TRANE®

MITSUBISHI ELECTRIC

AIR CONDITIONER

2025

R32

Service Handbook

Model

TUHYE072, E096, E120, E144, E168, E1923(4)AMM0AN

TUHYE264, E288, E312, E336, E360, E3843(4)BMM0AN

TUHYH072, H096, H1203(4)AMM0AN

TUHYH144, H192, H2403(4)BMM0AN

Safety Precautions

- Please read the following safety precautions carefully before installing the unit to ensure safety.

⚠WARNING	**Indicates a risk of death or serious injury.**
⚠CAUTION	**Indicates a risk of serious injury or structural damage.**

- Make sure that this manual is passed on to the end user to retain for future reference.
- Retain this manual for future reference. When the unit is reinstalled or repaired, have this manual available to those who provide these services. Make sure that this manual is passed on to any future users.

All electric work must be performed by qualified personnel.

Air tightness test must be performed by qualified personnel.

General Precautions

⚠WARNING

Do not use refrigerant other than the type indicated in the manuals provided with the unit and on the nameplate. Doing so may cause the unit or pipes to burst, or result in explosion or fire during use, during repair, or at the time of disposal of the unit. It may also be in violation of applicable laws. MITSUBISHI ELECTRIC TRANE HVAC US LLC cannot be held responsible for malfunctions or accidents resulting from the use of the wrong type of refrigerant.

Do not install the unit in a place where large amounts of oil, steam, organic solvents, or corrosive gases, such as sulfuric gas, are present or where acidic/alkaline solutions or sprays containing sulfur are used frequently. These substances can compromise the performance of the unit or cause certain components of the unit to corrode, which can result in refrigerant leakage, water leakage, injury, electric shock, malfunctions, smoke, or fire.

Do not try to defeat the safety features of the unit or make unauthorized setting changes. Forcing the unit to operate the unit by defeating the safety features of the devices such as the pressure switch or the temperature switch, making unauthorized changes to the switch settings, or using accessories other than the ones recommended by Mitsubishi Electric may result in smoke, fire, or explosion.

To reduce the risk of shorting, current leakage, electric shock, malfunctions, smoke, or fire, do not splash water on electric parts.

To reduce the risk of electric shock, malfunctions, smoke or fire, do not operate the switches/buttons or touch other electrical parts with wet hands.

To reduce the risk of pipe burst and explosion, do not allow gas refrigerant and refrigerant oil to be trapped in the refrigerant circuit.

To reduce the risk of burns or frost bites, do not touch the refrigerant pipes or refrigerant circuit components with bare hands during and immediately after operation.

To reduce the risk of burns, do not touch any electrical parts with bare hands during or immediately after stopping operation.

To reduce the risk of injury from falling tools, keep children away while installing, inspecting, or repairing the unit.

Keep the space well ventilated. Refrigerant can displace air and cause oxygen starvation. If leaked refrigerant comes in contact with a heat source, toxic gas may be generated.

Always replace a fuse with one with the correct current rating. The use of improperly rated fuses or a substitution of fuses with steel or copper wire may result in bursting, fire or explosion.

To reduce the risk of electric shock, smoke, and fire due to infiltration of dust and water, properly install all required covers.

To reduce the risk of electric shock, smoke, and fire due to infiltration of dust and water, properly install all required terminal block covers and insulation sheets.

To reduce the risk of electric shock, smoke, and fire due to infiltration of dust and water, properly install all required covers and panels on the terminal box and control box.

To reduce the risk of injury from units falling or falling over, periodically check the installation base for damage.

Consult an authorized agency for the proper disposal of the unit. Refrigerant oil and refrigerant that may be left in the unit pose a risk of fire, explosion, or environmental pollution.

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.

The unit shall be properly stored to prevent mechanical damage.

Before inspecting the inside of the control box, turn off the power, keep the unit off for at least 10 minutes.

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

Refrigerant leak detection sensor shall be set at a percentage of the LFL of the refrigerant and shall be calibrated to the refrigerant employed, and the appropriate percentage of gas (25% maximum) is confirmed.

Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipework.

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

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.

When installing an indoor unit or a shut off valve kit, if the floor area of the unit installation site falls below the minimum area (Amin) defined in Equation 1, please take appropriate safety measures in accordance with UL standards.

-Amin = mc/(0.5 × 0.306 × Hr) …Equation 1

mc: Refrigerange in the system

Hr: Height ft charrom the floor to the unit

Table 1

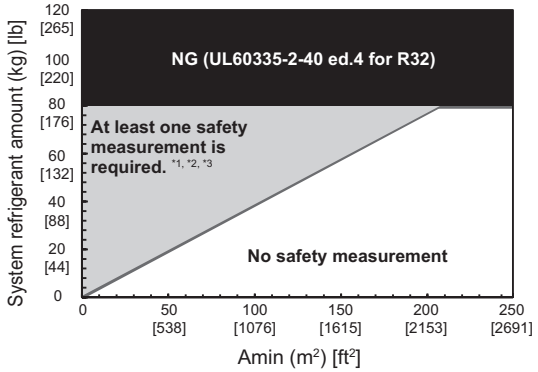
Refrigerant concentration and required safety measure (height of ceiling = 2.5 m [8-3/16 ft])

Amin		mc			Amin		mc		
m^2	ft^2	kg	lb	oz	m^2	ft^2	kg	lb	oz
5	53.9	1.9	4	3	110	1184.1	42.0	92	9
10	107.7	3.8	8	6	120	1291.7	45.9	101	3
20	215.3	7.6	16	12	130	1399.4	49.7	109	9
30	323.0	11.4	25	2	140	1507.0	53.5	117	15
40	430.6	15.3	33	11	150	1614.6	57.3	126	5
50	538.2	19.1	42	1	160	1722.3	61.2	134	14
60	645.9	22.9	50	7	170	1829.9	65.0	143	4
70	753.5	26.7	58	13	180	1937.6	68.8	151	10
80	861.2	30.6	67	7	190	2045.2	72.6	160	0
90	968.8	34.4	75	13	200	2152.8	76.5	168	10
100	1076.4	38.2	84	3	210	2260.5	79.5	175	4

* If the values of Table 1 are different from the values calculated by Equation 1, use the results calculated by the New Design Tool software of Mitsubishi Electric Corporation or the Diamond System Builder software of Mitsubishi Electric Trane HVAC US.

Fig. 1

Refrigerant concentration and required safety measure (height of ceiling space = 2.5 m [8-3/16 ft])



*1 Please be aware that this product does not have built-in safety measures for installation.

*2 The system is UL-Listed for the ETRS (Enhanced Tightness Refrigerant System).Therefore, please note that the installation requirements indicated in Fig. 1 are mitigated compared to ASHRAE 15 or local building codes.

*3 For safety reasons, do not install a shut off valve kit of other manufacturers in the refrigerant circuit to prevent equipment failure.

Prior to beginning work on systems, safety checks are necessary to ensure that the risk of ignition is minimised.

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

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 shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e. non-sparking, adequately sealed or intrinsically safe.

If any hot work is to be conducted on the refrigerating 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.

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.

The following checks shall be applied.

- the actual REFRIGERANT CHARGE is in accordance with the room size within which the refrigerant containing parts are installed;
- the ventilation machinery and outlets are operating adequately and are not obstructed;
- marking to the equipment continues to be visible and legible. Markings and signs that are illegible shall be corrected;
- refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.

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.

Sealed electrical components shall be replaced.

Intrinsically safe components must be replaced.

Only qualified personnel must decommissioning. The following checks shall be applied.

- All personal protective equipment is available and being used correctly;
- Recovery equipment and cylinders conform to the appropriate standards.
- Do not overfill cylinders (no more than 80 % volume liquid charge).
- Do not exceed the maximum working pressure of the cylinder, even temporarily.
- 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.
- Recovered refrigerant shall not be charged into another REFRIGERATING SYSTEM unless it has been cleaned and checked.

Equipment shall be labelled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. Ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.

⚠CAUTION

To reduce the risk of fire or explosion, do not place flammable materials or use flammable sprays around the unit.

To reduce the risk of being caught in rotating parts, electric shock, and burns, do not operate the unit without all required panels and guards being installed.

To reduce the risk of injury, do not sit, stand, or place objects on the unit.

The unit described in this manual is not intended for use with food, animals, plants, precision instruments, or art work.

To reduce the risk of water leakage and malfunctions, do not turn off the power immediately after stopping operation. Leave the unit turned on for at least 5 minutes before turning off the power.

Do not install the unit over things that are vulnerable to water damage from condensation dripping.

To reduce the risk of injury, electric shock, and malfunctions, do not touch or allow cables to come in contact with the edges of components.

To reduce the risk of injury, do not touch the heat exchanger fins or sharp edges of components with bare hands.

Always wear protective gears when touching electrical components on the unit. Several minutes after the power is switched off, residual voltage may still cause electric shock.

To reduce the risk of electric shock and burns, always wear protective gear when working on units.

To reduce the risk of injury, do not insert fingers or foreign objects into air inlet/outlet grills. If the unit is left on a damaged base, it may fall and cause injury.

To reduce the risk of injury, always wear protective gear when working on units.

Do not release refrigerant into the atmosphere. Collect and reuse the refrigerant, or have it properly disposed of by an authorized agency. Refrigerant poses environmental hazards if released into the air.

Transportation and Installation

⚠WARNING

Lift the unit by placing the slings at designated locations. Support the outdoor unit securely at four points to keep it from slipping and sliding. If the unit is not properly supported, it may fall and cause personal injury.

⚠CAUTION

To reduce the risk of injury, do not carry the product by the PP bands that are used on some packages.

To reduce the risk of injury, products weighing 20 kg (44 lbs) or more should be carried by two or more people.

Installation

⚠WARNING

Do not install the unit where there is a risk of leaking flammable gas.
If flammable gas accumulates around the unit, it may ignite and cause a fire or explosion.

To reduce the risk of injury from coming in contact with units, install units where they are not accessible to people other than maintenance personnel.

To reduce the risk of injury, properly dispose of the packing materials so that children will not play with them.

Properly dispose of the packing materials. Plastic bags pose suffocation hazard to children.

All drainage work should be performed by the dealer or qualified personnel according to the instructions detailed in the Installation Manual. Improper drainage work may cause water leakage and resultant damage to the furnishings.

Remove packing materials from the unit before operating the unit. Note that some accessories may be taped to the unit. Properly install all accessories that are required. Failing to remove the packing materials or failing to install required accessories may result in refrigerant leakage, oxygen deprivation, smoke, or fire.

Install the following safety devices according to system refrigerant amount, volume of installation space or residential space, and installation position.

- Safety shut off valve and mechanical ventilation device

Any additional parts must be installed by the dealer or qualified personnel. Only use the parts specified by Mitsubishi Electric. Installation by unauthorized personnel or use of unauthorized parts or accessories may result in water leakage, electric shock, or fire.

Take appropriate safety measures against wind gusts and earthquakes to prevent the unit from toppling over and causing injury.

To reduce the risk of injury from units falling or falling over, install the unit on a surface that is strong enough to support its weight.

To reduce the risk of injury from units falling or falling over, periodically check the installation base for damage.

⚠CAUTION

Do not install the unit over things that are vulnerable to water damage. Provide an adequate collective drainage system for the drain water from unit as necessary.

Do not install the unit over things that are vulnerable to water damage. When the indoor humidity exceeds 80% or if the drain water outlet becomes clogged, condensation may drip from the indoor unit onto the ceiling or floor.

To reduce the risk of damage to the unit and resultant electric leak and electric shock, keep small animals, snow, and rain water from entering the unit by closing the gap in the pipe and wire access holes.

To reduce the risk of rain water or drain water from entering the room and damaging the interior, drainage work must be performed by your dealer or qualified personnel according to the instructions detailed in the Installation Manual.

To reduce the risk of drain water overflow, install the unit horizontally, using a level.

Piping Work

⚠WARNING

To reduce the risk of injury, including frost bites, that may result from being blasted with refrigerant, use caution when operating the refrigerant service valve. If refrigerant comes into contact with an open flame, toxic gases, ignition, or fire may result.

To reduce the risk of refrigerant catching fire and causing burns, remove the refrigerant gas and the residual refrigerant oil in the pipes before heating them.

To reduce the risk of pipe damage, refrigerant leakage, and oxygen deprivation, use pipes that meet the pipe thickness specifications, which vary by the type of refrigerant used, pipe diameter, and pipe material.

To reduce the risk of pipe burst or explosion, evacuate the refrigerant circuit using a vacuum pump, and do not purge the system with refrigerant.

To reduce the risk of explosion and deterioration of refrigerant oil caused by chloride, do not use oxygen, flammable gas, or refrigerant that contains chloride as a pressurizing gas.

To prevent explosion, do not heat the unit with refrigerant gas in the refrigerant circuit.

Check for refrigerant leaks. If refrigerant leaks, oxygen deprivation may result. If refrigerant comes into contact with an open flame, toxic gases, ignition, or fire may result.

Insulate pipe connections after completing the air tightness test. Performing an air tightness test with the pipe being insulated may lead to failure to detect refrigerant leakage and cause oxygen deprivation.

To reduce the risk of pipe damage and resultant refrigerant leakage and oxygen deprivation, keep the field-installed pipes out of contact with the edges of components.

Pipe-work including piping material, pipe routing, and installation shall be in compliance with national and local codes and standards, such as ASHRAE 15, ASHRAE 15.2, IAPMO Uniform Mechanical Code, ICC International Mechanical Code, or CSA B52.

After completion of field piping for split systems, the field pipework shall be pressure tested with an inert gas and then vacuum tested prior to refrigerant charging, according to the following requirements;

-The minimum test pressure for the low side of the system shall be the low side design pressure and the minimum test pressure for the high side of the system shall be the high side design pressure, unless the high side of the system, cannot be isolated from the low side of the system in which case the entire system shall be pressure tested to the low side design pressure.

Field-made refrigerant joints indoors shall be tightness tested. The test method shall have a sensitivity of 5 grams per year of refrigerant or better under a pressure of at least 0.25 times the MAXIMUM ALLOWABLE PRESSURE. No leak shall be detected.

When breaking into the refrigerant circuit to make repairs or for any other purpose, the following procedure shall be adhered to.

-safely remove refrigerant following local and national regulations;

-continuously flush or purge with inert gas when using flame to open circuit;

-open the circuit.

The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. The system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems.

The outlet for the vacuum pump shall not be close to any potential ignition sources, and ventilation shall be available.

Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimise the amount of refrigerant contained in them.

Cylinders shall be kept in an appropriate position according to the instructions.

Ensure that the REFRIGERATING SYSTEM is earthed prior to charging the system with refrigerant.

Indicate the refrigerant charge on the label when charging is complete.

Extreme care shall be taken not to overfill the REFRIGERATING SYSTEM.

Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

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 is available. All cylinders to be used are designated for the recovered 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 occurs.

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 the flammable refrigerant. If in doubt, the manufacturer should be consulted. 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.

The recovered refrigerant shall be processed according to local legislation in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely.

⚠CAUTION

To reduce the risk of pipe bursting and explosion due to abnormal pressure rise, do not allow any substances other than R32 (such as air) to enter the refrigerant circuit.

To reduce the risk of water leakage and resultant damage to the furnishings, drain piping work must be performed by your dealer or qualified personnel according to the instructions detailed in the Installation Manual.

To keep the ceiling and floor from getting wet due to condensation, properly insulate the pipes.

Wiring Work

⚠WARNING

To reduce the risk of wire breakage, overheating, smoke, and fire, keep undue force from being applied to the wires.

To reduce the risk of wire breakage, overheating, smoke, or fire, properly secure the cables in place and provide adequate slack in the cables so as not to stress the terminals.

To reduce the risk of injury or electric shock, switch off the main power before performing electrical work.

All electric work must be performed by a qualified electrician according to the local regulations, standards, and the instructions detailed in the Installation Manual. Capacity shortage to the power supply circuit or improper installation may result in malfunction, electric shock, smoke, or fire.

To reduce the risk of electric shock, smoke, or fire, install an earth leakage breaker on the power supply to each unit.

To reduce the risk of electric shock, smoke, or fire, install an earth leakage breaker on the power supply to each unit. (Applicable to inverter units only)

Use properly rated breakers and fuses (earth leakage breaker, local switch <switch + fuse>, no-fuse breaker). The use of a breaker with a breaking capacity greater than the specified capacity may cause electric shock, malfunctions, smoke, or fire.

Use properly rated breakers and fuses (earth leakage breaker, local switch <switch + fuse>, no-fuse breaker). The use of a breaker with a breaking capacity greater than the specified capacity may cause electric shock, malfunctions, smoke, or fire. (Applicable to inverter units only)

To reduce the risk of current leakage, overheating, smoke, or fire, use properly rated cables with adequate current carrying capacity.

Proper grounding must be provided by a licensed electrician.
Do not connect the grounding wire to a gas pipe, water pipe, lightning rod, or telephone wire. Improper grounding may result in electric shock, smoke, fire, or malfunction due to electrical noise interference.

Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

Have all electric work done by a licensed electrician according to "Electric Facility Engineering Standard" and "Interior Wire Regulations" and the instructions given in this manual and always use a dedicated power supply.

⚠CAUTION

To reduce the risk of current leakage, wire breakage, smoke, or fire, keep the wiring out of contact with the refrigerant pipes and other parts, especially sharp edges.

Relocation and Repairs

⚠WARNING

To reduce the risk of refrigerant leakage, water leakage, injury, electric shock, and fire, units should only be moved or repaired by your dealer or qualified personnel.

To reduce the risk of wire shorting, electric leak, electric shock, smoke, or fire, do not perform maintenance work in the rain.

To reduce the risk of injury, electric shock, and fire, properly reinstall all removed components after completing repair work.

⚠CAUTION

To reduce the risk of wire shorting, electric shock, malfunctions, or fire, keep circuit boards dust free, and do not touch them with your hands or tools.

To reduce the risk of refrigerant and water leakage, check the pipe supports and insulation for damage during inspection or repair, and replace or repair the ones that are found to be deteriorated.

Additional Precautions

To avoid damage to the unit, use appropriate tools to install, inspect, or repair the unit.

To reduce the risk or malfunction, turn on the power at least 12 hours before starting operation, and leave the power turned on throughout the operating season.

Recover all refrigerant in the units, and dispose of it properly according to any applicable laws and regulations.

To reduce the risk of deterioration of refrigerant oil and compressor malfunctions caused by the use of refrigerant other than R32, only use R32.

Provide a maintenance access to allow for the inspection of pipes above the ceiling or the buried pipes.

Take appropriate measures against electrical noise interference when installing the air conditioners in hospitals or facilities with radio communication capabilities. Inverter, high-frequency medical, or wireless communication equipment as well as power generators may cause the air conditioning system to malfunction. Air conditioning system may also adversely affect the operation of these types of equipment by creating electrical noise.

To reduce the risk of damage to the unit, leave the valves on the unit closed until refrigerant charging is completed.

Place a wet towel on the refrigerant service valve before brazing the pipes to keep its temperature from rising above 120ºC and damaging the surrounding equipment.

Direct the blazing torch flame away from the adjacent cables and sheet metal to keep them from being overheated and damaged.

Prepare tools for exclusive use with R32. Do not use the following tools if they have been used with the conventional refrigerant (R410A): refrigerant recovery cylinder, refrigerant cylinder. Use a leak detector that is compatible with R32. Infiltration of the residual refrigerant, refrigerant oil, or water on these tools may cause the refrigerant oil in the new system to deteriorate or damage the compressor.

To reduce the risk of the vacuum pump oil backflowing into the refrigerant cycle and causing the refrigerant oil to deteriorate, use a vacuum pump with a check valve.

Have a set of tools for exclusive use with R32. Consult your nearest Mitsubishi Electric Dealer.

Keep dust, dirt, and water off charging hose. Infiltration of dust, dirt, or water into the refrigerant circuit may cause the refrigerant oil to deteriorate or damage the compressor.

Use refrigerant piping and couplings that meet the applicable standards. For refrigerant pipes, use pipes made of phosphorus deoxidized copper. Keep the inner and outer surfaces of pipes and couplings clean and free of such contaminants as sulfur, oxides, dust, dirt, shaving particles, oil, and moisture. Failure to follow these directions may result in the deterioration of refrigerant oil or compressor damage.

Store the piping materials indoors, and keep both ends of the pipes sealed until immediately before brazing. Keep elbows and other joints in plastic bags. Infiltration of dust, dirt, or water into the refrigerant circuit may cause the refrigerant oil to deteriorate or damage the compressor.

To reduce the risk of oxidized film from entering the refrigerant pipe and causing the refrigerant oil to deteriorate or damaging the compressor, braze pipes under nitrogen purge.

Do not use the existing refrigerant piping. A large amount of chloride that is contained in the residual refrigerant and refrigerant oil in the existing piping may cause the refrigerant oil in the new unit to deteriorate or damage the compressor.

Charge the system with an appropriate amount of refrigerant in the liquid phase. Refer to the relevant sections in the manuals to calculate the appropriate amount of refrigerant to be charged. Refrigerant overcharge or undercharge may result in performance drop, abnormal stop of operation, or compressor failure.

To reduce the risk of power capacity shortage, always use a dedicated power supply circuit.

To reduce the risk of both the breaker on the product side and the upstream breaker from tripping and causing problems, split the power supply system or provide protection coordination between the earth leakage breaker and no-fuse breaker.

Have a backup system, if failure of the unit has a potential for causing significant problems or damages.

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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. Leaked refrigerant that comes into contact with fire or a heated area may generate poisonous gas, posing a fire risk. Ensure the work area is well ventilated.

Note
- 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.

7. Specifications and system requirements may differ for products manufactured at different times. Refer to the relevant chapters for specification details. Production periods can be found from the serial number as follows.

5XW○○○ ···

- X: 1~9: Jan to Sept. / X~Z: Oct to Dec. (Production month)
- 5: April 2025 to March 2026 (Production year)

ex)	5ZW	December	2025
	51W	January	2026
	52W	February	2026
	53W	March	2026
	64W	April	2026

1-1-2 Tool Preparation

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

Tools for R32 (Availability of tools for R22, R407C, and R410A models)

◎ : Tools that can be shared with older models (R22, R407C, and R410A)

○ : Tools or materials that can be shared with older models (R22, R407C, and R410A) under certain conditions

△ : Tools or materials that cannot be shared with older models (R22, R407C, and R410A) (New tools or materials need to be prepared.)

× : Tools that are prohibited for use

Tools/Materials	Availability			Use	Notes
	R22	R407C	R410A		
Gauge manifold	△	△	◎*1	Evacuation and refrigerant charging	Pressure on the high-pressure side is 5.09 MPa [738 psi] or higher.
Charging hose	△	△	◎*1	Evacuation and refrigerant charging	The hose diameter is larger than the conventional model.
Charging port on the Refrigerant cylinder	△	△	◎*1	Refrigerant charging	The charge port diameter is larger than that of the current port.
Refrigerant recovery cylinder	△	△	△	Refrigerant charging	
Refrigerant cylinder	△	△	△	Refrigerant charging	The refrigerant type is indicated. The top of the cylinder is light blue.
Gas Leak detector	○	○	○	Gas leak detection	Can be used if compatible with R32 refrigerant. (Combustion type cannot be used.)
Vacuum pump	○	○	○	Vacuum drying	Can be used with a check valve adapter installed (if R32-compatible).
Refrigerant recovery equipment	○	○	○	Refrigerant recovery	Can be used if compatible with R32 refrigerant.
Vacuum pump with a check valve	○	○	○	Vacuum drying	Can be used if compatible with R32 refrigerant.
Bender	◎	◎	◎	Bending pipes	
Torque wrench	◎	◎	◎	Tightening flare nuts	The flare processing dimensions for pipes that have a diameter of ø12.7 (1/2") or ø15.88 (5/8") have been increased.
Pipe cutter	◎	◎	◎	Cutting pipes	
Welder and nitrogen cylinder	◎	◎	◎	Welding pipes	
Refrigerant charging meter	◎	◎	◎	Refrigerant charging	
Vacuum gauge	◎	◎	◎	Vacuum level check	
Charging cylinder	×	×	×	Refrigerant charging	Prohibited to use.
Tools containing abrasive materials	×	×	×	Cutting pipes	Prohibited to use.

*1 When sharing tools between R32 and R410A models, perform a nitrogen blow to remove refrigerant oil and other deposits before each use.
Nitrogen blow:
Set the nitrogen pressure to 1.0 MPa and blow nitrogen for 10 seconds. Cover the port on the opposite side of the nitrogen blow instrument with a cloth.

Extreme caution must be taken to ensure that no water or dust enters the tools.

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

Annealed	Soft copper pipes (annealed copper pipes). They can easily be bent with hands.
Drawn	Hard copper pipes (straight pipes). They are stronger than the Annealed at the same radial thickness.

- The distinction between Annealed and Drawn is made based on the strength of the pipes themselves.
- Annealed can easily be bent with hands.
- Drawn are considerably stronger than 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]	R32, R410A etc.

3. Piping materials/Radial thickness

Select piping materials that meet the requirements set forth in ASTM B280.

4. Thickness and refrigerant type indicated on the piping materials

Ask the pipe manufacturer for the symbols indicated on the piping material for refrigerant R32.

1-2-2 Storage of Piping Materials

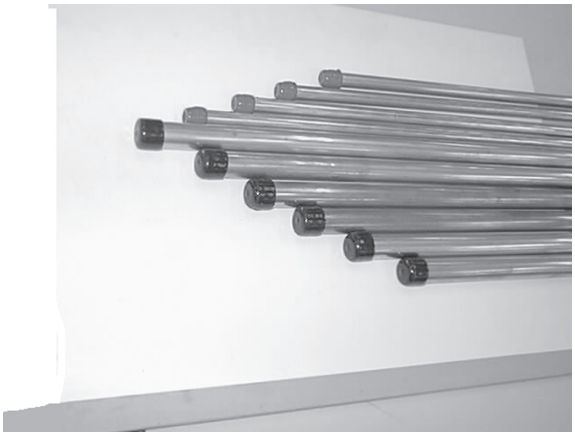
1. Storage location

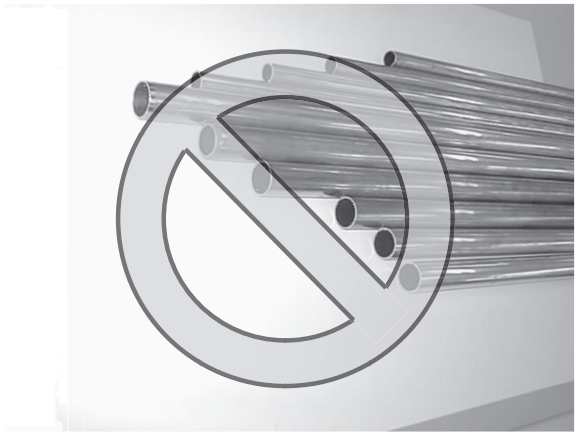




Store the pipes to be used indoors. (Warehouse at site or owner's warehouse)
If they are left outdoors, dust, dirt, or moisture may infiltrate and contaminate the pipe.

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.

Refrigerant oil is highly hygroscopic and is likely to degrade and cause compressor failure if moisture infiltrates into the system. Storage of piping materials requires stringent management.

1-2-3 Pipe Processing

Prevent the particles that are generated during pipe cutting or cut edge treatment from entering the pipes. If abrasive materials contained in sandpaper or cutting tools enter the refrigerant circuit, they may cause the compressor, valves, or other refrigerant circuit components to fail.

Note

- To deburr pipes, use a reamer or other deburring tools, not sandpaper.
- To cut pipes, use a pipe cutter, not a grinder or other tools that use abrasive materials.
- When cutting or deburring pipes, do not allow cutting chips or other foreign matters to enter the pipes.
- If cutting chips or other foreign matters enter pipes, wipe them off the inside of the pipes.

1-2-4 Differences in Refrigerant Properties

1. Chemical characteristics

R32, one of the two components of R410A, is a less toxic and chemically stable hydrofluorocarbon. Because R32 has an atmospheric lifespan of just 4.9 years, it has little impact on global warming. However, since R32 has a high percentage of hydrogen, it is slightly flammable.

<Comparison table of R32, R410A, R407C, and R22 characteristics>

	HFC			HCFC
Refrigerant	R32	R410A	R407C	R22
Component	HFC32	HFC32/HFC125	HFC32/HFC125/ HFC134a	HCFC22
Composition (%)	100	50/50	23/25/52	100
Type	Single refrigerant	Near-azeotropic refrigerant mixture	Non-azeotropic refrigerant	Single refrigerant
Chlorine	Not contained	Not contained	Not contained	Contained
Safety class	A2L	A1/A1	A1/A1/A1	A1
Pressure (physical property) [MPa (abs)] *1	3.14	3.07	2.11	1.94
Pressure (physical property) [psi (abs)] *1	455	445	306	281
Boiling point [°C]	-51.7	-51.4	-43.6	-40.8
Boiling point [°F]	-61.06	-60.52	-46.48	-41.44
Vapor pressure (25°C) [MPaG]	1.588	1.557	0.9177	0.94
Vapor pressure [psiG]	230	226	133	136
Ozone Depletion Potential (ODP) *2	0	0	0	0.055
Global Warming Potential (GWP) *3	675	2090	1770	1810
Charging	Liquid and gas charging	Liquid charging	Liquid charging	Gas charging
Additional charging when refrigerant leaks	Allowed	Allowed	Non allowed	Allowed

*1 Physical property at 50°C

*2 Relative to CFC11

*3 GWP = Global Warming Potential (Each value is based on the IPCC Forth Assessment Report.)

2. Pressure characteristics

As shown in the table below, the vapor pressure of R32 is almost as high as that of R410A at the same temperatures.
As with R410A, perform installation and servicing with high-pressure resistant tools and materials.

<Comparison table of saturated vapor pressure>

Temperature	Refrigerant			
	R32	R410A	R407C	R22
-20°C (-4°F)	0.30 MPa (44 psi)	0.30 MPa (44 psi)	0.11 MPa (16 psi)	0.14 MPa (20 psi)
0°C (32°F)	0.71 MPa (103 psi)	0.70 MPa (102 psi)	0.36 MPa (52 psi)	0.40 MPa (58 psi)
20°C (68°F)	1.37 MPa (199 psi)	1.34 MPa (194 psi)	0.78 MPa (113 psi)	0.81 MPa (117 psi)
40°C (104°F)	2.38 MPa (345 psi)	2.32 MPa (336 psi)	1.44 MPa (209 psi)	1.43 MPa (207 psi)
60°C (140°F)	3.84 MPa (557 psi)	3.73 MPa (541 psi)	2.43 MPa (352 psi)	2.33 MPa (338 psi)
65°C (149°F)	4.29 MPa (622 psi)	4.17 MPa (605 psi)	2.74 MPa (397 psi)	2.60 MPa (377 psi)

* The figures are calculated using NIST REFPROP V8.0.

3. Flammability

R32 may burn slightly if the following conditions (gas concentration and ignition energy) are met.

(1) Flammable gas concentration (when mixed with air)

R32 may burn if within the following flammable range when an ignition source is near. However, in comparison with propane, for example, R32 may not burn unless its concentration is higher than that of propane. Although the flammable concentration range of R32 could lead to oxygen deficiency (oxygen level of less than 18%), this is not typical in normal working environments.

<Flammable range> Unit (vol%)

	R32	(Reference) R290 (propane)
Upper limit	29.3	9.5
Lower limit (source: ASHRAE 34-2024)	14.4	2.1

(2) Energy required for ignition

R32 requires a large amount of energy for ignition and will not be ignited by static electricity from the human body or sparks from an electronic lighter (energy: a few mJ). Therefore, it can be said that R32 is harder to ignite than propane.

<Minimum ignition energy> Unit (mJ)

	R32	(Reference) R290 (propane)
Minimum ignition energy	15	0.246

(3) Combustion speed

Since the combustion speed of R32 is slow, it does not burn explosively like propane.

<Combustion speed> Unit (cm/s)

	R32	(Reference) R290 (propane)
Combustion speed	6.7	38.7

As noted above, R32 will not ignite under normal air conditioning or working conditions. However, in the event of ignition, be careful of spreading flames.

1-2-5 Refrigerant Oil

1. Refrigerant oil for R32 systems

Unlike the mineral oil used in R22 systems, R32 systems use synthetic oil, which is also used in R410A systems. However, the properties of synthetic oil may vary by manufacturer, so use the refrigerant oil specified by Mitsubishi Electric.

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 colspan="2">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 parts
Lock
Burn-in on the orbiting parts</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 parts</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 parts</td></tr>
</table>

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

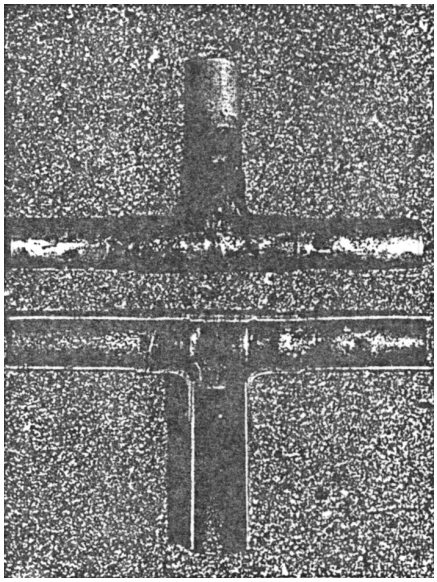
1-3 Working with Refrigerant Piping

1-3-1 Pipe Brazing

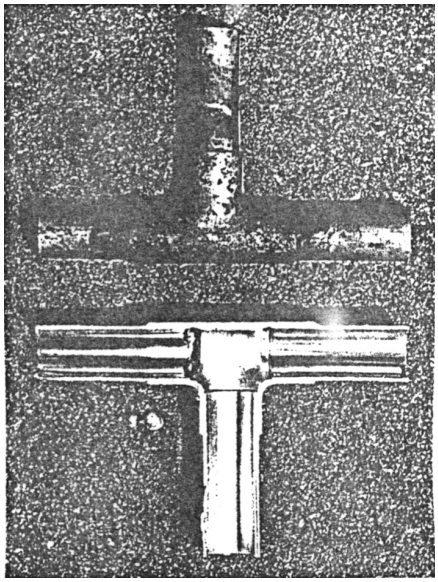
Perform brazing with special care to keep foreign objects (such as oxide scale, copper powder, water, and dust) out of the refrigerant system.

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

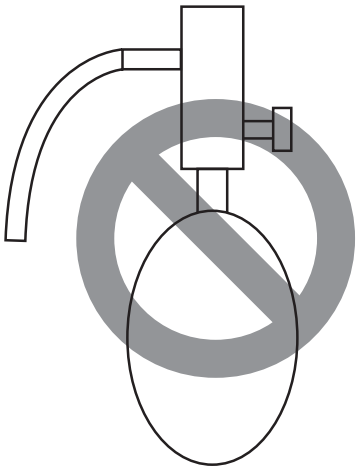
- The new refrigerant oil has over 10 times the water absorption capacity of the older types, and is more likely to cause unit failure if water enters the system.
- Flux typically contains chlorine, and any residual flux within the refrigerant circuit may form sludge.

3. Notes

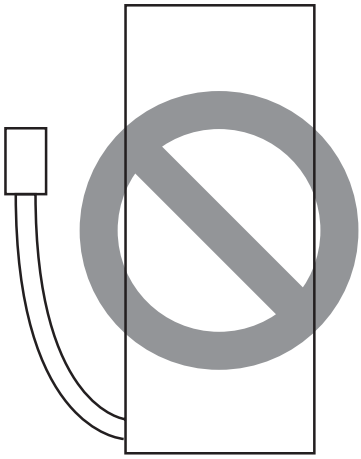
Do not use commercially available antioxidants because they may cause the pipes to corrode or refrigerating machine oil to deteriorate.

1-3-2 Air Tightness Test

Note that the refrigerant leak detectors for R22 and R410A cannot detect R32 refrigerant leaks.



Halide torch



R22 and R410A 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

The refrigerant leak detectors for R22 and R410A cannot detect R32 refrigerant leaks. Purchase a commercial refrigerant leak detector for HFC (R32) if needed.

1-3-3 Vacuum Drying



(Photo1) 15010H



(Photo2) Recommended 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 1 and 2)

Use a vacuum pump that attains 0.5 Torr (65 Pa) 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 (photo2)

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

4. Evacuation time

- After the degree of vacuum has reached 5 Torr (650 Pa), evacuate for an additional 1 hour. (A thorough vacuum drying removes moisture in the pipes.) When the outside temperature drops below 1°C (or when the saturation pressure drops below 656 Pa), continue vacuum drying for another 1 hour after the vacuum degree has reached the saturated vapor pressure of the water (ice) at the outside temperature. When performing vacuum drying at a low outside temperature, use a vacuum gauge appropriate for the temperature range.

Degree of vacuum (reference)

Outdoor temp.	-20°C (-4°F)	-15°C (5°F)	-10°C (14°F)	-5°C (23°F)	0°C (32°F)
Degree of vacuum	0.77 Torr (103 Pa)	1.24 Torr (165 Pa)	1.95 Torr (260 Pa)	3.01 Torr (402 Pa)	4.58 Torr (611 Pa)

* Degrees of vacuum shown above are obtained based on the saturated vapor pressure of ice.
* In a system using water heat exchangers, circulate water to prevent the water in the heat exchangers from freezing during vacuum drying.

- Verify that the vacuum degree has not risen by more than 1 Torr (130 Pa) 1hour after evacuation. A rise by less than 1 Torr (130 Pa) is acceptable.
- If the vacuum is lost by more than 1 Torr (130 Pa), 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 5 Torr (650 Pa) 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 0.5 kgf/cm^{2}G (0.05 MPa) and evacuate again. Repeat this cycle of pressurizing and evacuation either until the degree of vacuum below 5 Torr (650 Pa) is attained or until the pressure stops rising.
- Only use nitrogen gas for vacuum breaking. (The use of oxygen may result in an explosion.)

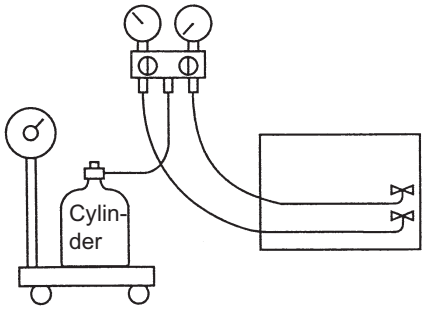
7. Triple Evacuation

The method below can also be used to evacuate the system.

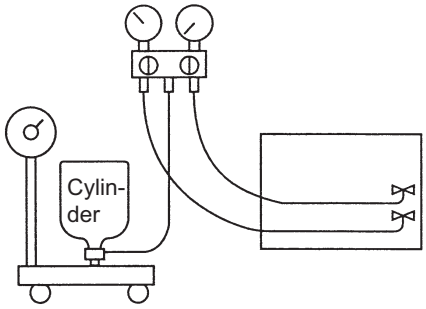
- Evacuate the system to 4 Torr (520 Pa) from both service valves. System manifold gauges must not be used to measure vacuum. A micron gauge must be used at all times. Break the vacuum with Nitrogen (N2) into the discharge service valve to 0 Torr (0 Pa).
- Evacuate the system to 1.5 Torr (195 Pa) from the suction service valve. Break the vacuum with Nitrogen (N2) into the discharge service valve to 0 Torr (0 Pa).
- Evacuate the system to 0.5 Torr (65 Pa). System must hold the vacuum at 0.5 Torr (65 Pa) for a minimum of 1 hour.
- Conduct a rise test for a minimum of 30 minutes

1-3-4 Refrigerant Charging

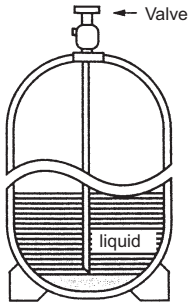
Cylinder with a siphon

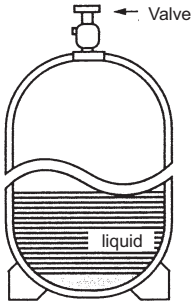


Cylinder without a siphon



Cylinder color R32 is light blue.





1. 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.

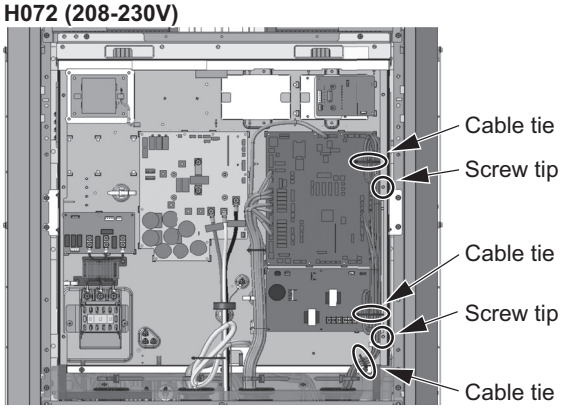
If the refrigerant leaks out, it may be replenished. The entire refrigerant does not need to be replaced. (Charge refrigerant in the liquid state.)
Refer to the following page(s). [8-10 Measures for Refrigerant Leakage]

Since R32 is a single-component refrigerant with a stable composition, it can be charged in both liquid and gas forms. However, charging the refrigerant from the low-pressure side too quickly can cause compressor failure. To avoid compressor failure, use a tool designed for use between the cylinder and the unit, or charge the refrigerant slowly.

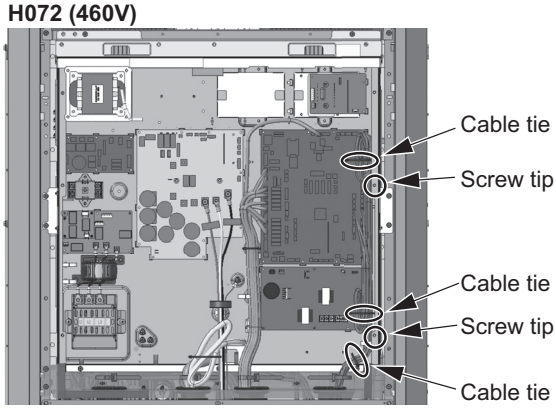
1-4 Precautions for Wiring

- 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 the front panel of the control box for inspection, turn off the unit's power at least 10 minutes in advance and ensure that the voltage at the electrolytic capacitor (main inverter circuit) is 20 VDC or lower. (It takes about 10 minutes for the capacitor to discharge.)
- Before servicing, disconnect the CNINV connector on the outdoor unit fan circuit board, as well as the CNFA1 or CNFA2 connector on the inverter circuit board.
  (When connecting or disconnecting the connectors, ensure that the outdoor unit fan is not rotating and that the voltage at the main circuit capacitor is 20 VDC or lower. For details, refer to the wiring nameplate on the back of the control box front panel.)
  Do not touch the sub-circuit boards mounted upright on each circuit board. Applying excessive force to the sub-circuit boards may damage the mounted electronic components.
  After servicing, reconnect all disconnected connectors.
- When turning the unit's power on, the compressor will be energized even if it is not operating. Before turning the power on, disconnect the electrical wiring from the compressor's terminal box, measure the insulation resistance, and check for ground faults.
  If the insulation resistance is 1 MΩ or lower, reconnect the electrical wiring to the compressor. Then, turn on the outdoor unit and energize the compressor for at least the designated number of hours. For details, refer to the specified page. [6-1 Read before Test Run]
  (Energizing the compressor will help evaporate the liquid refrigerant accumulated inside, which will increase the insulation resistance.)
- When connecting a cable to TB7, ensure the voltage is 20 VDC or lower.
- If the system controller is connected to TB7 on the outdoor unit, it is recommended to connect a power supply unit for the transmission cable to TB7.
  Disconnecting the power supply switch connector from CN41 and connecting it to CN40 will allow the system controller to receive power from the outdoor unit. Note that even when the outdoor unit is turned OFF, power may still be supplied to TB7, causing the system controller to detect an error and issue an alarm.
  Up to three system controllers can be connected to TB3.
- If the system controller is connected to the centralized control transmission cable and supplied with power from the outdoor unit (by connecting the power supply switch connector to CN40 on the outdoor unit), even when the outdoor unit is turned OFF, the outdoor fan, if rotated by a strong wind or other factors, may cause the power to be supplied from the outdoor unit to the centralized control transmission cable, resulting in error detection or alarm issuance by the system controller.
- If the cable ties inside the control box are removed, ensure that the tips of the screws on the control box cover do not come into contact with the cables.

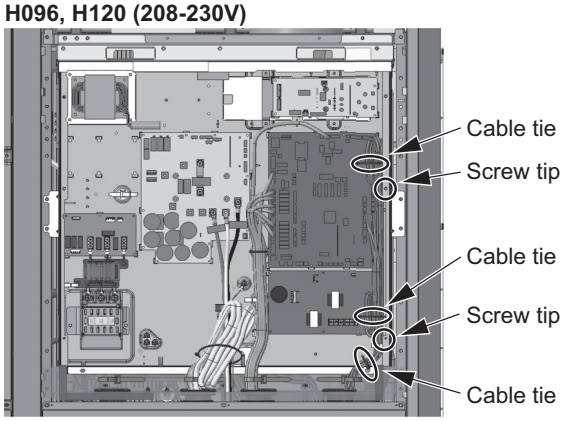
E072, E096, E120 (208-230V)
H072 (208-230V)



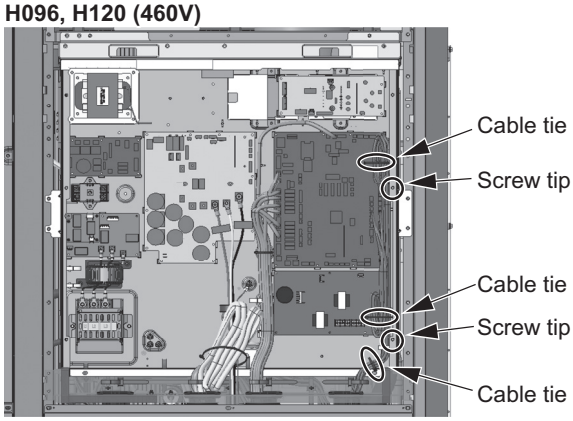
E072, E096, E120 (460V)
H072 (460V)



E144, E168, E192 (208-230V)
H096, H120 (208-230V)



E144, E168, E192 (460V)
H096, H120 (460V)



•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

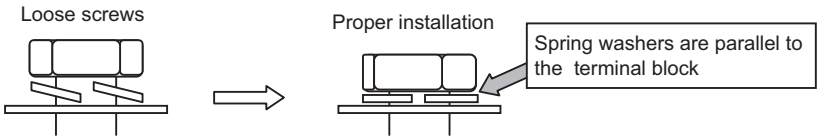
Screw	Recommended tightening torque (N·m [lbf·ft])
M3	0.69 [0.51]
M3.5	0.82 - 1.0 [0.60 - 0.74]
M4	1.47 [1.08]
M5	2.55 [1.88] *1 *3
M6	2.75 [2.03]
M8	6.20 [4.57]

∗1 Please replace according to the replacement instructions included with the substrate.
∗2 Deviating from the recommended tightening torque may cause damage to the unit or its parts.
∗3 The recommended torque for the screws that secure the DCL (DC reactor) is 4.00 (N·m).

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 (e.g., INV board, fan board) is not installed properly.



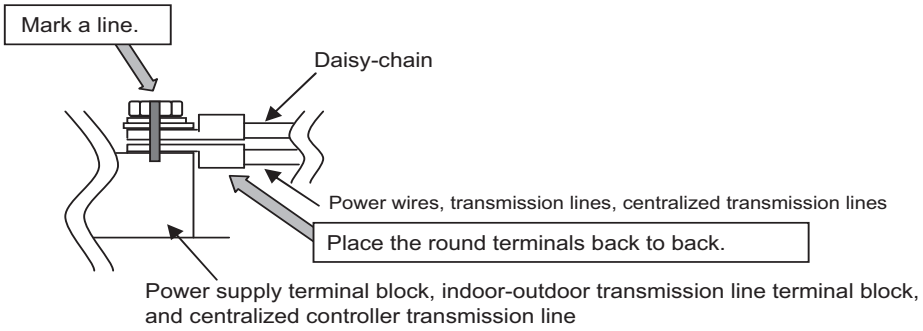
2) Check the wires are securely fastened to the screw terminals.

•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.

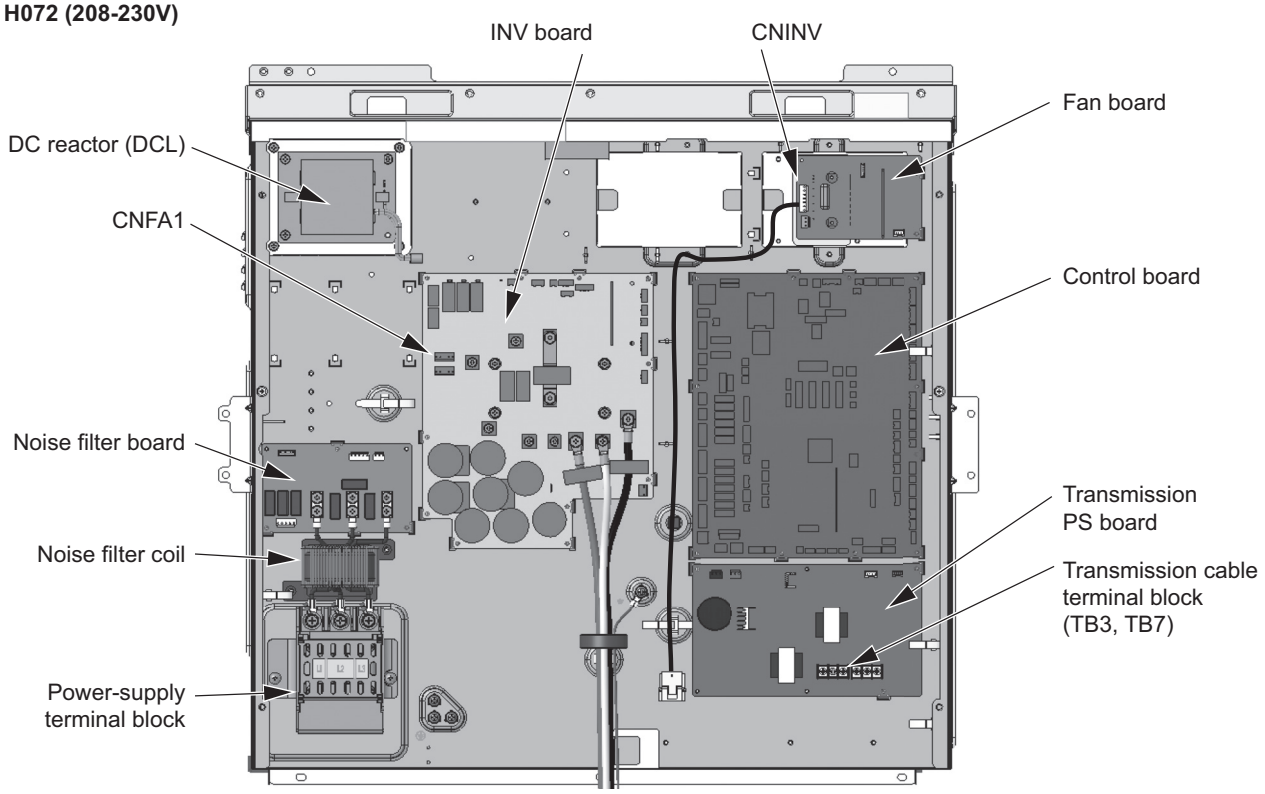
•After tightening the screw, mark a line through the screw head, washer, and terminals with a permanent marker.

Example

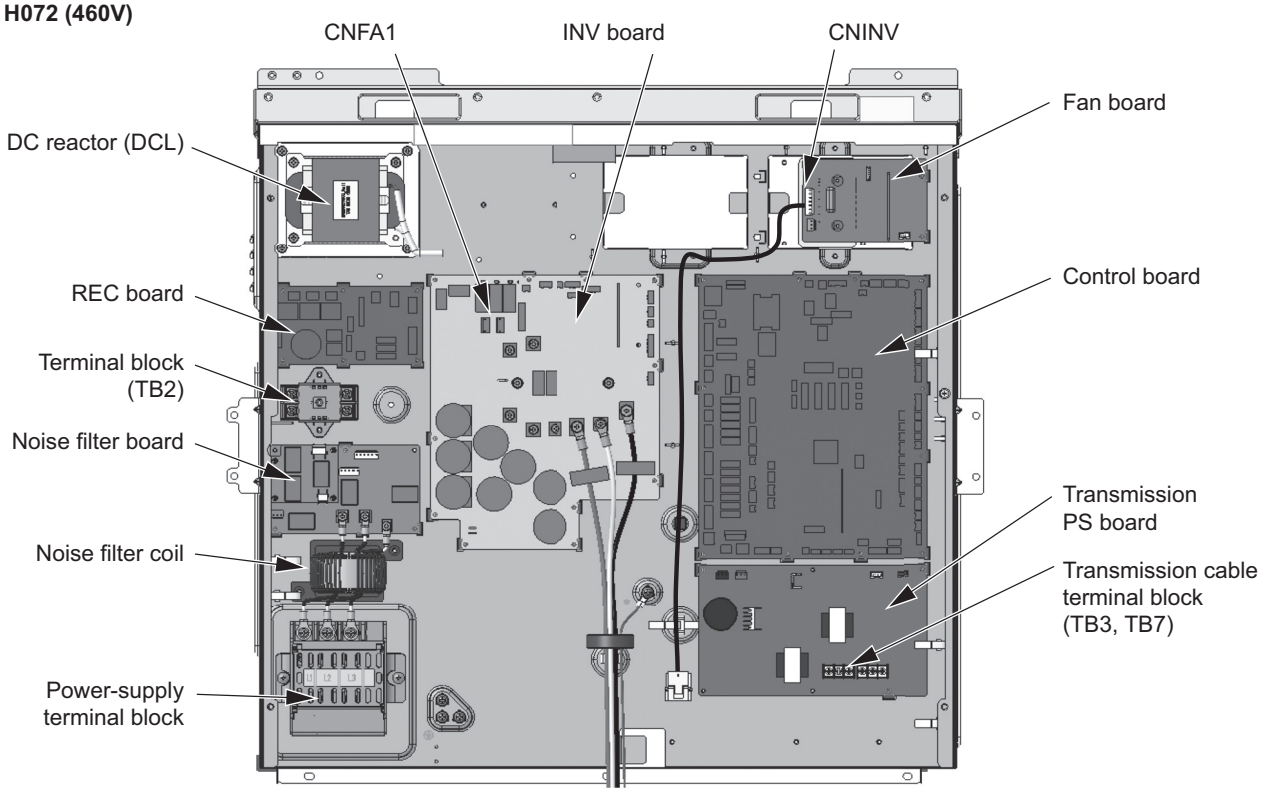


Poor contact caused by loose screws may result in overheating and fire.
Continued use of the damaged circuit board may cause overheating and fire.

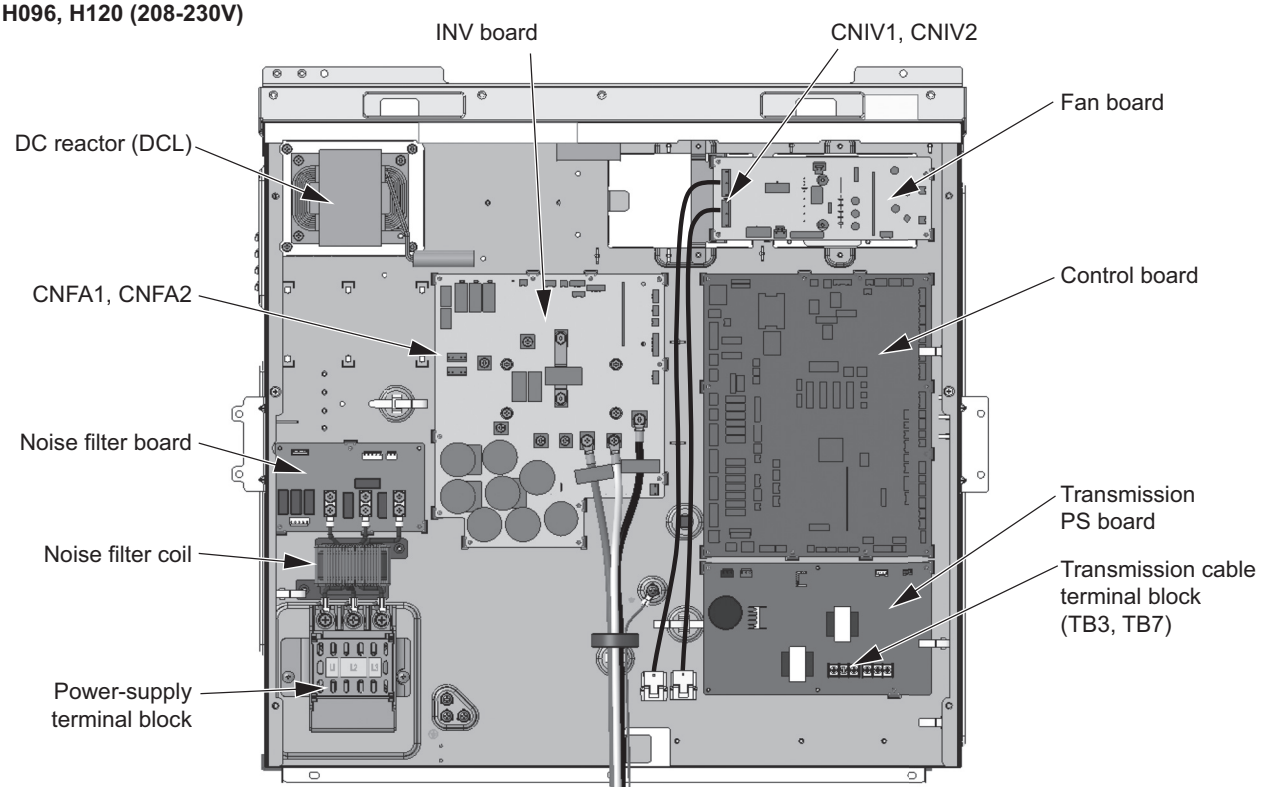
E072, E096, E120 (208-230V)
H072 (208-230V)



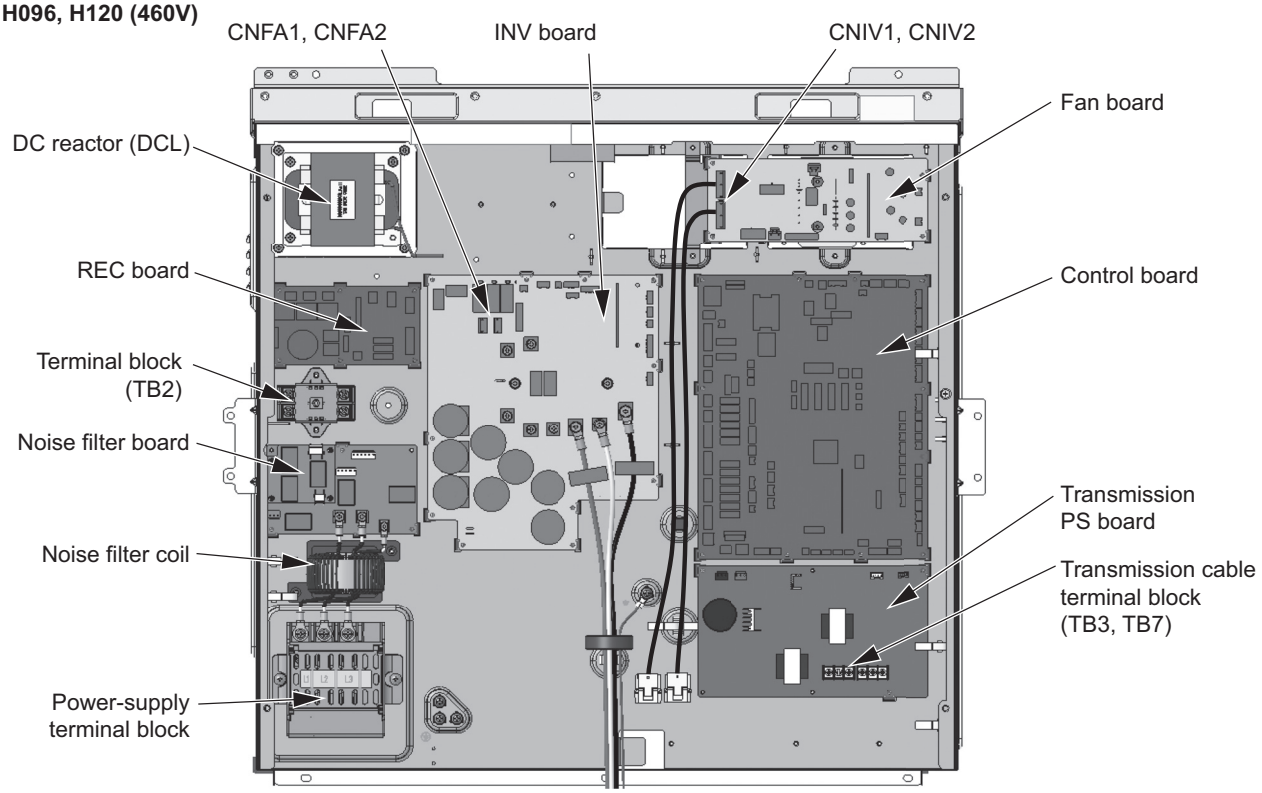
E072, E096, E120 (460V)
H072 (460V)



E144, E168, E192 (208-230V)
H096, H120 (208-230V)



E144, E168, E192 (460V)
H096, H120 (460V)



1-5 Cautionary notes on installation environment and maintenance

Please note the following when installing and maintaining outdoor units in marine atmosphere.

1) Install the 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.

1-6 Inspection and maintenance

1-6-1 Guideline for preventive maintenance

The following maintenance intervals indicate the estimated intervals of parts replacement and repair to be required as a result of periodic inspections. They do not necessarily mean that replacement is required at the maintenance intervals.
The maintenance intervals do not indicate the warranty period.

Parts	Inspection interval	Maintenance interval	Daily inspection	Maintenance inspection	Remarks
Compressor	1 year	20,000 hours		O	
Fan motor				O	
Electronic expansion valve				O	
Valve				O	
Heat exchanger		5 years		O	
Sensor		20,000 hours		O	
Electric board		25,000 hours		O	
Smoothing capacitor (Mounted on the inverter board)				O	Wide fluctuations in voltage may accelerate the deterioration of the unit.

1-6-2 Recommended parts inspection interval

Parts	Inspection interval	Inspection items	Criteria	Measures
Compressor	1 year	♦Auditory check of operating sounds ♦Measurement of insulation resistance ♦Visual check for loose terminals	♦No abnormal sounds ♦Insulation resistance must be 1 MΩ or above. ♦No loose terminals	Replace the compressor if an insulation problem is found when the refrigerant is not stagnating. Retighten loose terminals.
Fan motor (for air-cooled outdoor unit)		♦Auditory check of operating sounds ♦Measurement of insulation resistance	♦No abnormal sounds ♦Insulation resistance must be 1 MΩ or above.	Replace the fan motor if an insulation problem is found.
Electronic expansion valve		♦Operation check using operation data	♦Temperature must change in proportion to the valve position. (Check the temperature variation with the centralized controller.) ♦Changes in refrigerant circulation must be noticed as a result of the valve operation. ♦Operating sounds and temperature changes must be noticed.	Replace the valve if the operation data show an operation failure due to valve problems.
Valve		♦Operation check using operation data	Temperature must change according to the valve position.(Check the temperature variation when the operation mode is switched between cooling and heating.)	Replace the valve if the operation data show an operation failure due to valve problems.
Heat exchanger		♦Check for clogging, contamination, and damage	Clogging, contamination, and damage	Perform cleaning.
Sensor		♦Check for breakage and deterioration of the cables, and for disconnection of the connectors. ♦Measurement of insulation resistance	♦No breakage or deterioration of the cables or disconnected connectors. ♦Insulation resistance must be 1 MΩ or above.	Replace the sensor if the cable is broken, short-circuited, or severely deteriorated, or an insulation problem is found.
Electric board		♦Check the appearance.	♦No sedimentary remains	Clean with a brush if deposits are attached.
Smoothing capacitor (Mounted on the inverter board)		♦Check the appearance of electrolytic capacitors.	♦No liquid leakage, deformation, or sleeve (outer film) shrinkage	Replace the INV board if any leakage, deformation, or shrinkage of the sleeve (outer film) is found.

♦The inspection intervals depend on the usage and environment.
The inspection intervals do not indicate the warranty period.
♦The maintenance and inspection items may differ depending on maintenance providers. Please check with your maintenance provider when concluding a maintenance contract.
♦Repairs outside the warranty period will be charged, even if periodic inspections have been performed at the recommended intervals.

Chapter 2 Restrictions

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2-1 System Configurations

1. Table of compatible indoor units

The table below shows the types of indoor units connectable to this series of outdoor units.
The ones not listed are incompatible with this series of outdoor units. The TUHYE***3AMM0AN, TUHYE***4AMM0AN, TUHYH***3AMM0AN, and TUHYH***4AMM0AN outdoor units cannot be used in combination across the series.

(1) High efficiency series

Outdoor units	Composing units		Maximum total capacity of connectable indoor units	Maximum number of connectable indoor units	Types of connectable indoor units
E0723(4)AMM0AN	-	-	36 - 93	14	P004 - P072 models Y series indoor units
E0963(4)AMM0AN	-	-	48 - 124	19	P004 - P096 models Y series indoor units
E1203(4)AMM0AN	-	-	60 - 156	23	
E1443(4)AMM0AN	-	-	72 - 187	28	
E1683(4)AMM0AN	-	-	84 - 218	33	
E1923(4)AMM0AN	-	-	96 - 249	38	
E2643(4)BMM0AN	E1443(4)AMM0AN	E1203(4)AMM0AN	132 - 343	50	
E2883(4)BMM0AN	E1443(4)AMM0AN	E1443(4)AMM0AN	144 - 374		
E3123(4)BMM0AN	E1683(4)AMM0AN	E1443(4)AMM0AN	156 - 405		
E3363(4)BMM0AN	E1683(4)AMM0AN	E1683(4)AMM0AN	168 - 436		
E3603(4)BMM0AN	E1923(4)AMM0AN	E1683(4)AMM0AN	180 - 468		
E3843(4)BMM0AN	E1923(4)AMM0AN	E1923(4)AMM0AN	192 - 499		

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) TUHYE-3AMM0AN and TUHYH-3AMM0AN outdoor units cannot be used in combination.
   TUHYE-4AMM0AN and TUHYH-4AMM0AN outdoor units cannot be used in combination.

(2) Hyper Heating Inverter series

Outdoor units	Composing units		Maximum total capacity of connectable indoor units	Maximum number of connectable indoor units	Types of connectable indoor units
H0723(4)AMM0AN	-	-	36 - 93	14	P004 - P072 models Y series indoor units
H0963(4)AMM0AN	-	-	48 - 124	19	P004 - P096 models Y series indoor units
H1203(4)AMM0AN	-	-	60 - 156	23	
H1443(4)BMM0AN	H0723(4)AMM0AN	H0723(4)AMM0AN	72 - 187	28	
H1923(4)BMM0AN	H0963(4)AMM0AN	H0963(4)AMM0AN	96 - 249	38	
H2403(4)BMM0AN	H1203(4)AMM0AN	H1203(4)AMM0AN	120 - 312	47	

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) TUHYE-3AMM0AN and TUHYH-3AMM0AN outdoor units cannot be used in combination.
   TUHYE-4AMM0AN and TUHYH-4AMM0AN outdoor units cannot be used in combination.

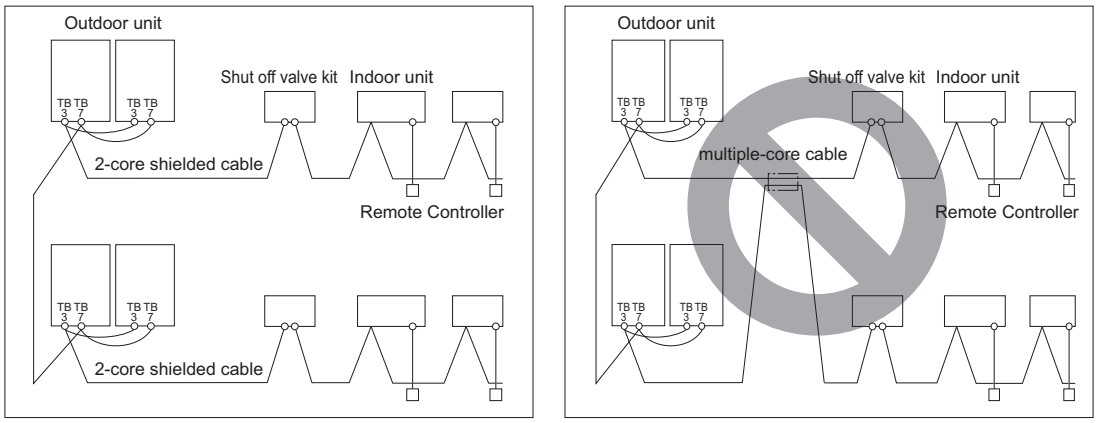
2-2 Types and Maximum Allowable Length of Cables

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 line. 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.
8) When opening and closing the front panel of the control box, do not touch the internal parts. When inspecting the inside of the control box, be sure to turn off the power of the unit at least 10 minutes beforehand and check that the voltage (across pins 1 and 5 of connector RYPN) has decreased to 20 V DC or less. (It takes about 10 minutes for the electricity to discharge after the power is turned off.)
9) The control box (inside and rear) contains high-temperature parts. Be careful even after shutting down the power.
10) Before servicing, ensure that the fan is not rotating, and then disconnect the CNINV connector on the fan board and the CNFA1 connector on the INV board. When connecting or disconnecting the connectors, ensure that the outdoor unit fan is not rotating. The outdoor unit fan, when rotated by a strong wind, may charge the main circuit capacitor, posing a risk of electrical shock. For details, refer to the wiring nameplate. After servicing, reconnect all disconnected connectors CNINV and CNFA1.
11) When connecting a cable to TB7, ensure the voltage is 20 VDC or lower.
12) When the power is on, the heater is energized even when the compressor is stopped. Before turning on the power, disconnect the power wires from the terminal block of the compressor and measure the insulation resistance of the compressor. Check that the compressor does not have a ground fault. If the insulation resistance is 1 MΩ or less, connect the power wires of the compressor and turn on the power of the outdoor unit. (The liquid refrigerant in the compressor will evaporate by energizing the heater.)
13) When connecting a system controller to the TB7 side of the outdoor unit, we recommend connecting a power supply unit for transmission to the TB7 side.
    If a system controller is connected to the TB3 side, up to three units can be connected.
    A system controller can be connected to the TB7 side if the power supply switch connector is disconnected from CN41 and then connected to CN40, but power will be supplied to the TB7 side even when the power of the outdoor unit is off so the system controller may log an error and generate a warning.
14) When tightening the screws, take care that the screws are not loose or overtightened. A contact fault resulting from screw looseness may cause the generation of heat and fire. Refer to the following page(s). [1-4 Precautions for Wiring]

(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]

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

Type	2-core shielded cable CVVS, CPEVS, or MVVS
Size	1.25 mm^2 [AWG 16], or ø1.2 mm or above
Length	Max. 200 m [656 ft]
Remarks	The maximum allowable length of transmission cables via outdoor units (both centralized control transmission cables and indoor-outdoor transmission cables) is 500 m [1640 ft]*1. The maximum allowable length of transmission cables from the power supply unit to each outdoor unit or to the system controller is 200 m [656 ft].

