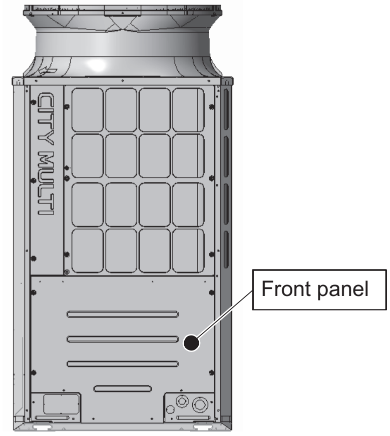


Figure 1

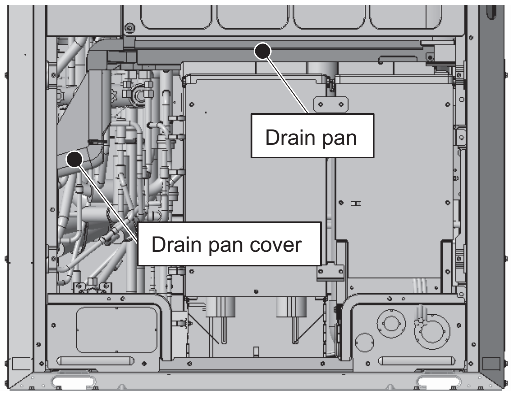


Figure 2

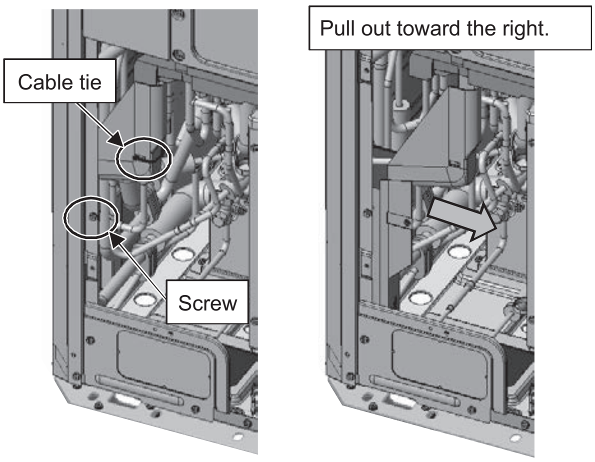


Figure 3

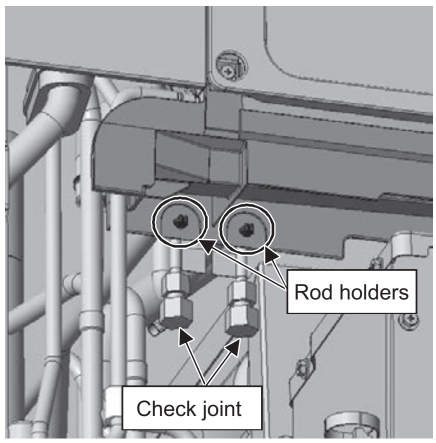


Figure 4

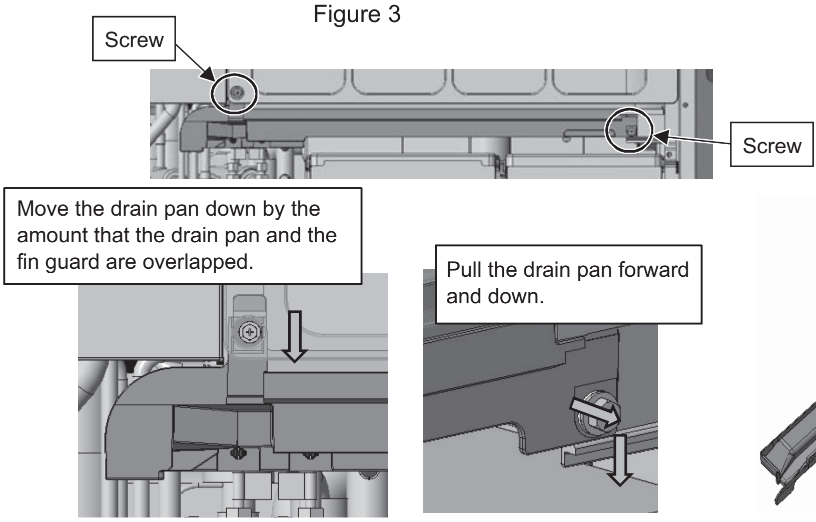


Figure 5

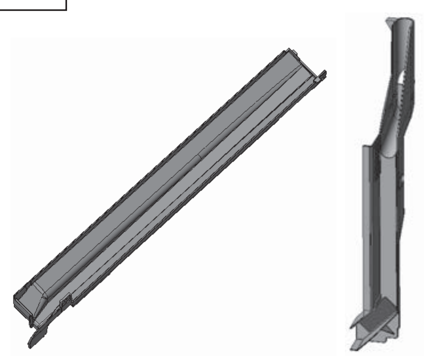


Figure 6

[Drain pan mounting procedure]

*Reuse the drain pan mounting screws that were removed from the replaced drain pan. (M5 x 16 mm with a nylon washer)

(1) Screw down the drain pan with two screws. (See Figure 7.)

(2) Hold the check joints to the drain pan with two rod holders. (See Figure 8.)

(3) Make sure that the silicon tube is properly placed on the defrost pipe, and then place the drain pan cover. Place the drain pan cover along the defrost pipe, and fit it to the drain pan. (See Figures 9 and 10.)

(4) Thread a cable tie through the rectangle hole on the screwed-down drain cover, and hold the silicon tube and the defrost pipe together in place. (See Figure 11.)

(5) Screw down the front panel with eight screws. (See Figure 12.)

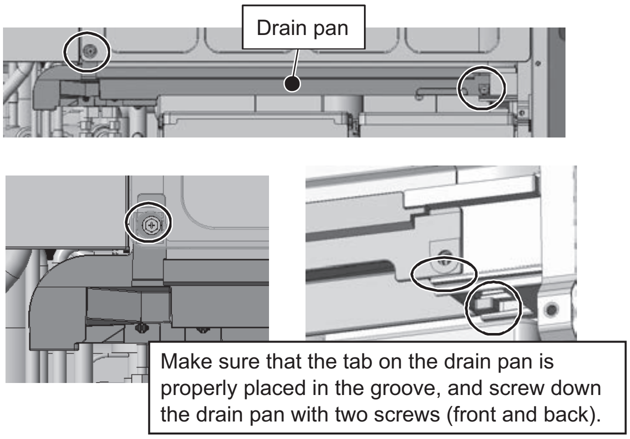


Figure 7

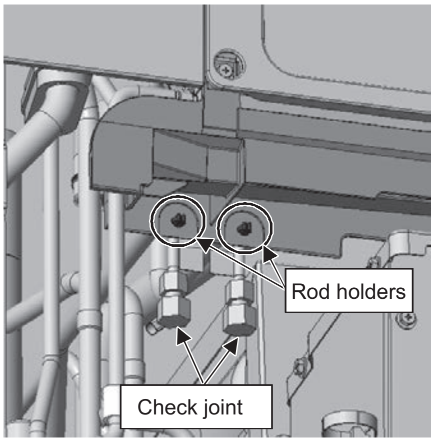


Figure 8

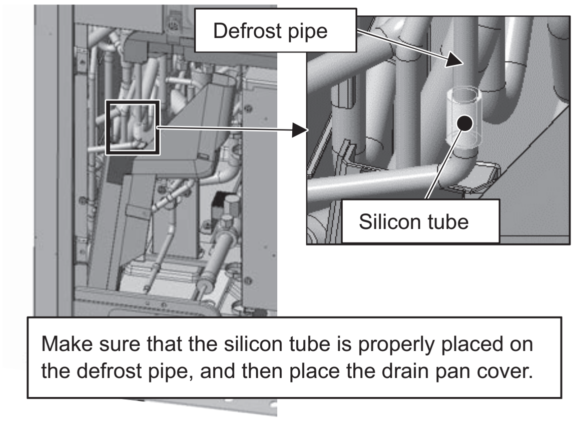


Figure 9

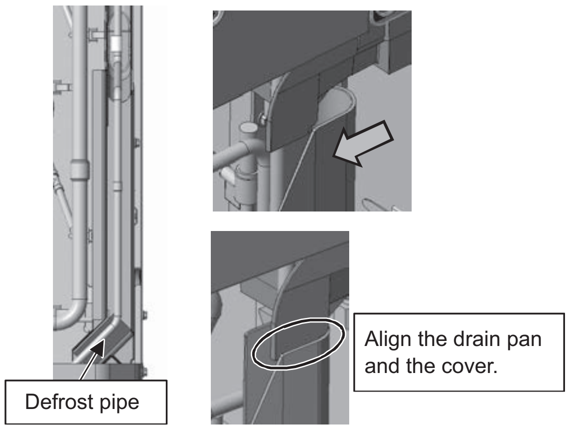


Figure 10

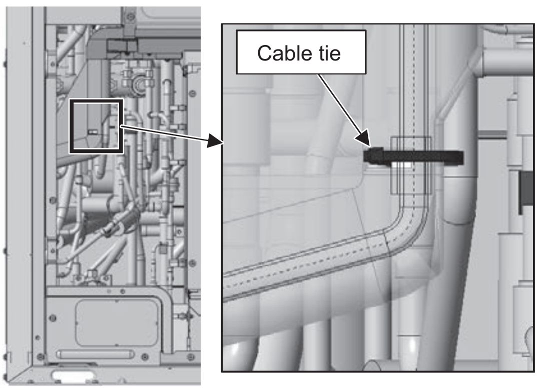


Figure 11

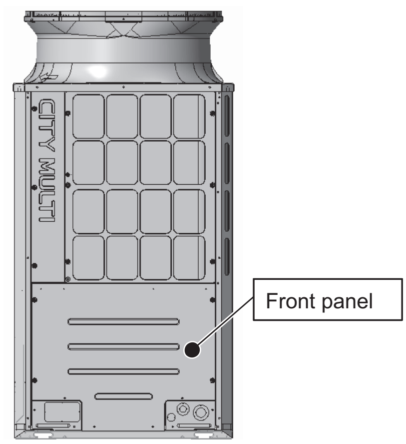


Figure 12

2. L-module

[Drain pan removal procedure]
(1) Remove the front panel from the unit by unscrewing the 14 screws. (See Figure 1.)
(2) Remove the fin guard and the center pillar by unscrewing the 11 screws shown in Figure 2.
Remove the cable straps from the center pillar. (See Figure 2.)
(3) Cut the cable tie, unscrew the screw, and pull the drain cover out to the right. (See Figure 3.)
(4) Remove the two rod holders holding the check joints in place, using a wrench. (See Figure 4.)
(5) Remove the drain pan by unscrewing the two screws. (See Figure 5.)
(6) Clean the drain pan and the drain pan cover. (See Figure 6.)
Remove dust and dirt from the drain groove.

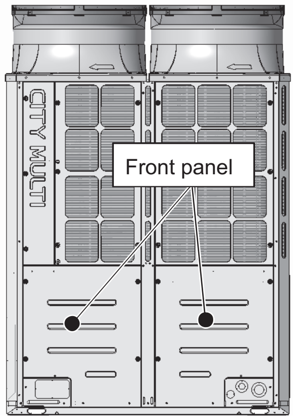


Figure 1

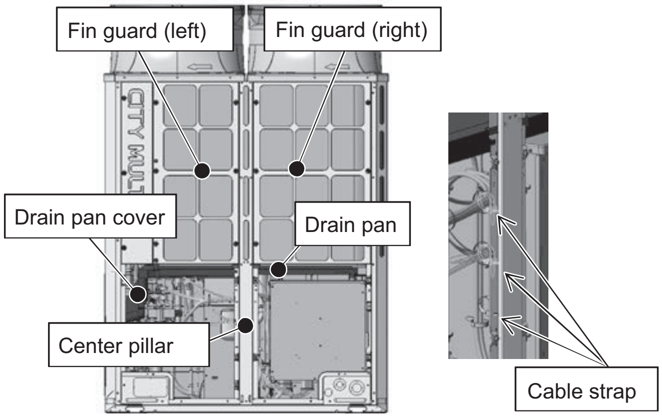


Figure 2

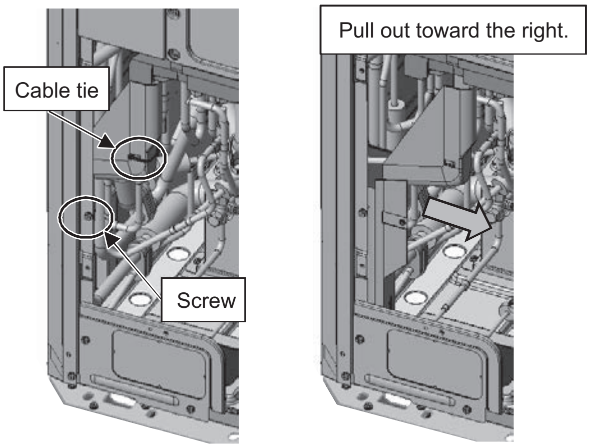


Figure 3

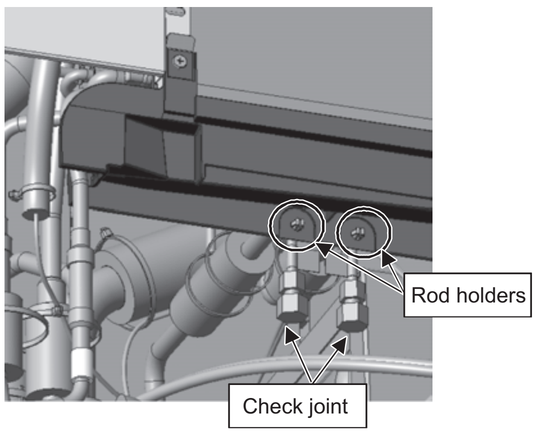


Figure 4

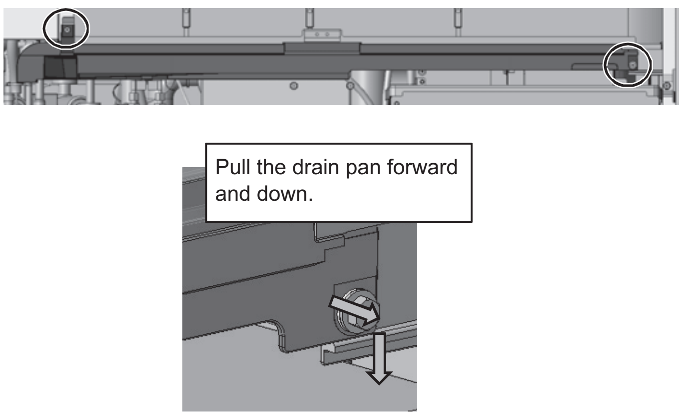


Figure 5

Figure 6

[Drain pan mounting procedure]
*Reuse the drain pan mounting screws from the replaced drain pan. (M5 x 16 mm with a nylon washer)
(1) Screw down the drain pan with two screws. (See Figure 7.)
(2) Hold the check joints to the drain pan with two rod holders. (See Figure 8.)
(3) Make sure that the silicon tube is properly placed on the defrost pipe, and then place the drain pan cover.
Place the drain pan cover along the defrost pipe, and fit it to the drain pan. (See Figures 9 and 10.)
(4) Thread a cable tie through the rectangle hole on the screwed-down drain cover, and hold the silicon tube and the defrost pipe together in place. (See Figure 11.)
(5) Screw down the fin guards, center pillar, and front panel with 14 screws. (See Figure 12.)

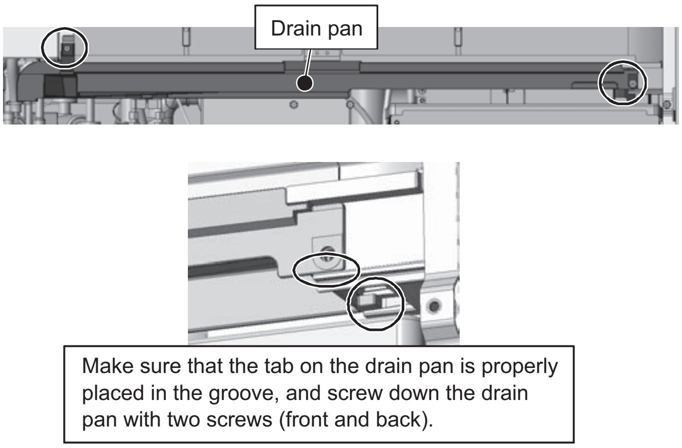


Figure 7

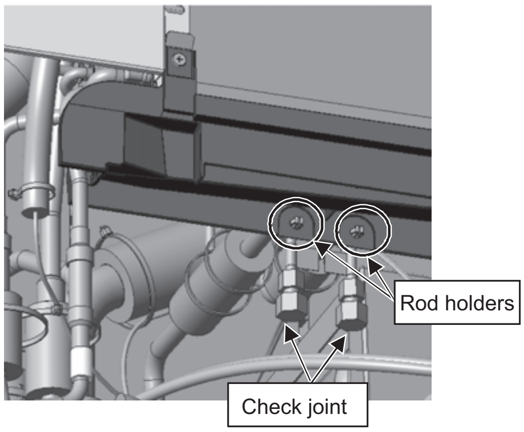


Figure 8

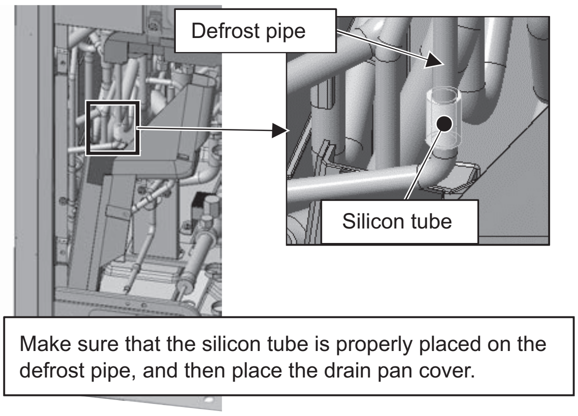


Figure 9

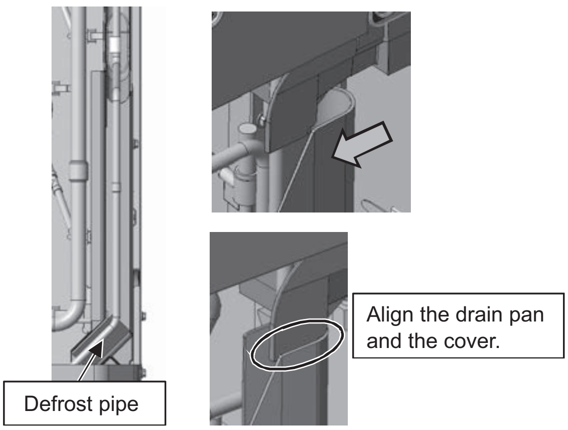


Figure 10

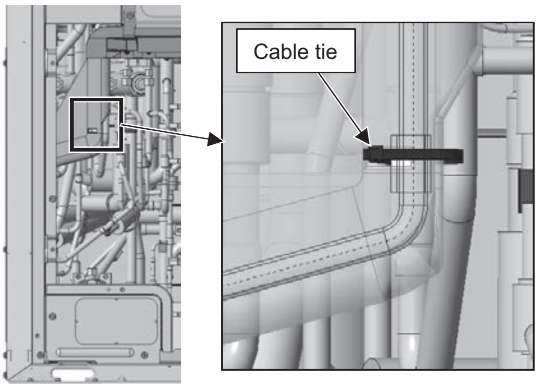


Figure 11

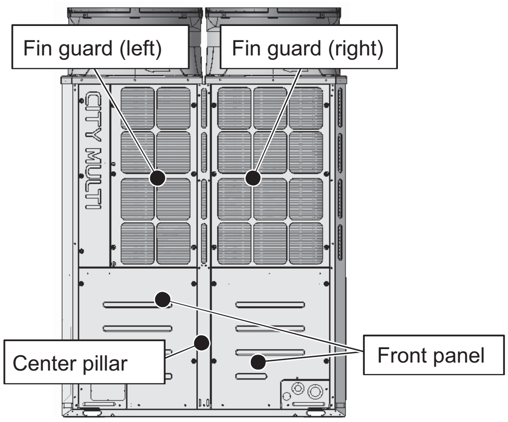


Figure 12

3. XL-module

[Drain pan removal procedure]
(1) Remove the front panel from the unit by unscrewing the 14 screws. (See Figure 1.)
(2) Remove the external temperature sensor wiring from the left drain pan by cutting the two cable ties.
Unhook the pipe cover from the left drain pan. (See Figure 3.)
(3) Remove the left drain pan by unscrewing the two screws. (See Figure 4.)
(4) Remove the right drain pan by unscrewing the two screws. (See Figure 5.)
(5) Clean inside the right and left drain pans. (See Figure 6.)
Remove dust and dirt from the drain groove.

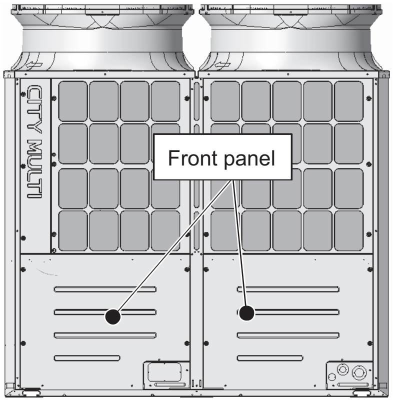


Figure 1

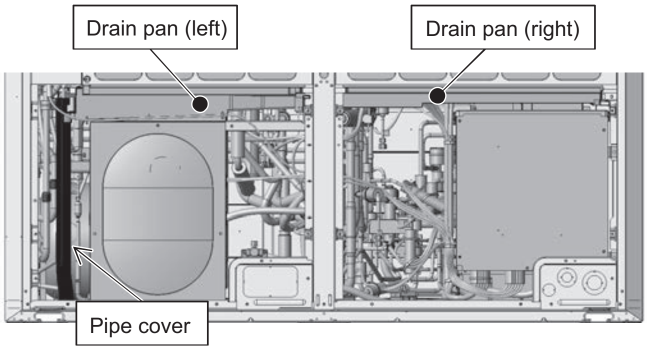


Figure 2

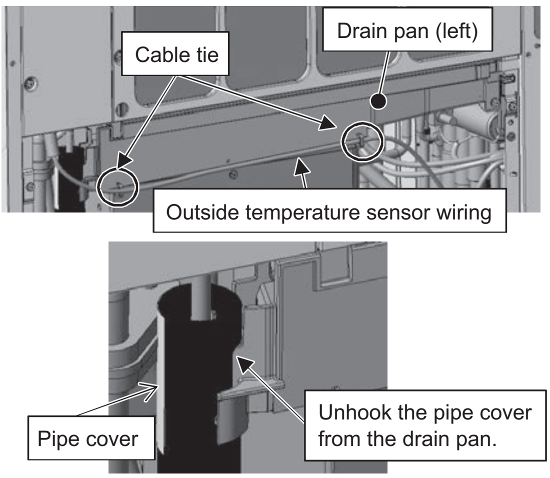


Figure 3

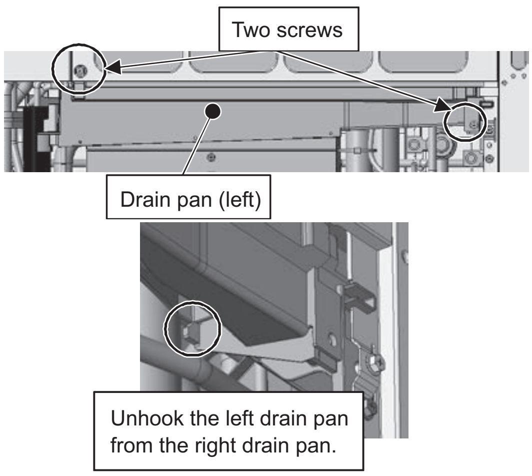


Figure 4

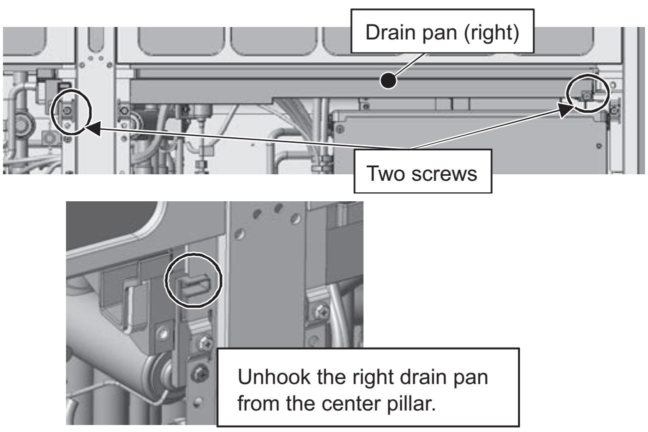


Figure 5

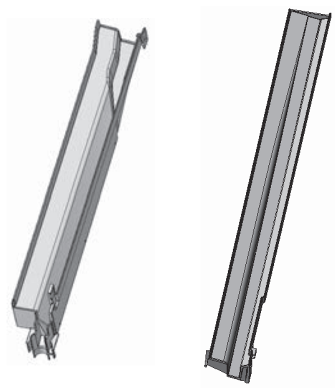


Figure 6

[Drain pan mounting procedure]
*Reuse the drain pan mounting screws that were removed from the replaced drain pan. (M5 x 16 mm with a nylon washer)
(1) Screw down the right drain pan with two screws. (See Figure 7.)
(2) Screw down the left drain pan with two screws. (See Figure 8.)
(3) Hook the pipe cover on the left drain pan. (See Figure 9.)
(4) Hold the external temperature sensor wiring to the left drain pan with two cable ties. (See Figure 10.)
(5) Screw down the front panel. (See Figure 11.)