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

* Ensure shield continuity when extending the transmission cable.

*1 When extending the length of the transmission cables to 1000 m [3280 ft], consult your dealer.

2) Remote controller wiring

	MA remote controller
Type	2-core cable VCTF, VCTFK, CVV, VVR, VVF, or VCT
Size	0.3 to 1.25 mm^2 [AWG 22 to 16] *1 *3
Length	Max. 200 m [656 ft] *2

*1 The use of cables that are smaller than 0.75 mm^2 [AWG 18] is recommended for easy handling.

*2 Max. 70 m [229 ft] for TAR-CT01MA series

*3 To wire TAR-CT01MA series, TAR-4"x"MA series, TAR-3"x"MA series ("x" represents 0 or later), or Simple MA remote controller, use a cable with a size of 0.3 mm^2 [AWG 22].

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]
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 *3 *4 and Indoor units
LOSSNAY, OA processing unit *1		LC	Outdoor units *3 *4 and LOSSNAY
MA remote controller	Main/sub remote controller	MA	Indoor units
CITY MULTI outdoor unit *2		OC, OS	Outdoor units *3 *4
Shut off valve kit		SV	Outdoor units *3 *4 and shut off valve kits

*1. Applicable when LOSSNAY units are connected to the indoor-outdoor transmission line.
*2. The outdoor units in the same refrigerant circuit are automatically designated as OC and OS in the order of capacity from large to small (if two or more units have the same capacity, in the order of address from small to large).
*3. Turn off the power to all the outdoor units in the same refrigerant circuit.
*4. 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	01 to 50*4	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. *3	00
M-NET adapter				
M-NET control interface				
Free Plan adapter				
LOSSNAY, OA processing unit		01 to 50*4	Assign an arbitrary but unique address to each of these units after assigning an address to all indoor units.	00
Shut off valve kit		151 to 200	Set the desired number minus 100.	00
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		51 to 100*1,*4	Assign sequential addresses to the outdoor units in the same refrigerant circuit. The outdoor units in the same refrigerant circuit are automatically designated as OC and OS. *4	00
System controller	Central controller TE-C400A TW-C50A	000, 201 to 250	Assign an arbitrary but unique address within the range listed on the left to each unit.	000

*1. To set the outdoor unit address to "100," set the rotary switches to "50."
*2. 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.
*3. The outdoor units in the same refrigerant circuit are automatically designated as OC and OS in the order of capacity from large to small (if two or more units have the same capacity, in the order of address from small to large).
*4. 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
System with one outdoor unit	–	–	–	CN41 (Factory setting)
System with multiple outdoor units	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	ON

*1 Set SW5-1 on all outdoor units in the same refrigerant circuit to the same setting.

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 and 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 TE-C400, 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*7]	Snow sensor signal input (level)	CN3S	
	Cooling/heating operation can be changed by an external input to the outdoor unit.	Auto-changeover	CN3N	
	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. The unit will automatically slide the evaporating temperature depending on the ΔT °C. (Control activate: ΔT is 1°C or lower.)	Energy-saving mode[*9] (Shifts evaporating temp. depending on the load)	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[*5]	CN51	Adapter for external output (PAC-SC37SA-E)
		Error status[*6*8]		

*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.When 2 or more outdoor units exist in one refrigerant circuit system, 8 levels of on-DEMAND are possible.

*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 < 3.13 MPa [454 psi]	TH7 > 3°C [37°F] and 63LS > 0.45 MPa [65 psi]	TH7 > 35°C [95°F] or 63HS1 > 3.43 MPa [497 psi]	TH7 < 0°C [32°F] or 63LS < 0.38 MPa [55 psi]

*5 If multiple outdoor units are connected to the same refrigerant circuit, signal input/output settings need to be made for each outdoor unit.

*6 Take out signals from the outdoor unit that is designated as OC if multiple outdoor units in the same system.

*7 If the formula TH7>5°C [41°F] holds true, the fan will not go into operation when the contact receives signal input.

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

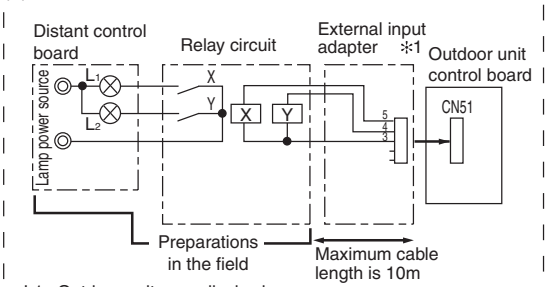
*9 This control can be enabled also from the system controller. For the procedure, refer to the manual of the system controller.

(2) Example of wiring connection

⚠ CAUTION

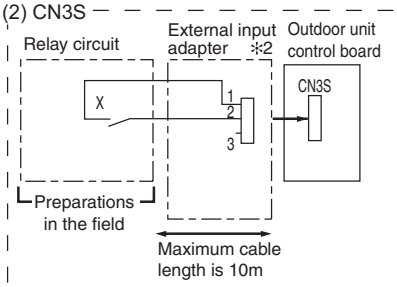
1) Wiring should be covered by insulation tube with supplementary insulation.
2) Use relays or switches with IEC or equivalent standard.
3) The electric strength between accessible parts and control circuit should have 2750V or more.

(1) CN51



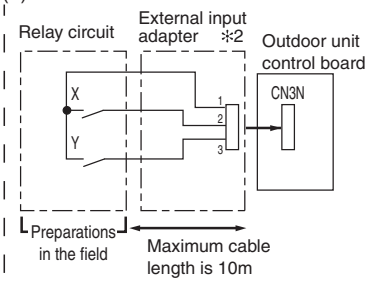
L1 : Outdoor unit error display lamp ※3
L2 : Compressor operation lamp (compressor running state)
X, Y : Relay (coil =<0.9W : DC12V)
※1. Optional part : PAC-SC37SA-E or field supply.
※3. When using a base heater, error output will not be available.

(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.

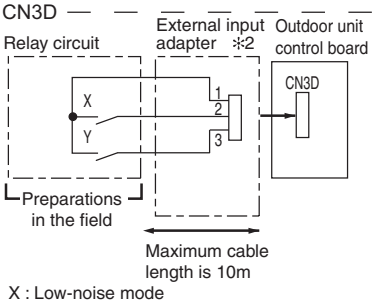
(3) CN3N



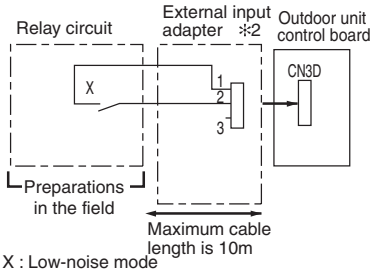
		X	
		OFF	ON
Y	OFF	Normal	
	ON	Cooling	Heating

X : Cooling / Heating
Y : Validity / Invalidity of X
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.

(4) CN3D

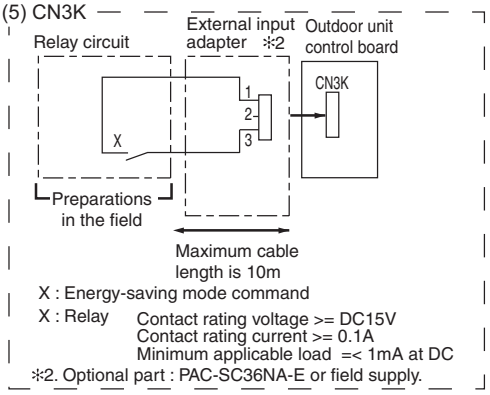


X : Low-noise mode
Y : Compressor ON/OFF
X,Y : Relay Contact rating voltage >= DC15V
Contact rating current >= 0.1A
Minimum applicable load =< 1mA at DC
※2. Optional part : PAC-SC36NA-E or field supply.



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.

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

No	Demand control switch	Dip SW6-8		Input to CN3D*2
		OC	OS	
1	2 steps (0-100%)	OFF	OFF	OC
2	4 steps (0-50-75-100%)	ON	OFF	OC
3		OFF	ON	OS
4	8 steps (0-25-38-50-63-75-88-100%)	ON	ON	OC and OS

*1 Available demand functions
E072-E1923(4)AMM0AN, H072-H1203(4)AMM0AN models (single-outdoor-unit system) : 2 and 4 steps shown in the rows 1 and 2 in the table above only.
E264-E3843(4)BMM0AN, H144-H2403BMM0AN models (two-outdoor-unit system OC+OS) : 2-8 steps shown in the rows 1, 2, 3, and 4 in the table above only.
*2 Signal is input to CN3D on the outdoor unit whose SW6-8 is set to ON. When SW6-8 is set to OFF on all outdoor units, the signal is input to the CN3D on the OC.
Outdoor units whose SW6-8 is set to ON are selectable in a single refrigerant system.
*3 If wrong sequence of steps are taken, the units may go into the Thermo-OFF (compressor stop) mode.
Ex) When switching from 100% to 50%
(Incorrect) 100%→0%→50% The units may go into the Thermo-OFF mode.
(Correct) 100%→75%→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 all outdoor units, the following operations cannot be performed.
- Performing 4-step demand in combination with the low-noise operation in a single-outdoor-unit system.
- Performing 8-step demand in combination with the low-noise operation in a two-outdoor-unit system.

(2) Contact input and control content

1) 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*2
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. This function and the 4 levels or 8 levels on-DEMAND function can be used together. Input the order to CN3D 1-2P on the outdoor unit whose SW6-8 is set to OFF.

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.

3) When SW6-8 on the two outdoor units in one refrigerant circuit system is set to ON (8 levels of on-DEMAND) (*4, *5)

8 levels of on-DEMAND		No.2 CN3D				
		1-2P	Open		Short-circuit	
No.1 CN3D	1-2P	1-3P	Open	Short-circuit	Open	Short-circuit
	Open	Open	100%	50%	88%	75%
		Short-circuit	50%	0%	38%	25%
	Short-circuit	Open	88%	38%	75%	63%
		Short-circuit	75%	25%	63%	50%

*4. Input the order to CN3D on the outdoor unit whose SW6-8 is set to ON.
*5. CN3D of No. 1, 2, 3 can be selected arbitrary with the outdoor unit whose SW6-8 is set to ON.

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.

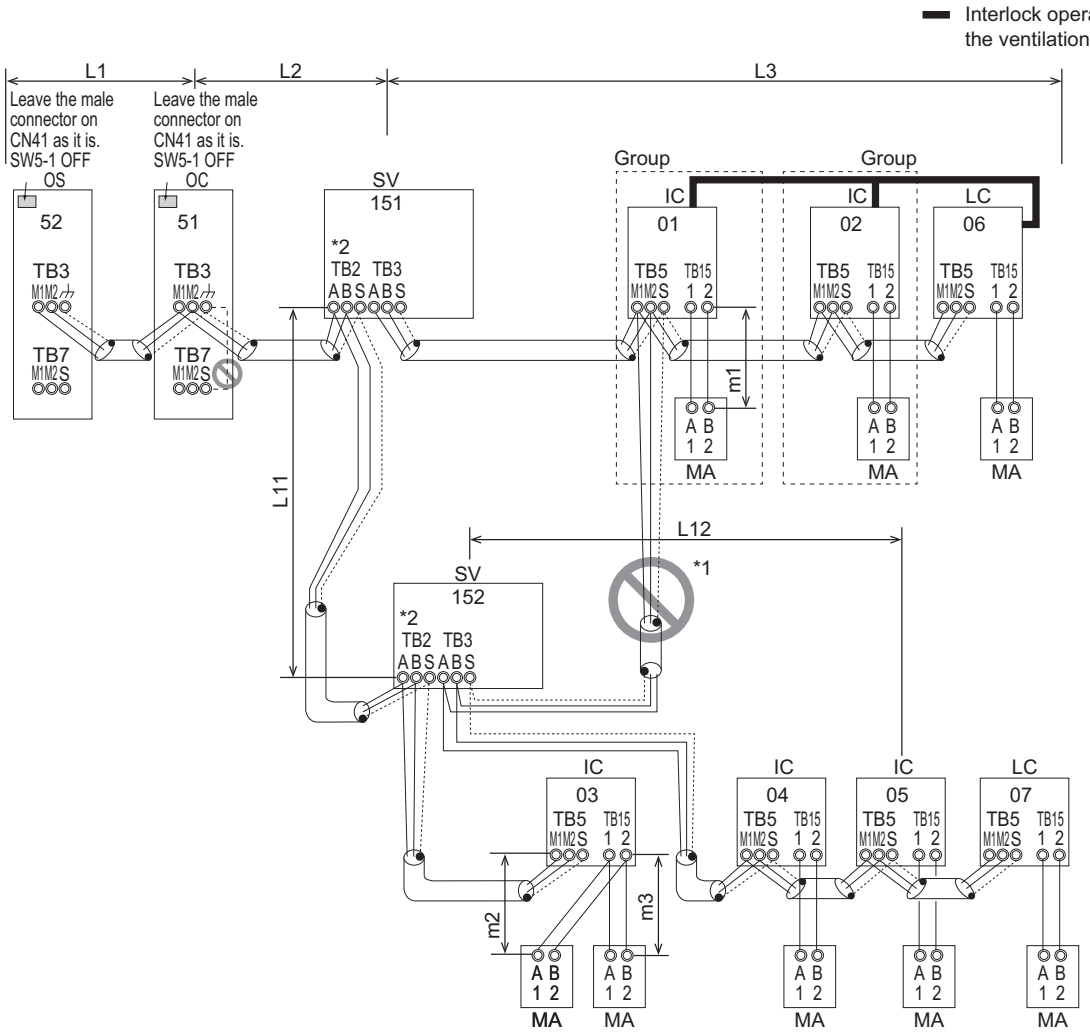
(1) An example of a system to which an MA remote controller is connected

	System configuration	Connection to the system controller	Address start up for indoor and outdoor units	Notes
1	Single refrigerant system	NO	Manual address setup	Connection of multiple LOSSNAY units
2	Multiple refrigerant systems	With connection to transmission line for centralized control	Manual address setup	
3	Multiple refrigerant systems	With connection to indoor-outdoor transmission line	Manual address setup	

2-7 Example System with an MA Remote Controller

2-7-1 Single Refrigerant System with LOSSNAY Units

(1) Sample control wiring



(2) Cautions

1) Do not connect the indoor unit transmission cable terminal block TB3 on the shut off valve kit to any indoor units that are not controlled by this shut off valve kit.
2) Up to two cables can be connected to the transmission cable terminal block TB2 (outdoor unit/indoor unit/shut off valve kit) on the shut off valve kit, and one cable can be connected to the transmission cable terminal block TB3 (indoor unit).
3) When the TAR-4"x"MA series ("x" represents 3 or later) is connected to a group, no other MA remote controllers can be connected to the same group.
4) For information on the maximum number of connectable indoor units or other devices, connection requirements, or the need for a transmission booster, refer to the MELANS Centralized Controller Technical Manual or Data Book.

(3) Maximum allowable length

1) Indoor/outdoor transmission line
   Maximum distance (1.25 mm^2 [AWG16] or larger)
   L1 + L2 + L3 ≤ 200 m [656 ft]
   L1 + L2 + L11 + L12 ≤ 200 m [656 ft]
   *If the power-supply distance exceeds the distance limit of 200 m, a transmission booster (PAC-SF46EPA-G) is required.
2) Transmission line for centralized control
   No connection is required.
3) MA remote controller wiring
   Maximum overall line length
   (0.3 to 1.25 mm^2 [AWG22 to 16])
   m1 ≤ 200 m [656 ft]
   m2 + m3 ≤ 100 m [328 ft] *1
   *1 Max. 70 m [229 ft] for TAR-CT01MA series
   ♦When connecting TAR-CT01MA, TAR-4"x"MA, TAR-3"x"MA ("x" represents 0 or later), use sheathed cables with a minimum thickness of 0.3 mm^2.

(4) Wiring method

1) Indoor/outdoor transmission line
   Daisy-chain the following terminals: the M1 and M2 terminals of the indoor-outdoor transmission cable terminal block TB3 on the outdoor units (OC and OS), the M1 and M2 terminals of the indoor-outdoor transmission cable terminal block TB5 on each indoor unit IC that does not require safety measures, and the A and B terminals of the transmission cable terminal block TB2 (outdoor unit/ indoor unit/shut off valve kit) on each shut off valve (SV). (Non-polarized two-wire)

Note

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

Grounding shielded cables

To ground the shielded cable, daisy-chain the following terminals: the ground terminals of the OC and OS, the S terminal of the terminal block on each indoor unit (IC) that does not require safety measures, and the S terminal of the transmission cable terminal block TB2 (outdoor unit/indoor unit/shut off valve kit (SV).

2) Indoor unit transmission line
   Daisy-chain the following terminals: the M1 and M2 terminals of the indoor-outdoor transmission cable terminal block TB5 on each indoor unit (IC) in which the refrigerant flow is to be shut off, and the M1 and M2 terminals of the transmission cable terminal block TB3 (indoor unit) on the shut off valve kit (SV) that controls these indoor units. (Non-polarized two-wire)
   Processing shielded cables
   To ground the shielded cable, daisy-chain the following terminals: the S terminal of the indoor-outdoor transmission cable terminal block TB5 on each indoor unit (IC) in which the refrigerant flow is to be shut off, and the S terminal of the transmission cable terminal block TB3 (indoor unit) on the shut off valve kit (SV) that controls these indoor units.
   Shielded cable connection
   To ground the shielded cable, daisy-chain the following terminals: the S terminal of the indoor-outdoor transmission cable terminal block TB5 on each indoor unit (IC) in which the refrigerant flow is to be shut off, and the S terminal of the transmission cable terminal block TB3 (indoor unit) on the shut off valve kit (SV) that shuts off the refrigerant flow of the above-mentioned indoor units.
3) Transmission line for centralized control
   No connection is required.
4) MA remote controller wiring
   Connect terminals 1 and 2 on the terminal block TB15 for MA remote controller on the indoor unit (IC) to the terminal block on the MA remote controller (MA).
   (Non-polarized two-wire)

   When two remote controllers are connected to the system

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

   - Set one of the MA remote controllers as a sub controller. (Refer to the Instruction Manual for the MA remote controller for the setting method.)
   - The remote controllers with alarms can be set as a main remote controller or supervisor remote controller using the main/sub setting.

5) LOSSNAY connection
   Connect the M1 and M2 terminals 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) *This is a typical connection example.

   - Ensure that the interlock control between the indoor unit and the LOSSNAY unit is set by the remote controller. (For the setting procedure, refer to the Installation Manual for the remote controller.)
   - For additional information on the LOSSNAY unit connection, refer to the technical documents for the LOSSNAY unit.

6) Switch setting
   Address setting is required as follows.

(5) Address setting method

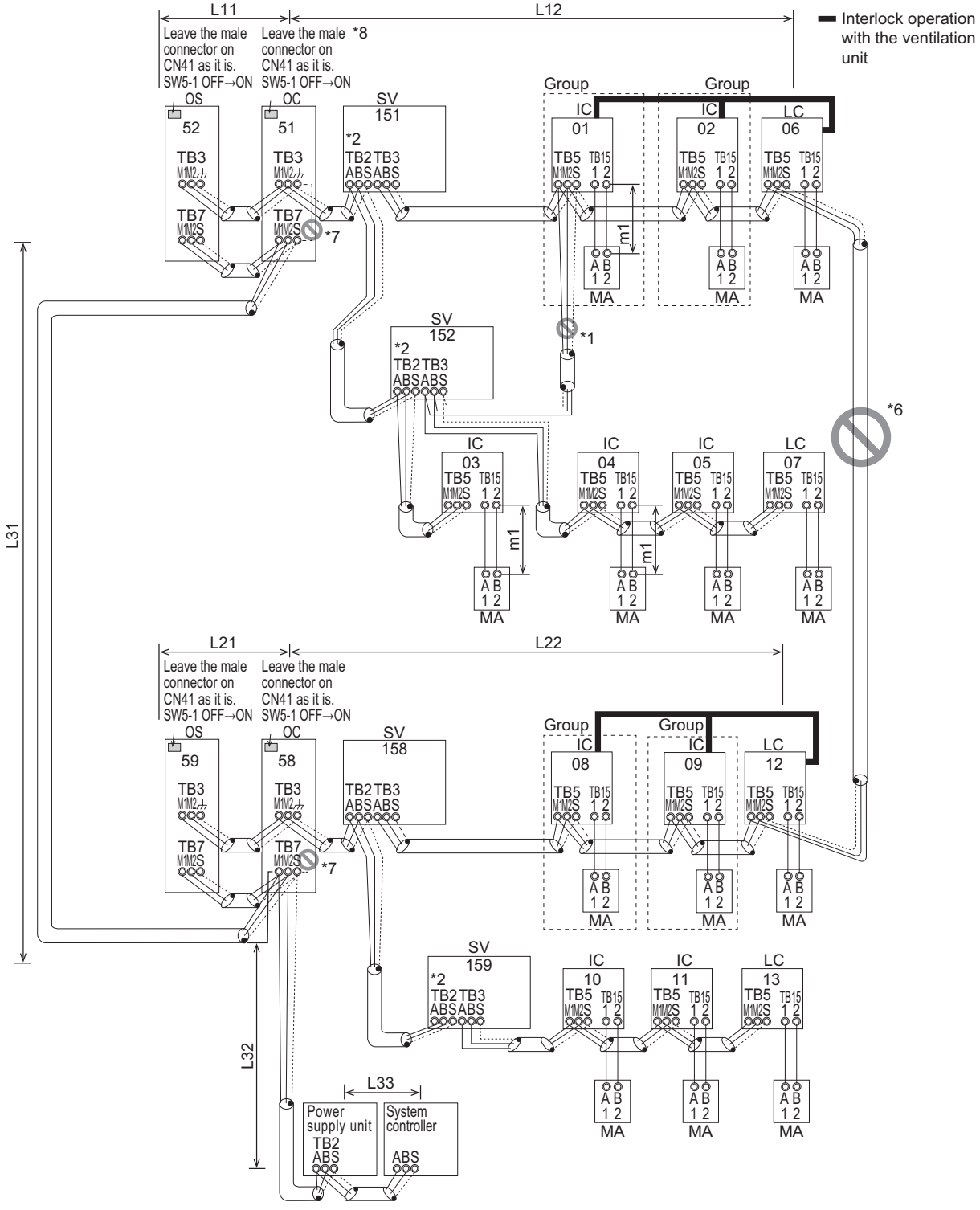
Procedures	Unit or controller			Address setting range	Setting method	Notes	Factory setting
1	Indoor unit	Main unit	IC	01 to 50	Assign the smallest address to the main unit in the group.	If indoor units with different functions operate in the same group, set the unit with the most functions as the main unit.	00
2	Shut off valve kit (Note1)		SV	151 to 200	For addresses from 151 to 200, set the desired number minus 100.	To set the address to 200, set the rotary switches to 50.	00
3	LOSSNAY		LC	01 to 50	After setting all indoor unit addresses, assign an address to the LOSSNAY unit.	Ensure that the address of the LOSSNAY unit does not overlap with those of indoor units.	00
4	MA remote controller	Main remote controller	MA	No settings required.	-		Main
		Supervisor remote controller	MA	Supervisor remote controller	Settings to be made with the Sub/Main switch		
5	Outdoor unit		OC OS	51 to 100	⬧Assign sequential address to the outdoor units in the same refrigerant circuit. ⬧The outdoor units are automatically designated as OC and OS.(Note 1)	⬧To set the address to 100, set the rotary switches to 50.	00

Note

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

2-7-2 System with a Connection of System Controller to Centralized Control Transmission Line for Supplying Power from Power Supply Unit

(1) Sample control wiring



(2) Cautions

1) Do not connect the indoor unit transmission cable terminal block TB3 on the shut off valve kit to any indoor units that are not controlled by this shut off valve kit.
2) Up to two cables can be connected to the transmission cable terminal block TB2 (outdoor unit/indoor unit/shut off valve kit) on the shut off valve kit, and one cable can be connected to the transmission cable terminal block TB3 (indoor unit).
3) When the TAR-4"x"MA series ("x" represents 3 or later) is connected to a group, no other MA remote controllers can be connected to the same group.
4) For information on the maximum number of connectable

indoor units or other devices, connection requirements, or the need for a transmission booster, refer to the MELANS Centralized Controller Technical Manual or Data Book.

5) Indoor units in a large space configuration can be controlled as a group. However, controlling indoor units in groups across different refrigerant systems or shut off valve kits is not allowed.
6) Do not connect TB5 terminal blocks of indoor units connected to different outdoor units.
7) If a power supply unit is connected, do not connect the ground terminal ($\frac{}{\pi}$) to the shield terminal S on the TB7 terminal block for the centralized control transmission cable.
8) If a power supply unit is connected to the centralized control transmission cable, keep the power supply switch connector connected to CN41 (factory default).

(3) Maximum allowable length

1) Indoor/outdoor transmission line
   Maximum distance (1.25 mm^2 [AWG16] or larger)
   L11 + L12 ≦ 200 m [656 ft]
   L21 + L22 ≦ 200 m [656 ft]
2) Transmission line for centralized control
   L33 ≦200 m [656 ft]
   L32 + L21 ≦ 200 m [656 ft]
   L32 + L31 + L11≦ 200 m [656 ft]
3) MA remote controller wiring
   Same as 2-7-1
4) Maximum line distance via outdoor unit
   (1.25 mm^2 [AWG16] or larger)
   L33 + L32 + L31 + L12 (L11) ≦ 1000 m [3280 ft]
   L33 + L32 + L22 (L21) ≦ 1000 m [3280 ft]
   L12 (L11) + L31 + L22 (L21) ≦ 1000 m [3280 ft]

(4) Wiring method

1) Indoor/outdoor transmission line
   Same as 2-7-1
   Grounding shielded cables
   Same as 2-7-1
2) Indoor unit transmission line
   Same as 2-7-1
   Shielded cable connection
   Same as 2-7-1
3) Transmission line for centralized control
   The A and B daisy-chain terminals on the system controller, the M1 and M2 terminals on the terminal block for transmission line for centralized control TB7 on the outdoor units (OC) in different refrigerant circuits and on the outdoor units (OC and OS) (Note a) in the same refrigerant circuit.
   If a system controller exists in the system, turn on the centralized control switch SW5-1 on the control circuit boards of all outdoor units.

Note

a) The outdoor units in the same refrigerant circuit are automatically designated as OC and OS. They are designated as OC and OS in the descending order of capacity (ascending order of address if the capacities are the same).
b) If TB7's on the outdoor units in the same refrigerant circuit are not daisy-chained, connect the transmission line for the central control system to TB7 of the OC. (Note a).To maintain the central control even during an OC failure or a power failure, connect TB7 on OC and OS together.
c) When connecting TB7, only commence after checking that the voltage is below 20 VDC.

- Only use shielded cables.

Grounding shielded cables
Daisy-chain the S terminal of the terminal block TB7 on the system controller, OC, and OS with the shield of the shielded cable.

4) MA remote controller wiring
   Same as 2-7-1
   When two remote controllers are connected to the system
   Same as 2-7-1
5) LOSSNAY connection
   Connect the M1 and M2 terminals 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) *This is a typical connection example.

- Ensure that the interlock control between the indoor unit and the LOSSNAY unit is set by the system controller. (For the setting procedure, refer to the Instruction Manual for the system controller.) However, if only an ON/OFF remote controller is connected, use the remote controller to set the interlock control.)
- For additional information on the LOSSNAY unit connection, refer to the technical documents for the LOSSNAY unit.

6) Switch setting
   Address setting is required as follows.

(5) Address setting method

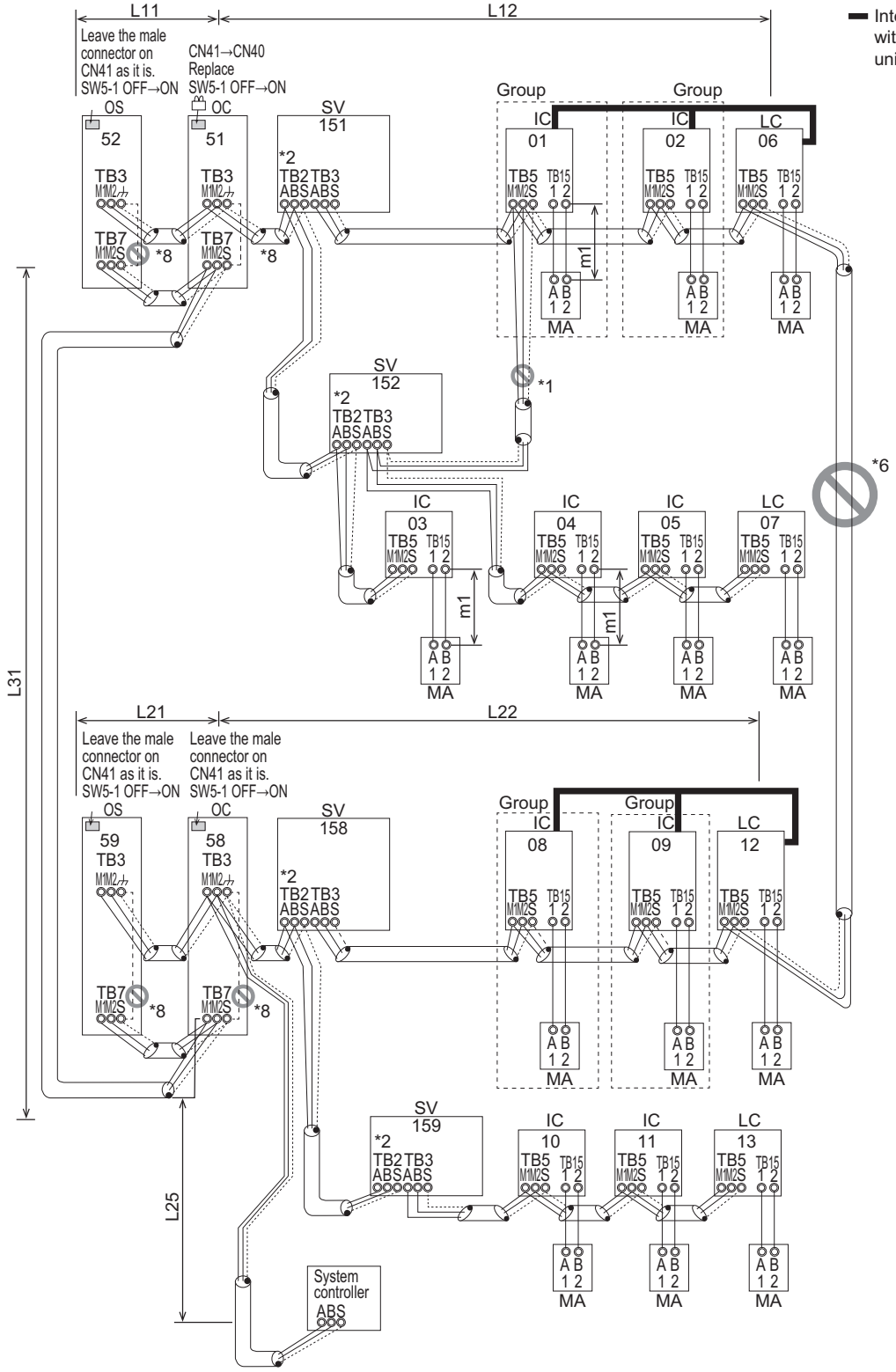
Procedures	Unit or controller			Address setting range	Setting method	Notes	Factory setting
1	Indoor unit	Main unit	IC	01 to 50	Assign the smallest address to the main unit in the group.	If indoor units with different functions operate in the same group, set the unit with the most functions as the main unit.	00
2	Shut off valve kit (Note1)		SV	151 to 200	For addresses from 151 to 200, set the desired number minus 100.	To set the address to 200, set the rotary switches to 50.	00
3	LOSSNAY		LC	01 to 50	After setting all indoor unit addresses, assign an address to the LOSSNAY unit.	Ensure that the address of the LOSSNAY unit does not overlap with those of indoor units.	00
4	MA remote controller	Main remote controller	MA	No settings required.	-	Apply the indoor unit group settings made by the MA remote controller to the system controller as an initial setting.	Main
		Supervisor remote controller	MA	Supervisor remote controller	Settings to be made with the Sub/Main switch		
5	Outdoor unit		OC OS	51 to 100	♦Assign sequential address to the outdoor units in the same refrigerant circuit. ♦The outdoor units are automatically designated as OC and OS.(Note 1)	♦To set the address to 100, set the rotary switches to 50.	00

Note

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

2-7-3 System with a Connection of System Controller to Indoor-Outdoor Transmission Line

(1) Sample control wiring



(2) Cautions

1) Do not connect the indoor unit transmission cable terminal block TB3 on the shut off valve kit to any indoor units that are not controlled by this shut off valve kit.

2) Up to two cables can be connected to the transmission cable terminal block TB2 (outdoor unit/indoor unit/shut off valve kit) on the shut off valve kit, and one cable can be connected to the transmission cable terminal block TB3 (indoor unit).

3) When the TAR-4"x"MA series ("x" represents 3 or later) is connected to a group, no other MA remote controllers can be connected to the same group.
4) For information on the maximum number of connectable indoor units or other devices, connection requirements, or the need for a transmission booster, refer to the MELANS Centralized Controller Technical Manual or Data Book.
5) Indoor units in a large space configuration can be controlled as a group. However, controlling indoor units in groups across different refrigerant systems or shut off valve kits is not allowed.
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.
8) Provide grounding to S terminal on the terminal block for transmission line for centralized control TB7 on only one of the outdoor units.

(3) Maximum allowable length

1) Indoor/outdoor transmission line
Maximum distance (1.25 mm^2 [AWG16] or larger)
L11 + L12 ≦ 200 m [656 ft]
L21 + L22 ≦ 200 m [656 ft]
L25 ≦ 200 m [656 ft]
2) Transmission line for centralized control
L31 + L21 ≦ 200 m [656 ft]
3) MA remote controller wiring
Same as 2-7-1
4) Maximum line distance via outdoor unit
(1.25 mm^2 [AWG16] or larger)
L25 + L31 + L12 (L11) ≦ 1000 m [3280 ft]
L12 (L11) + L31 + L22 (L21) ≦ 1000 m [3280 ft]

(4) Wiring method

1) Indoor/outdoor transmission line
Daisy-chain the following terminals: the M1 and M2 terminals of the indoor-outdoor transmission cable terminal block TB3 on the outdoor units (OC and OS) (Note), the M1 and M2 terminals of the indoor-outdoor transmission cable terminal block TB5 on each indoor unit (IC), and the S terminal on the system controller. (Non-polarized two-wire)
♦Only use shielded cables.

Note

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

Grounding shielded cables

To ground the shielded cable, daisy-chain the following terminals: the ground terminals (⏚) of the OC and OS, the S terminal of the terminal block TB5 on the IC, and the S terminal on the system controller.

2) Indoor unit transmission line
Same as 2-7-1
Shielded cable connection
Same as 2-7-1
3) 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 and on the OC and OS (Note a) in the same refrigerant circuit.
If a power supply unit is not connected to the transmission line for centralized control, replace the power jumper connector on the control board from CN41 to CN40 on only one of the outdoor units.
If a system controller exists in the system, turn on the centralized control switch SW5-1 on the control circuit boards of all outdoor units.

Note

a) The outdoor units in the same refrigerant circuit are automatically designated as OC and OS in the order of capacity from large to small (if two or more units have the same capacity, in the order of address from small to large).
b) If TB7's on the outdoor units in the same refrigerant circuit are not daisy-chained, connect the transmission line for the central control system to TB7 of the OC. (Note a). To maintain the central control even during an OC failure or a power failure, connect TB7 on OC and OS together. (If there is a problem with the outdoor unit whose power jumper was moved from CN41 to CN40, central control is not possible, even if TB7's are daisy-chained.)
c) When connecting TB7, only commence after checking that the voltage is below 20 VDC.
♦Only use shielded cables.

Grounding shielded cables

Daisy-chain the S terminal of the terminal block TB7 on the system controller, OC, and OS with the shield of the shielded cable. Short-circuit the ground terminal (⏚) and the S terminal on the terminal block TB7 on the outdoor unit whose power jumper connector is mated with CN40.

4) MA remote controller wiring
Same as 2-7-1

When two remote controllers are connected to the system

Same as 2-7-1
5) 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) *This is a typical connection example.
♦Ensure that the interlock control between the indoor unit and the LOSSNAY unit is set by the system controller. (For the setting procedure, refer to the Instruction Manual for the system controller.) However, if only an ON/OFF remote controller is connected, use the remote controller to set the interlock control.
♦For additional information on the LOSSNAY unit connection, refer to the technical documents for the LOSSNAY unit.
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	Indoor unit	Main unit	IC	01 to 50	Assign the smallest address to the main unit in the group.	If indoor units with different functions operate in the same group, set the unit with the most functions as the main unit.	00
2	Shut off valve kit (Note1)		SV	151 to 200	For addresses from 151 to 200, set the desired number minus 100.	To set the address to 200, set the rotary switches to 50.	00
3	LOSSNAY		LC	01 to 50	After setting all indoor unit addresses, assign an address to the LOSSNAY unit.	Ensure that the address of the LOSSNAY unit does not overlap with those of indoor units.	00
4	MA remote controller	Main remote controller	MA	No settings required.	-	Make the same indoor unit group settings with the system controller as the ones that were made with the MA remote controller.	Main
		Supervisor remote controller	MA	Supervisor remote controller	Settings to be made with the Sub/Main switch		
5	Outdoor unit		OC OS	51 to 100	♦Assign sequential address to the outdoor units in the same refrigerant circuit. ♦The outdoor units are automatically designated as OC and OS.(Note 1)	♦To set the address to 100, set the rotary switches to 50.	00

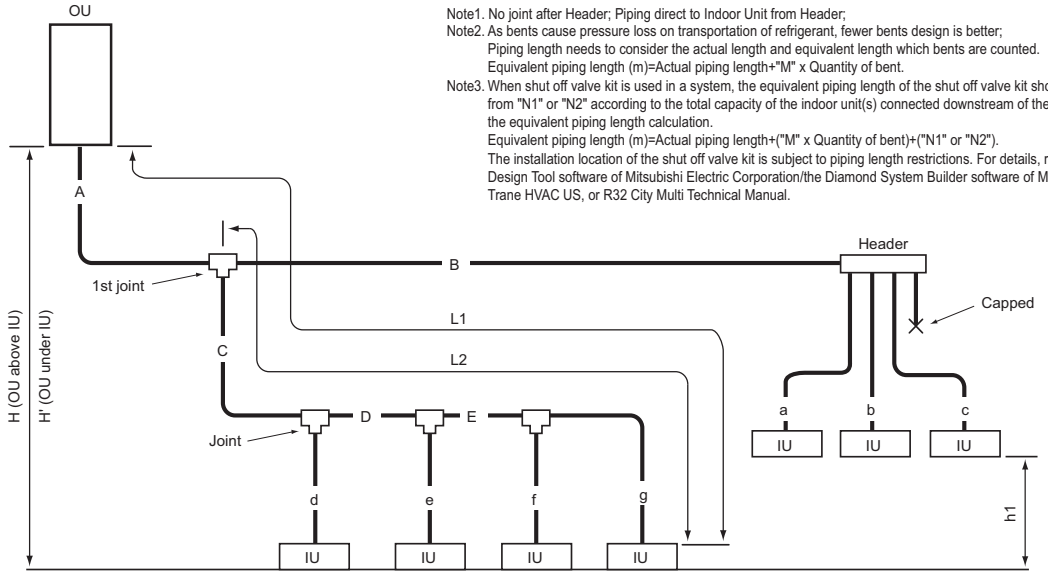
Note

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

2-8 Restrictions on Refrigerant Pipes

2-8-1 Restrictions on Refrigerant Pipe Length and Refrigerant Pipe Size

(1) TUHYE072-1923AMM0AN/4AMM0AN, TUHYH072-1203AMM0AN/4AMM0AN Piping



Note1. No joint after Header; Piping direct to Indoor Unit from Header;
Note2. As bents cause pressure loss on transportation of refrigerant, fewer bents design is better;
Piping length needs to consider the actual length and equivalent length which bents are counted.
Equivalent piping length (m)=Actual piping length+"M" x Quantity of bent.
Note3. When shut off valve kit is used in a system, the equivalent piping length of the shut off valve kit should be selected from "N1" or "N2" according to the total capacity of the indoor unit(s) connected downstream of the kit and added to the equivalent piping length calculation.
Equivalent piping length (m)=Actual piping length+("M" x Quantity of bent)+("N1" or "N2").
The installation location of the shut off valve kit is subject to piping length restrictions. For details, refer to the New Design Tool software of Mitsubishi Electric Corporation/the Diamond System Builder software of Mitsubishi Electric Trane HVAC US, or R32 City Multi Technical Manual.

Fig. Piping scheme

IU : Indoor unit , OU : Outdoor unit

Piping length **(m [ft.])**

Item	Piping in the figure	Max. length	Max. equivalent length
Total piping length	A+B+C+D+E+a+b+c+d+e+f+g	1000 [3280]	-
Farthest IU from OU (L1)	A+C+D+E+g / A+B+c	165 [541]	190 [623]
Farthest IU from the first joint (L2)	C+D+E+g / B+c	40 [131] *3	40 [131]
Height between OU and IU (OU above IU)	H	50 [164] *1	-
Height between OU and IU (OU under IU)	H'	40 [131] *2	-
Height between IU and IU	h1	15 [49] *4	-

OU: Outdoor Unit, IU: Indoor Unit
*1 113 m [370 ft.] is available depending on the model and installation conditions. For more detailed information, contact your local distributor.
*2 60 m [197 ft.] is available depending on the model and installation conditions. For more detailed information, contact your local distributor.
*3 90 m [295 ft.] is available. When the piping length exceeds 40 m [131 ft.], use one size larger liquid pipe starting with the section of piping where 40 m [131 ft.] is exceeded and all piping after that point.
In the figure above, if the piping labeled "E" exceeds 40 m [131 ft.] (but does not exceed 90 m [295 ft.]), increase the size of the liquid piping labeled E, f, and g by one size.
*4 30 m [98 ft.] is available. If the height difference between indoor units exceeds 15 m [49 ft.] (but does not exceed 30 m [98 ft.]), use one-size larger pipes for indoor unit liquid pipes.
In the figure above, if "h1" exceeds 15 m [49 ft.], increase the size of the liquid piping labeled d, e, f, and g by one size.

Bent equivalent length "M"

Outdoor Model	M (m/bent [ft./bent])
TUHYE0723(4)AMM0AN	0.35 [1.15]
TUHYE0963(4)AMM0AN	0.42 [1.38]
TUHYE1203(4)AMM0AN	0.50 [1.65]
TUHYE1443(4)AMM0AN	0.50 [1.65]
TUHYE1683(4)AMM0AN	0.50 [1.65]
TUHYE1923(4)AMM0AN	0.50 [1.65]
TUHYH0723(4)AMM0AN	0.35 [1.15]
TUHYH0963(4)AMM0AN	0.42 [1.38]
TUHYH1203(4)AMM0AN	0.50 [1.65]

Equivalent length "N1" for SV with one indoor unit connected

Indoor Unit size	N1 (m [ft.])
P004 ~ P018	1.6 [5.2]
P024 ~ P054	5.3 [17.4]
P072	15.0 [49.2]
P096	35.4 [116.1]

Equivalent length "N2" for SV with multiple indoor units connected

Total down-stream Indoor capacity	N2 (m [ft.])
P008 ~ P054	5.3 [5.2]
P055 ~ P072	15.0 [49.2]
P073 ~ P096	35.4 [116.1]

Table1. Piping "A" size selection rule (mm [in.])

Outdoor unit	Pipe(Liquid)	Pipe(Gas)
TUHYE0723(4)AMM0AN	ø9.52 [3/8]	ø22.2 [7/8]
TUHYE0963(4)AMM0AN	ø9.52 [3/8] *1	ø22.2 [7/8]
TUHYE1203(4)AMM0AN	ø9.52 [3/8] *2	ø28.58 [1-1/8]
TUHYE1443(4)AMM0AN	ø12.7 [1/2]	ø28.58 [1-1/8]
TUHYE1683(4)AMM0AN	ø15.88 [5/8]	ø28.58 [1-1/8]
TUHYE1923(4)AMM0AN	ø15.88 [5/8]	ø28.58 [1-1/8]
TUHYH0723(4)AMM0AN	ø9.52 [3/8]	ø22.2 [7/8]
TUHYH0963(4)AMM0AN	ø9.52 [3/8] *1	ø22.2 [7/8]
TUHYH1203(4)AMM0AN	ø9.52 [3/8] *2	ø28.58 [1-1/8]

*1. L1>=90 m [295 ft.], ø12.70 mm [1/2 in.] ; L1<90m [295ft.], ø9.52mm [3/8in.]

*2. L1>=40 m [131 ft.], ø12.70 mm [1/2 in.] ; L1<40m [131ft.], ø9.52mm [3/8in.]

Table2. Piping"B","C","D","E"size selection rule (mm [in.])

Total down-stream Indoor capacity	Pipe(Liquid)	Pipe(Gas)
~ P054	ø9.52 [3/8]	ø15.88 [5/8]
P055 ~ P072	ø9.52 [3/8]	ø19.05 [3/4]
P073 ~ P108	ø9.52 [3/8]	ø22.20 [7/8]
P109 ~ P144	ø12.70 [1/2]	ø28.58 [1-1/8]
P145 ~ P240	ø15.88 [5/8]	ø28.58 [1-1/8]
P241 ~ P308	ø19.05 [3/4]	ø34.93 [1-3/8]
P309 ~	ø19.05 [3/4]	ø41.28 [1-5/8]

Table3. Piping "a","b","c","d","e","f","g" size selection rule (mm [in.])

Indoor Unit size	Pipe(Liquid)	Pipe(Gas)
P004 ~ P018	ø6.35 [1/4]	ø12.70 [1/2]
P024 ~ P054	ø9.52 [3/8]	ø15.88 [5/8]
P072	ø9.52 [3/8]	ø19.05 [3/4]
P096	ø9.52 [3/8]	ø22.20 [7/8]

Table4-1. Selection criteria for joints

Total down-stream Indoor capacity	Joint
~P072	CMY-Y102SS-G2
P073 ~P144	CMY-Y102LS-G2
P145 ~P240	CMY-Y202S-G2
P241 ~	CMY-Y302S-G2

*Concerning detailed usage of joint parts, refer to its Installation Manual.

Table4-2.
See the table below for the first joint of the outdoor unit described below.

Outdoor unit model	Joint model
E072 to E192	CMY-Y102LS-G2
H072 to H120	CMY-Y102LS-G2

Table5. Header selection rule

	4-branch Header	8-branch Header	10-branch Header
	CMY-Y104C-G	CMY-Y108C-G	CMY-Y1010C-G
Total down-stream Indoor capacity	<=M72	<=M144	<=M240

* CMY-Y104C-G can directly connect TUHYE0723(4)AMM0AN and TUHYH0723(4)AMM0AN, but can NOT directly connect TUHYE0963(4)AMM0AN and TUHYH0963(4)AMM0AN or above;
* CMY-Y108C-G can directly connect TUHYE072~1683(4)AMM0AN and TUHYH072~1443(4)A(B)MM0AN, but can NOT directly connect TUHYE1923(4)A(B)MM0AN and TUHYH1923(4)A(B)MM0AN or above;
* CMY-Y1010C-G can directly connect TUHYE072~1923(4)AMM0AN and TUHYH072~2403(4)A(B)MM0AN;
* CMY-Y104C-G can NOT connect P072~P096 Indoor, but CMY-Y108,Y1010C-G can do;
* Concerning detailed usage of Header parts, refer to its Installation Manual.

Note4. Indoor capacity is described as its model size;
For example, TPEFYP006MA1M0A, its capacity is P006;

Note5. Total down-stream Indoor capacity is the summary of the model size of Indoors downstream.
For example, TPEFYP006MA1M0A + TPEFYP008MA1M0A. Total Indoor capacity = P006 + P008 = P014

Note6. Piping size determined by the Total down-stream indoor capacity is NOT necessary to be bigger than the up-stream one.
i.e. A>=B; A>=C>=D

(2) TUHYE264-3843(4)BMM0AN, TUHYH144-2403(4)BMM0AN Piping

Note1. No joint after Header; Piping direct to Indoor Unit from Header;
Note2. As bents cause pressure loss on transportation of refrigerant, fewer bents design is better;
Piping length needs to consider the actual length and equivalent length which bents are counted.
Equivalent piping length (m)=Actual piping length+"M" x Quantity of bent.
Note3. When shut off valve kit is used in a system, the equivalent piping length of the shut off valve kit should be selected from "N1" or "N2" according to the total capacity of the indoor unit(s) connected downstream of the kit and added to the equivalent piping length calculation.
Equivalent piping length (m)=Actual piping length+("M" x Quantity of bent)+("N1" or "N2").
The installation location of the shut off valve kit is subject to piping length restrictions. For details, refer to the New Design Tool software of Mitsubishi Electric Corporation/the Diamond System Builder software of Mitsubishi Electric Trane HVAC US, or R32 City Multi Technical Manual.

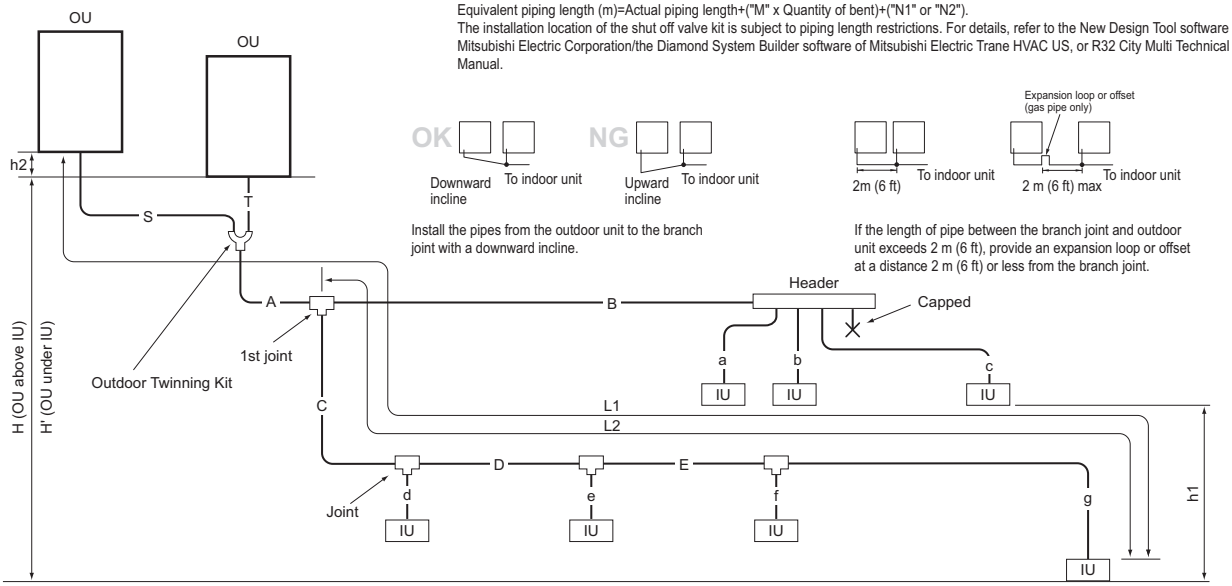


Fig. Piping scheme

IU: Indoor unit , OU: Outdoor unit

Piping length **(m [ft.])**

Item	Piping in the figure	Max. length	Max. equivalent length
Total piping length	S+T+A+B+C+D+E+a+b+c+d+e+f+g	1000 [3280]	-
Distance between OU and OU	S+T	10 [32]	-
Height between OU and OU	h2	0.1 [0.3]	-
Farthest IU from OU (L1)	S(T)+A+C+D+E+g / S(T)+A+B+c	165 [541]	190 [623]
Farthest IU from the first joint (L2)	C+D+E+g / B+c	40 [131] *3	40 [131]
Height between OU and IU (OU above IU)	H	50 [164] *1	-
Height between OU and IU (OU under IU)	H'	40 [131] *2	-
Height between IU and IU	h1	15 [49] *4	-

OU: Outdoor Unit, IU: Indoor Unit
*1 113 m [370 ft.] is available depending on the model and installation conditions. For more detailed information, contact your local distributor.
*2 60 m [197 ft.] is available depending on the model and installation conditions. For more detailed information, contact your local distributor.
*3 90 m [295 ft.] is available. When the piping length exceeds 40m [131ft], use one size larger liquid pipe starting with the section of piping where 40m [131ft] is exceeded and all piping after that point.
In the figure above, if the piping labeled "E" exceeds 40m [131ft] (but does not exceed 90 m [295 ft.]), increase the size of the liquid piping labeled E, f, and g by one size.
*4 30 m [98 ft.] is available. If the height difference between indoor units exceeds 15 m [49 ft.] (but does not exceed 30 m [98 ft.]), use one-size larger pipes for indoor unit liquid pipes.
In the figure above, if "h1" exceeds 15 m [49 ft.], increase the size of the liquid piping labeled g by one size.

Bent equivalent length "M"

Outdoor Model	M (m/bent [ft./bent])
TUHYE2643(4)BMM0AN	0.70 [2.30]
TUHYE2883(4)BMM0AN	0.70 [2.30]
TUHYE3123(4)BMM0AN	0.70 [2.30]
TUHYE3363(4)BMM0AN	0.80 [2.63]
TUHYE3603(4)BMM0AN	0.80 [2.63]
TUHYE3843(4)BMM0AN	0.80 [2.63]
TUHYH1443(4)BMM0AN	0.50 [1.65]
TUHYH1923(4)BMM0AN	0.50 [1.65]
TUHYH2403(4)BMM0AN	0.70 [2.30]

Equivalent length "N1" for SV with one indoor unit connected

Indoor Unit size	N1 (m [ft.])
P004 ~ P018	1.6 [5.2]
P024 ~ P054	5.3 [17.4]
P072	15.0 [49.2]
P096	35.4 [116.1]

Equivalent length "N2" for SV with multiple indoor units connected

Total down-stream Indoor capacity	N2 (m [ft.])
P008 ~ P054	5.3 [5.2]
P055 ~ P072	15.0 [49.2]
P073 ~ P096	35.4 [116.1]

Table1. Piping "A" size selection rule **(mm [in.])**

Outdoor unit	Twinning kit	Pipe(Liquid)	Pipe(Gas)
TUHYE2643(4)BMM0AN	CMY-Y300CBK2	ø19.05 [3/4]	ø34.93 [1-3/8]
TUHYE288-3123(4)BMM0AN	CMY-Y200CBK2	ø19.05 [3/4]	ø34.93 [1-3/8]
TUHYE336-3843(4)BMM0AN	CMY-Y200CBK2	ø19.05 [3/4]	ø41.28 [1-5/8]
TUHYH1443(4)BMM0AN	CMY-Y100CBK3	ø12.70 [1/2]	ø28.58 [1-1/8]
TUHYH192-2403(4)BMM0AN	CMY-Y100CBK3	ø15.88 [5/8]	ø28.58 [1-1/8]

For Piping size "S", "T", please refer to specification of the Twinning kit at the Outdoor unit's external drawing.

Table2. Piping"B","C","D","E" size selection rule **(mm [in.])**

Total down-stream Indoor capacity	Pipe(Liquid)	Pipe(Gas)
~ P054	ø9.52 [3/8]	ø15.88 [5/8]
P055 ~ P072	ø9.52 [3/8]	ø19.05 [3/4]
P073 ~ P108	ø9.52 [3/8]	ø22.20 [7/8]
P109 ~ P144	ø12.70 [1/2]	ø28.58 [1-1/8]
P145 ~ P240	ø15.88 [5/8]	ø28.58 [1-1/8]
P241 ~ P308	ø19.05 [3/4]	ø34.93 [1-3/8]
P309 ~	ø19.05 [3/4]	ø41.28 [1-5/8]

able3. Piping"a","b","c","d","e","f","g" size selection rule **(mm [in.])**

Indoor Unit size	Pipe(Liquid)	Pipe(Gas)
P004 ~ P018	ø6.35 [1/4]	ø12.70 [1/2]
P024 ~ P054	ø9.52 [3/8]	ø15.88 [5/8]
P072	ø9.52 [3/8]	ø19.05 [3/4]
P096	ø9.52 [3/8]	ø22.20 [7/8]

Table4-1. Selection criteria for joints

Total down-stream Indoor capacity	Joint
~ P072	CMY-Y102SS-G2
P073 ~ P144	CMY-Y102LS-G2
P145 ~ P240	CMY-Y202S-G2
P241 ~	CMY-Y302S-G2

*Concerning detailed usage of joint parts, refer to its Installation Manual.
*The total capacity of the units in the downstream of the branch joint on at least one of the piping lines that are connected to the branch joint should be 240 or below.
If the total capacity of the units in the downstream of the branch joints on both lines is above 240 use two branch joints (CMY-Y302S-G2).

Table4-2.
See the table below for the first joint of the outdoor unit described below.

Outdoor unit model	Joint model
E264 to E384	CMY-Y202S-G2
H144 to H240	CMY-Y202S-G2

Table5. Header selection rule

	4-branch Header	8-branch Header	10-branch Header
	CMY-Y104C-G	CMY-Y108C-G	CMY-Y1010C-G
Total down-stream Indoor capacity	<=P072	<=P144	<=P240

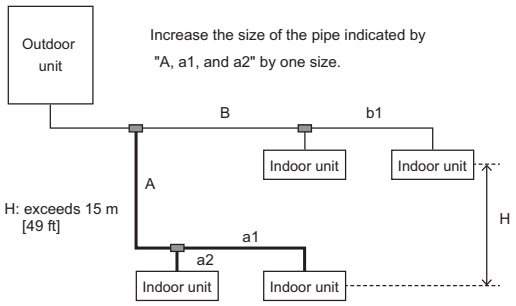
* CMY-Y104C-G can directly connect TUHYE0723(4)AMM0AN and TUHYH0723(4)AMM0AN, but can NOT directly connect TUHYE0963(4)AMM0AN and TUHYH0963(4)AMM0AN or above;
* CMY-Y108C-G can directly connect TUHYE072~1683(4)AMM0AN and TUHYH072~1443(4)A(B)MM0AN, but can NOT directly connect TUHYE1923(4)A(B)MM0AN and TUHYH1923(4)A(B)MM0AN or above;
* CMY-Y1010C-G can directly connect TUHYE072~1923(4)AMM0AN and TUHYH072~2403(4)A(B)MM0AN;
* CMY-Y104C-G can NOT connect P072~P096 Indoor, but CMY-Y108,Y1010C-G can do;
* Concerning detailed usage of Header parts, refer to its Installation Manual.

Note4. Indoor capacity is described as its model size;
For example, TPEFYP006MA1M0A, its capacity is P006;
Note5. Total down-stream Indoor capacity is the summary of the model size of Indoors downstream.
For example, TPEFYP006MA1M0A + TPEFYP008MA1M0A. Total Indoor capacity = P006 + P008 = P014
Note6. Piping size determined by the Total down-stream indoor capacity is NOT necessary to be bigger than the up-stream one.
i.e. A>=B; A>=C>=D

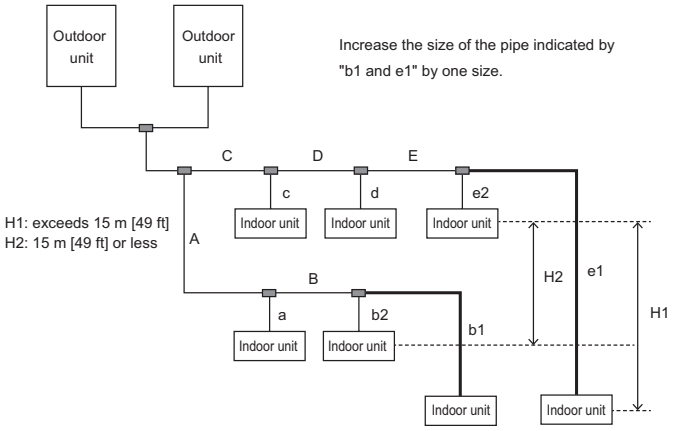
When the vertical separation between indoor units exceeds 15 m [49 ft]

Outdoor unit above indoor unit

example 1

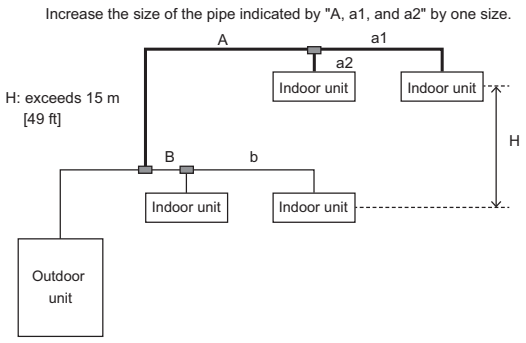


example 2



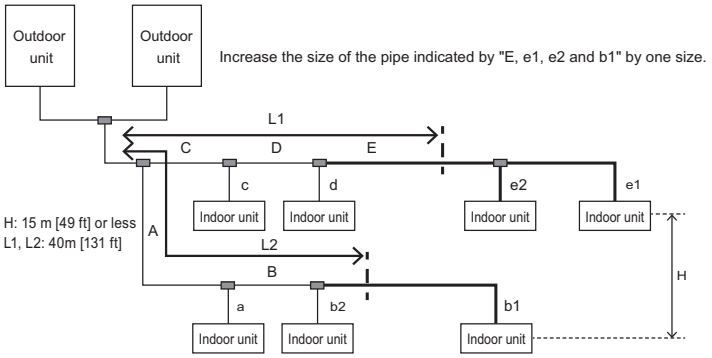
Outdoor unit below indoor unit

example 3



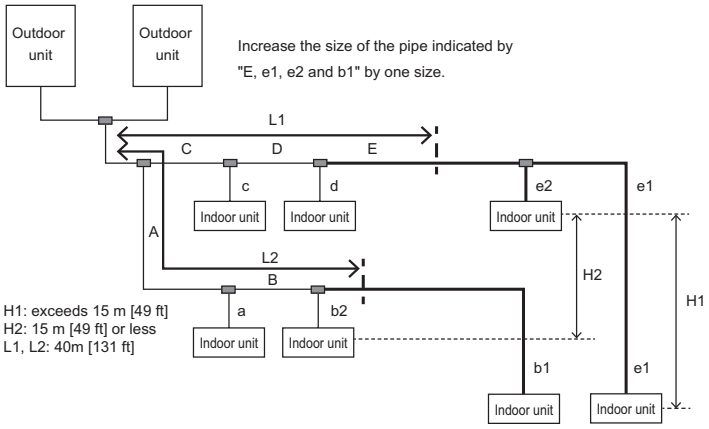
When the distance from the first branch to the farthest indoor unit exceeds 40 m [131 ft]

example 4



When the distance from the first branch to the farthest indoor unit exceeds 40 m [131 ft] and the vertical separation between indoor units exceeds 15 m [49 ft]

example 5



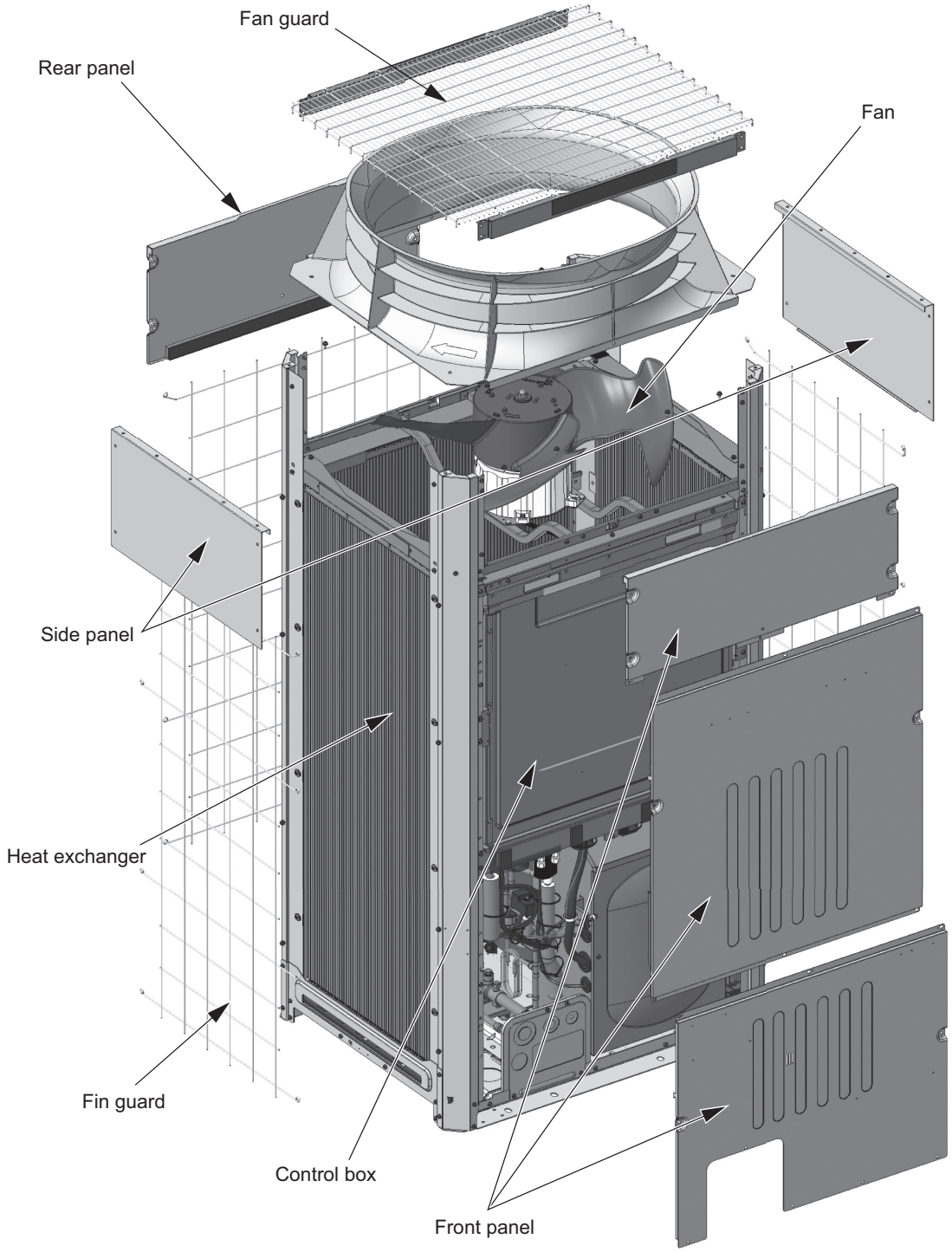
Chapter 3 Major Components, Their Functions and Refrigerant Circuits

3-1 External Appearance and Refrigerant Circuit Components of Outdoor Unit 1
3-1-1 External Appearance of Outdoor Unit 1
3-1-2 Outdoor Unit Refrigerant Circuits 3
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3-7 Functions of the Major Components of Shut Off Valve Kit 12

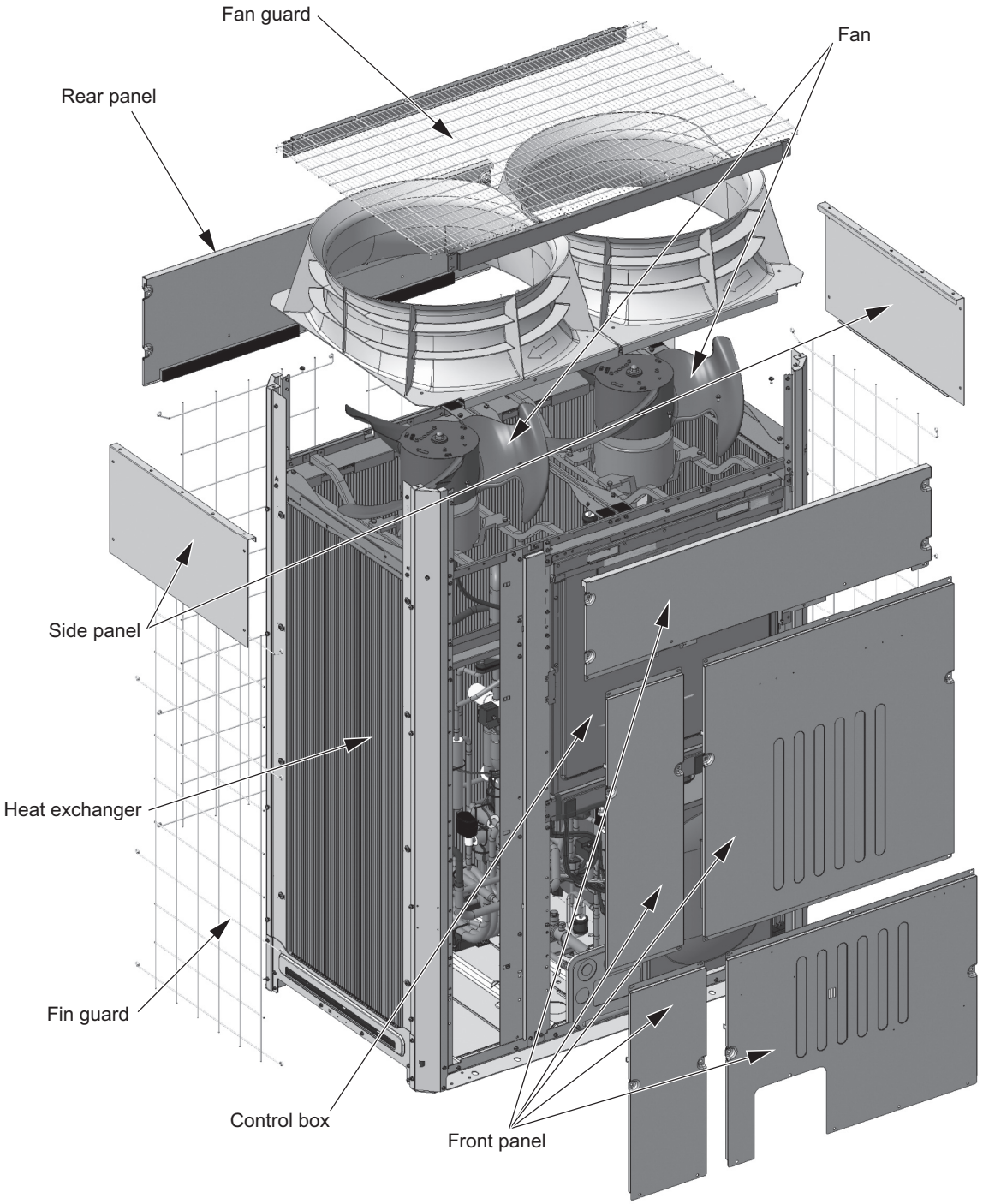
3-1 External Appearance and Refrigerant Circuit Components of Outdoor Unit