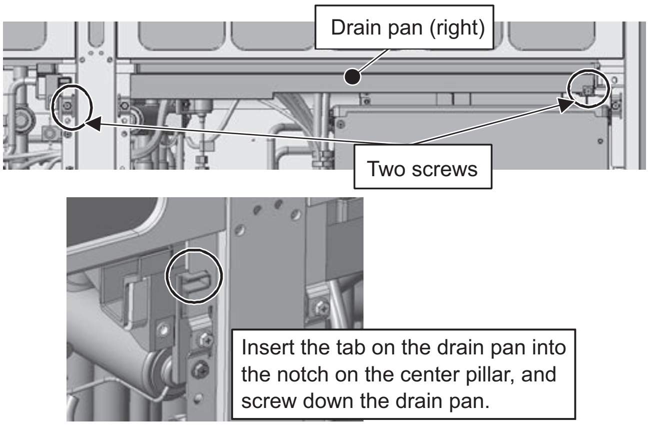


Figure 7

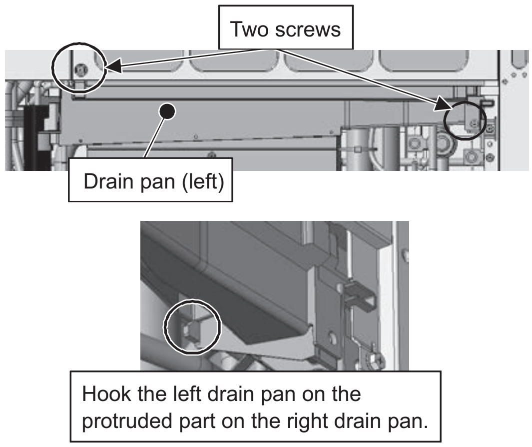


Figure 8

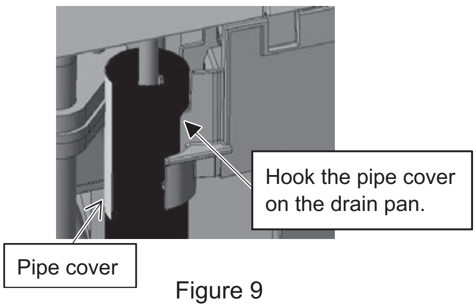


Figure 9

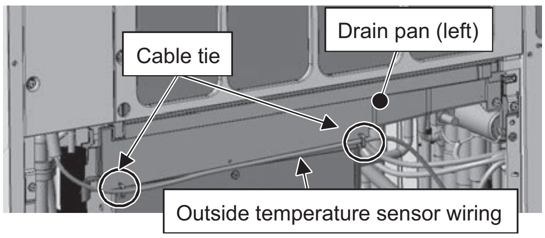


Figure 10

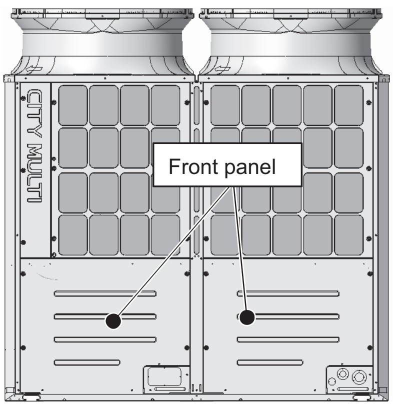


Figure 11

8-13-7 Maintenance Procedures for the Heat Exchanger

1. S-module

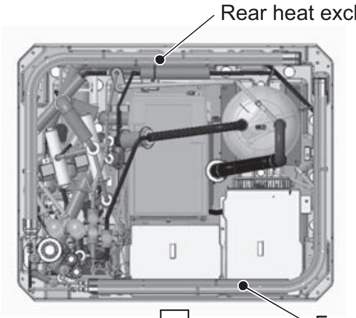


Figure 1

(1) Remove the front panel from the unit by unscrewing the 8 screws. (See Figure 2.)
(2) Remove the fin guard by unscrewing the 6 screws. (See Figure 2.)
(3) Remove the drain cover by unscrewing the screw and cutting the cable tie. (See Figures 3 and 4.)
When re-placing the drain pan cover, make sure that the silicon tube is properly placed on the defrost pipe, and then fix the drain pan cover in place with a cable tie.
(4) Remove the drain pan by unscrewing the 2 screws. (See Figure 3.)
Be sure to remove the two rod holders holding the check joints to the drain pan. (See Figure 4.)

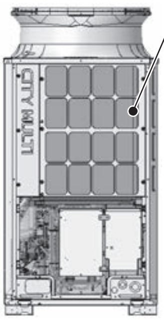


Figure 2

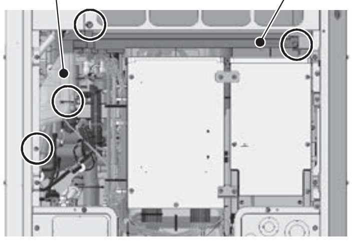


Figure 3

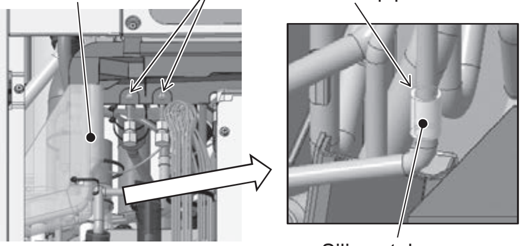


Figure 4

(5) Remove the top attachment that connects the main control box to the inverter control box by unscrewing the 2 screws. (See Figure 5.)
(6) Remove the cover from the inverter control box by unscrewing the 3 screws. (See Figure 5.)
(7) Remove the cable straps holding motor wiring. (See Figure 6.)

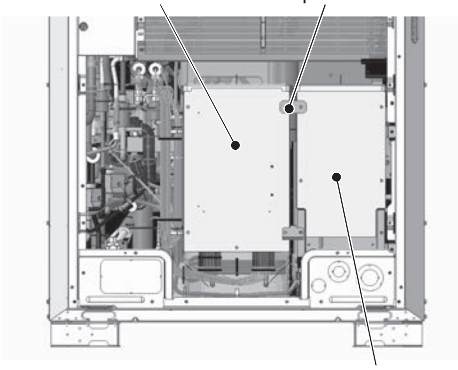


Figure 5

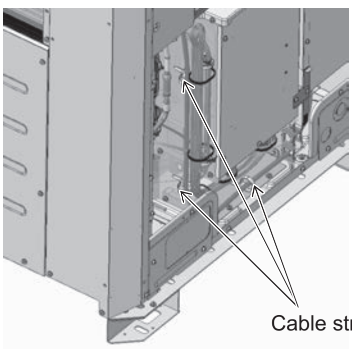


Figure 6

(8) Remove the fan guard by unscrewing the 6 screws. (See Figure 7.)
(9) Insert a spacer between the main control box and the heat exchanger.
(10) Remove the motor ASSY by unscrewing the 4 screws, using caution not to damage the motor wiring or the fan. (See Figure 8.)

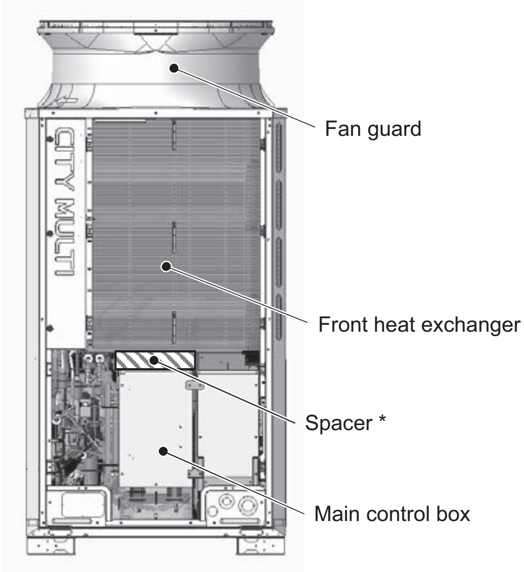


Figure 7

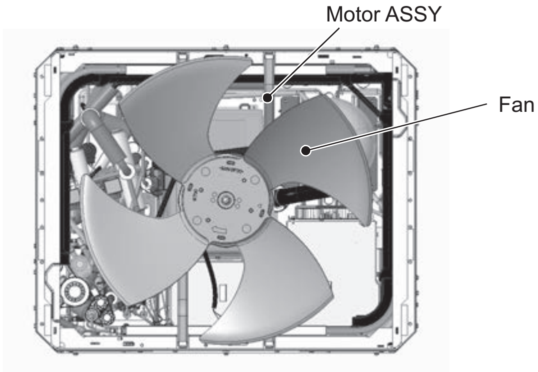


Figure 8

(11) Remove the front pillar by unscrewing the 7 screws. (See Figure 9.)
(12) Disconnect the TH7 sensor holder from the front pillar. (See Figure 9 Rear.)
(13) Remove the TH7 wiring from the front heat exchanger by cutting the cable tie. (See Figure 10.)

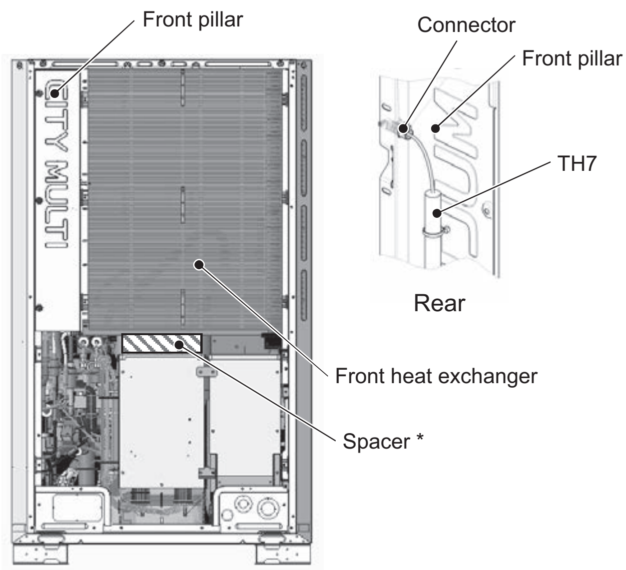


Figure 9

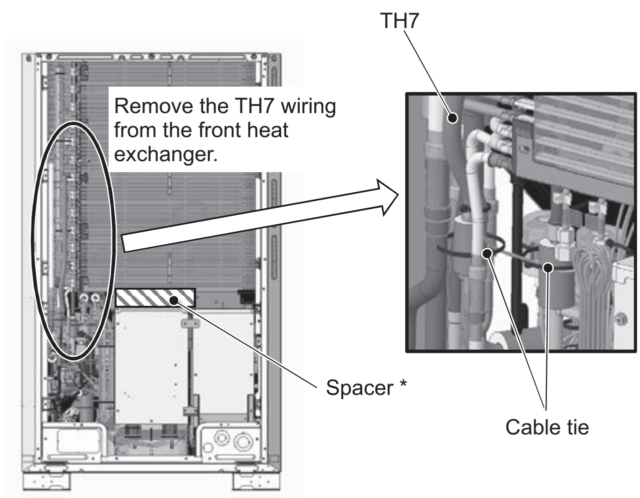


Figure 10

*Use the supplied spacers.
Use the spacers 60 (D) X 250 (W) X 60 (H) when replacing the heat exchangers for the maintenance of the accumulator and the pipes.

(14) To remove the front heat exchanger, first remove the front, left, and right frames by unscrewing the 10 screws. (See Figure 11.)
To remove the rear heat exchanger, remove the rear frame in addition to the front, left, and the right frames by unscrewing the 12 screws. (See Figure 11.)
(15) Unscrew the two screws each on the right and left panels. (See Figure 12 Right and Left.)
(16) Remove the left front pillar by unscrewing the 9 screws on a standard model or 10 screws on a high-efficiency model. (See Figure 12 Front and Left.)
(17) Remove the right front pillar by unscrewing the 5 screws. (See Figure 12 Front and Right.)

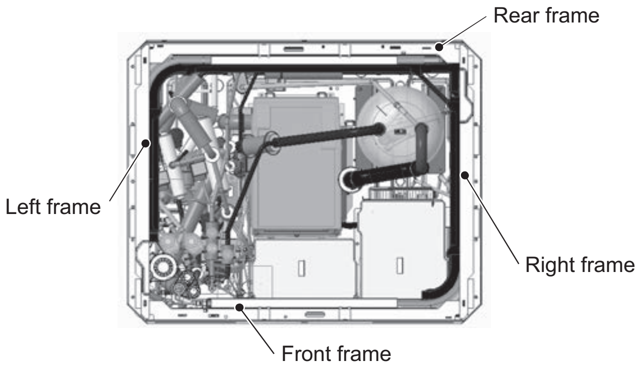


Figure 11

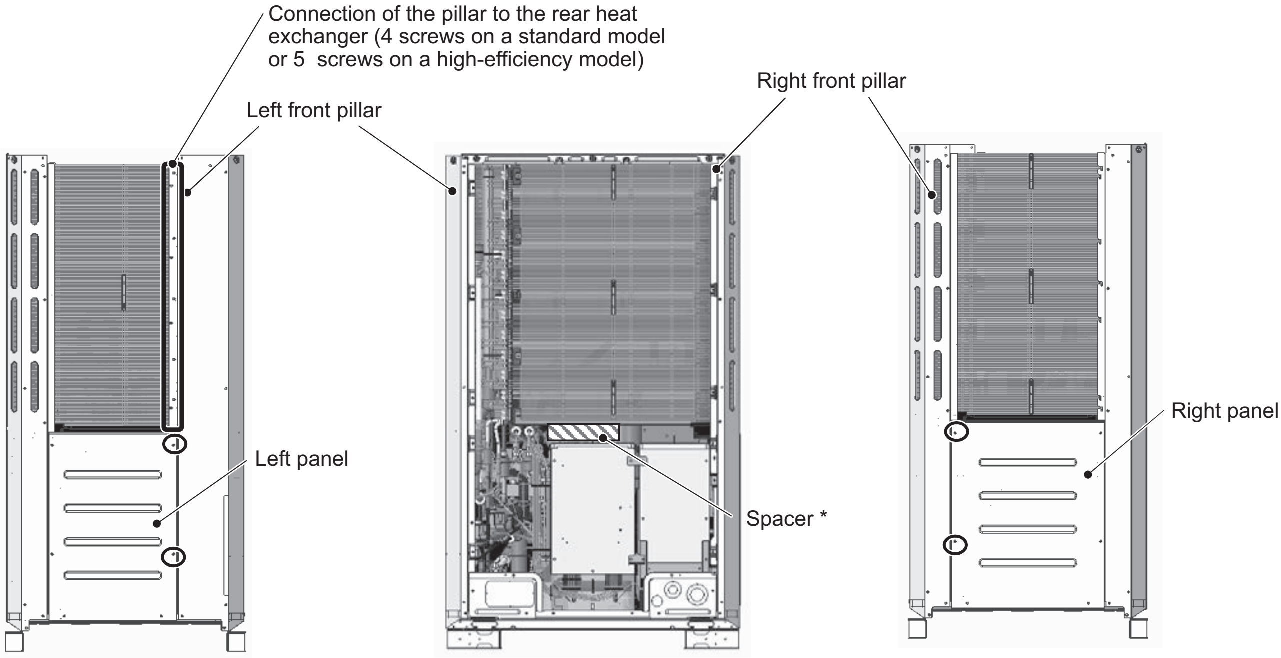


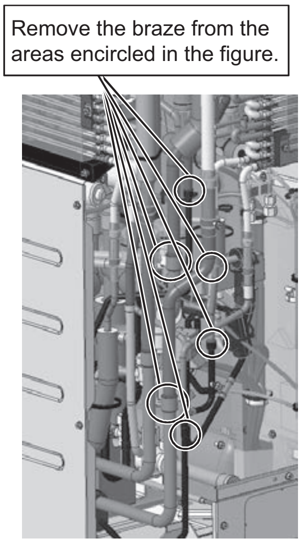
Figure 12 Left

Figure 12 Front

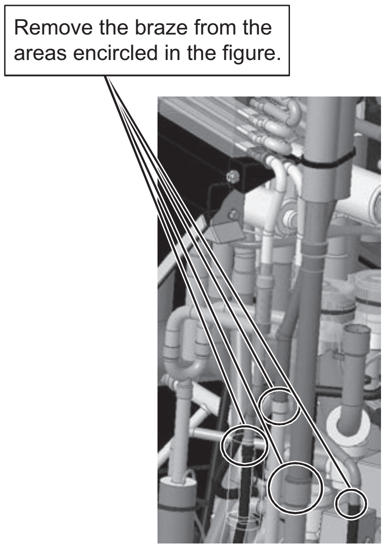
Figure 12 Right

*Use the supplied spacers. Use the spacers 60 (D) X 250 (W) X 60 (H) when replacing the heat exchangers for the maintenance of the accumulator and the pipes.

(18) Before removing the front heat exchanger, protect the surrounding electrical components and the pipe cover with a recommended cloth soaked in water, and then remove the braze from six areas. (See Figure 13.)
To remove the rear heat exchanger, remove the braze from four areas. (See Figure 14.)

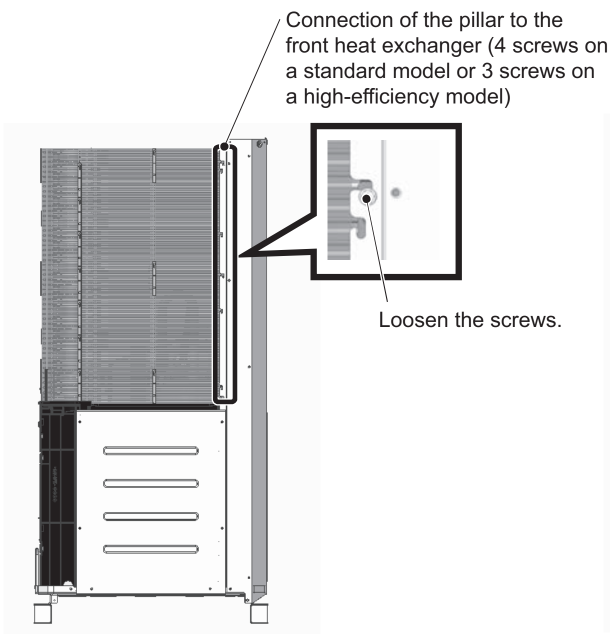


Removing the front heat exchanger
(Figure 13)

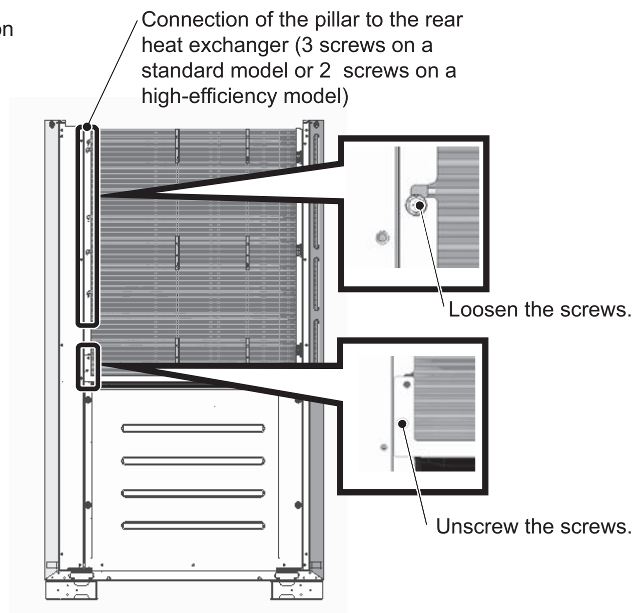


Removing the rear heat exchanger
(Figure 14)

(19) To remove the front heat exchanger, loosen the screws on the right side of the right rear pillar. (4 screws on a standard model or 3 screws on a high-efficiency model) (See Figure 15.)
To remove the rear heat exchanger, loosen the screws on the back of the right rear pillar. (3 screws on a standard model or 2 screws on a high-efficiency model) (See Figure 16.)
Remove the screw holding the pillar to the rear heat exchanger support. (See Figure 16.)

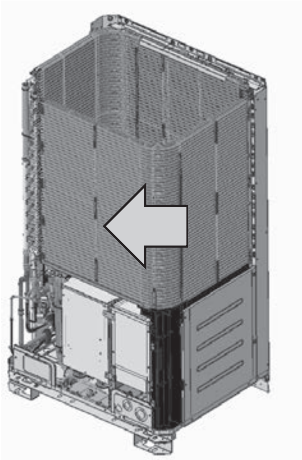


Removing the front heat exchanger
(Figure 15)

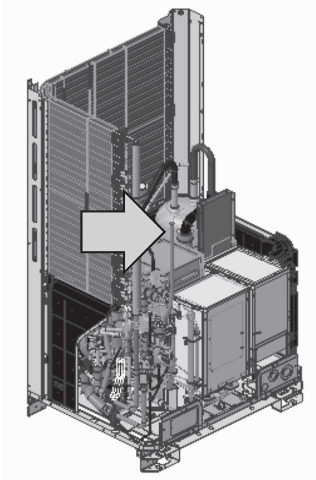


Removing the rear heat exchanger
(Figure 16)

(20) Remove the heat exchanger by diagonally lifting it up, using caution not to damage the fins or the pipes.



Removing the front heat exchanger
(Figure 17)



Removing the rear heat exchanger
(Figure 18)

(21) Re-place the front and the rear heat exchangers in the reverse order as they were removed.
Re-place the components that were removed as they were.

Notes for replacing refrigerant circuit components (heat exchanger)
- Be sure to perform non-oxidized brazing.
- After brazing is done, check that the brazing is done properly and check for leaks before vacuum-drying the pipes.
- Direct the brazing torch flame away from the wiring and sheet metals inside the unit not to damage them.
- Place the wet felt sheets listed below (or their equivalents) around the areas to be brazed to protect the heat exchanger, pipes, and pipe covers from being damaged from the brazing torch flame.
  Recommended felt sheets: Spatter felt 50CF-11 (5t x 1 m x 1 m) by TRUSCO Nakayama
  Felt sheets that meet the JIS standard (JIS A 1323 type A "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works")

2. L-module

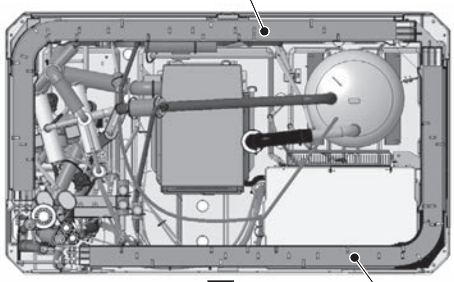


Figure 1

(1) Remove the two front panels from the unit by unscrewing the 14 screws. (See Figure 2.)
(2) Remove the fin guard by unscrewing the 12 screws. (See Figure 2.)
(3) Remove the cable straps holding the weak and strong electrical wirings. (See Figure 3.)
(4) Remove the center pillar by unscrewing the 5 screws. (See Figure 2.)
(5) Remove the drain cover by unscrewing the screw and cutting the cable tie. (See Figures 3 and 4.)
When re-placing the drain pan cover, make sure that the silicon tube is properly placed on the defrost pipe, and then fix the drain pan cover in place with a cable tie.
(6) Remove the drain pan by unscrewing the 2 screws. (See Figure 3.)
Be sure to remove the two rod holders holding the check joints to the drain pan. (See Figure 4.)

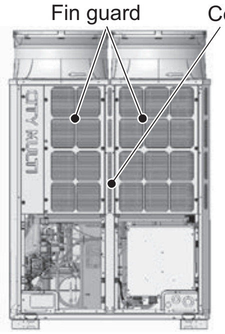


Figure 2

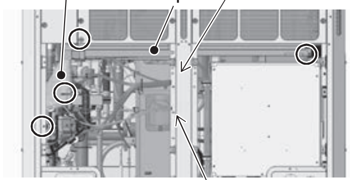


Figure 3

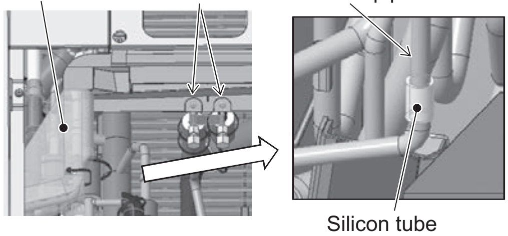


Figure 4

(7) Remove the cover from the control box by unscrewing the 5 screws. (See Figure 5.)
(8) Remove the cable straps holding motor wiring. (See Figure 6.)

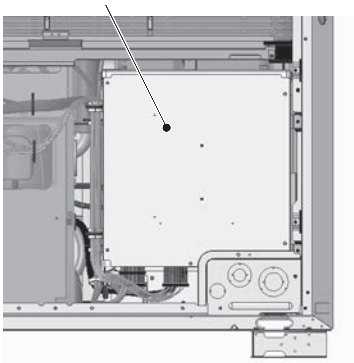


Figure 5

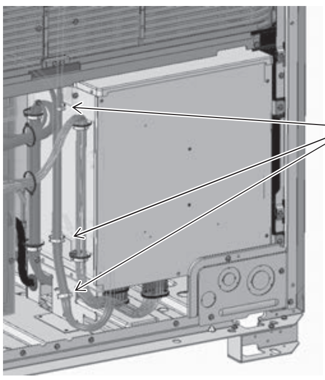


Figure 6

8 Troubleshooting Based on Observed Symptoms

(9) Remove the fan guard by unscrewing the 12 screws. (See Figure 7.)
(10) Insert a spacer between the control box and the heat exchanger.
(11) Remove the motor ASSY by unscrewing the 8 screws, using caution not to damage the motor wiring or the fan. (See Figure 8.)

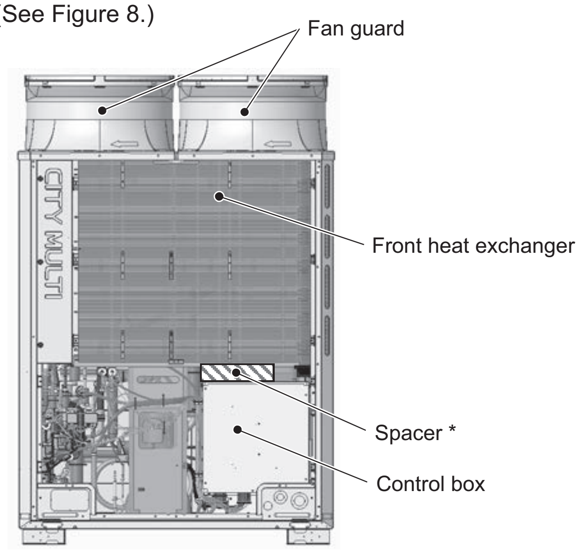


Figure 7

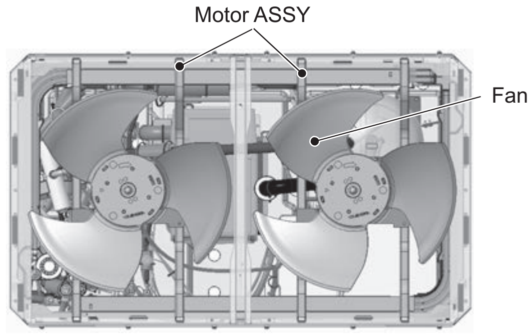


Figure 8

(12) Remove the front pillar by unscrewing the 7 screws. (See Figure 9.)
(13) Disconnect the TH7 sensor holder from the front pillar. (See Figure 9 Rear.)
(14) Remove the TH7 wiring from the heat exchanger by cutting the cable tie. (See Figure 10.)

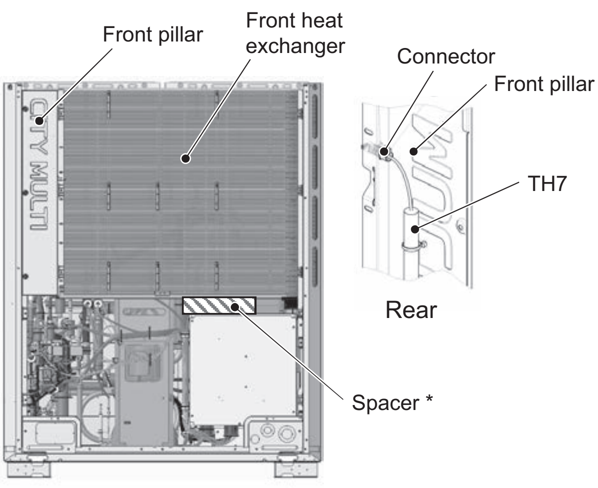


Figure 9

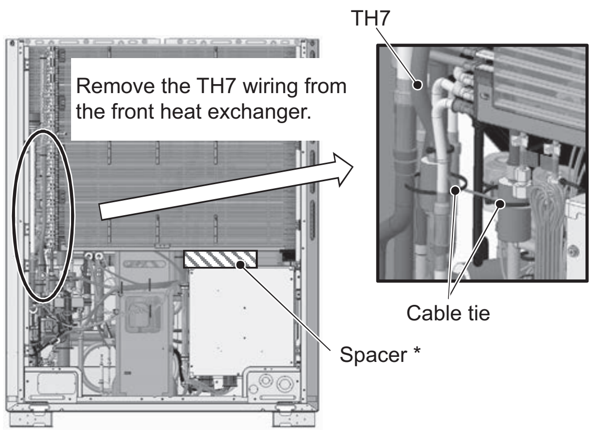


Figure 10

*Use the supplied spacers.
Use the spacers 60 (D) x 250 (W) x 60 (H) when replacing the heat exchangers for the maintenance of the accumulator and the pipes.

(15) To remove the front heat exchanger, first remove the front, left, right, and center frames by unscrewing the 14 screws. (See Figure 11.)
To remove the rear heat exchanger, remove the rear frame in addition to the front, left, right, and center frames by unscrewing the 16 screws. (See Figure 11.)
(16) Unscrew the two screws each on the right and left panels. (See Figure 12 Right and Left.)
(17) Remove the left front pillar by unscrewing the 9 screws on a standard model or 10 screws on a high-efficiency model. (See Figure 12 Front and Left.)
(18) Remove the right front pillar by unscrewing the 5 screws. (See Figure 12 Front and Right)

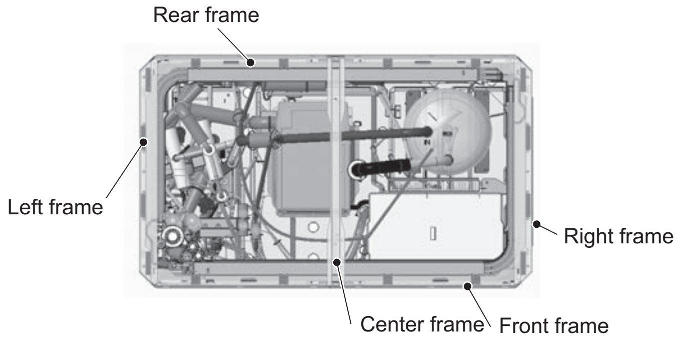


Figure 11

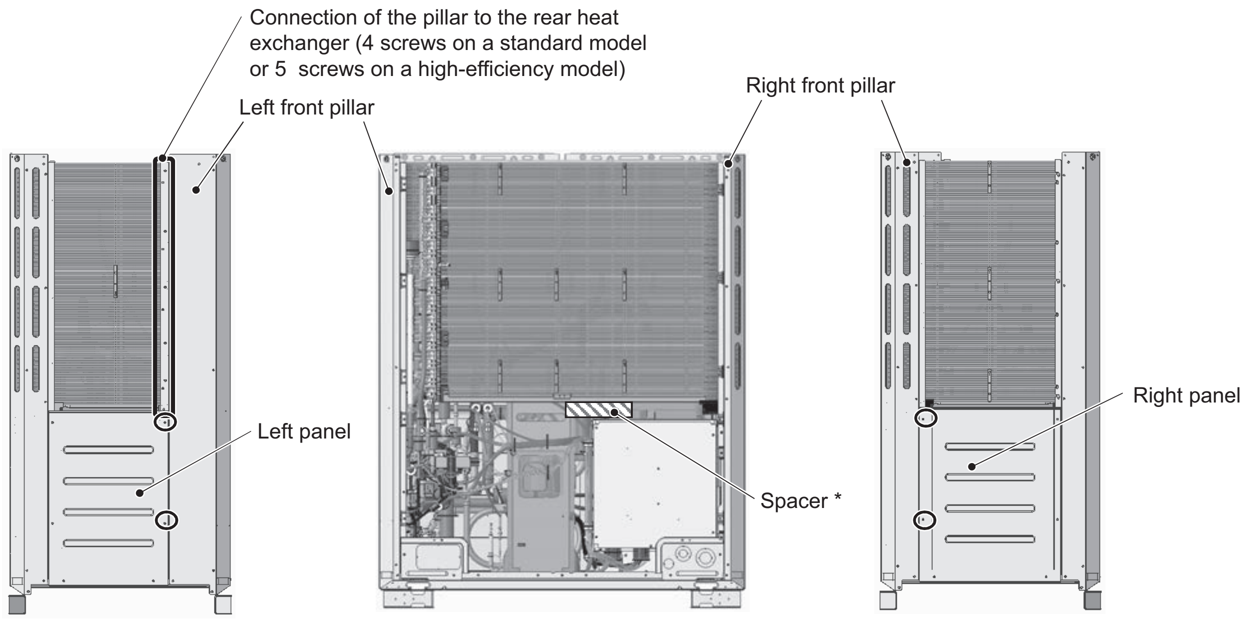


Figure 12 Left

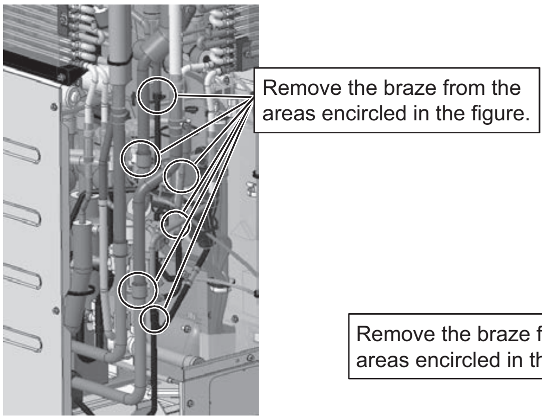
Figure 12 Front

Figure 12 Right

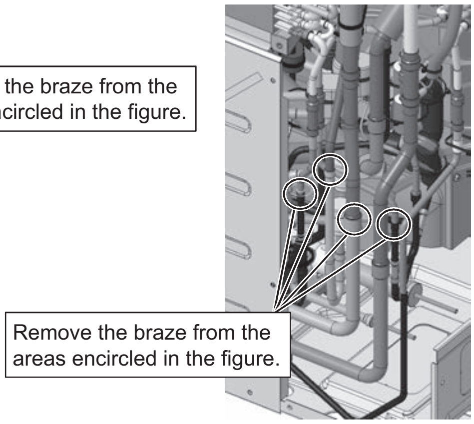
*Use the supplied spacers. Use the spacers 60 (D) X 250 (W) X 60 (H) when replacing the heat exchangers for the maintenance of the accumulator and the pipes.

8 Troubleshooting Based on Observed Symptoms

(19) Before removing the front heat exchanger, protect the surrounding electrical components and the pipe cover with a recommended felt soaked in water, and then remove the braze from six areas. (See Figure 13.)
To remove the rear heat exchanger, remove the braze from four areas. (See Figure 14.)

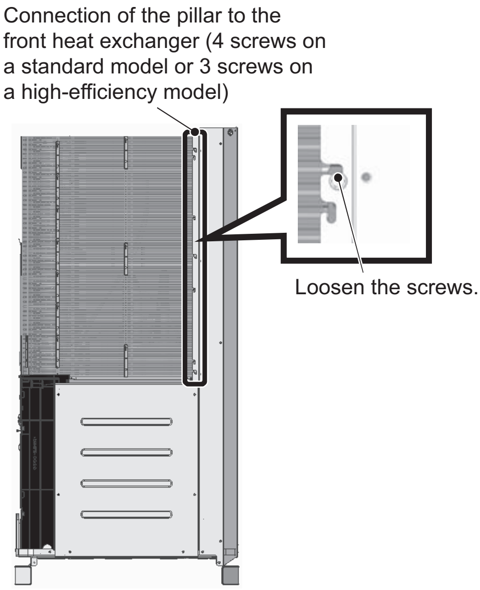


Removing the front heat exchanger
(Figure 13)

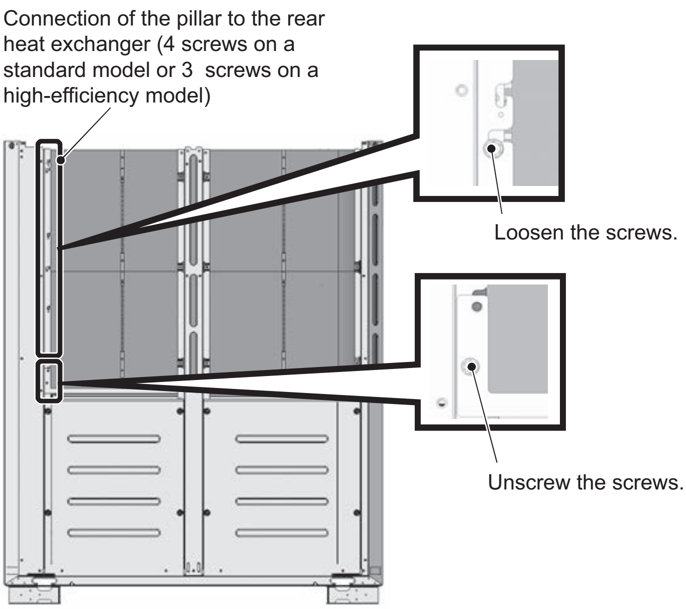


Removing the rear heat exchanger
(Figure 14)

(20) To remove the front heat exchanger, loosen the screws on the right side of the right rear pillar. (4 screws on a standard model or 3 screws on a high-efficiency model) (See Figure 15.)
To remove the rear heat exchanger, loosen the screws on the back of the right rear pillar. (4 screws on a standard model or 3 screws on a high-efficiency model) (See Figure 16.)
Remove the screw holding the pillar to the rear heat exchanger support.



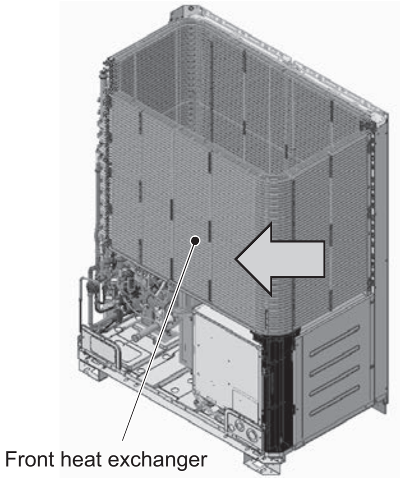
Removing the front heat exchanger
(Figure 15)



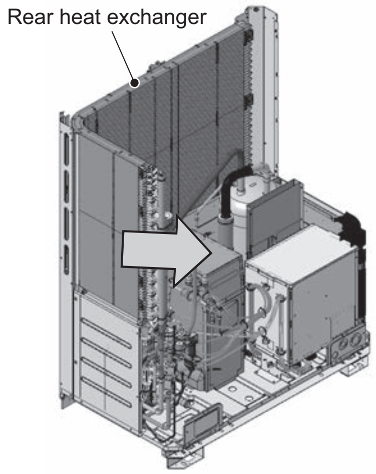
Removing the rear heat exchanger
(Figure 16)

8 Troubleshooting Based on Observed Symptoms

(21) Remove the heat exchanger by diagonally lifting it up, using caution not to damage the fins or the pipes.



Removing the front heat exchanger
(Figure 17)



Removing the rear heat exchanger
(Figure 18)

(22) After removing the heat exchangers, dispose of the front and the rear heat exchanger supports. (See Figures 19 and 20.)
The front and the rear heat exchanger supports do not need to be installed. (The front and the rear heat exchanger supports are for suppressing vibration during transportation.)

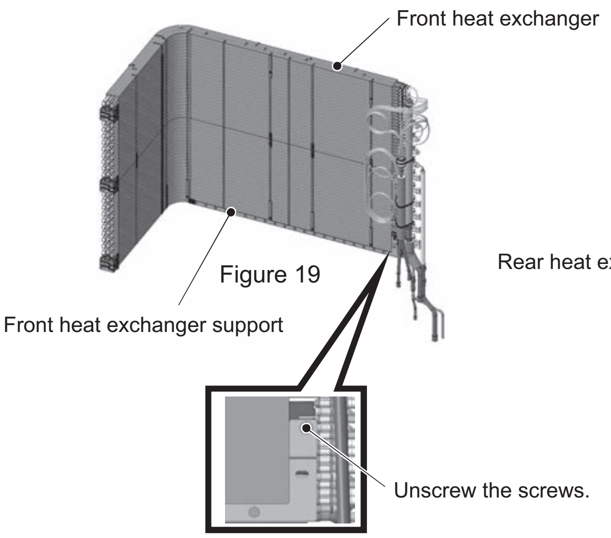


Figure 19

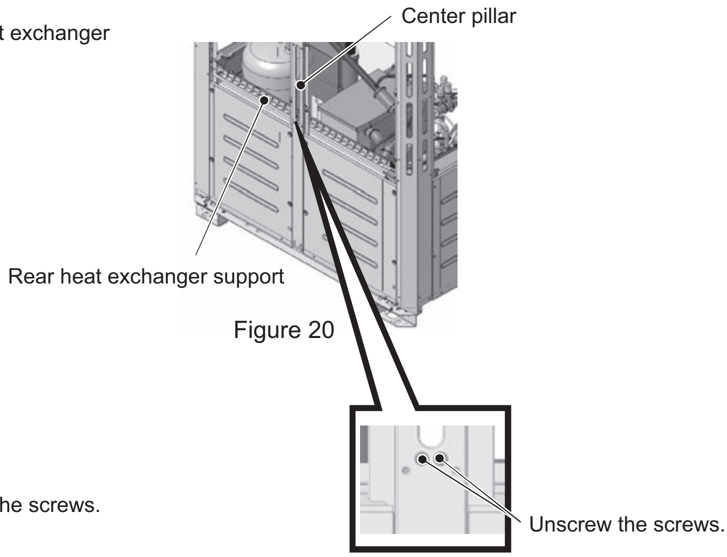


Figure 20

(23) Re-place the front and the rear heat exchangers in the reverse order as they were removed.
Re-place the components that were removed as they were.

3. XL-module

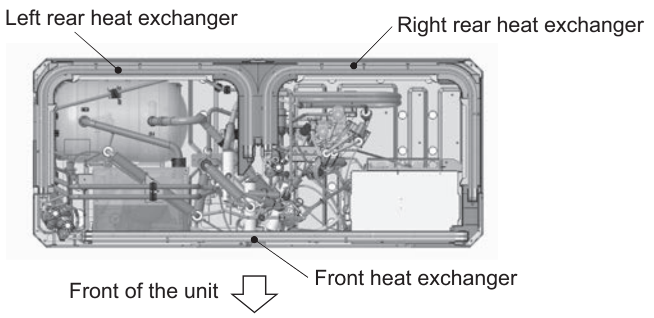


Figure 1

(1) Remove the two front panels from the unit by unscrewing the 14 screws. (See Figure 2.)
(2) Remove the fin guard by unscrewing the 12 screws. (See Figure 2.)
(3) Remove pipe cover. (See Figure 3.)
(4) Remove the left drain pan by unscrewing the two screws and cutting the two cable ties. (See Figure 3.)
(5) Remove the right drain pan by unscrewing the 2 screws. (See Figure 3.)
(6) Remove the 3 cable straps from the center pillar. (See Figure 4.)

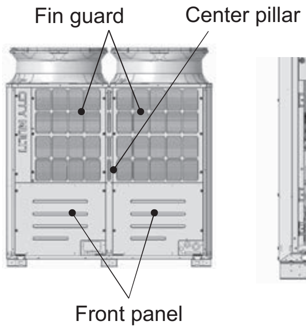


Figure 2

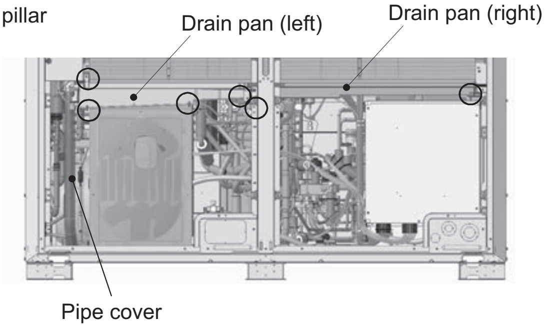


Figure 3

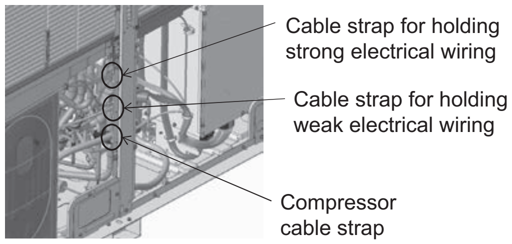


Figure 4

(7) Remove the 3 cable straps holding motor wiring from the control box. (See Figure 5.)
(8) Remove the fan guard by unscrewing the 12 screws. (See Figure 6.)
(9) Remove the wire from the center frame. (See Figure 7.)
(10) Remove the motor ASSY by unscrewing the 8 screws, using caution not to damage the motor wiring or the fan. (See Figure 7.)

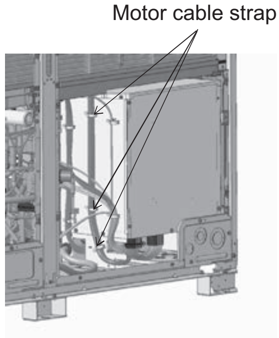


Figure 5

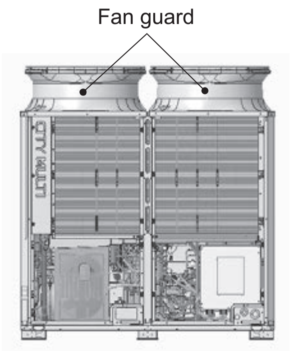


Figure 6

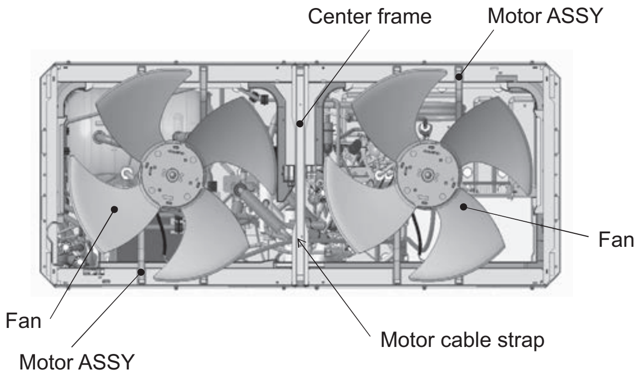
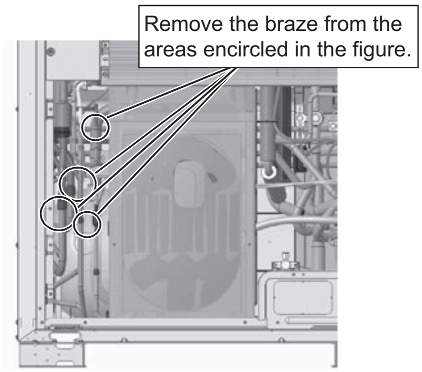
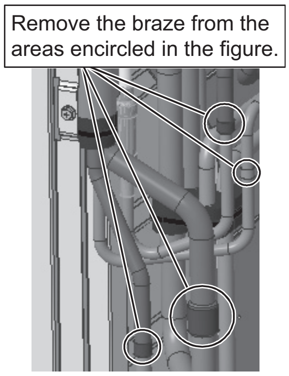


Figure 7

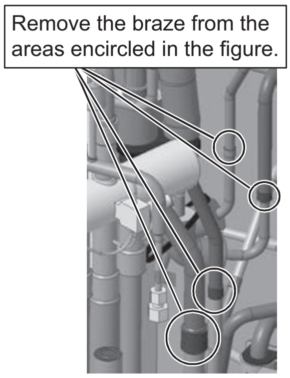
(11) Before removing the front heat exchanger, protect the surrounding electrical components and the pipe cover with a recommended felt soaked in water, and then remove the braze from four areas. (See Figure 8.)
To remove the right and left rear heat exchangers, remove the braze from four areas. (See Figures 9 and 10.)



Removing the front heat exchanger (Figure 8)



Removing the left rear heat exchanger (Figure 9)



Removing the right rear heat exchanger (Figure 10)

(12) Remove the front pillar by unscrewing the 7 screws. (See Figure 11.)
(13) Disconnect the TH7 sensor holder from the front pillar. (See Figure 11 Rear.)

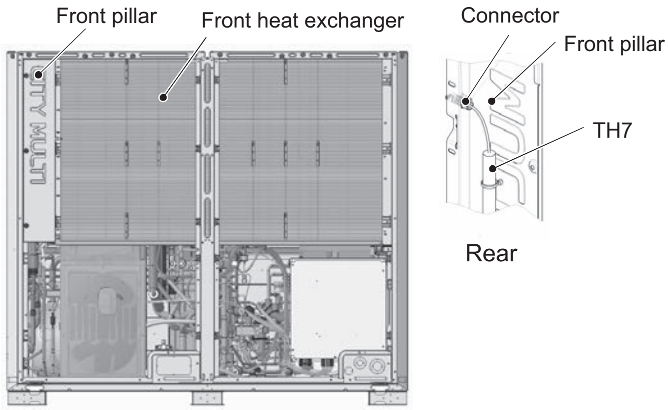


Figure 11

(14) To remove the front heat exchanger, first remove the front, left, right, and center frames by unscrewing the 16 screws. (See Figure 12.)
To remove the right and left rear heat exchangers, remove the top and the rear frames in addition to the front, left, right, and center frames by unscrewing the 21 screws. (See Figure 12.)
(15) Remove the center front pillar by unscrewing the 4 screws. (See Figure 13.)

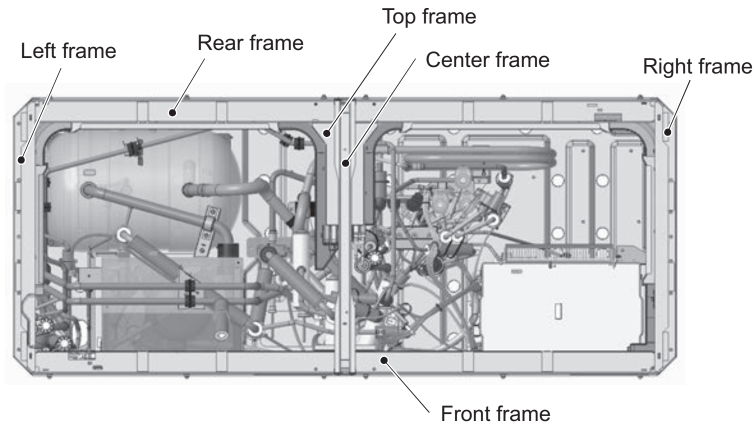


Figure 12

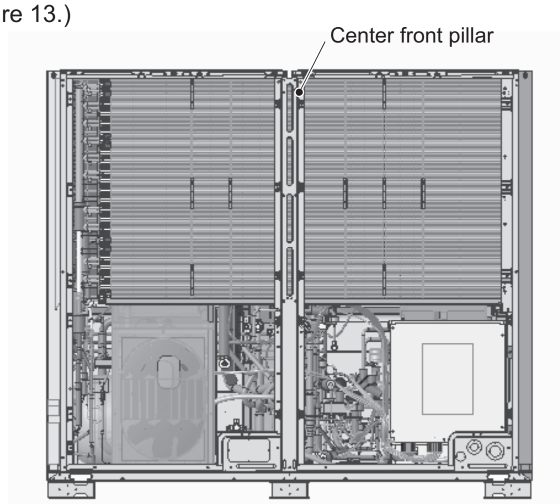
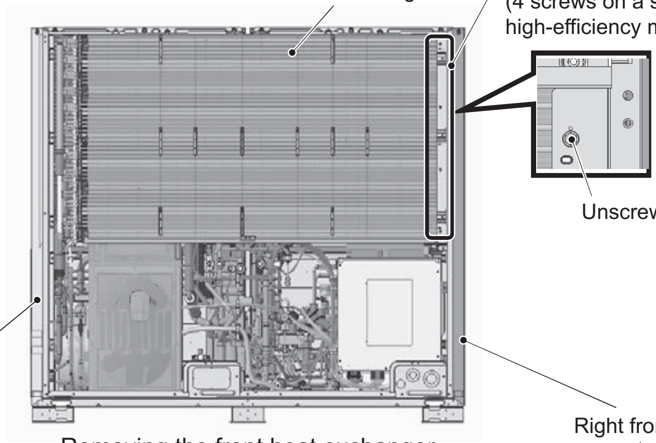


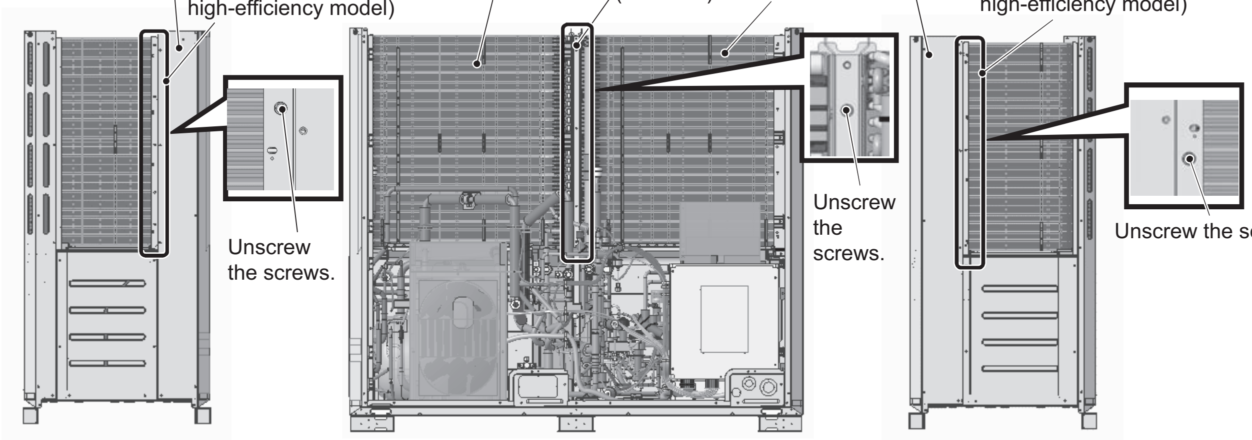
Figure 13

8 Troubleshooting Based on Observed Symptoms

(16) To remove the front heat exchanger, unscrew the screws on the front of the right front pillar. (4 screws on a standard model or 3 screws on a high-efficiency model) (See Figure 14.)
To remove the left rear heat exchanger, unscrew the screws on the left side of the left front pillar and the screws on the front of the center pillar (7 screws on a standard model or 8 screws on a high-efficiency model. (See Figures 15 and 16.)
To remove the right rear heat exchanger, unscrew the screws on the right side of the right front pillar and the screws on the front of the center pillar (7 screws on a standard model or 6 screws on a high-efficiency model. (See Figures 16 and 17.)