3-1-1 External Appearance of Outdoor Unit

(1) TUHYE072, 096, 1203(4)AMM0AN TUHYH0723(4)AMM0AN

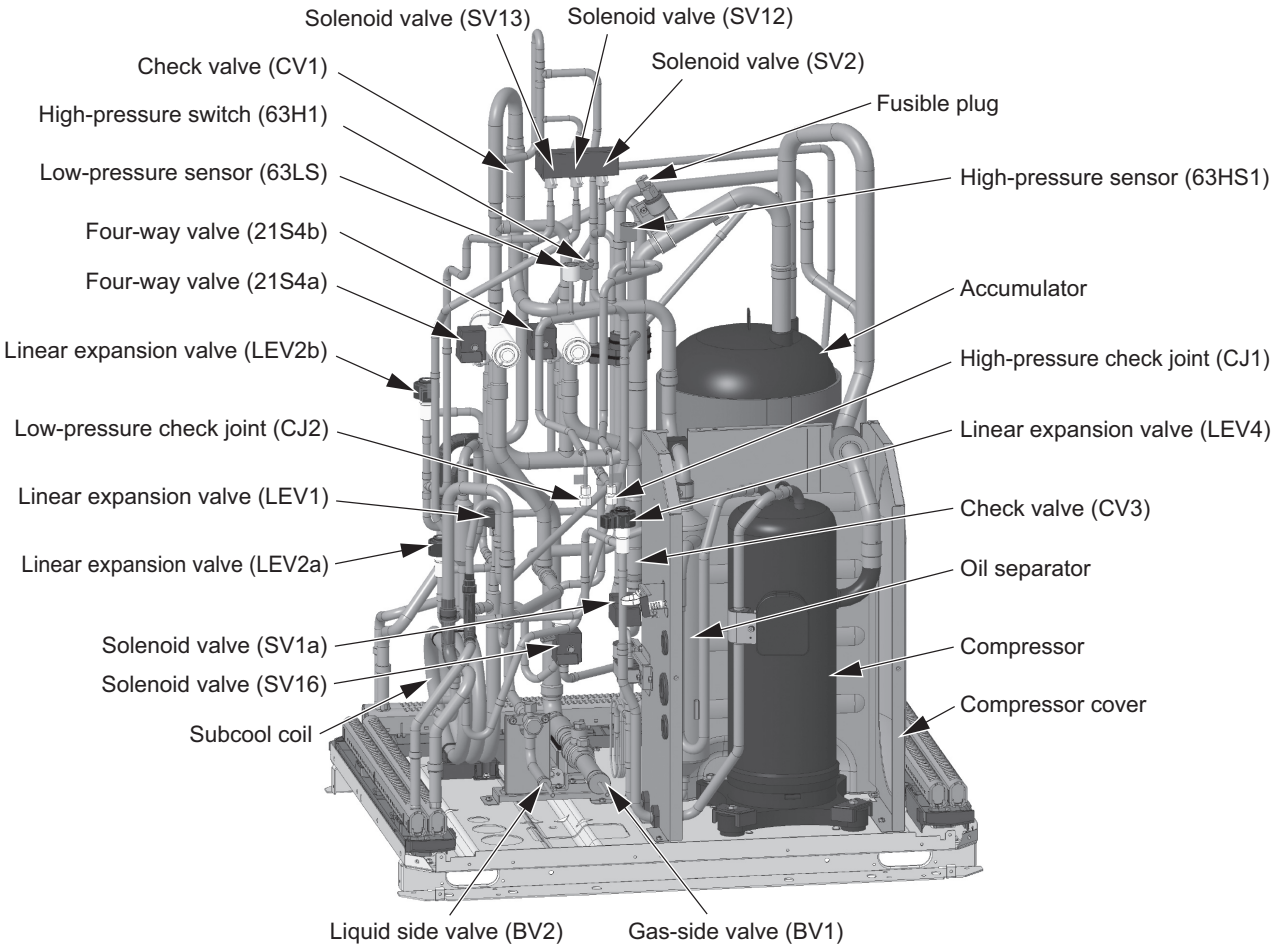


(2) TUHYE144, 168, 1923(4)AMM0AN
TUHYH096, 1203(4)AMM0AN

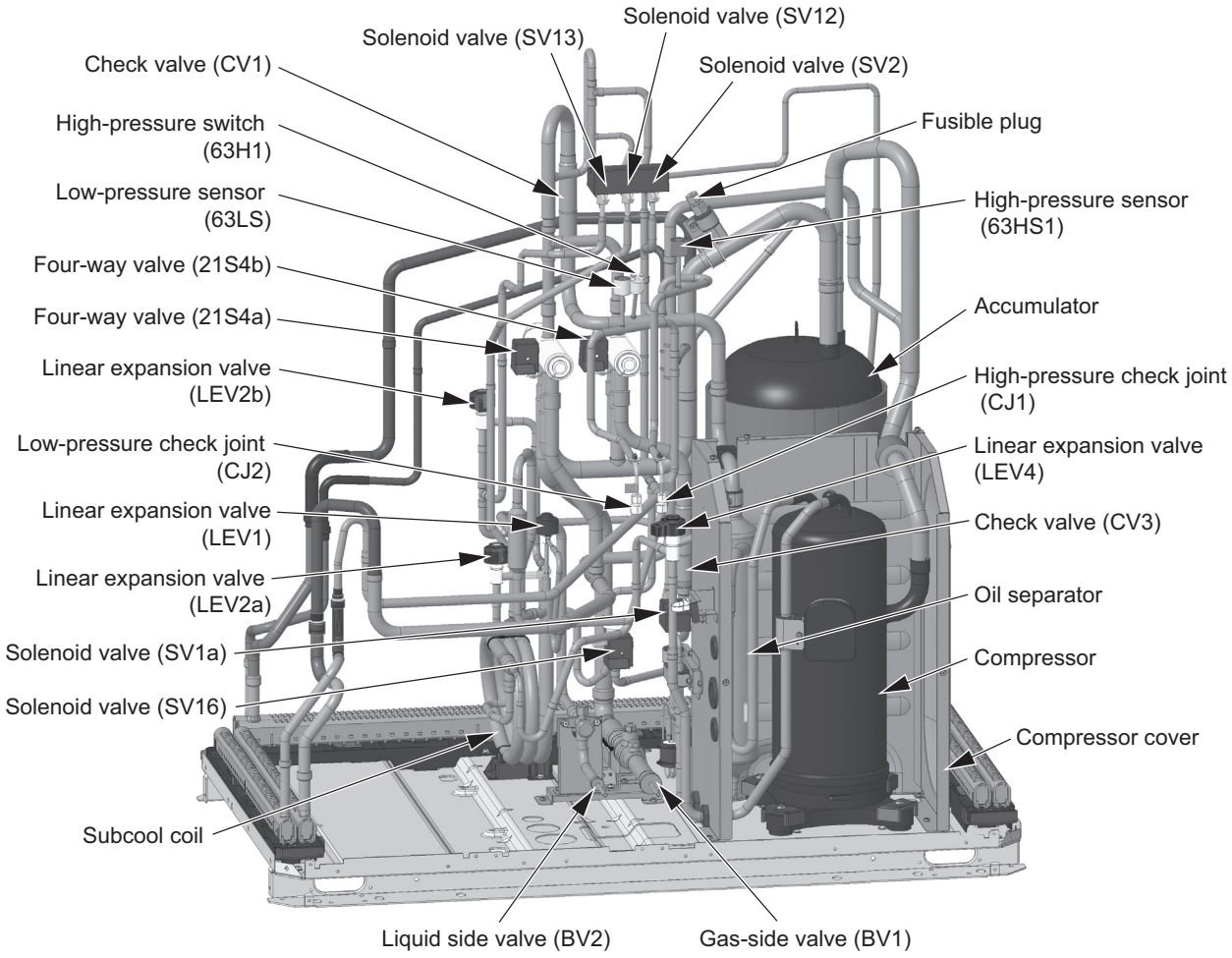


3-1-2 Outdoor Unit Refrigerant Circuits

(1) TUHYE072, 096, 1203(4)AMM0AN TUHYH0723(4)AMM0AN

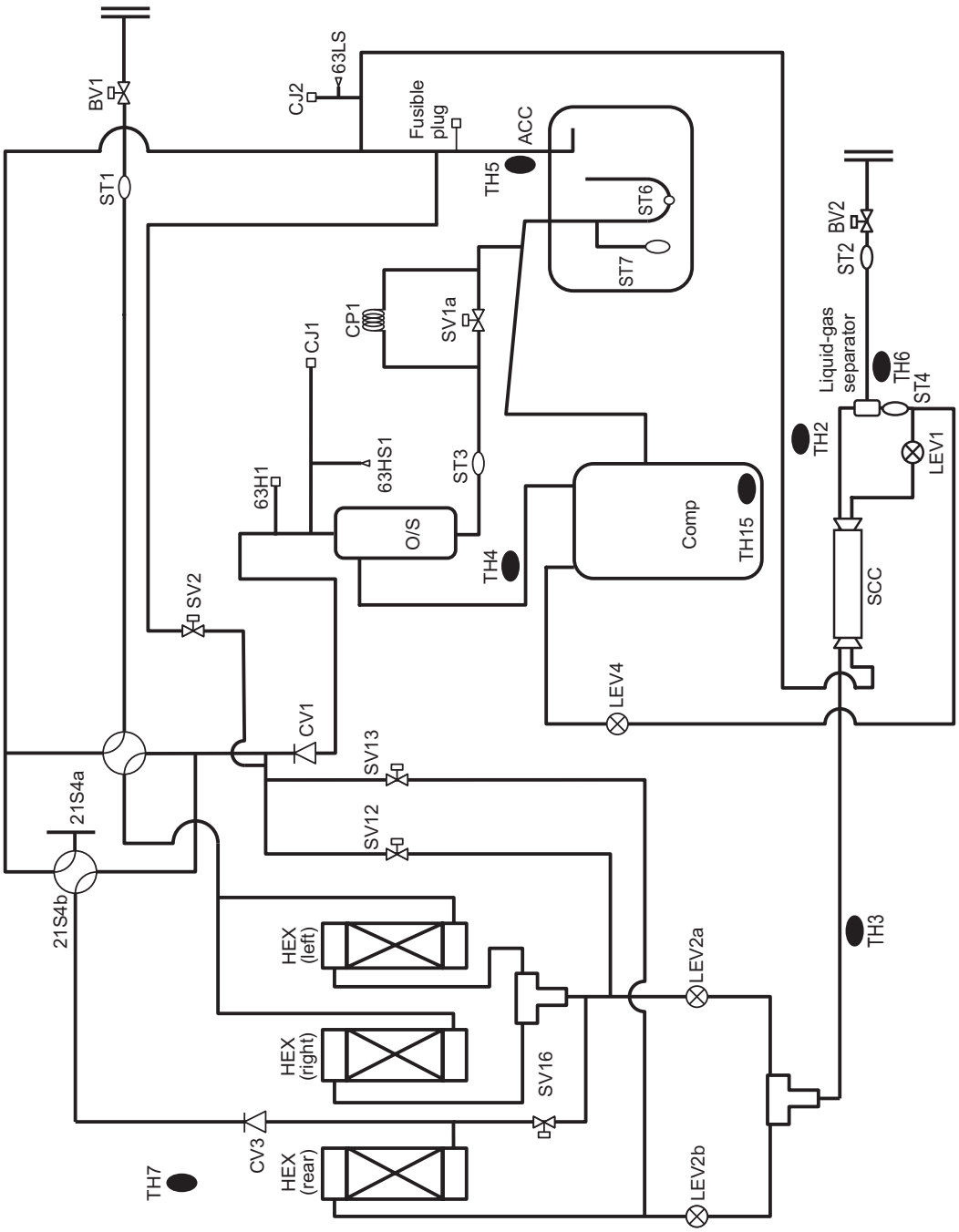


(2) TUHYE144, 168, 1923(4)AMM0AN
TUHYH096, 1203(4)AMM0AN

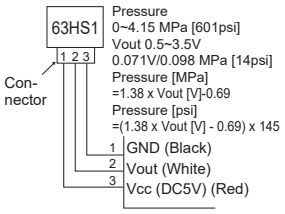
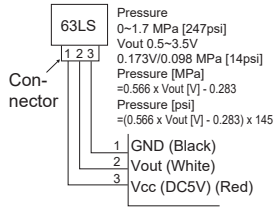


3-2 Outdoor Unit Refrigerant Circuit Diagrams

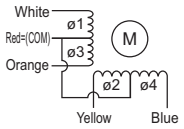
(1) TUHYE072-1923(4)AMM0AN
TUHYH072-1203(4)AMM0AN



3-3 Functions of the Major Components of Outdoor Unit

Part name	Symbols (functions)	Notes	Usage	Specifications	Check method
Compressor	MC1 (Comp1)		Adjusts the amount of circulating refrigerant by adjusting the operating frequency based on the operating pressure data	E072, 096, 120 models H072 model Low-pressure shell scroll compressor wirewound resistance 20°C [68°F] : 0.431 Ω (460V), 0.124 Ω (208-230V) E144, 168, 192 models H096, 120 models Low-pressure shell scroll compressor wirewound resistance 20°C [68°F] : 0.212 Ω (460V), 0.079 Ω (208-230V)	
High pressure sensor	63HS1		1) Detects high pressure 2) Regulates frequency and provides high-pressure protection		
Low pressure sensor	63LS		1) Detects low pressure 2) Provides low-pressure protection 3) Defrost control during heating operation		
Pressure switch	63H1		1) Detects high pressure 2) Provides high-pressure protection	4.15MPa[601psi] OFF setting	
Power supply transformer	Transformer	460V only	Decreases the power supply voltage (460V) supplied to the circuit board	Primary rated voltage: 460V, 50/60Hz Secondary rated voltage: 229V (No-load voltage)	

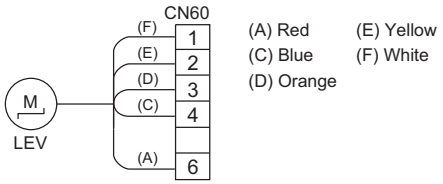
Part name	Symbols (functions)	Notes	Usage	Specifications	Check method
Thermistor	TH4 (Discharge temperature)		1) Detects discharge air temperature 2) Provides high-pressure protection 0°C[32°F] :645 kΩ 10°C[50°F] :396 kΩ 20°C[68°F] :250 kΩ 30°C[86°F] :161 kΩ 40°C[104°F] :107 kΩ 50°C[122°F] : 72 kΩ 60°C[140°F] : 50 kΩ 70°C[158°F] : 35 kΩ 80°C[176°F] : 25 kΩ 90°C[194°F] :18.0 kΩ 100°C[212°F] :13.6 kΩ 110°C[230°F] : 9.9 kΩ	Degrees Celsius R_{120} = 7.465kΩ $R_{25/120}$ = 4057 $R_t = 7.465\exp\{4057(\frac{1}{273+t}-\frac{1}{393})\}$	Resistance check
	TH2 (Subcool coil outlet temperature)		LEV 1 is controlled based on the TH2, TH3, and TH6 values.	Degrees Celsius R_0 = 15kΩ $R_{0/80}$ = 3460 $R_t = 15\exp\{3460(\frac{1}{273+t}-\frac{1}{273})\}$ 0°C[32°F] :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 (Accumulator inlet temperature)		Used to control the refrigerant flow in combination units during heating operation.		
	TH6 (Pipe temperature)		1) Controls LEV1 by detecting the outlet temperature of the subcooling coil using TH6 and data from HPS (high pressure sensor) 2) Used to control the refrigerant flow in combination units during heating operation		
	TH15 (Shell bottom temperature)		Detects liquid backflow to protect the compressor		
	THHS Inverter heat sink temperature	IPM is built in. Do not attempt to measure resistance.	Inverter overheating protection	Degrees Celsius R_{50} = 17kΩ $R_{25/120}$ = 4016 $R_t = 17\exp\{4016(\frac{1}{273+t}-\frac{1}{323})\}$ 0°C[32°F] :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	-

Part name	Symbols (functions)	Notes	Usage	Specifications	Check method
Solenoid valve	SV1a Discharge-suction bypass		1) High/low pressure bypass at start-up and stopping, and capacity control during low-load operation 2) High-pressure-rise prevention	208 - 230 VAC Open while being powered/ closed while not being powered	Continuity check with a tester
	SV2		1) High/low pressure bypass during defrost recovery and start-up of heating operation at low ambient temperatures 2) Controls capacity during low-load heating operation	208 - 230 VAC Open while being powered/ closed while not being powered	
	SV12		-	208 - 230 VAC Opens while being powered/ closed while not being powered	
	SV13		Controls capacity during low-load heating operation.	208 - 230 VAC Opens while being powered/ closed while not being powered	
	SV16		Controls the heat exchanger capacity of the outdoor unit.	208 - 230 VAC Opens while being powered/ closed while not being powered	
Linear expansion valve	LEV1 (SC adjustment)		Adjusts the bypass flow from outdoor unit liquid pipe during cooling operation.	12 VDC Opening of stepping motor driving valve: 0 to 480 pulses (direct-driven type)	Continuity Test with a Tester. Continuity between white and orange.Continuity between yellow, brown, and blue 
	LEV2a, 2b (Flow control)		1) Controls the heat exchanger capacity of the outdoor unit. 2) Adjust flow rate during heating operation	12 VDC Opening of stepping motor driving valve: 0 to 3,000 pulses	
	LEV4		Injection amount control	12 VDC Opening of stepping motor driving valve: 0 to 3,000 pulses	
Four-way valve	21S4a		Changeover between cooling and heating.	208 - 230 VAC Dead: cooling cycle Live: heating cycle	Continuity check with a tester
	21S4b		1) Changeover between cooling and heating. 2) Controls the heat exchanger capacity of the outdoor unit.	208 - 230 VAC Dead: cooling cycle,100% of heat exchanger capacity of outdoor unit Live: 50% of heat exchanger capacity of outdoor unit, or heating cycle	
Fan motor	FAN motor 1,2	FAN motor 2 is used in E144-192, H096-120 models.	Regulates the heat exchanger capacity by adjusting the operating frequency and operating the propeller fan based on the operating pressure.	(208-230V) E072, E096, E120, H072 200-230 VAC, 920 W E144, E168, E192, H096, H120 200-230 VAC, 460 W (460V) E072, E096, E120, H072 380-460 VAC, 920 W E144, E168, E192, H096, H120 380-460 VAC, 460 W	

Part name	Symbols (functions)	Notes	Usage	Specifications	Check method
Crank-case heater	CH11		Heat the compressor shell to make liquid refrigerant in the compressor evaporate.	♦E072, E096, E120, H072 AC240V, 45W ♦E144, E168, E192, H096, H120 AC240V, 48W	Continuity check with a tester
Fusible plug	Fusible plug		Discharges the internal gas into the air when the temperature rises above the specified level.	Melting Point: 90±2°C Hole: ø3.1mm	

3-4 Functions of the Major Components of Indoor Unit

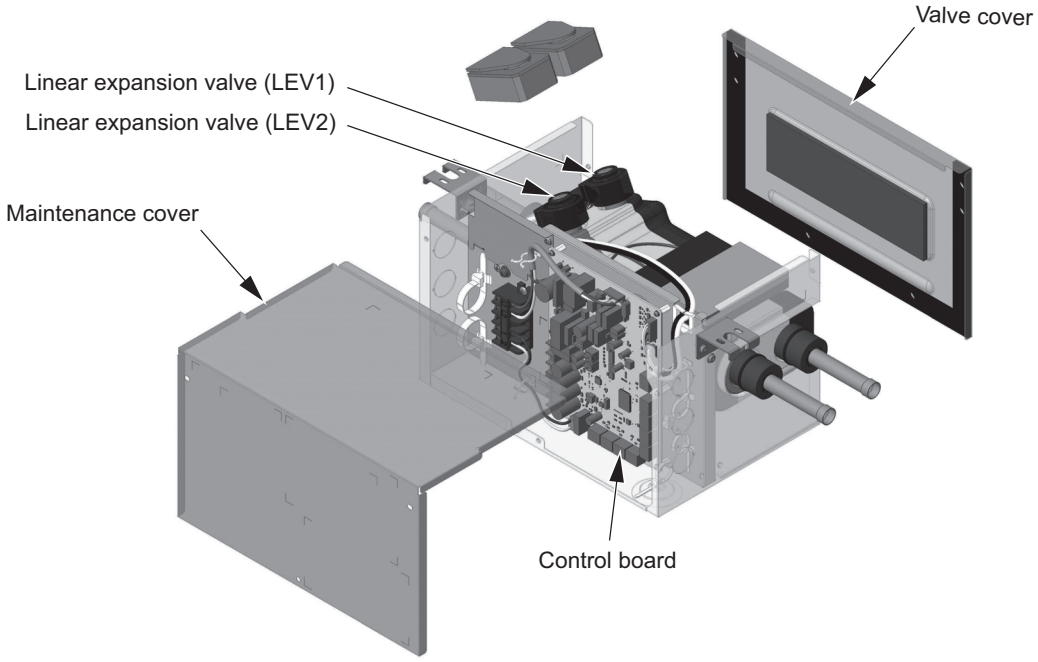
<table>
<tr><th>Part Name</th><th>Symbol (functions)</th><th>Notes</th><th>Usage</th><th>Specification</th><th>Check method</th></tr>
<tr><td>Linear expansion valve</td><td>LEV</td><td></td><td>1) Adjusts superheat at the indoor heat exchanger outlet during cooling
2) Adjusts subcool at the indoor unit heat exchanger outlet during heating</td><td>DC12V
Opening of stepping motor driving valve 0-(1800) pulses

<table><tr><th colspan="4">Normal</th><th>Abnormal</th></tr><tr><td>1-6
White-Red</td><td>2-6
Yellow-Red</td><td>3-6
Orange-Red</td><td>4-6
Blue-Red</td><td rowspan="2">Open or short</td></tr><tr><td colspan="4">(150Ω) ±10%</td></tr></table></td><td>Disconnect the connector, and measure the resistance between terminals with a tester.
For details, refer to the Service Handbook for the indoor unit.</td></tr>
<tr><td rowspan="5">Thermistor</td><td>TH1
(Suction air temperature)</td><td></td><td>Indoor unit control (Thermo)</td><td rowspan="5">R_0=15kΩ
$R_{0/80}$=3460
Rt = 15exp{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</td><td rowspan="5">Resistance check</td></tr>
<tr><td>TH2
(Pipe temperature)</td><td></td><td>1) Indoor unit control (Frost prevention, Hot adjust)
2) LEV control during heating operation (subcool detection).</td></tr>
<tr><td>TH3
(Gas pipe temperature)</td><td></td><td>LEV control during cooling operation (superheat detection)</td></tr>
<tr><td>TH4
Outdoor air temperature)*1</td><td></td><td>Indoor unit control (Thermo)</td></tr>
<tr><td>Temperature sensor (Indoor air temperature)</td><td></td><td>Indoor unit control (Thermo)</td></tr>
</table>

*1. Indicates gas pipe temperature on the TPKFYP_KM1M0A model.

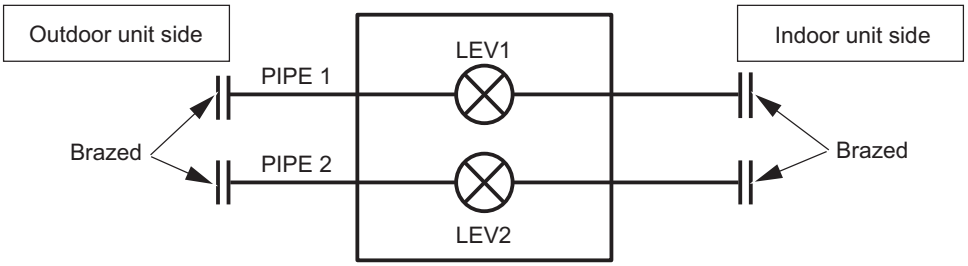
3-5 External Appearance and Refrigerant Circuit Components of Shut Off Valve Kit

CMR-M100KT-NA



3-6 Shut Off Valve Kit Refrigerant Circuit Diagram

CMR-M100KT-NA



Ensure that the connections for the liquid pipe and gas pipe are not reversed between the “Outdoor Unit Side” and “Indoor Unit Side” of the shut off valve kit before making the connections.

3-7 Functions of the Major Components of Shut Off Valve Kit

Part Name	Symbol (functions)	Notes	Usage	Specification	Check method
LEV	LEV1, LEV2		Shuts off the refrigerant circuit if there is a refrigerant leak.	12 VDC Opening of stepping motor driving valve: 0 - 6,000 pulses	Same as the indoor unit LEV. However, the resistance value is different from that of the indoor unit LEV.

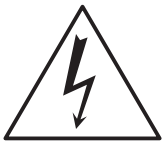
Chapter 4 Electrical Components and Wiring Diagrams

4-1 Outdoor Unit Circuit Board Arrangement 1
4-1-1 Outdoor Unit Control Box 1
4-2 Outdoor Unit Circuit Board Components 6
4-2-1 Control Board 6
4-2-2 Power-supply board (PS Board) 7
4-2-3 Inverter Board (INV Board) 8
4-2-4 Fan board 10
4-2-5 Noise Filter 14
4-2-6 REC board 16
4-3 Outdoor Unit Electrical Wiring Diagrams 17
4-4 Transmission Booster Electrical Wiring Diagrams 21
4-5 Shut Off Valve Kit Control Board 22
4-6 Shut Off Valve Kit Electrical Wiring Diagram 23

4-1 Outdoor Unit Circuit Board Arrangement

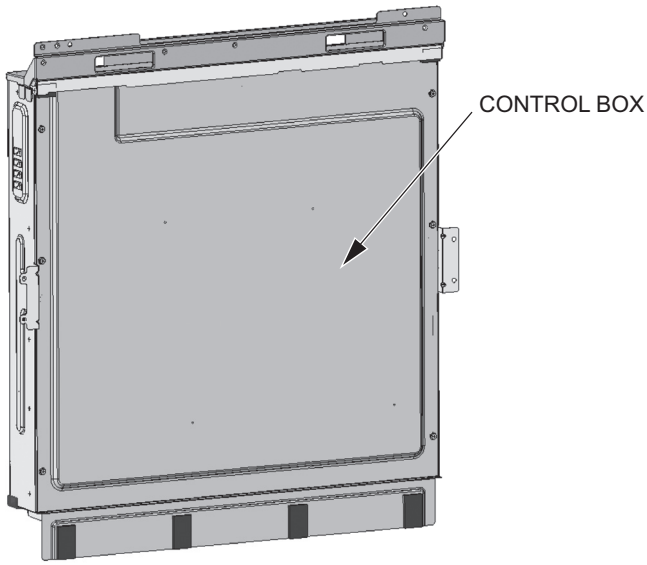
4-1-1 Outdoor Unit Control Box

<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) TUHYE072-1923(4)AMM0AN TUHYH072-1203(4)AMM0AN

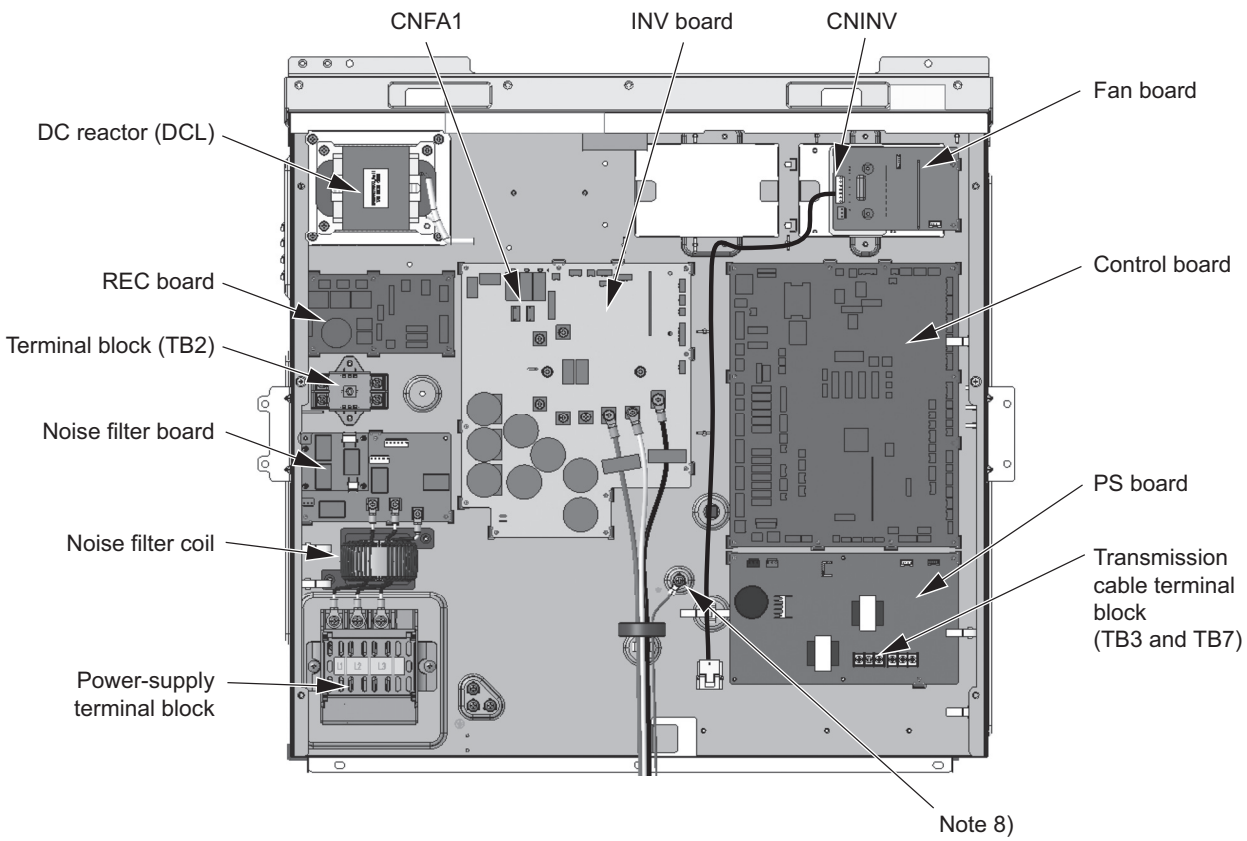


Note

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) Before servicing, ensure that the fan is not rotating, and then disconnect the CNINV connector on the fan board and the CNFA1 connector on the INV board.
   When connecting or disconnecting the connectors, ensure the outdoor unit fan is not rotating.
   The outdoor unit fan, when rotated by a strong wind, may charge the main circuit capacitor, posing a risk of electrical shock.
   See the wiring diagram nameplate for details.
4) The rear surface and inside of the control box have many hot areas. Be careful of those areas even after shutting off the power.
5) When connecting a cable to TB7, ensure the voltage is 20 VDC or lower.
6) After servicing, reconnect the disconnected connectors (CNINV and CNFA1).
7) When turning the unit's power on, the heater will be energized even if the compressor is not operating.
   Before turning the power on, disconnect the electrical wiring from the compressor's terminal box, and measure the insulation resistance.
   Ensure that the compressor does not have a ground fault.
   If the insulation resistance is 1 MΩ or lower, reconnect the electrical wiring to the compressor and turn on the outdoor unit.
   Energizing the heater will help evaporate the liquid refrigerant accumulated inside the compressor.
8) Do not remove the ground wire even during servicing.

(2) TUHYE072, 096, 120
TUHYH072

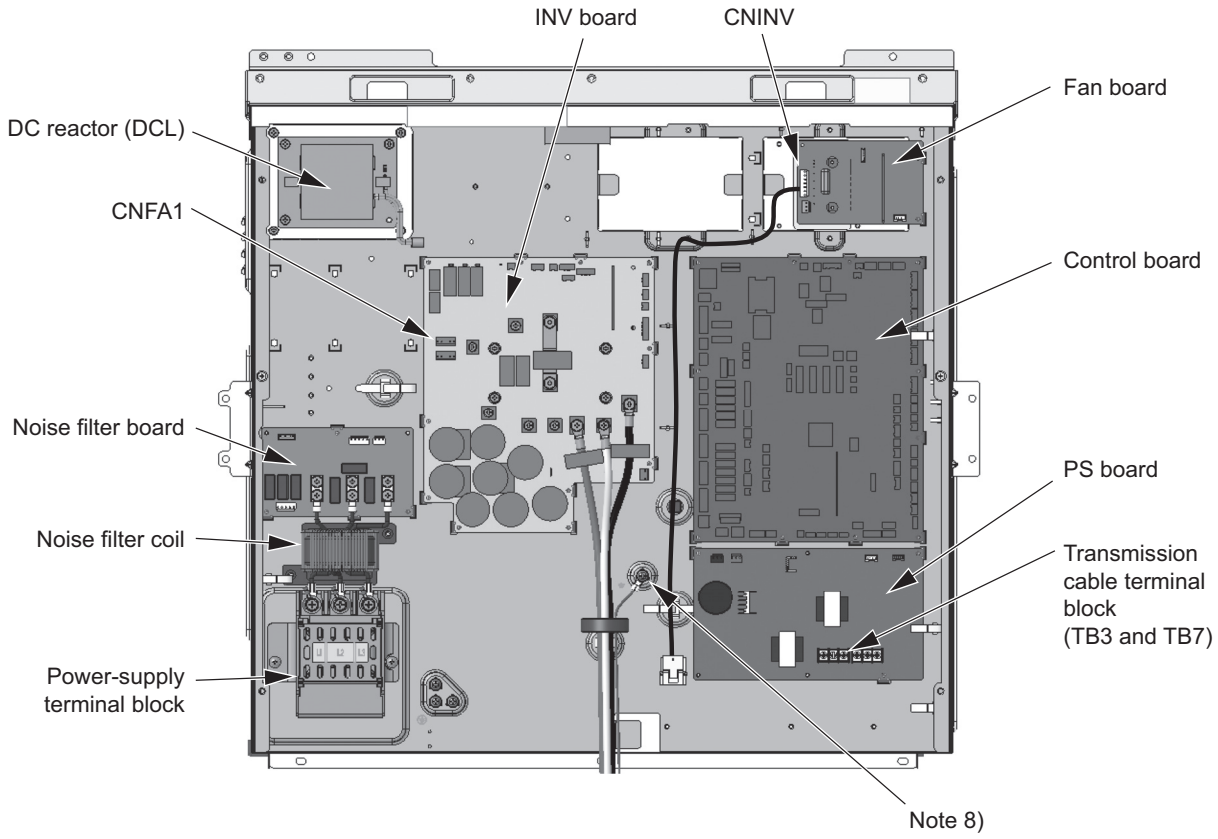
(460V)



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) The control box contains several high voltage charging components. Before servicing, ensure that the unit is turned off for at least 10 minutes to allow the voltage across the tab terminals FTP and FTN on the INV board to drop to 20 VDC or lower.
3) Before servicing, ensure that the fan is not rotating, and then disconnect the CNINV connector on the fan board and the CN-FA1 connector on the INV board.
   When connecting or disconnecting the connectors, ensure the outdoor unit fan is not rotating.
   The outdoor unit fan, when rotated by a strong wind, may charge the main circuit capacitor, posing a risk of electrical shock.
   See the wiring diagram nameplate for details.
4) The rear surface and inside of the control box have many hot areas. Be careful of those areas even after shutting off the power.
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   Energizing the heater will help evaporate the liquid refrigerant accumulated inside the compressor.
8) Do not remove the ground wire even during servicing.

(208-230V)

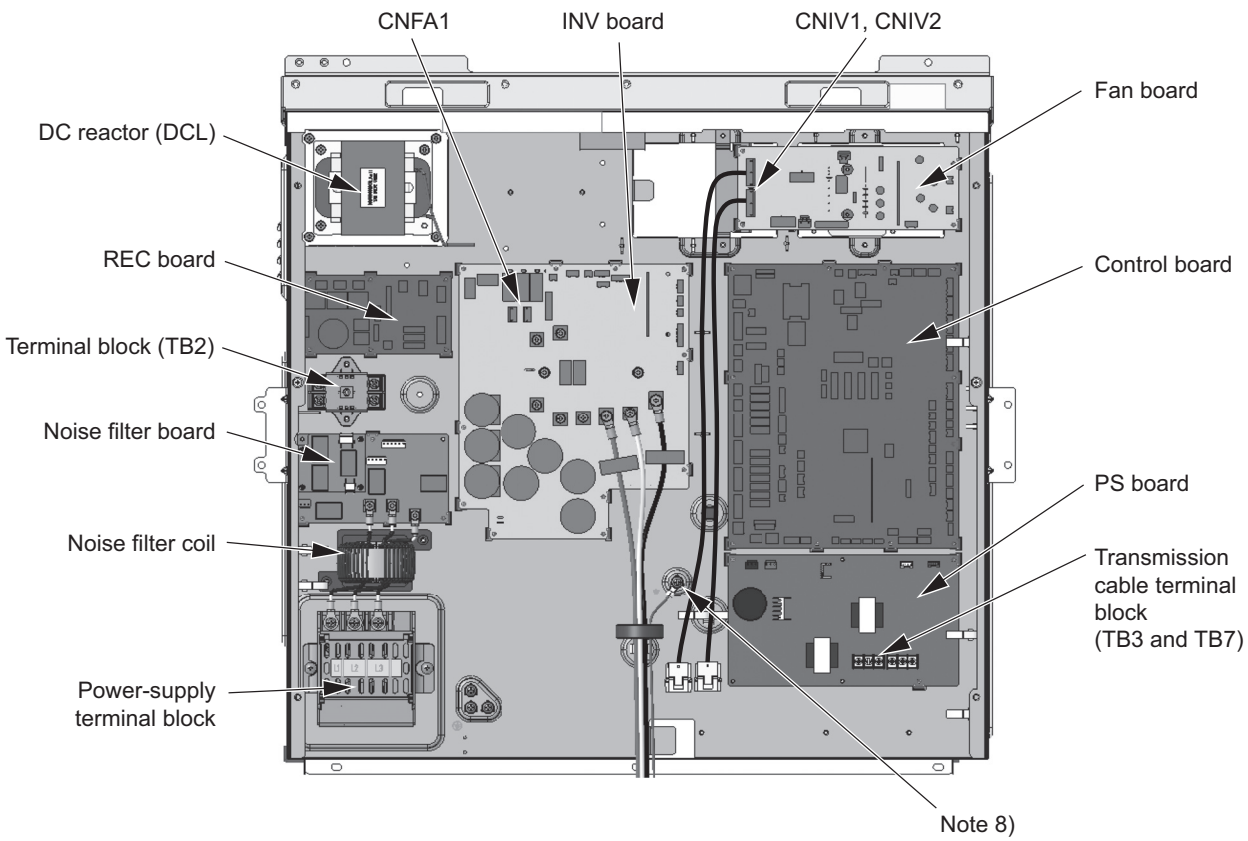


Note

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3) Before servicing, ensure that the fan is not rotating, and then disconnect the CNINV connector on the fan board and the CN-FA1 connector on the INV board.
   When connecting or disconnecting the connectors, ensure the outdoor unit fan is not rotating.
   The outdoor unit fan, when rotated by a strong wind, may charge the main circuit capacitor, posing a risk of electrical shock. See the wiring diagram nameplate for details.
4) The rear surface and inside of the control box have many hot areas. Be careful of those areas even after shutting off the power.
5) When connecting a cable to TB7, ensure the voltage is 20 VDC or lower.
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7) When turning the unit's power on, the heater will be energized even if the compressor is not operating.
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   If the insulation resistance is 1 MΩ or lower, reconnect the electrical wiring to the compressor and turn on the outdoor unit. Energizing the heater will help evaporate the liquid refrigerant accumulated inside the compressor.
8) Do not remove the ground wire even during servicing.

(3) TUHYE144, 168, 192
TUHYH096, 120

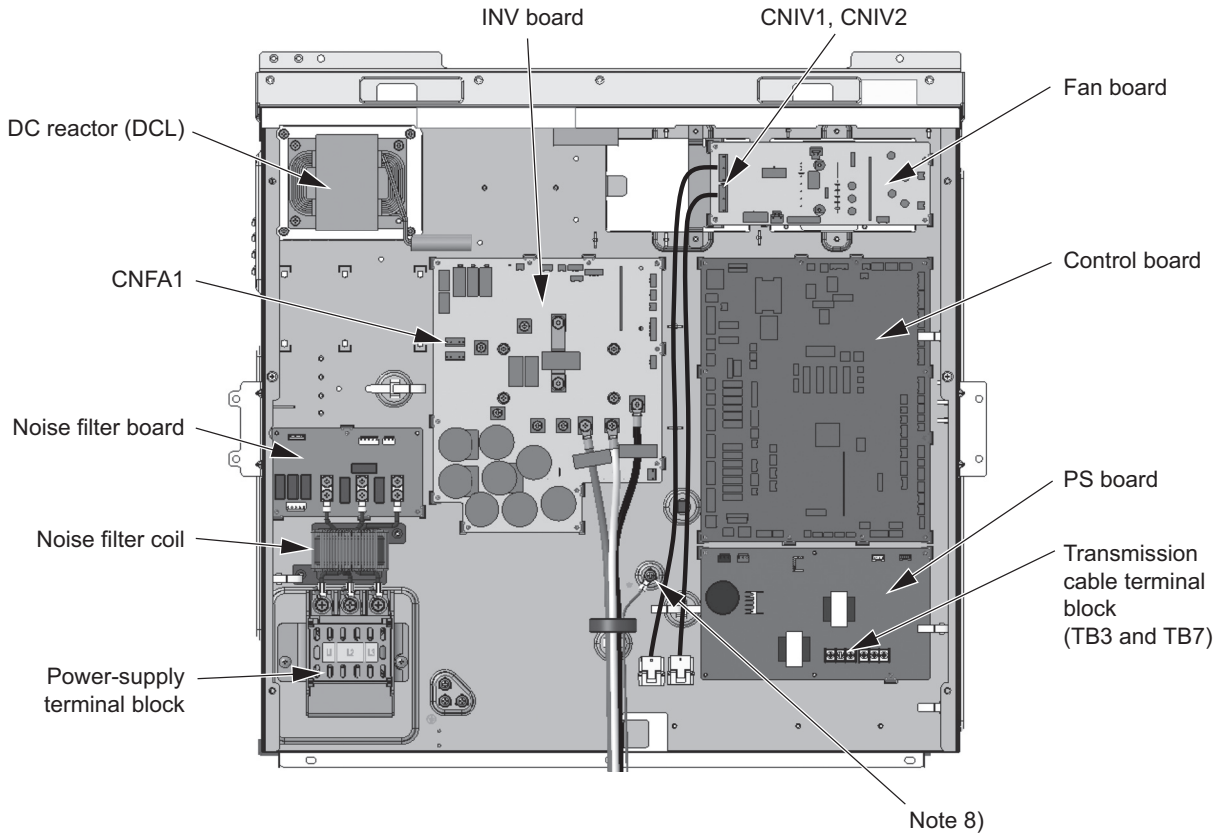
(460V)



Note

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3) Before servicing, ensure that the fan is not rotating, and then disconnect the CNIV1 and CNIV2 connectors on the fan board and the CNFA1 connector on the INV board.
   When connecting or disconnecting the connectors, ensure the outdoor unit fan is not rotating.
   The outdoor unit fan, when rotated by a strong wind, may charge the main circuit capacitor, posing a risk of electrical shock.
   See the wiring diagram nameplate for details.
4) The rear surface and inside of the control box have many hot areas. Be careful of those areas even after shutting off the power.
5) When connecting a cable to TB7, ensure the voltage is 20 VDC or lower.
6) After servicing, reconnect the disconnected connectors (CNIV1, CNIV2, and CNFA1).
7) When turning the unit's power on, the heater will be energized even if the compressor is not operating.
   Before turning the power on, disconnect the electrical wiring from the compressor's terminal box, and measure the insulation resistance.
   Ensure that the compressor does not have a ground fault.
   If the insulation resistance is 1 MΩ or lower, reconnect the electrical wiring to the compressor and turn on the outdoor unit.
   Energizing the heater will help evaporate the liquid refrigerant accumulated inside the compressor.
8) Do not remove the ground wire even during servicing.

(208-230V)

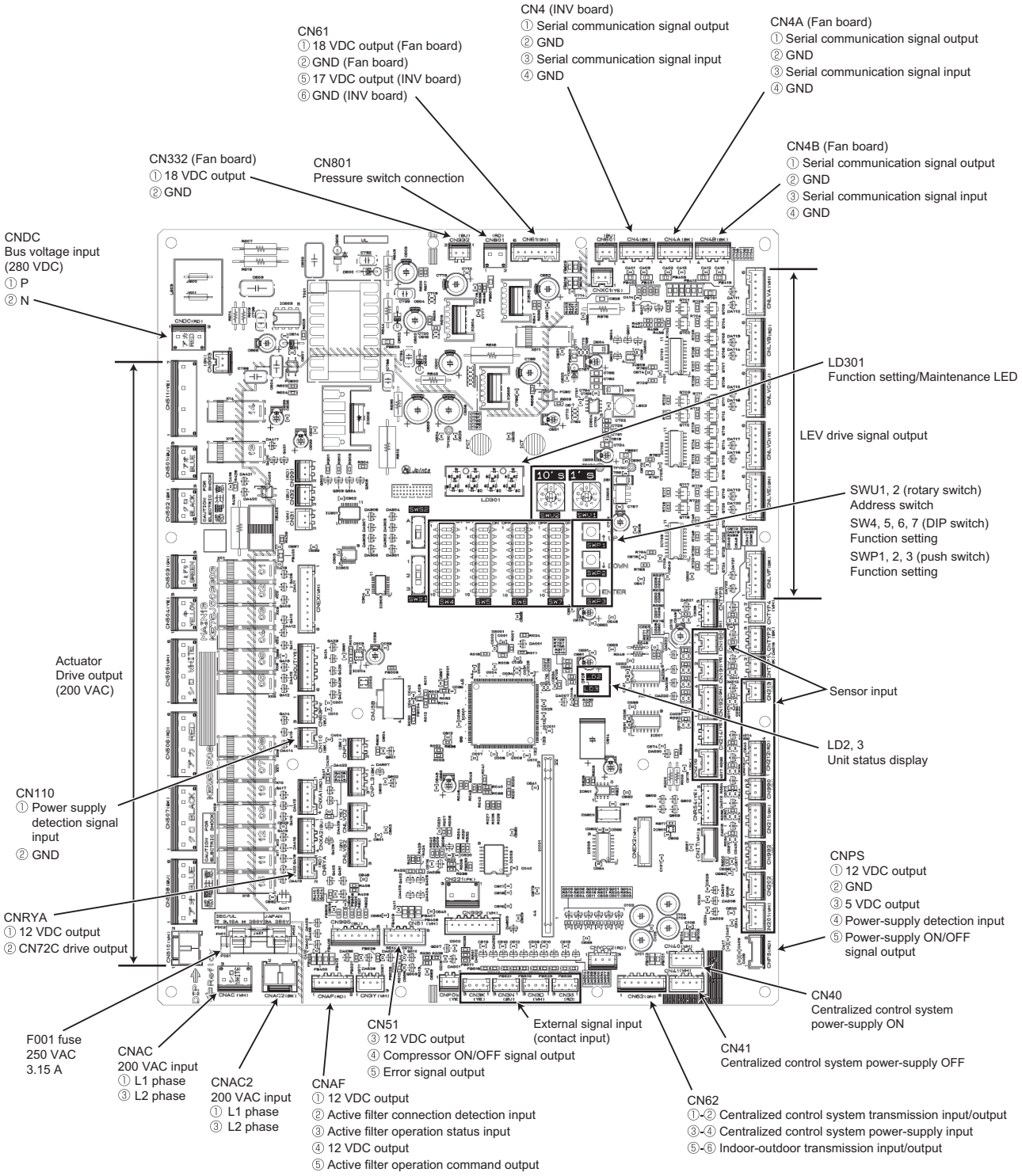


Note

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) The control box contains several high voltage charging components. Before servicing, ensure that the unit is turned off for at least 10 minutes to allow the voltage across the tab terminals FTP and FTN on the INV board to drop to 20 VDC or lower.
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   Ensure that the compressor does not have a ground fault.
   If the insulation resistance is 1 MΩ or lower, reconnect the electrical wiring to the compressor and turn on the outdoor unit.
   Energizing the heater will help evaporate the liquid refrigerant accumulated inside the compressor.
8) Do not remove the ground wire even during servicing.

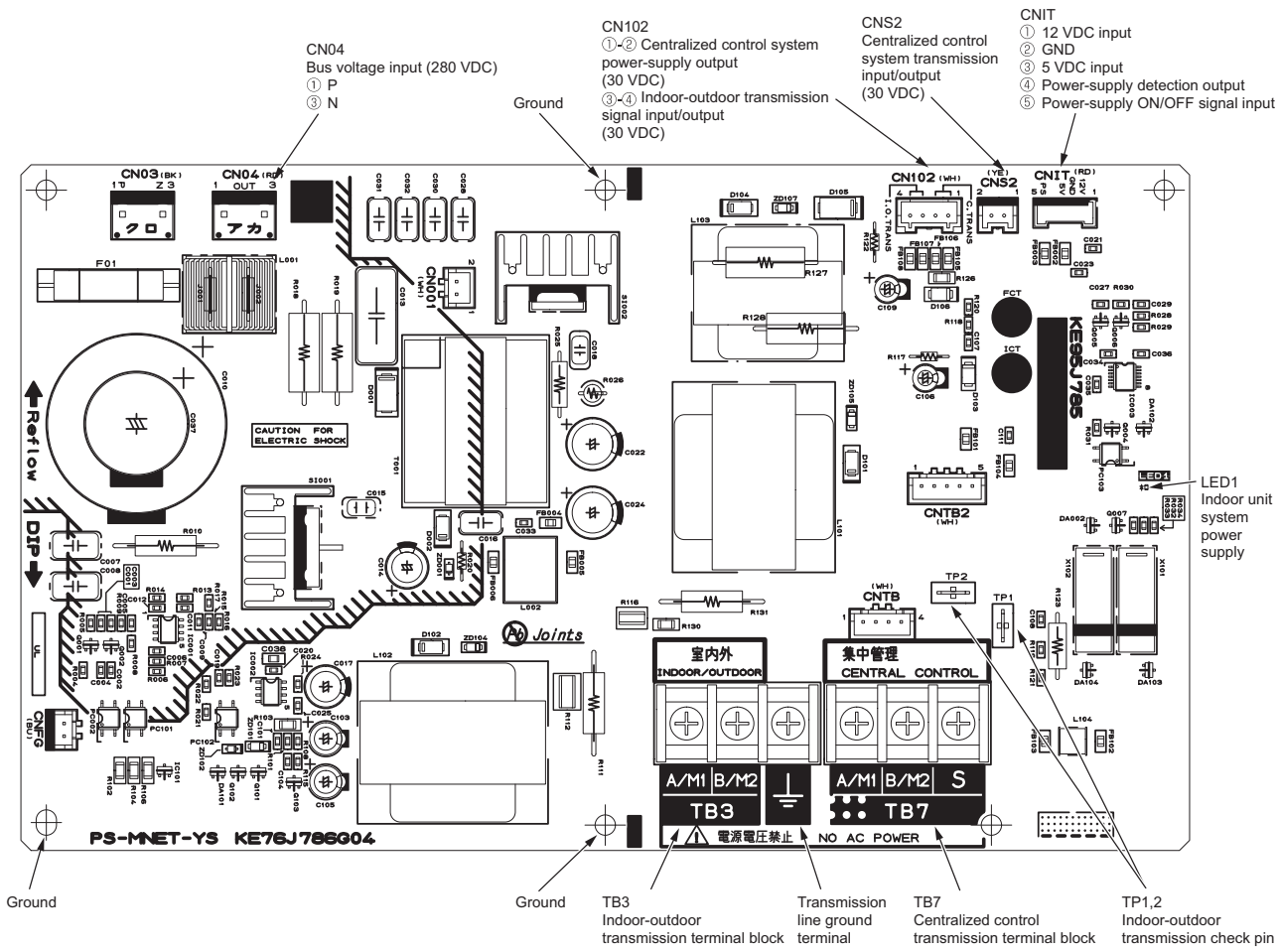
4-2 Outdoor Unit Circuit Board Components

4-2-1 Control Board



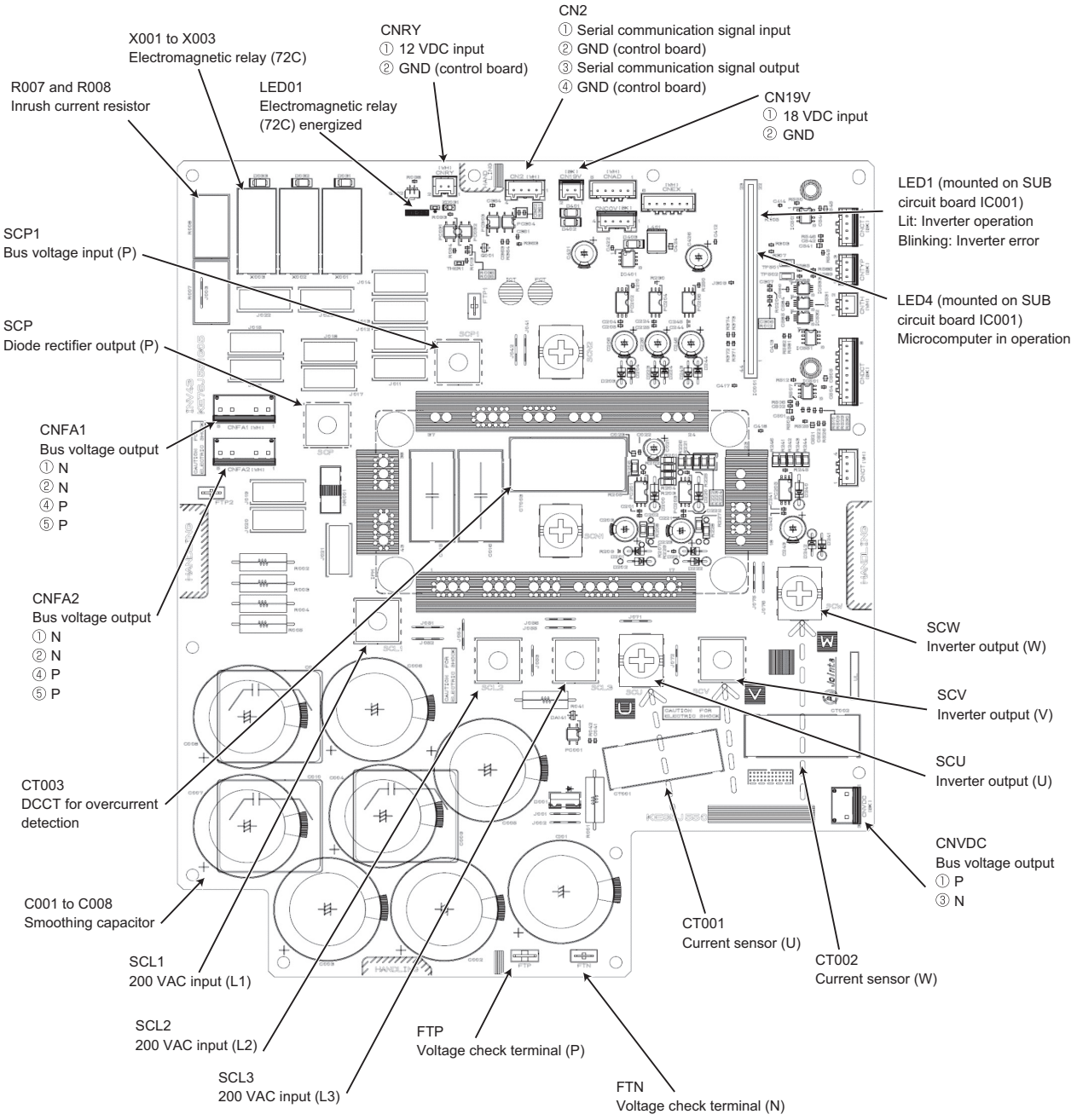
*For information about the display of SW4 function settings, refer to the following page(s). [5-1-1 Outdoor Unit Switch Functions and Factory Settings]

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

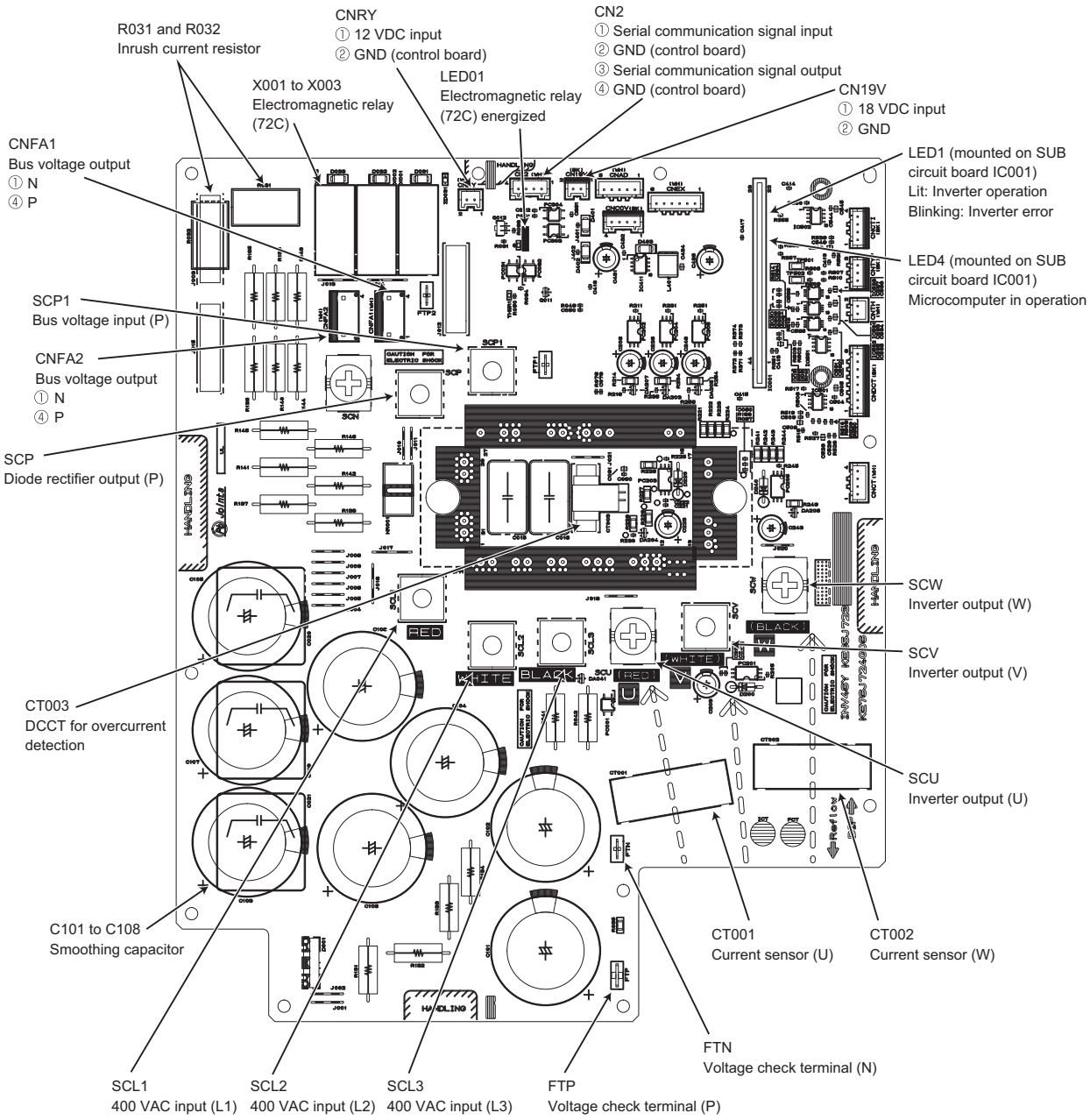


4-2-3 Inverter Board (INV Board)

(1) TUHYE072/096/120/144/168/1923AMM0AN TUHYH072/096/1203AMM0AN

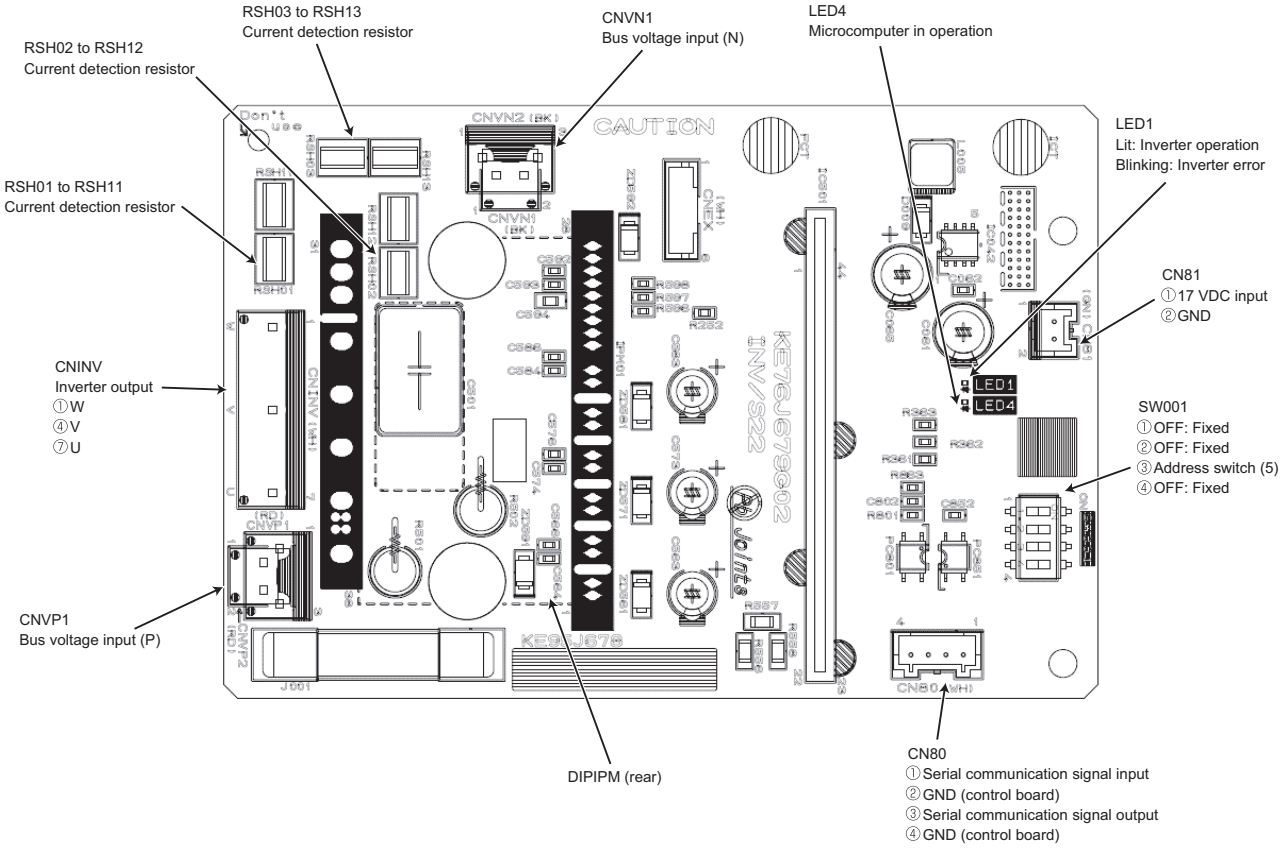


(2) TUHYE072/096/120/144/168/1924AMM0AN
TUHYH072/096/1204AMM0AN

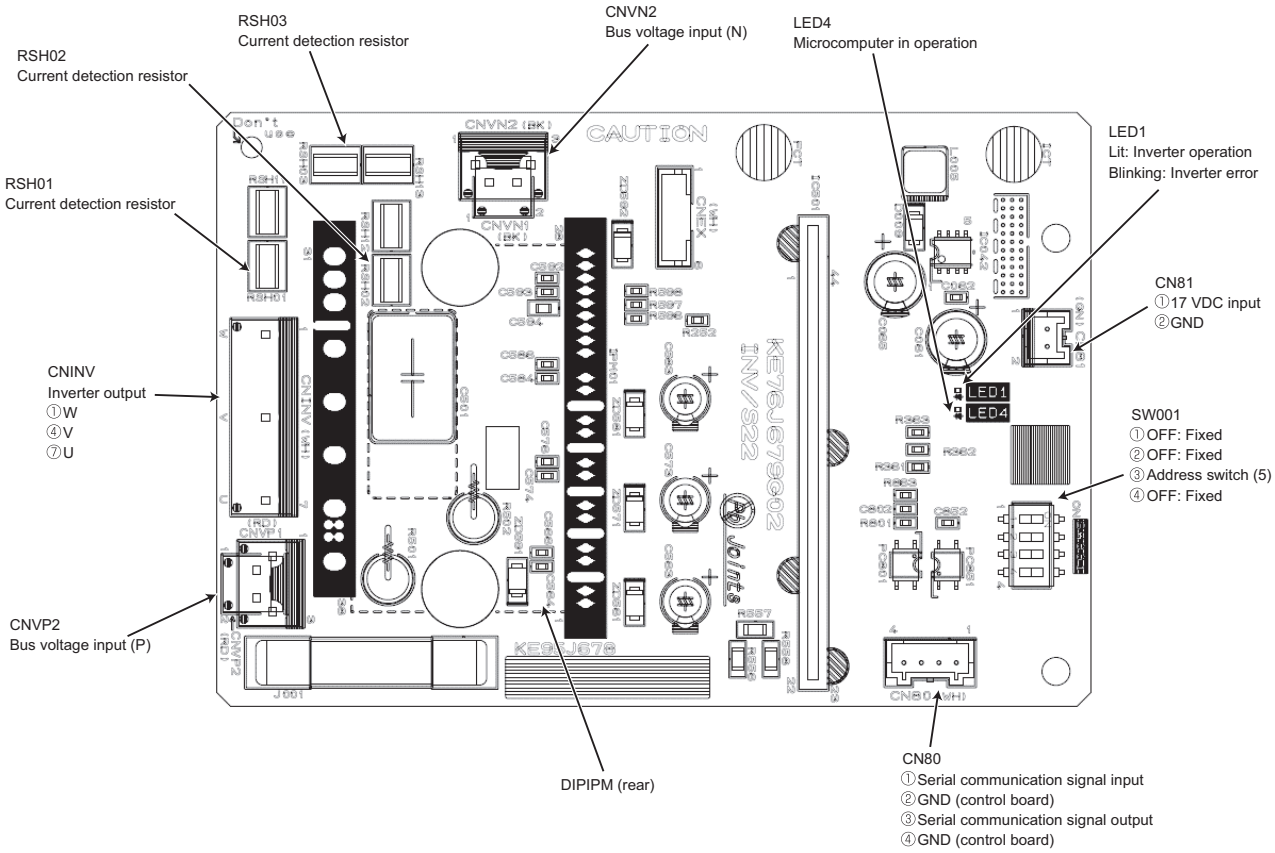


4-2-4 Fan board

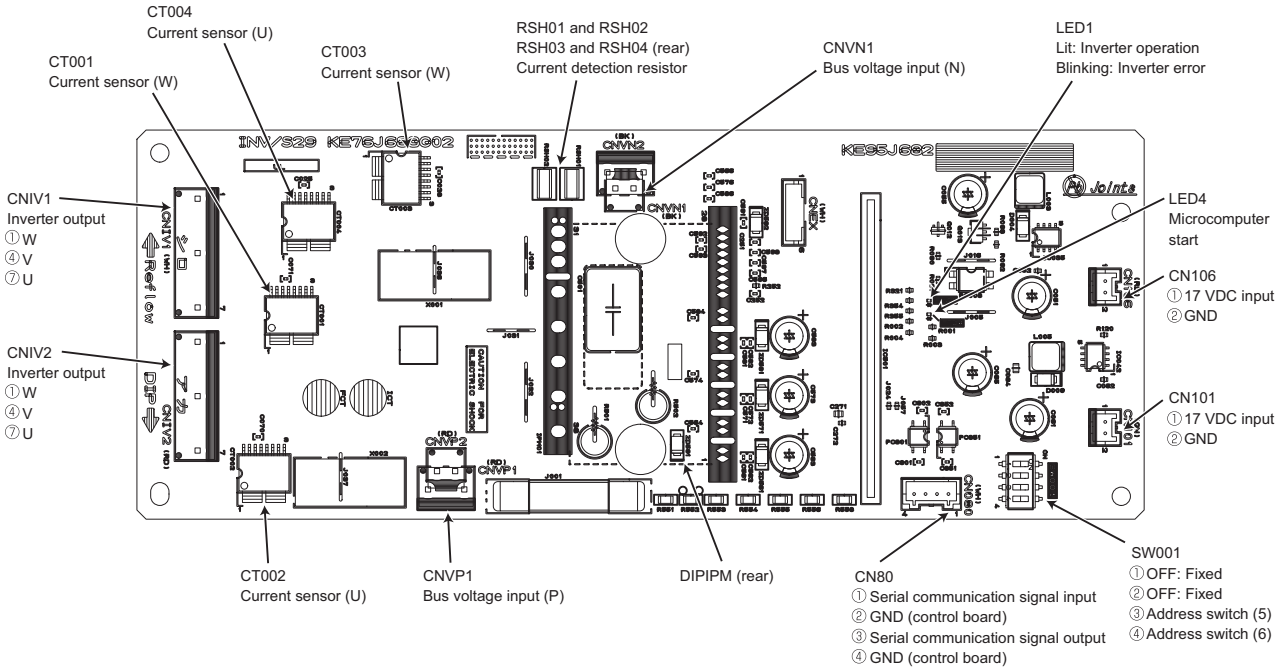
(1) TUHYE072/096/1203AMM0AN
TUHYH0723AMM0AN



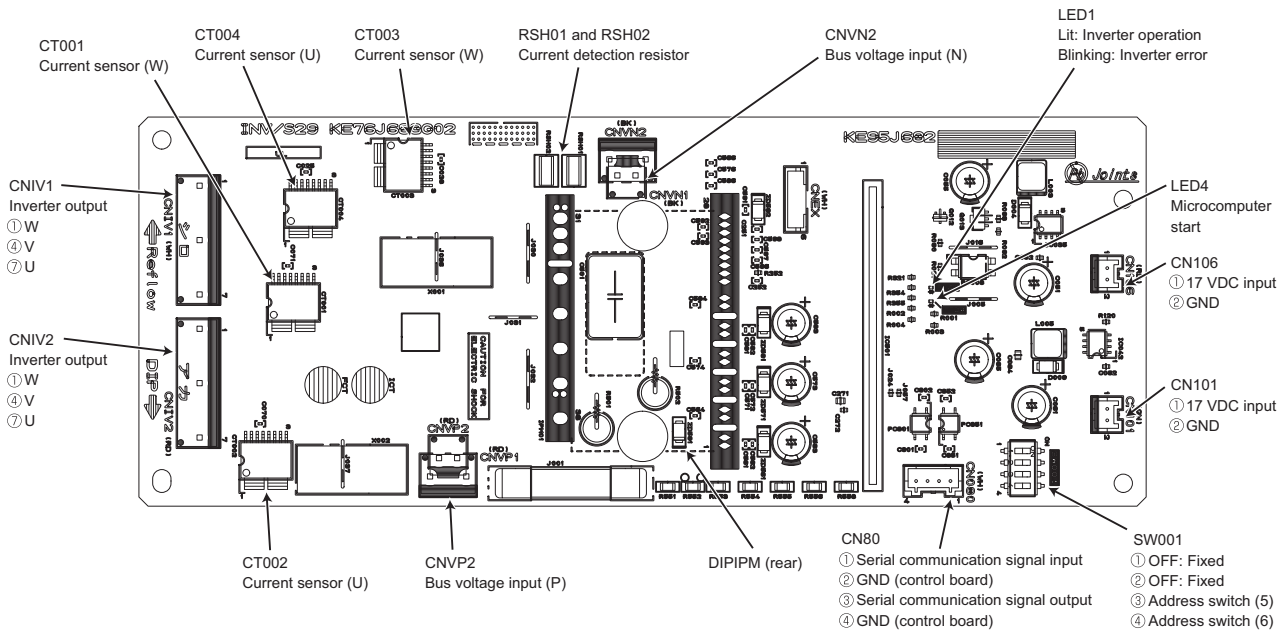
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TUHYH0724AMM0AN