Removing the front heat exchanger
(Figure 14)

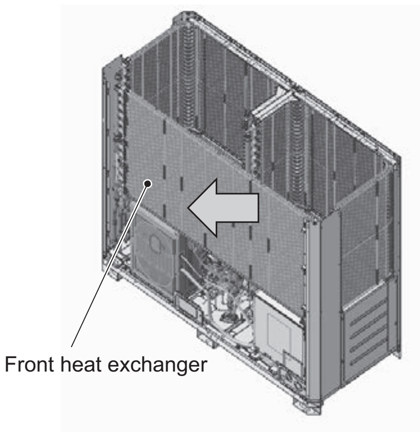


Removing the left rear heat exchanger (Figure 15)

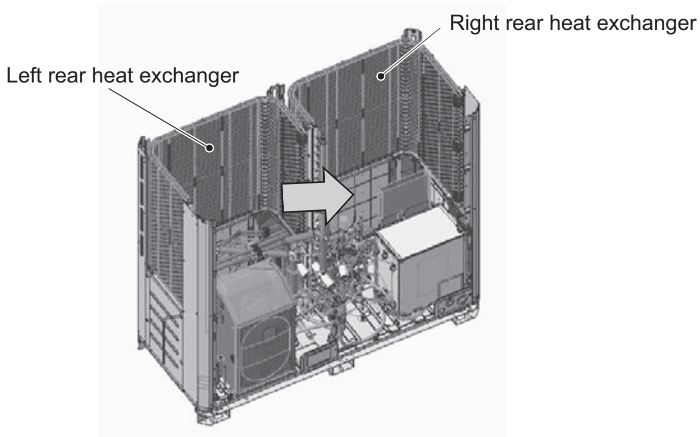
Removing the right and left rear heat exchangers (Figure 16)

Removing the right rear heat exchanger (Figure 17)

(17) Remove the heat exchanger by diagonally lifting it up, using caution not to damage the fins or the pipes.



Removing the front heat exchanger
(Figure 18)



Removing the rear heat exchanger
(Figure 19)

(18) Re-place the front and the rear heat exchangers in the reverse order as they were removed.
Re-place the components, except the rear heat exchanger support, that were removed as they were.

8-13-8 Accumulator Replacement Procedure

1. S, L-module

(1) Remove the front heat exchanger. Refer to 8-13-7 Maintenance Procedures for the Heat Exchanger for details.
(2) Remove the top, front, and right compressor covers. Refer to 8-13-4 Compressor Replacement Procedure for details.
(3) Remove the duct from the control box. Refer to the control box replacement procedure for details.
(4) Remove the right and inside (right) compressor panels by unscrewing the four screws. (Applicable only to the S-module. See Figures 1 and 2.)

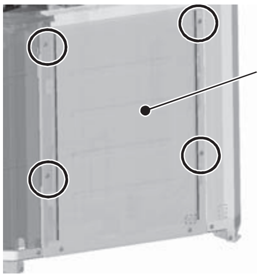


Figure 1

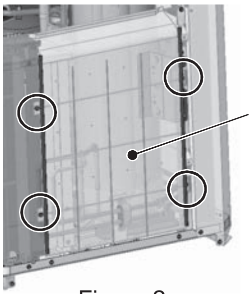


Figure 2

(5) Unscrew the four screws from the right accumulator fixing plate. (See Figures 3 and 5.)
(6) Unscrew the four screws from the rear accumulator fixing plate. (See Figures 3 and 4.)
(7) Remove the accumulator by unscrewing the four screws at the base legs. (See Figure 6.)

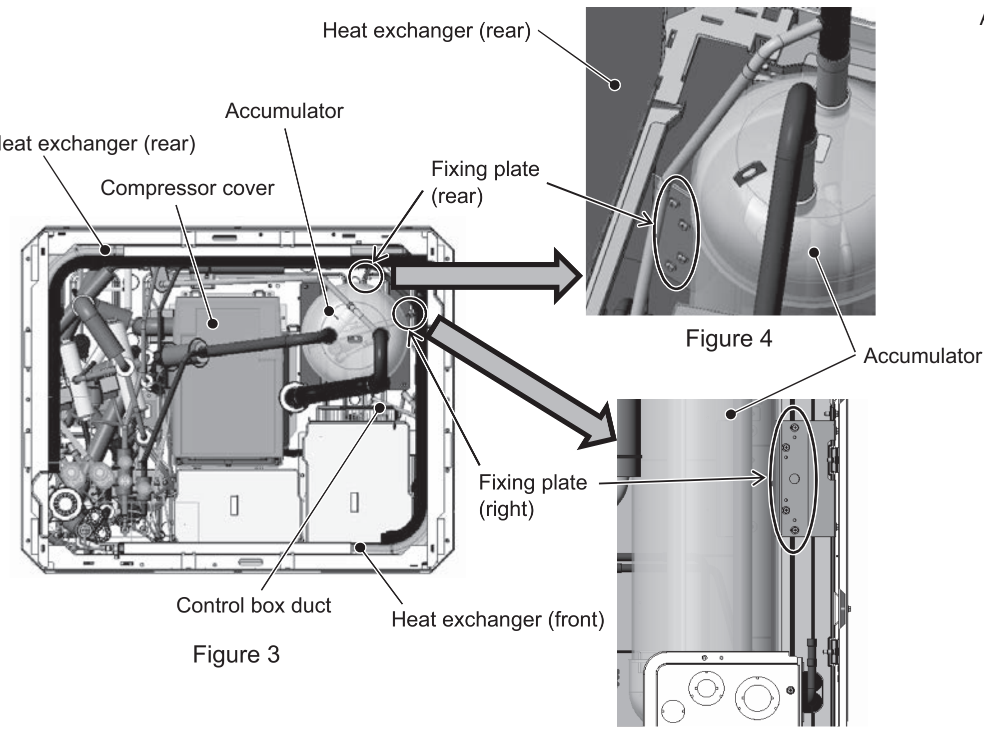


Figure 3

Figure 4

Figure 5

Accumulator

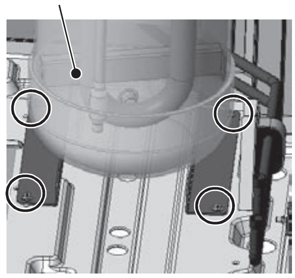


Figure 6

(8) Remove the braze at the four areas on the accumulator inlet and outlet pipes shown in Figure 7.

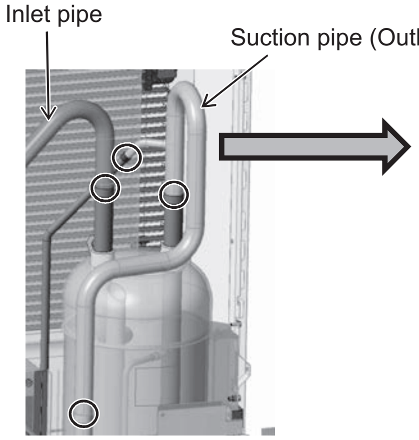


Figure 7

S-module suction pipe

L-module suction pipe

(9) Re-place the accumulator in the reverse order as it was removed.
Re-place the components that were removed as they were.

*Notes on replacing refrigerant circuit components (accumulator)
- Be sure to perform non-oxidized brazing.
- Before heating the pipes, wrap the refrigerant circuit components with a wet towel to keep the temperature of the components from rising above 120°C.
- After brazing is done, check that the brazing is done properly and check for leaks before vacuum-drying the pipes.
- Direct the brazing torch flame away from the wiring and sheet metals inside the unit not to damage them.
- Wet felt sheets listed below (or its equivalent), and place them around the areas to be brazed to protect the heat exchanger, pipes, and pipe covers from being damaged from the brazing torch flame.
  Recommended felt sheets: Spatter felt 50CF-11 (5t x 1 m x 1 m) by TRUSCO Nakayama
  Felt sheets that meet the JIS standard (JIS A 1323 type A "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works")

2. XL-module

(1) Remove the front heat exchanger. Refer to 8-13-7 Maintenance Procedures for the Heat Exchanger for details.
(2) Remove the top, front, and right compressor covers. Refer to 8-13-4 Compressor Replacement Procedure for details.
(3) Remove the fixing plate 1 above four-way valve (21S4b), saddle, and rubber spacer by unscrewing the three screws shown in Figure 8.
Either remove or protect the wiring, pipe cover, and plastic components to keep them from being damaged by the torch flame.

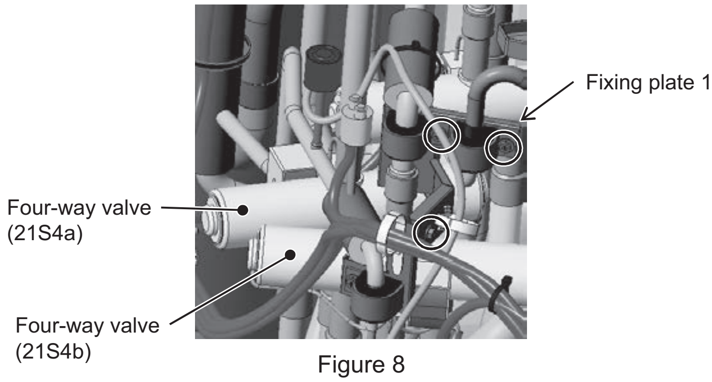


Figure 8

(4) Remove the sheet metal, cable ties, and rubber spacers from the accumulator mounting plate by unscrewing the screw. (See Figure 9.)

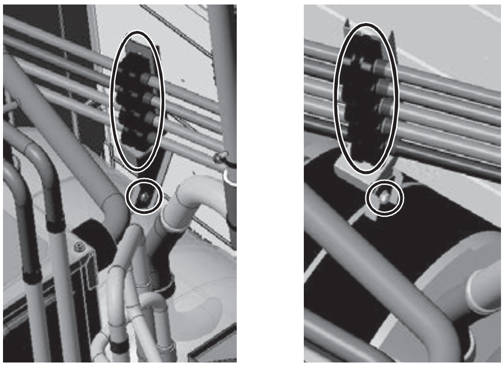


Figure 9

(5) Remove the braze at the two areas on the accumulator outlet (suction) pipe. (See Figure 10.)
(6) Remove the braze at the two areas on the accumulator inlet pipe. (See Figure 11.)

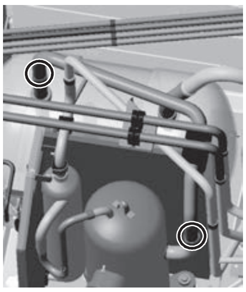


Figure 10

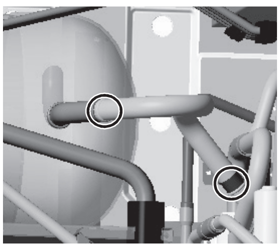


Figure 11

(7) For the four-pipe piping on the back of the accumulator, follow the procedures below.
Remove the braze at the four areas on the four pipes on the back of the accumulator. (See Figure 12.)
Remove the braze at the six areas that are located on the right side of the four pipes on the back of the accumulator. (See Figure 13.)

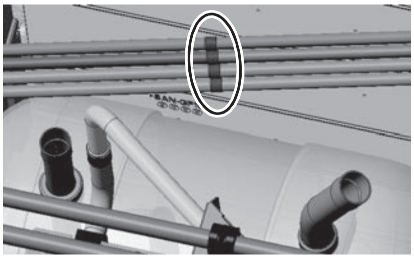


Figure 12

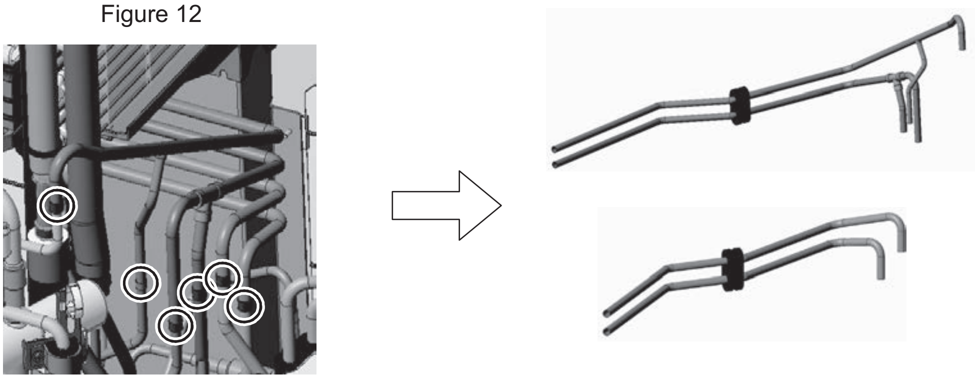


Figure 13

(8) For the five-pipe piping on the back of the accumulator, follow the procedures below.
Remove the braze at the five areas on the five pipes on the back of the accumulator. (See Figure 14.)
Remove the braze at the seven areas that are located on the right side of the five pipes on the back of the accumulator. (See Figure 15.)

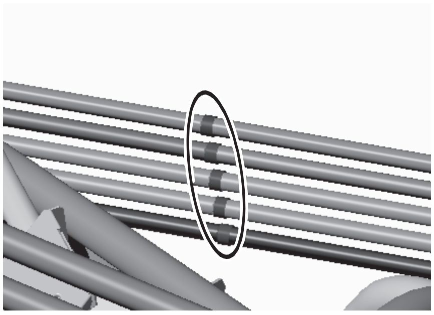
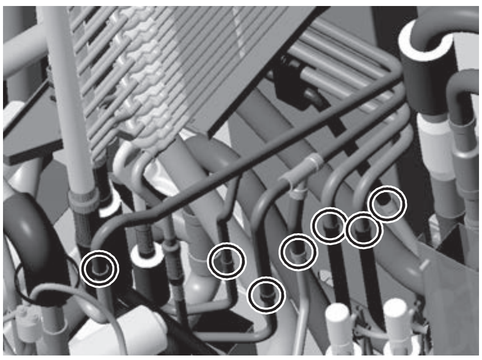


Figure 14



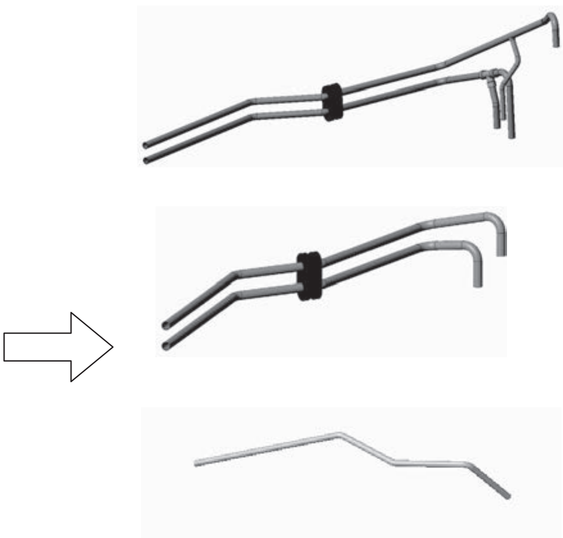
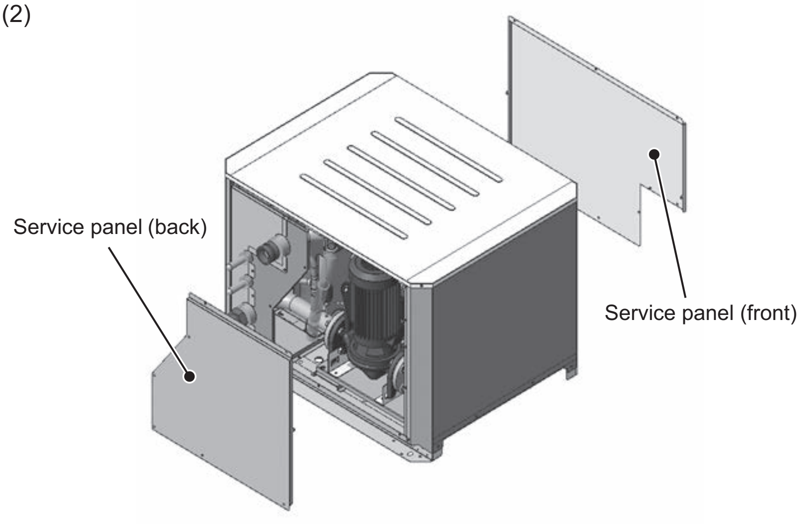
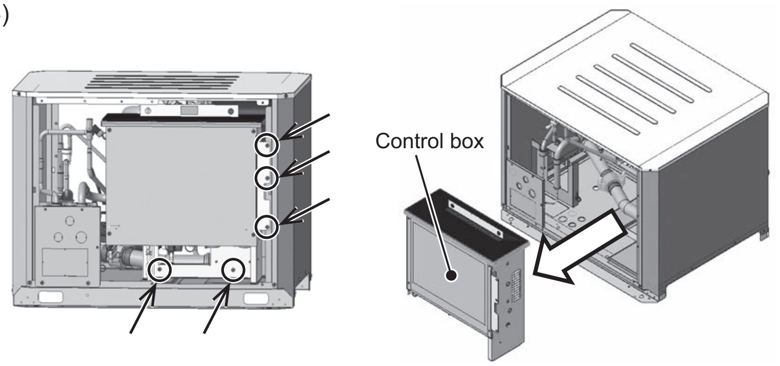
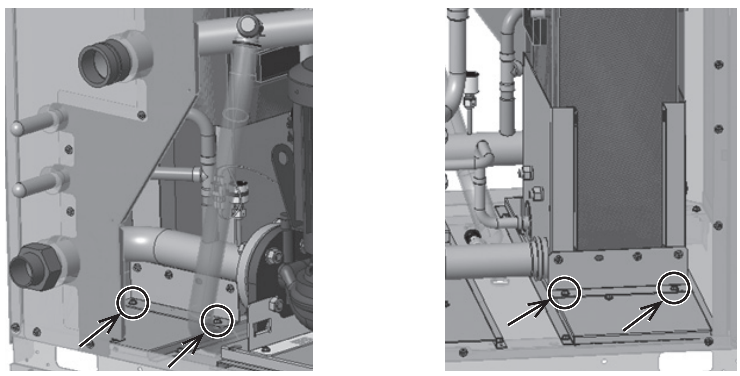


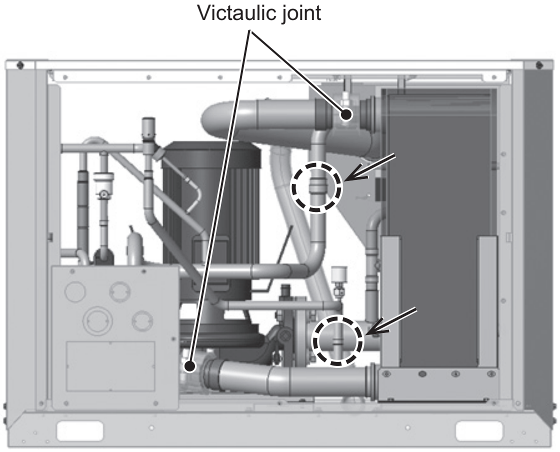
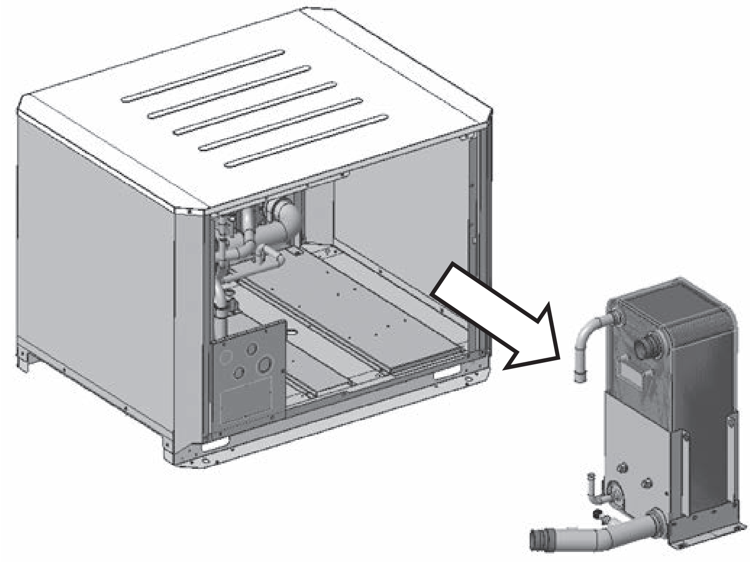
Figure 15

(9) Re-place the accumulator in the reverse order as it was removed.
Re-place the components that were removed as they were.

8-14 Hydro Unit Maintenance Instructions

8-14-1 Plate Heat Exchanger Replacement Procedure

Operation procedures	Illustrations
1) Remove all refrigerant from the pipes. 2) Remove the front panel (8 screws) and the rear panel (7 screws). 3) Disconnect all wires connecting the control box to the unit (including the wires added on site). 4) Pull the control box (5 screws) out in the direction of the arrow. 5) Remove the plate heat exchanger set screws (2 in the front and 2 in the back).	(2)  (4)  (5) 

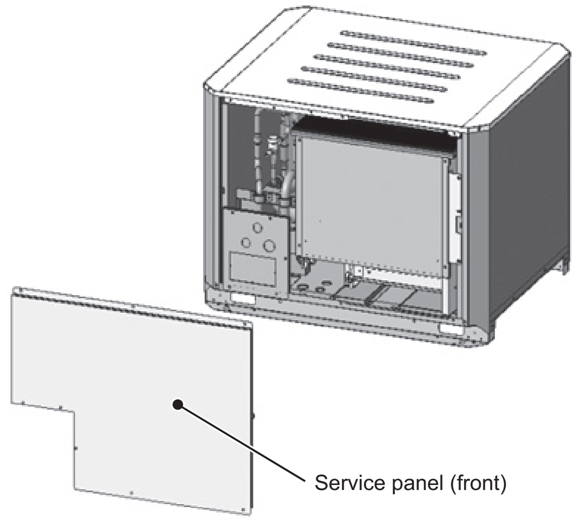
Operation procedures	Illustrations
6) Remove the braze from the two areas indicated with arrows, and remove the two victaulic joints from the water pipe. 7) Pull the plate heat exchanger forward and out. 8) Replace the heat exchanger.	(6)  (7) 

8-14-2 Strainer Replacement Procedure

Operation procedures	Illustrations

1) Remove all refrigerant from the pipes.
2) Remove the front panel (8 screws).
3) Remove the saddle by unscrewing the screws.
4) Remove the braze from the areas circled in the figure.
5) Pull the pipe out in the direction of the arrow.
6) Remove the strainer from the pipe, and replace it.

(2)



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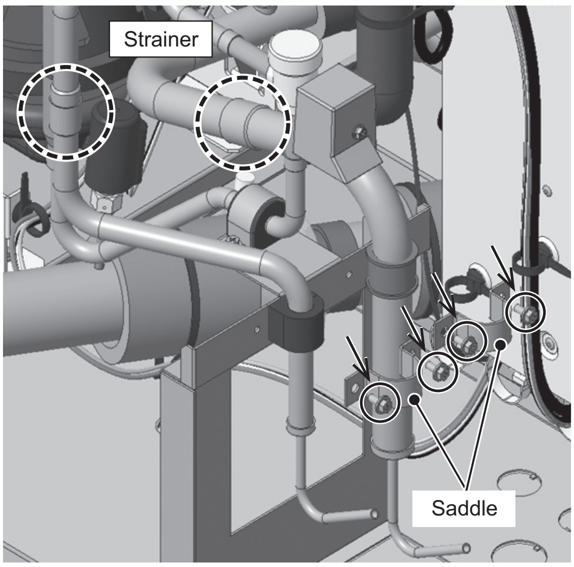
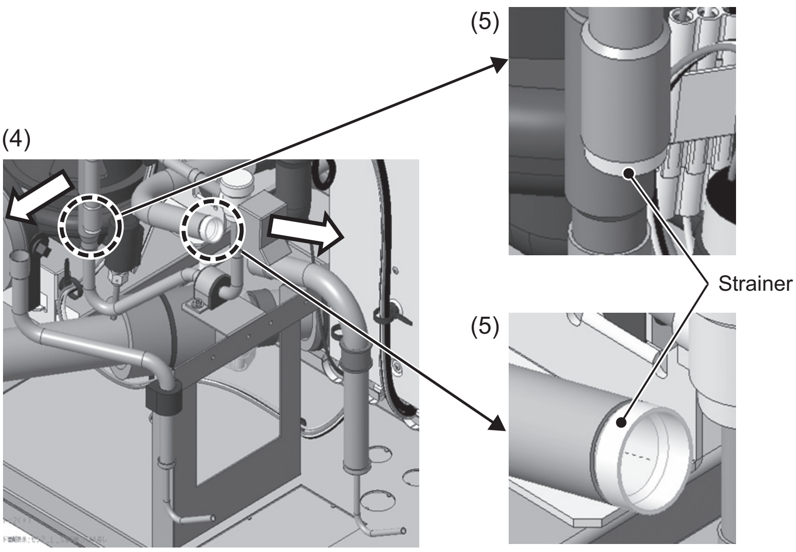
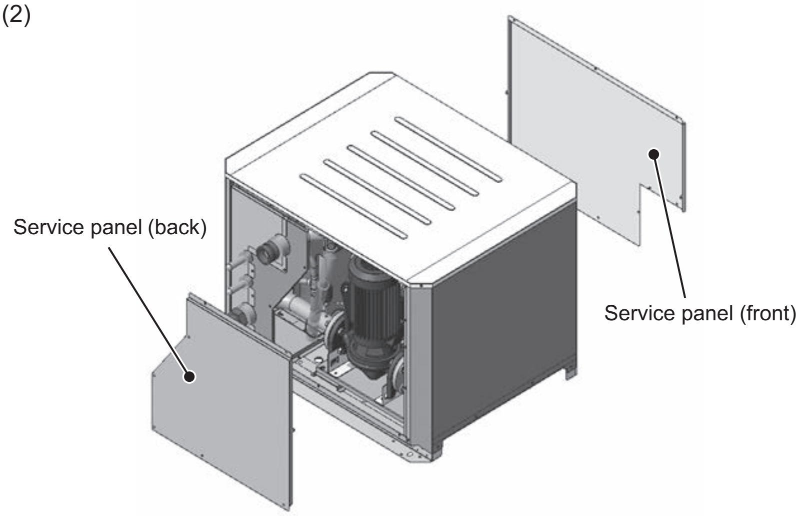




8-14-3 Pressure Sensor (Refrigerant) Replacement Procedure

<table>
<tr><th>Operation procedures</th><th>Illustrations</th></tr>
<tr><td>1) Remove all refrigerant from the pipes.
2) Remove the front panel (8 screws) and the rear panel (7 screws).
3) Disconnect all wires connecting the control box and the pressure sensor.
4) Remove the braze from the areas circled in the figure.
5) Replace the pressure sensor, and connect it to the control box connector.</td><td>(2)


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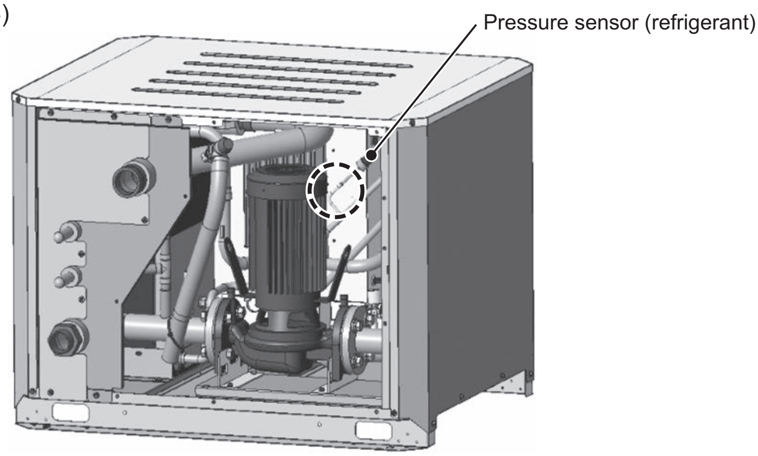
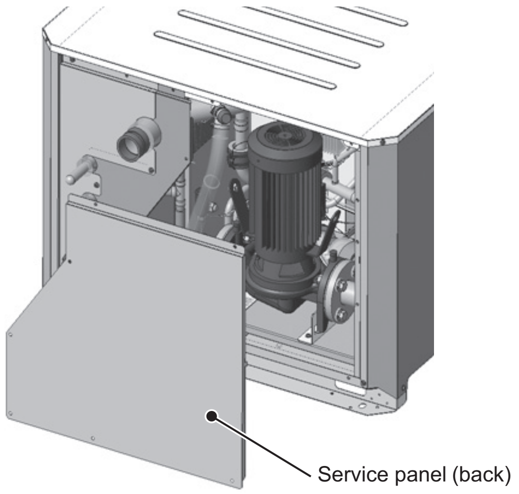