(3) TUHYE144/168/1923AMM0AN
TUHYH096/1203AMM0AN

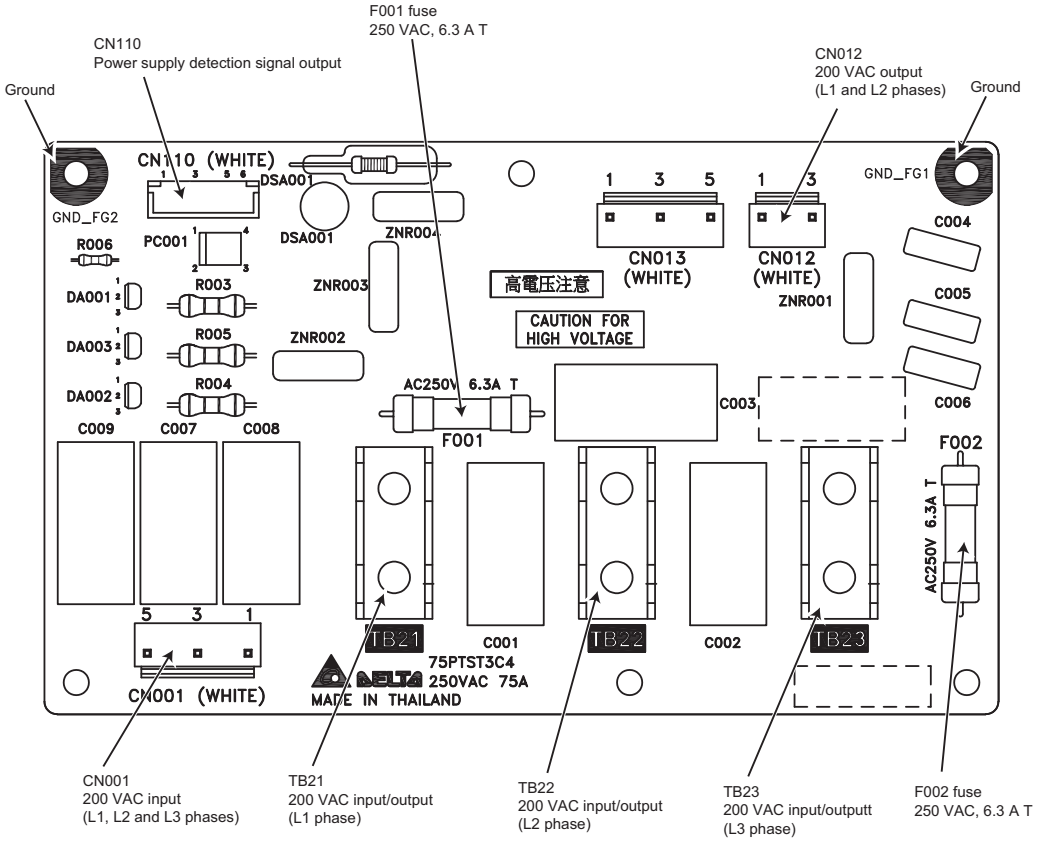


(4) TUHYE144/168/1924AMM0AN
TUHYH096/1204AMM0AN

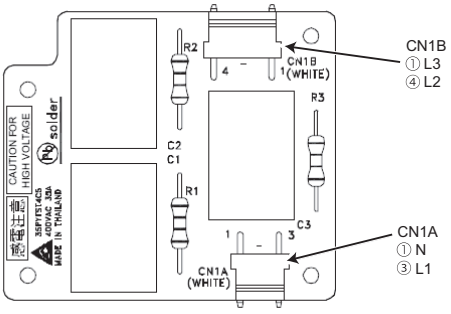


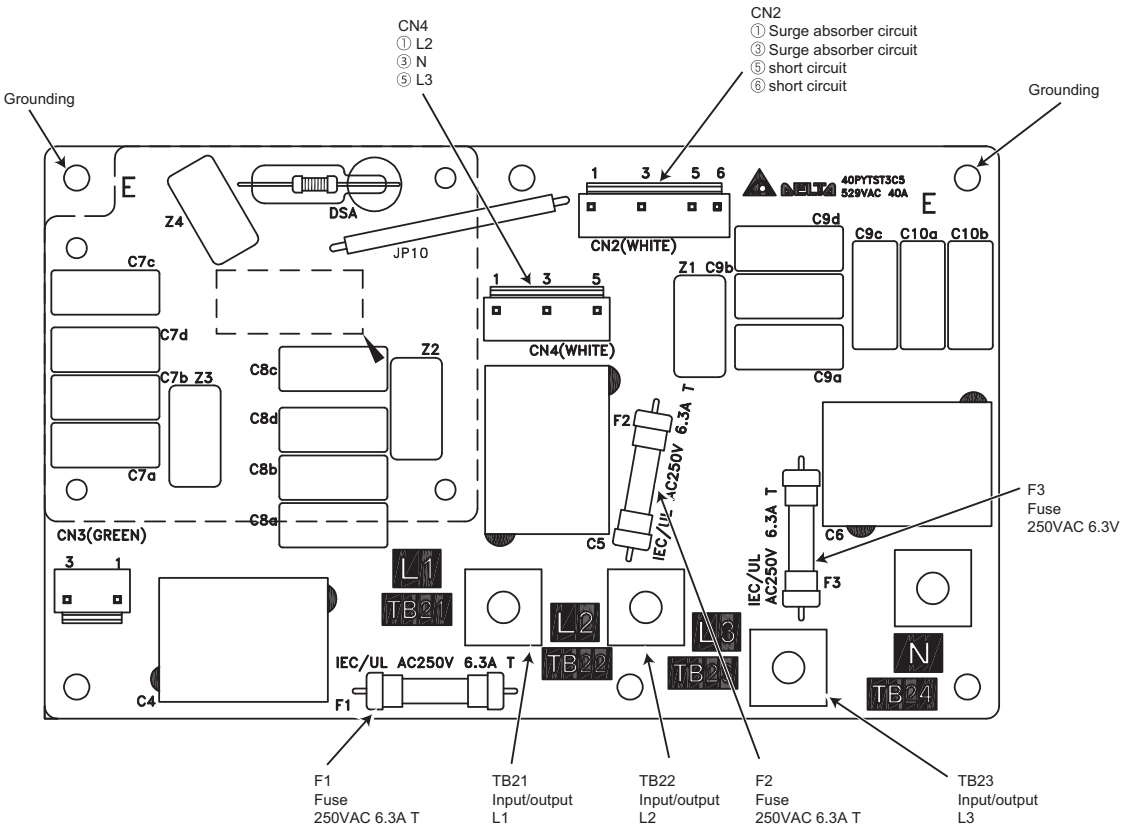
4-2-5 Noise Filter

(1) TUHYE072/096/120/144/168/1923AMM0AN
TUHYH072/096/1203AMM0AN

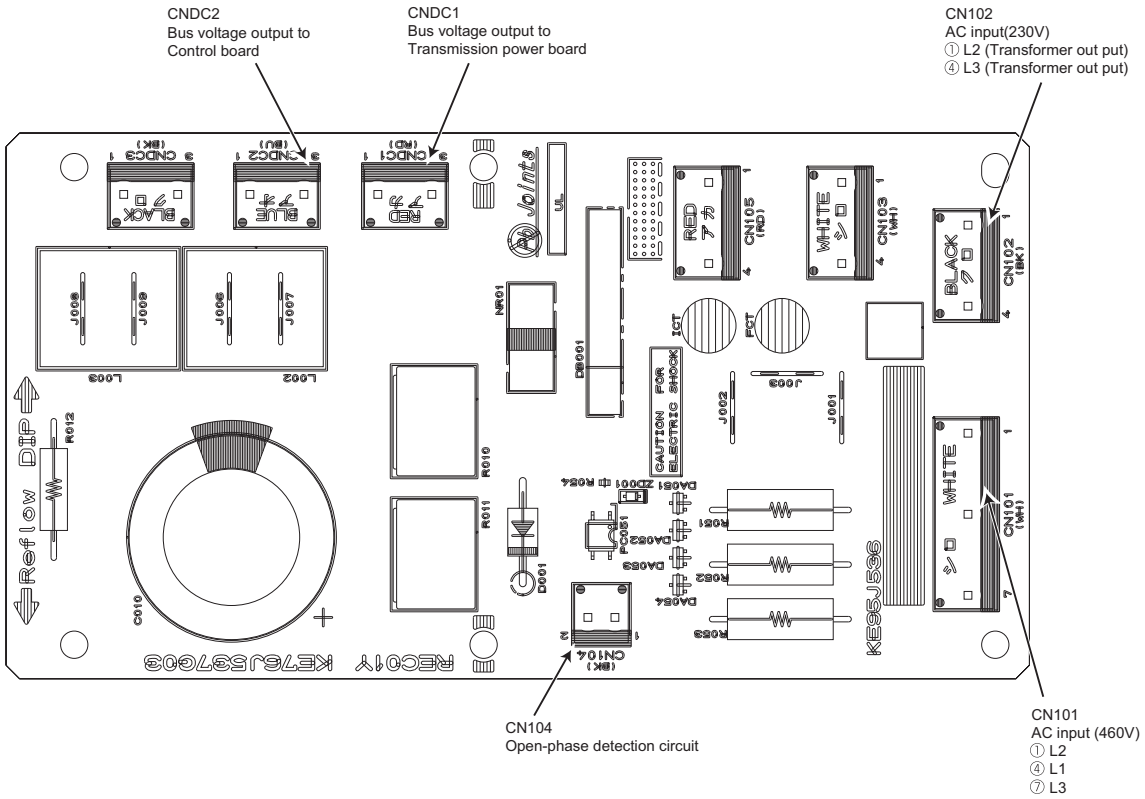


(2) TUHYE072/096/120/144/168/1924AMM0AN
TUHYH072/096/1204AMM0AN



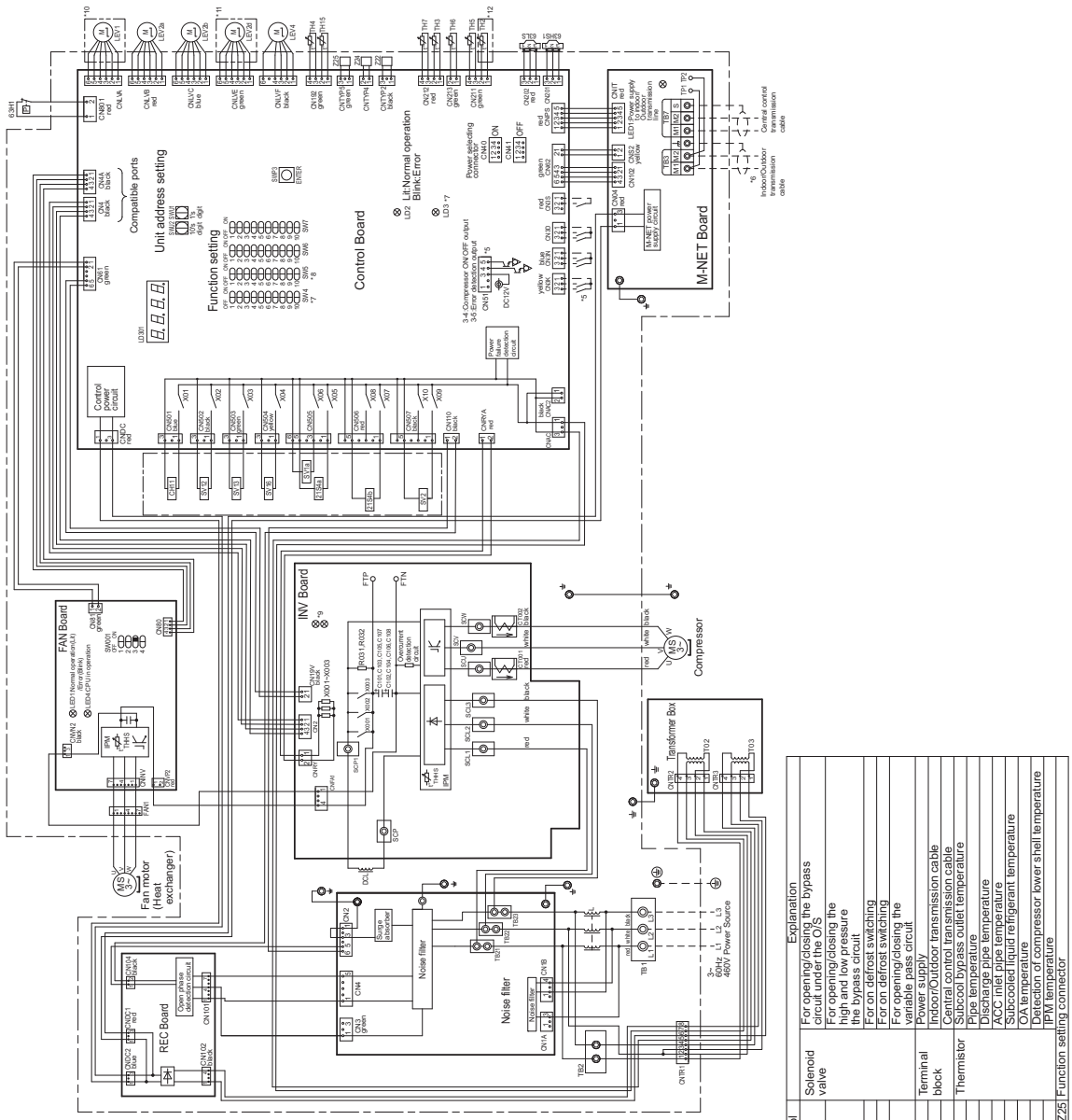


4-2-6 REC board



4-3 Outdoor Unit Electrical Wiring Diagrams

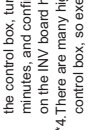
(1) TUHYE072, 096, 1204AMM0AN / TUHYH0724AMM0AN



*1.Dot-dash lines indicate wiring not supplied with unit.
*2.Single-dotted lines indicate the control box boundaries.
*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 between the FTP and FTN terminals on the INV board has dropped to DC20V or less.
*4.There are many high-temperature parts inside and on the back of the control box, so exercise caution even after turning off the power.
*5.Refer to the Data book for connecting input/output signal connectors.
*6.Refer to the Data book for outdoor units in the same refrigerant system.
*7.SW4:in the case of All OFF
•LD3 Lit:Operation
Blink:Turning on
Unlit:Turn off
Refer to the Data book and Service Handbook for other switch setting and monitoring items.
*8.Setting the Central control switch(SW5-1).

System configuration	SW5-1
No connection system with the system controller	OFF
Connection system with the system controller	ON

*9.Refer to the following for the LED on the INV board.



LED4:Microcomputer operation
LED1:Normal operation(Lit)
/Error(Blink)

*10.Difference of appliance

Model name	Appliance
PUHY-TUHY	*10 exist
PURY-TURY	*10 do not exist

*11.Difference of appliance

Model name	Appliance
PUHY-TUHY	*11 do not exist
PURY-TURY	*11 exist

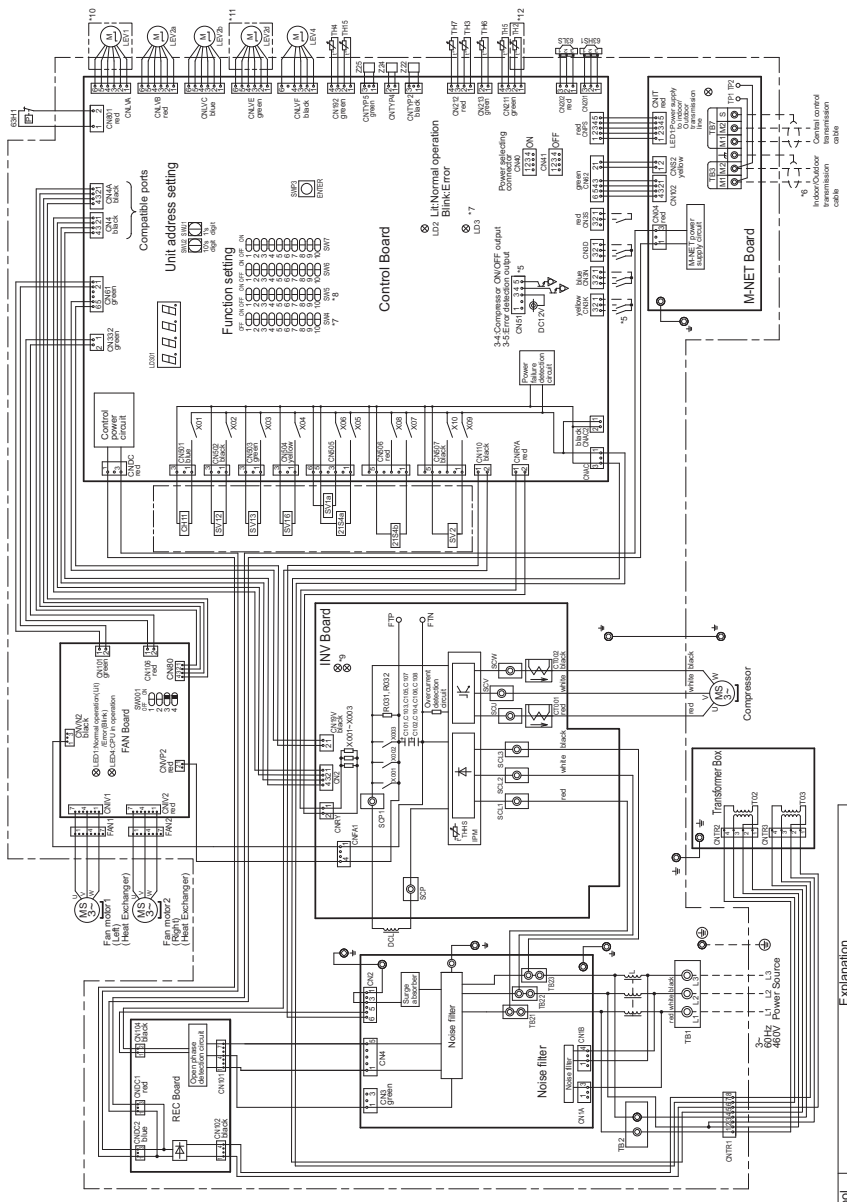
*12.Difference of appliance

Model name	Appliance
PUHY-TUHY	*12 exist
PURY-TURY	*12 do not exist

<Symbol explanation>

Symbol	Explanation	Symbol	Explanation	
21S4a	4-way valve	Cooling/Heating switching	SV1a	Solenoid valve	For opening/closing the bypass circuit under the O/S
21S4b		HEX capacity switching			
63H1	Pressure switch(High pressure protection)		SV2		For opening/closing the high and low pressure the bypass circuit
63HS1	Pressure sensor	Discharge pressure			
63LS		Low pressure			
X001~X003	Magnetic relay(inverter main circuit)Y2C		SV12		For on defrost switching
C001~C007	Capacitor(inverter main circuit)		SV13		For on defrost switching
CH11	Crankcase heater (for heating the compressor)		SV16		For opening/closing the variable pass circuit
CT001,002	Current sensor				
DCL	DC reactor(For power factor enhancement)		TB1	Terminal block	Power supply
L	Choke coil(For high-frequency noise reduction)		TB3		Indoor/Outdoor transmission cable
LEV1	Linear expansion valve	Pressure control, Refrigerant flow late control.	TB7		Central control transmission cable
			TH2	Thermistor	Subcool bypass outlet temperature
LEV2a		Pressure control, Refrigerant flow late control.	TH3		Pipe temperature
			TH4		Discharge pipe temperature
LEV2b		Pressure control,Refrigerant flow late control.	TH5		ACC inlet pipe temperature
			TH6		Subcooled liquid refrigerant temperature
LEV2d		Pressure control,Refrigerant flow late control.	TH7		OA temperature
			TH15		Detection of compressor lower shell temperature
LEV4		For opening/closing the injection circuit	THHS		IPM temperature
			Z22,Z24,Z25		Function setting connector
R007,008	Resistor	Inrush current prevention			

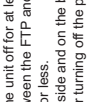
(2) TUHYE144, 168, 1924AMM0AN / TUHYH096, 1204AMM0AN



*1.Dot-dash lines indicate wiring not supplied with unit.
*2.Single-dotted lines indicate the control box boundaries.
*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 between the FTP and FTN terminals on the INV board has dropped to DC20V or less.
*4.There are many high-temperature parts inside and on the back of the control box, so exercise caution even after turning off the power.
*5.Refer to the Data book for connecting input/output signal connectors.
*6.Refer to the Data book for outdoor units in the same refrigerant system.
*7.SW4:In the case of All OFF
•LD3
Lit:Operation
Blink:Turning on
Unit:Turn off
Refer to the Data book and Service Handbook for other switch setting and monitoring items.
*8.Setting the Central control switch(SW5-1).

System configuration	SW5-1
No connection system with the system controller	OFF
Connection system with the system controller	ON

*9.Refer to the following for the LED on the INV board.



•LED4:Microcomputer operation
•LED1:Normal operation(Lit)
/Error(Blink)

*10.Difference of appliance

Model name	Appliance
PUHY/TUHY	*10 exist
PURY/TURY	*10 do not exist

*11.Difference of appliance

Model name	Appliance
PURY/TURY	*11 do not exist
PURY/TURY	*11 exist

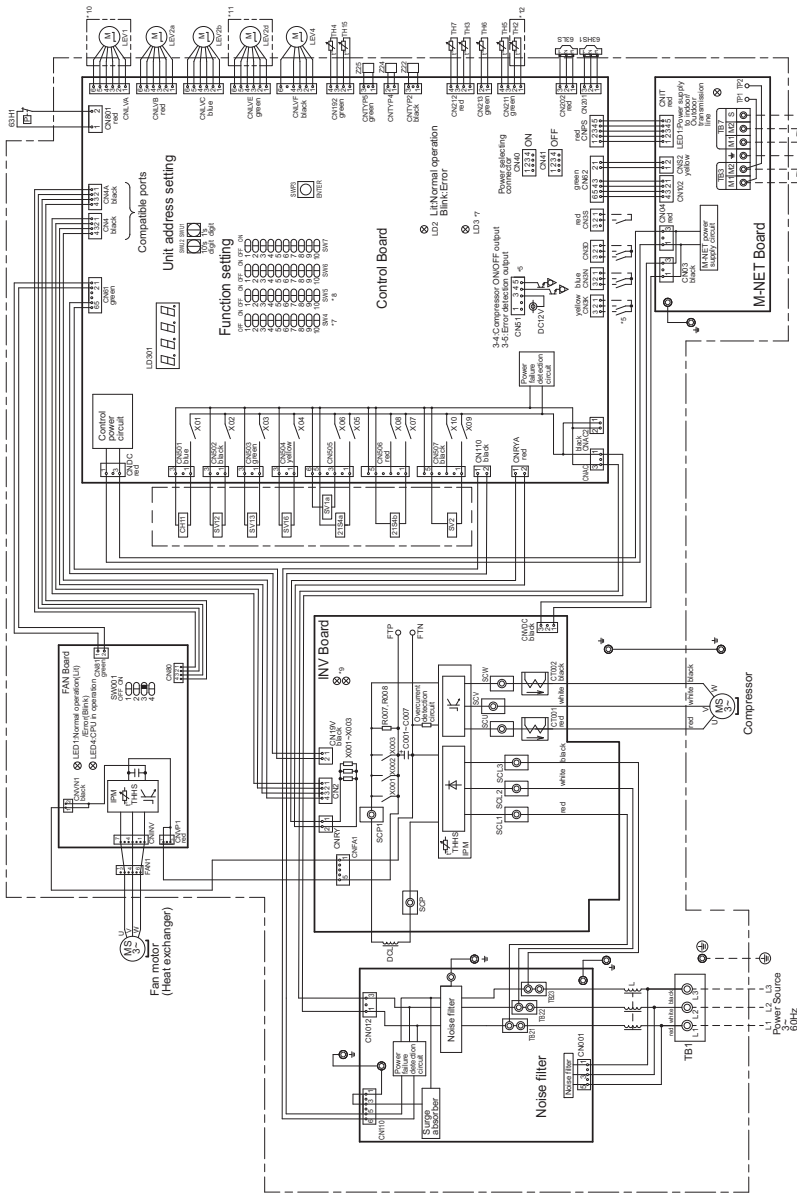
*12.Difference of appliance

Model name	Appliance
PURY/TURY	*12 exist
PURY/TURY	*12 do not exist

<Symbol explanation>

Symbol	Explanation	Symbol	Explanation	
21S4a	4-way valve	Cooling/Heating switching	SV1a	Solenoid valve	For opening/closing the bypass circuit under the O/S
21S4b		HEX capacity switching			
63H1	Pressure switch(High pressure protection)		SV2		For opening/closing the high and low pressure the bypass circuit
63HS1	Pressure sensor	Discharge pressure			
63LS		Low pressure			
X001~X003	Magnetic relay(Inverter main circuit)Y2C		SV12		For on defrost switching
C001~C007	Capacitor(Inverter main circuit)		SV13		For on defrost switching
CH11	Crankcase heater (for heating the compressor)		SV16		For opening/closing the variable pass circuit
CT001,002	Current sensor				
DCL	DC reactor(For power factor enhancement)		TB1	Terminal block	Power supply
L	Choke coil(For high-frequency noise reduction)		TB3		Indoor/Outdoor transmission cable
LEV1	Linear expansion valve	Pressure control.	TB7		Central control transmission cable
		Refrigerant flow late control.	TH2	Thermistor	Subcool bypass outlet temperature
LEV2a		Pressure control.	TH3		Pipe temperature
		Refrigerant flow late control.	TH4		Discharge pipe temperature
LEV2b		Pressure control, Refrigerant flow late control.	TH5		ACC inlet pipe temperature
			TH6		Subcooled liquid refrigerant temperature
LEV2d		Pressure control, Refrigerant flow late control.	TH7		OA temperature
			TH15		Detection of compressor lower shell temperature
LEV4		For opening/closing the injection circuit	THHS		IPM temperature
			Z22,Z24,Z25		Function setting connector
R007,008	Resistor	Inrush current prevention			

(3) TUHYE072, 096, 1203AMM0AN / TUHYH0723AMM0AN



*1.Dot-dash lines indicate wiring not supplied with unit.
*2.Single-dotted lines indicate the control box boundaries.
*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 between the FTP and FTN terminals on the INV board has dropped to DC20V or less.
*4.There are many high-temperature parts inside and on the back of the control box, so exercise caution even after turning off the power.
*5.Refer to the Data book for connecting input/output signal connectors.
*6.Refer to the Data book for outdoor units in the same refrigerant system.
*7.SW4:In the case of All OFF
•LD3 Lit:Operation
Blink:Turning on
Unit:Turn off
Refer to the Data book and Service Handbook for other switch setting and monitoring items.
*8.Setting the Central control switch(SW5-1).

System configuration	SW5-1
No connection system with the system controller	OFF
Connection system with the system controller	ON

*9.Refer to the following for the LED on the INV board.



LED4:Microcomputer operation
LED1:Normal operation(Lit)
/Error(Blink)

*10.Difference of appliance

Model name	Appliance
PUHY/TUHY	*10 exist
PURY/TURY	*10 do not exist

*11.Difference of appliance

Model name	Appliance
PURY/TURY	*11 do not exist
PURY/TURY	*11 exist

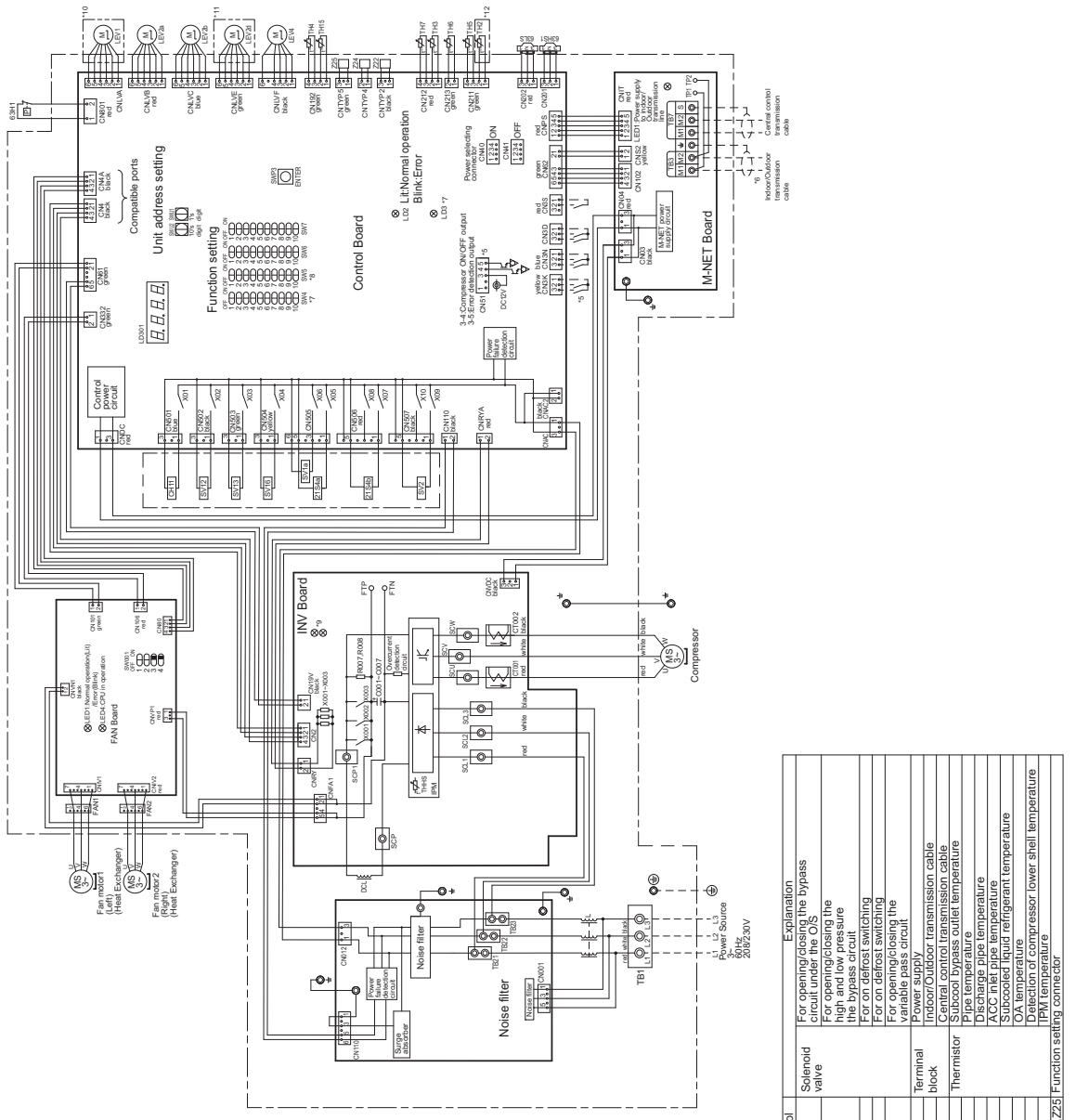
*12.Difference of appliance

Model name	Appliance
PUHY/TUHY	*12 exist
PURY/TURY	*12 do not exist

<Symbol explanation>

Symbol	Explanation	Symbol		Explanation
21S4a	Cooling/Heating switching	SV1a	Solenoid valve	For opening/closing the bypass circuit under the O/S
21S4b	HEX capacity switching			
63H1	Pressure switch(High pressure protection)	SV2		For opening/closing the high and low pressure the bypass circuit
63HS1	Pressure sensor Discharge pressure			
63LS	Low pressure			
X001~X003	Magnetic relay(Inverter main circuit)/2C	SV12		For on defrost switching
C001~C007	Capacitor(Inverter main circuit)	SV13		For on defrost switching
CH11	Crankcase heater (for heating the compressor)	SV16		For opening/closing the variable pass circuit
CT001,002	Current sensor			
DCL	DC reactor(For power factor enhancement)	TB1	Terminal block	Power supply
L	Choke coil(For high-frequency noise reduction)	TB3		Indoor/Outdoor transmission cable
LEV1	Linear expansion valve	TB7		Central control transmission cable
		TH2	Thermistor	Subcool bypass outlet temperature
LEV2a	Pressure control, Refrigerant flow late control.	TH3		Pipe temperature
		TH4		Discharge pipe temperature
LEV2b	Pressure control, Refrigerant flow late control.	TH5		ACC inlet pipe temperature
		TH6		Subcooled liquid refrigerant temperature
LEV2d	Pressure control, Refrigerant flow late control.	TH7		OA temperature
		TH15		Detection of compressor lower shell temperature
LEV4	For opening/closing the injection circuit	THHS		IPM temperature
		Z22,Z24,Z25		Function setting connector
R007,008	Resistor			Inrush current prevention

(4) TUHYE144, 168, 1923AMM0AN / TUHYH096, 1203AMM0AN



*1.Dot-dash lines indicate wiring not supplied with unit.
*2.Single-dotted lines indicate the control box boundaries.
*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 between the FTP and FTN terminals on the INV board has dropped to DC20V or less.
*4.There are many high-temperature parts inside and on the back of the control box, so exercise caution even after turning off the power.
*5.Refer to the Data book for connecting input/output signal connectors.
*6.Refer to the Data book for outdoor units in the same refrigerant system.
*7.SW4:In the case of All OFF
•LD3 Lit:Operation
Blink:Turning on
Unit:Turn off
Refer to the Data book and Service Handbook for other switch setting and monitoring items.
*8.Setting the Central control switch(SW5-1).

System configuration	SW5-1
No connection system with the system controller	OFF
Connection system with the system controller	ON

*9.Refer to the following for the LED on the INV board.



LED4:Microcomputer operation
LED1:Normal operation(Lit)
/Error(Blink)

*10.Difference of appliance

Model name	Appliance
PUHY/TUHY	*10 exist
PURY/TURY	*10 do not exist

*11.Difference of appliance

Model name	Appliance
PUHY/TUHY	*11 do not exist
PURY/TURY	*11 exist

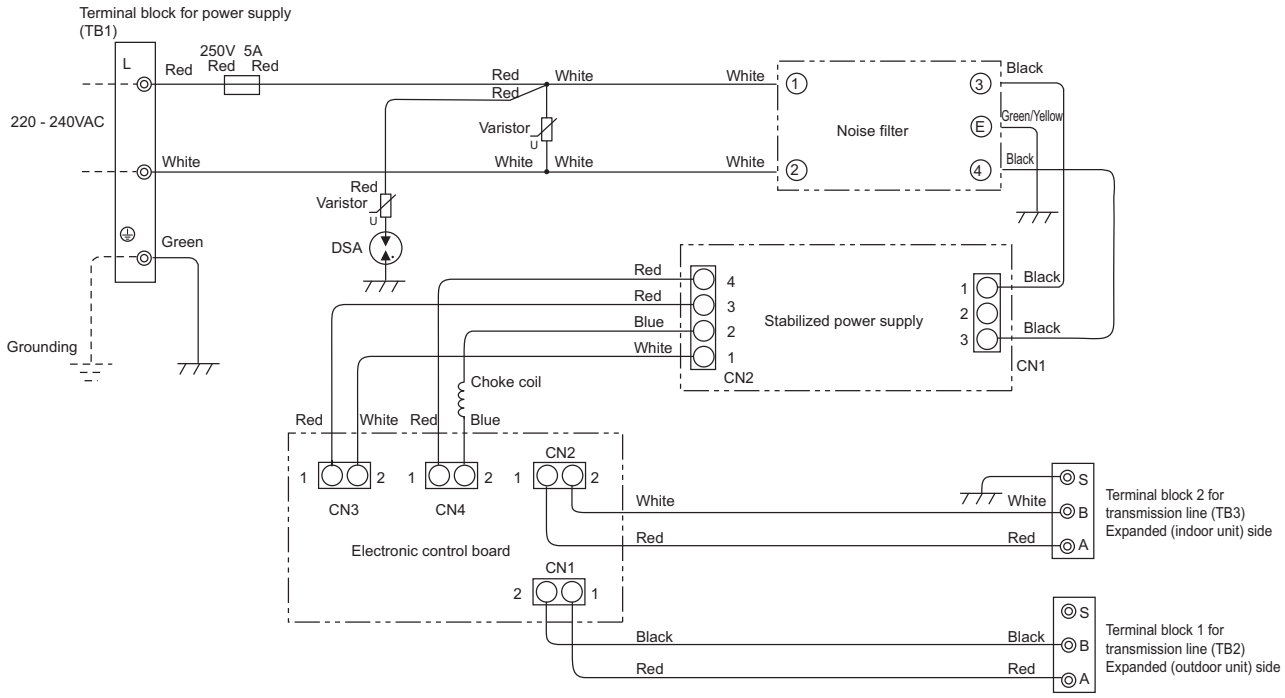
*12.Difference of appliance

Model name	Appliance
PUHY/TUHY	*12 exist
PURY/TURY	*12 do not exist

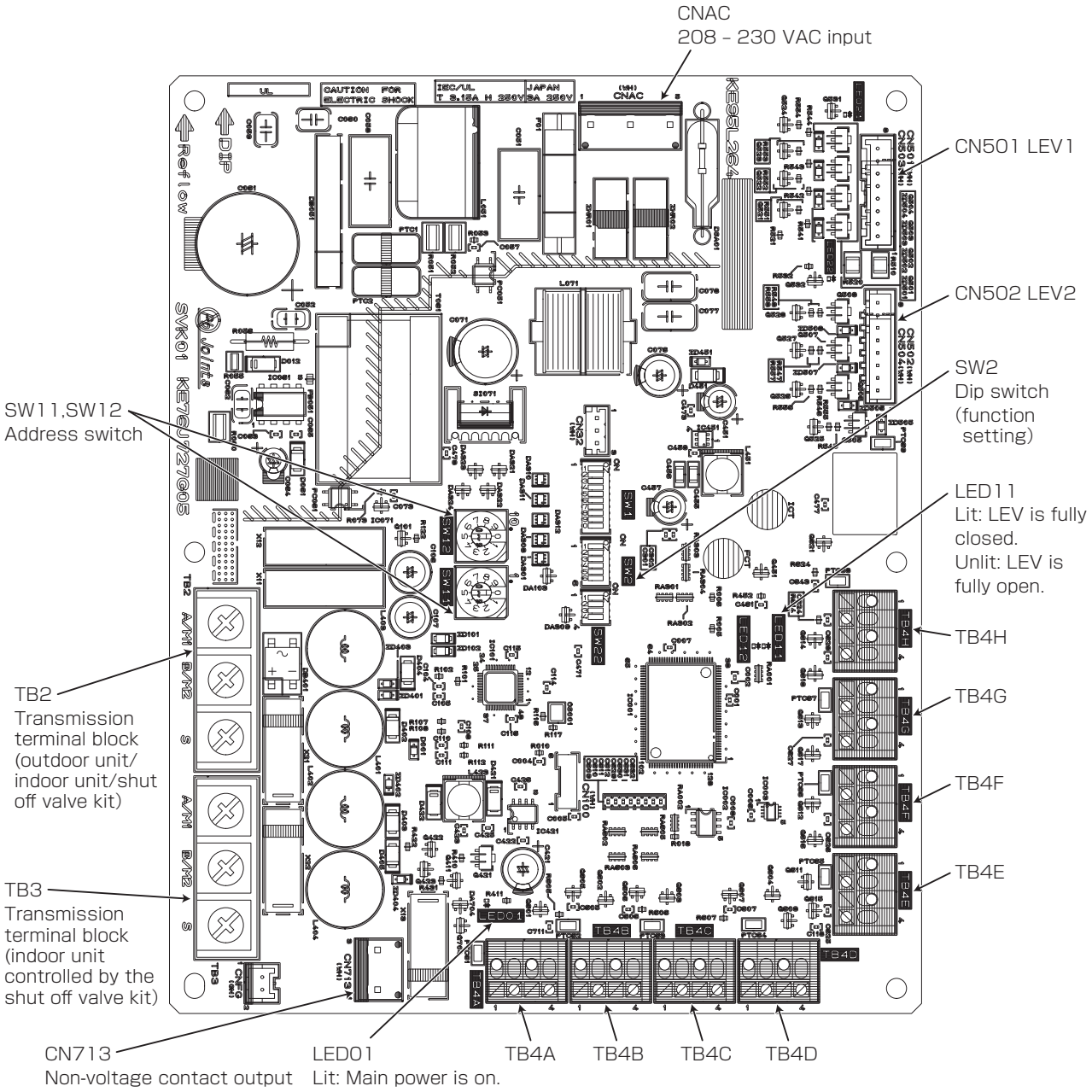
<Symbol explanation>

Symbol		Explanation	Symbol		Explanation
21S4a	4-way valve	Cooling/Heating switching	SV1a	Solenoid valve	For opening/closing the bypass circuit under the O/S
21S4b		HEX capacity switching			
63H1	Pressure switch	(High pressure protection)	SV2		For opening/closing the high and low pressure the bypass circuit
63HS1	Pressure sensor	Discharge pressure			
63LS		Low pressure			
X001~X003	Magnetic relay	(Inverter main circuit)Y2C	SV12		For on defrost switching
C001~C007	Capacitor	(Inverter main circuit)	SV13		For on defrost switching
CH11	Crankcase heater	(for heating the compressor)	SV16		For opening/closing the variable pass circuit
CT001_002	Current sensor				
DCL	DC reactor	(For power factor enhancement)	TB1	Terminal block	Power supply
L	Choke coil	(For high-frequency noise reduction)	TB3		Indoor/Outdoor transmission cable
LEV1	Linear expansion valve	Pressure control.	TB7		Central control transmission cable
LEV2a		Refrigerant flow late control.	TH2	Thermistor	Subcool bypass outlet temperature
		Pressure control.	TH3		Pipe temperature
LEV2b		Refrigerant flow late control.	TH4		Discharge pipe temperature
		Pressure control.	TH5		ACC inlet pipe temperature
		Refrigerant flow late control.	TH6		Subcooled liquid refrigerant temperature
LEV2d		Pressure control.	TH7		OA temperature
		Refrigerant flow late control.	TH15		Detection of compressor lower shell temperature
LEV4		For opening/closing the injection circuit	THHS		IPM temperature
			Z22,Z24,Z25		Function setting connector
R007,008	Resistor	Inrush current prevention			

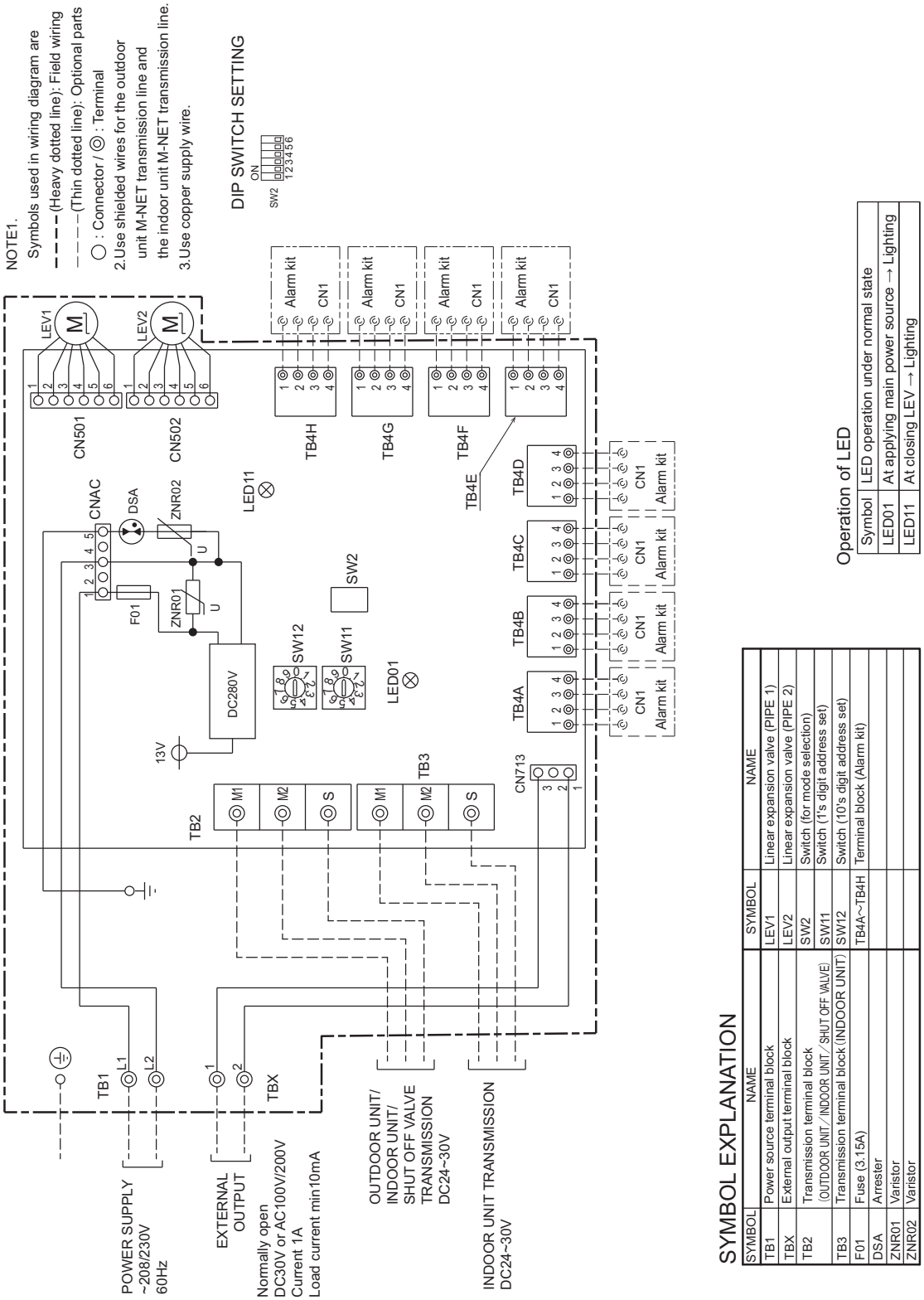
4-4 Transmission Booster Electrical Wiring Diagrams



4-5 Shut Off Valve Kit Control Board



4-6 Shut Off Valve Kit Electrical Wiring Diagram



Operation of LED

Symbol	LED operation under normal state
LED01	At applying main power source → Lighting
LED11	At closing LEV → Lighting

SYMBOL EXPLANATION

SYMBOL	NAME	SYMBOL	NAME
TB1	Power source terminal block	LEV1	Linear expansion valve (PIPE 1)
TBX	External output terminal block	LEV2	Linear expansion valve (PIPE 2)
TB2	Transmission terminal block (OUTDOOR UNIT / INDOOR UNIT / SHUT OFF VALVE)	SW2	Switch (for mode selection)
		SW11	Switch (1's digit address set)
TB3	Transmission terminal block (INDOOR UNIT)	SW12	Switch (10's digit address set)
F01	Fuse (3.15A)	TB4A~TB4H	Terminal block (Alarm kit)
DSA	Arrester		
ZNR01	Varistor		
ZNR02	Varistor		

Chapter 5 Control

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

Switch		Function	Function according to switch setting		Switch setting timing	Units that require switch setting (Note 2)
			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	C
	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: [8-8-1(2)[7] Fan inverter damage check (no load)]	No-load operation disabled	No-load operation enabled	Any time after power on	C
	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: [8-8-1(2)[7] Fan inverter damage check (no load)]	No-load operation disabled	No-load operation enabled	Any time after power on	C
	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	C

Note

1) Unless otherwise specified, leave the switch to OFF where indicated by "-," which may be set to OFF for a reason.
2) A: Only the switch on OC needs to be set for the setting to be effective.
   B: The switches on both the OC and OS need to be set to the same setting for the setting to be effective.
   C: The switches on both the OC and OS need to be set.
3) 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]
4) 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]
5) Operation noise is reduced by limiting the frequency of the compressor and rotation speed of the outdoor unit fan.
6) 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 *1
	ON	60Pa *1	80Pa *1, *2

*1 The setting is only available for cooling and heating in models E072 to E144 and E264 to E288, and for cooling in models E168 and E312 to E336.

*2 The setting is only available in models H072 and H144.

7) 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.
8) Shaded areas (▭) indicate factory settings.

(2) Additional dipswitch settings at time of shipment

Switch			Function		Function according to switch setting		Switch setting timing	Units that require switch setting (Note 2)
					OFF (LED3 Unlit)	ON (LED3 Lit)		
SW4 SW6-10: OFF	1-10 1:ON, 0:OFF		Self-diagnosis/operation monitor				Anytime after power on	C
SW4 1-10 [0:OFF, 1:ON] (Note 1) SW6-10:ON	No.1	1000000000	Test run mode: ON/OFF		Stops all ICs	Sends a test-run signal to all IC	Anytime after power on	A
	No.3	1100000000	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.)	A
	No.4	0010000000	Clearance of error history	OC	Retained (IC/OC)	Deleted (IC/OC)	Anytime after power on (OFF→ON)	C
				OS	Retained (OS)	Deleted (OS)		
	No.8	0001000000	Cumulative compressor operation time deletion		Retained	Cleared	Any time after being energized (When changed from OFF to ON)	C
	No.16	0000100000	Forced defrost (Note 3)		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)	D
	No.17	1000100000	Pump down function		Normal control	Pump down operation	After being energized and while the compressor is stopped	A
	No.24	0001100000	Automatic address initialization switch		Disabled	Initialization and reset	After being energized and when units are stopped	B
	No.768	0000000011	System response		Disabled	Enabled	Anytime after power on	B
	No.817	1000110011	Starts up drive recorder		Enabled	Disabled	Anytime after power on	A
	No.818	0100110011	Data collection during an error		Disabled	Enabled	Anytime after power on	A
	No.852	0010101011	Shifts evaporating temp. depending on the load.		Depends on the setting combination with No. 853 (Note 6) (Factory setting: OFF)		Anytime after power on	A
	No.853	1010101011	Shifts evaporating temp. depending on the load.		Depends on the setting combination with No. 852 (Note 6) (Factory setting: OFF)		Anytime after power on	A
	No.891	1101111011	Rapid mode during startup of heating operation		Disabled	Enabled	After being energized and while the compressor is stopped	A
	No.897	1000000111	High sensible heat operation setting		Depends on the combined setting with No. 900 (Note 4) (Factory setting: OFF)		After being energized and while the compressor is stopped	A
	No.900	0010000111	High sensible heat operation setting		Depends on the combined setting with No. 897 (Note 4) (Factory setting: OFF)		After being energized and while the compressor is stopped	A
	No.915	1100100111	Defrost start temperature (Note 3)		E072-120, H072: -13°C [9°F] E144-192, H096-120: -11°C [12°F]	-8°C [18°F]	Anytime after power on	B
	No.916	0010100111	Defrost end temperature (Note 3)		0°C [32°F]	5°C [41°F]	Anytime after power on	B
	No.918	0110100111	Changes the defrost timer setting (Note 3)		50 minutes	90 minutes	Anytime after power on (OFF→ON)	B
	No.921	1001100111	Temperature/pressure unit selection		°C/kgf/cm^2	°F/psi	Anytime after power on	C
	No.932	0010010111	Heating backup		Disabled	Enabled	Anytime after power on	A
	No.933	1010010111	Snow sensor setting		Effective only when TH7 ≤ 5°C [41°F] is true or the snow sensor contact input is on.	Effective when TH7 ≤ 5°C [41°F] is true	Anytime after power on	C
	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	C
	No.935	1110010111	COP priority setting (at low outside temperature)		COP priority mode	Heating capacity priority control mode	After power on and while the compressor is stopped	A
	No.959	1111110111	Cool toughness mode		Disabled	Enabled	After being energized and when units are stopped	A
	No.964	0010001111	Target evaporation temperature setting		Depends on the setting combination with No. 982 (Note 5) (Factory setting: OFF)		Anytime after power on	A
	No.968	0001001111	Target condensation temperature setting (Tcm max=53°C [126°F])		Disabled	Enabled	Anytime after power on	A

Switch			Function	Function according to switch setting		Switch setting timing	Units that require switch setting (Note 2)
				OFF (LED3 Unlit)	ON (LED3 Lit)		
SW4 1-10 [0:OFF, 1:ON] (Note 1) SW6-10:ON	No.972	0011001111	Automatic cooling/heating mode (IC with the smallest address)	Normal control	Automatic cooling/heating mode	Before power on (After configuring the setting, perform a power reset.)	A
	No.982	0110101111	Target evaporation temperature setting	Depends on the setting combination with No. 964 (Note 5) (Factory setting: OFF)		Anytime after power on	A
	No.985	1001101111	Error output setting for refrigerant leak detection	Error output	Refrigerant leak detection output	After power on and while the compressor is stopped	A
	No.997	1010011111	Multiple-stage low-noise setting	See note 9 below. (Factory setting: OFF)		After power on and while the compressor is stopped	A
	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) A: Only the switch on OC needs to be set for the setting to be effective.
   B: The switches on both the OC and OS need to be set to the same setting for the setting to be effective.
   C: The switches on both the OC and OS need to be set.
   D: The switch on either the OC or OS needs to be set.
3) For details, refer to the following page(s).[5-2-7 Defrost Operation Control]
4) 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.

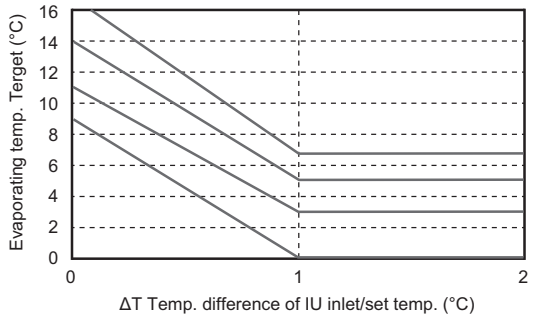
Switch		No.900	
		OFF	ON
No.897	OFF	0°C [32°F]	9°C [48°F]
	ON	6°C [43°F]	14°C [57°F]

5) 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]

6) The table below shows the combination of the settings for items No.852 and No.853 and the target evaporating temperature (target ET) setting that corresponds to each combination when energy-saving mode is activated. Refer to the following page(s). [2-4-7 Various Control Methods Using the Signal Input/Output Connector on Outdoor Unit]

Switch No.852	OFF	ON	OFF	ON
Switch No.853	OFF	OFF	ON	ON
Target ET max	9°C [48°F]	11°C [52°F]	14°C [57°F]	17°C [63°F]
Target ET min	0°C [32°F]	3°C [37°F]	5°C [41°F]	6°C [43°F]



7) Unless otherwise specified, leave the switch to OFF where indicated by "-," which may be set to OFF for a reason.
8) The function settings No. 768 through 1023 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.
9) 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%

10) 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). [8-8-1(2)[7] Fan inverter damage check (no 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		
SW1	1	Room temperature detection position	Indoor unit inlet	Built-in sensor on the remote controller	While the unit is stopped (Remote controller OFF)	
	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		
	6	Humidifier control	During heating operation	Always on while in the heating mode		
	7	Fan speed setting for Heating Thermo-OFF	Very Low	Low		
		Forced heating operation at OA temp of 5°C or below	Not available	Available		
	8	Fan speed setting for Heating Thermo-OFF	According to the SW1-7 setting	Preset speed		
	9	Self-recovery after power failure	Disabled	Enabled		
	10	Power source start-stop	Disabled	Enabled		
SW3	1	Unit model selection	Heat pump	Cooling only		
	2	Louver	Not available	Available		
	3	Vane	Not available	Available		
	4	Vane swing function	Not available	Available		
	5	-	-	-		
	6	Vane angle limit setting for cooling operation	Downblow B,C	Horizontal		
		Initial vane position	Enabled	Disabled		
	7	Automatic LEV value conversion function	Not available	Available		
	8	Heating 4°C [7.2°F] up	Enabled	Disabled		
	9	SHm setting	2°C [3.6°F]	5°C [9°F]		The setting depends on the model and type.
	10	SCm setting	10°C [18°F]	15°C [27°F]		The setting depends on the model and type.

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.

Note 3. By setting SW3-1, SW1-7, and SW1-8 to a certain configuration, the fan can be set to remain stopped during cooling Thermo-OFF. See the table below for details.

Switch setting			Fan speed during Thermo-OFF		Cooling-only/heat pump
SW3-1	SW1-7	SW1-8	Heating	Cooling	
OFF	OFF	OFF	Very Low	Preset speed	Heat pump
	ON		Low		
	OFF	ON	Preset speed		
	ON		Stop		
ON	OFF	OFF	-	Preset speed	Cooling-only
	ON		-		
	OFF	ON	-	Stop	
	ON		Stop	Stop	Heat pump

Note 4. Switch settings vary with indoor units models. Refer to the Service Handbook for indoor units for details.

Note

The setting timing for SW2 is before power is turned on.
Switch settings vary with different types of indoor units. Refer to the service handbooks of relevant indoor units for details.

(2) Address switch

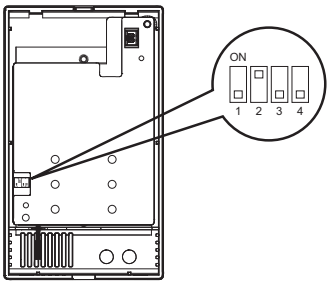
Actual indoor unit address setting varies in different systems. Refer to the installation manual for the outdoor unit for details on how to make the address setting.
Each address is set with a combination of the settings for the 10's digit and 1's digit.
(Example)

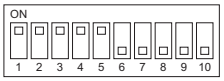
When setting the address to "3", set the 1's digit to 3, and the 10's digit to 0.
When setting the address to "25", set the 1's digit to 5, and the 10's digit to 2.

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

(1) MA simple remote controller (TAC-YT53CRAU)

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 SW2, and OFF for SW1, 3, and 4.)





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

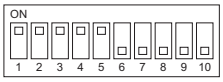
The MA remote controllers (TAR-CT01MA series, TAR-4"x"MA series, or TAR-3"x"MA series ("x" represents 0 or later)) do not have the switches listed above. Refer to the installation manual for the function setting.

5-2 Outdoor Unit Control

5-2-1 Overview

- The outdoor units are designated as OC and OS in the order of capacity from large to small (if two or more units have the same capacity, in the order of address from small to large).
- The setting of outdoor unit can be verified by using the self-diagnosis switch (SW4).

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



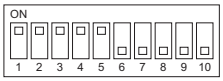
The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

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

5-2-2 Rotation Control

- At the initial startup, outdoor units start up in the order of "OC and OS." When the cumulative operation time of the OC reaches two hours, the OS will start up before the OC at the next start up.
- Startup sequence rotation is performed while all the indoor units are stopped. (Even after two hours of operation, startup sequence rotation is not performed while the compressor is in operation.)
  In a system with multiple outdoor units (OC and OS), when the integrated operation time of the unit in operation (either OC or OS) reaches one hour during a cooling operation at low outside temperature, that unit will stop and the other unit will go into operation.
- Two-outdoor-unit combination models will start rotation control when either of the outdoor units operates for four hours in total.
- For information about rotation control at initial startup, refer to the following page(s). [5-2-13 Control at Initial Startup]
- Performing startup sequence rotation does not change the basic operation of OC and OS. Only startup sequence is changed.
- Startup sequence of the outdoor units can be checked with the self-diagnosis switch (SW4) on the OC.

SW4 (SW6-10:OFF)	Display
	• OC→OS: "OC" and the OC address appear alternately on the display. • OS→OC: "OS" and the OS address appear alternately 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.

5-2-3 Initial Control

- When the power is turned on, the initial processing of the microcomputer is given top priority.
- During the initial processing, control processing of the operation signal is suspended. (The control processing is resumed after the initial processing is completed. Initial processing involves data processing in the microcomputer and initial setting of each of the LEV opening. This process will take up to 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.

5-2-4 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).

5-2-5 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 [energized] = 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	ON for 3 minutes. 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 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 0.07 MPa [10 psi]	When the low pressure (63LS) rises above 0.16 MPa [23 psi]
When high pressure (63HS1) rises	When the high pressure (63HS1) reaches 3.62 MPa [525 psi] or higher during cooling operation When the high pressure (63HS1) reaches 3.43 MPa [497 psi] or higher during heating operation	When the high pressure (63HS1) drops to 3.43 MPa [497 psi] or lower during cooling operation When the high pressure (63HS1) drops to 2.64 MPa [383 psi] or lower during heating operation

(2) Bypass solenoid valve (SV2) (ON [energized] = Open)

Operation	SV2	
	ON	OFF
When returning to normal operation after completion of the defrost cycle	ON for a few minutes	After a few minutes have passed
At startup	When TH7<=25°C [77°F], SV2 stays on for 5 minutes after startup and stays on for 15 minutes until the following conditions are met: TH5-Te<=3°C [5°F] or TH5 - Te < 15°C [27°F] (only TH7<=-10°C[14°F]).	Other than on the left
When high pressure (63HS1) rises during heating operation	When the high pressure (63HS1) reaches 3.62 MPa [525 psi] or higher at the minimum frequency during heating operation	When the high pressure (63HS1) drops to 2.84 MPa [412 psi] or lower
Others	Always OFF	

(3) Bypass solenoid valve (SV13) (ON [energized] = Open)

Operation	SV13	
	ON	OFF
When high pressure (63HS1) rises during heating operation	When the high pressure (63HS1) reaches 3.62 MPa [525 psi] or higher at the minimum frequency during heating operation	When the high pressure (63HS1) drops to 2.84 MPa [412 psi] or lower after 60 seconds

5-2-6 Frequency Control

- Depending on the capacity required, the frequency of the compressor is controlled to keep constant evaporation temperature during cooling operation, and condensing temperature 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
E072 model	52	16	56	16
E096 model	65	16	71	16
E120 model	74	16	88	16
E144 model	97	27	110	27
E168 model	111	27	128	27
E192 model	130	27	130	27
H072 model	52	16	56	16
H096 model	65	27	71	27
H120 model	74	27	88	27

Note

The maximum frequency during heating operation is affected by the outdoor air temperature to a certain extent.
The frequency may exceed the values shown above temporarily (e.g. during defrosting).

(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 thirty second.

- Operating temperature is 110°C [230°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).

5-2-7 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 (the previous defrost time is less than 12 minutes) 150 minutes or more (the previous defrost time is 12 minutes or more)
Evaporating temperature (Te)	The evaporating temperature has stayed below the temperature in the table below (Note1) for 3 minutes	When TH7 is lower than -27°C [-17°F], Te remains at -37°C [-35°F] or lower continuously for three minutes, or when TH7 is -27°C [-17°F] or higher, Te remains at 1.1×TH7-7.5 or lower continuously for three minutes.	The evaporating temperature has stayed below the temperature in the table below (Note1) for 3 minutes

Note

1) Evaporating temperature (Te)

	E072	E096	E120	E144	E168	E192
SW4 (915) OFF	-13 ºC [9°F]	-13 ºC [9°F]	-13 ºC [9°F]	-11 ºC [12°F]	-11 ºC [12°F]	-11 ºC [12°F]
SW4 (915) ON	-8 ºC [18°F]	-8 ºC [18°F]	-8 ºC [18°F]	-8 ºC [18°F]	-8 ºC [18°F]	-8 ºC [18°F]

	H072	H096	H120
SW4 (915) OFF	-13 ºC [9°F]	-13 ºC [9°F]	-13 ºC [9°F]
SW4 (915) ON	-8 ºC [18°F]	-8 ºC [18°F]	-8 ºC [18°F]

- 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(16) 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.
- Depending on the type of the connected indoor unit, etc., the next defrosting prohibition time may be 30 or 40 minutes.

(2) Defrost operation

Compressor frequency	Model	Compressor frequency
	E072, E096, E120 models H072 model	129 Hz
	E144, E168, E192 models H096, H120 models	155 Hz*1
Outdoor unit fan	Stops	
SV1a	ON (open)	
21S4a, 21S4b	OFF	
LEV1	0 *2	
LEV2a	41	
LEV2b	3,000	
LEV4	41 to 300 pulses	
SV2	OFF (close), ON (open)	
SV12	OFF (close)	
SV13	OFF (close)	
SV16	ON (open)	

*1. When TH7 is below -20°C [-4°F], the compressor frequency is 175 Hz.
*2. This value may be greater than 0 pulse depending on the 63LS and TH4 status.

(3) Stopping the defrost operation

- The defrost cycle ends under the following conditions:
  - 12 minutes*1 have passed since the defrost cycle started.
  - The piping temperature (TH3) is detected to remain at 0°C [32°F] or higher for four minutes (when SW4 (916) is OFF).
  - The piping temperature (TH3) is detected to remain at 5°C [41°F] or higher continuously for two minutes (when SW4 (916) is ON).
- The defrost cycle will last for at least four minutes once it has started. However, the defrost cycle ends under the following conditions:
  - The piping temperature (TH3) exceeds 15°C [59°F] after one minute (when SW4 (916) is OFF).
  - The piping temperature (TH3) exceeds α*2 = 25°C + TH7°C [77°F + TH7°F] after one minute (when SW4 (916) is ON).
- In the multiple-outdoor-unit system, the defrost cycle stops simultaneously for all units.

*1 If TH7 is below -20°C [-4°F], the defrost cycle may last for up to 20 minutes.
*2 5°C [41°F] ≤ α ≤ 25°C [77°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.

5-2-8 Refrigerant Recovery Control

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

(1) During heating operation

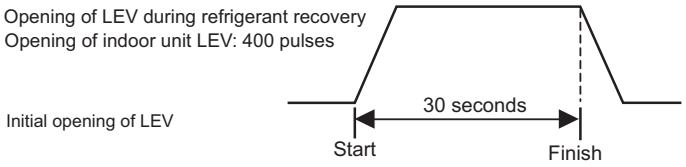
Starting refrigerant recovery mode

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

- 10 minutes have passed since the completion of previous refrigerant recovery.
- TH4 > 105°C [221°F]
- Frequencies below 100 Hz

Refrigerant recovery

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



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

(2) During cooling operation

Starting refrigerant recovery mode

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

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

Refrigerant recovery

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

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 condensing temperature of (outside temperature + 10°C [18°F]) during cooling operation and constant evaporation temperature of (0°C [35°F]=0.71 MPa [103 psi]) during heating operation.
- The OS in the multiple-outdoor-unit system operates at the actual outdoor unit fan control value that is calculated by the OS based on the preliminary outdoor unit fan control value that the OC determines.

(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.

(3) Outdoor heat exchanger capacity control pattern

- Outdoor fan rotation control is supported.
- As the operation pattern number increases, the refrigerant bypassing the outdoor heat exchanger increases. As the operation pattern number increases, the capacity difference becomes smaller between cooling operation.
- In each mode, the four-way valve and the expansion valve operate as shown in the table on the next page. The expansion valve may open or close during the refrigerant equalization control or the evaporation temperature control. See [5-2-11 Refrigerant Flow Control (Linear Expansion Valves <LEV2a and LEV2b>)]

Model	Operation mode	Operation pattern	Four-way valve		LEV		Solenoid valve		
			21S4a	21S4b	LEV2a	LEV2b	SV12	SV13	SV16
E072, E096, E120, H072 models	Cooling	1	OFF	OFF	41	3000	OFF	OFF	ON
		2	OFF	ON	3000	41	OFF	OFF	OFF
	Heating	1	ON	ON	3000*1	600*1	OFF	OFF	OFF
	Defrost (reverse)	1	OFF	OFF	41	3000	OFF	OFF	ON
E144, E168, E192, H096, H120 models	Cooling	1	OFF	OFF	41	3000	OFF	OFF	ON
		2	OFF	ON	3000	41	OFF	OFF	OFF
	Heating	1	ON	ON	3000*1	1600*1	OFF	OFF	OFF
	Defrost (reverse)	1	OFF	OFF	41	3000	OFF	OFF	ON

*1. In the heating mode, the openings of LEV2a and LEV2b change according to the outside temperature.

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

- The OC and OS controls the subcool coil individually.

	Heating mode		Cooling mode		Stopping mode	Defrost
	Thermo-ON	Thermo-OFF	Thermo-ON	Thermo-OFF	-	-
LEV1	0	0 (*1)	*2	0	0 (*3)	0 (*4)

*1. The LEV opens to 65 pulses when 15 minutes have passed after Thermo-OFF.
*2. 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.
*3. When SW4(988)=OFF, LEV1=0, when SW4(988)=ON, LEV1=480
*4. 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 and LEV2b>)

- Refrigerant flow is controlled by each unit in the combined models during heating. Refrigerant flow control is performed by the OC and OS individually.
- 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.
- See [5-2-9 Outdoor Unit Fan Control] for the operation of LEV2 in different operation modes.

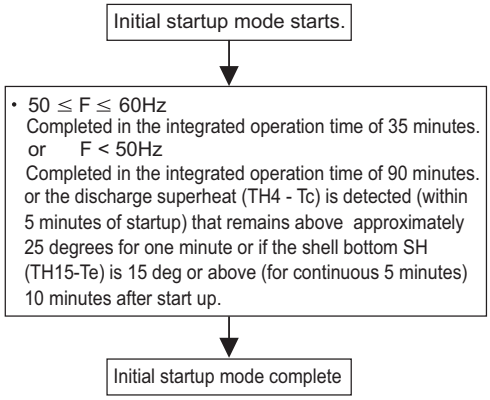
5-2-12 Injection Control (Linear Expansion Valve <LEV4>)

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

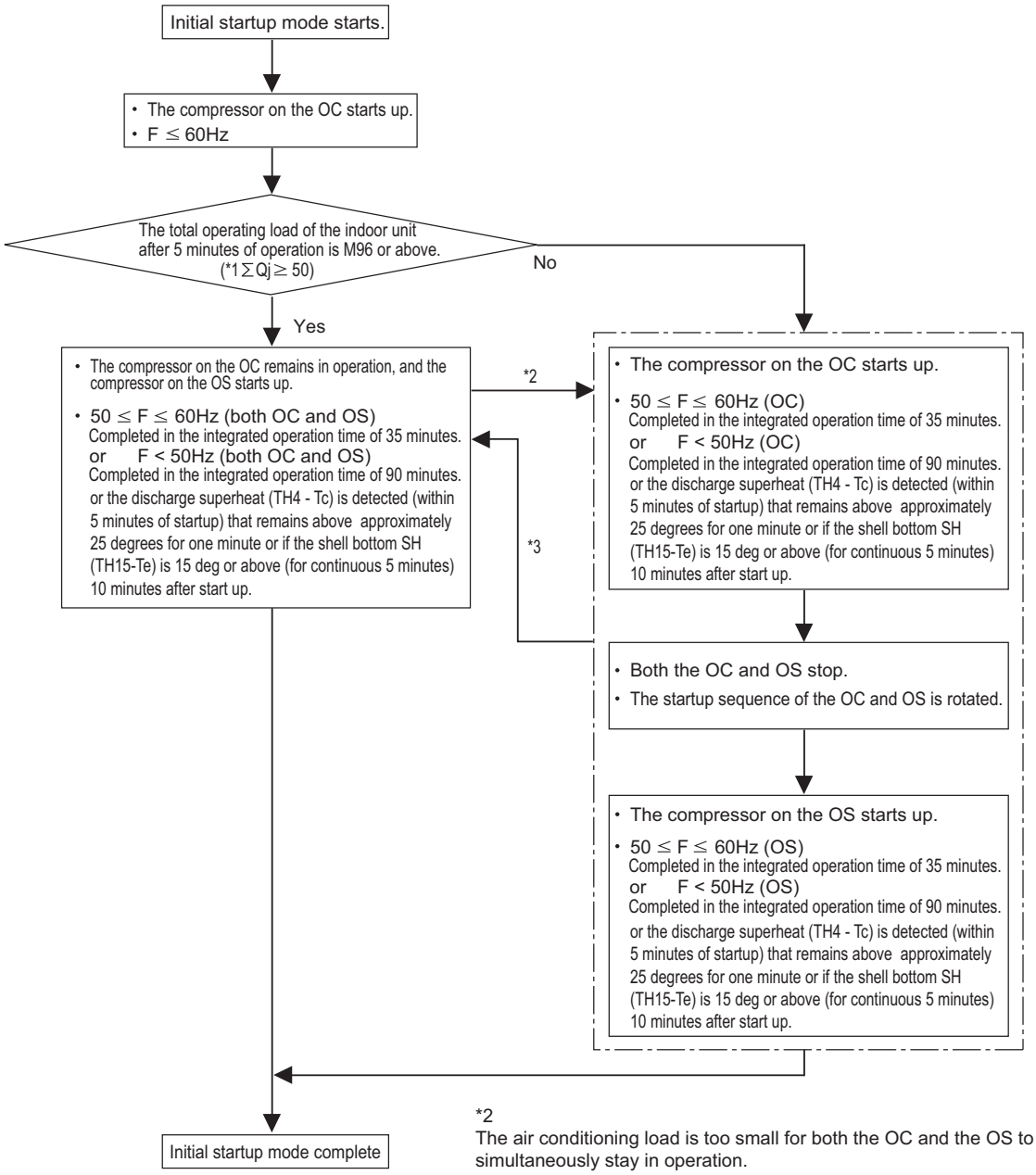
5-2-13 Control at Initial Startup

- ♦When started up for the first time after power on, the unit goes into the initial startup mode.
- ♦At the completion of the initial operation mode on the OC and OS, they will go into the normal control mode.

(1) Single-outdoor-unit system



(2) Two-outdoor-unit system



*2
The air conditioning load is too small for both the OC and the OS to simultaneously stay in operation.
*3
The air conditioning load is high enough for both OC and OS to simultaneously stay in operation.

∗1 ∑Qj:Total capacity (models) code

5-2-14 Emergency Operation Mode

1. Problems with the outdoor unit

- Systems with two outdoor units have a mode that allows one of the outdoor units to perform a backup operation when the other outdoor unit in the system malfunctions.
- This mode can be started by performing an error reset via the remote controller.

(1) Starting the emergency operation

1) When an error occurs, the error source and the error code will be displayed on the display on the remote controller.
2) The error is reset using the remote controller.
3) If an error code appears that permits an emergency operation in step 1) above, (See the table below.), the retry operation starts.
4) If the same error is detected during the retry operation (step 3) above), an emergency operation can be started by resetting the error via the remote controller.

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

Trouble source		Error codes that permit an emergency operation	Error code description
Compressor Fan motor Inverter		0403	Serial communication error
		1550	Liquid back error (detected by current sensor)
		4220,4225,4226	Bus voltage drop
		4230,4235	Heatsink overheat protection
		4240,4245	Overload protection
		4250,4255,4256	Overcurrent relay trip
		5110	Heatsink temperature sensor failure (THHS)
		5120	DCL temperature sensor circuit fault
		5301	Current sensor/circuit failure
		5305,5306	Position error
Thermistor	TH2	5102	Subcool heat exchanger bypass outlet temperature sensor failure
	TH3	5103	Pipe temperature sensor failure
	TH4	5104	Discharge temperature sensor failure
	TH6	5106	Subcool heat exchanger liquid outlet sensor failure
	TH7	5107	Outside air temperature sensor failure
	TH15	5115	Compressor shell bottom temperature sensor fault
Power		4102	Open phase
		4115	Power supply sync signal abnormality

* In the event of Accumulator inlet temperature sensor failure (TH5 5105 error), the emergency operation mode cannot be activated to protect the fusible plug. Replace the sensor.

Emergency operation pattern (2 outdoor units)

		OC failure pattern	OS failure pattern
OC		Trouble	Normal
OS		Normal	Trouble
Emergency operation	Cooling	Permitted	Permitted
	Heating	Permitted	Permitted
Maximum total capacity of indoor units (Note 1)		60%	

(Note 1) If an attempt is made to put into operation a group of indoor units whose total capacity exceeds the maximum allowable capacity, some of the indoor units will go into the same condition as Thermo-OFF.

(2) Ending the emergency operation

1) End conditions

When one of the following conditions is met, emergency operation stops, and the unit makes an error stop.

- When the integrated operation time of compressor in cooling mode has reached four hours.
- When the integrated operation time of compressor in heating mode has reached two hours.
- When an error is detected that does not permit the unit to perform an emergency operation.

2) Control at or after the completion of emergency operation

- At or after the completion of emergency operation, the compressor stops, and the error code reappears on the remote controller.
- If another error reset is performed at the completion of an emergency mode, the unit repeats the procedures in section (1) above.
- To stop the emergency mode and perform a current-carrying operation after correcting the error, perform a power reset.

2. Communication circuit failure or when some of the outdoor units are turned off

This is a temporary operation mode in which the outdoor unit that is not in trouble operates when communication circuit failure occurs or when some of the outdoor units are turned off.

(1) Starting the emergency operation (When the OC is in trouble)

1) When an error occurs, the error source and the error code appear on the display on the remote controller.
2) Reset the error via the remote controller to start an emergency operation.

Precautions before servicing the unit

- When the OC is in trouble, the OS temporarily takes over the OC's function and performs an emergency operation. When this happens, the indoor unit connection information are changed.
- In a system that has a billing function, a message indicating that the billing system information has an error may appear on the TG-2000A. Even if this message appears, do not change (or set) the refrigerant system information on the TG-2000A. After the completion of an emergency operation, the correct connection information will be restored.

(2) Starting the emergency operation (When the OS is in trouble)

1) A communication error occurs. → An emergency operation starts in approximately six minutes.

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

Trouble source	Error codes that permit an emergency operation	Error code description
Circuit board failure or the power to the outdoor units is off	6607	No acknowledgement error
	6608	No response error

Emergency operation pattern (2 outdoor units)

		OC failure pattern	OS failure pattern
OC		Trouble	Normal
OS		Normal	Trouble
Emergency operation	Cooling	Permitted	Permitted
	Heating	Permitted	Permitted
Maximum total capacity of indoor units (Note 1)		Capacity that matches the total capacity of the operable outdoor units	

(Note 1) If an attempt is made to put into operation a group of indoor units whose total capacity exceeds the maximum allowable capacity, some of the indoor units will go into the same condition as Thermo-OFF.

(3) Ending the emergency operation

When communication is restored, the emergency mode is cancelled, and the units go into the normal operation mode.

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 Crankcase Heater

A crankcase heater 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 16 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 off-on cycle at 30-minute intervals

Chapter 6 Test Run

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6-4 The Following Symptoms Are Normal 7

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

- The control box contains several high voltage charging components. Before inspecting the control box, ensure that the unit is turned off and that the voltage between the tab terminals FTP and FTN on the INV board has dropped sufficiently (to 20 VDC or lower).
- Disconnect the relay connectors (FAN 1 and FAN 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 (FAN 1 and FAN 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 16 hours, the refrigerant in the compressor will evaporate and the insulation resistance will go up. (Refer to section (7) for details.)
- 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 heater is energized even while the compressor 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 heater.)
- Make sure both the gas and liquid valves are fully opened.
- Be sure to tighten the cap.

(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) Before starting operation, leave the power on for the time periods shown in the table below.

Time to leave the power on before starting operation

Minimum outside temperature	Time
Minimum outside temperature < 0 ºC [32 ºF]	16 hours
0 ºC [32 ºF] ≤ Minimum outside temperature < 15 ºC [59 ºF]	12 hours
15 ºC [59 ºF] ≤ Minimum outside temperature < 30 ºC [86 ºF]	10 hours
30 ºC [86 ºF] ≤ Minimum outside temperature	8 hours

Keep the power on while the units are operating. Keep the air conditioning units on even during periods when they are not in use, except for maintenance or installation. Failure to do so may disable safety devices.

- If the shut off valve kits are connected, turn on the indoor units, shut off valve kits, and transmission boosters before turning on the outdoor unit.

(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

(9) After a test run

System response setting No. 768 can be disabled before a test run is started other than at the time of initial installation. To enable the System response setting No. 768, make the setting after a test run is completed.This allows the system to respond (close the shut off valve) to communication errors or sensor failures.
Refer to (2) in [5-1-1 Outdoor Unit Switch Functions and Factory Settings] for the settings of No. 768.
After enabling No. 768, turn off all bits of SW4 and the bits of SW6 to SW10, then check that the FLAG 4 on the Control Board LED display is lit.

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 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 a small number of 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 1500/1550 (liquid back) 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 105°C [221°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].)	

*Evaluate the refrigerant amount using other criteria during the injection control.

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.

♦E072-1924(3)AMM0AN

Unit model		E072	E096	E120	E144	E168	E192
Maximum refrigerant charge	Factory charged	5.3 kg	5.3 kg	5.3 kg	6.3 kg	6.3 kg	6.3 kg
	Charged on site	23.8 kg	27.2 kg	27.2 kg	31.0 kg	31.3 kg	31.3 kg
	Total for system	29.1 kg	32.5 kg	32.5 kg	37.3 kg	37.6 kg	37.6 kg
	Factory charged	187 oz	187 oz	187 oz	223 oz	223 oz	223 oz
	Charged on site	840 oz	960 oz	960 oz	1094 oz	1105 oz	1105 oz
	Total for system	1027 oz	1147 oz	1147 oz	1316 oz	1327 oz	1327 oz

♦E264-3844(3)AMM0AN

Unit model		E264	E288	E312	E336	E360	E384
Maximum refrigerant charge	Factory charged	11.6 kg	12.6 kg	12.6 kg	12.6 kg	12.6 kg	12.6 kg
	Charged on site	52.9 kg	51.9 kg	52.0 kg	52.9 kg	52.9 kg	53.0 kg
	Total for system	64.5 kg	64.5 kg	64.6 kg	65.5 kg	65.5 kg	65.6 kg
	Factory charged	410 oz	445 oz	445 oz	445 oz	445 oz	445 oz
	Charged on site	1866 oz	1831 oz	1835 oz	1866 oz	1866 oz	1870 oz
	Total for system	2276 oz	2276 oz	2279 oz	2311 oz	2311 oz	2314 oz

♦H072-1204(3)AMM0AN

Unit model		H072	H096	H120
Maximum refrigerant charge	Factory charged	5.3 kg	6.3 kg	6.3 kg
	Charged on site	23.8 kg	28.0 kg	28.4 kg
	Total for system	29.1 kg	34.3 kg	34.7 kg
	Factory charged	187 oz	223 oz	223 oz
	Charged on site	840 oz	988 oz	1002 oz
	Total for system	1027 oz	1210 oz	1225 oz

♦H144-2404(3)AMM0AN

Unit model		H144	H192	H240
Maximum refrigerant charge	Factory charged	10.6 kg	12.6 kg	12.6 kg
	Charged on site	49.7 kg	51.1 kg	51.2 kg
	Total for system	60.3 kg	63.7 kg	63.8 kg
	Factory charged	374 oz	445 oz	445 oz
	Charged on site	1754 oz	1803 oz	1807 oz
	Total for system	2128 oz	2247 oz	2251 oz

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

Note

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

Operation

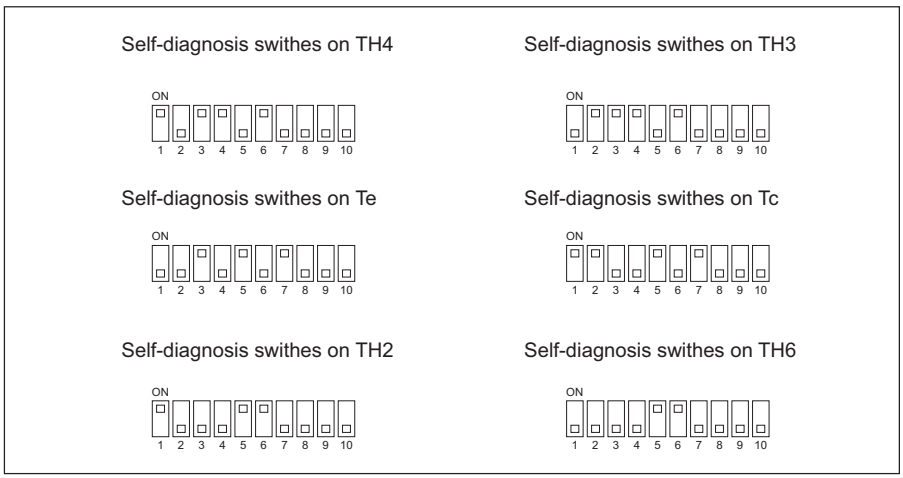
When the unit is in the refrigerant amount adjust mode, the LEV on the indoor unit does not open as fully as it normally does during cooling operation to secure subcooling.

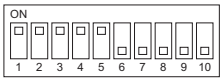
Note

1) Using the flowchart on the next page, adjust the refrigerant charge. Check the TH4, TH3, TH2, TH6, Te, and Tc values of OC and OS 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).

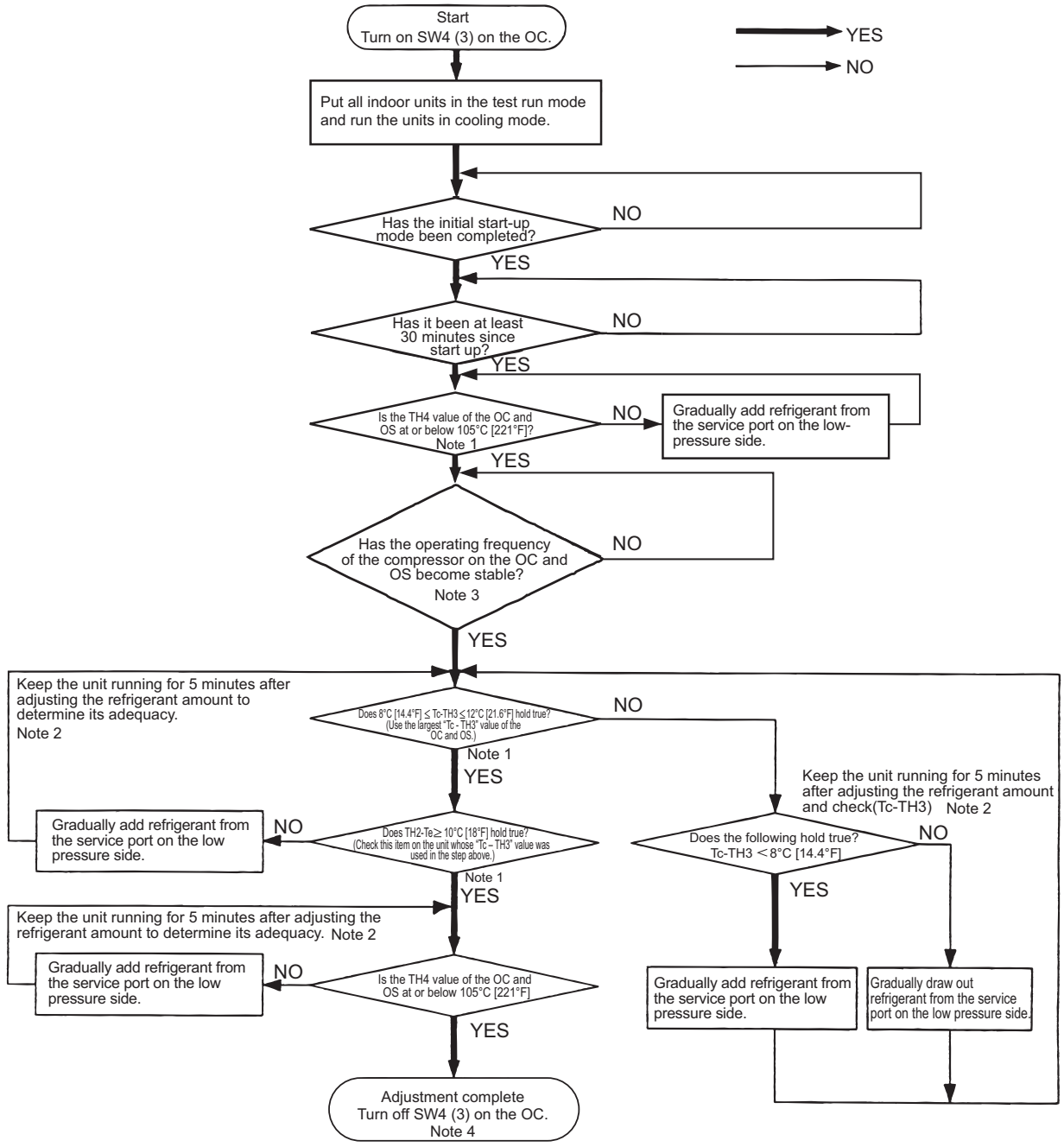
   When the amount of refrigerant is truly adequate.
   TH3-TH6 on the outdoor unit is 5°C [9°F] or above and SH on the indoor unit is between 5 and 15°C [9 and 27°F].
   The refrigerant amount may seem adequate at the moment, but may turn out to be inadequate later on.
   TH3-TH6 on the outdoor unit is 5°C [9°F] or less and SH on the indoor unit is 5°C [9°F] or less.
   Wait until the TH3-TH6 reaches 5°C [9°F] or above and the SH of the indoor unit is between 5 and 15°C [9 and 27°F] to determine that the refrigerant amount is adequate.
3) 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 (3) 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.

6-4 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 unit makes noise during cooling/heating changeover.	Normal display	This noise is made when the refrigerant circuit is reversed and is normal.
Sound of the refrigerant flow is heard from the indoor unit immediately after starting operation.	Normal display	This is caused by the transient instability of the refrigerant flow and is normal.
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.

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7-1 Error Code and Preliminary Error Code Lists

Error Code	Preliminary error code	Error (preliminary) detail code	Error code definition	Searched unit					Notes
				Outdoor unit	Indoor unit	Shut off valve kit	LOSSNAY	Remote controller	
0403	4300 4305 4306 (Note)	1 5 6 (Note)	Serial communication error	O	O				(page 7)
0404	-	-	Indoor unit control-related errors		O				(page 8)
0900	-	-	Test run				O		
0910	-	-	Circuit check (detected unit)		O				(page 8)
0911	-	-	Circuit check (other units)		O	O			(page 8)
1102	1202	-	Discharge temperature fault	O					(page 9)
1301	-	-	Low pressure fault	O					(page 10)
1302	1402	-	High pressure fault	O					(page 11)
1500	1600	-	Liquid back error (detected by refrigerant temperature)	O					(page 12)
-	1605	-	Preliminary suction pressure fault	O					
1521	-	-	Refrigerant leak error (self detection of the unit)		O				(page 13)
1522	-	-	Refrigerant leak error (other units)		O	O			(page 13)
-	1625	-	Refrigerant sensor maintenance (indoor unit)		O				(page 16)
1550	1650	001	Liquid back error (Instantaneous overcurrent detected with the current sensor)	O					(page 14)
		002	Liquid back error (Overcurrent effective value shut off error detected with the current sensor)	O					(page 14)
		003	Liquid back error (ACCT overcurrent error detected with the current sensor)	O					(page 14)
2500	-	-	Drain sensor submergence		O				(page 17)
2502	-	-	Drain pump fault		O				(page 18)
2600	-	-	Water leakage				O		(page 19)
2601	-	-	Water supply cutoff				O		(page 19)
3121	-	-	Out-of-range outside air temperature	O					(page 20)
4102	4152	-	Open phase	O					(page 21)
4106	-	-	Transmission power supply fault	O					(page 22)
4109	-	-	Indoor unit fan operation error		O				(page 22)
4114	-	-	Indoor unit fan motor error		O				(page 23)
4115	-	-	Power supply sync signal abnormality	O					(page 23)
4116	-	-	RPM error/Motor error		O		O		(page 24)
4121	4171	–	Function setting error	O					(page 24)
4124	-	–	Electric system not operate due to damper abnormality		O				(page 25)

Error Code	Preliminary error code	Error (preliminary) detail code	Error code definition		Searched unit: Outdoor unit	Indoor unit	Shut off valve kit	LOSSNAY	Remote controller	Notes
4130	-	-	Control power supply error				O			(page 26)
4136	-	-	Safety shut off valve circuit error				O			(page 27)
4220 4225 4226 (Note)	4320 4325 4326 (Note)	[0]	Backup operation		O					
		[108]	Abnormal bus voltage drop (Software detection) (460V)		O					(page 28)
			Abnormal bus voltage drop (Software detection) (208-230V)		O					(page 29)
		[109]	Abnormal bus voltage rise (Software detection)		O					(page 30)
		[111]	Logic error		O					(page 30)
		[129]	Control power-supply fault		O					(page 31)
		[131]	Low bus voltage at startup (460V)		O					(page 31)
			Low bus voltage at startup (208-230V)		O					(page 31)
4230 4235 4236 (Note)	4330 4335 4336 (Note)	[125]	Heatsink overheat protection		O					(page 32)
4240 4245 4246 (Note)	4340 4345 4346 (Note)	-	Overload protection (460V)		O					(page 33)
			Overload protection (208-230V)		O					(page 34)
4250 4255 4256 (Note)	4350 4355 4356 (Note)	[0]	Backup operation		O					
		[101]	IPM error		O					(page 35)
		[104]	Short-circuited IPM/Ground fault		O					(page 36)
		[105]	Overcurrent error due to short-circuited motor		O					(page 37)
		[106]	Instantaneous overcurrent (S/W detection)		O					(page 38)
		[107]	Overcurrent (effective value)(S/W detection)		O					(page 38)
4255 4256	4355 4356	[137]	Motor synchronization loss		O					(page 39)
4260	-	-	Heatsink overheat protection at startup		O					(page 39)
5101	1202	-	Temperature sensor fault	Return air temperature (TH21)		O				(page 40)
				OA processing unit inlet temperature (TH4)				O		(page 40)
5102	1217	-	Temperature sensor fault	Indoor unit pipe temperature (TH22)		O				(page 40)
				OA processing unit pipe temperature (TH2)				O		(page 40)
				HIC bypass circuit outlet temperature (TH2)	O					(page 41)

Error Code	Preliminary error code	Error (preliminary) detail code	Error code definition		Searched unit					Notes
					Outdoor unit	Indoor unit	Shut off valve kit	LOSSNAY	Remote controller	
5103	1205	00	Temperature sensor fault	Indoor unit gas-side pipe temperature (TH23)		O				(page 40)
				OA processing unit gas-side pipe temperature (TH3)				O		(page 40)
				Pipe temperature at heatexchanger outlet (TH3)	O					(page 41)
5104	1202	-	Temperature sensor fault	OA processing unit intake air temperature (TH1)				O		(page 40)
				Outside temperature (TH24)		O				(page 40) Detectable only by the All-Fresh type indoor units
				Outdoor unit discharge temperature (TH4)	O					(page 41)
5105	1204	-	Temperature sensor fault	Accumulator inlet temperature (TH5)	O					(page 41)
5106	1216	-	Temperature sensor fault	HIC circuit outlet temperature (TH6)	O					(page 41)
5107	1221	-	Temperature sensor fault	Outside temperature (TH7)	O					(page 41)
5115			Temperature sensor fault	Shell bottom temperature (TH15)	O					(page 41)
5110	1214	[0]	Backup operation		O					
		01, 05, 06	Temperature sensor fault	Heatsink temperature (THHS)	O					(page 43)
5201	1402	-	High-pressure sensor fault (63HS1)		O					(page 43)
5301 5305 5306 (Note)	4300 4305 4306 (Note)	[0]	Backup operation		O					
		[115]	ACCT sensor fault (460V)		O					(page 44)
			ACCT sensor fault (208-230V)		O					(page 44)
		[117]	ACCT sensor circuit fault		O					(page 44)
		[119]	IPM open / ACCT connector disconnection error		O					(page 45)
		[120]	Faulty ACCT wiring error		O					(page 45)
		[135]	Current sensor fault		O					(page 46)
		[136]	Current sensor / circuit fault		O					(page 46)
5558	-	-	Refrigerant sensor error			O				(page 47)
5701	-	-	Loose float switch connector			O				(page 47)
6201	-	-	Remote controller board fault (nonvolatile memory error)						O	(page 48)
6202	-	-	Remote controller board fault (clock IC error)						O	(page 48)

Error Code	Preliminary error code	Error (preliminary) detail code	Error code definition	Searched unit					Notes
				Outdoor unit	Indoor unit	Shut off valve kit	LOSSNAY	Remote controller	
6600	-	[001]	Detection of overlapped address in centralized control system	O	O		O	O	(page 48)
		[002]	Detection of overlapped address in indoor unit system	O	O		O	O	(page 48)
6601	-	[001]	Detection of polarity setting error in centralized control system					O	(page 49)
		[002]	Detection of polarity setting error in indoor unit system					O	(page 49)
6602	-	[001]	Transmission processor hardware error in centralized control system	O	O		O	O	(page 50)
		[002]	Transmission processor hardware error in indoor unit system	O	O		O	O	(page 50)
6603	-	[001]	Transmission Bus-Busy error in centralized control system	O	O		O	O	(page 51)
		[002]	Transmission Bus-Busy error in indoor unit system	O	O		O	O	(page 51)
6606	-	[003]	Communication error between device processor on circuit board and M-NET processor	O	O		O	O	(page 51)
6607	-	-	No ACK error	O	O		O	O	(page 52)
6608	-	-	No response error	O	O		O	O	(page 58)
6815	-	-	Supervisor remote controller communication error		O			O	(page 59)
6831	-	-	MA controller signal reception error (No signal reception)		O			O	(page 60)
6832	-	-	MA remote controller signal transmission error (Synchronization error)		O			O	(page 61)
6833	-	-	MA remote controller signal transmission error (Hardware error)		O			O	(page 62)
6834	-	-	MA controller signal reception error (Start bit detection error)		O			O	(page 63)
6840	-	-	Indoor/outdoor unit communication error		O				(page 64)
6841	-	-	A control communication synchronism not recover		O				(page 65)
6842	-	-	A control communication transmission/reception hardware trouble		O				(page 65)
6843	-	-	A control communication start bit detection error		O				(page 66)
6846	-	-	Start-up time over		O				(page 67)
7100	-	-	Total capacity error	O					(page 68)
7101	-	-	Capacity code setting error	O	O		O		(page 69)
7102	-	-	Wrong number of connected units	O		O			(page 70)
7105	-	-	Address setting error	O					(page 71)
7106	-	-	Attribute setting error				O		(page 71)
7110	-	-	Connection information signal transmission/reception error	O					(page 72)
7111	-	-	Remote controller sensor fault		O		O		(page 72)
7113	-	-	Function setting error (improper connection of CN-TYP)	O					(page 73)

Error Code	Prelimi-nary error code	Error (prelim-inary) detail code	Error code definition	Searched unit					Notes
				Outdoor unit	Indoor unit	Shut off valve kit	LOSSNAY	Remote controller	
7117	-	-	Model setting error	O					(page 74)
7119	-	-	M-NET wiring connection error (detected unit)		O				(page 75)
7120	-	-	M-NET wiring connection error (other units)		O	O			(page 75)
7121	-	-	Power-off detection		O	O			(page 76)
7130	-	-	Incompatible unit combination	O					(page 76)

∗If an error not listed in the error code list occurs, check the switch settings and connector connections, and then contact AC&R Systems Works.

Note

- The error codes and preliminary error codes can be checked on the service LED (LD301) by setting the SW on the outdoor unit control board.
  For how to read the SW settings, refer to the following page(s). [10-1 LED Status Indicators]
- There are the inverter system and fan inverter system. See the last digit of the error codes from 4000 to 5999 to determine each error code and corresponding detail code are intended for the compressor or fan.

Example) 4225 (detail 108) code → Abnormal bus voltage drop: Fan inverter system
4230 code → Heatsink overheat protection: Inverter system

Last digit	Target unit
0 or 1	Inverter system
5 or 6*1	Fan inverter system

*1. When there are two fan motors, the fan motor on the left in the control box is "5" and that on the right is "6."

Series name	Model name	Inverter system					Fan inverter system		
		Overload protection Imax (Arms)	Current effective value error (Arms)	Current peak value error (Apeak)	Temperature protection TOL (°C [°F])	Compressor winding resistance (standard) (Ω: 20°C [68°F])	Overload protection Imax (Arms)	Current peak value error (Apeak)	Fan motor winding resistance (standard) (Ω: 20°C [68°F])
Highly-efficient series	TUHYE0723AMM0AN	35	42	91	95 [203]	0.12	6	13	1.7
	TUHYE0963AMM0AN	35	42	91	95 [203]	0.12	6	13	1.7
	TUHYE1203AMM0AN	45	54	91	95 [203]	0.12	6	13	1.7
	TUHYE1443AMM0AN	53	64	108	95 [203]	0.08	5.3	12	2.7
	TUHYE1683AMM0AN	53	64	108	95 [203]	0.08	5.3	12	2.7
	TUHYE1923AMM0AN	53	64	108	95 [203]	0.08	5.3	12	2.7
	TUHYE0724AMM0AN	19	23	49	95 [203]	0.43	3.2	7	4.7
	TUHYE0964AMM0AN	19	23	49	95 [203]	0.43	3.2	7	4.7
	TUHYE1204AMM0AN	24	29	49	95 [203]	0.43	3.2	7	4.7
	TUHYE1444AMM0AN	27	33	56	95 [203]	0.21	3.2	9	5.5
	TUHYE1684AMM0AN	27	33	56	95 [203]	0.21	3.2	9	5.5
	TUHYE1924AMM0AN	27	33	56	95 [203]	0.21	3.2	9	5.5
Hyper-heating series	TUHYH0723AMM0AN	45	54	91	95 [203]	0.12	6	13	1.7
	TUHYH0963AMM0AN	53	64	108	95 [203]	0.08	5.3	12	2.7
	TUHYH1203AMM0AN	53	64	108	95 [203]	0.08	5.3	12	2.7
	TUHYH0724AMM0AN	24	29	49	95 [203]	0.43	3.2	7	4.7
	TUHYH0964AMM0AN	27	33	56	95 [203]	0.21	3.2	9	5.5
	TUHYH1204AMM0AN	27	33	56	95 [203]	0.21	3.2	9	5.5

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

3. Cause, check method and remedy

(1) Faulty wiring

Check the following wiring connections.

1) Between Control board and Fan board

Control board	Fan board
CN4A	CN80

2) Between control board and INV board

Control board	INV board
CN4	CN2

3) Between control board and INV board

Control board	INV board
CN61	CN19V

4) Between control board and Fan board

Control board	Fan board
CN61	CN81 (CN101*)

* CN101 for when there are two fan motors.

(2) 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.

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.

7-2-3 Error Code [0910]

1. Error code definition

Circuit check (detected unit)

2. Error definition and error detection method

This error code is displayed by the circuit check target indoor unit to inform that the circuit check is under way.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Circuit check	This is not abnormal. After the circuit check, cancel the error.

7-2-4 Error Code [0911]

1. Error code definition

Circuit check (other units)

2. Error definition and error detection method

1) This error code is displayed by indoor units that belong to the same shut off space as the circuit check target indoor unit to inform that the circuit check is under way.
2) This is a maintenance error code displayed by the indoor units connected to the same outdoor unit that does not belong to the same shut off space as the circuit check target indoor unit to inform that the circuit check is under way.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Circuit check	This is not abnormal. After the circuit check, cancel the error.

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, 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 (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)	LEV failure on the indoor unit	Perform a cooling or heating operation to check the operation. Cooling: Indoor unit LEV, LEV1, LEV2, LEV4 Heating: Indoor unit LEV, LEV2, LEV4 Refer to the following page(s). [8-7 Troubleshooting LEV Problems]
(4)	Outdoor unit LEV1 actuation failure Outdoor unit LEV2 actuation failure Outdoor unit LEV4 actuation failure	
(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). [8-6 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 Code [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.	Refer to the following page(s). [8-4-3 Comparing the Low-Pressure Sensor Measurement and Gauge Pressure]
(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	

Note

When a shut off valve is installed as a safety measure, closing of the valve may cause this error.

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)	Outdoor unit LEV2 actuation failure -> Cooling Indoor unit LEV actuation failure -> Heating	Perform a cooling or heating operation to check the operation. Cooling: Outdoor unit LEV2 Heating: Indoor unit LEV Refer to the following page(s). [8-7 Troubleshooting LEV 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). [8-6 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). [8-5 Troubleshooting Solenoid Valve Problems]
(12)	Thermistor failure (TH3, TH7)	Refer to the following page(s). [7-7-2 Error Code [5102,5103,5104,5105,5106,5107,5115]]
(13)	Pressure sensor failure	Refer to the following page(s). [8-4-1 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.	Refer to the following page(s). [8-4-1 Comparing the High-Pressure Sensor Measurement and Gauge Pressure]
(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	
(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

Liquid back error (detected by refrigerant temperature)

2. Error definition and error detection method

An error can be detected by the shell bottom superheat (TH15 - Te).

1) If the formula "compressor bottom SH (TH15 - Te) ≤ 10ºC [18ºF]" 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 "compressor bottom SH (TH15 - Te) ≤ 10ºC [18ºF]" is satisfied again within 40 minutes of the first stoppage of the outdoor unit (second detection), the unit comes to an abnormal stop, and the error code "1500" appears.
3) If the formula "compressor bottom SH (TH15 - Te) ≤ 10ºC [18ºF]" is satisfied 40 minutes or more after the first stoppage of the outdoor unit, the same sequence as Item 1) above (first detection) is followed.
4) For 40 minutes after the stop of the outdoor unit, preliminary errors will be displayed on the LED display.
5) If the formula "compressor bottom SH (TH15 - Te) ≤ 10ºC [18ºF]" is satisfied during the defrost operation and if the formula "compressor bottom SH (TH15 - Te) ≤ 10ºC [18ºF]" is also satisfied after the defrost operation, the same sequence as Item 1) above (first detection) is followed.

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 (TH4, TH15)	Check the temperature and pressure readings on the thermistor that are displayed on the LED monitor.
(4)	Malfunction of outdoor LEV2a and 2b → Heating Malfunction of outdoor LEV4 → Cooling, heating Malfunction of outdoor LEV 1 (when stopped) → Cooling	Refer to the following page(s). [8-7 Troubleshooting LEV Problems]
(5)	Distribution failure in the outdoor distributor → Heating	Use a level to check if the distributor is installed horizontally. Check if the length of the straight pipe before the distributor is 500 mm or more.

7-3-6 Error Code [1521]

Note

Error codes related to refrigerant leak are displayed with higher priority than other error codes. Take actions according to [11-7-3 Flowchart for Refrigerant Leak].

1. Error code definition

Refrigerant leak error (self detection of the unit)

2. Error definition and error detection method

If the indoor unit with the built-in refrigerant sensor detects a refrigerant leak.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Refrigerant leak	The refrigerant gas may have leaked in the room. Take the remedies according to [11-7-3 Flowchart for Refrigerant Leak].

7-3-7 Error Code [1522]

Note

Error codes related to refrigerant leak are displayed with higher priority than other error codes. Take actions according to [11-7-3 Flowchart for Refrigerant Leak].

1. Error code definition

Refrigerant leak error (other units)

2. Error definition and error detection method

1) An error detected by indoor units that belong to the same shut off space as the unit that detected a refrigerant leak
2) A maintenance error code detected by indoor units that belong to a different shut off space from that for the unit that detected a refrigerant leak and are connected to the same outdoor unit

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Refrigerant leak	Identify the unit that has issued the error code (1521) and take the remedies. Take the remedies according to [11-7-3 Flowchart for Refrigerant Leak].

7-3-8 Error Code [1550]

1. Error code definition

Liquid back error (detected by current sensor)
Instantaneous overcurrent (detail code 001)
Overcurrent (effective value) shut off error (detail code 002)
ACCT overcurrent error (detail code 003)

2. Error definition and error detection method

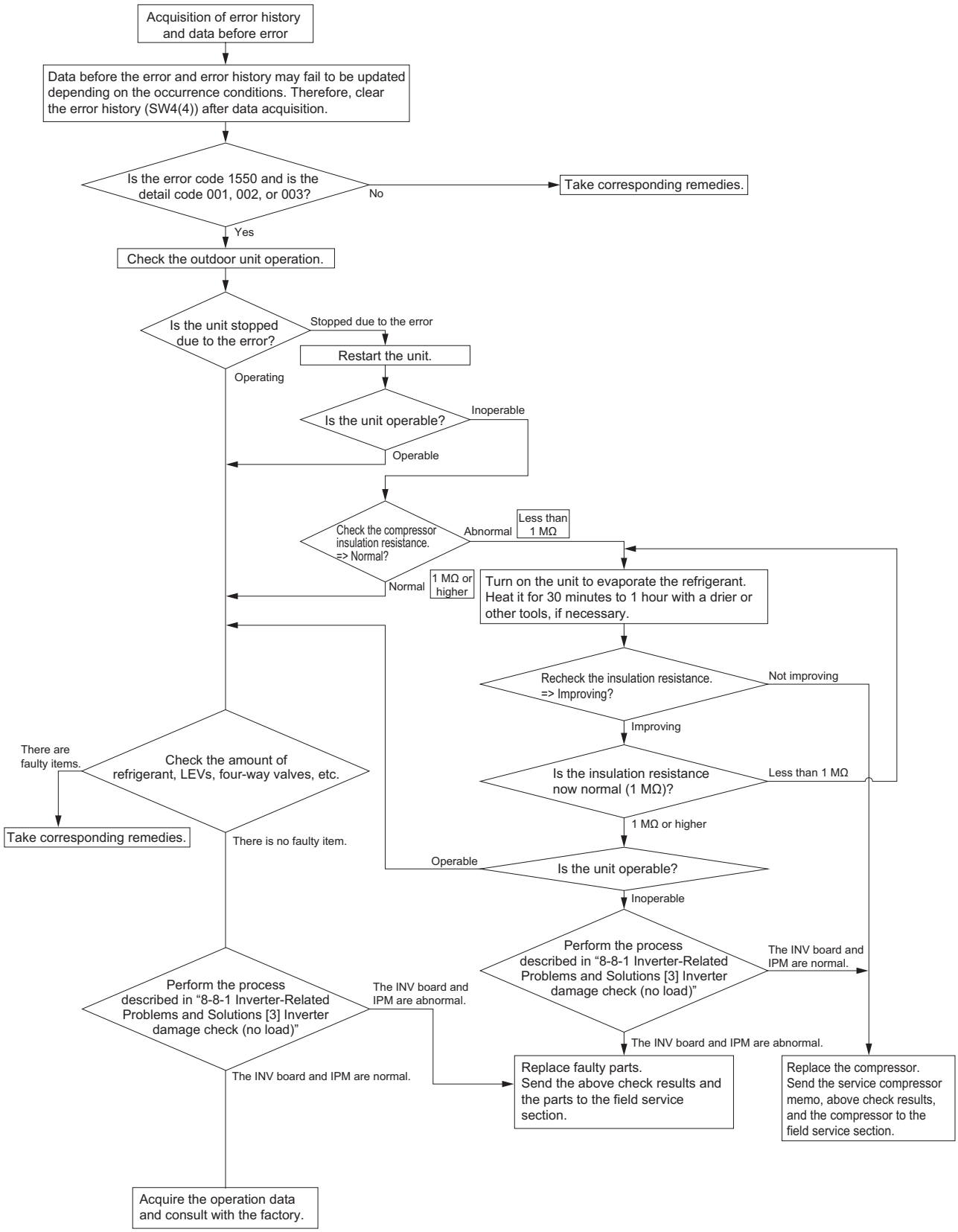
If the current sensor detects an overcurrent that is equal to or greater than the specified value after the start of operation.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Liquid back	Refer to the action flow for 1550 shown on the next page (refrigerant overcharge, malfunctions of outdoor LEVs, distributors, and compressors).
(2) Inverter output-related problems	Refer to the following page(s). [8-8-1 Inverter-Related Problems and Solutions]
(3) The setting for the outdoor unit model selection switch is incorrect (control boards SW5-3 to 5-8).	Check the outdoor unit model selection switch (control boards SW5-3 to 5-8). For details of the switch settings, refer to the following page(s). [5-1 Dipswitch Functions and Factory Settings]

Action flow for the error 1550

Handle the error 1550 according to the following flowchart.



7-3-9 Error Code [1625]

1. Error code definition

Refrigerant sensor maintenance (indoor unit)

2. Error definition and error detection method

Time to replace the built-in refrigerant sensor in the indoor unit

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Time to replace the refrigerant sensor	Replace the built-in refrigerant sensor in the indoor unit.

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

7-4-1 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:

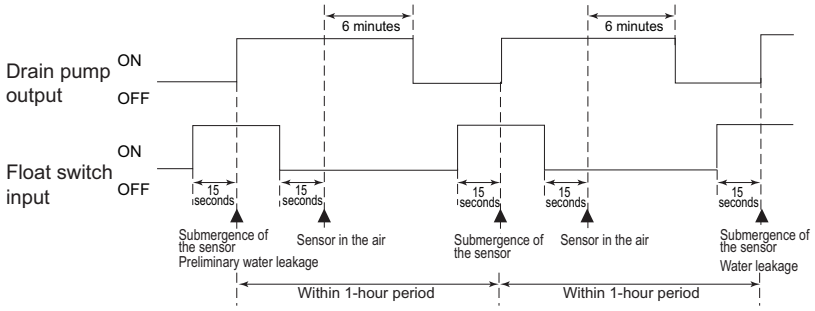
- One hour after the preliminary water leakage was detected, it is not detected that the drain pump goes from OFF to ON.
- The operation mode is changed to Cool/Dry.
- The liquid pipe temperature minus the inlet temperature is - 10°C [-18°F] or less.

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>

Drain pump operation triggered by a submergence of the liquid level sensor (except during the Cooing/Dry mode)



7-4-2 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.

7-4-3 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.

7-4-4 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 -33°C[-27°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 -31°C[-24°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 and below)	-50 ˚C [-58 ˚F] and below (241 kΩ and above)

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 was detected at power on.

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) Terminal block TB1/TB2 failure	Check the continuity between the primary and secondary sides of each phase on the terminal block.
(3) Noise filter problem - Coil (L) problem - Circuit board failure	- Check the coil connections. - Check for coil burnout.
(4) Wiring failure	[208-230V models] Check the wiring between CN012 on the noise filter and CNAC on the control board. Check the wiring between CN110 on the noise filter and CN110 on the control board. [460V models] Confirm that the voltage at the control board connector CNAC is 190 V or above. - If the voltage is below 190, check the wiring between each of the following. CN2 on the noise filter – REC board – CN104 – CNAC on the control board TB21/TB22/TB23 on the noise filter – TB2 on the terminal block – CNTR1
(5) Blown fuse	[208-230V models] Check that F001 on the control board is not blown. → If a blown fuse is found, check for a short-circuiting or ground fault of the actuator. Check noise filter fuses F001 and F002. → If a blown fuse is found, check for a short-circuiting or ground fault of the actuator. [460V models] Check the fuse F001 on the control board and the continuity between the primary and secondary sides of TB2. → If the fuse F001 is blown or there is not continuity between the primary and secondary sides of TB2, check for a short-circuiting or ground fault of the actuator.
(6) 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. [8-10-2 Troubleshooting 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. [8-10-2 Troubleshooting 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)	Contact failure of the relay connector for the fan motor	Check the relay connector for the fan motor for proper connection.
(3)	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.
(4)	Fan motor fault	Replace the fan motor if the voltage is normal in step (3) 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]

1. Error code definition

Power supply sync signal abnormality

2. Error definition and error detection method

The power supply frequency cannot be judged at the power-on.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Power supply problem	Check the voltage at the power supply terminal block TB1.
(2)	Terminal block failure	Check the continuity between the primary and secondary sides of each phase on the terminal block.
(3)	Noise filter problem ♦Coil problem ♦Circuit board failure	♦Check the coil connections. ♦Check for coil burnout. ♦Confirm that the voltage at the CN012 connector is 180 V or above.
(4)	Blown fuse	Check fuses F001 and F002 on the noise filter board and fuse F001 on the control board.
(5)	Wiring failure Between CN012 on the noise filter and CNAC on the control board	Confirm that the voltage at the control board connector CNAC is 180 V or above.
(6)	Control board failure	Replace the control board if all of the above are normal and the problem persists after the power-on.

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

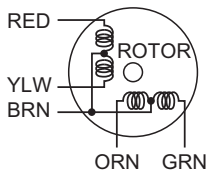
2. Error definition and error detection method

When the damper is not located at the designated position.

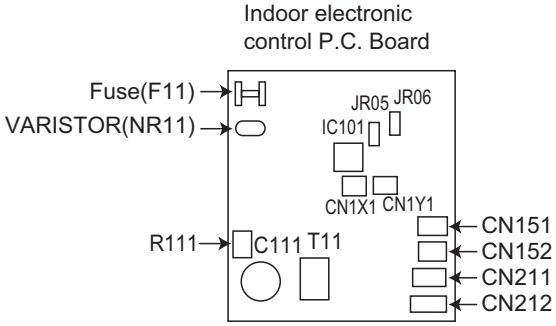
3. Cause, check method and remedy

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.

<table>
<tr><th>Part name</th><th>Check method and criteria</th><th>Figure</th></tr>
<tr><td>Damper lock motor Right(ML1)
Damper lock motor Left(ML2)</td><td>Measure the resistance between the terminals with a tester.
(Part temperature: 10°C ~ 30°C)
<table><tr><th>Color of the lead wire</th><th>Normal</th></tr><tr><td>BRN-other one</td><td>235Ω~255Ω</td></tr></table></td><td rowspan="2">
</td></tr>
<tr><td>Damper motor (MV2)</td><td>Measure the resistance between the terminals with a tester.
(Part temperature: 10°C ~ 30°C)
<table><tr><th>Color of the lead wire</th><th>Normal</th></tr><tr><td>BRN-other one</td><td>282Ω~306Ω</td></tr></table></td></tr>
</table>

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.



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

7-6-9 Error Code [4130]

1. Error code definition

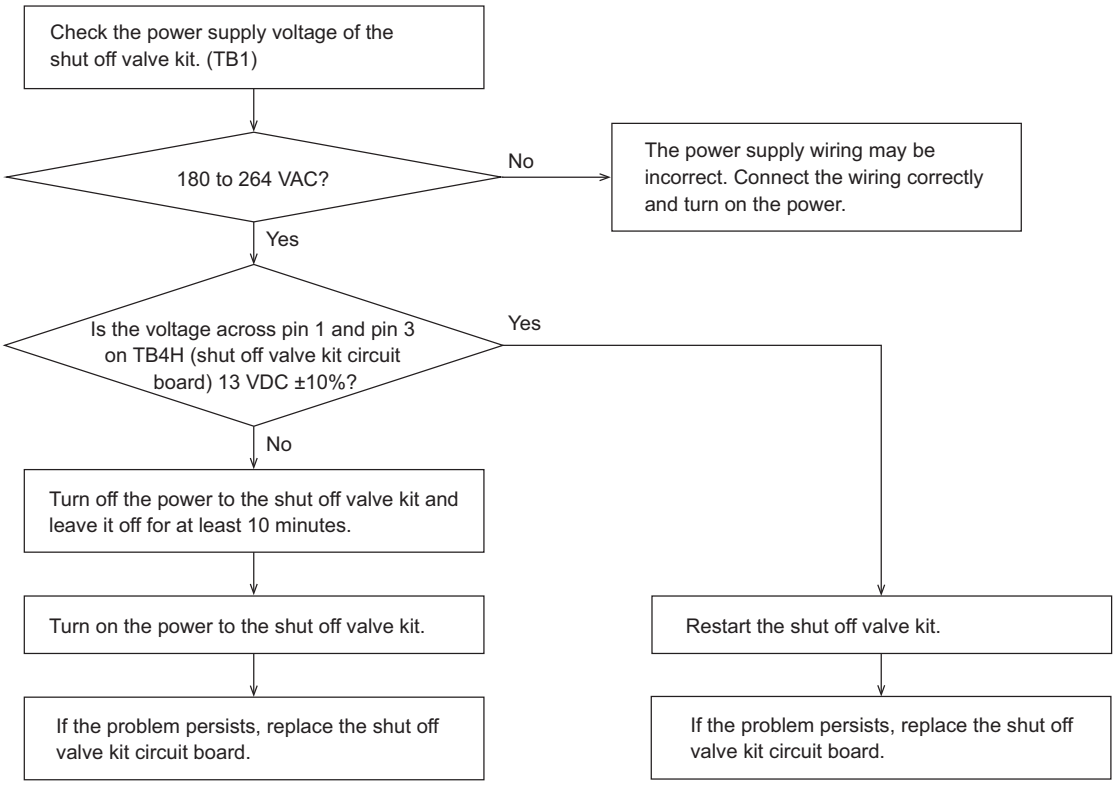
Control power supply error

2. Error definition and error detection method

An error detected when power is not supplied to the control board from the power supply board

3. Cause, check method and remedy

Check and handle the error according to the following flowchart.



7-6-10 Error Code [4136]

1. Error code definition

Safety shut off valve circuit error

2. Error definition and error detection method

If the shut off valve kit detects an abnormal control signal from safety shut off valve

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Connection failure	♦Check the connector (CN501) or (CN502) on the shut off valve kit circuit board. ♦Check the wiring that connects the safety shut off valve and the shut off valve kit.
(2) Circuit board failure	Replace the shut off valve kit circuit board.

7-6-11 Error Code [4220, 4225, 4226] Detail Code 108

1. Error code definition

Abnormal bus voltage drop (Detail code 108) (460V)

2. Error definition and error detection method

If Vdc 350 V or less is detected during inverter operation. (S/W detection)

3. Cause, check method and remedy

(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 414 V or less across all phases.

(2) Voltage drop detected

4220

- Check the voltage between the tab terminals FTP and FTN on the INV board 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 350 V, and replace the inverter board if it is 350 V or below.
2) Check the coil (L) connections and for broken wiring.
3) Check the wiring connections.
   Between the noise filter board and INV board, INV board and DCL
   Replace the INV board if no problems are found.

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.
3) Check if the inrush current resistors (R031 and R032) on the inverter board are open.
4) If the problem persists after reboot, replace the INV board.

4225, 4226

- Check the voltage between CNVP2 and CNVN2 on the fan board while the inverter is stopped.

If the voltage is 420 V or above, check the following items.

1) Check for proper connections of the coil (L) and DC reactor, and for broken wiring.
2) Check the wiring connections.
   Between the noise filter board and INV board, INV board and fan board
   Replace the fan board if no problems are found.
   If the problem persists in operation after the fan board is replaced, replace the INV board.

If the voltage is below 420 V, check the following items.

1) Check the wiring connections.
   Between the noise filter board and INV board, INV board and fan board
   Replace the fan board if no problems are found.
   If the problem persists in operation after the fan board is replaced, replace the INV board.

(3) Control board failure

Check if LED01 on the INV board is lit while the inverter is operating. If it is not lit, check the following wiring connections.
Between control board CNRYA and INV board CNRY
Replace the control board if no problem is found in the wiring.

Note

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

7-6-12 Error Code [4220, 4225, 4226] Detail Code 108

1. Error code definition

Abnormal bus voltage drop (Detail code 108) (208-230V)

2. Error definition and error detection method

If Vdc 180 V or less is detected during inverter operation. (S/W detection)

3. Cause, check method and remedy

(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 180 V or less across all phases.

(2) Voltage drop detected

4220

- Check the voltage between the tab terminals FTP and FTN on the INV board while the inverter is stopped.

If the voltage is 220 V or above, check the following items.

1) Check the LED monitor to see if the bus voltage is above 180 V, and replace the inverter board if it is 180 V or below.
2) Check the coil (L) connections and for broken wiring.
3) Check the wiring connections.
   Between the noise filter board and INV board, INV board and DCL
   Replace the INV board if no problems are found.

If the voltage is below 220 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.
3) Check if the inrush current resistors (R007 and R008) on the inverter board are open.
4) If the problem persists after reboot, replace the INV board.

4225, 4226

- Check the voltage between CNVP1 and CNVN1 on the fan board while the inverter is stopped.

If the voltage is 220 V or above, check the following items.

1) Check for proper connections of the coil (L) and DC reactor, and for broken wiring.
2) Check the wiring connections.
   Between the noise filter board and INV board, INV board and fan board
   Replace the fan board if no problems are found.
   If the problem persists in operation after the fan board is replaced, replace the INV board.

If the voltage is below 220 V, check the following items.

1) Check the wiring connections.
   Between the noise filter board and INV board, INV board and fan board
   Replace the fan board if no problems are found.
   If the problem persists in operation after the fan board is replaced, replace the INV board.

(3) Control board failure

Check if LED01 on the INV board is lit while the inverter is operating. If it is not lit, check the following wiring connections.
Between control board CNRYA and INV board CNRY
Replace the control board if no problem is found in the wiring.

Note

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

7-6-13 Error Code [4220, 4225, 4226] Detail Code 109

1. Error code definition

Abnormal bus voltage rise (Detail code 109)

2. Error definition and error detection method

4220

If Vdc ≥ 830 V is detected by the INV board during inverter operation. (460V)
If Vdc ≥ 400 V is detected by the INV board during inverter operation. (208-230V)

4225, 4226

If Vdc ≥ 830 V is detected by the fan board during inverter operation. (460V)
If Vdc ≥ 407 V is detected by the fan board during inverter operation. (208-230V)

3. Cause, check method and remedy

(1) Different voltage connection

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

(2) INV board failure

If no problem is found in the power supply voltage but the problem recurs after restarting the inverter, replace the INV board or fan board.
In the case of 4220: INV board
In the case of 4225 and 4226: Fan board

Note

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

7-6-14 Error Code [4220, 4225, 4226] Detail Code 111

1. Error code definition

Logic error (Detail code 111)

2. Error definition and error detection method

An electronic circuit error on the INV board or fan board
An error detected when the output was stopped with a specific abnormal state not detected by the INV board or fan board electronic circuit

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). [8-8-1(2)[1] INV board error detection circuit check]
(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). [8-8-1(2)[6] Fan board error detection circuit check (no load)] [8-8-1(2)[7] Fan inverter damage check (no load)] [8-8-1(2)[8] Fan inverter damage check (with load)]
(2) Fan board failure	

Note

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

7-6-15 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

If insufficient drive voltage for relays (X001, X002, X003) on INV board is detected.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Faulty wiring	Check the wiring between the control board and INV board.
(2) Connector contact failure	Check the connectors CNRY on INV board and CNRYA on control board for proper connections.
(3) Control power supply drop	Disconnect the connector CNRYA from the control board and check the voltage at the connector CNRYA pins on the control board. If the voltage is 10 V or less, replace the control board.
(4) INV board failure	If the problem persists after reboot, replace the INV board.

Note

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

7-6-16 Error Code [4220, 4225, 4226] Detail Code 131

1. Error code definition

Low bus voltage at startup (Detail code 131) (460V)

2. Error definition and error detection method

When Vdc ≤350 V is detected just before the inverter operation. (460V)

3. Cause, check method and remedy

(1) Inverter main circuit failure

Same as detail code 108 of 4220, 4225, 4226 error

Note

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

7-6-17 Error Code [4220, 4225, 4226] Detail Code 131

1. Error code definition

Low bus voltage at startup (Detail code 131) (208-230V)

2. Error definition and error detection method

When Vdc ≤180 V is detected just before the inverter operation. (208-230V)

3. Cause, check method and remedy

(1) Inverter main circuit failure

Same as detail code 108 of 4220, 4225, 4226 error

Note

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

7-6-18 Error Code [4230, 4235, 4236] Detail Code 125

1. Error code definition

Heatsink overheat protection (Detail code 125)

2. Error definition and error detection method

When the heat sink temperature (THHS) remains at or above TOH is detected.

models	TOH
INV board	100°C [212°F]
Fan board	100°C [212°F]

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Fan board failure	Refer to the following page(s). [8-8-1(2)[6] Fan board error detection circuit check (no load)] [8-8-1(2)[7] Fan inverter damage check (no load)] [8-8-1(2)[8] Fan inverter damage check (with load)]
(2) Outdoor fan failure	Check the outdoor fan for proper operation. Check the fan motor if problems are found with the operation of the fan.
(3) Air passage blockage	Check that the heat sink cooling air passage is not blocked.
(4) THHS failure	1) Check the power modules and heatsink for proper mounting. (Remove the inverter and check the status of the heat dissipation grease for the power module or the heat dissipation sheet.) When heat dissipation grease is used, check for any missing application of the grease. When heat dissipation sheet is used, check for the presence of the sheet and for damage or breakage of the sheet. 2) Check the THHS sensor reading on the LED monitor. → If the THHS value is abnormal, replace the INV board or the fan board that has the abnormal THHS value.

Note

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

7-6-19 Error Code [4240, 4245, 4246]

1. Error code definition

Overload protection (460V)

2. Error definition and error detection method

In the case of 4240

If the output current of "(Iac) >Imax (Arms)" or "THHS > TOL" is continuously detected for 10 minutes during inverter operation.

In the case of 4245 and 4246

If the output current of "(Iac) >Imax (Arms)" is continuously detected for 10 minutes during inverter operation.

For details of the model names and specified values, refer to the following page(s). The note of [7-1 Error Code and Preliminary Error Code Lists].

3. Cause, check method and remedy

Cause	Check method and remedy
(1) The control board SW7-1 (control board SW7-2 or fan board SW1-1 for 4245 and 4246) is on with the inverter output wiring connected.	Check the status of the control board SW7-1 (control board SW7-2 and fan board SW1-1 for 4245 and 4246).
(2) Power module contact failure	Check the power modules and heatsink for proper mounting. (Remove the inverter and check the status of the heat dissipation grease for the power module or the heat dissipation sheet.) When heat dissipation grease is used, check for any missing application of the grease. When heat dissipation sheet is used, check for the presence of the sheet and for damage or breakage of the sheet.
(3) Air passage blockage	Check that the heat sink cooling air passage is not blocked.
(4) Power supply environment	Power supply voltage is 414 V or above.
(5) Inverter failure	Refer to the following page(s). [8-8 Troubleshooting Inverter Problems]
(6) Compressor failure (for 4240)	Check that the compressor has not overheated during operation. → Check the refrigerant circuit (oil return section). Refer to the following page(s). [8-8-1(2)[2] Compressor ground fault and winding error check]
(7) Fan motor failure (for 4245 and 4246)	Check if the fan is locked.
(8) The setting for the outdoor unit model selection switch is incorrect (control boards SW5-3 to 5-8).	Check the outdoor unit model selection switch (control boards SW5-3 to 5-8). For details of the switch settings, refer to the following page(s). [5-1 Dipswitch Functions and Factory Settings]

Note

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

7-6-20 Error Code [4240, 4245, 4246]

1. Error code definition

Overload protection (208-230V)

2. Error definition and error detection method

In the case of 4240

If the output current of "(Iac) >Imax (Arms)" or "THHS > TOL" is continuously detected for 10 minutes during inverter operation.

In the case of 4245 and 4246

If the output current of "(Iac) >Imax (Arms)" is continuously detected for 10 minutes during inverter operation.

For details of the model names and specified values, refer to the following page(s). The note of [7-1 Error Code and Preliminary Error Code Lists].

3. Cause, check method and remedy

Cause	Check method and remedy
(1) The control board SW7-1 (control board SW7-2 or fan board SW1-1 for 4245 and 4246) is on with the inverter output wiring connected.	Check the status of the control board SW7-1 (control board SW7-2 and fan board SW1-1 for 4245 and 4246).
(2) Power module contact failure	Check the power modules and heatsink for proper mounting. (Remove the inverter and check the status of the heat dissipation grease for the power module or the heat dissipation sheet.) When heat dissipation grease is used, check for any missing application of the grease. When heat dissipation sheet is used, check for the presence of the sheet and for damage or breakage of the sheet.
(3) Air passage blockage	Check that the heat sink cooling air passage is not blocked.
(4) Power supply environment	Power supply voltage is 188 V or above.
(5) Inverter failure	Refer to the following page(s). [8-8 Troubleshooting Inverter Problems]
(6) Compressor failure (for 4240)	Check that the compressor has not overheated during operation. → Check the refrigerant circuit (oil return section). Refer to the following page(s). [8-8-1(2)[2] Compressor ground fault and winding error check]
(7) Fan motor failure (for 4245 and 4246)	Check if the fan is locked.
(8) The setting for the outdoor unit model selection switch is incorrect (control boards SW5-3 to 5-8).	Check the outdoor unit model selection switch (control boards SW5-3 to 5-8). For details of the switch settings, refer to the following page(s). [5-1 Dipswitch Functions and Factory Settings]

Note

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

7-6-21 Error Code [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 on the INV board.

In the case of 4255 and 4256

If an error signal is detected from IPM on the fan board.

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). [8-8-1(2)[1] INV board error detection circuit check] [8-8-1(2)[2] Compressor ground fault and winding error check] [8-8-1(2)[3] Inverter damage check (no load)] [8-8-1(2)[4] Inverter damage check (during compressor operation)] [8-8-2 Checking the Installation Conditions] Check the IGBT module resistance value of the INV board, if no problems are found. [8-8-6 Troubleshooting Problems with IGBT Module]
(2) The setting for the outdoor unit model selection switch is incorrect (control boards SW5-3 to 5-8).	Check the outdoor unit model selection switch (control boards SW5-3 to 5-8). For details of the switch settings, refer to the following page(s). [5-1 Dipswitch Functions and Factory Settings]
(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). [8-8-1(2)[5] Fan motor ground fault and winding error check]
(2) Fan board failure	Refer to the following page(s). [8-8-1(2)[6] Fan board error detection circuit check (no load)] [8-8-1(2)[7] Fan inverter damage check (no load)] [8-8-1(2)[8] Fan inverter damage check (with load)]
(3) The setting for the outdoor unit model selection switch is incorrect (control boards SW5-3 to 5-8).	Check the outdoor unit model selection switch (control boards SW5-3 to 5-8). For details of the switch settings, refer to the following page(s). [5-1 Dipswitch Functions and Factory Settings]

Note

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

7-6-22 Error Code [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). [8-8-1(2)[2] Compressor ground fault and winding error check]
(2) Inverter output related	Refer to the following page(s). [8-8-1(2)[1] INV board error detection circuit check] [8-8-1(2)[3] Inverter damage check (no load)] [8-8-1(2)[4] Inverter damage check (during compressor operation)] [8-8-2 Checking the Installation Conditions]
(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) Grounding fault of fan motor	Refer to the following page(s). [8-8-1(2)[5] Fan motor ground fault and winding error check]
(2) Fan board failure	Refer to the following page(s). [8-8-1(2)[6] Fan board error detection circuit check (no load)] [8-8-1(2)[7] Fan inverter damage check (no load)] [8-8-1(2)[8] Fan inverter damage check (with load)]

Note

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

7-6-23 Error Code [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

If a short is detected in the compressor or fan motor 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 winding	Refer to the following page(s). [8-8-1(2)[2] Compressor ground fault and winding error check]
(2) Inverter output wiring	Check for a short circuit.

In the case of 4255 and 4256

Cause	Check method and remedy
(1) Short-circuited fan motor winding	Refer to the following page(s). [8-8-1(2)[5] Fan motor ground fault and winding error check]
(2) Fan inverter output wiring	Check for a short circuit.

Note

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

7-6-24 Error Code [4250] Detail Code 106 and 107

1. Error code definition

Instantaneous overcurrent (Detail code 106)
Overcurrent (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 following page(s). [7-1 Error Code and Preliminary Error Code Lists] for the details of model names and the specified values.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Inverter output related	Refer to the following page(s). [8-8-1(2)[1] INV board error detection circuit check] [8-8-1(2)[3] Inverter damage check (no load)] [8-8-1(2)[4] Inverter damage check (during compressor operation)] [8-8-2 Checking the Installation Conditions] Check the IGBT module resistance value of the INV board, if no problems are found. [8-8-6 Troubleshooting Problems with IGBT Module]
(2)	The setting for the outdoor unit model selection switch is incorrect (control boards SW5-3 to 5-8).	Check the outdoor unit model selection switch (control boards SW5-3 to 5-8). For details of the switch settings, refer to the following page(s). [5-1 Dipswitch Functions and Factory Settings]

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

7-6-25 Error Code [4255, 4256] Detail Code 106

1. Error code definition

Instantaneous overcurrent (Detail code 106)

2. Error definition and error detection method

If the current sensor detects an overcurrent other than the specified value.
* For details of the model names and specified values, refer to the following page(s). The note of [7-1 Error Code and Preliminary Error Code Lists]

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Open phase of the fan board output	Check the connection of the fan board output line.
(2)	Air passage blockage	Check that the heat sink cooling air passage, such as heat exchangers, is not blocked.
(3)	Strong wind such as a gust	Check if there is strong wind such as a gust.
(4)	Fan motor failure	Check if the fan is locked.
(5)	Fan board failure	Refer to the following page(s). [8-8-1(2)[6] Fan board error detection circuit check (no load)] [8-8-1(2)[7] Fan inverter damage check (no load)] [8-8-1(2)[8] Fan inverter damage check (with load)]
(6)	The setting for the outdoor unit model selection switch is incorrect (control boards SW5-3 to 5-8).	Check the outdoor unit model selection switch (control boards SW5-3 to 5-8). For details of the switch settings, refer to the following page(s). [5-1 Dipswitch Functions and Factory Settings]

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

7-6-26 Error Code [4255, 4256] Detail Code 137

1. Error code definition

Motor synchronization loss (Detail code 137)

2. Error definition and error detection method

If fan motor locking is 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)	Open phase of the fan board output	Check the connection of the fan board output wiring.
(3)	Fan motor failure	Refer to the following page(s). [8-8-1(2)[5] Fan motor ground fault and winding error check]
(4)	Strong wind such as a gust	Check if there is strong wind such as a gust.
(5)	Fan board failure	Refer to the following page(s). [8-8-1(2)[6] Fan board error detection circuit check (no load)] [8-8-1(2)[7] Fan inverter damage check (no load)] [8-8-1(2)[8] Fan inverter damage check (with load)]
(6)	The setting for the outdoor unit model selection switch is incorrect (control boards SW5-3 to 5-8).	Check the outdoor unit model selection switch (control boards SW5-3 to 5-8). For details of the switch settings, refer to the following page(s). [5-1 Dipswitch Functions and Factory Settings]

Note

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

7-6-27 Error Code [4260]

1. Error code definition

Heatsink overheat protection at startup

2. Error definition and error detection method

When heatsink temperature (THHS) remains at or above 100°C [212°F] for 10 minutes or longer after inverter startup

3. Cause, check method and remedy

Same as 4230 error

Note

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

7-7 Error Code Definitions and Solutions: Codes [5000 - 5999]

7-7-1 Error Code [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	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
(2)	Connector contact failure	
(3)	Disconnected wire or partial disconnected thermistor wire	
(4)	Unattached thermistor or contact failure	
(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 Code [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.
- Error code 5105 (Accumulator inlet temperature sensor (TH5) fault) is issued when the TH5 temperature exceeds 80°C to protect the fusible plug. Check if the fusible plug has melted when this error is issued.

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	110°C [230°F] and above (0.4k and below)	-50°C [-58°F] and below (230k and above)
TH3	110°C [230°F] and above (0.4k and below)	-50°C [-58°F] and below (230k and above)
TH4	240°C [464°F] and above (0.57k and below)	-20°C [-4°F] and below (1880k and above)
TH5	80°C [176°F] and above (0.84k and below)	-50°C [-58°F] and below (230k and above)
TH6	110°C [230°F] and above (0.4k and below)	-50°C [-58°F] and below (230k and above)
TH7	110°C [230°F] and above (0.4k and below)	-50°C [-58°F] and below (230k and above)
TH15	110°C [230°F] and above (0.4k and below)	-50°C [-58°F] and below (230k and above)

7-7-3 Error Code [5110]

1. Error code definition

Heatsink temperature sensor (THHS) fault (Detail code 01, 05, 06)

2. Error definition and error detection method

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

3. Cause, check method and remedy

Detail code 01

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

Detail code 05, 06

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

Note

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

7-7-4 Error Code [5201]

1. Error code definition

High-pressure sensor fault (63HS1)

2. Error definition and error detection method

- If the high pressure sensor detects 0.098MPa [14psi] or less during the operation, the outdoor unit stops once, turns to anti-restart mode for 3 minutes, and restarts after 3 minutes when the detected high pressure sensor is 0.098MPa [14psi] or more.
- If the high pressure sensor detects 0.098MPa [14psi] or less just before the restart, the outdoor unit makes an error stop, and the error code "5201" will appear.
- During 3-minute antirestart mode, preliminary errors will be displayed on the LED display.
- A error is not detected for 3 minutes after the compressor start, during defrost operation, or 3 minutes after defrost operation.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) High pressure sensor failure	Refer to the following page(s). [8-4-1 Comparing the High-Pressure Sensor Measurement and Gauge Pressure]
(2) Pressure drop due to refrigerant leak	Check for refrigerant leakage
(3) Torn wire coating	Check for damaged wire coating
(4) A pin on the male connector is missing or contact failure	Check whether a connector pin is missing
(5) Disconnected wire	Check for disconnected or broken wire
(6) High pressure sensor input circuit failure on the control board	Check the temperature detected by the sensor from the LED monitor. If the temperatureis significantly different from the actual temperature, replace the control board.

7-7-5 Error Code [5301] Detail Code 115

1. Error code definition

ACCT sensor fault (Detail code 115) (460V)

2. Error definition and error detection method

When the formula "output current < 1.0 Arms" remains satisfied for 10 seconds while the inverter is in operation.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) INV output phase loss	Check the output wire for proper connection.
(2) Compressor failure	Refer to the following page(s). [8-8-1(2)[2] Compressor ground fault and winding error check]
(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). [8-8 Troubleshooting Inverter Problems]

7-7-6 Error Code [5301] Detail Code 115

1. Error code definition

ACCT sensor fault (Detail code 115) (208-230V)

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.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) INV output phase loss	Check the output wire for proper connection.
(2) Compressor failure	Refer to the following page(s). [8-8-1(2)[2] Compressor ground fault and winding error check]
(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). [8-8 Troubleshooting Inverter Problems]

7-7-7 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). [8-8-1(2)[1] INV board error detection circuit check] [8-8-1(2)[3] Inverter damage check (no load)] [8-8-1(2)[4] Inverter damage check (during compressor operation)]
(2) Compressor failure	Refer to the following page(s). [8-8-1(2)[2] Compressor ground fault and winding error check]

Note

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

7-7-8 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) Inverter output wiring failure	Check the output wiring connections. Check if the U- and W-phase output wires penetrate through CT001 and CT002 on the INV board.
(2) Inverter failure	Refer to the following page(s). [8-8-1(2)[3] Inverter damage check (no load)] [8-8-1(2)[4] Inverter damage check (during compressor operation)]
(3) Compressor failure	Refer to the following page(s). [8-8-1(2)[2] Compressor ground fault and winding error check]

Note

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

7-7-9 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) Inverter output wiring failure	Check the output wiring connections. Check if the U- and W-phase output wires penetrate through CT001 and CT002 on the INV board.
(2) Inverter failure	Refer to the following page(s). [8-8-1(2)[3] Inverter damage check (no load)] [8-8-1(2)[4] Inverter damage check (during compressor operation)]
(3) Compressor failure	Refer to the following page(s). [8-8-1(2)[2] Compressor ground fault and winding error check]

Note

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

7-7-10 Error Code [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.
*For 208-230V models with two motors, the threshold is 0.3 Arms.