</td></tr>
</table>

8-14-4 Check Valve Replacement Procedure

<table>
<tr><th>Operation procedures</th><th>Illustrations</th></tr>
<tr><td>1) Remove all refrigerant from the pipes.
2) Remove the rear panel (7 screws).
3) Remove the braze from the areas circled in the figure.
4) Replace the check valve.</td><td>(2)


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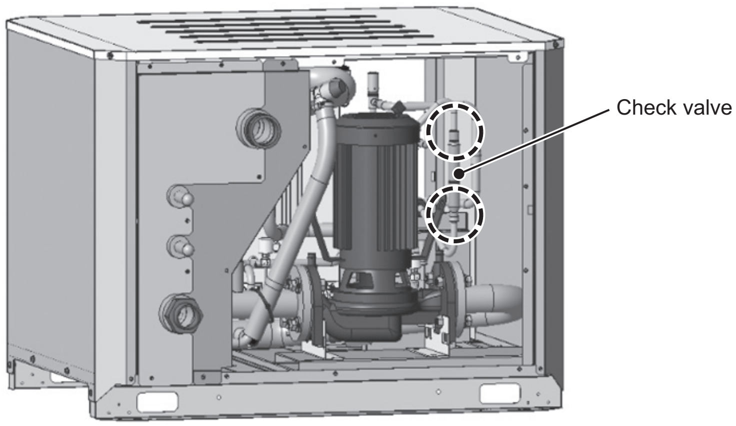
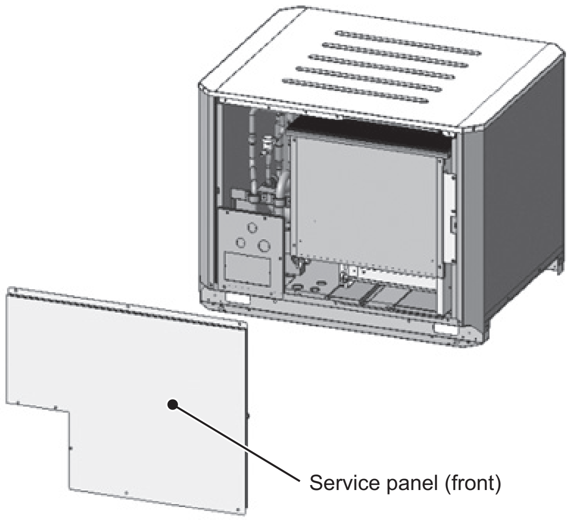
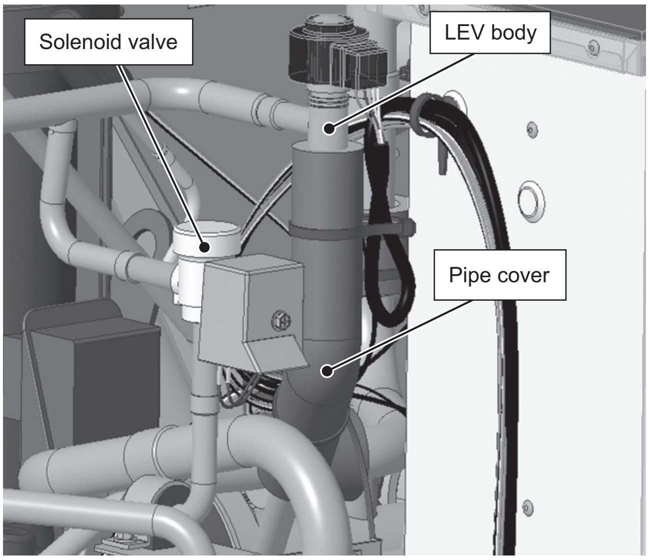
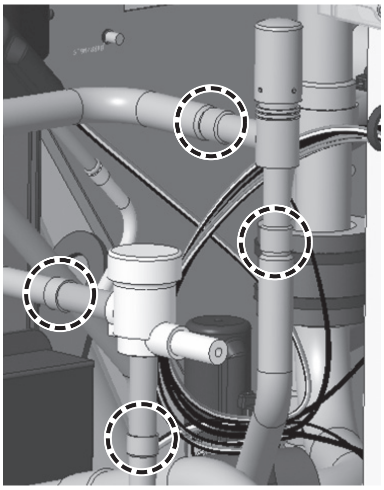
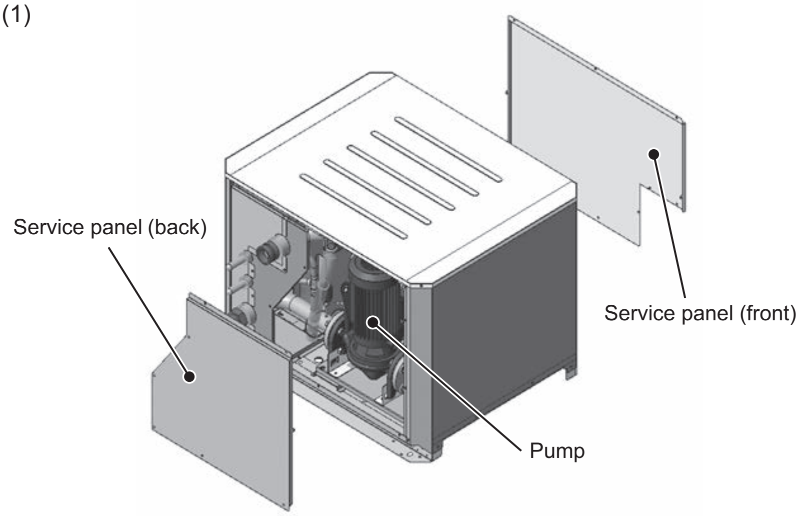
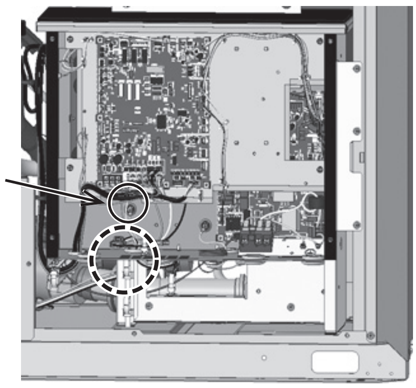
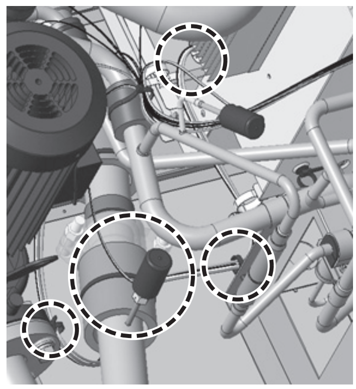
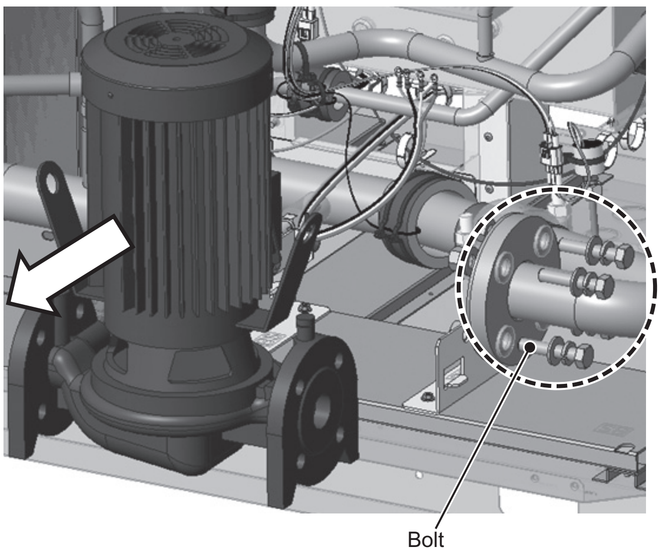
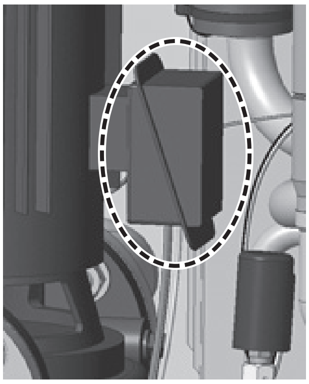

</td></tr>
</table>

8-14-5 Solenoid Valve and LEV Body Replacement Procedure

Operation procedures	Illustrations
1) Remove all refrigerant from the pipes. 2) Remove the front panel (8 screws). 3) Remove the pipe cover. 4) Disconnect all wires connecting the control box, solenoid valve, and LEV coil. (See Steps 3 and 4 for the removal procedure.) 5) Remove the braze from the areas circled in the figure. 6) Replace the solenoid valve and the LEV coil.	(2)  (3)  (5) 

8-14-6 Pump Replacement Procedure

Operation procedures	Illustrations
1) Remove the front panel (8 screws) and the rear panel (7 screws). 2) Disconnect the wires connecting the control box and the pump (relay connector and ground wire). 3) Unclamp the wires. 4) Remove the eight bolts from the flanges, and pull the pump out in the direction of the arrow. * The pump must be replaced by two persons.	(1)  (2)  (3)  (4) 

Operation procedures	Illustrations
5) Remove the terminal screws, and remove the connector. 6) Replace the pump.	(5) 

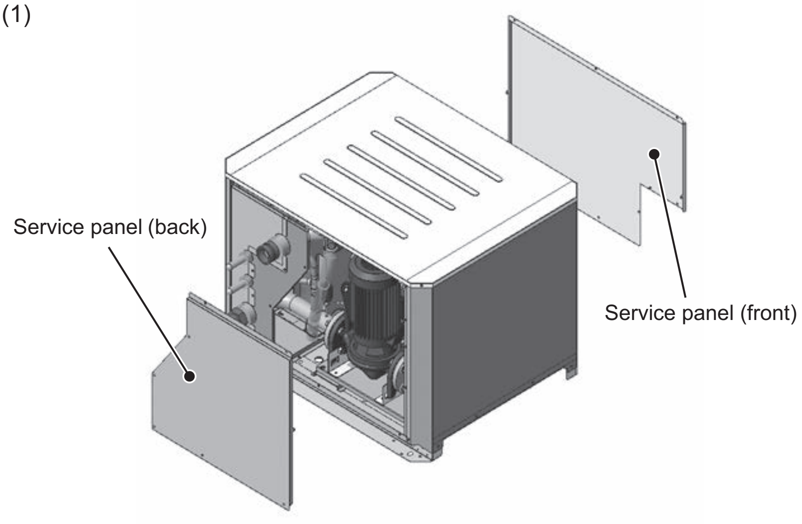
8-14-7 Thermistors Replacement Procedure

<table>
<tr><th>Operation procedures</th><th>Illustrations</th></tr>
<tr><td>

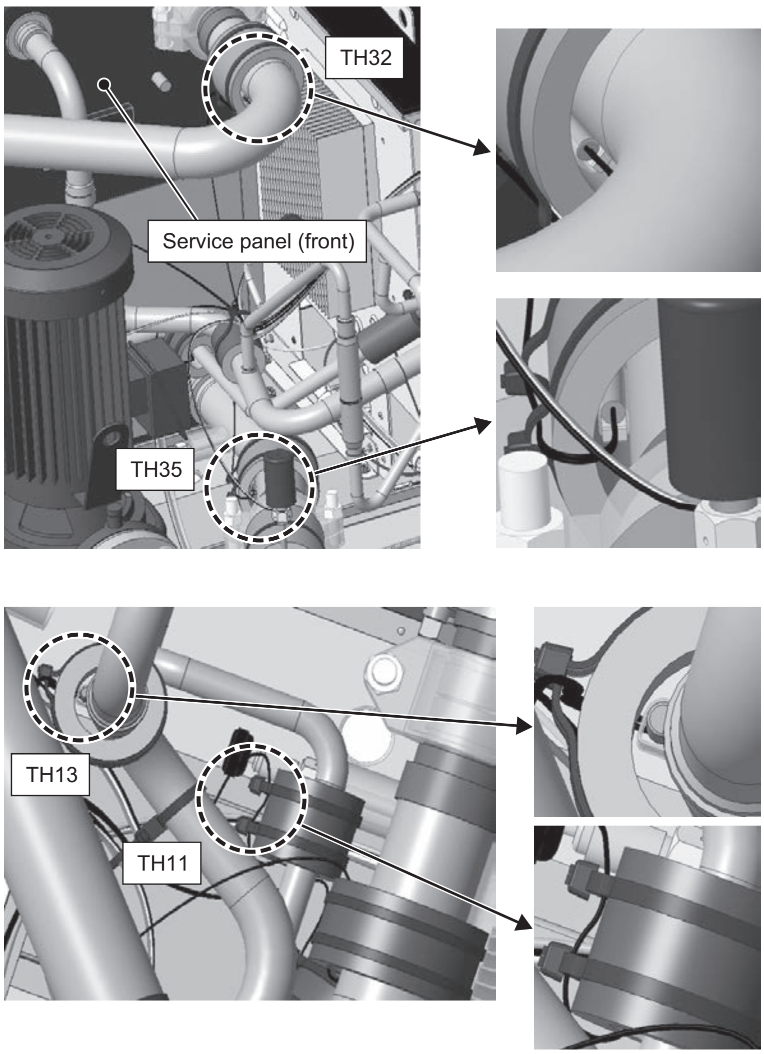
1) Remove the front panel (8 screws) and the rear panel (7 screws).
2) Disconnect the wires connecting the control box and all thermistors. (TH32 and TH35, and TH13, and TH11 are connected to the same connector.)
3) Install the replacement thermistors as shown in the figure, and connect them to the control box connectors.

</td><td>

(1)

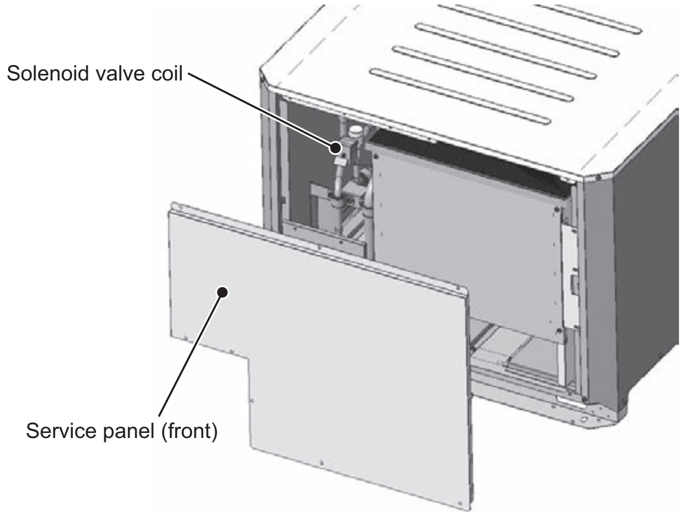
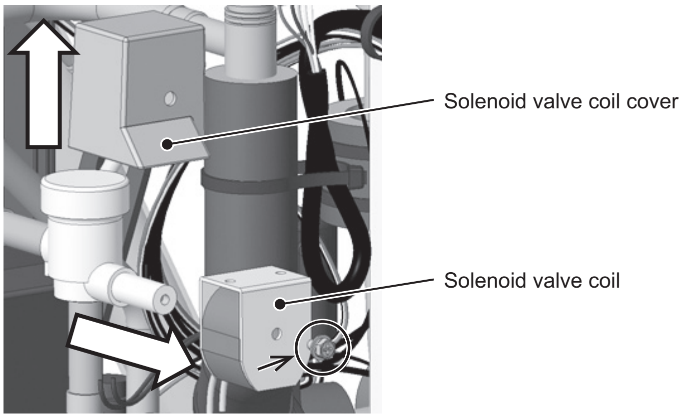


(2)

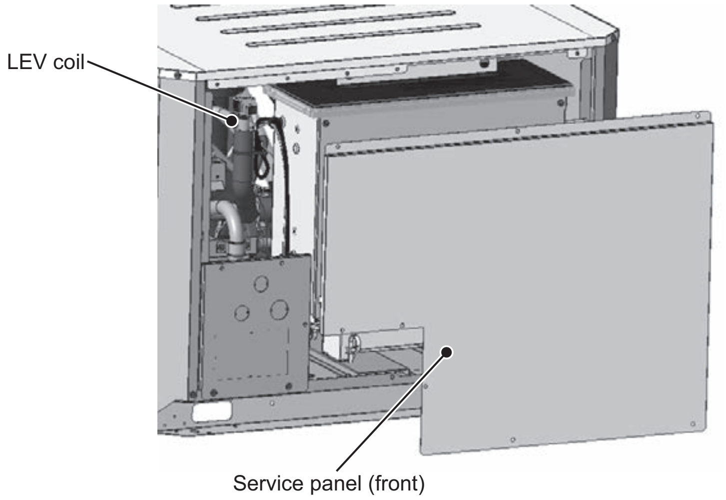


</td></tr>
</table>

8-14-8 Solenoid Valve Coil Replacement Procedure

Operation procedures	Illustrations
1) Remove the front panel (8 screws). 2) Remove the wires connecting the control box and the solenoid valve coil. 3) Remove the screw from the coil cover, and remove the coil cover and the coil. 4) Install the replacement solenoid valve coil as shown in the figure, and connect it to the control box connector.	(1)  (3) 

8-14-9 LEV Coils Replacement Procedure

<table>
<tr><th>Operation procedures</th><th>Illustrations</th></tr>
<tr><td>
1) Remove the front panel (8 screws).
2) Remove the wires connecting the control box and the LEV coil.
3) Turn the LEV coil, and pull it up to remove it.
4) Install the replacement LEV coil as shown in the figure, and connect it to the control box connector.
</td><td>
(1)


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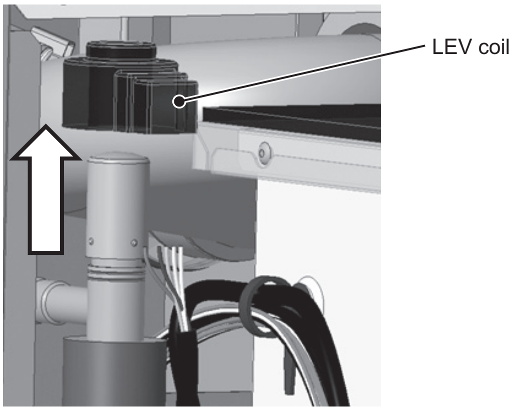

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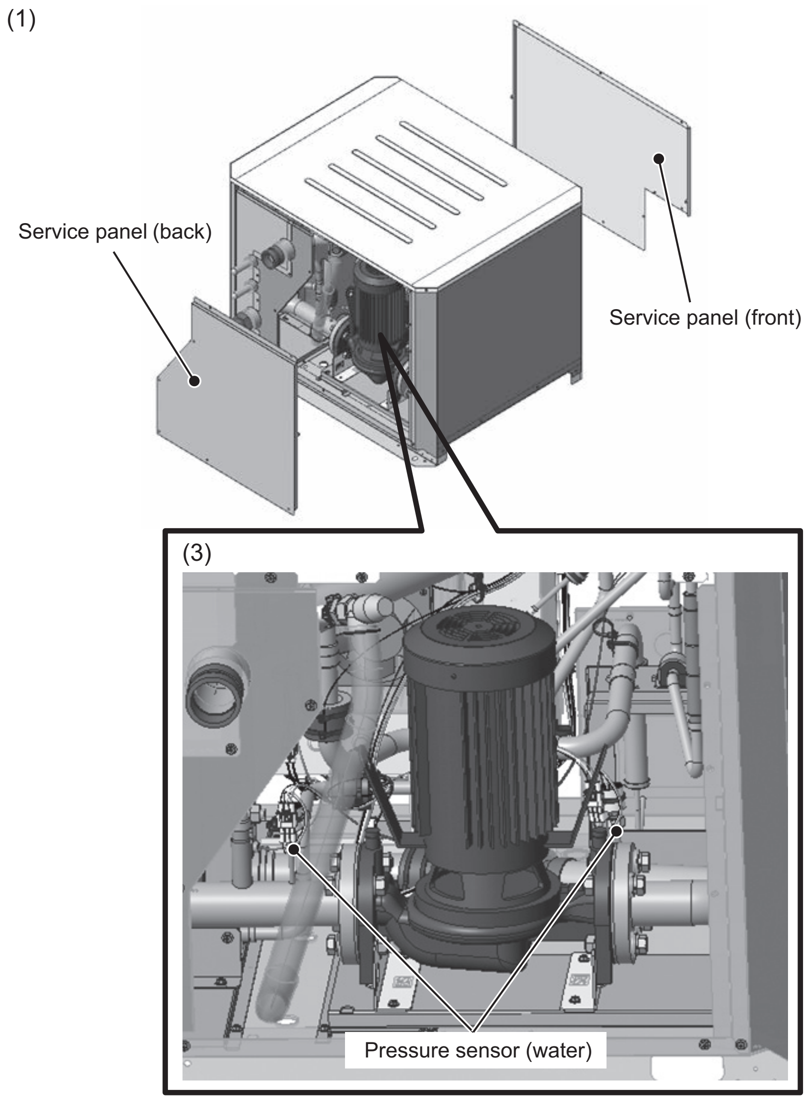
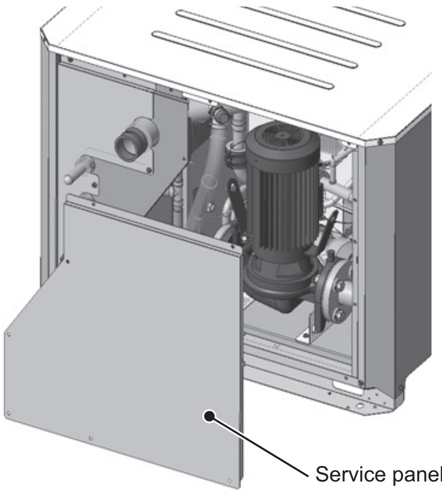
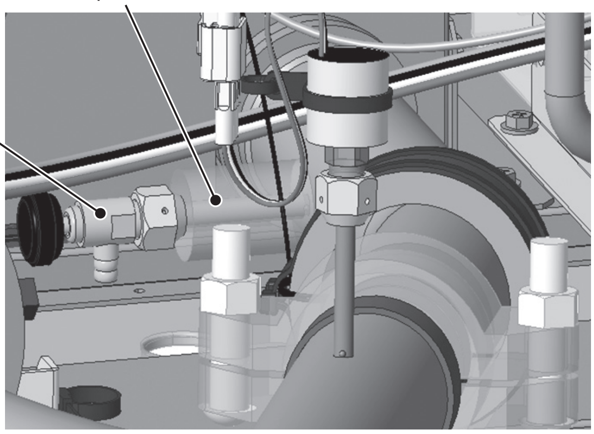
8-14-10 Pressure Sensor (Water) Replacement Procedure

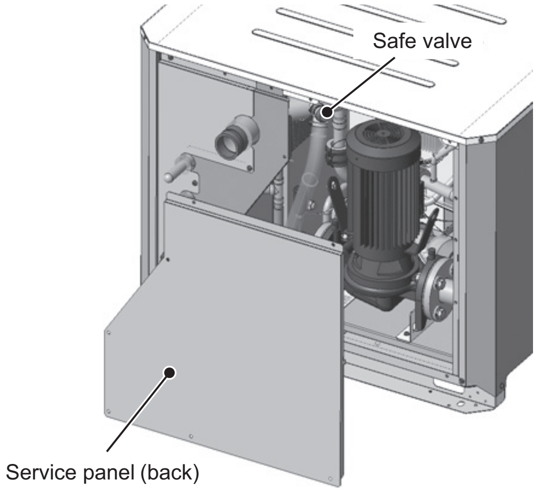
Operation procedures	Illustrations
1) Remove the front panel (8 screws) and the rear panel (7 screws). 2) Disconnect the wires connecting the control box and the pressure sensor. 3) Remove the flare nuts fixing the pressure sensor with a wrench, replace the pressure sensor, and connect it to the control box connector.	

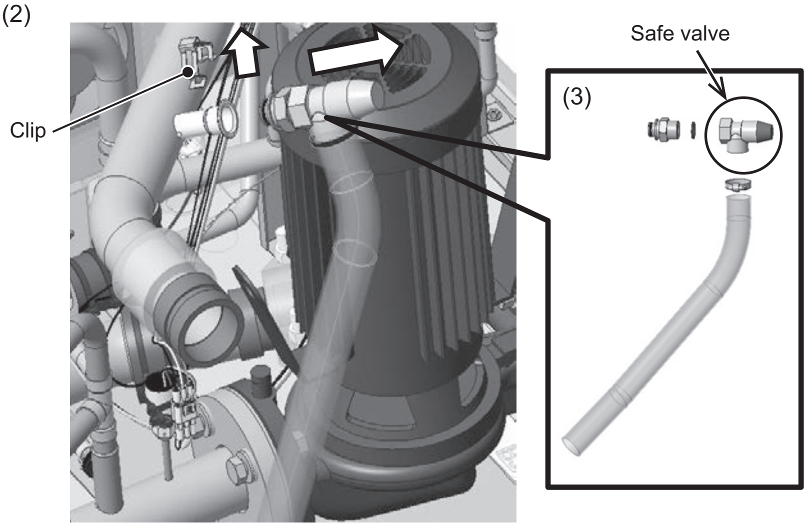
8-14-11 Water Purge Valve Replacement Procedure

Operation procedures	Illustrations
1) Remove the rear panel (7 screws). 2) Remove the pipe cover from the pipe with the water purge valve. 3) Loosen the flare nuts with a wrench, and replace the water purge valve.	(1)  (2,3) 

8-14-12 Safe Valve Replacement Procedure

<table>
<tr><th>Operation procedures</th><th>Illustrations</th></tr>
<tr><td>
1) Remove the rear panel (7 screws).
2) Remove the clip (see below), and remove the valve assy.

3) Remove the tube and the joint.
4) Replace the safety valve.
</td><td>
(1)


(2)


</td></tr>
</table>

8 Troubleshooting Based on Observed Symptoms

8-15 Troubleshooting Problems Using the LED Status Indicators on the Outdoor Unit

If the LED error display appear as follows while all the SW4 switches and SW6-10 are set to OFF, check the items under the applicable item numbers below.

1. Error code appears on the LED display.

Refer to the following page(s). [7-1 Error Code and Preliminary Error Code Lists]

2. LED is blank.

Take the following troubleshooting steps.

(1) Refer to the section on troubleshooting the transmission power supply circuit, if the voltage across pins 1 through 3 of CNDC on the control panel is outside the range between 220 VDC and 380 VDC. [8-11-2 Troubleshooting Problems with Outdoor Unit Transmission Power Supply Circuit]

(2) If the LED error display becomes lit when the power is turned on with all the connectors on the control board except CNDC 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 PS board. (CN62, CNPS, CNIT, 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 shows the same display as the initial display upon disconnection of transmission lines (TB3, TB7), there is a problem with the transmission lines or with the connected devices. [10-1-2 Initial LED Display]

Chapter 9 USB Function

9-1 Service Overview

9-1-1 Function Overview

The control board has a USB port that allows the use of the following two functions.