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). [8-8-1(2)[5] Fan motor ground fault and winding error check]
(3) Fan board failure	Refer to the following page(s). [8-8-1(2)[6] Fan board error detection circuit check (no load)] [8-8-1(2)[7] Fan inverter damage check (no load)] [8-8-1(2)[8] Fan inverter damage check (with load)]

Note

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

7-7-11 Error Code [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 on the fan board 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). [8-8-1(2)[6] Fan board error detection circuit check (no load)] [8-8-1(2)[7] Fan inverter damage check (no load)] [8-8-1(2)[8] Fan inverter damage check (with load)]

Note

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

7-7-12 Error Code [5558]

1. Error code definition

Refrigerant sensor error

2. Error definition and error detection method

If the indoor unit refrigerant sensor has an error.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Refrigerant sensor failure	Replace the refrigerant sensor.
(2)	Wiring failure	Check the wiring of the refrigerant sensor.
(3)	A disconnected connector of the built-in refrigerant sensor in the indoor unit	Check the connector status (CNSA) on the indoor unit board.
(4)	If the refrigerant sensor is removed.	♦Install the refrigerant sensor. ♦When removing the refrigerant sensor, refer to the following page(s). [11-9-2 Checking and Changing the System Configuration]

7-7-13 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, LOSSNAY units, controllers. <Example> 6600 "01" appears on the remote controller Unit #01 detected the error. Two or more units in the system have 01 as their address. (2) Signals are distorted by the noise on the transmission line.	♦Find the unit that has the same address as that of the error source.**Once the unit is found, correct the address. Then, turn off the outdoor units, indoor units, and LOSSNAY units, keep them all turned off for at least five minutes, and turn them back on.** ♦When air conditioning units are operating normally despite the address overlap error Check the transmission wave shape and noise on the transmission line. Refer to the following page(s). [8-3 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.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) No voltage is applied to the M-NET transmission line that TE-C/TW-C are connected to. (2) M-NET transmission line to which TE-C/TW-C are connected is short-circuited. (3) When two or more power supplies are connected to the M-NET	Check if power is supplied to the M-NET transmission line of the TE-C/TW-C, and correct any problem found.

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

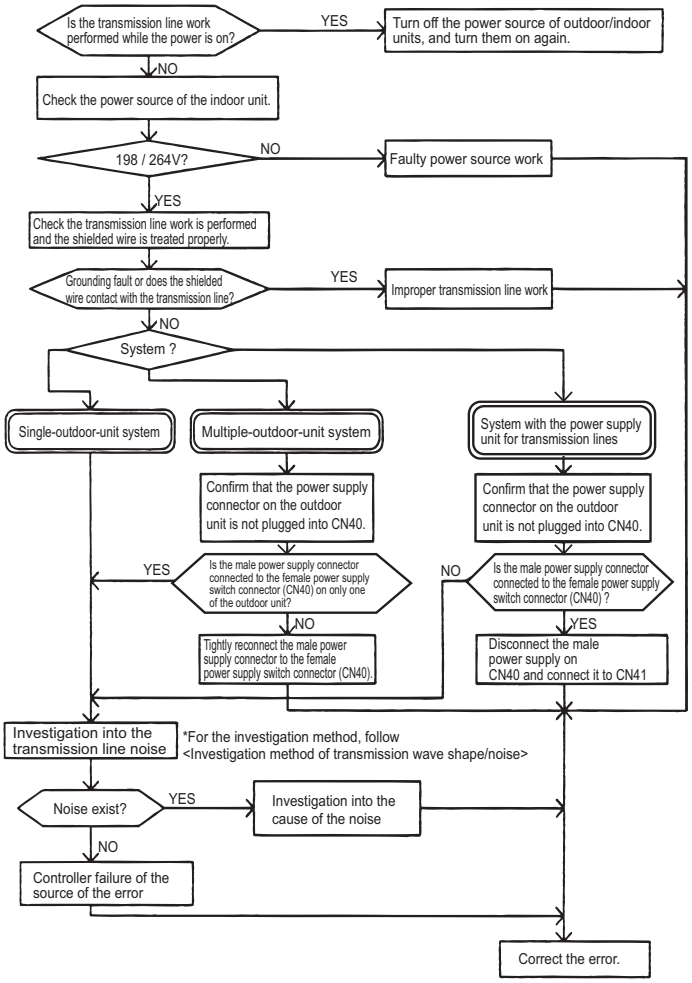
Note

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

3. Cause

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

4. Check method and remedy



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). [8-3 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 source of the outdoor and the indoor units.(When the power source is turned off separately, the microcomputer will not be reset, and the error will not be corrected.) → If the same error occurs, the error source controller is a failure.
(2)	Error source controller failure	

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)	Check whether Error Code [Er91] is displayed on the service LED on the outdoor unit.
(2)	Contact failure of transmission line of OC or IC	2)	If the code is not displayed, turn off the power to the outdoor unit, and then turn it back on.
(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	3)	If the error is accidental, it will run normally. If not, check the causes (2) - (5). * Skip check item 1) on the outdoor unit whose firmware does not need to be updated.
(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		
(6)	Firmware update error on the outdoor unit		

7-8-9 Error Code [6607] Error Source Address = Indoor Unit (IC)

1. Error code definition

No ACK error

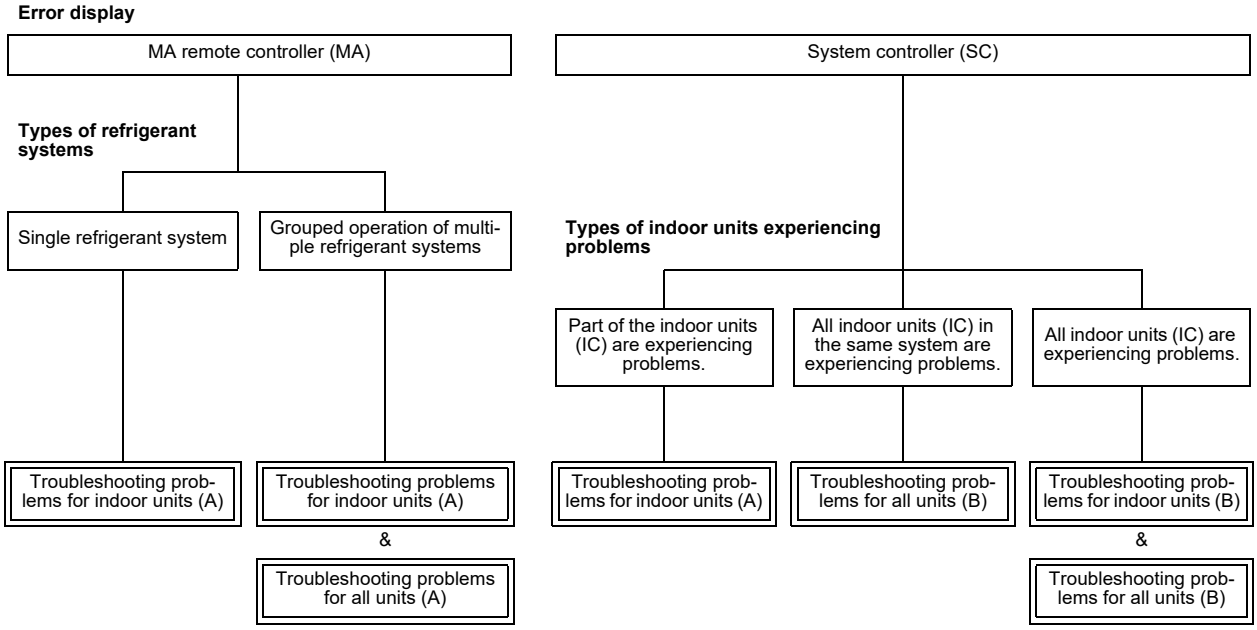
2. Error definition and error detection method

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) - (5).
(3) Faulty or disconnected IC transmission wiring	
(4) Disconnected IC connector (CN2M)	
(5) Indoor unit 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	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)	Disconnection or shutdown of the power source of the power supply unit for transmission line		
(3)	System controller (MELANS) malfunction	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 = LOSSNAY (LC)

1. Error code definition

No ACK error

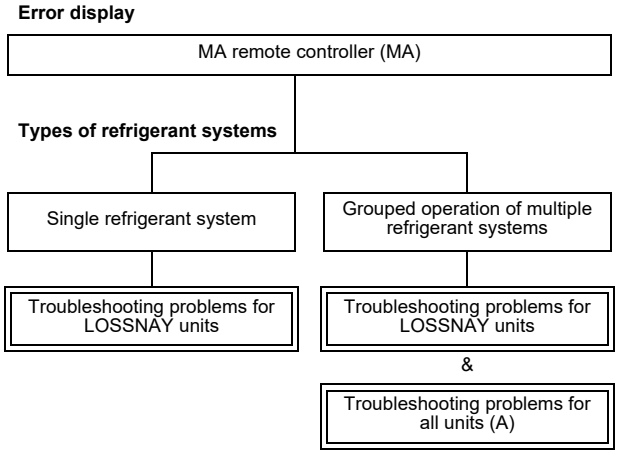
2. Error definition and error detection method

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	1)	Turn off the power source of LOSSNAY and turn it on again.
(2)	The power source of LOSSNAY has been shut off.	2)	If the error is accidental, it will run normally. If not, check the causes (2) - (6).
(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		

7-8-11 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

MA remote controller (MA)

Type of unit/controller in error

All indoor units (IC) in the same system are experiencing problems.

Troubleshooting problems for all units (B)

7-8-12 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)	1)	Check the causes of (1) - (4). If the cause is found, correct it. If no cause is found, check 2).
(2)	When multiple outdoor units are connected and the power source of one of the outdoor units has been shut off.	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
(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)		

(2) Troubleshooting problems for all units (B)

Cause		Check method and remedy	
(1)	Total capacity error (7100)	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.
(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		

7-8-13 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) When an error occurs during commissioning, turn off the power sources for the outdoor unit, indoor unit, and LOSSNAY for 5 or more minutes, and then turn them on again.
   - 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). [8-3 Checking Transmission Waveform and for Electrical Noise Interference]
   Noise is the most possible cause of the error "6608".

7-8-14 Error Code [6815]

1. Error code definition

Supervisor remote controller communication error

2. Error definition and error detection method

If an error is detected in communication with the MA remote controller set as the supervisor remote controller.

3. Cause

1) Cable contact failure of the MA remote controller set as the supervisor remote controller or the MA remote controller for the indoor unit
2) The wiring specifications are not met.
   - Cable length
   - Cable width
   - The number of remote controllers
   - The number of indoor units
3) A connected MA remote controller was removed without turning off the power.
4) Noise in the MA remote controller signal transmission line
5) Failure of the circuit that receives signals from the MA remote controller, which is on the indoor unit board
6) Sending/receiving circuit failure of the MA remote controller

4. Check method and remedy

1) Check for a disconnected or loose transmission line of the MA remote controller for the indoor unit or that set as the supervisor remote controller.
2) Check the main power and power supply to the remote controller.
3) Check if the MA remote controller cable exceeds the allowable ranges.
4) Check if the MA remote controllers have been set as the main or supervisor remote controller. Set one of them as the supervisor remote controller.
5) Perform the remote controller diagnosis. (Refer to the Installation Manual for the remote controller.)
   [OK]: No problem with the remote controller (Check the wiring specifications.)
   [NG]: Replace the remote controller.
   [6832, 6833, ERC]: Noise is causing the problem. Go to 6).
6) Investigate the waveforms and noise of the signals transmitted in the MA remote controller cable.
   For the investigation method, refer to the Service Handbook for the outdoor unit.
7) When there is no problem in 1) to 6) above, replace the indoor unit board or the MA remote controller set as the supervisor remote controller.
   - The main power to the indoor unit is on when the LED 1 is lit.
   - The power is supplied to the MA remote controller cable when the LED 2 is lit.

7-8-15 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). [8-3 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.

7-8-16 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). [8-3 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.

7-8-17 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). [8-3 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 [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). [8-3 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 [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.

7-8-20 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.

7-8-21 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.

7-8-22 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.

7-8-23 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,

After troubleshooting the error using the check methods and remedies shown below, turn the power back on.

<table>
<tr><th>Error source</th><th>Cause</th><th>Check method and remedy</th></tr>
<tr><td rowspan="3">Outdoor unit</td><td>(1) The Qj total of indoor units in the system with one outdoor unit exceeds the following table.

<table>
<tr><th>Model</th><th>Capacity total</th></tr>
<tr><td>72 model</td><td>93</td></tr>
<tr><td>96 model</td><td>124</td></tr>
<tr><td>120 model</td><td>156</td></tr>
<tr><td>144 model</td><td>187</td></tr>
<tr><td>168 model</td><td>218</td></tr>
<tr><td>192 model</td><td>249</td></tr>
<tr><td>240 model</td><td>312</td></tr>
<tr><td>264 model</td><td>343</td></tr>
<tr><td>288 model</td><td>374</td></tr>
<tr><td>312 model</td><td>405</td></tr>
<tr><td>336 model</td><td>436</td></tr>
<tr><td>360 model</td><td>468</td></tr>
<tr><td>384 model</td><td>499</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).</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>72 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>96 model</td><td>ON</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td></tr>
<tr><td>120 model</td><td>OFF</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>144 model</td><td>ON</td><td>ON</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>168 model</td><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td>192 model</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr>
</table>
*1 ON: E model; OFF: H 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>(3) The outdoor unit and the auxiliary unit (OS) that is connected to the same system are not properly connected.</td><td>Confirm that the TB3 on the OC and OS are properly connected.</td></tr>
</table>

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 capacity code) indoor unit or outdoor unit

3. Error source, cause, check method and remedy

After troubleshooting the error using the check methods and remedies shown below, turn the power back on.

<table>
<tr><th>Error source</th><th>Cause</th><th>Check method and remedy</th></tr>
<tr><td>Outdoor unit
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>72 model</td><td>OFF</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td><td rowspan="6">*1</td></tr>
<tr><td>96 model</td><td>ON</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td></tr>
<tr><td>120 model</td><td>OFF</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>144 model</td><td>ON</td><td>ON</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>168 model</td><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td>192 model</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr>
</table>
*1 ON: E model; OFF: H 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>

7-9-3 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

After troubleshooting the error using the check methods and remedies shown below, turn the power back on.

<table>
<tr><th>Error source</th><th>Cause</th><th>Check method and remedy</th></tr>
<tr><td>Outdoor unit</td><td>(1) 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>14 : 72 model
19 : 96 model
23 : 120 model
28 : 144 model
33 : 168 model
38 : 192 model
47 : 240 model
50 : 264 - 384 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 : E072 - E192 models
H072 - H120 models
2 : E264 - E384 models
H144 - H240 models</td></tr>
</table>
</td><td>1) Check whether the number of units connected to the outdoor terminal block (TB3) for indoor/ outdoor transmission lines does not exceed the limitation. (See (1) and (2) on the left.)</td></tr>
<tr><td></td><td>(2) Disconnected transmission line of the outdoor unit</td><td>2) Check (2) - (3) on the left.</td></tr>
<tr><td></td><td>(3) Short-circuited transmission line
When (2) and (3) apply, the following display will appear.

♦MA remote controller
"HO" or "PLEASE WAIT" blinks.</td><td>3) Check whether the transmission line for the terminal block for centralized control (TB7) is not connected to the terminal block for the indoor/outdoor transmission line (TB3).</td></tr>
<tr><td></td><td>(4) The model selection switch (SW5-7) on the outdoor unit is set to OFF. (Normally set to ON)

(5) Outdoor unit address setting error
The outdoor units in the same refrigerant circuit do not have sequential address numbers.</td><td>4) 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>Shut off valve kit or power supply interface for alarm kit</td><td>(1) The number of indoor units connected to the TB3 terminal of the shut off valve kit or the power supply interface for alarm kit exceeds the following limit.

<table>
<tr><th>Item</th><th>Quantity limit</th></tr>
<tr><td>Total number of indoor units</td><td>1 - 8 : CMR-M100KT</td></tr>
</table>
</td><td>Ensure that the number of indoor units connected to the TB3 terminal of the shut off valve kit or the power supply interface for alarm kit is within the quantity limit.</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. Error source, 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 source, cause, check method and remedy

After troubleshooting the error using the check methods and remedies shown below, turn the power back on.

Error source	Cause	Check method and remedy
-	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.	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. Operation Method / SW3-1 Interlocked operation with the indoor unit / OFF Direct operation via the MA remote controller / ON

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

After troubleshooting the error using the check methods and remedies shown below, turn the power back on.

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

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

After troubleshooting the error using the check methods and remedies shown below, turn the power back on.

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

After troubleshooting the error using the check methods and remedies shown below, turn the power back on.

Error source	Cause	Check method and remedy
Outdoor unit	(1) Wiring fault (2) Loose connectors, short-circuit, contact failure (3) Incompatible control board and INV board (replacement with a wrong circuit board) (4) DIP SW setting error on the control board	(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.
		(Detail code 14) 1) Check the settings of SW5-3 through SW5-6 on the control board. 2) Check the connector CNTYP4 on the control board for proper connection.
		(Detail code 12) 1) Check the settings of SW5-3 through SW5-6 on the control board. 2) Check the connector CNTYP2 on the control board for proper connection. 3) Check the connector CNTYP5 on the control board for proper connection. 4) Check the connector CNTYP on the INV board for proper connection.
		(Detail code 16) 1) Check the settings of SW5-3 through SW5-6 on the control board. 2) Check the connector CNTYP5 on the control board for proper connection. 3) Check the connector CNTYP2 on the control board for proper connection. 4) Check the wiring between the control board and INV board. Refer to the following page(s). [7-2-1 Error Code [0403]] 5) Check the connector CNTYP on the INV board for proper connection.
		(Detail codes 56, 66) 1) Check the settings of SW5-3 through SW5-6 on the control board. 2) Check the wiring between the control board and the Fan board. Refer to the following page(s). [7-2-1 Error Code [0403]] 3) Make sure the Fan board has been properly replaced.
		(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.

7-9-9 Error Code [7117]

1. Error code definition

Model setting error

2. Error source, cause, check method and remedy

After troubleshooting the error using the check methods and remedies shown below, turn the power back on.

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. 3) Check the connector CNTYP on the INV board for proper connection.
		(Detail code 16) 1) Check the connector CNTYP5 on the control board for proper connection. 2) Check the connector CNTYP2 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]] 4) Check the connector CNTYP on the INV board for proper connection.
		(Detail codes 56, 66) 1) Check the wiring between the control board and the Fan board. Refer to the following page(s). [7-2-1 Error Code [0403]] 2) Make sure the Fan board has been properly replaced.
		(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.

7-9-10 Error Code [7119,7120]

1. Error code definition

7119
M-NET wiring connection error (detected unit)

7120
M-NET wiring connection error (other units)

2. Error definition and error detection method

Check the M-NET wiring connection path to search the indoor unit connected to the shut off valve kit or power supply interface for alarm kit TB3 terminal to understand the refrigerant shut off area of the shut off valve kit or power supply interface for alarm kit. The following errors are detected when there is an error in the M-NET wiring connection path.

1) The error detected when the indoor units with the same address are connected to multiple shut off valve kit or power supply interface for alarm kits
2) The error detected when multiple shut off valve kit or power supply interface for alarm kits are connected to a single indoor unit
3) The error detected when no indoor unit is connected to the shut off valve kit or power supply interface for alarm kit TB3 terminal
4) The error detected when the shut off valve kit or power supply interface for alarm kit is connected to the TB3 terminal of another shut off valve kit or power supply interface for alarm kit
5) The error detected when the outdoor unit is connected to the shut off valve kit or power supply interface for alarm kit TB3 terminal

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Duplicate M-NET address for the indoor units	• If the indoor unit address is 00, wait for 10 minutes and check that the error is no longer displayed. • If the indoor unit address is not 00 and duplicated, the error code (7119) is displayed on multiple remote controllers. Change the address and turn the outdoor unit back on.
(2) Incorrect M-NET wiring	Check the M-NET wiring of the indoor unit connected to the remote controller displaying the error code (7119) and remove the following causes. Then, turn the outdoor unit back on. • The M-NET line connects the indoor unit TB5 terminal to two or more shut off valve kit TB3 terminals. • The shut off valve kit TB3 terminal is connected to another shut off valve kit TB2 terminal. • The shut off valve kit TB3 terminal and TB2 terminal are connected oppositely.
(3) The shut off valve kit or power supply interface for alarm kit TB3 terminal is not connected to the indoor unit	If the remote controller does not display the error code (7119) and all other remote controllers display the error code (7120), the indoor unit may not be connected to the shut off valve kit or power supply interface for alarm kit TB3 terminal. Connect the indoor unit to be protected from refrigerant leak to the shut off valve kit or power supply interface for alarm kit TB3 terminal before turning the outdoor unit back on.

7-9-11 Error Code [7121]

1. Error code definition

Power-off detection

2. Error definition and error detection method

If the power-off of the indoor units and shut off valve kit or power supply interface for alarm kits are detected

3. Cause, check method and remedy

Cause	Check method and remedy
(1) The indoor units and shut off valve kit or power supply interface for alarm kits are off	Turn on all indoor units and shut off valve kit or power supply interface for alarm kits in the refrigerant system before turning the outdoor unit back on.

7-9-12 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 or when the combination of the outdoor units is not as per [2-1 System Configurations].

3. Error source, cause, check method and remedy

After troubleshooting the error using the check methods and remedies shown below, turn the power back on.

Error source	Cause	Check method and remedy
Outdoor unit	(1) Indoor units for use with different refrigerant systems The connected indoor unit is for use with R410A, R22 or R407C. Incorrect type of indoor units are connected. 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. The type of refrigerant that can be detected by the built-in refrigerant sensor (indoor unit) is different from that used in the system.	1) 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.)
	(2) Combination of outdoor units The combination of the outdoor units is not as per [2-1 System Configurations]. In addition, the connected outdoor units cannot mix old and new model names.	2) Check the model name of the outdoor units (OC) and (OS). Check whether the combination of the outdoor units is as per [2-1 System Configurations].

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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

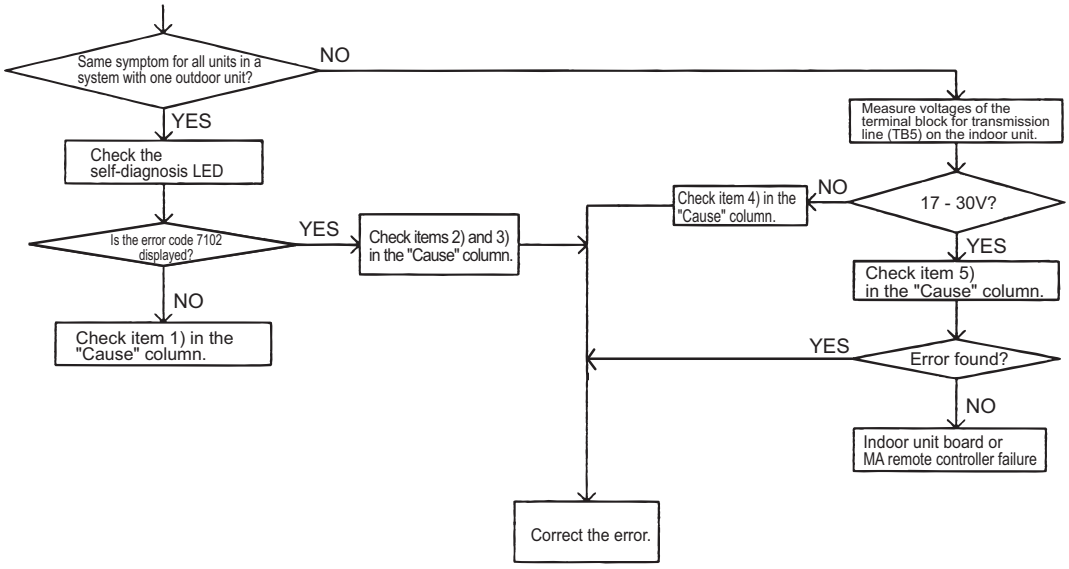
When the remote controller operation SW is turned on, the operation status briefly appears on the display, then it goes off, and the display lights out immediately, and the unit stops.

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).[8-9-2 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

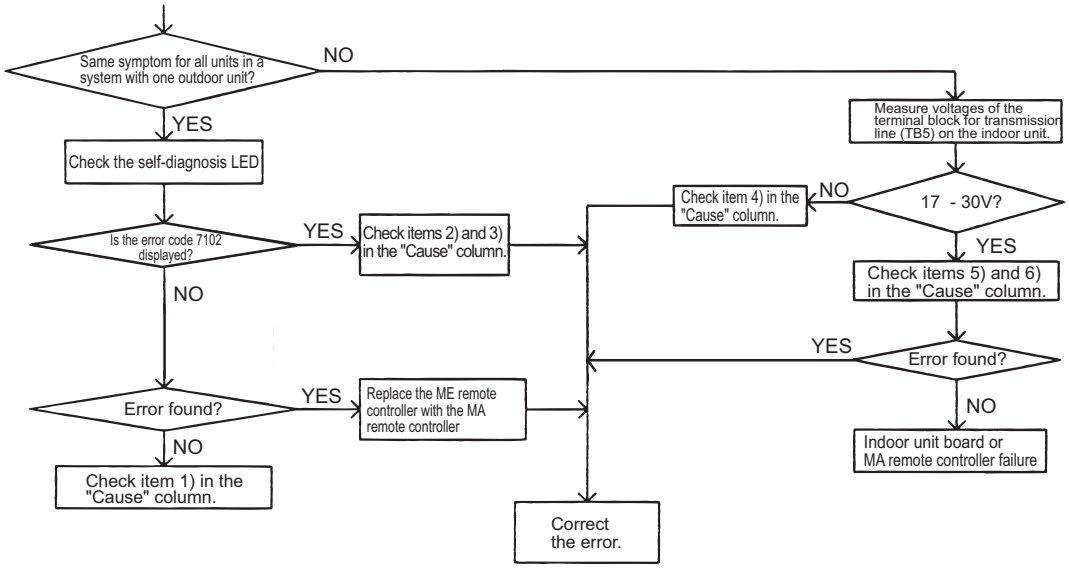
"HO" or "PLEASE WAIT" display on the remote controller does not disappear, and no operation is performed even if the button is pressed. ("HO" or "PLEASE WAIT" display will normally turn off 5 minutes later after the power on.)

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). [8-9-2 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). [8-12 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.

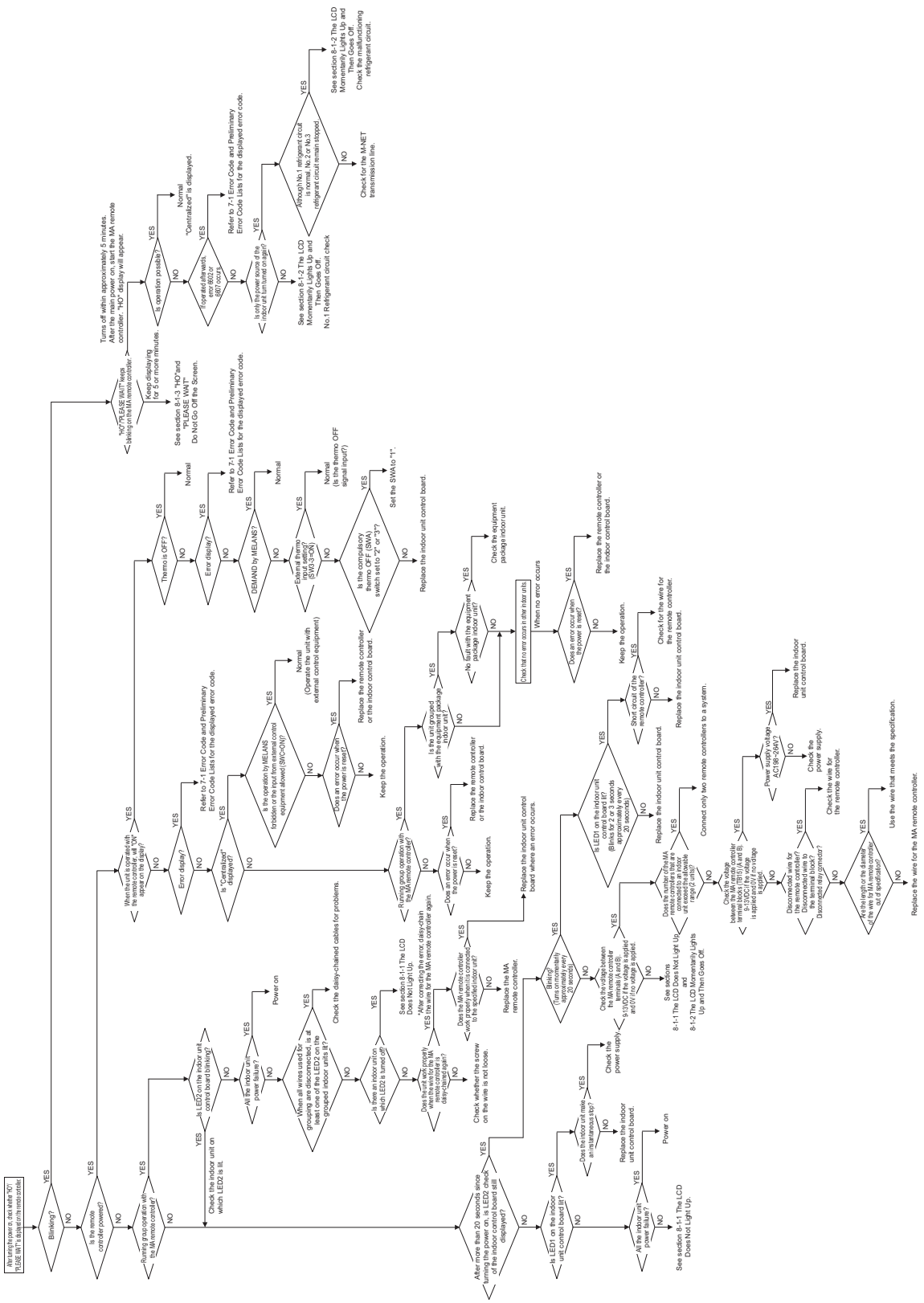


8-1-4 Air Conditioning Units Do Not Operate When the ON Button Is Pressed.

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 Refrigerant Control Problems

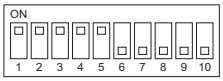
8-2-1 Units in the Cooling Mode Do Not Operate at Expected Capacity.

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). [8-4-1 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 ON 1 2 3 4 5 6 7 8 9 10 Low pressure sensor SW4 ON 1 2 3 4 5 6 7 8 9 10 (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 ON 1 2 3 4 5 6 7 8 9 10 Target evaporating temperature Tem SW4 ON 1 2 3 4 5 6 7 8 9 10 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)]
2. Indoor unit LEV malfunction ♦Insufficient refrigerant flows due to LEV malfunction (not enough opening) or protection works and compressor frequency does not rise due to pressure drop. ♦Refrigerant leak from LEV on the stopping unit causes refrigerant shortage on the running unit.	Refer to the following page(s). [8-7 Troubleshooting LEV Problems]



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
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). [8-6 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 inlet 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). [8-7 Troubleshooting LEV 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).[8-7 Troubleshooting LEV Problems]
13. 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.

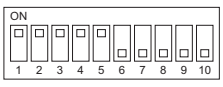
8-2-2 Units in the Heating Mode Do Not Operate at Expected Capacity.

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). [8-4-1 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 SW4 ON 1 2 3 4 5 6 7 8 9 10 Low pressure sensor SW4 ON 1 2 3 4 5 6 7 8 9 10 (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 SW4 ON 1 2 3 4 5 6 7 8 9 10 Target condensing temperature Tcm SW4 ON 1 2 3 4 5 6 7 8 9 10 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. Indoor unit LEV malfunction Insufficient refrigerant flows due to LEV malfunction (not enough opening).	Refer to the following page(s). [8-7 Troubleshooting LEV 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). [8-6 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). [8-7 Troubleshooting LEV Problems]
13. LEV4 malfunction Refrigerant flood-back occurs when LEV4 is open due to a malfunction, resulting in an excessively low discharge temperature. When the valve is closed during Heating operation (especially at low outside temperature), compressor frequency does not accelerate properly.	Refer to the following page(s). [8-7 Troubleshooting LEV 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.

8-2-3 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 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.	Liquid back error (detected by refrigerant temperature)		
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.)		

8-3 Checking Transmission Waveform and for Electrical Noise Interference

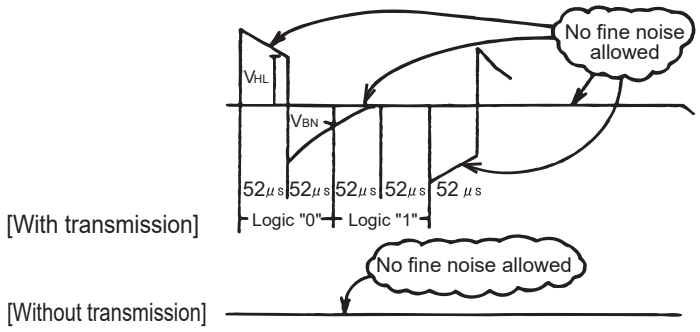
8-3-1 M-NET

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

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

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

(2) Wave shape check



Wave shape check

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

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

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

(3) Check method and remedy

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

	Error code definition	Remedy
Check that the wiring work is performed according to wiring specifications.	1. The transmission line and the power line are not wired too closely.	Isolate the transmission line from the power line (5cm [1-31/32"] or more). Do not insert them in the same conduit.
	2. The transmission line is not bundled with that for another systems.	The transmission line must be isolated from another transmission line. When they are bundled, erroneous operation may be caused.
	3. The specified wire is used for the transmission line.	Use the specified transmission line. Type: Shielded wire CVVS/CPEVS/MVVS 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 ($\pm$) 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 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).

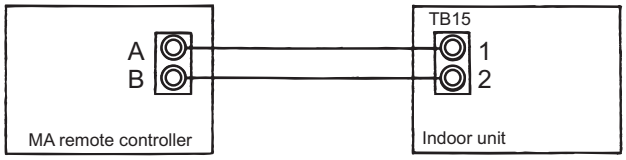
8-3-2 MA Remote Controller

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

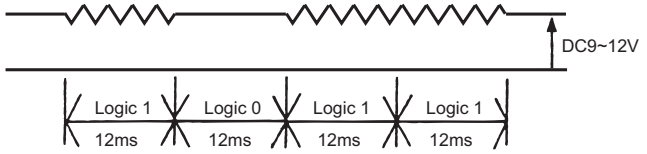
If noise is generated on the transmission line, and the communication between the MA remote controller and the indoor unit is interrupted for 3 minutes in a row, MA transmission error (6831) will occur.

(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)



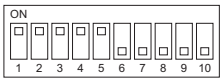
① Satisfies the formula
12 ms/bit ±5%
② Voltage among terminals must be between DC9 and 12 V.

8-4 Pressure Sensor Circuit Configuration and Troubleshooting Pressure Sensor Problems

8-4-1 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.





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.

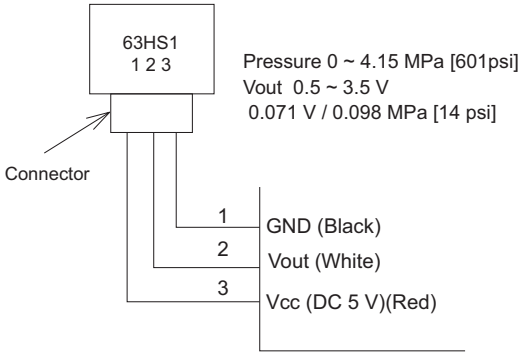
8-4-2 High-Pressure Sensor Configuration (63HS1)

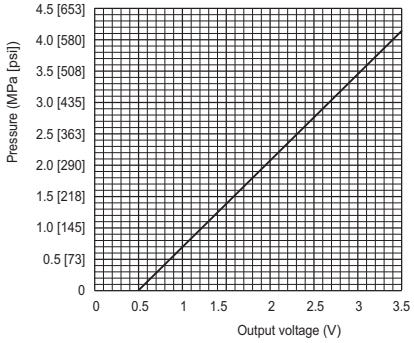
The high pressure sensor consists of the circuit shown in the figure below. If DC 5V is applied between the red and the black wires, voltage corresponding to the pressure between the white and the black wires will be output, and the value of this voltage will be converted by the microcomputer. The output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

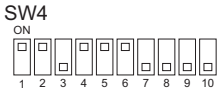
	Body side	Control board side
Vcc	Pin 1	Pin 3
Vout	Pin 2	Pin 2
GND	Pin 3	Pin 1

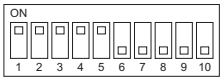




8-4-3 Comparing the Low-Pressure Sensor Measurement and Gauge Pressure

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.





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.

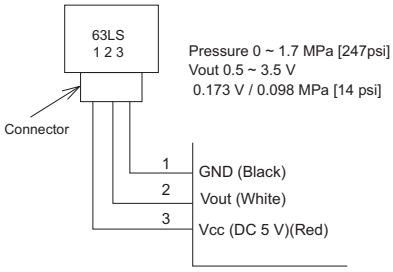
8-4-4 Low-Pressure Sensor Configuration (63LS)

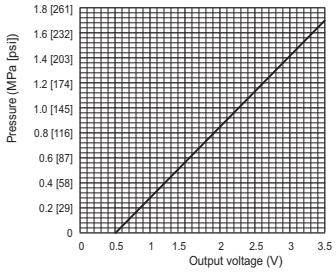
The low pressure sensor consists of the circuit shown in the figure below. If DC5V is applied between the red and the black wires, voltage corresponding to the pressure between the white and the black wires will be output, and the value of this voltage will be converted by the microcomputer. The output 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



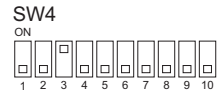


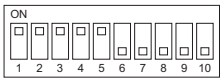
8-5 Troubleshooting Solenoid Valve Problems

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
	Upper	21S4a		CH11	SV12	SV1(a)		SV2	
	Lower			21S4b					
	Upper								Power supply
	Lower						SV13	SV16	



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 refrigerant between the oil separator outlet and heat exchanger (right heat exchanger and left heat exchanger), and between the gas ball valve (BV1) and the accumulator to complete the circuit for the cooling cycle.
When powered:
The refrigerant 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 refrigerant 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)

About this 4-way valve
When not powered:
Conducts refrigerant between the oil separator outlet and heat exchanger (rear heat exchanger) (<21S4b>), and opens and closes the heat exchanger circuit for the heating and cooling cycles.
When powered:
The refrigerant 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 21S4a during heating. In this case, check the intake and the discharge temperature for the 4-way valve to check that the refrigerant 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) SV12 (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) SV13 (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) SV16 (Solenoid valve)

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

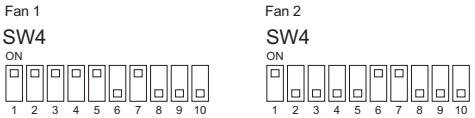
Note

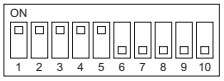
Do not give an impact from outside, as the outer hull will be deformed leading to the malfunction of the inner valve.

8-6 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 E144 - E192, H096 - H120 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).

[8-8-1(2)[5] Fan motor ground fault and winding error check]
[8-8-1(2)[6] Fan board error detection circuit check (no load)]
[8-8-1(2)[7] Fan inverter damage check (no load)]
[8-8-1(2)[8] Fan inverter damage check(with load)]

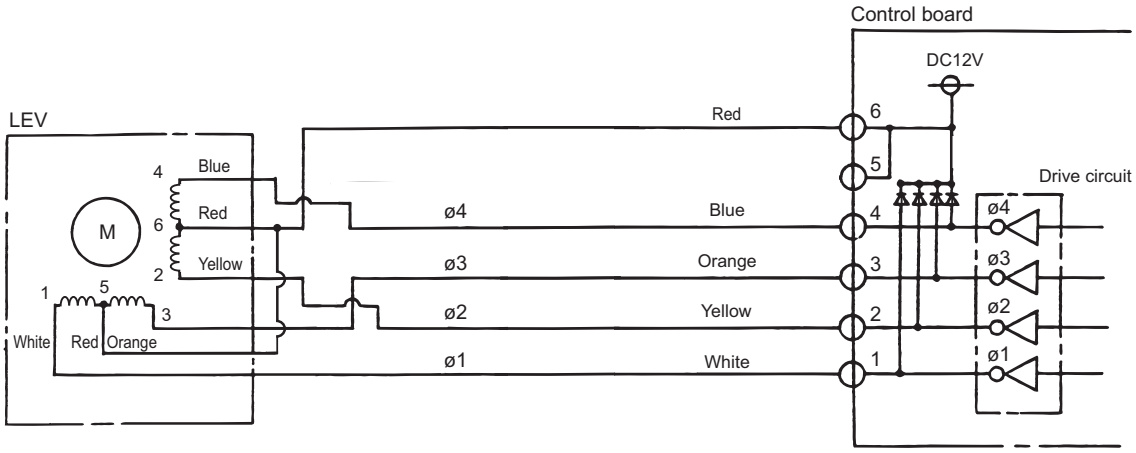
8-7 Troubleshooting LEV Problems

8-7-1 General Overview on LEV Operation

LEV (Indoor unit: Linear expansion valve), LEV2 (Outdoor unit: Linear expansion valve), LEV1, and LEV2 (Shut off valve kit: Linear expansion valve) are stepping-motor-driven valves that operate by receiving the pulse signals from the control boards of indoor, outdoor unit, and shut off valve kit.

(1) Indoor LEV, Outdoor LEV (LEV2, LEV4), and Shut off valve kit (LEV1, LEV2)

The valve opening changes according to the number of pulses.



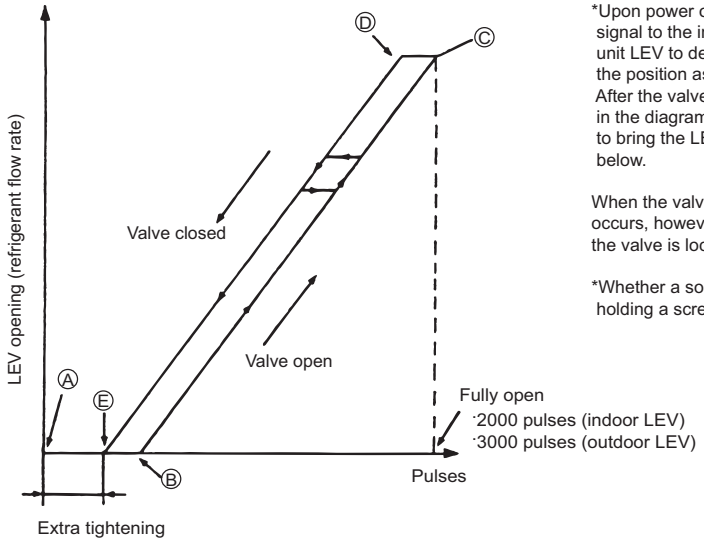
1) Pulse signal output and valve operation

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.

2) LEV closing and opening operation



*Upon power on, the indoor unit circuit board sends a 2200 pulse closing signal to the indoor unit LEV and a 3200 pulse closing signal to the outdoor unit LEV to determine the valve position and always brings the valve to the position as indicated by "Ⓐ" in the diagram.
After the valve position has been adjusted to the position as indicated by Ⓐ in the diagram below, the indoor unit circuit board sends a 41-pulse signal to bring the LEV opening to the position as indicated by Ⓑ in the diagram below.

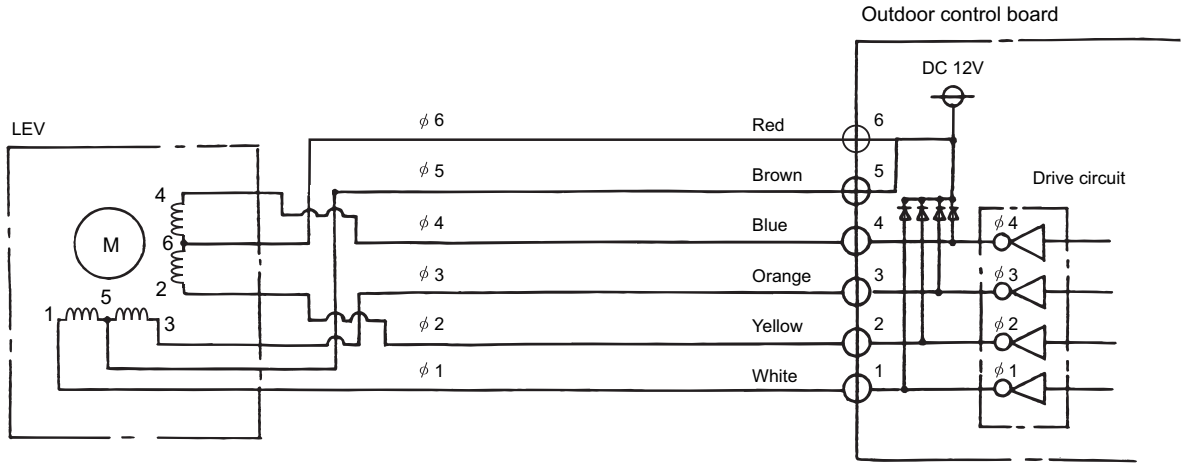
When the valve operates smoothly, no sound from LEV or no vibration occurs, however, when the pulses change from Ⓔ to Ⓐ in the chart or the valve is locked, a big sound occurs.

*Whether a sound is generated or not can be determined by holding a screwdriver against it, then placing your ear against the handle.

(2) Outdoor LEV (LEV1)

The valve opening changes according to the number of pulses.

1) Connections between the outdoor control board and LEV1 (outdoor expansion valve)



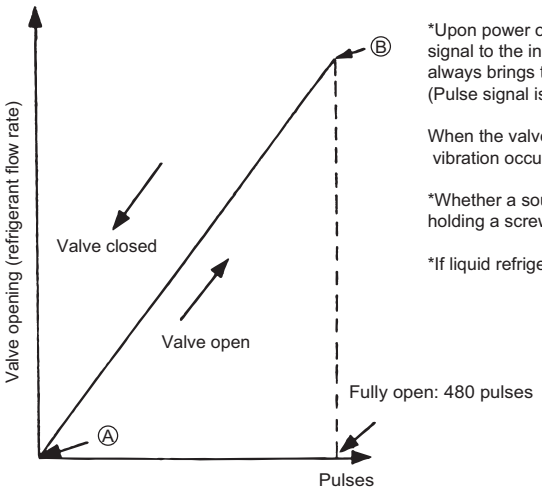
2) Pulse signal output and valve operation

Output (phase) number	Output state							
	1	2	3	4	5	6	7	8
ϕ1	ON	OFF	OFF	OFF	OFF	OFF	ON	ON
ϕ2	ON	ON	ON	OFF	OFF	OFF	OFF	OFF
ϕ3	OFF	OFF	ON	ON	ON	OFF	OFF	OFF
ϕ4	OFF	OFF	OFF	OFF	ON	ON	ON	OFF

Output pulses change in the following orders when the
Valve is open; 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 1
Valve is closed; 8 → 7 → 6 → 5 → 4 → 3 → 2 → 1 → 8

*1. When the LEV opening angle does not change, all the output phases will be off.
*2. When the output is open phase or remains ON, the motor cannot run smoothly, and rattles and vibrates.

3) LEV valve closing and opening operation



*Upon power on, the outdoor 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.

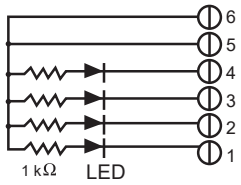
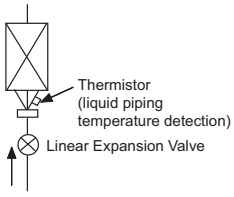
*Whether a sound is generated or not can be determined by holding a screwdriver against it, then placing your ear against the handle.

*If liquid refrigerant flows inside the LEV, the sound may become smaller.

8-7-2 Possible Problems and Solutions

Note

The specifications of the outdoor unit (outdoor LEV), shut off valve kit (SVK LEV), and the indoor unit (indoor LEV) differ. Therefore, remedies for each failure may vary. Check the remedy specified for the appropriate LEV as indicated in the below column.

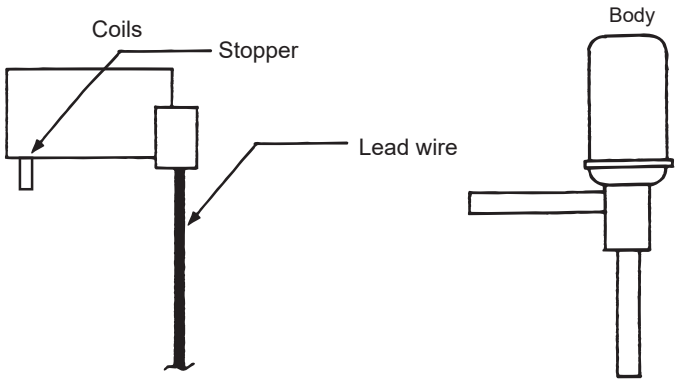
Malfunction mode	Judgment method	Remedy	Target LEV
Microcomputer driver circuit failure	Disconnect the control board connector and connect the check LED as shown in the figure below.  Resistance : 0.25W 1kΩ LED : DC15V 20mA or more When the main power is turned on, the indoor unit circuit board outputs pulse signals to the indoor unit LEV for 10 seconds, and the outdoor unit circuit board outputs pulse signals to the outdoor unit LEV for 17 seconds. If any of the LED remains lit or unlit, the drive circuit is faulty.	When the drive circuit has a problem, replace the control board.	Indoor Outdoor SVK
LEV mechanism is locked	If the LEV is locked, the drive motor runs idle, and makes a small clicking sound. When the valve makes a closing and opening sound, the valve has a problem.	Replace the LEV.	Indoor Outdoor SVK
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.	Indoor
	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, LEV4) SVK
	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)
Incomple sealing (leak from the valve)	When checking the refrigerant leak from the indoor LEV, run the target indoor unit in the fan mode, and the other indoor units in the cooling mode. Then, check the liquid temperature (TH2) with the self-diagnosis LED. When the unit is running in the fan mode, the LEV is fully closed, and the temperature detected by the thermistor is not low. If there is a leak, however, the temperature will be low. If the temperature is extremely low compared with the inlet temperature displayed on the remote controller, the LEV is not properly sealed, however, if there is a little leak, it is not necessary to replace the LEV when there are no effects to other parts. 	If there is a large amount of leakage, replace the LEV.	Indoor
Faulty wire connections in the connector or faulty contact	1. Check for loose pins on the connector and check the colors of the lead wires visually 2. Disconnect the control board's connector and conduct a continuity check using a tester.	Check the continuity at the points where an error occurs.	Indoor Outdoor SVK

8-7-3 Coil Removal Instructions

(1) Outdoor unit LEV (LEV1)

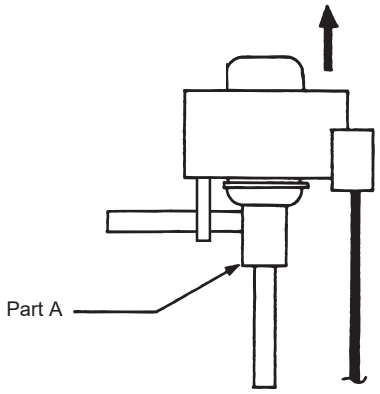
1) LEV component

As shown in the figure, the outdoor LEV is made in such a way that the coils and the body can be separated.



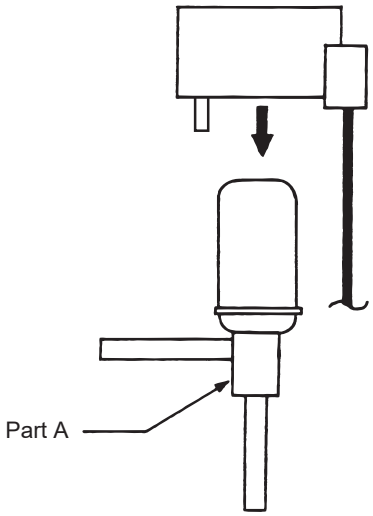
2) Removing the coils

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

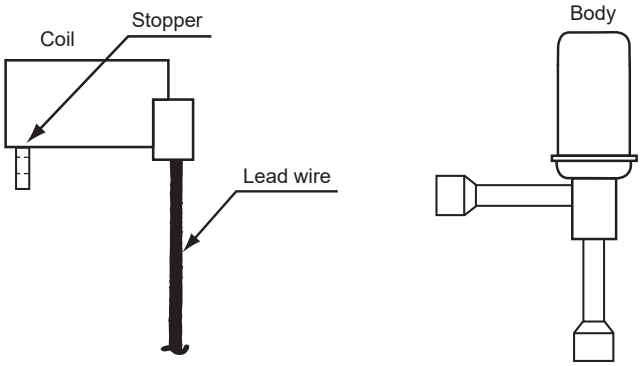
Fix the body tightly at the bottom (Part A in the figure) so that the body will not move, then insert the coils from the top, and insert the coil stopper securely in the pipe on the body.
If the coils are pushed without the body gripped, undue force will be applied and the pipe will be bent. Hold the body when pulling out the coils to prevent so that the pipe will not be bent.



(2) Outdoor unit LEV (LEV2a, LEV2b, LEV4) and Shut off valve kit (LEV1, LEV2)

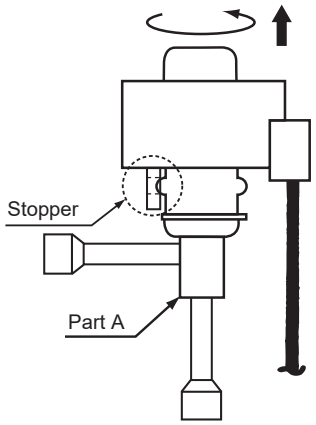
1) Components

The outdoor unit LEV consists of a coil and a valve body that can be separated from each other.



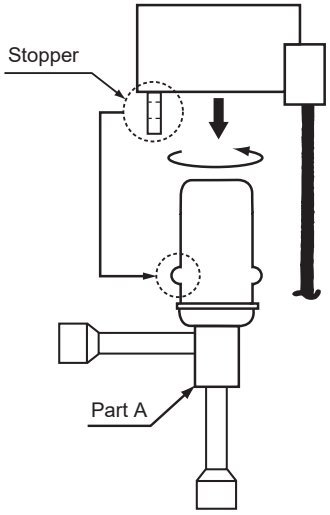
2) Removing the coil

Securely hold the LEV at the bottom (Part 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.



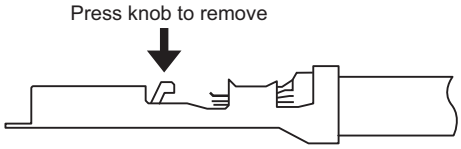
8-8 Troubleshooting Inverter Problems

8-8-1 Inverter-Related Problems and Solutions

- If only the compressor has failed, replace only the compressor. (If the compressor fails, an overcurrent flows to the INV board. However, the INV board detects the overcurrent and shuts down to prevent itself from being damaged. Make sure that the outdoor unit model selection switch (SW5-3 to SW5-8 of the DIP switch on the outdoor control board) is set correctly. For the switch settings, refer to the following page(s). [7-9-2 Error Code [7101]]
- If only the fan motor has failed, replace only the fan motor. (If the fan motor fails, an overcurrent flows to the fan board. However, the fan board will not be damaged.)
- If the INV board or fan board has failed, replace the INV board or fan board as necessary.
- If both the compressor and INV board have failed, replace both the compressor and INV board.
- If both the fan motor and fan board have failed, replace both the fan motor and fan board.

(1) Inverter-related failure diagnosis and remedies

1) Because the inverter is equipped with a large electrolytic capacitor, voltage remains even after the main power is turned off, posing a dangerous risk of electric shock. As such, turn off the power to the unit at least 10 minutes before inspecting inside the control box, and ensure that the voltage across the electrolytic capacitor in the main circuit (across tab terminals FTP and FTN) is no more than 20 VDC.
   (It takes about 10 minutes to discharge the voltage after the power has been turned off.)
2) Before servicing, ensure that the fan is not rotating, and then disconnect the connectors CNINV, CNIV1, and CNIV2 on the fan board and the connectors CNFA1 and CNFA2 on the INV board. When connecting or disconnecting the connectors, ensure that the outdoor unit fan is not rotating and that the voltage across electrolytic capacitor (across tab terminals FTP and FTN) in the main circuit is 20 VDC or lower. The outdoor unit fan, when rotated by a strong wind, may charge the main circuit capacitor, posing a risk of electrical shock. For details, refer to the wiring nameplate.
3) When connecting a cable to TB7, ensure that the voltage across the electrolytic capacitor in the main circuit (across tab terminals FTP and FTN) is no more than 20 VDC.
4) After servicing, reconnect all disconnected connectors.
5) The inverter can be damaged if the wiring screws are not tightened properly or if the connectors are not inserted properly. If a problem occurs after replacing a board or an electrical component, check if the wiring, screws, connectors, tab terminals, and other components are inserted correctly, as problems are often caused by incorrect wiring.
6) Do not disconnect or connect any inverter-related connectors while the main power is turned on. Doing so may damage the board.
7) Tab terminals are terminals with locks. Press and hold the knob in the center of the terminal to release the lock. After engaging the lock, ensure the lock is securely fastened.



8) When using heat-dissipating grease during replacement of boards or electrical components, apply the grease supplied with the service parts thinly and evenly to the applicable components. Grease on the wiring terminals may cause poor contact, so be sure to wipe off any excess grease.
9) If the output wiring to the compressor is connected incorrectly, the compressor could be damaged. Be very careful to note the phase order before starting the work.
10) When turning the unit's power on, the compressor or heater will be energized even if it is not operating. Before turning the power on, disconnect the electrical wiring from the compressor's terminal box, measure the insulation resistance, and check for ground faults. If the insulation resistance is 1 MΩ or lower, reconnect the electrical wiring to the compressor and turn on the outdoor unit. Energizing the compressor or heater will help evaporate the liquid refrigerant accumulated inside the compressor.

	Error display / Symptom	Remedy / Inspection item
[1]	Inverter-related error 0403, 1550, 4220, 4225, 4226, 4230, 4235, 4236, 4240, 4245, 4246, 4250, 4255, 4256, 4260, 5110, 5301, 5305, 5306	Check the details of the inverter error in the error history as specified under [10 LED Status Indicators]. Perform the necessary actions as specified in [7-2 Error Code Definitions and Solutions: Codes [0 - 999]] for the error code and error details.
[2]	The main power breaker was tripped. Check for breaker failure (e.g., contacts welded together) before attempting to resolve or inspect the problem.	<1> Check the breaker capacity.
		<2> Check for short-circuits and ground faults in electrical systems other than the inverter.
		<3> If no problems are found in checks <1> and <2>, see [8-8-3 Solutions for the Main Breaker Trip].
[3]	The main power earth leakage breaker was tripped. Check for earth leakage breaker failure (e.g., contacts welded together) before attempting to resolve or inspect the problem.	<1> Check the earth leakage breaker capacity and sensitivity current.
		<2> Check for insulation faults in electrical systems other than the inverter.
		<3> If no problems are found in checks <1> and <2>, see [8-8-4 Solutions for the Main Earth Leakage Breaker Trip].
[4]	The compressor is inoperable.	Check the inverter frequency on the LED monitor. If it is displayed as operating, see (2) - [4] under [8-8-1 Inverter-Related Problems and Solutions].
[5]	The compressor vibrates constantly or makes abnormal noise.	See (2) - [4] under [8-8-1 Inverter-Related Problems and Solutions].
[6]	The compressor speed does not increase to the specified speed.	<1> Check for compressor current or heatsink temperature problems, taking note of the information in [7-1 Error Code and Preliminary Error Code Lists]. <2> Check for power supply voltage imbalance problems. (Standard: 2% or less)
[7]	The fan motor is inoperable.	Check the inverter frequency on the LED monitor. If it is displayed as operating, see (2) - [6], [7], and [8] under [8-8-1 Inverter-Related Problems and Solutions].
[8]	The fan motor vibrates constantly or makes abnormal noise.	Check the inverter frequency on the LED monitor. If it is displayed as operating, go to (2) - [6], [7], and [8] under [8-8-1 Inverter-Related Problems and Solutions].
[9]	Noise is present in peripheral equipment.	<1> Check for any peripheral equipment power source wiring, etc. close to the outdoor unit power source wiring.
		<2> Check for any power source wiring or transmission wiring close to the inverter output wiring.
		<3> Check that the transmission line is properly shielded if necessary, and properly grounded.
		<4> Check for insulation faults in electrical systems other than the inverter.
		<5> Add a ferrite core to the inverter output wiring. (Service parts are available. Consult a Mitsubishi Electric factory for more information.)
		<6> Switch to an alternate power supply line.
		<7> If noise occurs suddenly, the inverter output may have a ground fault. Go to (2) -[4] under [8-8-1 Inverter-Related Problems and Solutions].
		* Consult a Mitsubishi Electric factory for situations other than the above.
[10]	A sudden malfunction (due to external noise) occurs.	<1> Check for improper grounding.
		<2> Check that the transmission line is properly shielded if necessary, and properly grounded.
		<3> Check for any transmission lines or external connection wiring that is close to other power supply lines, etc., or in the same conduit.
		* Consult a Mitsubishi Electric factory for situations other than the above.

(2) Troubleshooting for inverter output-related problems

	Check item	Symptom	Remedy
[1] INV board error detection circuit check	(1) Disconnect the inverter output wiring from the INV board terminals (SCU, SCV, SCW). (2) Operate the outdoor unit.	1) An overcurrent shut-off error occurs. Error code: 1550 Detail code: 001, 002, 003	See the action flow for the error 1550 in [7-3-8 Error Code [1550]].
		2) An IPM/overcurrent shut-off error occurs. Error code: 4250 Detail code: 101, 104, 105	Replace the INV board.
		3) A logic error occurs. Error code: 4220 Detail code: 111	Replace the INV board.
		4) A sensor system circuit error occurs. Error code: 5301 Detail code: 117	Replace the INV board.
		5) An IPM open error occurs. Error code: 5301 Detail code: 119	Normal
[2] Compressor ground fault and winding error check	Disconnect the compressor wiring and check for compressor insulation faults and winding resistance faults.	1) A compressor insulation fault occurs. An error occurs at less than 1MΩ. 2) A compressor winding resistance fault occurs. For details on the standard compressor winding resistance values, refer to the specified page. See the notes in [7-1 Error Code and Preliminary Error Code Lists].	See the action flow for the error 1550 in [7-3-8 Error Code [1550]].
[3] Inverter damage check (no load)	(1) Disconnect the inverter output wiring from the INV board terminals (SCU, SCV, SCW). (2) Turn on SW7-1 on the control board. (3) Operate the outdoor unit. Check the inverter output voltage after the inverter output frequency has stabilized.	1) An inverter system error is detected.	Turn off SW7-1 on the control board and go to [1].
		2) No inverter voltage is output.	Replace the INV board.
		3) The following imbalance exists in the voltage between each line. 5% or more or 5 V or more (whichever is greater)*1	Replace the INV board.
		4) No imbalance exists in the voltage between each line.	Normal * After checking, turn off SW7-1 on the control board. If the inverter output wiring is connected while SW7-1 on the control board is on, overload protection is activated during operation. Error code: 4240
[4] Inverter damage check (during compressor operation)	Operate the outdoor unit. Check the inverter output voltage after the inverter output frequency has stabilized.	1) An overcurrent error occurs immediately after the start of compressor or during operation. Error code: 1550 Detail code: 001, 002, 003 Error code: 4250 Detail code: 101	a. Confirm that there is no problem in the check items of [1] to [3]. b. Check if the high pressure and low pressure are balanced. c. Check for liquified refrigerant stagnation and liquid backflow in the compressor. → If the problem persists after rebooting a few times, check "d." d. Check if there is a difference between the high pressure and low pressure after the startup. → Check if the high pressure changes on the LED monitor. If there is no differential pressure, replace the compressor. (The compressor may have been locked.)
		2) After the inverter output voltage has stabilized, the following imbalance exists in the voltage between each line. 5% or more or 5 V or more (whichever is greater)	If the imbalance exists, replace the INV board.

*1 Measure the voltage while the outdoor unit is operating. (Note that the inverter voltage can be imbalanced even on a normal board if measured while the outdoor unit is stopped.)

	Check item	Symptom	Remedy
[5] Fan motor ground fault and winding error check	Disconnect the fan motor wiring and check for fan motor insulation faults and winding resistance faults.	1) A fan motor insulation fault occurs. An error occurs at less than 1 MΩ.	Replace the fan motor.
		2) Broken wiring of the fan motor For details on the standard fan motor winding resistance values, refer to the specified page. See the notes in [7-1 Error Code and Preliminary Error Code Lists].	Replace the fan motor.
[6] Fan board error detection circuit check (no load)	(1) Turn off the breaker. * Make sure to turn off the power. (2) Remove the CNINV connector (CNIV1 connector and CNIV2 connector when two fan motors are mounted) from the fan board. (3) Turn on the breaker. (4) Operate the unit.	1) An overcurrent error occurs. Error code: 4255, 4256 Detail code: 101, 104	Replace the fan board.
		2) A logic error occurs. Error code: 4225, 4256 Detail code: 111	Replace the fan board.
		3) A sensor system circuit error occurs. Error code: 5305, 5306 Detail code: 136	Replace the fan board.
		4) A step-out error or current sensor error occurs. Error code: 4255, 4256 Detail code: 137 Error code: 5305, 5306 Detail code: 135	Normal * After checking, reconnect the CNINV connector (CNIV1 connector and CNIV2 connector when two fan motors are mounted) to the fan board.
[7] Fan inverter damage check (no load)	(1) Turn off the breaker. * Make sure to turn off the power. (2) Remove the CNINV connector (CNIV1 connector and CNIV2 connector when two fan motors are mounted) from the fan board. (3) Turn on SW7-2 on the control board. (4) Turn on the breaker. (5) Operate the unit. The unit operates with no load, outputting a constant voltage. During operation with no load, a constant voltage of 100 V or higher is output between each line.	1) After operation, any error is detected.	Replace the fan board.
		2) The following imbalance exists in the voltage between each line. 5 V or more	Replace the fan board.
		3) No imbalance exists in the voltage between each line.	Normal * After checking, reconnect the CNINV connector (CNIV1 connector and CNIV2 connector when two fan motors are mounted) and turn off the SW on the board. If the connector is reconnected while SW7-2 on the control board is on, overload protection is activated during operation. Error code: 4245, 4246

	Check item	Symptom	Remedy
[8] Fan inverter damage check (with load)	(1) Operate the unit.	1) The operation stops within approximately 10 seconds after the startup and a step-out error or overcurrent error occurs. Error code: 4255, 4256 Detail code: 137, 101, 106	Check if the fan motor is locked. → Replace the fan motor if it is locked. If the problem persists after the replacement, replace the fan board. → If it is not locked, check the remedies for 2).
		2) An overcurrent error occurs during operation. Error code: 4255, 4256 Detail code: 101, 106	a. Check if there is strong wind such as a gust. b. If the error occurs with no abnormal wind outside, check [5]. c. If no problems are found in [5], replace the fan board. d. If the problem persists after the replacement of the fan board, replace the fan motor.
		3) An overvoltage error occurs during operation. Error code: 4225, 4226 Detail code: 109	a. Check if there is strong wind such as a gust. b. If the error occurs with no abnormal wind outside, replace the fan board.
		4) A load short circuit error occurs. Error code: 4255, 4256 Detail code: 105	a. If no problems are found in the check of [6] and [7], check for a short circuit in the motor wiring. b. If no problems are found in a., replace the fan motor. c. If the same error is detected after the replacement of the fan motor, replace the fan board.
		5) After the rotation rate has stabilized, the following imbalance exists in the voltage between each line. 5% or more or 5 V or more (whichever is greater)	a. If the voltage imbalance exists, check [5]. b. If no problems are found in [5], replace the fan board. c. If the problem persists after the replacement of the fan board, replace the fan motor.
[9] On-site installation condition check	(1) Check the charged refrigerant amount.	The amount of charged refrigerant exceeds the specified amount.	Reduce it to the specified amount.
	(2) Check the installation conditions of the outdoor unit branch pipe.	The approach distance before the branch is less than 500 mm.	Ensure at least 500 mm of the approach distance between the branches.
		The branch pipe is inclined more than ±15° from the horizontal.	Install the branch pipe horizontally (within ±15°).

8-8-2 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°

8-8-3 Solutions for the Main Breaker Trip

Note

Measure the secondary voltage of the main power breaker before checking because the main power breaker may have been broken.

	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. Check the continuity between the primary and secondary sides of each phase on TB1.	Zero to several ohm, or Meg-failure No continuity between the primary and secondary sides of each phase on TB1	Check each part and wiring. Refer to the following page(s). [8-8-5 Simple Check on Inverter Circuit Components] ♦IGBT module ♦Rush current protection resistor ♦Electromagnetic relay ♦DC reactor If there is not continuity between the primary and secondary sides of each phase on TB1, replace the TB1 terminal block. To identify the cause of the trip, inspect the above parts and check the wiring for signs of shorts and abrasion of the sheaths.
[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. 2) Main power breaker trip	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, the compressor may be faulty. Check the compressor for ground fault and coil failure according to 8-8-1 (2) [2]. c) If item b) above is not the cause of the problem, the fan motor may be faulty. Check the fan motor for ground fault and coil failure according to 8-8-1 (2) [5].

8-8-4 Solutions for the Main Earth Leakage Breaker Trip

Note

Measure the secondary voltage of the main power earth leakage breaker before checking because the main power earth leakage breaker may have been broken.

	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 the INV board, fan board. Refer to the following page(s). [8-8-5 Simple Check on Inverter Circuit Components] [8-8-6 Troubleshooting Problems with IGBT Module]
[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.

8-8-5 Simple Check on Inverter Circuit Components

Note

Before checking, turn off the power to the unit and wait for at least 10 minutes. After checking that the voltage across the electrolytic capacitor in the main circuit (across the tab terminals FTP and FTN) is 20 VDC or less, remove the target component from the control box.

Part name	Judgment method
DC reactor (DCL)	Measure the resistance between terminals: 1Ω or lower (almost 0 Ω) Measure the resistance between terminals and the chassis: ∞

8-8-6 Troubleshooting Problems with IGBT Module

Measure the resistance across each pair of terminals on the INV board and fan board with a tester, and use the results for troubleshooting.

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 to the target board before 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.