1. Collection and storage of operation data

Operation information from indoor units, outdoor units, and other equipment and devices in the system are collected andstored in the flash memory in the control board of the outdoor unit (OC).
The data can be transferred and stored in a USB memory stick.

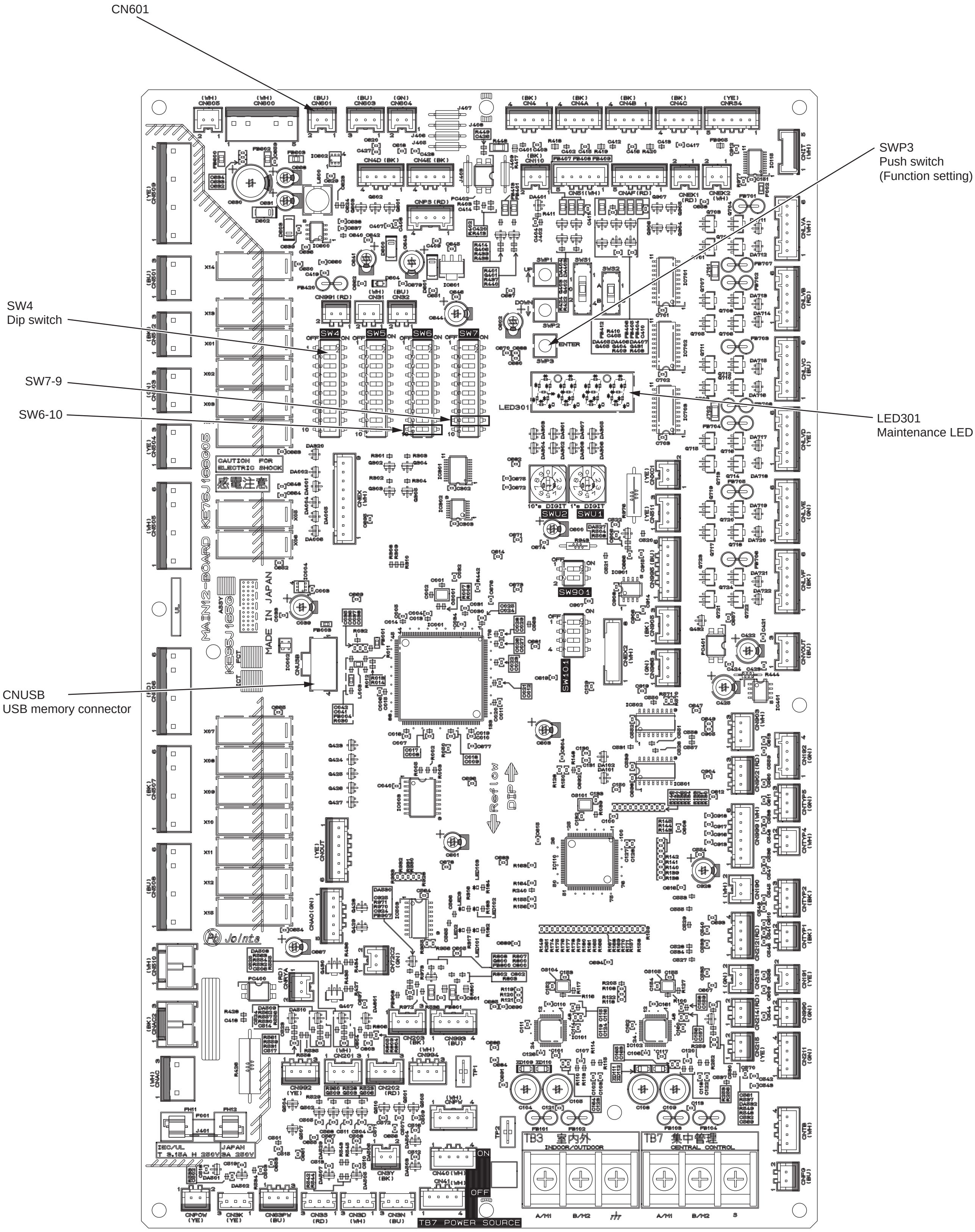
2. Software rewrite function

The software on outdoor units can be rewritten using a USB memory stick.

For detailed information about each function, refer to Section [9-2 Operation Data Collection and Storage Functions] and Section [9-3 Software Rewrite Function on the USB].
For information regarding the maintenance LED display content and regarding troubleshooting, refer to Section [9-4 Maintenance LED Display and Troubleshooting].

9-1-2 System Structure

(1) Control board on the outdoor unit



9-1-3 Necessary Materials

The use of the USB function requires a USB memory stick and a portable battery charger.
See below for the types of USB memory stick and portable charger that can be used.

(1) USB memory stick

Use a USB memory stick that meets the following specifications.

- ♦USB 2.0 compatible
- ♦Formatted in FAT 32
- ♦Without a security function

(2) Portable battery charger

Use a portable battery charger that meets the following specifications for rewriting the software.

- ♦USB 2.0 compatible
- ♦ Voltage and amperage rating of 5 V and 2.1 A (MAX)

A LEAD WIRE ASSY USB is required to connect the control board and the portable charger.
Use a cable that meets the following specifications.

- ♦[Type A male] - [Male XA connector for the PCB] USB cable. For details of “LEAD WIRE ASSY USB”, please contact the sales office.

The connector on the control board side is a female XA connector for the PCB.

9-2 Operation Data Collection and Storage Functions

Operation data of the units collected on the outdoor unit can be recorded in the flash memory of the control board. These data canalso be exported to and recorded in a USB memory stick.
See Section [9-2-2 Storing Data on a USB Memory Stick] for information on storing data on a USB memory stick.
See Section [9-2-3 Collecting Operation Data] for information on the collection of operation data.

9-2-1 Preparation

A USB memory stick and a portable battery charger are required to store data on a USB memory stick (not supplied).
Prepare a USB memory stick and a portable battery charger as described in Section [9-1-3 Necessary Materials].

9-2-2 Storing Data on a USB Memory Stick

Store operation data recorded in the flash memory on the control board in a USB memory stick.
The content of the stored file can be confirmed using the maintenance tool.
Operation data should be stored in a dedicated mode (Store Mode).

1. Procedure

(1) Preparation of a USB memory stick

1) Since the size of the saved file containing operation data is 50 MB, prepare a USB memory stick with 50 MB or more available memory. A USB memory stick which has other data in it may also be used. However, it is recommended to clear the remaining data in advance to prevent any malfunctions.The saved file is stored in the folder named "MntXXX." XXX represents a serial number from 000 to 100. Since folders named "Mnt101" or more cannot be created, unnecessary folders and files should be deleted.

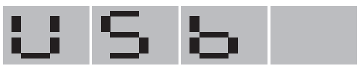
(2) Storing data on a USB memory stick

Data can be stored to a USB memory stick either with the main power to the outdoor unit turned on (Method 2) or off (Method 1). For safety reasons, it is recommended to store the data on a USB memory stick with the main power to the outdoor unit turned off (Method 1). If turning off the power is not feasible, take appropriate measures to ensure safety.

[Method 1 (recommended)] Storing data on a USB memory stick with the main power to the outdoor unit turned off

<Starting up the unit in the data storage mode>

- Turn off the main power to the outdoor unit.
- Connect a USB memory stick to the USB port (CNUSB) on the control board.
- With SWP3 (ENTER) being held down, connect the portable battery charger to the XA connector (CN601) for the PCB, and supply power to the control board. Wait for five seconds until the USB memory stick is recognized.
- [USB] will appear on the monitoring LED301. If "USB" does not appear, refer to Section 1.(1) in [9-4-2 Troubleshooting].



- When [USB] has appeared on the LED, lift the finger off SWP3 (ENTER).
The unit is now in the data storage mode.

<Storing data>

- Press SWP3 (ENTER). If the data storage process has properly started, the progress (0-99) will be shown on the monitoring LED 301.
- [End] on the LED indicates successful completion of the data storage process.
*It takes approximately five minutes for the data storage process to be completed.

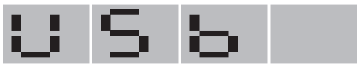
<Ending the data storage mode>

- When done storing data, disconnect the portable battery charger from the control board.
- Then disconnect the USB memory stick from the control board.
- Turn the main power to the outdoor unit back on.
- If the data collection process needs to be started, check the operation data collection status by following the procedures explained in [9-2-3 Collecting Operation Data]and making the necessary settings.

[Method 2] Storing data on a USB memory stick with the main power to the outdoor unit turned on

<Starting up the unit in the data storage mode>

- Stop the operation of all indoor units.
  *Although operation data can be collected without stopping all indoor units, doing so may be detected as a communication error.
- Connect a USB memory stick to the USB port (CNUSB) on the control board. Wait for five seconds until the USB memory stick is recognized.
- Press and hold SWP3 (ENTER) for approximately 10 seconds until [USB] appears on the monitoring LED 301.



- When [USB] has appeared on the LED, lift the finger off SWP3 (ENTER).
  The unit is now in the data storage mode.

<Storing data>

- Press SWP3 (ENTER). If the data storage process has properly started, the progress (0-99) will be shown on the monitoring LED 301.
- [End] on the LED indicates successful completion of the data storage process.
  *It takes approximately five minutes for the data storage process to be completed.

<Ending the data storage mode>

- When done storing data, disconnect the USB memory stick from the control board.
- Press and hold SWP3 (ENTER) for approximately 10 seconds until [End] disappears from the monitoring LED 301.
- Restart the indoor and outdoor units that were stopped to perform data storage.
- If the data collection process needs to be started, check the operation data collection status by following the procedures explained in [9-2-3 Collecting Operation Data]and making the necessary settings.

(3) Confirmation of stored file

Confirm that the operation data is stored in the USB memory stick. Insert the USB memory stick into a computer, and check the contents in the memory stick.

When there are the following files in the USB memory stick
Check that there is the following file in the memory stick.
File: MNTXXX.MT
“XXX” represents serial numbers from “000” to “100.”

9-2-3 Collecting Operation Data

This function is used to collect the operation data of the outdoor and indoor units via M-NET, and record the data in the flash memory on the control board. When the memory is full, it is overwritten from the first segment.
The settings for checking the status of operation data collection, for starting/ending data collection, and for continuing/stopping error-data collection are made, using the switches on the control board. The items to be set are shown in the table below.
The data collection setting is enabled by default, and the setting for error data collection during an error is disabled by default.

Switch			Function	Operation set by the switch		Timing for switch operation	Unit for setting
SW6-10	SW4 (0: OFF, 1: ON)			OFF (LED3 OFF)	ON (LED3 ON)		
OFF	NO.28	00111000000	Data being collected	-	-	Anytime after power-on	OC setting necessary
ON	NO.817	10001100110	Data collection enabled	Enabled	Disabled	Anytime after power-on	OC setting necessary
ON	NO.818	01001100110	Data collection during an error	Disabled	Enabled	Anytime after power-on	OC setting necessary

*When setting the switch SW4 on the control board, make sure the outdoor unit is energized.
Also use Section [5-1 Dipswitch Functions and Factory Settings] as a reference.

The procedure for making the operation data settings is shown below.

1. Operation procedure

(1) Status Confirmation

1) Confirm the current status of operation data collection by setting the switches on the control board following the table shown above.
Switch setting: SW6-10: OFF
SW4: 28
Check the status on the maintenance LED display (LED301).
* For details, refer to Section [9-4-1 Maintenance LED Display Content List]

- When “ON” or “OFF” is displayed, go to step (2) and the later steps.
- When “Err” is displayed, go to step (3) and the later steps.
- When “F-Er” is displayed, it indicates an error in the flash memory on the control board.
Refer to Section [9-4-2 Troubleshooting]

(2) Setting Start and End of data collection

1) Set the switches on the control board by following the table shown above.
Switch setting: SW6-10: ON
SW4: 817
2) Press SWP3 (ENTER).With each switch operation, the setting can be alternately switched ON and OFF.
3) After conducting step (1), check that the operating condition is stable.
Data collection start: OFF (Enabled)
Data collection end: ON (Disabled)
Setting procedure is now complete.

(3) Settings for error-data collection during an error

Stops or continues error-data collection when an error occurs.
1) Referring to the table above, set the control switches.
Switch setting: SW6-10: ON
SW4: 818
Stop collecting error-data when an error occurs: OFF
Continue collecting error-data when an error occurs: ON
2) To set the switches, press SWP3 (ENTER). Each pressing of SWP3 (ENTER) toggles between ON and OFF. Error data in the 6000's and the 7000's will be collected, regardless of the SW4 (818) settings.

(4) Restarting data collection

1) If “Err” is shown, it indicates that data collection is being suspended for some reason, even though data collection is enabled. To restart, it is necessary to set the switches on the control board. Referring to (2)-1) and (2)-2), set the switches on the control board from OFF (original setting) to ON, and then to OFF again, and make sure the switches settings are indicated as being ON, following the instructions in (1)-1).

9-2-4 Precautions

For dealing with display on the maintenance LED and other problems, refer to Section [9-4 Maintenance LED Display and Troubleshooting].

1. Storage of data in a USB memory stick

- Take extra care regarding electric shock during the work on the control board, such as the insertion of the USB memory stick.
- Before starting in Normal Mode, remove the USB memory stick from the control board.
- Storing data in the USB memory stick may take a long time resulting in OS and communication errors. These errors affect neither storing process nor unit operation. If an error occurs, refer to [9-4-2 Troubleshooting].
- After normal startup, set the operation status of the air-conditioning units to the original status.
- USB memory sticks may become unusable due to unexpected damage or memory shortage. It is recommended to take extra USB memory sticks to the site.
- If only the OS is operated due to problems with the OC, collect data also from the OS by following the same operation procedure as for OC. Refer to Section [9-2-2 Storing Data on a USB Memory Stick].

2. Collection of operation data

- The collection of operation data does not start immediately after power-on, but does after ten minutes.
- When the operation data are being collected from AE-200 or the Maintenance Tool, the function to collect outdoor unit (OC) data with a USB memory stick will not be available for use.

9-3 Software Rewrite Function on the USB

The USB memory stick may be used to rewrite the software of the outdoor unit in the same way as using a ROM writer.

9-3-1 Preparation

- Prepare a USB memory stick and a portable battery charger.
  A LEAD WIRE ASSY USB for connecting the control board and the charger is also necessary.
  Make sure the portable battery charger is sufficiently charged.
- Prepare a countermeasure program file "******.mot" for the intended model.
- Copy the software rewrite program file "******.mot" onto the root folder of the USB memory stick.
  Install only one program and only in the root folder of the USB memory stick.

9-3-2 Rewriting Software

The procedure is show below.

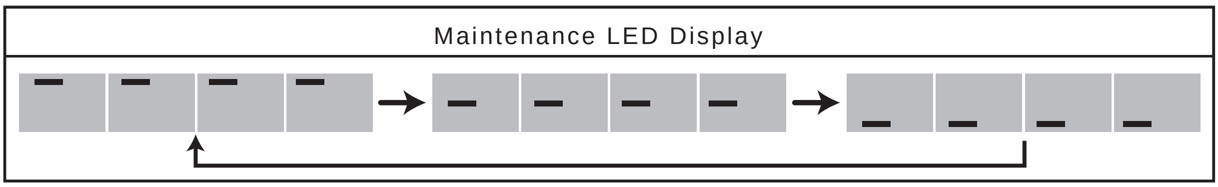
1. Operation procedure

(1) Starting software rewrite mode

1) Shut down the power for the outdoor unit. Make sure the power for the control board is off.
   This is done by confirming LED2 is off.
2) Turn on switches SW7-9 of the control board.
3) Insert the USB memory stick into the USB port (CNUSB) on the control board.
4) Connect the portable battery charger to the XA connector (CN601) for the PCB.
   The power of the control board will turn on. Wait for five seconds until the USB memory stick is recognized.
5) Make sure the display “Pro” is shown on the maintenance LED (LED301)
   This shows that Software Rewrite Mode has been started.

(2) Performing software rewriting

1) Wait for 5 seconds after “Pro” appeared on the LED, and press SWP3 (ENTER) to start software rewrite.
   When the rewrite process is in progress, progress bars move as shown below.



2) If "End" is displayed on the LED, the rewrite process has been completed correctly. * Generally, this process takes about five minutes.

(3) Confirmation of operation

1) Disconnect the portable battery charger from the XA connector (CN601) for the PCB. The control board will be turned off.
2) Remove the USB memory stick from the USB port (CNUSB) on the control board.
3) Turn off the switches SW7-9 on the control board.
4) Turn on the outdoor unit, and check that the versions of the outdoor unit and the software are the same.
   The version of the software may be found using the maintenance tool or other means.
   Perform a test run, and check for normal operation.

9-3-3 Precautions

For dealing with the displays shown on the maintenance LED and other problems, refer to Section [9-4 Maintenance LED Display and Troubleshooting]

- Take care to choose the correct countermeasure program for the intended model and version.
  Store only one software rewrite program on the USB memory stick.
  If this requirement is not met, software rewrite may not start.
- Be cautious of electric shock when connecting an USB memory stick or a portable battery charger to the control board.
- Connect the portable battery charger to the LEAD WIRE ASSY USB and then to the control board.
- Make sure the portable battery charger is sufficiently charged. Rewrite error may occur if battery charge is insufficient.
- Take care not to forget to remove the USB memory stick in step (3) - 2) or forget to turn off SW7-9 in step (3) - 3). [9-3-2 Rewriting Software]If these precautions are not taken, the system may not start normally.
- When rewriting ended unsuccessfully, redo the procedure from step (1) - 3). [9-3-2 Rewriting Software]When rewriting ended unsuccessfully, the system may be started in Software Rewrite Mode instead of using the switches on the control board.
  Also refer to Section [9-4-2 Troubleshooting].
- If software cannot be successfully rewritten using an USB memory stick, use a ROM writer to rewrite the software.

9-4 Maintenance LED Display and Troubleshooting

9-4-1 Maintenance LED Display Content List

The following table shows the maintenance LED displays for each function.
When dealing with the errors shown on the display, refer to Section [9-4-2 Troubleshooting]

1. Storing data on a USB memory stick

No.	Switch	Meaning	Maintenance LED Display	Description
1	Not applicable	Storage Mode activated	USb	"USB" Storage Mode to USB memory stick is active. Storage is enabled. See Section [9-4-2 Troubleshooting]1-(1) and 1- (2).
2		Storage in progress	0 ~ 99	0 to 99 is displayed. Status of the data storage to the USB memory stick is shown by the progress rate.
3		Storage completed	End	"END" The storage process has been completed successfully.
4		Error (USB memory side)	Er01	"Er01" The storage process cannot be started due to failure of the USB memory stick. See Section [9-4-2 Troubleshooting]1- (3).
			Er02	"Er02" The storage process was stopped due to failure of the USB memory stick during processing. See Section [9-4-2 Troubleshooting]1- (4).
5		Error (control board side)	Er10	"Er10" The storage process cannot be started due to failure of the control board. See Section [9-4-2 Troubleshooting]1- (5).

2. Collecting operation data

No.	Switch	Meaning	Maintenance LED Display	Description
6	SW6-10: OFF SW4: No.28	Collection in progress	on	“ON” OC is collecting operation data. A blinking display indicates that data collection is temporarily suspended. No switch setting is necessary. Data collection will be resumed automatically. See Section [9-4-2 Troubleshooting]2-(1).
7		Collection suspended	oFF	“OFF” Collection of operation data is suspended.
8		Flash memory error	F-Er	“F-Er” Collection of operation data is suspended due to failure in the flash memory used to store operation data. It may be necessary to change the board. See Section [9-4-2 Troubleshooting]2-(2).
9		Error	Err	“Err” Error was found due to the failure in units. After addressing the cause, data collection needs to be restated. See Section [9-4-2 Troubleshooting]2- (3).

3. Rewriting software

No.	Switch	Meaning	Maintenance LED Display	Description
10		Rewrite Mode activated		"PRO" Software rewrite mode is active. Software rewrite is enabled. See Section [9-4-2 Troubleshooting]3-(1), 3-(2) and 3- (3).
11		Rewrite in progress		Software rewrite is in progress. Bars are displayed in turn.
				
				
12	SW7-9: ON	Software rewrite has been completed.		"END" Software rewrite has been completed successfully.
13		Error (USB memory side)		"Er01" Software rewrite process cannot be started due to failure of the USB memory stick. See Section [9-4-2 Troubleshooting]3- (4).
				"Er02" Software rewrite was stopped due to failure of the USB memory stick during the software rewrite process. See Section [9-4-2 Troubleshooting]3- (5).
14		Error (control board side)		"Er10" Software rewrite was not completed due to failure in deleting the existing software. See Section [9-4-2 Troubleshooting]3- (6).
				"Er11" Software rewrite has not been completed due to failure in writing new software. See Section [9-4-2 Troubleshooting]3- (6).

9-4-2 Troubleshooting

Troubleshooting of USB functions are shown below.
The displays on the maintenance LED described in Section [9-4-1 Maintenance LED Display Content List]may also be used as a reference.

1. Storing on a USB memory stick

(1) Maintenance LED does not display "USB."

(Meaning or Cause)

The system was not started in Storage Mode.
The USB memory stick is not connected. Or, switch SWP3 may not be pressed deeply enough.

(Solution)

Check the connection of the USB memory stick, and try again using Section [9-2-2 Storing Data on a USB Memory Stick]as a reference.
Hold down the switch SWP3 until "USB" is displayed on the maintenance LED.
If the problem persists, there may be a problem with the USB memory stick.
Check if the USB memory stick meets the specification described in Section [9-1-3 Necessary Materials](1) USB memory stick.
If compliance is confirmed, the USB memory stick may be broken. Replace it with a new one.

(2) Pressing the switch SWP3 does not start data storage, and the maintenance LED continues to display "USB."

(Meaning or Cause)

There may be a problem with the USB memory stick.

(Solution)

Check the connection of the USB memory stick.
If no problem is found, the USB memory stick may be at fault.
Check that the USB memory stick meets the specification described in Section [9-1-3 Necessary Materials](1) USB memory stick.
If compliance is confirmed, the USB memory stick may be broken. Replace it with a new one.

(3) Maintenance LED displays "Er01."

(Meaning or Cause)

- Because there was a problem regarding the USB memory before the start of data storage, data storage has not been completed.
- Error Er01 occurs when SWP3 on the control board is pressed to rewrite the software immediately after power is supplied to the USB-connected control board.
(When the software rewriting is started before the control board recognizes the USB memory stick.)

(Solution)

Check the connection of the USB memory stick.
If no problem is found, the USB memory stick may be at fault.
Check the following four items.

- After supplying power to the USB-connected control board, wait at least five seconds before pressing SWP3 on the control board to rewrite software because it takes approximately five seconds for the control board to recognize the USB memory stick.
- Compliance of the USB memory stick to the specification described in Section [9-1-3 Necessary Materials](1) USB memory stick.
- Available free space of the USB memory stick exceeding 50 MB.
- The maximum number of folders or files is not exceeded. When files are created in the USB memory stick, the upper limit of files is 101, including those files from "MNT000.MT" to "MNT100.MT."
Delete unnecessary folders or files.

When there is no problem in the above, the USB memory stick may be broken. Replace it with a new one.

(4) Maintenance LED displays "Er02."

(Meaning or Cause)

Because there was a problem regarding the USB memory during data storage, data storage is unfinished.
For example, if the USB memory stick is disconnected during data storage, this display appears on the maintenance LED.

(Solution)

Check the connection of the USB memory stick.
If no problem was found, remove the USB memory stick from the control board and insert it again. Then conduct data storage referring to Section [9-2-2 Storing Data on a USB Memory Stick].

(5) Maintenance LED displays "Er10."

(Meaning or Cause)

Because there was a problem regarding the control board during data storage, data storage is unfinished.

(Solution)

Perform data storage again.
Remove the USB memory stick from the control board and insert it again. Then conduct data storage using Section [9-2-2 Storing Data on a USB Memory Stick]as a reference.

If this still does not correct the problem, there may be a problem with the control board.

(6) System does not start in Normal Mode.

(Meaning or Cause)

The USB memory stick may be left connected.

(Solution)

Remove the USB memory stick from the control board by referring to <Ending the data storage mode> under Section [9-2-2 Storing Data on a USB Memory Stick]. Then press SWP3 (ENTER). If the problem is not resolved, turn off the power to the outdoor unit, and restart the unit.

(7) Unit cannot be started in the data storage mode.

(Meaning or Cause)

There may be problems with the control board.

(Solution)

Take the two measures 1 and 2 explained in (2) Storing data on a USB memory stick in 1 Procedure under [9-2-2 Storing Data on a USB Memory Stick].
If the unit cannot be started up in the data storage mode by following either of the two methods 1 or 2, the control board may be malfunctioning.

2. Collecting operation data

(1) Maintenance LED displays blinking "ON."

(Meaning or Cause)

Despite data collection function being enabled, it is not started yet.
There may be two causes.
Firstly, the initialization process immediately after the system startup may have inhibited the start of data collection.
Secondly, M-NET communication may be underway to enable maintenance tools or collect AE-200 logs.

(Solution)

After a certain time, the problem will resolve itself, requiring no corrective actions.

(2) Maintenance LED displays "F-Er."

(Meaning or Cause)

Because there was a problem with the flash memory used to store operation data, the collection of operation data is unfinished.

(Solution)

Restart the outdoor unit, check the status of data collection.
If the LED displays "F-Er," the flash memory may be broken.
Depending on the local conditions, replace the control board.
When the flash memory is not working correctly, data collection and storage to a memory stick cannot be performed, but the outdoor unit itself functions normally.

(3) Maintenance LED displays blinking "Err."

(Meaning or Cause)

An error occurred in the unit, suspending data collection.

(Solution)

After resolving the error, resume data collection, referring to 1. Operation procedure (4) Restarting data collection under Section [9-2-3 Collecting Operation Data].

3. Rewriting software

(1) Maintenance LED does not display "Pro."

(Meaning or Cause)

The system is not started in Software Rewrite Mode.
Switches SW7-9 on the control board may not be in the ON position, or the portable charger may not be charged sufficiently.

(Solution)

Make sure switches SW7-9 are ON using Section [9-3-2 Rewriting Software]as a reference.
Restart using a fully charged portable charger or a different charger.

(2) Pressing the switch for starting the storage process does not start the process, and Maintenance LED continues to display "Pro."

(Meaning or Cause)

There may be a problem with the USB memory stick.

(Solution)

Check the connection of the USB memory stick.
If no problem is found, the USB memory stick may be at fault.
Check if the USB memory stick meets the specification described in Section [9-1-3 Necessary Materials](1) USB memory stick.
If compliance is confirmed, the USB memory stick may be broken. Replace it with a new one.

(3) At the time of the system start after "END" was displayed, Maintenance LED displays "Pro."

(Meaning or Cause)

The system was started in Software Rewrite Mode.
Switches SW7-9 on the control board may not be in the OFF position.
If the switches are in the OFF position, it means the software rewrite process has failed.