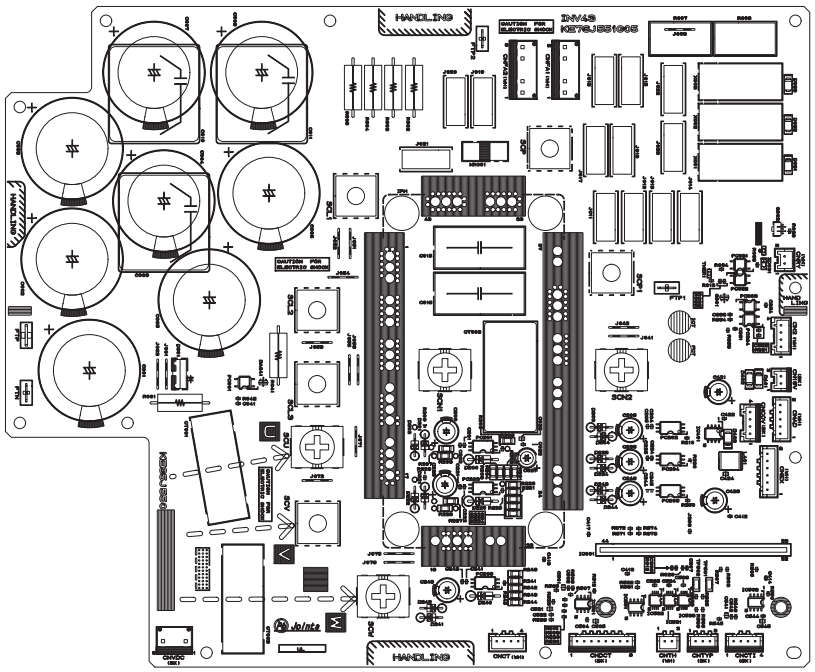
<INV43>

Reference resistance value

		Black (+)				
		SCP	FTN	SCL1	SCL2	SCL3
Red (-)	SCP	-	-	5-200 Ω	5-200 Ω	5-200 Ω
	FTN	-	-	∞	∞	∞
	SCL1	∞	5-200 Ω	-	-	-
	SCL2	∞	5-200 Ω	-	-	-
	SCL3	∞	5-200 Ω	-	-	-

		Black (+)				
		SCP1	FTN	SCU	SCV	SCW
Red (-)	SCP1	-	-	5-200 Ω	5-200 Ω	5-200 Ω
	FTN	-	-	∞	∞	∞
	SCU	∞	5-200 Ω	-	-	-
	SCV	∞	5-200 Ω	-	-	-
	SCW	∞	5-200 Ω	-	-	-
	chassis	∞	∞	-	-	-

INV board outline drawing



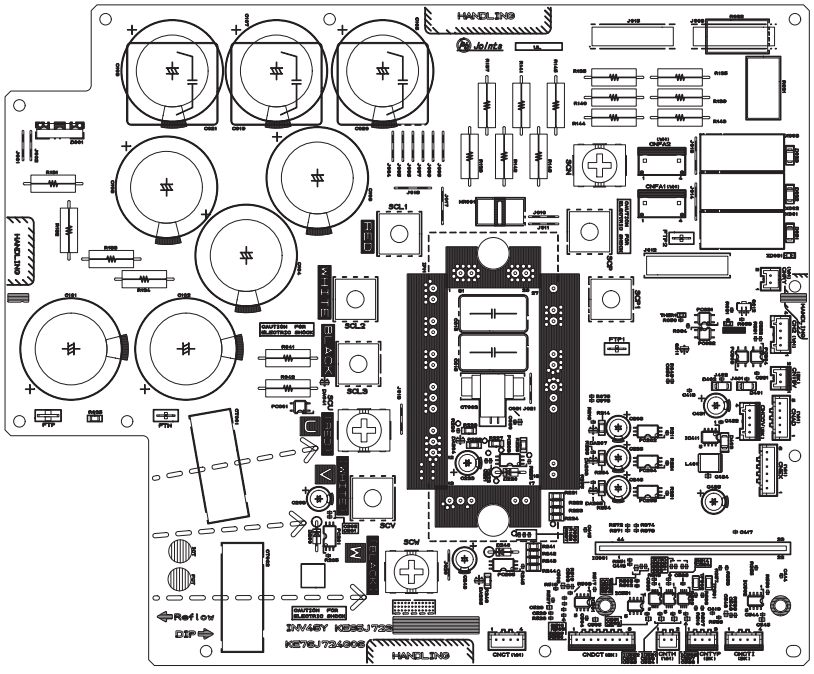
<INV46Y>

Reference resistance value

		Black (+)				
		SCP	FTN	SCL1	SCL2	SCL3
Red (-)	SCP	-	-	5-200 Ω	5-200 Ω	5-200 Ω
	FTN	-	-	∞	∞	∞
	SCL1	∞	5-200 Ω	-	-	-
	SCL2	∞	5-200 Ω	-	-	-
	SCL3	∞	5-200 Ω	-	-	-

		Black (+)				
		SCP1	FTN	SCU	SCV	SCW
Red (-)	SCP1	-	-	5-200 Ω	5-200 Ω	5-200 Ω
	FTN	-	-	∞	∞	∞
	SCU	∞	5-200 Ω	-	-	-
	SCV	∞	5-200 Ω	-	-	-
	SCW	∞	5-200 Ω	-	-	-
	chassis	∞	∞	-	-	-

INV board outline drawing

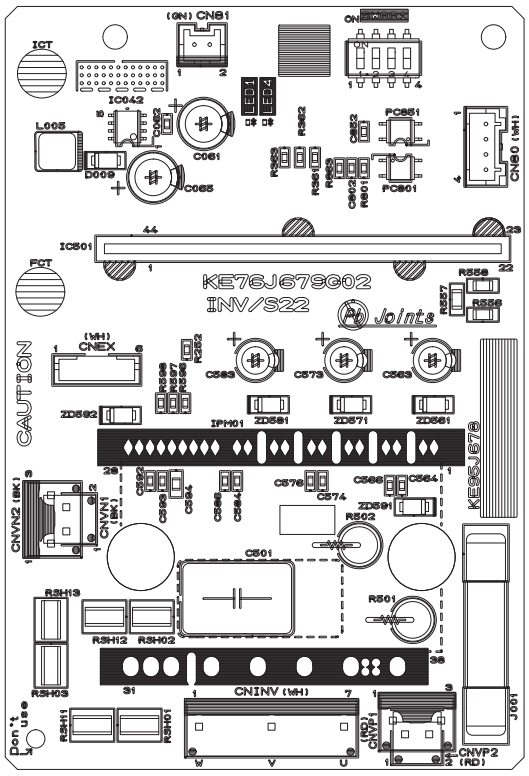


<INV/S22>

Reference resistance value

		Black (+)				
		CNVP1 (CNVP2)	CNVN1 (CNVN2)	CNINV 1 pin	CNINV 4 pin	CNINV 7 pin
Red (-)	CNVP1 (CNVP2)	-	-	5-200 Ω	5-200 Ω	5-200 Ω
	CNVN1 (CNVN2)	-	-	∞	∞	∞
	CNINV 1 pin	∞	5-200 Ω	-	-	-
	CNINV 4 pin	∞	5-200 Ω	-	-	-
	CNINV 7 pin	∞	5-200 Ω	-	-	-
	chassis	∞	∞	-	-	-

INV board outline drawing

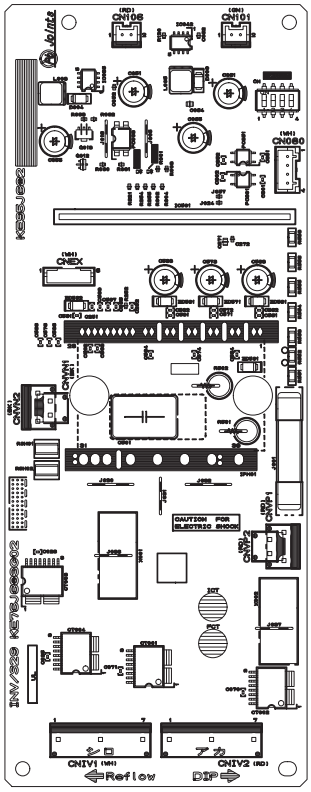


<INV/S29>

Reference resistance value

		Black (+)				
		CNVP1 (CNVP2)	CNVN1 (CNVN2)	CNIV1 1 pin	CNIV1 4 pin	CNIV1 7 pin
Red (-)	CNVP1 (CNVP2)	-	-	5-200 Ω	5-200 Ω	5-200 Ω
	CNVN1 (CNVN2)	-	-	∞	∞	∞
	CNIV1 1 pin	∞	5-200 Ω	-	-	-
	CNIV1 4 pin	∞	5-200 Ω	-	-	-
	CNIV1 7 pin	∞	5-200 Ω	-	-	-
	chassis	∞	∞	-	-	-

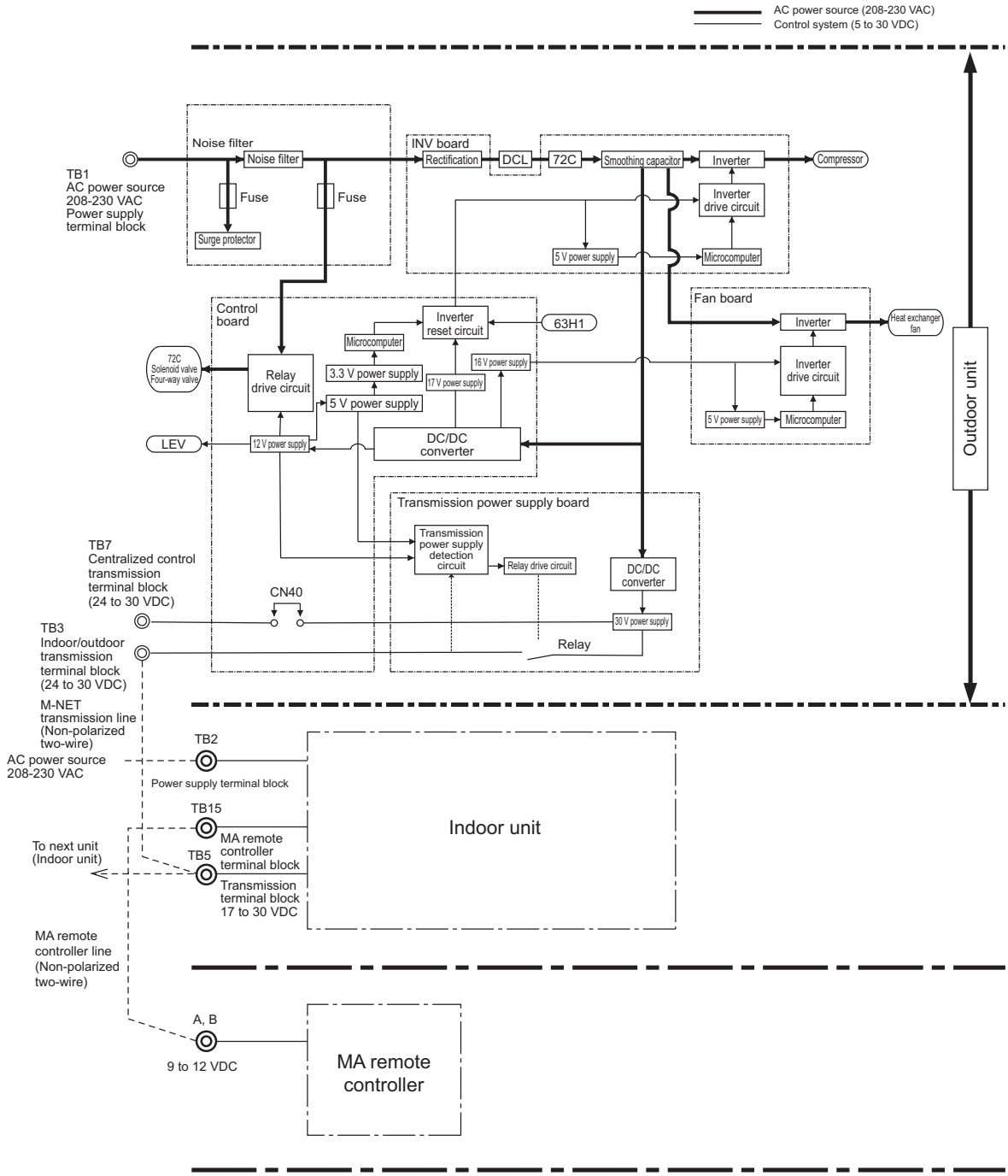
INV board outline drawing



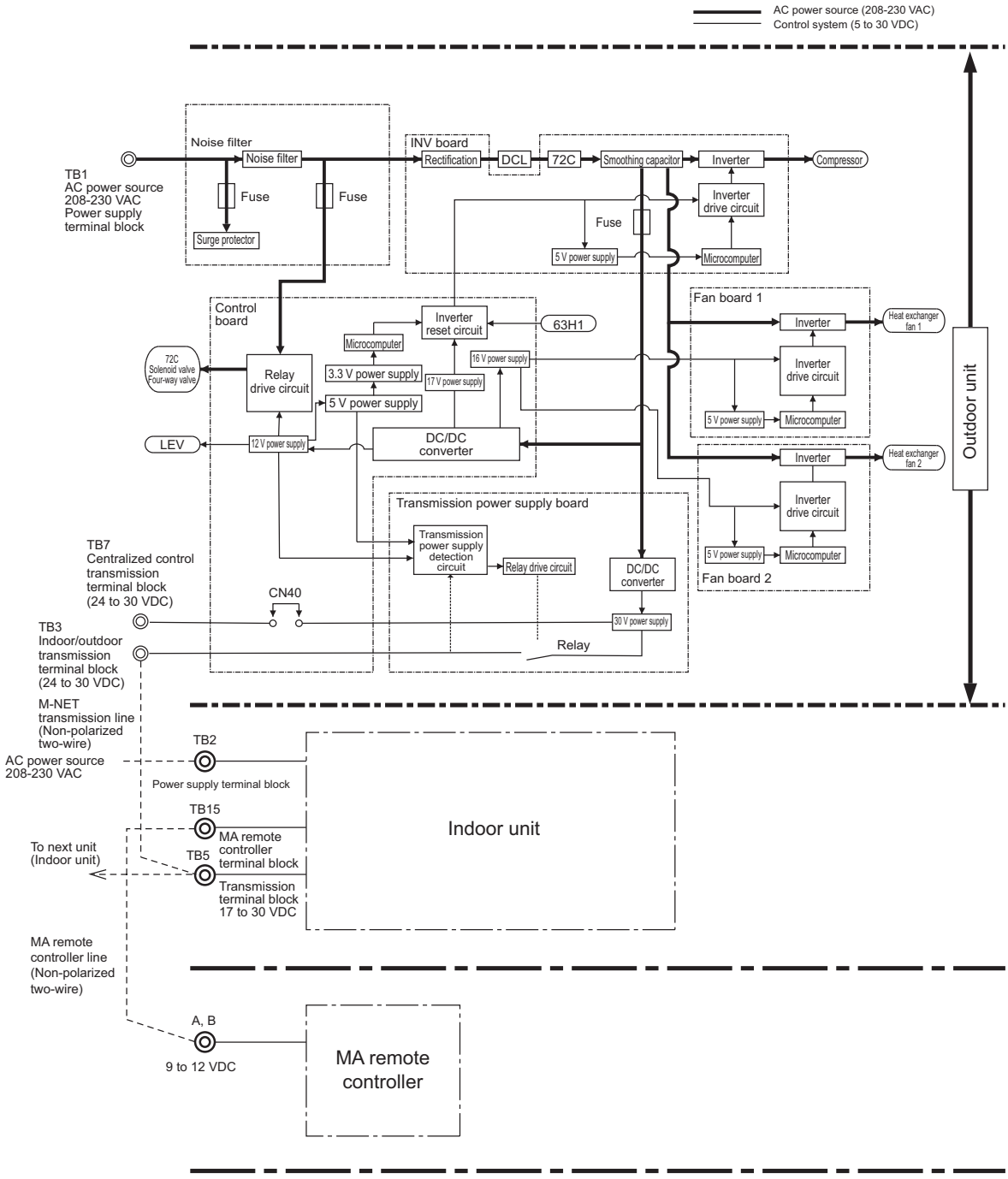
8-9 Control Circuit

8-9-1 Control Power Supply Function Block

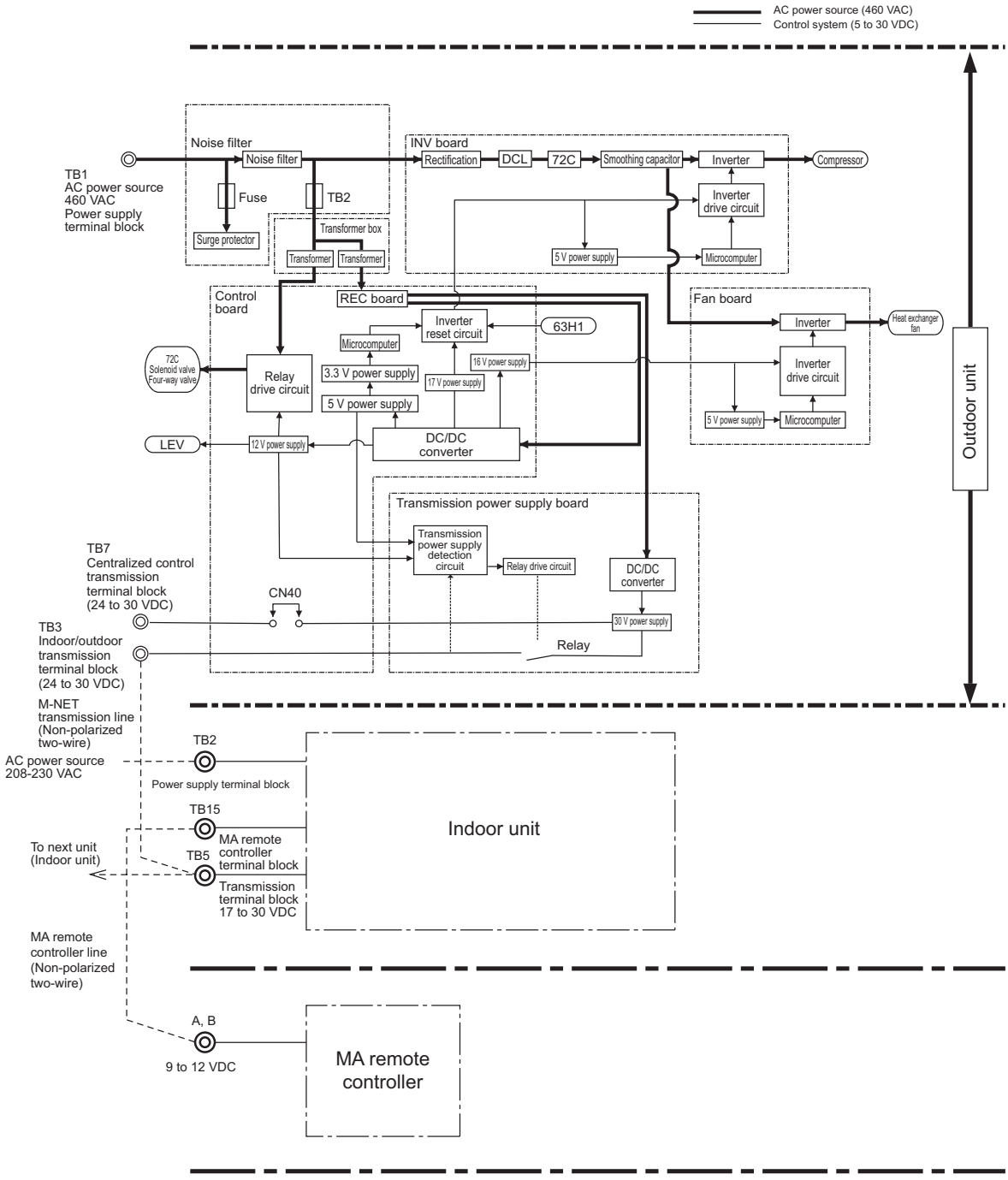
1) TUHYE072/096/1203AMM0AN
TUHYH0723AMM0AN



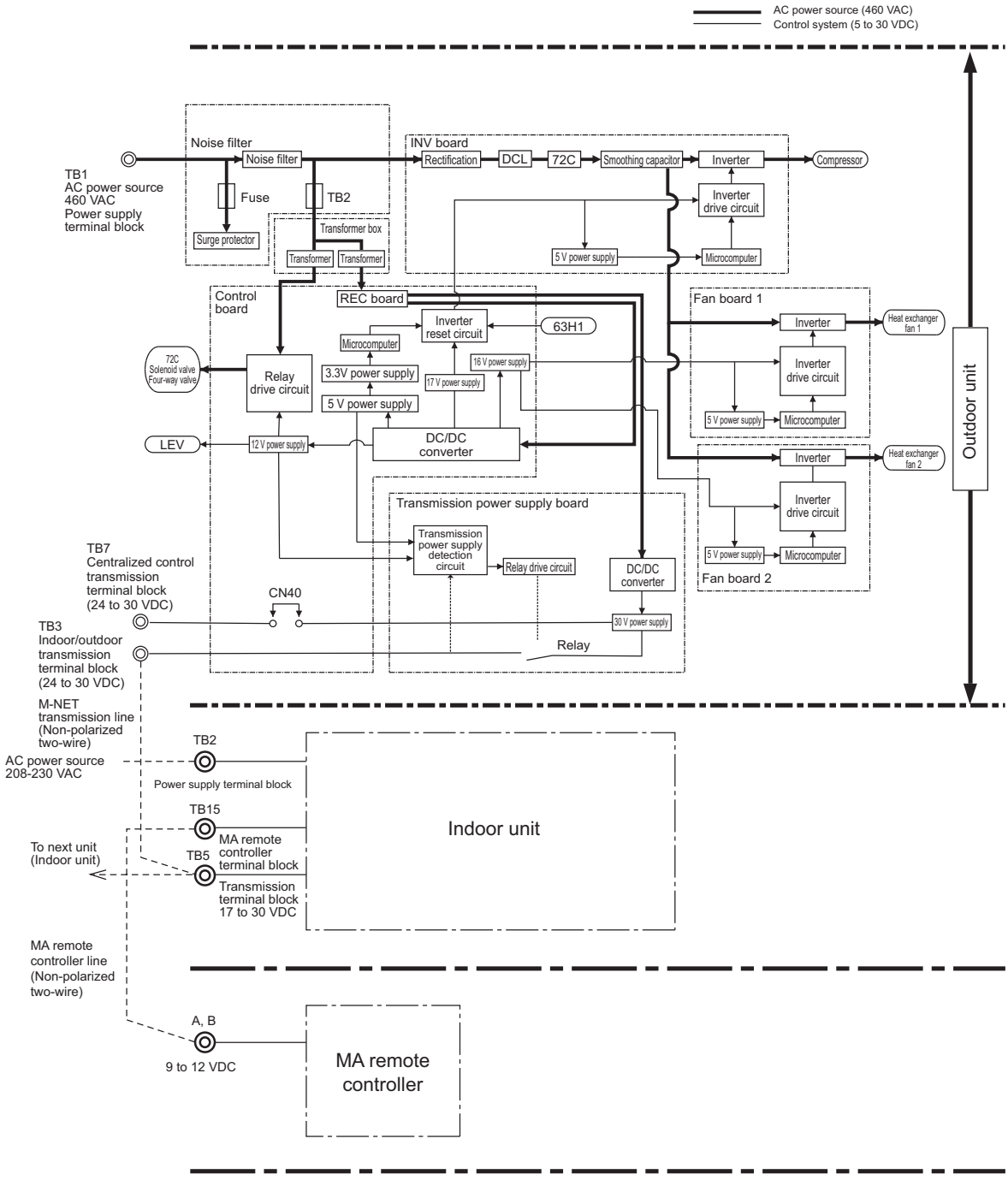
2) TUHYE144/168/1923AMM0AN
TUHYH096/1203AMM0AN



3) TUHYE072/096/1204AMM0AN
TUHYH0724AMM0AN

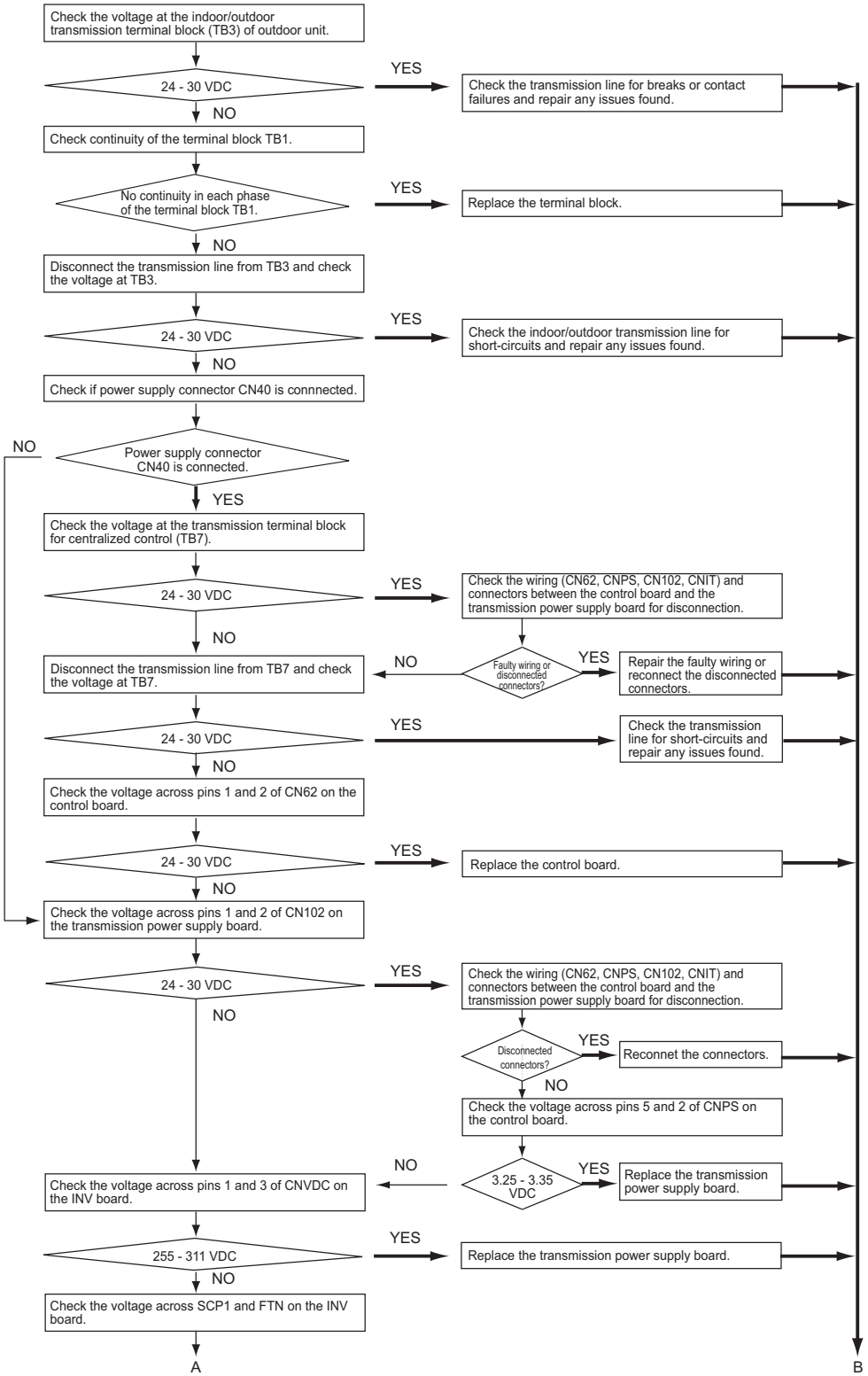


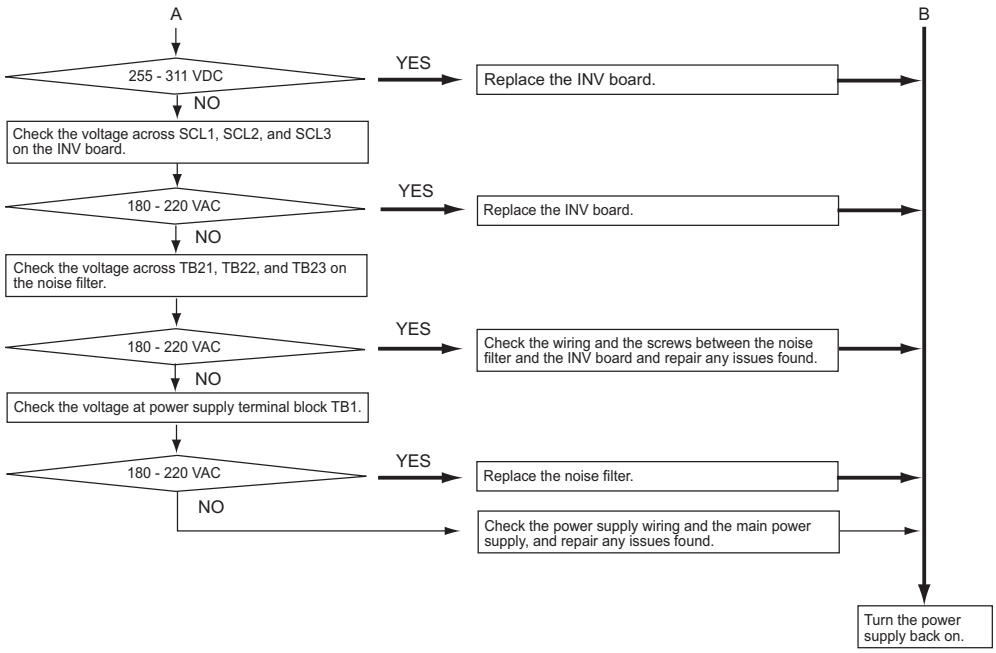
4) TUHYE144/168/1924AMM0AN
TUHYH096/1204AMM0AN



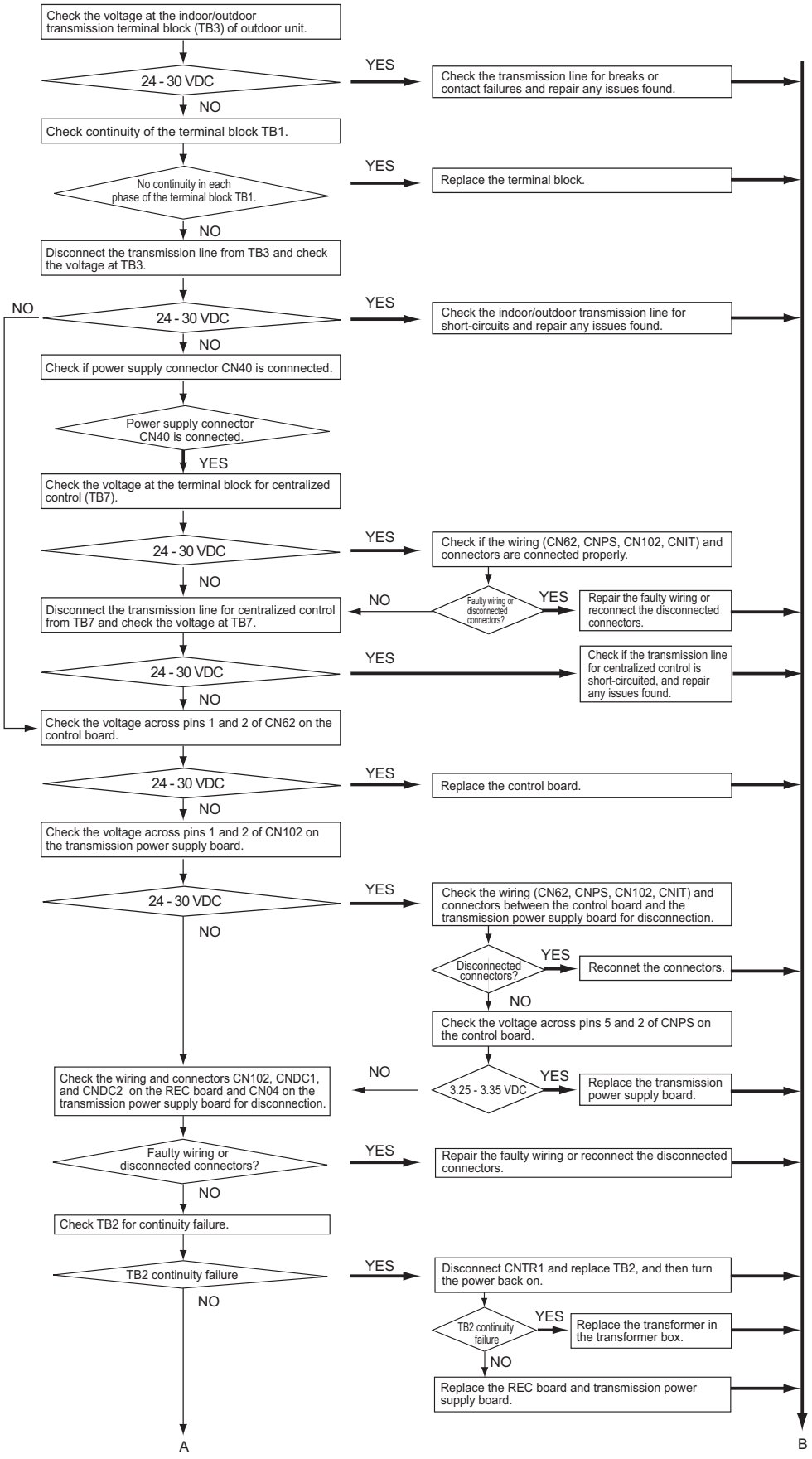
8-9-2 Troubleshooting Problems with Outdoor Unit Transmission Power Supply Circuit

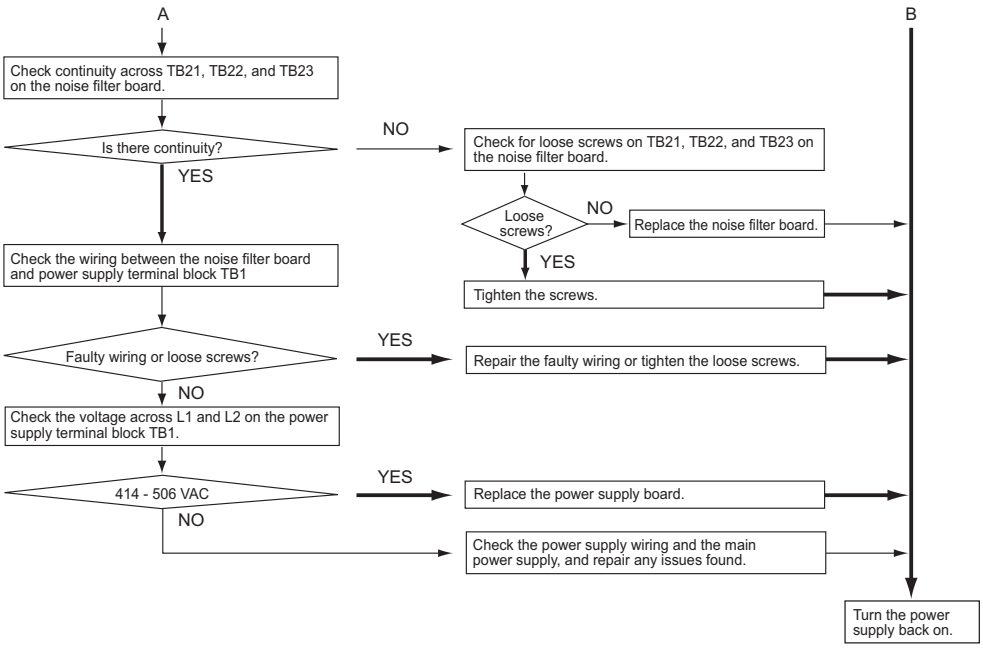
1) TUHYE072/096/120/144/168/1923AMM0AN
TUHYH072/096/1203AMM0AN




A
B
255 - 311 VDC
YES
Replace the INV board.
NO
Check the voltage across SCL1, SCL2, and SCL3 on the INV board.
180 - 220 VAC
YES
Replace the INV board.
NO
Check the voltage across TB21, TB22, and TB23 on the noise filter.
180 - 220 VAC
YES
Check the wiring and the screws between the noise filter and the INV board and repair any issues found.
NO
Check the voltage at power supply terminal block TB1.
180 - 220 VAC
YES
Replace the noise filter.
NO
Check the power supply wiring and the main power supply, and repair any issues found.
Turn the power supply back on.

2) TUHYE072/096/120/144/168/1924AMM0AN
TUHYH072/096/1204AMM0AN




A
B
Check continuity across TB21, TB22, and TB23 on the noise filter board.
Is there continuity?
NO
YES
Check for loose screws on TB21, TB22, and TB23 on the noise filter board.
Loose screws?
NO
YES
Replace the noise filter board.
Tighten the screws.
Check the wiring between the noise filter board and power supply terminal block TB1
Faulty wiring or loose screws?
YES
NO
Repair the faulty wiring or tighten the loose screws.
Check the voltage across L1 and L2 on the power supply terminal block TB1.
414 - 506 VAC
YES
NO
Replace the power supply board.
Check the power supply wiring and the main power supply, and repair any issues found.
Turn the power supply back on.

8-10 Measures for Refrigerant Leakage

1. Leak spot: In the case of extension pipe for indoor 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 (17) 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 (17) is ON), all the indoor units will automatically stop when the low pressure (63LS) reaches 0.383MPa [55psi] or less or 15 minutes have passed after the pump mode started. Stop all the indoor units and compressors when the pressure indicated by the pressure gauge, which is on the check joint (CJ2) for low-pressure service, reaches 0.383MPa [55psi] or 20 minutes pass after the pump down operation is started.
5) Close the gas service valve (BV1) inside the outdoor unit.
6) Collect the refrigerant that remains in the extended pipe for the indoor unit 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 indoor unit or optional unit.
9) To adjust refrigerant amount, open the service valves (BV1 and BV2) inside the outdoor unit and turn off SW4 (17).

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 (1) 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.

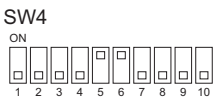
(2) Check the values of Tc and TH6.
(To display the values on the LED screen, use the self-diagnosis switch (SW4 (when SW6-10 is set to OFF)) on the outdoor unit control board.)

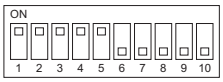
1) When Tc-TH6 is 10°C [18°F] or more : See the next item (3).
2) When Tc-TH6 is less than 10°C [18°F] : After the compressor stops, collect the refrigerant inside the system, repair the leak, perform evacuation, and recharge new refrigerant. (Leak spot: 4. In the case of outdoor unit, handle in the 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 (1) 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, 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 for indoor 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 (1) 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 (1) 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 the indoor 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 indoor 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 indoor 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 indoor 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.

8-11 Parts Replacement Instructions

8-11-1 Ensuring Maintenance Space (Preparation for the Maintenance of Refrigerant Circuit Parts)

1. S, L-module

To ensure a clear workspace for servicing, follow the steps below.

(1) Remove the front panels of the casing. (15 screws on S module, 21 screws on L module: Fig. 1)
The following steps apply to both S and L modules.

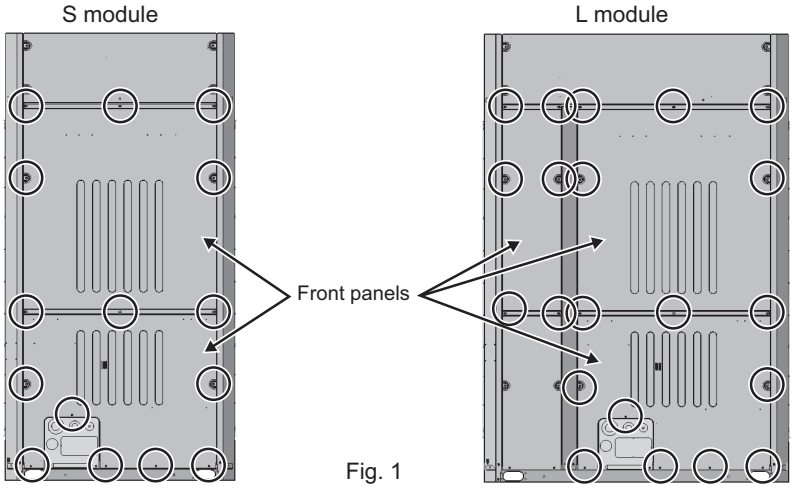


Fig. 1

(2) Remove the control box cover and the wiring connected to the unit from the control box. (Six screws: Fig. 2)

(3) Remove the control box. (Nine screws: Fig. 3)

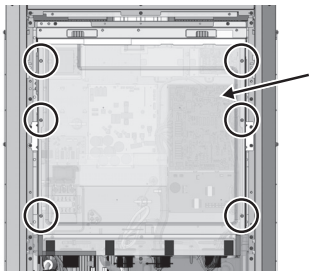


Fig. 2

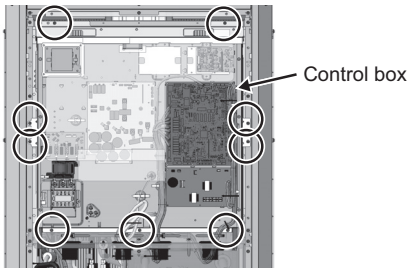


Fig. 3

(4) Remove the plastic clips and the wiring from the frame, and then remove the frame. (Four screws: Fig. 4)

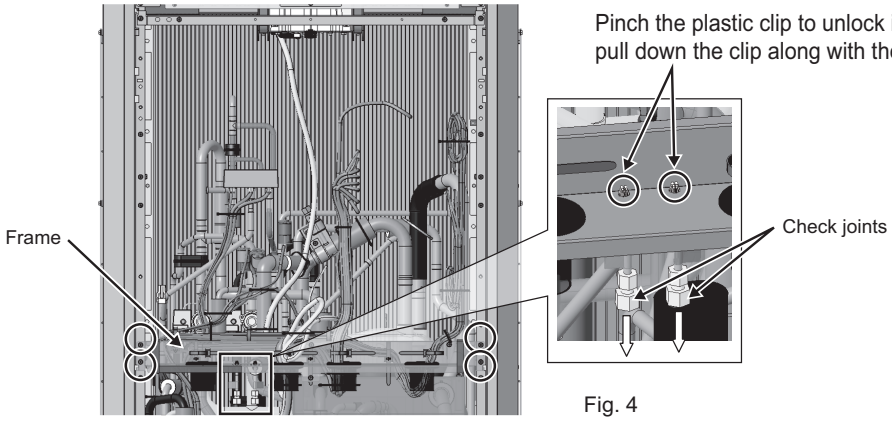


Fig. 4

8-11-2 Compressor Replacement Procedure

1. S, L-module

[WARNING]
Refrigerant, when coming into direct contact with flame, can produce poisonous gases, so perform work in a well-ventilated place where the refrigerant does not stagnate.

The steps for replacing the compressor are as follows. Before replacing the compressor, ensure a sufficient maintenance space and prepare the refrigerant circuit parts for servicing. For details, refer to Section [8-11-1 Ensuring Maintenance Space (Preparation for the Maintenance of Refrigerant Circuit Parts)]

(1) Remove the front and top covers of the compressor. (Six screws: Fig. 1)

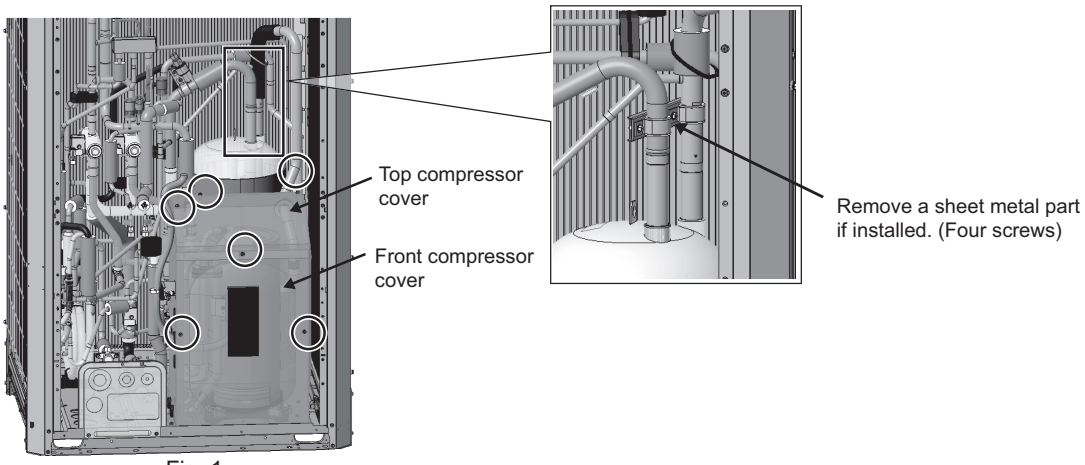


Fig. 1

(2) Remove the compressor cable, TH15, right compressor cover, saddles, pipe cover, rubber spacer, soundproofing material, and bands. (One screw on the compressor cover and three saddles: Fig. 2)
Remove the saddles following the procedure shown in Fig. 3.
*The cover will be reused when the compressor is restored.

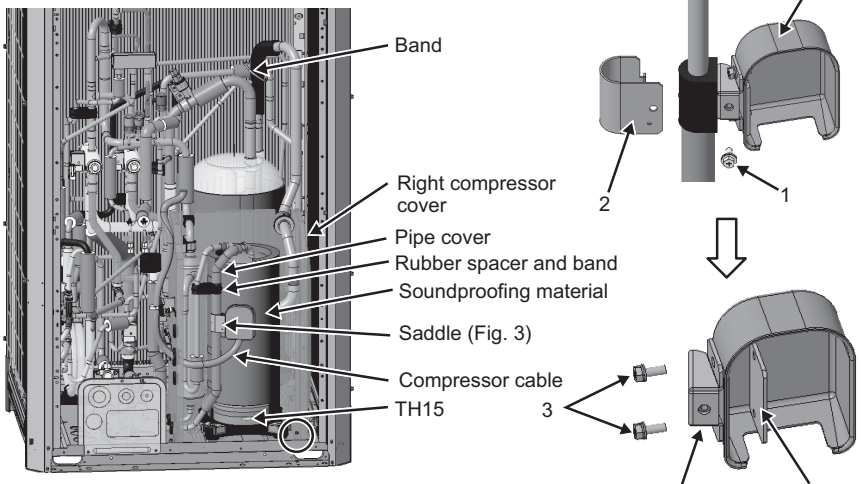


Fig. 2

Fig. 3

Cautions for replacing a compressor
- Ensure a non-oxidizing brazing is performed.
- When heating the piping, wrap a wet towel around the refrigerant circuit components to keep their temperature below 120°C [248°F].
- After brazing, check the area around the brazing joint for any leaks before performing vacuum drying.
- Beware of the flame direction during brazing, as it may burn the wiring or sheet metal parts inside the unit.
- To protect the heat exchanger, unit piping, and pipe covers from the flame during brazing, place a wet felt around the brazed area. Use the felt recommended below or equivalent.
  Recommended felt: TRUSCO NAKAYAMA Spatter Felt 50CF-11 (5t × 1 m × 1 m)
  Flame retardant testing method for spark droplets from welding and gas cutting on fabric sheets in construction works (JIS A 1323) Type A approved
- Ensure the heat exchanger is protected from spatter during brazing.

(3) Before removing the brazing from the pipes, protect the sealing material on the suction pipe of the compressor and heat exchanger from burning by using a wet felt cloth, such as the recommended felt. (Five areas to remove brazing: Fig. 4)
(4) Remove the compressor securing bolts. (Four bolts: Fig. 5)
(5) Seal the pipes to prevent oil from leaking when the compressor is tilted.
(6) After replacing the compressor, protect the sealing material on the suction pipe of the compressor and the heat exchanger by using a wet felt cloth in the same manner as removal of the brazing, and then braze the pipes. (Five areas to braze: Fig. 4)

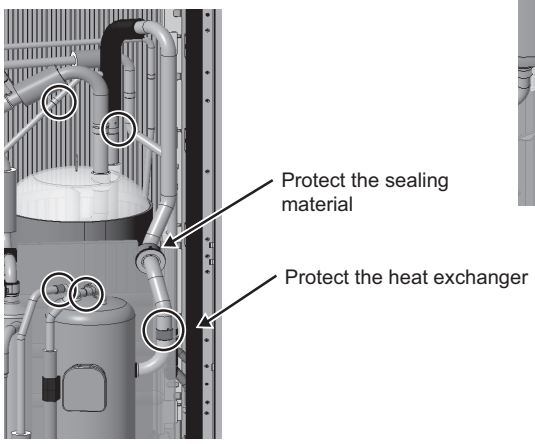


Fig. 4

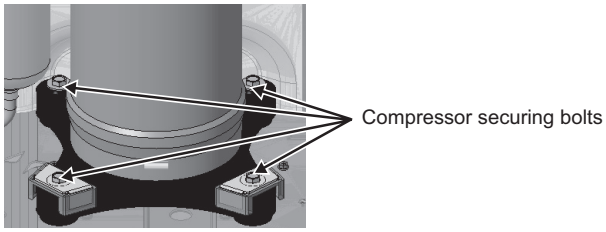


Fig. 5

(7) Tighten the compressor securing bolts using a torque-setting tool. Recommended tightening torque is 3.0 N·m.
(8) Install the compressor covers in the reverse order of removal.
*Ensure that the pipe and damper, and the pipe covers above the accumulator, are tied with bands. (Fig. 6)
*The recommended torque for the screws on the power terminal block in the compressor terminal box is 2.2 to 2.6 N·m. (Fig. 7)

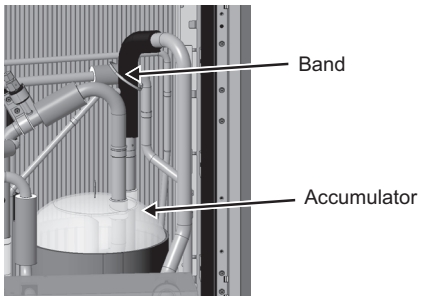


Fig. 6

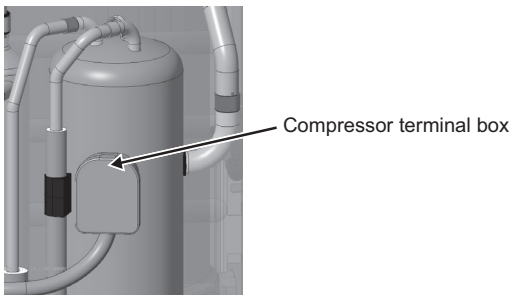


Fig. 7

8-11-3 Accumulator Replacement Procedure

1. S, L-module

[WARNING]
Refrigerant, when coming into direct contact with flame, can produce poisonous gases, so perform work in a well-ventilated place where the refrigerant does not stagnate.

The steps for replacing the accumulator are as follows.
Before replacing the accumulator, ensure a sufficient maintenance space and prepare the refrigerant circuit parts for servicing.
For details, refer to Section [8-11-1 Ensuring Maintenance Space (Preparation for the Maintenance of Refrigerant Circuit Parts)]
(1) Remove the front panels. (Five screws on S module, six screws on L module: Fig. 1)

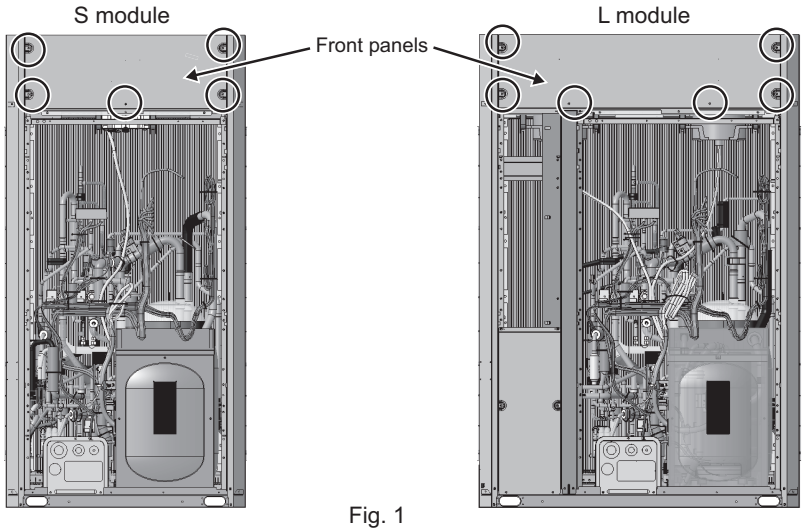


Fig. 1

(2) Remove the remaining panels (right, left, and rear), fan guards, bell mouths, fans, and motors.
Refer to “Maintenance Procedures for the Heat Exchanger” for details. (Fig. 2)
(3) Remove the frames. (Four screws on S module: Fig. 2, six screws on L module: Fig. 3)

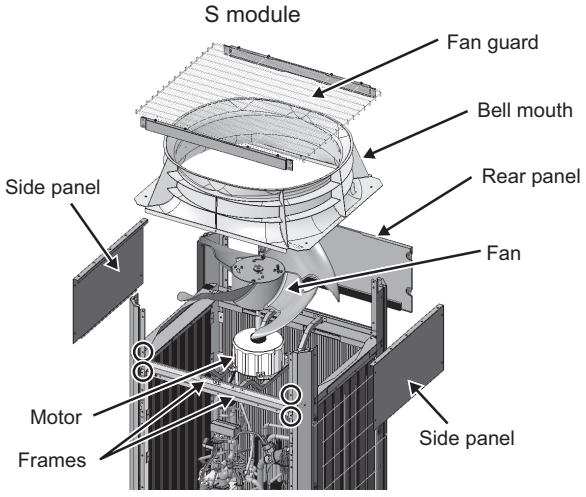


Fig. 2

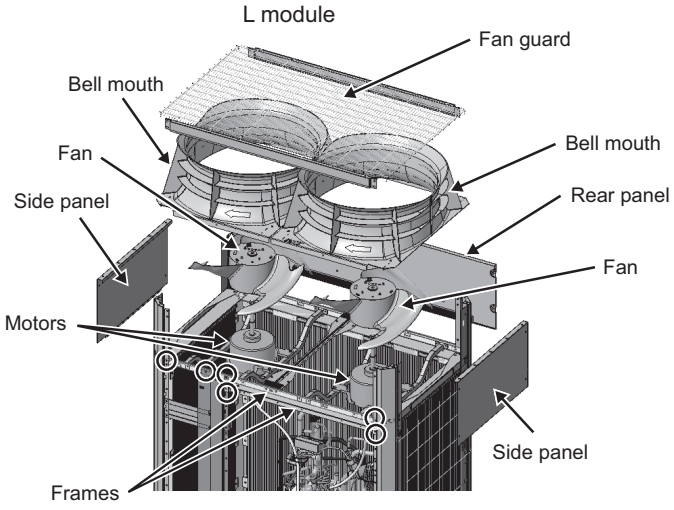


Fig. 3

(4) Remove the front and top covers of the compressor. (Six screws: Fig. 4)

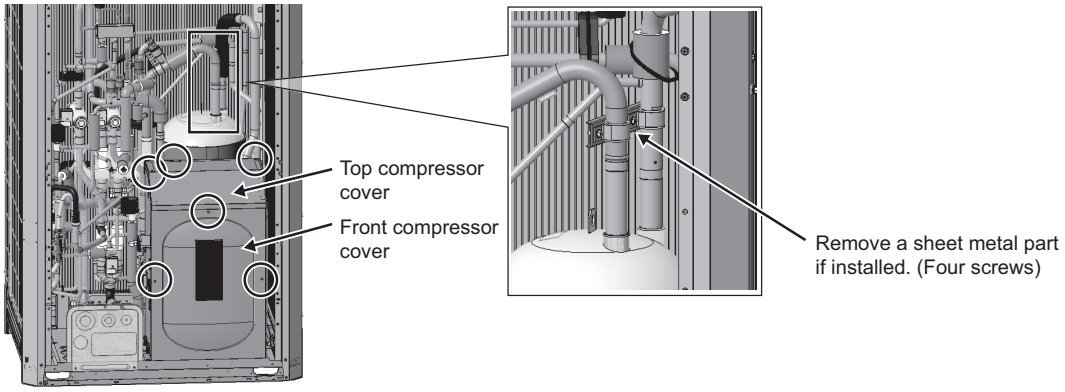


Fig. 4

(5) Remove the right compressor cover, SV1 coil, pipe cover, soundproofing material, and bands.
(One screw on the compressor cover, one on the SV1 coil: Fig. 5)
*The pipe cover will be reused when the accumulator is restored.

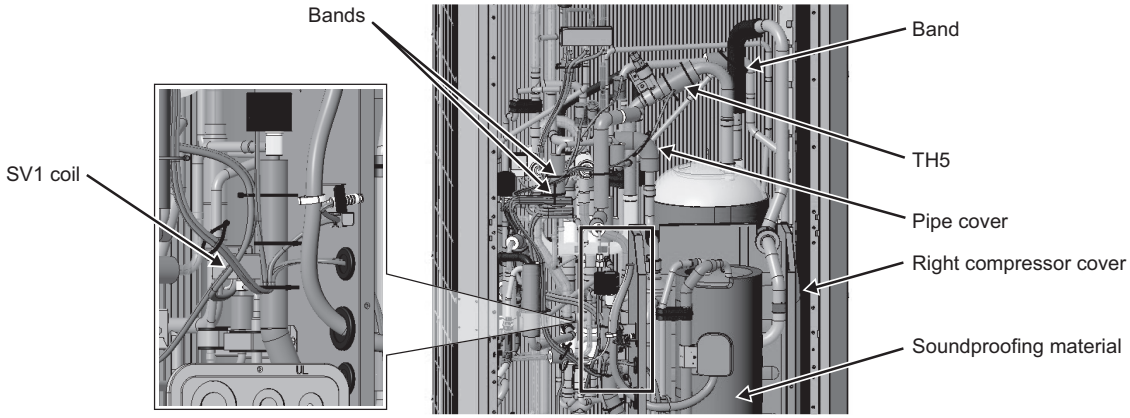


Fig. 5

(6) Remove the brazing from the intake pipe of the accumulator. (Four areas: Fig. 6)

Cautions for replacing a refrigerant circuit component (accumulator)
- Ensure a non-oxidizing brazing is performed.
- When heating the piping, wrap a wet towel around the refrigerant circuit components to keep their temperature below 120°C [248°F] and the fusible plug temperature below 88°C [190°F].
- After brazing, check the area around the brazing joint for any leaks before performing vacuum drying.
- Beware of the flame direction during brazing, as it may burn the wiring or sheet metal parts inside the unit.
- To protect the heat exchanger, unit piping, and pipe covers from the flame during brazing, place a wet felt around the brazed area. Use the felt recommended below or equivalent.
  Recommended felt: TRUSCO NAKAYAMA Spatter Felt 50CF-11 (5t × 1 m × 1 m)
  Flame retardant testing method for spark droplets from welding and gas cutting on fabric sheets in construction works (JIS A 1323) Type A approved
- Ensure the heat exchanger is protected from spatter during brazing.

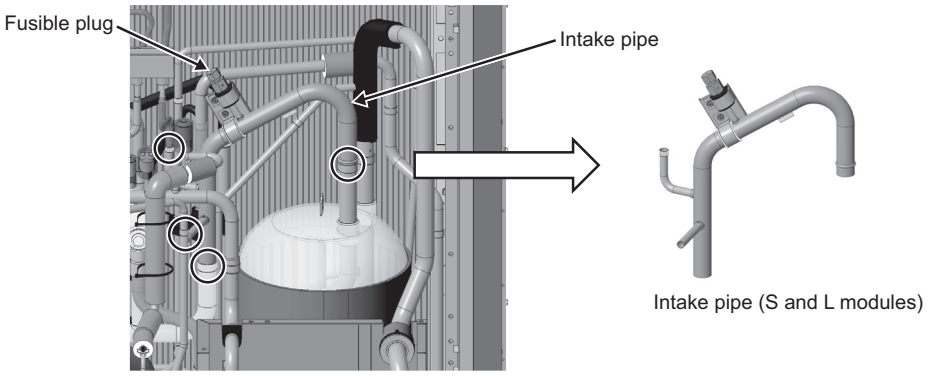


Fig. 6

(7) Remove the brazing from the suction pipe. (Four areas: Fig. 7)

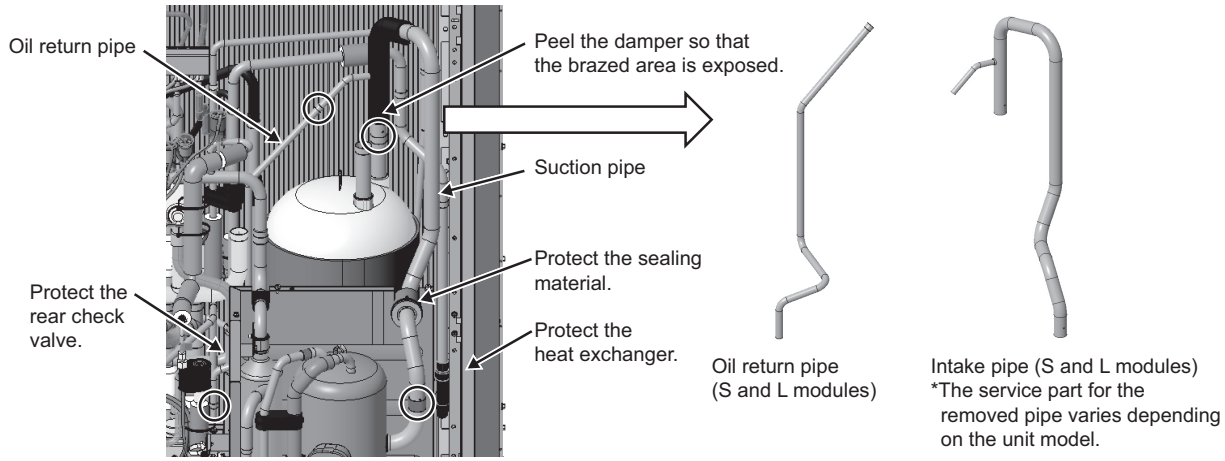


Fig. 7

(8) Remove the brazing from the heat exchange gas pipe. (Two areas: Fig. 8)

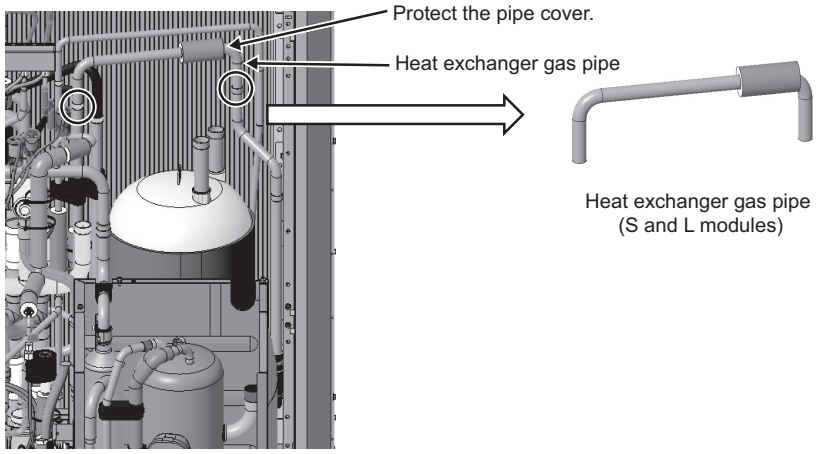


Fig. 8

(9) Remove the brazing from the heat exchange liquid pipe. (Two areas: Fig. 9)

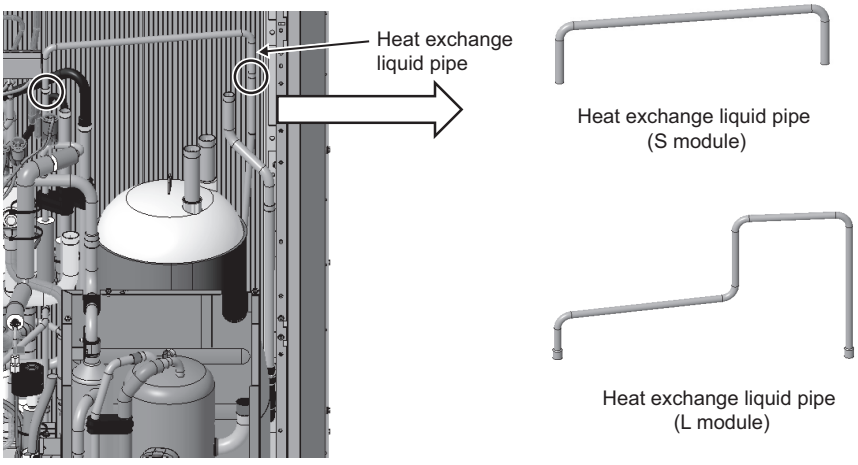


Fig. 9

(10) Remove the screws securing the accumulator at the bottom. (Six screws: Fig. 10)

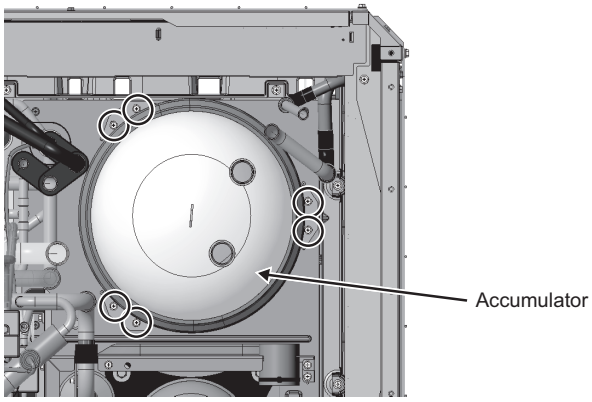


Fig. 10

(11) After replacing the accumulator, reinstall the accumulator in the reverse order.
Reinstall the components that were removed in each step back into their original positions.

8-11-4 Four-way Valve Replacement Procedure

1. S, L-module (Applicable to four-way valves 21S4a and 21S4b)

[WARNING]
Refrigerant, when coming into direct contact with flame, can produce poisonous gases, so perform work in a well-ventilated place where the refrigerant does not stagnate.

The steps for replacing the four-way valves 21S4a (left side when viewed from the front) and 21S4b (right side when viewed from the front) are as follows. Before replacing the four-way valves, ensure a sufficient maintenance space and prepare the refrigerant circuit parts for servicing. For details, refer to Section [8-11-1 Ensuring Maintenance Space (Preparation for the Maintenance of Refrigerant Circuit Parts)]

(1) Remove the four-way valve coils, LEV coils, coil covers, coil caps, pipe covers, rubber spacers, and bands. (Fig. 1)
*These pipe covers will be reused when the four-way valves are restored.

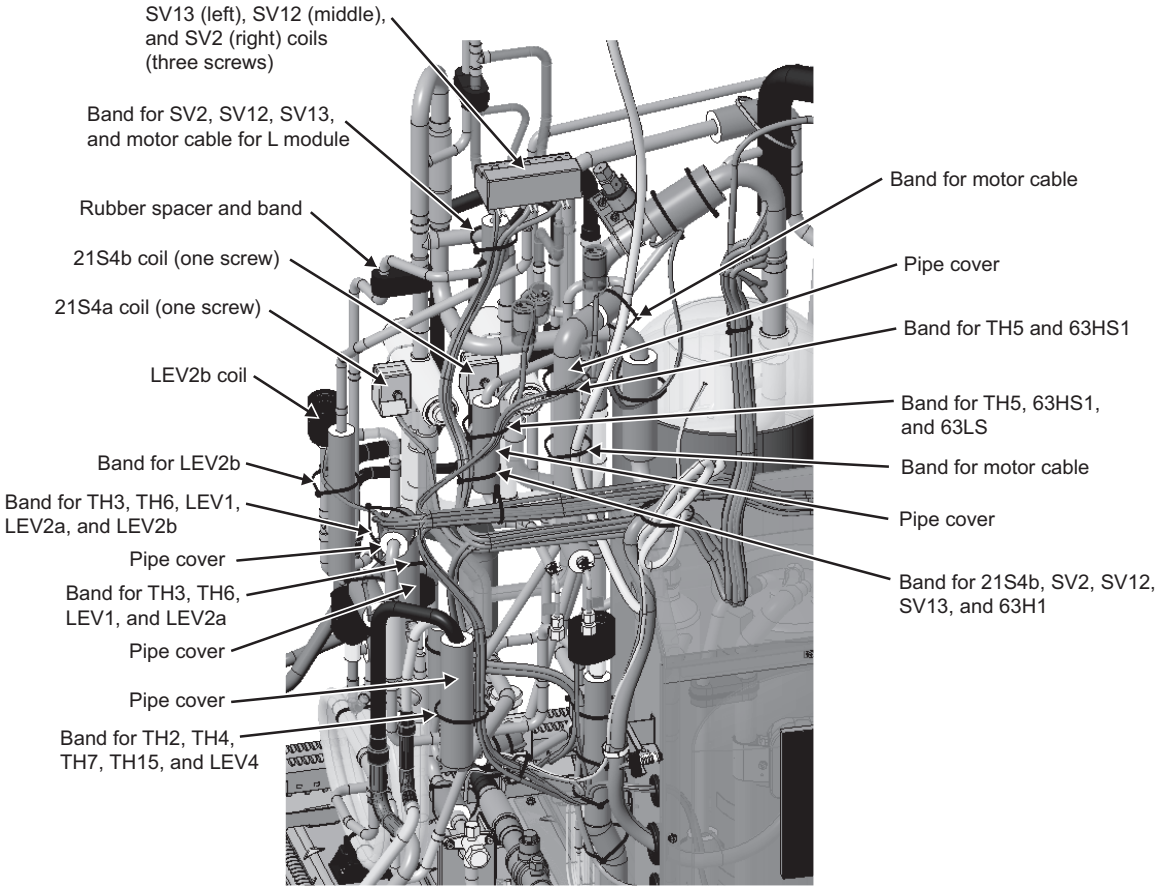


Fig. 1

(2) When brazing the four-way valves or removing the brazing, protect the surrounding pipe covers and cables. (Fig. 2)

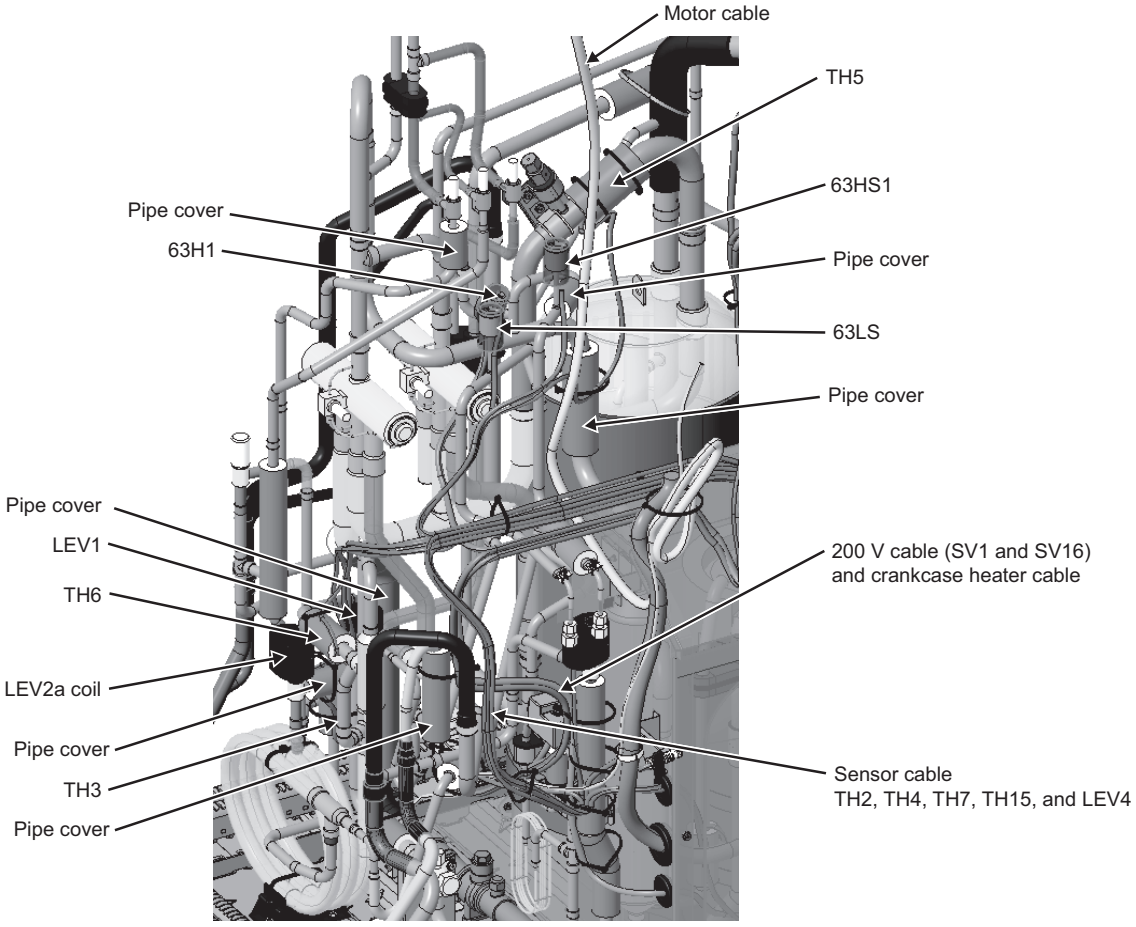


Fig. 2

Cautions for replacing refrigerant circuit components (four-way valve, solenoid valve, and LEV)
- Ensure a non-oxidizing brazing is performed.
- When heating the piping, wrap a wet towel around the refrigerant circuit components to keep their temperature below 120°C [248°F] and the fusible plug temperature below 88°C [190°F].
- After brazing, check the area around the brazing joint for any leaks before performing vacuum drying.
- Beware of the flame direction during brazing, as it may burn the wiring or sheet metal parts inside the unit.
- To protect the heat exchanger, unit piping, and pipe covers from the flame during brazing, place a wet felt around the brazed area. Use the felt recommended below or equivalent.
  Recommended felt: TRUSCO NAKAYAMA Spatter Felt 50CF-11 (5t × 1 m × 1 m)
  Flame retardant testing method for spark droplets from welding and gas cutting on fabric sheets in construction works (JIS A 1323) Type A approved
- Ensure the heat exchanger is protected from spatter during brazing.