(Solution)

After turning off control board switches SW7-9, turn on the system again.
If the switches are in the OFF position, it means the software rewrite process has failed.
Try rewriting the software again by following the procedure detailed in 1 (1) Starting software rewrite mode under Section [9-3-2 Rewriting Software]. If the problem persists, rewrite the software, using a ROM writer.

(4) Maintenance LED displays "Er01."

(Meaning or Cause)

- Because an error occurred in the USB memory stick before the start of software rewrite, software rewrite has not been completed.
- Error Er01 occurs when SWP3 on the control board is pressed to rewrite the software immediately after power is supplied to the USB-connected control board.
  (When the software rewriting is started before the control board recognizes the USB memory stick.)

(Solution)

Check the connection of the USB memory stick.
If no problem is found, the USB memory stick may be at fault.
Check the following five items.

- After supplying power to the USB-connected control board, wait at least five seconds before pressing SWP3 on the control board to rewrite software because it takes approximately five seconds for the control board to recognize the USB memory stick.
- Compliance of the USB memory stick to the specification of Section [9-1-3 Necessary Materials](1) USB memory stick.
- The countermeasure program file "******.mot" for the intended model is used.
  The countermeasure program is not for a different model or version.
- The countermeasure program file "******.mot" is stored in the root folder. It is not stored in another folder.
- Make sure that the program file "******.mot" is stored in the root folder of the USB memory and not in any folder created on the USB memory stick.

When there is no problem in the above, the USB memory stick may be broken. Replace it with a new one. After data storage is competed, follow the procedure starting with the step explained in 1. Operation procedure (1) Starting software rewrite mode under [9-3-2 Rewriting Software].

(5) Maintenance LED displays "Er02."

(Meaning or Cause)

Software rewrite is suspended due to a problem with the USB memory stick during the software rewrite process.
For example, if the USB memory stick is disconnected during data storage, this display appears on the maintenance LED.

(Solution)

Check the connection of the USB memory stick.
If no problems are found, follow the procedure starting with the step explained in 1. Operation procedure (1) Starting software rewrite mode under [9-3-2 Rewriting Software].

(6) Maintenance LED displays "Er10” or "Er11.”

(Meaning or Cause)

Because there was a problem in the control board during the software rewrite process, software rewrite has not been completed.

(Solution)

Try rewriting the software again by following the procedure detailed in 1. Operation procedure (1) Starting software rewrite mode under Section [9-3-2 Rewriting Software]. If the problem persists, rewrite the software, using a ROM writer.

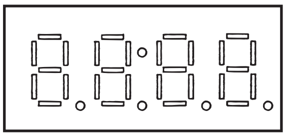
Chapter 10 LED Status Indicators

10-1 LED Status Indicators (Outdoor unit)

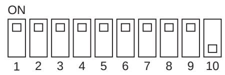
10-1-1 How to Read the LED

By setting the DIP SW 4-1 through 4-10 (Set SW6-10 to OFF.)(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.

7SEG LED



SW4



• In the example above, 1 through 9 are set to ON, and 10 is set to OFF.

Pressure and temperature are examples of numerical values, and operating conditions and the on-off status of solenoid valve are examples of flag display.

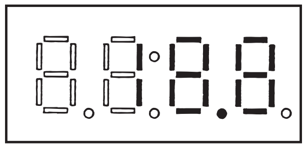
1) Display of numerical values

   Example: When the pressure data sensor reads 18.8kg/cm^2 (Item No. 58)

   • The unit of pressure is in kg/cm^2

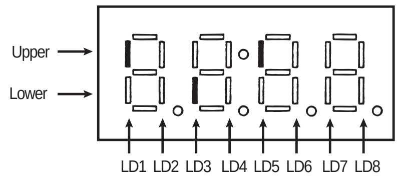
   • Use the following conversion formula to convert the displayed value into a value in SI unit.

   Value in SI unit (MPa) = Displayed value (kg/cm^2) x 0.098

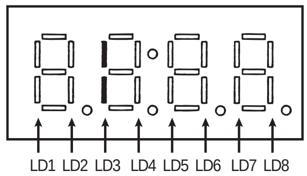


2) Flag display

   Example: When 21S4a, 21S4b, SV1a are ON. (Item No. 3)

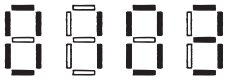
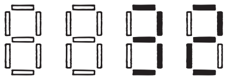
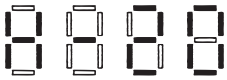
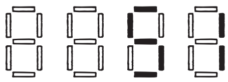


   Example: 3-minutes restart mode (Item No. 14)



10-1-2 Initial LED Display

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		[32] : R32
3	Model and capacity		[H-20] : 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.

- How to convert HP capacity to Model name

HP capacity is the capacity of outdoor unit that is shown on LED display at initial setting.
Please refer to the following table to covert from HP capacity to Model name.

HP	Model
8	(E)M200
10	(E)M250
12	(E)M300
14	(E)M350
16	(E)M400
18	(E)M450
20	(E)M500

10-1-3 Clock Memory Function

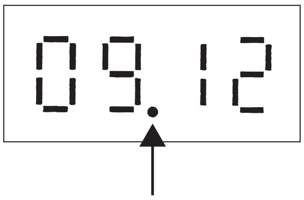
The outdoor unit has a simple clock function that enables the unit to calculate the current time with an internal timer by receiving the time set by the system controller, such as AG-150A.
If an error (including a preliminary error) occurs, the error history data and the error detection time are stored 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 AG-150A 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 AG-150A, 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.)

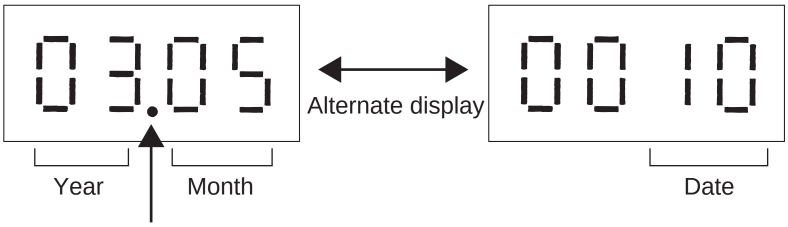
(1) Reading the time data:

1) Time display
Example: 12 past 9



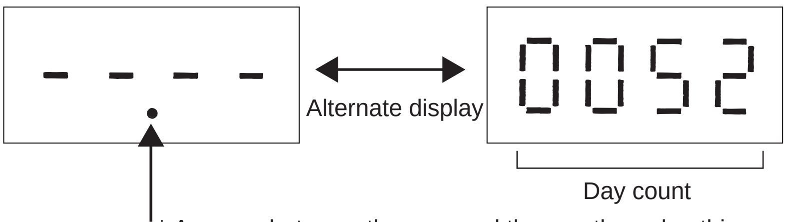
* Disappears if the time data is deviated due to a power failure, or if a system controller that sets the time is not connected.

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



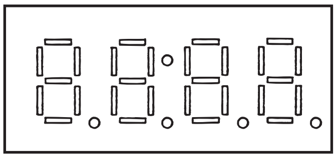
* Appears between the year and the month, and nothing appears when the date is displayed.

10-2 LED Status Indicators (Hydro unit)

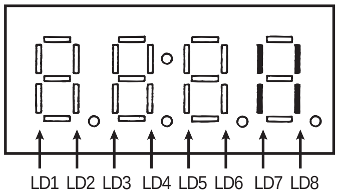
10-2-1 How to Read the LED

The operation status of the unit can be monitored on the service monitor.
The service monitor uses 4-digit 7-segment LED to display flags.
There are no check items using dipswitch settings.

7SEG LED

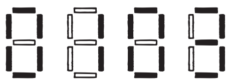
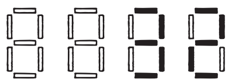
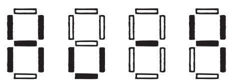
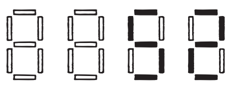


LD1: Pump in operation
LD2: DIP SW 011-4 ON
LD3: DIP SW 011-5 ON
LD5: 52C
LD7: HU
LD8: Microcomputer in operation



10-2-2 Initial LED Display

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		[32] : R32
3	Model and capacity		[Hu-2] : WM250 [Hu-3] : WM350 [Hu-4] : WM500
4	Communication address		[52] : Address 52

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.

10-3 LED Status Indicators Table

Current data

No.	SW4 (When SW6 - 10 is set to OFF)	Item		Display								Unit (A, B) *1*2	Remarks
	1234567890			LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	
0	0000000000	Relay output display 1 Lighting		Comp in operation				72C		OC	CPU in operation	A	
		Check (error) display 1 OC/OS error		0000 to 9999 (Address and error codes highlighted)								B	
1	1000000000	Check (error) display 2 OC/OS error		0000 to 9999 (Address and error codes highlighted)								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	SV10	CH11		SV1a		SV2	SV11	A	
			Bottom			21S4b	SV5b						
4	0010000000	Relay output display 3	Top					21S4c		SV9	Power supply for indoor transmission line	A	
			Bottom			SV14		SV15					
7	1110000000	Special control		Retry operation	Emergency operation						Communication error 3-minute restart delay mode	B	
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.
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	
12	0011000000	External signal (Open input contact point)								Circulation fan is locked.	Low-noise mode (Quiet priority)	A	
13	1011000000	External signal									Circulation fan output	A	
14	0111000000	Outdoor unit operation status			Warm-up mode	3-minutes restart mode	Compressor in operation	Preliminary error	Error	3-minutes restart after instantaneous power failure	Preliminary low pressure error	A	
15	1111000000	OC/OS identification		OC/OS-1/OS-2								A	

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.
*2 This model of outdoor unit is not used in combination, and there is no OS in the system. The status of the OC will be shown.

Current data

No.	SW4 (When SW6 - 10 is set to OFF)	Item		Display								Unit (A, B) *1*2	Remarks
	1234567890			LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	
16	0000100000	Indoor unit check	Top	Unit No. 1	Unit No. 2	Unit No. 3	Unit No. 4	Unit No. 5	Unit No. 6	Unit No. 7	Unit No. 8	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	Unit No. 9	Unit No. 10	Unit No. 11	Unit No. 12	Unit No. 13	Unit No. 14	Unit No. 15	Unit No. 16		
17	1000100000		Top	Unit No. 17	Unit No. 18	Unit No. 19	Unit No. 20	Unit No. 21	Unit No. 22	Unit No. 23	Unit No. 24		
			Bottom	Unit No. 25	Unit No. 26	Unit No. 27	Unit No. 28	Unit No. 29	Unit No. 30	Unit No. 31	Unit No. 32		
18	0100100000		Top	Unit No. 33	Unit No. 34	Unit No. 35	Unit No. 36	Unit No. 37	Unit No. 38	Unit No. 39	Unit No. 40		
			Bottom	Unit No. 41	Unit No. 42	Unit No.43	Unit No. 44	Unit No. 45	Unit No. 46	Unit No. 47	Unit No. 48		
19	1100100000		Top	Unit No. 49	Unit No. 50								
			Bottom										
20	0010100000	Indoor unit Operation mode	Top	Unit No. 1	Unit No. 2	Unit No. 3	Unit No. 4	Unit No. 5	Unit No. 6	Unit No. 7	Unit No. 8	B	Lit during cooling Blinking during heating Unlit while the unit is stopped or in the fan mode
			Bottom	Unit No. 9	Unit No. 10	Unit No. 11	Unit No. 12	Unit No. 13	Unit No. 14	Unit No. 15	Unit No. 16		
21	1010100000		Top	Unit No. 17	Unit No. 18	Unit No. 19	Unit No. 20	Unit No. 21	Unit No. 22	Unit No. 23	Unit No. 24		
			Bottom	Unit No. 25	Unit No. 26	Unit No. 27	Unit No. 28	Unit No. 29	Unit No. 30	Unit No. 31	Unit No. 32		
22	0110100000		Top	Unit No. 33	Unit No. 34	Unit No. 35	Unit No. 36	Unit No. 37	Unit No. 38	Unit No. 39	Unit No. 40		
			Bottom	Unit No. 41	Unit No. 42	Unit No.43	Unit No. 44	Unit No. 45	Unit No. 46	Unit No. 47	Unit No. 48		
23	1110100000		Top	Unit No. 49	Unit No. 50								
			Bottom										
24	0001100000	Indoor unit thermostat	Top	Unit No. 1	Unit No. 2	Unit No. 3	Unit No. 4	Unit No. 5	Unit No. 6	Unit No. 7	Unit No. 8	B	Lit when thermostat is on Unlit when thermostat is off
			Bottom	Unit No. 9	Unit No. 10	Unit No. 11	Unit No. 12	Unit No. 13	Unit No. 14	Unit No. 15	Unit No. 16		
25	1001100000		Top	Unit No. 17	Unit No. 18	Unit No. 19	Unit No. 20	Unit No. 21	Unit No. 22	Unit No. 23	Unit No. 24		
			Bottom	Unit No. 25	Unit No. 26	Unit No. 27	Unit No. 28	Unit No. 29	Unit No. 30	Unit No. 31	Unit No. 32		
26	0101100000		Top	Unit No. 33	Unit No. 34	Unit No. 35	Unit No. 36	Unit No. 37	Unit No. 38	Unit No. 39	Unit No. 40		
			Bottom	Unit No. 41	Unit No. 42	Unit No.43	Unit No. 44	Unit No. 45	Unit No. 46	Unit No. 47	Unit No. 48		
27	1101100000		Top	Unit No. 49	Unit No. 50								
			Bottom										
28	0011100000	Drive recorder status		Drive recorder is stopped (OFF).: "OFF" Drive recorder is in operation (ON).: "ON" Drive recorder is in operation, but unable to start for a certain reason. *1: "ON" flashes. On-board flash error *2: "F-Er" Drive recorder has automatically stopped due to a serious error in the system. "Err"								B	
39	1110010000	Outdoor unit Operation mode		Permissible stop	Standby	Cooling		Heating				B	
42	0101010000	Outdoor unit control mode		Stop	Thermo OFF	Abnormal stop	Scheduled control	Initial start up	Defrost	Oil balance	Low frequency oil recovery	A	
43	1101010000			Warm-up mode	Refrigerant recovery			Continuous heating 2	Continuous heating 1			A	
45	1011010000	TH4		-99.9 to 999.9								A	The unit is [°C]
46	0111010000	TH3		-99.9 to 999.9								A	
47	1111010000	TH7		-99.9 to 999.9								A	
48	0000110000	TH6		-99.9 to 999.9								A	
49	1000110000	TH2		-99.9 to 999.9								A	
50	0100110000	TH5		-99.9 to 999.9								A	
54	0110110000	TH9		-99.9 to 999.9								A	
56	0001110000	THHS1		-99.9 to 999.9								A	The unit is [°C]
58	0101110000	High-pressure sensor data		-99.9 to 999.9								A	The unit is [kgf/cm^2]
59	1101110000	Low-pressure sensor data		-99.9 to 999.9								A	

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.
*2 This model of outdoor unit is not used in combination, and there is no OS in the system. The status of the OC will be shown.

Current data

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1*2	Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	
62	0111110000	TH15	-99.9 to 999.9								A	The unit is [°C]
63	1111110000	TH11	-99.9 to 999.9								A	The unit is [°C]
78	0111001000	∑ Qj	0000 to 9999								B	
79	1111001000	∑ Qjc	0000 to 9999								B	
80	0000101000	∑ Qjh	0000 to 9999								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	
84	0010101000	Te	-99.9 to 999.9								A	
86	0110101000	Total frequencies (OC+OS)	0000 to 9999								B	Control data [Hz]
87	1110101000	Total frequency of each unit	0000 to 9999								A	
88	0001101000	COMP frequency	0000 to 9999								A	
91	1101101000	COMP operating frequency	0000 to 9999								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	Number of times error occurred during IH crankcase heating by compressor motor	0000 to 9999								A	Number of times INV error occurred during IH crankcase heating by compressor motor
93	1011101000	All AK (OC+OS)	0000 to 9999								B	
94	0111101000	AK	0000 to 9999								A	
95	1111101000	FAN1	0000 to 9999								A	Fan output [%]
96	0000011000	Fan inverter output rpm (FAN1)	0000 to 9999								A	[rpm]
97	1000011000	FAN2	0000 to 9999								A	Fan output [%]
98	0100011000	Fan inverter output rpm (FAN2)	0000 to 9999								A	[rpm]
103	1110011000	LEV1	0000 to 9999								A	Outdoor LEV opening (Fully open: 480)
104	0001011000	LEV2a	0000 to 9999								A	Outdoor LEV opening (Fully open: 3000)
105	1001011000	LEV4	0000 to 9999								A	Outdoor LEV opening (Fully open: 480)
108	0011011000	COMP operating current (DC)	00.0 to 999.9								A	Peak value [A]
109	1011011000	LEV2b	0000 to 9999								A	Outdoor LEV opening (Fully open: 3000)
110	0111011000	LEV2c	0000 to 9999								A	Outdoor LEV opening (Fully open: 3000)
111	1111011000	COMP bus voltage	00.0 to 999.9								A	The unit is [V]
113	1000111000	LEV9	0000 to 9999								A	Outdoor LEV opening (Fully open: 480)
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.
*2 This model of outdoor unit is not used in combination, and there is no OS in the system. The status of the OC will be shown.

Current data

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1*2	Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	
117	1010111000	COMP Operation time Upper 4 digits	0000 to 9999								A	The unit is [h]
118	0110111000	COMP Operation time Lower 4 digits	0000 to 9999								A	
121	1001111000	Backup mode	Abnormal pressure rise	High-pressure drop	Low-pressure drop	Abnormal Td rise					A	Stays lit for 90 seconds after the completion of backup control
123	1101111000	COMP number of start-stop events Upper 4 digits	0000 to 9999								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	
129	1000000100	Integrated operation time of compressor (for rotation purpose)	0000 to 9999								B	The unit is [h]
178	0100110100	Error history 1	0000 to 9999								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	
180	0010110100	Error history 2	0000 to 9999								B	
181	1010110100	Error details of inverter	Error details of inverter (0001-0120)								A	
182	0110110100	Error history 3	0000 to 9999								B	
183	1110110100	Error details of inverter	Error details of inverter (0001-0120)								A	
184	0001110100	Error history 4	0000 to 9999								B	
185	1001110100	Error details of inverter	Error details of inverter (0001-0120)								A	
186	0101110100	Error history 5	0000 to 9999								B	
187	1101110100	Error details of inverter	Error details of inverter (0001-0120)								A	
188	0011110100	Error history 6	0000 to 9999								B	
189	1011110100	Error details of inverter	Error details of inverter (0001-0120)								A	
190	0111110100	Error history 7	0000 to 9999								B	
191	1111110100	Error details of inverter	Error details of inverter (0001-0120)								A	
192	0000001100	Error history 8	0000 to 9999								B	
193	1000001100	Error details of inverter	Error details of inverter (0001-0120)								A	
194	0100001100	Error history 9	0000 to 9999								B	
195	1100001100	Error details of inverter	Error details of inverter (0001-0120)								A	
196	0010001100	Error history 10	0000 to 9999								B	
197	1010001100	Error details of inverter	Error details of inverter (0001-0120)								A	
198	0110001100	Error history of inverter (At the time of last data back-up before error)	0000 to 9999								B	
199	1110001100	Error details of inverter	Error details of inverter (0001-0120)								A	

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Error history

No.	SW4 (When SW6 - 10 is set to OFF)	Item		Display								Unit (A, B) *1 *2	Remarks
	1234567890			LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	
201	1001001100	Outdoor unit operation status			Warm-up mode	3-minutes restart mode	Compressor in operation	Preliminary error	Error	3-minutes restart after instantaneous power failure	Preliminary low pressure error	A	
202	0101001100	OC/OS identification		OC/OS-1/OS-2								A	
205	1011001100	Outdoor unit Operation mode		Permissible stop	Standby	Cooling		Heating				A	
208	0000101100	Outdoor unit control mode		Stop	Thermo OFF	Abnormal stop	Scheduled control	Initial start up	Defrost	Oil balance	Low frequency oil recovery	A	
209	1000101100			Warm-up mode	Refrigerant recovery			Continuous heating 2	Continuous heating 1			A	
211	1100101100	Relay output display 1 Lighting		COMP in operation				72C		OC	Always lit	A	
212	0010101100	Relay output display 2 Lighting	Top	21S4a	SV10	CH11		SV1a		SV2	SV11	A	
			Bottom			21S4b	SV5b						
213	1010101100	Relay output display 3 Lighting	Top					21S4c		SV9	Lit while power to the indoor units is being supplied	A	
			Bottom			SV14		SV15					
216	0001101100	TH4		-99.9 to 999.9								A	The unit is [°C]
217	1001101100	TH3		-99.9 to 999.9								A	
218	0101101100	TH7		-99.9 to 999.9								A	
219	1101101100	TH6		-99.9 to 999.9								A	
220	0011101100	TH2		-99.9 to 999.9								A	
221	1011101100	TH5		-99.9 to 999.9								A	
227	1100011100	THHS1		-99.9 to 999.9								A	The unit is [°C]
229	1010011100	High-pressure sensor data		-99.9 to 999.9								A	The unit is [kgf/cm^2]
230	0110011100	Low-pressure sensor data		-99.9 to 999.9								A	
233	1001011100	TH15		-99.9 to 999.9								A	The unit is [°C]
249	1001111100	∑ Qj		0000 to 9999								B	
250	0101111100	∑ Qjc		0000 to 9999								B	
251	1101111100	∑ Qjh		0000 to 9999								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	The unit is [°C]
255	1111111100	Te		-99.9 to 999.9								A	
257	1000000010	Total frequencies (OC+OS) *2		0000 to 9999								B	Control data [Hz]
258	0100000010	Total frequency of each unit		0000 to 9999								A	
259	1100000010	COMP frequency		0000 to 9999								A	
262	0110000010	COMP operating frequency		0000 to 9999								A	The unit is [rps]
264	0001000010	All AK (OC+OS) *2		0000 to 9999								B	
265	1001000010	AK		0000 to 9999								A	
266	0101000010	FAN1		0000 to 9999								A	Fan inverter output [%]
267	1101000010	Fan inverter output rpm (FAN1)		0000 to 9999								A	[rpm]

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Error history

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1 *2	Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	
268	0011000010	FAN2	0000 to 9999								A	Fan inverter output [%]
269	1011000010	Fan inverter output rpm (FAN2)	0000 to 9999								A	[rpm]
274	0100100010	LEV1	0000 to 9999								A	Outdoor LEV opening (Fully open: 480)
275	1100100010	LEV2a	0000 to 9999								A	Outdoor LEV opening (Fully open: 3000)
276	0010100010	LEV4	0000 to 9999								A	Outdoor LEV opening (Fully open: 480)
279	1110100010	COMP operating current (DC)	00.0 to 999.9								A	
282	0101100010	COMP bus voltage	00.0 to 999.9								A	The unit is [V]
283	1101100010	LEV2b	0000 to 9999								A	Outdoor LEV opening (Fully open: 3000)
284	0011100010	LEV2c	0000 to 9999								A	Outdoor LEV opening (Fully open: 3000)
286	0111100010	LEV9	0000 to 9999								A	Outdoor LEV opening (Fully open: 480)
288	0000010010	COMP Operation time Upper 4 digits	0000 to 9999								A	The unit is [h]
289	1000010010	COMP Operation time Lower 4 digits	0000 to 9999								A	
294	0110010010	COMP number of start-stop events Upper 4 digits	0000 to 9999								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	
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.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1 *2	Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	
301	1011010010	Power supply unit	OC/OS-1/OS-2 ↔ Address								B	
302	0111010010	Start-up unit	OC/OS-1/OS-2 ↔ Address								B	

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Data on indoor unit system

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1 *2	Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	
351	1111101010	IC1 Address/capacity code	0000 to 9999				0000 to 9999				B	Displayed alternately every 5 seconds
352	0000011010	IC2 Address/capacity code	0000 to 9999				0000 to 9999					
353	1000011010	IC3 Address/capacity code	0000 to 9999				0000 to 9999					
354	0100011010	IC4 Address/capacity code	0000 to 9999				0000 to 9999					
355	1100011010	IC5 Address/capacity code	0000 to 9999				0000 to 9999					
356	0010011010	IC6 Address/capacity code	0000 to 9999				0000 to 9999					
357	1010011010	IC7 Address/capacity code	0000 to 9999				0000 to 9999					
358	0110011010	IC8 Address/capacity code	0000 to 9999				0000 to 9999					
359	1110011010	IC9 Address/capacity code	0000 to 9999				0000 to 9999					
360	0001011010	IC10 Address/capacity code	0000 to 9999				0000 to 9999					
361	1001011010	IC11 Address/capacity code	0000 to 9999				0000 to 9999					
362	0101011010	IC12 Address/capacity code	0000 to 9999				0000 to 9999					
363	1101011010	IC13 Address/capacity code	0000 to 9999				0000 to 9999					
364	0011011010	IC14 Address/capacity code	0000 to 9999				0000 to 9999					
365	1011011010	IC15 Address/capacity code	0000 to 9999				0000 to 9999					
366	0111011010	IC16 Address/capacity code	0000 to 9999				0000 to 9999					
367	1111011010	IC17 Address/capacity code	0000 to 9999				0000 to 9999					
368	0000111010	IC18 Address/capacity code	0000 to 9999				0000 to 9999					
369	1000111010	IC19 Address/capacity code	0000 to 9999				0000 to 9999					
370	0100111010	IC20 Address/capacity code	0000 to 9999				0000 to 9999					
371	1100111010	IC21 Address/capacity code	0000 to 9999				0000 to 9999					
372	0010111010	IC22 Address/capacity code	0000 to 9999				0000 to 9999					
373	1010111010	IC23 Address/capacity code	0000 to 9999				0000 to 9999					
374	0110111010	IC24 Address/capacity code	0000 to 9999				0000 to 9999					
375	1110111010	IC25 Address/capacity code	0000 to 9999				0000 to 9999					
376	0001111010	IC26 Address/capacity code	0000 to 9999				0000 to 9999					
377	1001111010	IC27 Address/capacity code	0000 to 9999				0000 to 9999					
378	0101111010	IC28 Address/capacity code	0000 to 9999				0000 to 9999					
379	1101111010	IC29 Address/capacity code	0000 to 9999				0000 to 9999					
380	0011111010	IC30 Address/capacity code	0000 to 9999				0000 to 9999					
381	1011111010	IC31 Address/capacity code	0000 to 9999				0000 to 9999					
382	0111111010	IC32 Address/capacity code	0000 to 9999				0000 to 9999					
383	1111111010	IC33 Address/capacity code	0000 to 9999				0000 to 9999					
384	0000000110	IC34 Address/capacity code	0000 to 9999				0000 to 9999					
385	1000000110	IC35 Address/capacity code	0000 to 9999				0000 to 9999					
386	0100000110	IC36 Address/capacity code	0000 to 9999				0000 to 9999					
387	1100000110	IC37 Address/capacity code	0000 to 9999				0000 to 9999					
388	0010000110	IC38 Address/capacity code	0000 to 9999				0000 to 9999					
389	1010000110	IC39 Address/capacity code	0000 to 9999				0000 to 9999					
390	0110000110	IC40 Address/capacity code	0000 to 9999				0000 to 9999					
391	1110000110	IC41 Address/capacity code	0000 to 9999				0000 to 9999					

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Data on indoor unit system

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1 *2	Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	
392	0001000110	IC42 Address/capacity code	0000 to 9999				0000 to 9999				B	Displayed alternately every 5 seconds
393	1001000110	IC43 Address/capacity code	0000 to 9999				0000 to 9999					
394	0101000110	IC44 Address/capacity code	0000 to 9999				0000 to 9999					
395	1101000110	IC45 Address/capacity code	0000 to 9999				0000 to 9999					
396	0011000110	IC46 Address/capacity code	0000 to 9999				0000 to 9999					
397	1011000110	IC47 Address/capacity code	0000 to 9999				0000 to 9999					
398	0111000110	IC48 Address/capacity code	0000 to 9999				0000 to 9999					
399	1111000110	IC49 Address/capacity code	0000 to 9999				0000 to 9999					
400	0000100110	IC50 Address/capacity code	0000 to 9999				0000 to 9999					
408	0001100110	IC1 Suction temperature	-99.9 to 999.9								B	The unit is [°C]
409	1001100110	IC2 Suction temperature	-99.9 to 999.9									
410	0101100110	IC3 Suction temperature	-99.9 to 999.9									
411	1101100110	IC4 Suction temperature	-99.9 to 999.9									
412	0011100110	IC5 Suction temperature	-99.9 to 999.9									
413	1011100110	IC6 Suction temperature	-99.9 to 999.9									
414	0111100110	IC7 Suction temperature	-99.9 to 999.9									
415	1111100110	IC8 Suction temperature	-99.9 to 999.9									
416	0000010110	IC9 Suction temperature	-99.9 to 999.9									
417	1000010110	IC10 Suction temperature	-99.9 to 999.9									
418	0100010110	IC11 Suction temperature	-99.9 to 999.9									
419	1100010110	IC12 Suction temperature	-99.9 to 999.9									
420	0010010110	IC13 Suction temperature	-99.9 to 999.9									
421	1010010110	IC14 Suction temperature	-99.9 to 999.9									
422	0110010110	IC15 Suction temperature	-99.9 to 999.9									
423	1110010110	IC16 Suction temperature	-99.9 to 999.9									
424	0001010110	IC17 Suction temperature	-99.9 to 999.9									
425	1001010110	IC18 Suction temperature	-99.9 to 999.9									
426	0101010110	IC19 Suction temperature	-99.9 to 999.9									
427	1101010110	IC20 Suction temperature	-99.9 to 999.9									
428	0011010110	IC21 Suction temperature	-99.9 to 999.9									
429	1011010110	IC22 Suction temperature	-99.9 to 999.9									
430	0111010110	IC23 Suction temperature	-99.9 to 999.9									
431	1111010110	IC24 Suction temperature	-99.9 to 999.9									
432	0000110110	IC25 Suction temperature	-99.9 to 999.9									
433	1000110110	IC26 Suction temperature	-99.9 to 999.9									
434	0100110110	IC27 Suction temperature	-99.9 to 999.9									
435	1100110110	IC28 Suction temperature	-99.9 to 999.9									
436	0010110110	IC29 Suction temperature	-99.9 to 999.9									
437	1010110110	IC30 Suction temperature	-99.9 to 999.9									
438	0110110110	IC31 Suction temperature	-99.9 to 999.9									
439	1110110110	IC32 Suction temperature	-99.9 to 999.9									
440	0001110110	IC33 Suction temperature	-99.9 to 999.9									
441	1001110110	IC34 Suction temperature	-99.9 to 999.9									

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Data on indoor unit system

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1 *2	Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	
442	0101110110	IC35 Suction temperature	-99.9 to 999.9								B	The unit is [°C]
443	1101110110	IC36 Suction temperature	-99.9 to 999.9									
444	0011110110	IC37 Suction temperature	-99.9 to 999.9									
445	1011110110	IC38 Suction temperature	-99.9 to 999.9									
446	0111110110	IC39 Suction temperature	-99.9 to 999.9									
447	1111110110	IC40 Suction temperature	-99.9 to 999.9									
448	0000001110	IC41 Suction temperature	-99.9 to 999.9									
449	1000001110	IC42 Suction temperature	-99.9 to 999.9									
450	0100001110	IC43 Suction temperature	-99.9 to 999.9									
451	1100001110	IC44 Suction temperature	-99.9 to 999.9									
452	0010001110	IC45 Suction temperature	-99.9 to 999.9									
453	1010001110	IC46 Suction temperature	-99.9 to 999.9									
454	0110001110	IC47 Suction temperature	-99.9 to 999.9									
455	1110001110	IC48 Suction temperature	-99.9 to 999.9									
456	0001001110	IC49Suction temperature	-99.9 to 999.9									
457	1001001110	IC50 Suction temperature	-99.9 to 999.9									
458	0101001110	IC1 Water pipe inlet temperature	-99.9 to 999.9								B	The unit is [°C]
459	1101001110	IC2 Water pipe inlet temperature	-99.9 to 999.9									
460	0011001110	IC3 Water pipe inlet temperature	-99.9 to 999.9									
461	1011001110	IC4 Water pipe inlet temperature	-99.9 to 999.9									
462	0111001110	IC5 Water pipe inlet temperature	-99.9 to 999.9									
463	1111001110	IC6 Water pipe inlet temperature	-99.9 to 999.9									
464	0000101110	IC7 Water pipe inlet temperature	-99.9 to 999.9									
465	1000101110	IC8 Water pipe inlet temperature	-99.9 to 999.9									
466	0100101110	IC9 Water pipe inlet temperature	-99.9 to 999.9									
467	1100101110	IC10 Water pipe inlet temperature	-99.9 to 999.9									
468	0010101110	IC11 Water pipe inlet temperature	-99.9 to 999.9									
469	1010101110	IC12 Water pipe inlet temperature	-99.9 to 999.9									
470	0110101110	IC13 Water pipe inlet temperature	-99.9 to 999.9									
471	1110101110	IC14 Water pipe inlet temperature	-99.9 to 999.9									
472	0001101110	IC15 Water pipe inlet temperature	-99.9 to 999.9									
473	1001101110	IC16 Water pipe inlet temperature	-99.9 to 999.9									
474	0101101110	IC17 Water pipe inlet temperature	-99.9 to 999.9									
475	1101101110	IC18 Water pipe inlet temperature	-99.9 to 999.9									
476	0011101110	IC19 Water pipe inlet temperature	-99.9 to 999.9									
477	1011101110	IC20 Water pipe inlet temperature	-99.9 to 999.9									
478	0111101110	IC21 Water pipe inlet temperature	-99.9 to 999.9									
479	1111101110	IC22 Water pipe inlet temperature	-99.9 to 999.9									
480	0000011110	IC23 Water pipe inlet temperature	-99.9 to 999.9									
481	1000011110	IC24 Water pipe inlet temperature	-99.9 to 999.9									
482	0100011110	IC25 Water pipe inlet temperature	-99.9 to 999.9									
483	1100011110	IC26 Water pipe inlet temperature	-99.9 to 999.9									
484	0010011110	IC27 Water pipe inlet temperature	-99.9 to 999.9									

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Data on indoor unit system

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1 *2	Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	
485	1010011110	IC28 Water pipe inlet temperature	-99.9 to 999.9								B	The unit is [°C]
486	0110011110	IC29 Water pipe inlet temperature	-99.9 to 999.9									
487	1110011110	IC30 Water pipe inlet temperature	-99.9 to 999.9									
488	0001011110	IC31 Water pipe inlet temperature	-99.9 to 999.9									
489	1001011110	IC32 Water pipe inlet temperature	-99.9 to 999.9									
490	0101011110	IC33 Water pipe inlet temperature	-99.9 to 999.9									
491	1101011110	IC34 Water pipe inlet temperature	-99.9 to 999.9									
492	0011011110	IC35 Water pipe inlet temperature	-99.9 to 999.9									
493	1011011110	IC36 Water pipe inlet temperature	-99.9 to 999.9									
494	0111011110	IC37 Water pipe inlet temperature	-99.9 to 999.9									
495	1111011110	IC38 Water pipe inlet temperature	-99.9 to 999.9									
496	0000111110	IC39 Water pipe inlet temperature	-99.9 to 999.9									
497	1000111110	IC40 Water pipe inlet temperature	-99.9 to 999.9									
498	0100111110	IC41 Water pipe inlet temperature	-99.9 to 999.9									
499	1100111110	IC42 Water pipe inlet temperature	-99.9 to 999.9									
500	0010111110	IC43 Water pipe inlet temperature	-99.9 to 999.9									
501	1010111110	IC44 Water pipe inlet temperature	-99.9 to 999.9									
502	0110111110	IC45 Water pipe inlet temperature	-99.9 to 999.9									
503	1110111110	IC46 Water pipe inlet temperature	-99.9 to 999.9									
504	0001111110	IC47 Water pipe inlet temperature	-99.9 to 999.9									
505	1001111110	IC48 Water pipe inlet temperature	-99.9 to 999.9									
506	0101111110	IC49 Water pipe inlet temperature	-99.9 to 999.9									
507	1101111110	IC50 Water pipe inlet temperature	-99.9 to 999.9									

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Setting data

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1 *2	Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	
512	0000000001	Self-address	Alternate display of self address and unit model								A	
513	1000000001	IC/FU address	Count-up display of number of connected units								B	
514	0100000001	RC 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	
518	0110000001	OC address	OC address display									

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Data on indoor unit system

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1 *2	Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	
523	1101000001	IC1 Water pipe outlet temperature	-99.9 to 999.9								B	The unit is [°C]
524	0011000001	IC2 Water pipe outlet temperature	-99.9 to 999.9									
525	1011000001	IC3 Water pipe outlet temperature	-99.9 to 999.9									
526	0111000001	IC4 Water pipe outlet temperature	-99.9 to 999.9									
527	1111000001	IC5 Water pipe outlet temperature	-99.9 to 999.9									
528	0000100001	IC6 Water pipe outlet temperature	-99.9 to 999.9									
529	1000100001	IC7 Water pipe outlet temperature	-99.9 to 999.9									
530	0100100001	IC8 Water pipe outlet temperature	-99.9 to 999.9									
531	1100100001	IC9 Water pipe outlet temperature	-99.9 to 999.9									
532	0010100001	IC10 Water pipe outlet temperature	-99.9 to 999.9									
533	1010100001	IC11 Water pipe outlet temperature	-99.9 to 999.9									
534	0110100001	IC12 Water pipe outlet temperature	-99.9 to 999.9									
535	1110100001	IC13 Water pipe outlet temperature	-99.9 to 999.9									
536	0001100001	IC14 Water pipe outlet temperature	-99.9 to 999.9									
537	1001100001	IC15 Water pipe outlet temperature	-99.9 to 999.9									
538	0101100001	IC16 Water pipe outlet temperature	-99.9 to 999.9									
539	1101100001	IC17 Water pipe outlet temperature	-99.9 to 999.9									
540	0011100001	IC18 Water pipe outlet temperature	-99.9 to 999.9									
541	1011100001	IC19 Water pipe outlet temperature	-99.9 to 999.9									
542	0111100001	IC20 Water pipe outlet temperature	-99.9 to 999.9									
543	1111100001	IC21 Water pipe outlet temperature	-99.9 to 999.9									
544	0000010001	IC22 Water pipe outlet temperature	-99.9 to 999.9									
545	1000010001	IC23 Water pipe outlet temperature	-99.9 to 999.9									
546	0100010001	IC24 Water pipe outlet temperature	-99.9 to 999.9									
547	1100010001	IC25 Water pipe outlet temperature	-99.9 to 999.9									
548	0010010001	IC26 Water pipe outlet temperature	-99.9 to 999.9									
549	1010010001	IC27 Water pipe outlet temperature	-99.9 to 999.9									
550	0110010001	IC28 Water pipe outlet temperature	-99.9 to 999.9									
551	1110010001	IC29 Water pipe outlet temperature	-99.9 to 999.9									
552	0001010001	IC30 Water pipe outlet temperature	-99.9 to 999.9									
553	1001010001	IC31 Water pipe outlet temperature	-99.9 to 999.9									
554	0101010001	IC32 Water pipe outlet temperature	-99.9 to 999.9									
555	1101010001	IC33 Water pipe outlet temperature	-99.9 to 999.9									
556	0011010001	IC34 Water pipe outlet temperature	-99.9 to 999.9									
557	1011010001	IC35 Water pipe outlet temperature	-99.9 to 999.9									
558	0111010001	IC36 Water pipe outlet temperature	-99.9 to 999.9									
559	1111010001	IC37 Water pipe outlet temperature	-99.9 to 999.9									
560	0000110001	IC38 Water pipe outlet temperature	-99.9 to 999.9									
561	1000110001	IC39 Water pipe outlet temperature	-99.9 to 999.9									
562	0100110001	IC40 Water pipe outlet temperature	-99.9 to 999.9									
563	1100110001	IC41 Water pipe outlet temperature	-99.9 to 999.9									

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.
*2 This model of outdoor unit is not used in combination, and there is no OS in the system. The status of the OC will be shown.

Data on indoor unit system

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1 *2	Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	
564	0010110001	IC42 Water pipe outlet temperature	-99.9 to 999.9								B	The unit is [°C]
565	1010110001	IC43 Water pipe outlet temperature	-99.9 to 999.9									
566	0110110001	IC44 Water pipe outlet temperature	-99.9 to 999.9									
567	1110110001	IC45 Water pipe outlet temperature	-99.9 to 999.9									
568	0001110001	IC46 Water pipe outlet temperature	-99.9 to 999.9									
569	1001110001	IC47 Water pipe outlet temperature	-99.9 to 999.9									
570	0101110001	IC48 Water pipe outlet temperature	-99.9 to 999.9									
571	1101110001	IC49 Water pipe outlet temperature	-99.9 to 999.9									
572	0011110001	IC50 Water pipe outlet temperature	-99.9 to 999.9									
573	1011110001	IC1SH	-99.9 to 999.9								B	The unit is [°C]
574	0111110001	IC2SH	-99.9 to 999.9									
575	1111110001	IC3SH	-99.9 to 999.9									
576	0000001001	IC4SH	-99.9 to 999.9									
577	1000001001	IC5SH	-99.9 to 999.9									
578	0100001001	IC6SH	-99.9 to 999.9									
579	1100001001	IC7SH	-99.9 to 999.9									
580	0010001001	IC8SH	-99.9 to 999.9									
581	1010001001	IC9SH	-99.9 to 999.9									
582	0110001001	IC10SH	-99.9 to 999.9									
583	1110001001	IC11SH	-99.9 to 999.9									
584	0001001001	IC12SH	-99.9 to 999.9									
585	1001001001	IC13SH	-99.9 to 999.9									
586	0101001001	IC14SH	-99.9 to 999.9									
587	1101001001	IC15SH	-99.9 to 999.9									
588	0011001001	IC16SH	-99.9 to 999.9									
589	1011001001	IC17SH	-99.9 to 999.9									
590	0111001001	IC18SH	-99.9 to 999.9									
591	1111001001	IC19SH	-99.9 to 999.9									
592	0000101001	IC20SH	-99.9 to 999.9									
593	1000101001	IC21SH	-99.9 to 999.9									
594	0100101001	IC22SH	-99.9 to 999.9									
595	1100101001	IC23SH	-99.9 to 999.9									
596	0010101001	IC24SH	-99.9 to 999.9									
597	1010101001	IC25SH	-99.9 to 999.9									
598	0110101001	IC26SH	-99.9 to 999.9									
599	1110101001	IC27SH	-99.9 to 999.9									
600	0001101001	IC28SH	-99.9 to 999.9									
601	1001101001	IC29SH	-99.9 to 999.9									
602	0101101001	IC30SH	-99.9 to 999.9									
603	1101101001	IC31SH	-99.9 to 999.9									
604	0011101001	IC32SH	-99.9 to 999.9									
605	1011101001	IC33SH	-99.9 to 999.9									
606	0111101001	IC34SH	-99.9 to 999.9									

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*2 This model of outdoor unit is not used in combination, and there is no OS in the system. The status of the OC will be shown.

Data on indoor unit system

No.	SW4 (When SW6 - 10 is set to OFF) 1234567890	Item	Display (LD1–LD8)	Unit (A, B) *1 *2 OC	Remarks
607	1111101001	IC35SH	-99.9 to 999.9	B	The unit is [°C]
608	0000011001	IC36SH	-99.9 to 999.9		
609	1000011001	IC37SH	-99.9 to 999.9		
610	0100011001	IC38SH	-99.9 to 999.9		
611	1100011001	IC39SH	-99.9 to 999.9		
612	0010011001	IC40SH	-99.9 to 999.9		
613	1010011001	IC41SH	-99.9 to 999.9		
614	0110011001	IC42SH	-99.9 to 999.9		
615	1110011001	IC43SH	-99.9 to 999.9		
616	0001011001	IC44SH	-99.9 to 999.9		
617	1001011001	IC45SH	-99.9 to 999.9		
618	0101011001	IC46SH	-99.9 to 999.9		
619	1101011001	IC47SH	-99.9 to 999.9		
620	0011011001	IC48SH	-99.9 to 999.9		
621	1011011001	IC49SH	-99.9 to 999.9		
622	0111011001	IC50SH	-99.9 to 999.9		
623	1111011001	IC1SC	-99.9 to 999.9	B	The unit is [°C]
624	0000111001	IC2SC	-99.9 to 999.9		
625	1000111001	IC3SC	-99.9 to 999.9		
626	0100111001	IC4SC	-99.9 to 999.9		
627	1100111001	IC5SC	-99.9 to 999.9		
628	0010111001	IC6SC	-99.9 to 999.9		
629	1010111001	IC7SC	-99.9 to 999.9		
630	0110111001	IC8SC	-99.9 to 999.9		
631	1110111001	IC9SC	-99.9 to 999.9		
632	0001111001	IC10SC	-99.9 to 999.9		
633	1001111001	IC11SC	-99.9 to 999.9		
634	0101111001	IC12SC	-99.9 to 999.9		
635	1101111001	IC13SC	-99.9 to 999.9		
636	0011111001	IC14SC	-99.9 to 999.9		
637	1011111001	IC15SC	-99.9 to 999.9		
638	0111111001	IC16SC	-99.9 to 999.9		
639	1111111001	IC17SC	-99.9 to 999.9		
640	0000000101	IC18SC	-99.9 to 999.9		
641	1000000101	IC19SC	-99.9 to 999.9		
642	0100000101	IC20SC	-99.9 to 999.9		
643	1100000101	IC21SC	-99.9 to 999.9		
644	0010000101	IC22SC	-99.9 to 999.9		
645	1010000101	IC23SC	-99.9 to 999.9		
646	0110000101	IC24SC	-99.9 to 999.9		
647	1110000101	IC25SC	-99.9 to 999.9		
648	0001000101	IC26SC	-99.9 to 999.9		
649	1001000101	IC27SC	-99.9 to 999.9		

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*2 This model of outdoor unit is not used in combination, and there is no OS in the system. The status of the OC will be shown.

Data on indoor unit system

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1 *2	Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	
650	0101000101	IC28SC	-99.9 to 999.9								B	The unit is [°C]
651	1101000101	IC29SC	-99.9 to 999.9									
652	0011000101	IC30SC	-99.9 to 999.9									
653	1011000101	IC31SC	-99.9 to 999.9									
654	0111000101	IC32SC	-99.9 to 999.9									
655	1111000101	IC33SC	-99.9 to 999.9									
656	0000100101	IC34SC	-99.9 to 999.9									
657	1000100101	IC35SC	-99.9 to 999.9									
658	0100100101	IC36SC	-99.9 to 999.9									
659	1100100101	IC37SC	-99.9 to 999.9									
660	0010100101	IC38SC	-99.9 to 999.9									
661	1010100101	IC39SC	-99.9 to 999.9									
662	0110100101	IC40SC	-99.9 to 999.9									
663	1110100101	IC41SC	-99.9 to 999.9									
664	0001100101	IC42SC	-99.9 to 999.9									
665	1001100101	IC43SC	-99.9 to 999.9									
666	0101100101	IC44SC	-99.9 to 999.9									
667	1101100101	IC45SC	-99.9 to 999.9									
668	0011100101	IC46SC	-99.9 to 999.9									
669	1011100101	IC47SC	-99.9 to 999.9									
670	0111100101	IC48SC	-99.9 to 999.9									
671	1111100101	IC49SC	-99.9 to 999.9									
672	0000010101	IC50SC	-99.9 to 999.9									

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Setting data

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1 *2	Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	
676	0010010101	INV board S/W version	0.00 to 99.99								A	
679	1110010101	Fan board (address 5) S/W version	0.00 to 99.99								A	
680	0001010101	Fan board (address 6) S/W version	0.00 to 99.99								A	
688	0000110101	Current time	00:00 to 23:59								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
700	0011110101	Time of error detection 6	00:00 to 23:59									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								A	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

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*2 This model of outdoor unit is not used in combination, and there is no OS in the system. The status of the OC will be shown.

Data on indoor unit system

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1 *2	Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	
764	0011111101	IC1 Operation mode	0000: Stop 0001: Ventilation 0002: Cooling 0003: Heating 0004: Dry								B	
765	1011111101	IC2 Operation mode										
766	0111111101	IC3 Operation mode										
767	1111111101	IC4 Operation mode										
768	0000000011	IC5 Operation mode										
769	1000000011	IC6 Operation mode										
770	0100000011	IC7 Operation mode										
771	1100000011	IC8 Operation mode										
772	0010000011	IC9 Operation mode										
773	1010000011	IC10 Operation mode										
774	0110000011	IC11 Operation mode										
775	1110000011	IC12 Operation mode										
776	0001000011	IC13 Operation mode										
777	1001000011	IC14 Operation mode										
778	0101000011	IC15 Operation mode										
779	1101000011	IC16 Operation mode										
780	0011000011	IC17 Operation mode										
781	1011000011	IC18 Operation mode										
782	0111000011	IC19 Operation mode										
783	1111000011	IC20 Operation mode										
784	0000100011	IC21 Operation mode										
785	1000100011	IC22 Operation mode										
786	0100100011	IC23 Operation mode										
787	1100100011	IC24 Operation mode										
788	0010100011	IC25 Operation mode										
789	1010100011	IC26 Operation mode										
790	0110100011	IC27 Operation mode										
791	1110100011	IC28 Operation mode										
792	0001100011	IC29 Operation mode										
793	1001100011	IC30 Operation mode										
794	0101100011	IC31 Operation mode										
795	1101100011	IC32 Operation mode										
796	0011100011	IC33 Operation mode										

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*2 This model of outdoor unit is not used in combination, and there is no OS in the system. The status of the OC will be shown.

Data on indoor unit system

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1 *2	Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	
797	1011100011	IC34 Operation mode									B	
798	0111100011	IC35 Operation mode										
799	1111100011	IC36 Operation mode										
800	0000010011	IC37 Operation mode										
801	1000010011	IC38 Operation mode										
802	0100010011	IC39 Operation mode										
803	1100010011	IC40 Operation mode										
804	0010010011	IC41 Operation mode										
805	1010010011	IC42 Operation mode	0000: Stop 0001: Ventilation 0002: Cooling 0003: Heating 0004: Dry									
806	0110010011	IC43 Operation mode										
807	1110010011	IC44 Operation mode										
808	0001010011	IC45 Operation mode										
809	1001010011	IC46 Operation mode										
810	0101010011	IC47 Operation mode										
811	1101010011	IC48 Operation mode										
812	0011010011	IC49 Operation mode										
813	1011010011	IC50 Operation mode										
814	0111010011	IC1 filter	0000 to 9999								B	Hours since last maintenance [h]
815	1111010011	IC2 filter	0000 to 9999									
816	0000110011	IC3 filter	0000 to 9999									
817	1000110011	IC4 filter	0000 to 9999									
818	0100110011	IC5 filter	0000 to 9999									
819	1100110011	IC6 filter	0000 to 9999									
820	0010110011	IC7 filter	0000 to 9999									
821	1010110011	IC8 filter	0000 to 9999									
822	0110110011	IC9 filter	0000 to 9999									
823	1110110011	IC10 filter	0000 to 9999									
824	0001110011	IC11 filter	0000 to 9999									
825	1001110011	IC12 filter	0000 to 9999									
826	0101110011	IC13 filter	0000 to 9999									
827	1101110011	IC14 filter	0000 to 9999									
828	0011110011	IC15 filter	0000 to 9999									
829	1011110011	IC16 filter	0000 to 9999									
830	0111110011	IC17 filter	0000 to 9999									
831	1111110011	IC18 filter	0000 to 9999									
832	0000001011	IC19 filter	0000 to 9999									
833	1000001011	IC20 filter	0000 to 9999									
834	0100001011	IC21 filter	0000 to 9999									
835	1100001011	IC22 filter	0000 to 9999									
836	0010001011	IC23 filter	0000 to 9999									
837	1010001011	IC24 filter	0000 to 9999									
838	0110001011	IC25 filter	0000 to 9999									
839	1110001011	IC26 filter	0000 to 9999									

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10 LED Status Indicators

Data on indoor unit system

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1 *2	Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	
840	0001001011	IC27 filter	0000 to 9999								B	Hours since last maintenance [h]
841	1001001011	IC28 filter	0000 to 9999									
842	0101001011	IC29 filter	0000 to 9999									
843	1101001011	IC30 filter	0000 to 9999									
844	0011001011	IC31 filter	0000 to 9999									
845	1011001011	IC32 filter	0000 to 9999									
846	0111001001	IC33 filter	0000 to 9999									
847	1111001011	IC34 filter	0000 to 9999									
848	0000101011	IC35 filter	0000 to 9999									
849	1000101011	IC36 filter	0000 to 9999									
850	0100101011	IC37 filter	0000 to 9999									
851	1100101011	IC38 filter	0000 to 9999									
852	0010101011	IC39 filter	0000 to 9999									
853	1010101011	IC40 filter	0000 to 9999									
854	0110101011	IC41 filter	0000 to 9999									
855	1110101011	IC42 filter	0000 to 9999									
856	0001101011	IC43 filter	0000 to 9999									
857	1001101011	IC44 filter	0000 to 9999									
858	0101101011	IC45 filter	0000 to 9999									
859	1101101011	IC46 filter	0000 to 9999									
860	0011101011	IC47 filter	0000 to 9999									
861	1011101011	IC48 filter	0000 to 9999									
862	0111101011	IC49 filter	0000 to 9999									
863	1111101011	IC50 filter	0000 to 9999									

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*2 This model of outdoor unit is not used in combination, and there is no OS in the system. The status of the OC will be shown.

Other types of data

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1 *2	Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	
871	1110011011	U-phase current effective value 1	-99.9 to 999.9								A	The unit is [A]
872	0001011011	W-phase current effective value 1	-99.9 to 999.9								A	
873	1001011011	Power factor phase angle 1	-99.9 to 999.9								A	The unit is [deg]
880	0000111011	Control board Reset counter	0 to 254								A	The unit is [time]
881	1000111011	INV board Reset counter	0 to 254								A	
884	0010111011	Fan board (address 5) reset counter	0 to 254								A	The unit is [time]
885	1010111011	Fan board (address 6) reset counter	0 to 254								A	
980	0010101111	M-NET processor S/W version	0.00 to 99.99								A	

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*2 This model of outdoor unit is not used in combination, and there is no OS in the system. The status of the OC will be shown.

Service Handbook

Model

PUHY-M200, M250, M300, M350, M400, M450, M500YNW-A1
PUHY-EM200, EM250, EM300, EM350, EM400, EM450, EM500YNW-A1
CMH-WM250, 350, 500V-A

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