Replacing the four-way valve 21S4a

(3A) Cut the pipe connected to the bottom center port of the four-way valve 21S4a using a pipe cutter or a similar tool at the points shown in the figure below.
After cutting the pipe, remove the brazing from the pipe. (Two points to cut and two areas to remove brazing: Fig. 3)

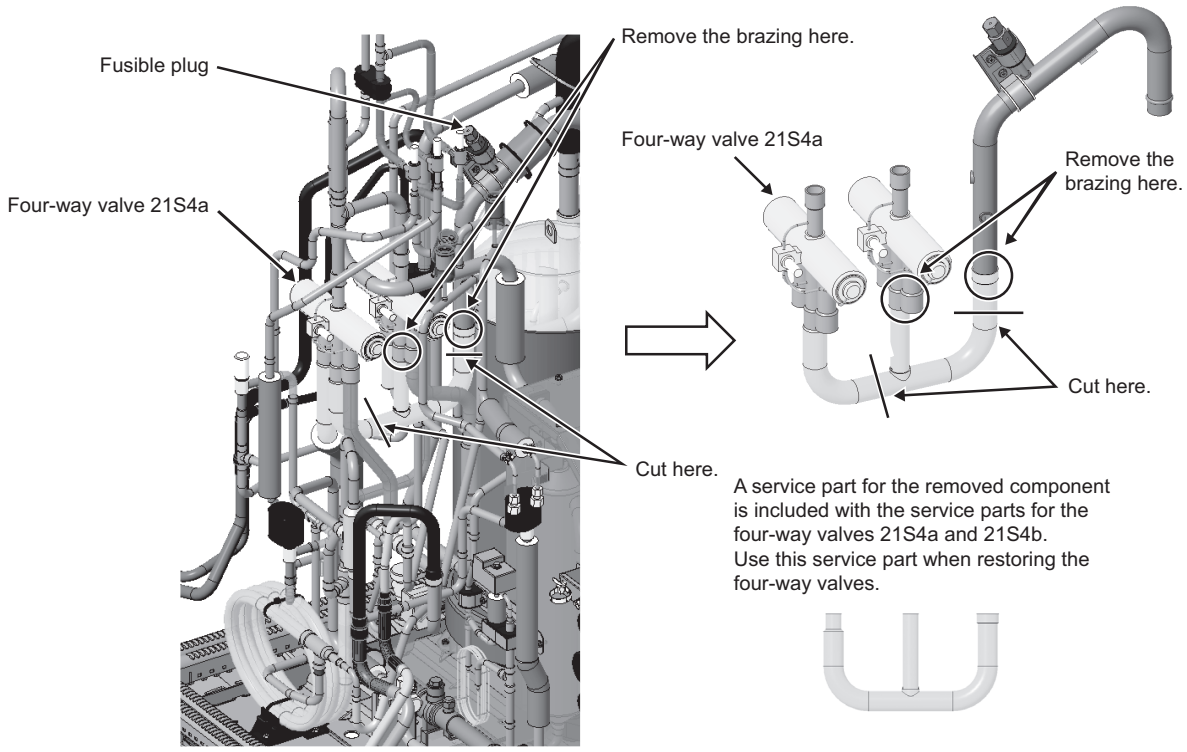


Fig. 3

(4A) Remove the brazing from the pipe connected to the bottom front port of the four-way valve 21S4a. (Two areas: Fig. 4)

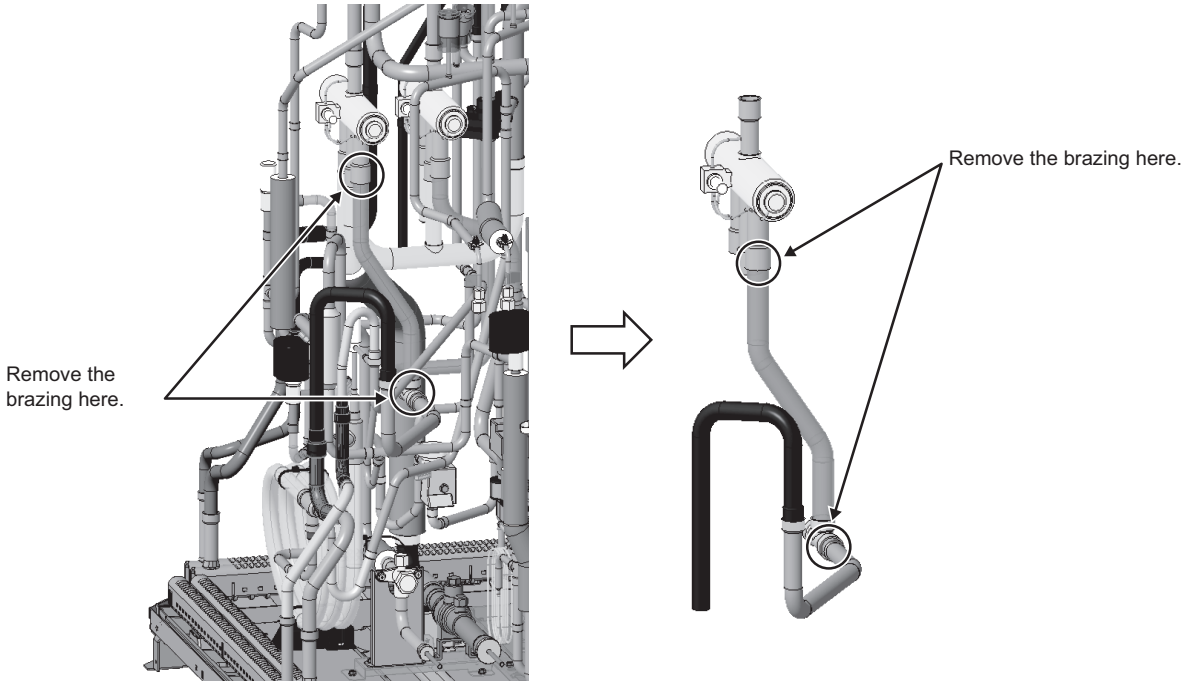


Fig. 4

(5A) Cut the pipe extending from the top port of the four-way valve 21S4a using a pipe cutter or a similar tool at the point shown in the figure. (One point to cut: Fig. 5)

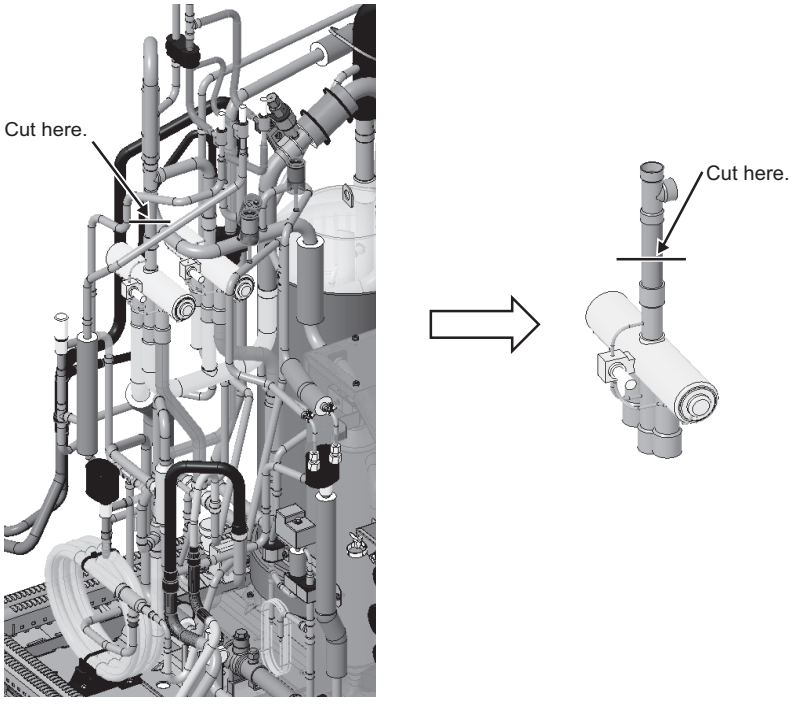


Fig. 5

(6A) Remove the brazing from the pipe connected to the bottom rear port of the four-way valve 21S4a. (One area: Fig. 6)

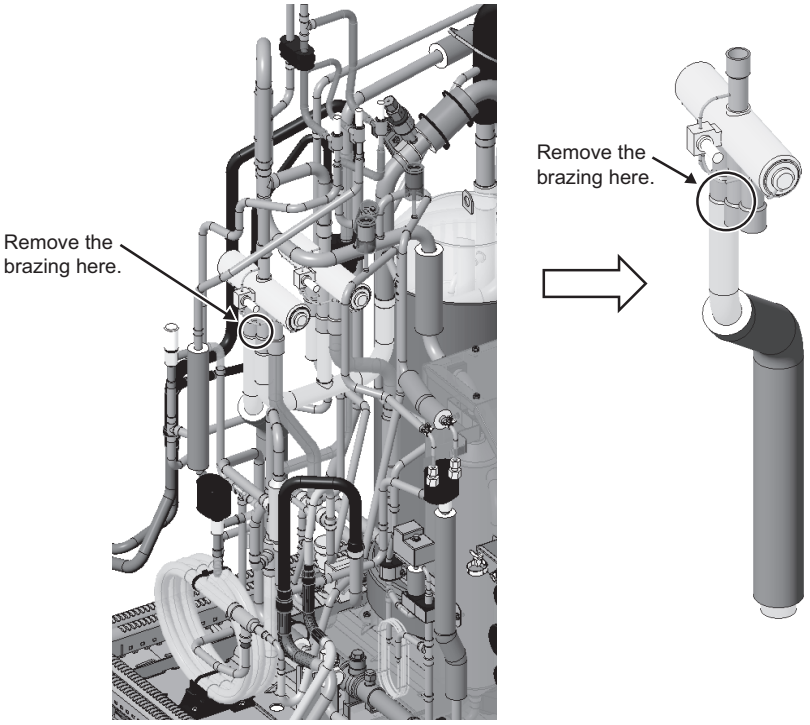
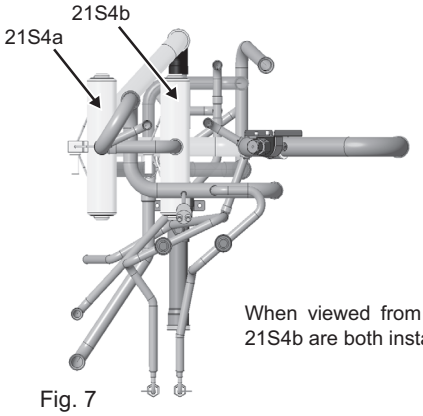


Fig. 6

(7A) Install the new four-way valve 21S4a. Fig. 7 shows the positions of the four-way valves for reference.



When viewed from the top, the four-way valves 21S4a and 21S4b are both installed perpendicularly.

Fig. 7

(8A) Before installing the new four-way valve 21S4a, cut the supplied pipe, of which one end is expanded, to the length of the cut pipe connected to the top port of the four-way valve. (Fig. 8)

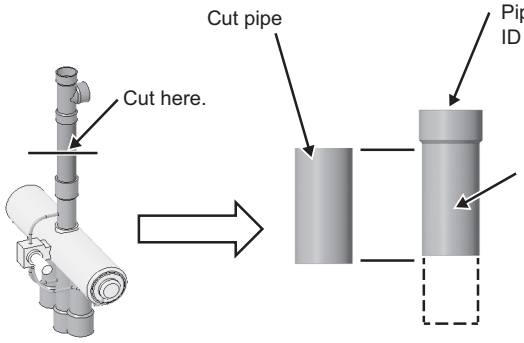


Fig. 8

(9A) Braze the pipe to the bottom rear port of the four-way valve 21S4a.
Braze three areas in total, including the pipe joint in step (8A) and the area shown in Fig. 9. (Three areas: Fig. 9)

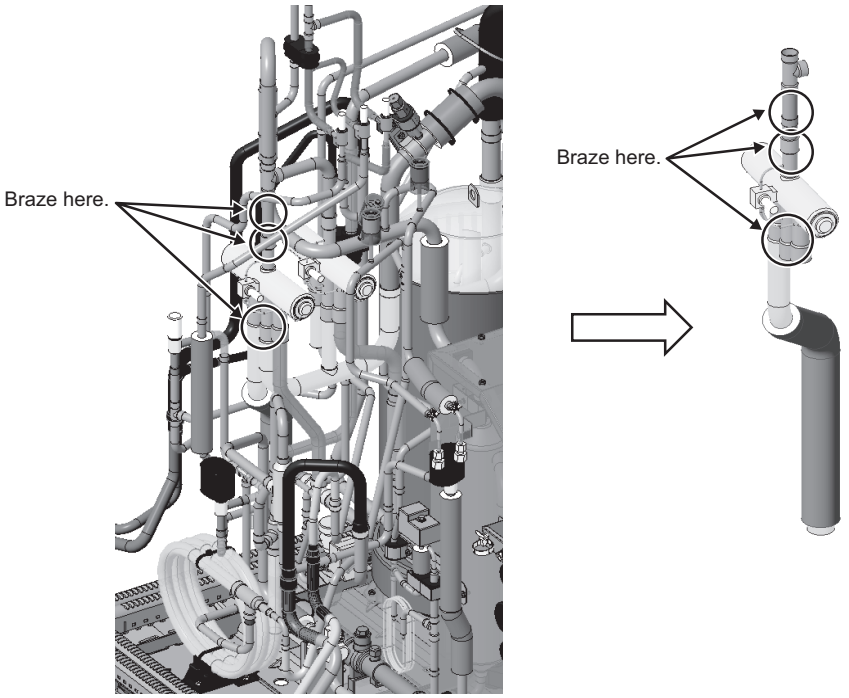


Fig. 9

(10A) Braze the pipe to the bottom center port of the four-way valve 21S4a. (Three areas: Fig. 10)

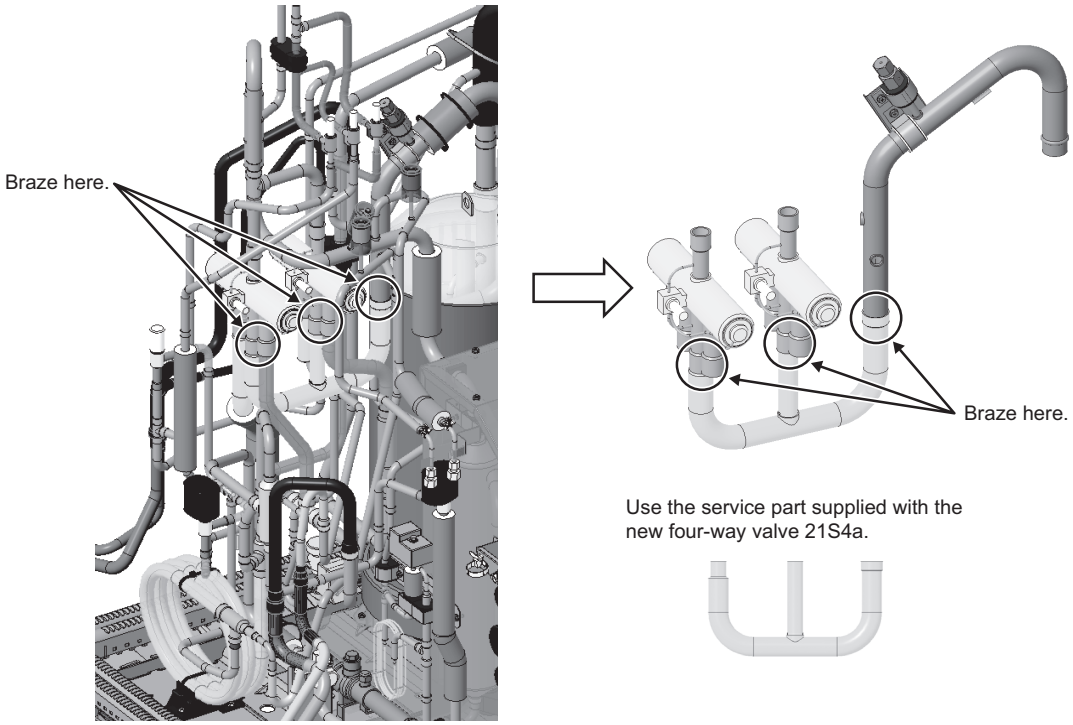


Fig. 10

(11A) Braze the pipe to the bottom front port of the four-way valve 21S4a. (Two areas: Fig. 11)

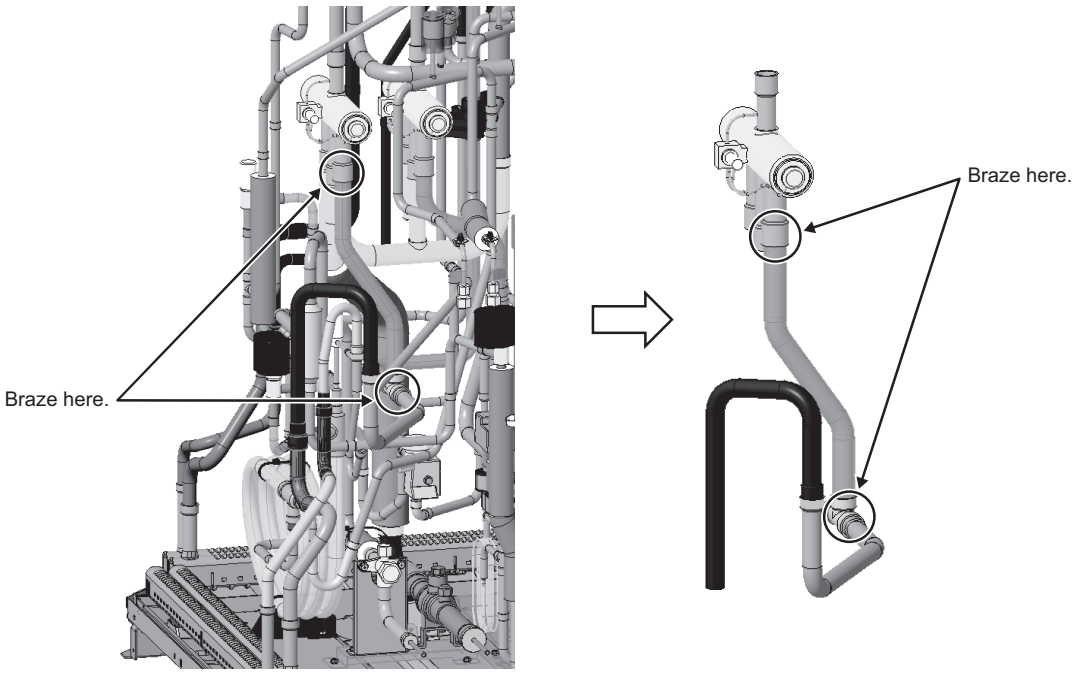


Fig. 11

The replacement of the four-way valve 21S4a is completed here.
Reinstall the components that were removed in each step back into their original positions.

Replacing the four-way valve 21S4b

(12B) Cut the pipe connected to the bottom center port of the four-way valve 21S4b using a pipe cutter or a similar tool at the points shown in the figure. After cutting the pipe, remove the brazing from the pipe. (Two points to cut and two areas to remove brazing: Fig. 12)

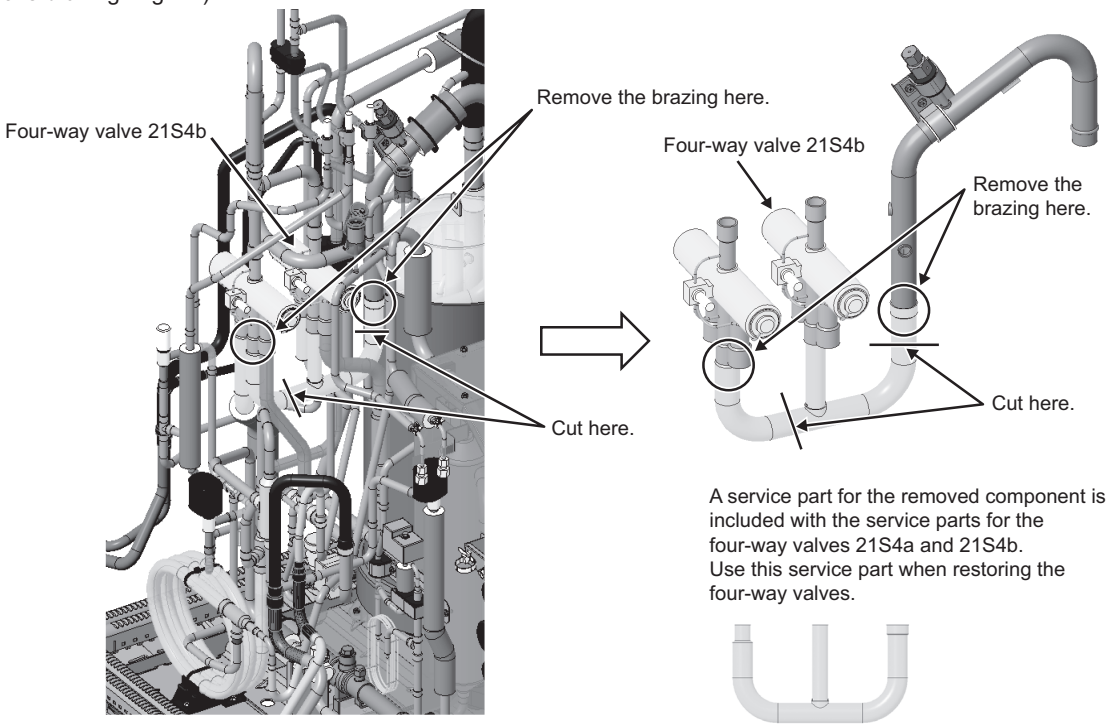


Fig. 12

(13B) Cut the pipe extending from the top port of the four-way valve 21S4b using a pipe cutter or a similar tool at the point.
(One point to cut: Fig. 13)

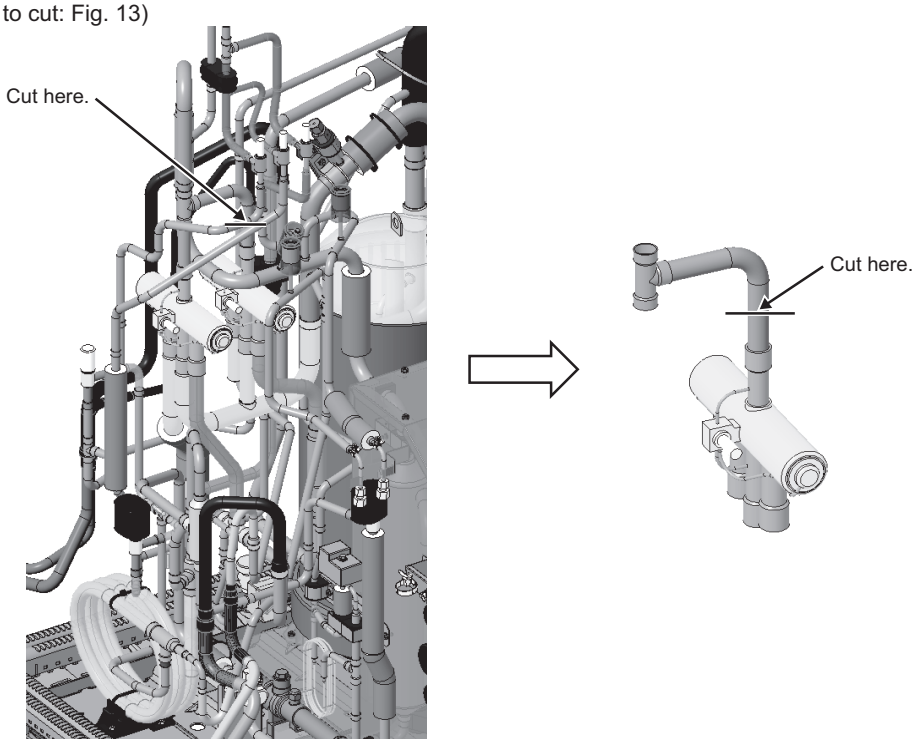


Fig. 13

(14B) Remove the brazing from the pipe connected to the bottom front port of the four-way valve 21S4b. (One area: Fig. 14)

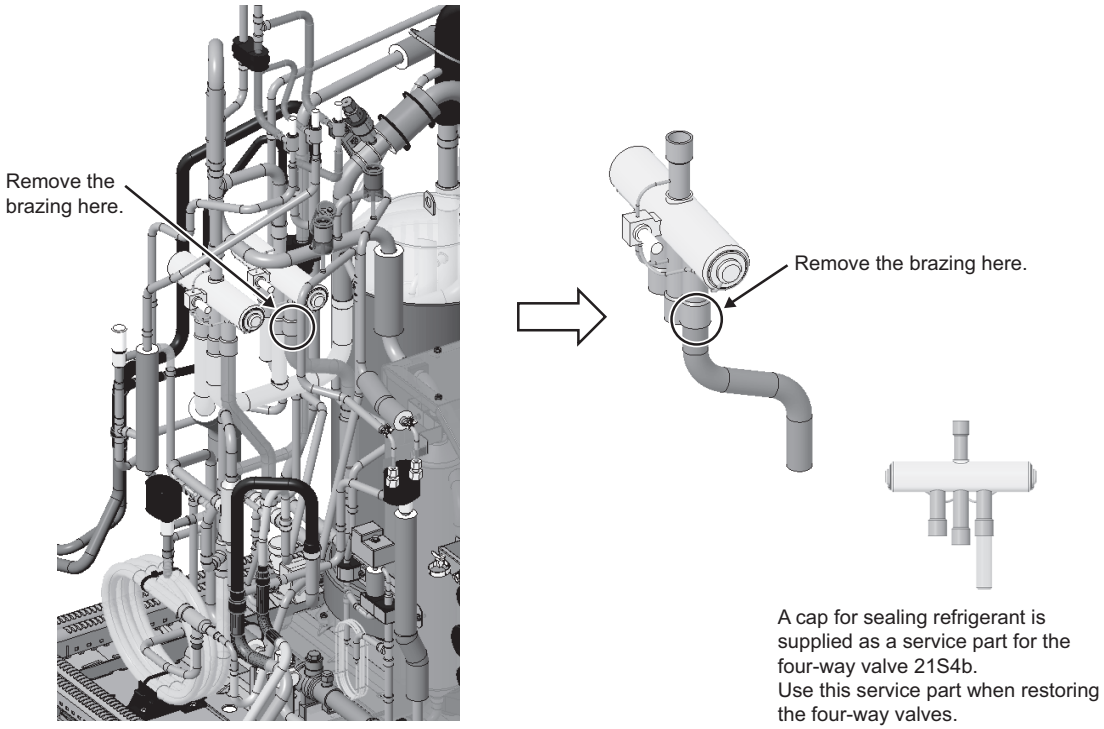
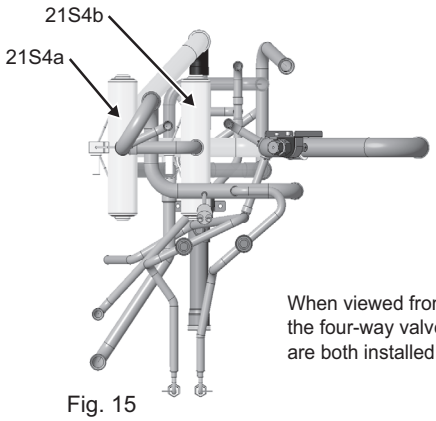


Fig. 14

(15B) Install the new four-way valve 21S4b. Fig. 15 shows the positions of the four-way valves for reference.



When viewed from the top,
the four-way valves 21S4a and 21S4b
are both installed perpendicularly.

Fig. 15

(16B) Before installing the new four-way valve 21S4b, cut the supplied pipe, of which one end is expanded, to the length of the cut pipe connected to the top port of the four-way valve. (Fig. 16)

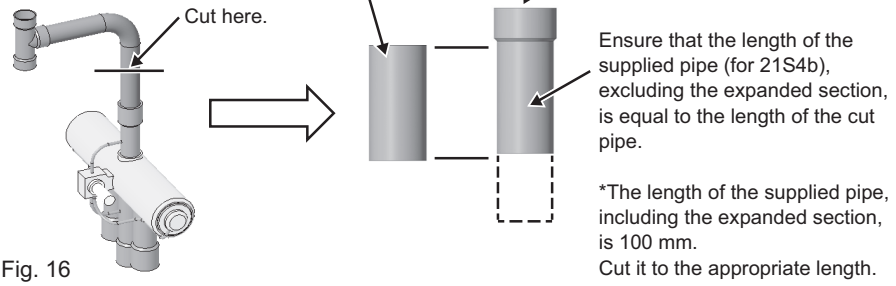


Fig. 16

(17B) Braze the pipe to the center bottom port of the four-way valve 21S4b.
Braze five areas in total, including the pipe joint in step (16B) and the areas shown in Fig. 17. (Five areas: Fig. 17)

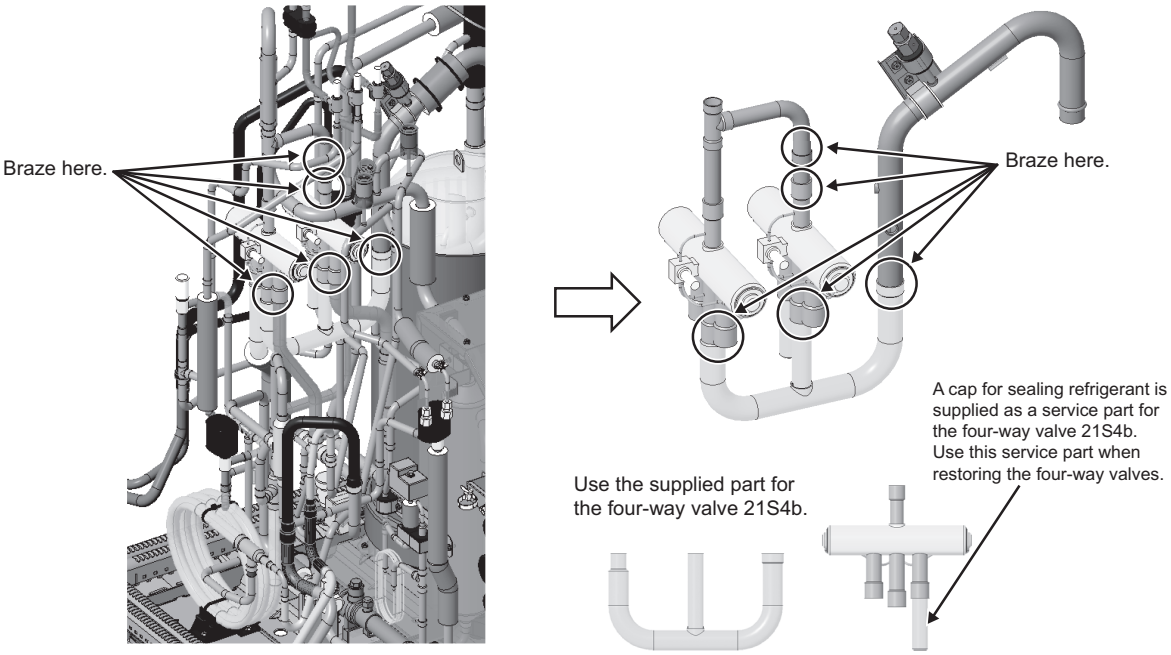


Fig. 17

(18B) Braze the pipe to the bottom front port of the four-way valve 21S4b. (One area: Fig. 18)

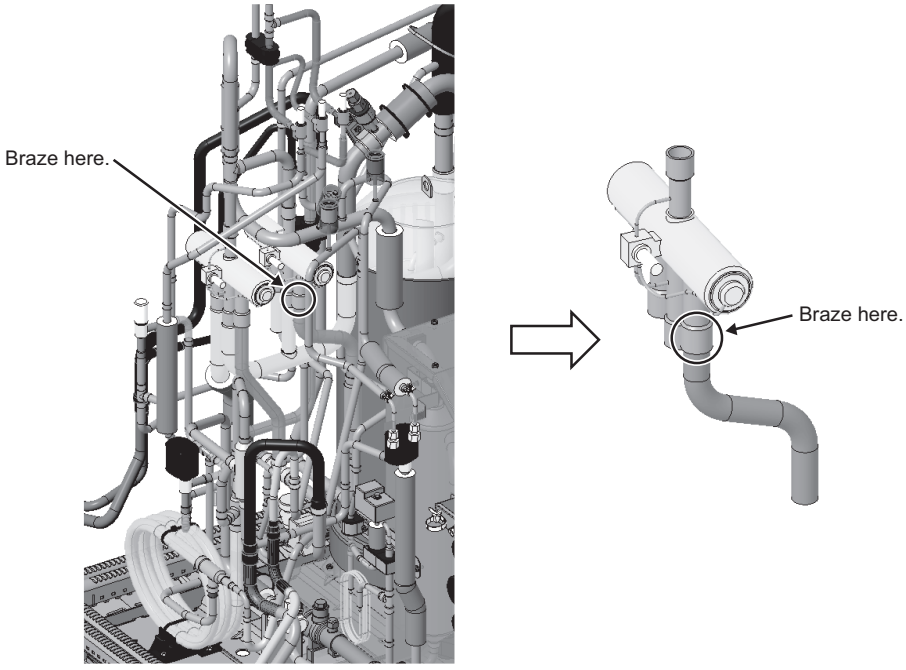


Fig. 18

The replacement of the four-way valve 21S4b is completed here. Reinstall the components that were removed in each step back into their original positions.

8-11-5 Capillary Assembly Replacement Procedure

1. S, L-module

[WARNING]
Refrigerant, when coming into direct contact with flame, can produce poisonous gases, so perform work in a well-ventilated place where the refrigerant does not stagnate.

The steps for replacing the capillary assembly are as follows. Before replacing the capillary assembly, ensure a sufficient maintenance space and prepare the refrigerant circuit parts for servicing. For details, refer to Section [8-11-1 Ensuring Maintenance Space (Preparation for the Maintenance of Refrigerant Circuit Parts)]

Cautions for replacing a capillary assembly
- Ensure a non-oxidizing brazing is performed.
- After brazing, check the area around the brazing joint for any leaks before performing vacuum drying.
- Beware of the flame direction during brazing, as it may burn the wiring or sheet metal parts inside the unit.
- To protect the heat exchanger, unit piping, and pipe covers from the flame during brazing, place a wet felt around the brazed area. Use the felt recommended below or equivalent.
  Recommended felt: TRUSCO NAKAYAMA Spatter Felt 50CF-11 (5t × 1 m × 1 m)
  Flame retardant testing method for spark droplets from welding and gas cutting on fabric sheets in construction works (JIS A 1323) Type A approved
- Ensure the heat exchanger is protected from spatter during brazing.

(1) Remove the brazing from the capillary assembly. (Two areas: Fig. 1)
(2) When heating the piping, wrap wet towels around the capillary assembly to prevent the brazing from melting. (Two wet towels: Fig. 2)
(3) Connect the pipes of the capillary assembly. (Two areas to braze: Fig. 2)

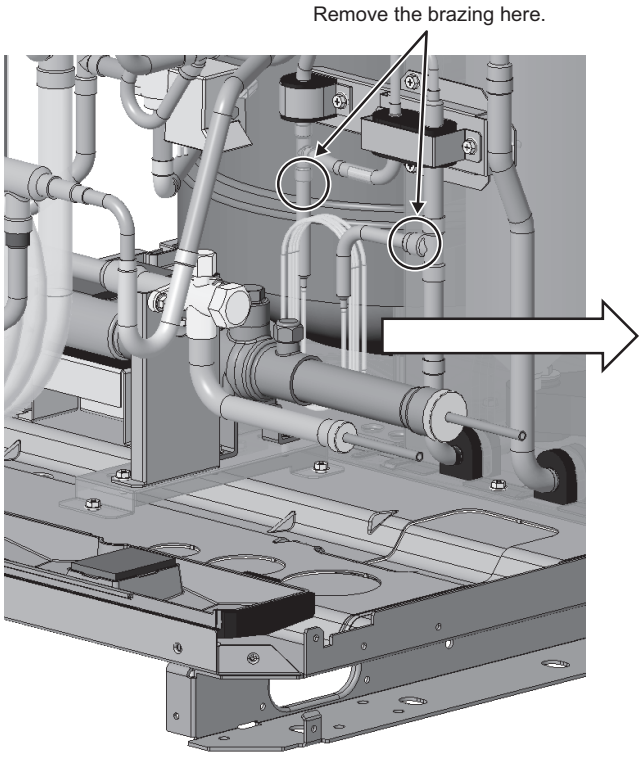


Fig. 1

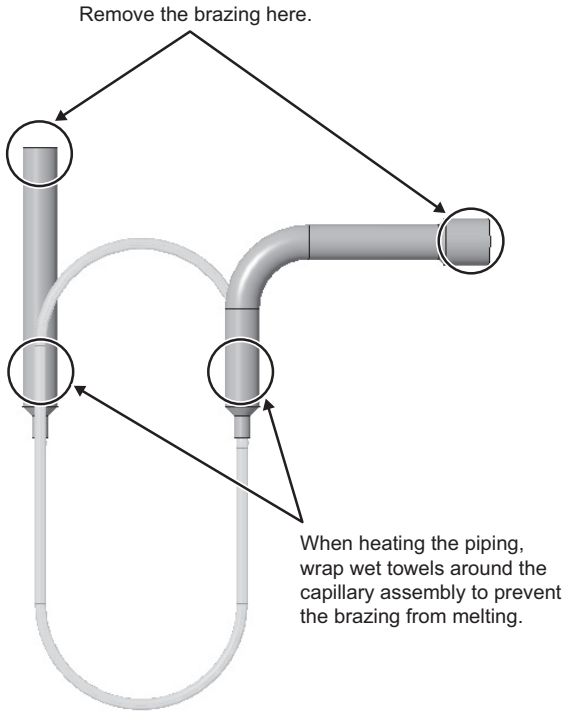


Fig. 2

The replacement of the capillary assembly is completed here.
Install the removed components back into their original positions.

8-11-6 Maintenance Procedures for the Heat Exchanger

1. For the S-module

[Precautions]
·Do not touch fin surfaces of the heat exchanger and the sharp edges of components.
·Operate with protective equipment.
·Two persons shall operate when carrying the heat exchanger.
·When brazing piping, be careful not to burn the wiring and sheet metal in the unit.
·Use a wet towel to moisten the rubber tube near the brazing area before brazing.
·When connecting piping, be sure to perform non-oxidation brazing with nitrogen substitution.
Do not use commercially available antioxidants as they may cause pipe corrosion and degradation of the refrigeration oil. Otherwise, the compressor may be damaged.
·Heat exchanger is provided with cushioning material so that the aluminum pipe does not come into contact with the ground, and a clearance is secured between the aluminum pipe and the ground when it is placed on the ground.
·When holding the heat exchanger, do not use gloves that have touched corrosive components (copper, iron, sulfur, etc.) so that the aluminum pipes do not corrode.

[Warning]
Refrigerant, when coming into direct contact with flame, can produce poisonous gases, so perform work in a well-ventilated place where the refrigerant does not stagnate.

1-1. Advance preparation for service heat exchanger replacement operation.
Remove various parts before removing the heat exchanger.
(1) Remove the panel from the unit. (20 screws: Fig. 1)

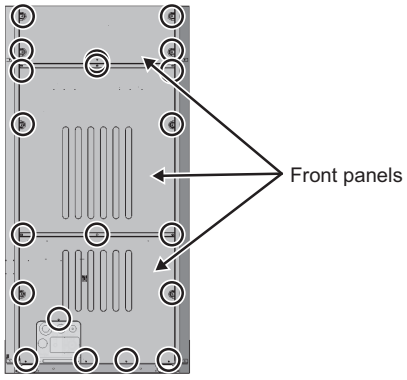


Fig. 1

(2) Remove the control box cover and remove the wiring connected to the unit from the control box. (Six screws: Fig. 2)

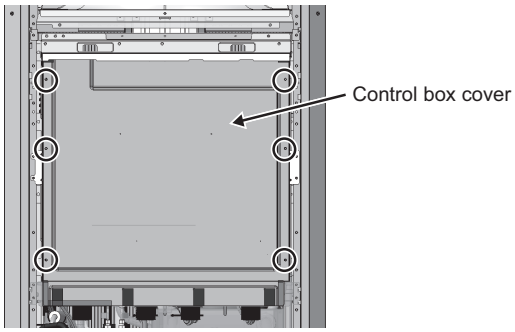


Fig. 2

(3) Remove the control box. (Nine screws: Fig. 3)

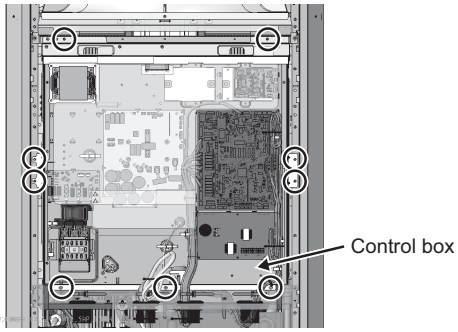


Fig. 3

(4) Remove the wires that are secured to frame B and remove frames A and B. (Six screws: Fig. 4)

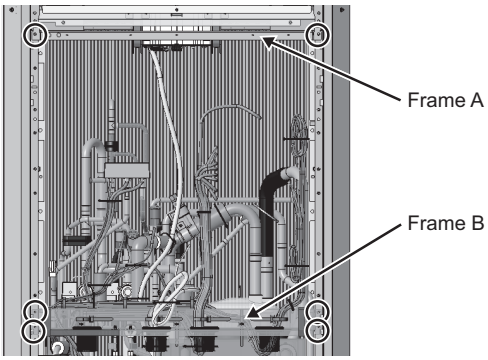


Fig. 4

(5) Remove the top panel except the front panel. (Four screws on the left and right each, and five screws on the rear: Fig. 5)

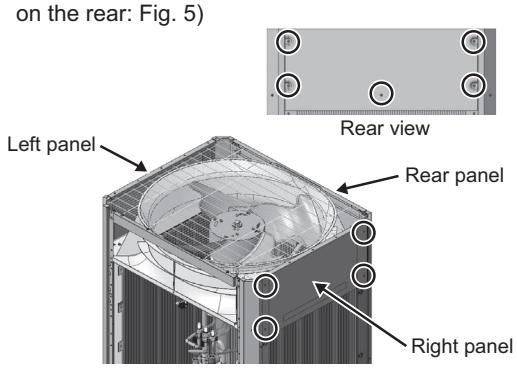


Fig. 5

(6) Remove the fan guard and the upper frames. (Four screws: Fig. 6)

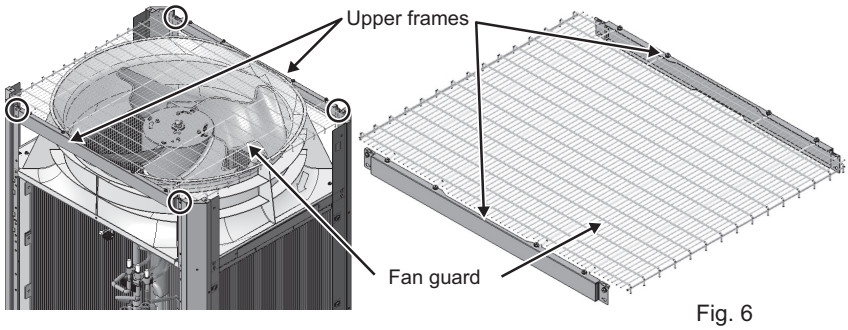


Fig. 6

(7) Remove the fan. (One nut: Fig. 7)

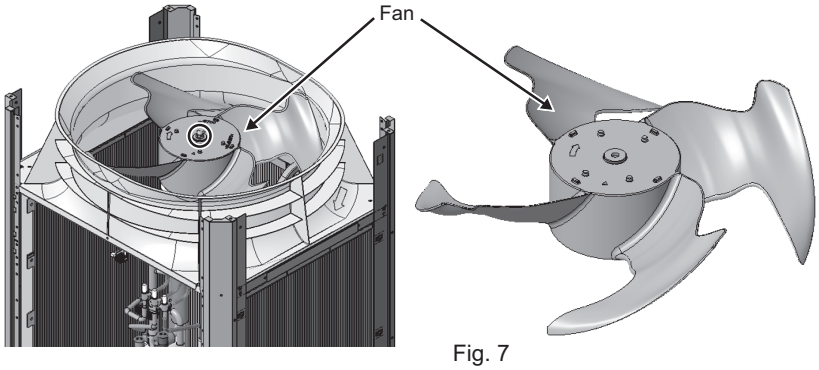


Fig. 7

(8) Remove the bell mouth. (Four screws: Fig. 8)

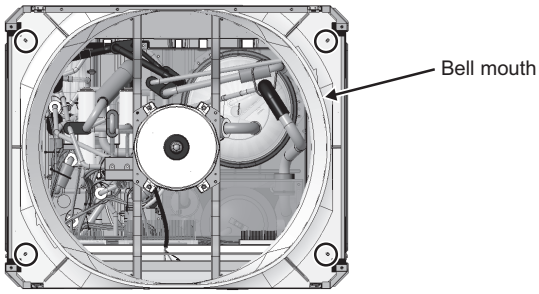


Fig. 8

(9) Remove the motor. (Eight screws: Fig. 9)

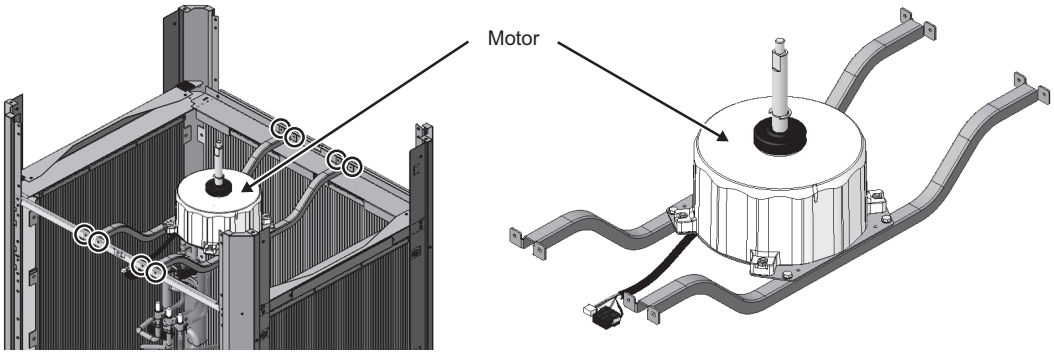


Fig. 9

(10) Remove each frame on the top of the unit.
At this time, remove the screws from all frames before removing the frames.
(Two screws on each of the front, rear, left, and right: Fig. 10)

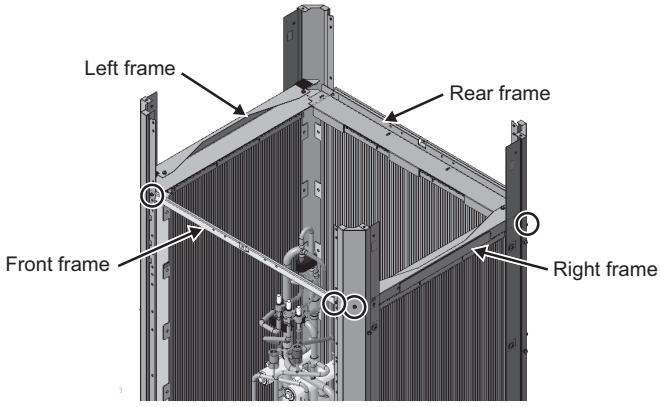


Fig. 10

(11) If the unit comes with fin guards, remove them.
(Eight screws on the left and right each: Fig. 11)

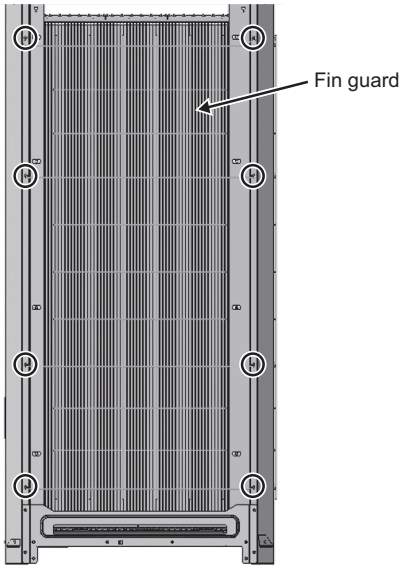


Fig. 11

That's all for removing the various parts.

1-2. When performing services from the front of the unit

(1) When removing the heat exchanger, use the recommended wet felt to avoid burning the aluminum heat exchanger and pipe cover, etc.
Remove the brazed part. (Six areas to braze: Fig. 12, Fig. 13, and Fig. 14)
*It is no problem to cut the piping of the heat exchanger to be replaced and remove the brazing.

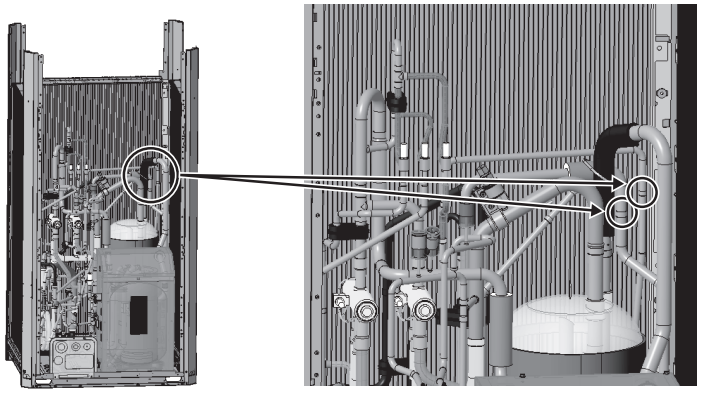


Fig. 12 Brazing point of the right heat exchanger piping

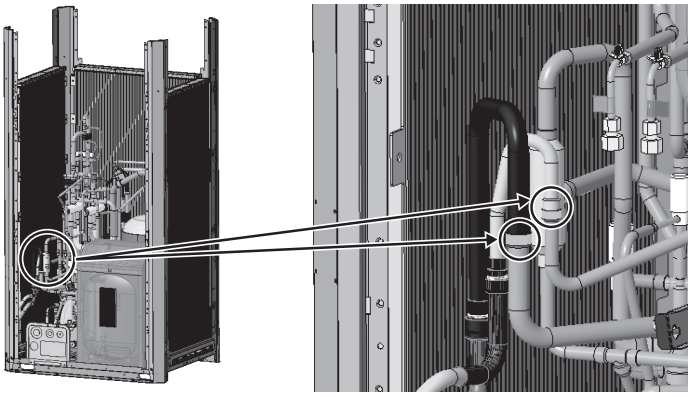


Fig. 13 Brazing point of the left heat exchanger piping

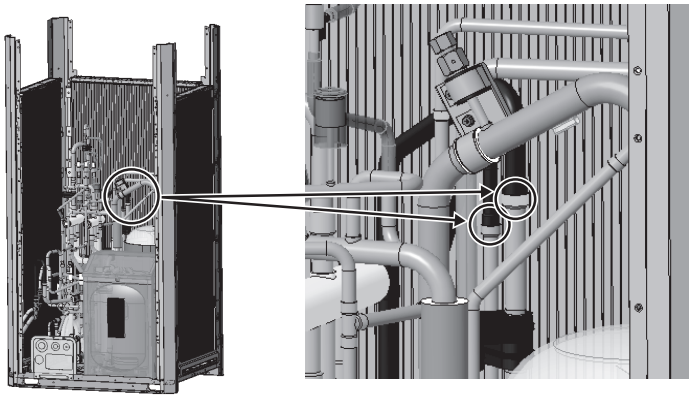


Fig. 14 Brazing point of the rear heat exchanger piping

(2) Remove the right pillar on the front side and the screws that hold the heat exchanger. (Four screws: Fig. 16)
*The left and right sides are symmetrical, so please handle the left pillar in the same way.

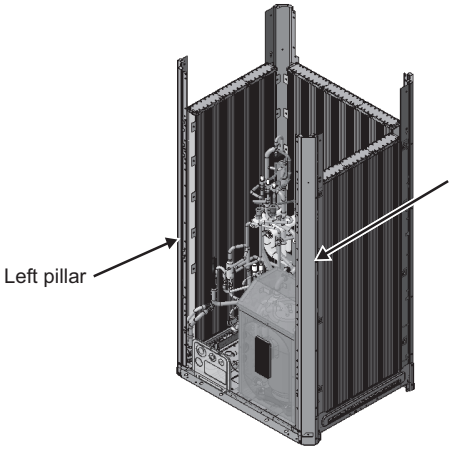


Fig. 15

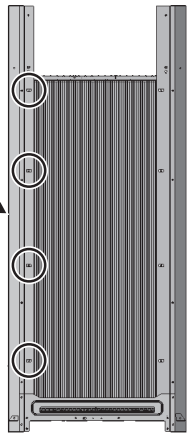


Fig. 16 Right

(3) Remove the screws that secure the right pillar on the front side and remove the pillar. (Six screws: Fig. 17)
*The left and right sides are symmetrical, so please handle the left pillar in the same way.

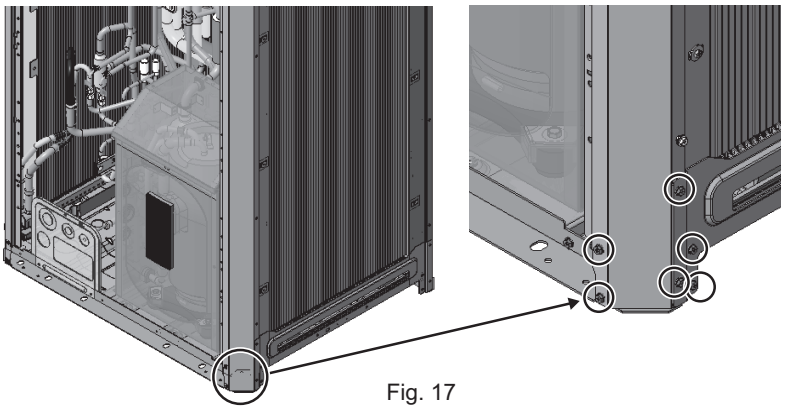


Fig. 17

(4) Access through the front space and remove the screws that secure the right heat exchanger and rear pillars. (Four screws: Fig. 19)
*Be careful not to hit the piping when moving the heat exchanger. The left and right sides are symmetrical, so please handle the left pillar in the same way.
When holding the heat exchanger, hold the side plates (sheet metal) on both sides. (Fig. 20)

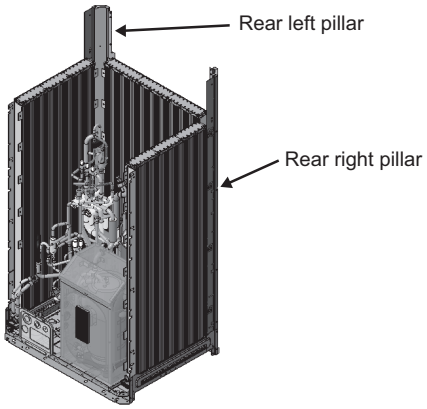


Fig. 18

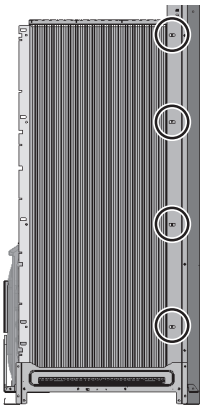


Fig. 19 Right

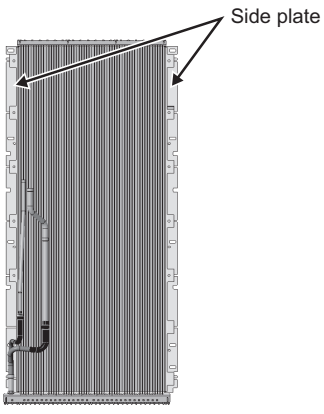


Fig. 20

(5) Remove the rear heat exchanger and the screws that hold the pillars, and remove the heat exchanger.
(Eight screws: Fig. 22)

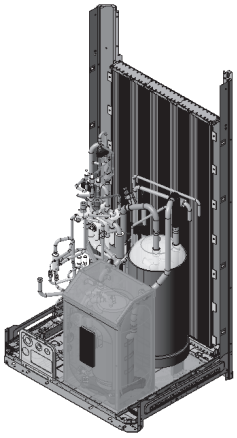


Fig. 21

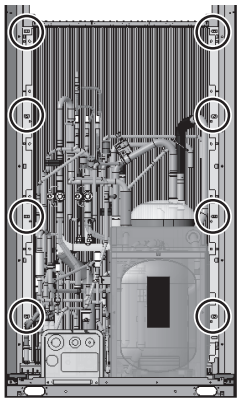


Fig. 22

1-3. When servicing from the rear of the unit, only the rear heat exchanger can be replaced.
(1) Remove the brazing from the piping. (Two areas to remove brazing: Fig. 23)

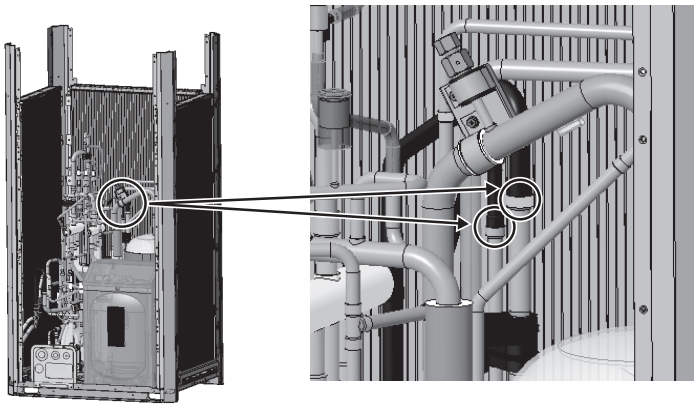


Fig. 23 Brazing point of the rear heat exchanger piping

(2) Remove the rear guard. (Two screws: Fig. 25)

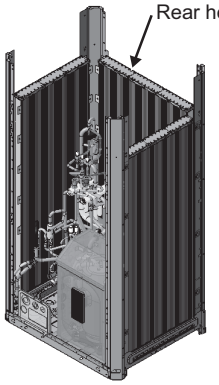


Fig. 24

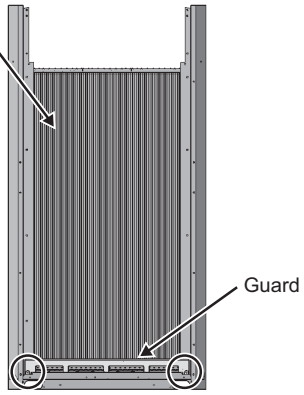


Fig. 25 Rear

(3) Remove the screws that secure the rear and right pillars. (10 screws: Fig. 26 and Fig. 27)
*Be careful not to hit the piping when moving the heat exchanger.
The left and right sides are symmetrical, so please handle the left pillar in the same way.

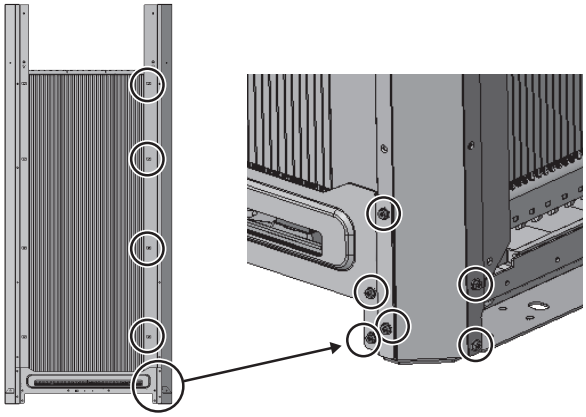


Fig. 26 Right

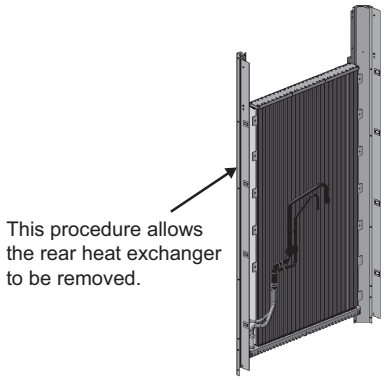


Fig. 27 Rear heat exchanger unit drawing

·When replacing the heat exchanger, use threadlocker-coated screws (service parts). The orange thread-locking agent is applied to the tip of the screw. (Fig. 28)
*Do not reuse the removed screws.
·The tightening torque of the screws when installing the heat exchanger should be 2.7±0.1 N-m.

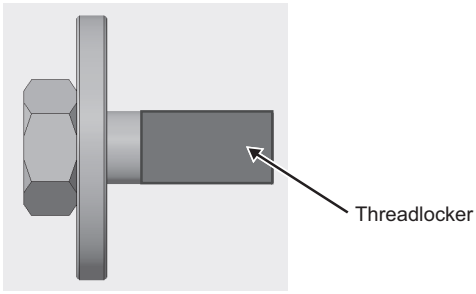


Fig. 28 Threadlocker application range

·After replacing all the heat exchangers, return the parts removed in each process to their original condition.
·In addition, the screw fixing part between the heat exchanger and each pillar is made to have a long hole in consideration of variation.
If it is difficult to fit the fixing holes, installing the upper frame first will make it easier to fix since the pillars are arranged vertically.

Cautions for replacing refrigerant circuit components (heat exchanger)
- Ensure a non-oxidizing brazing is performed.
- When heating the piping, wrap a wet towel around the refrigerant circuit components to keep their temperature below 120°C [248°F].
- After brazing, check the area around the brazing joint for any leaks before performing vacuum drying.
- Beware of the flame direction during brazing, as it may burn the wiring or sheet metal parts inside the unit.
- To protect the heat exchanger, unit piping, and pipe covers from the flame during brazing, place a wet felt around the brazed area. Use the felt recommended below or equivalent.
  Recommended felt: TRUSCO NAKAYAMA Spatter Felt 50CF-11 (5t × 1 m × 1 m)
  Flame retardant testing method for spark droplets from welding and gas cutting on fabric sheets in construction works (JIS A 1323) Type A approved

2. For the L-module

[Precautions]
·Do not touch fin surfaces of the heat exchanger and the sharp edges of components.
·Operate with protective equipment.
·Two persons shall operate when carrying the heat exchanger.
·When brazing piping, be careful not to burn the wiring and sheet metal in the unit.
·Use a wet towel to moisten the rubber tube near the brazing area before brazing.
·When connecting piping, be sure to perform non-oxidation brazing with nitrogen substitution.
Do not use commercially available antioxidants as they may cause pipe corrosion and degradation of the refrigeration oil. Otherwise, the compressor may be damaged.
·Heat exchanger is provided with cushioning material so that the aluminum pipe does not come into contact with the ground, and a clearance is secured between the aluminum pipe and the ground when it is placed on the ground.
·When holding the heat exchanger, do not use gloves that have touched corrosive components (copper, iron, sulfur, etc.)so that the aluminum pipes do not corrode.

[Warning]
Refrigerant, when coming into direct contact with flame, can produce poisonous gases, so perform work in a well-ventilated place where the refrigerant does not stagnate.

2-1. Advance preparation for service heat exchanger replacement operation.
Remove various parts before removing the heat exchanger.
(1) Remove the panels from the unit. (31 screws: Fig. 29)

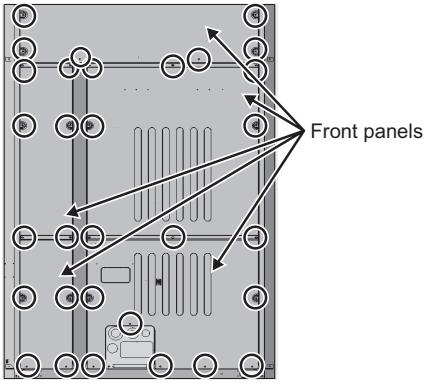


Fig. 29

(2) Remove the control box cover and remove the wiring connected to the unit from the control box. (Six screws: Fig. 30)

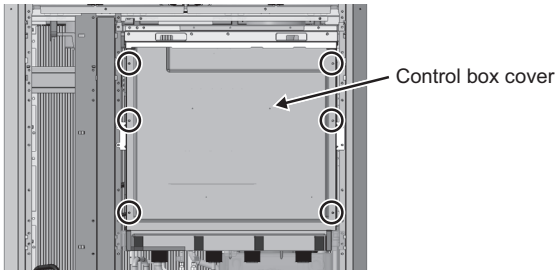


Fig. 30

(3) Remove the control box. (Nine screws: Fig. 31)

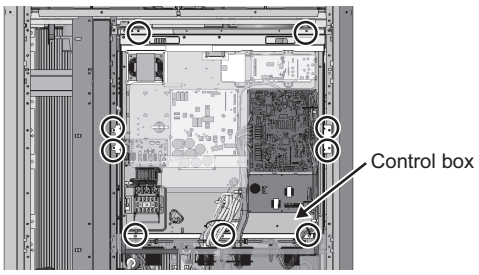


Fig. 31

(4) Remove the wires that are secured to frame B and remove frames A and B. (Six screws: Fig. 32)

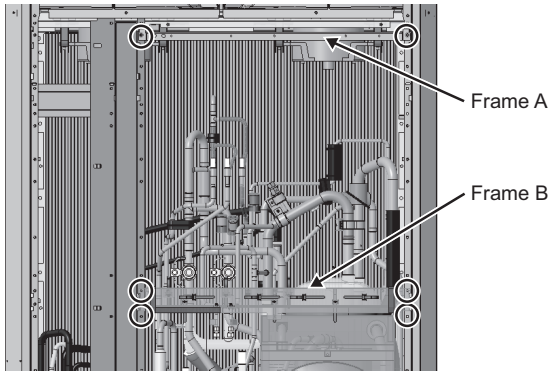


Fig. 32

(5) Remove the top panel except the front panel. (Four screws on the left and right each, and six screws on the rear: Fig. 33)



Rear view

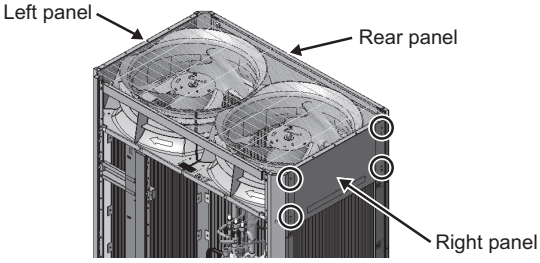


Fig. 33

(6) Remove the fan guard and the upper frames. (Four screws: Fig. 34)

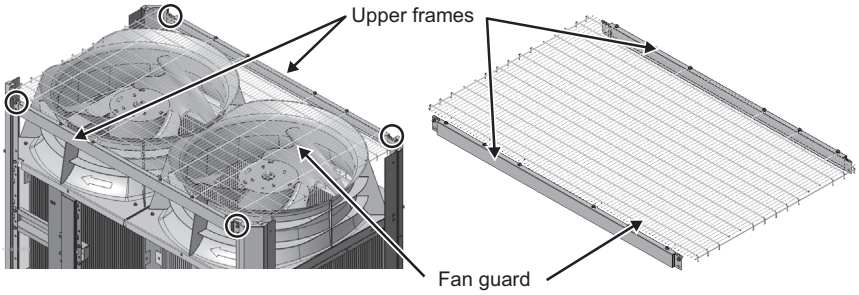


Fig. 34

(7) Remove the fan. (Two nuts: Fig. 35)

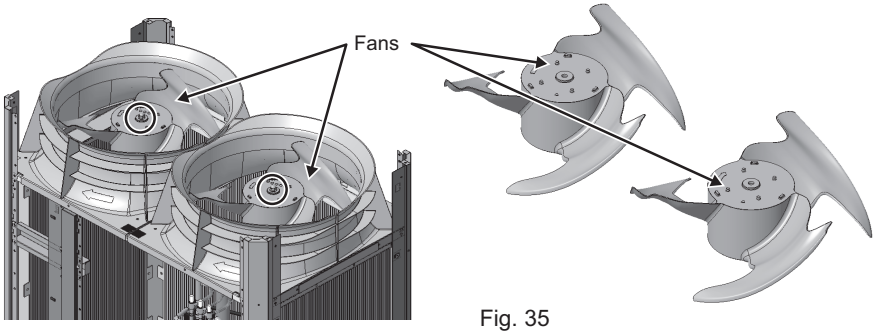


Fig. 35

(8) Remove the bell mouth. (Eight screws: Fig. 36)

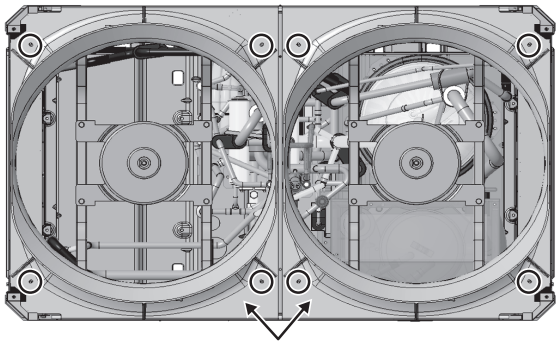


Fig. 36

(9) Remove the motors. (16 screws: Fig. 37)

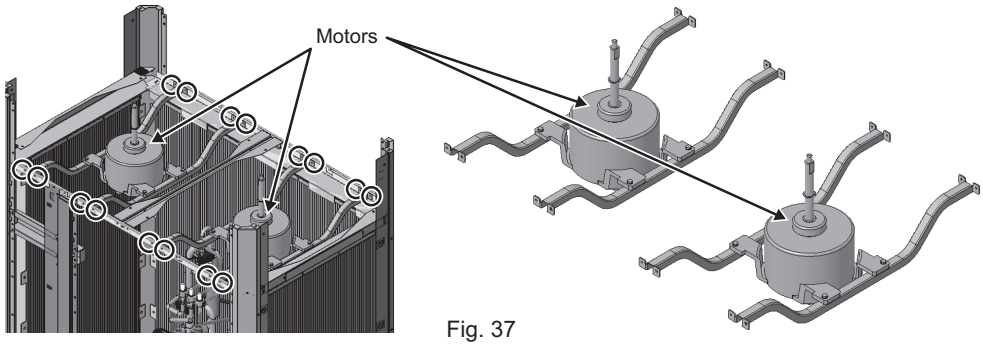


Fig. 37

(10) Remove the center pillar on the front of the unit and the fixing attachment.
(Eight screws on the pillar, and two screws on the attachment: Fig. 38)

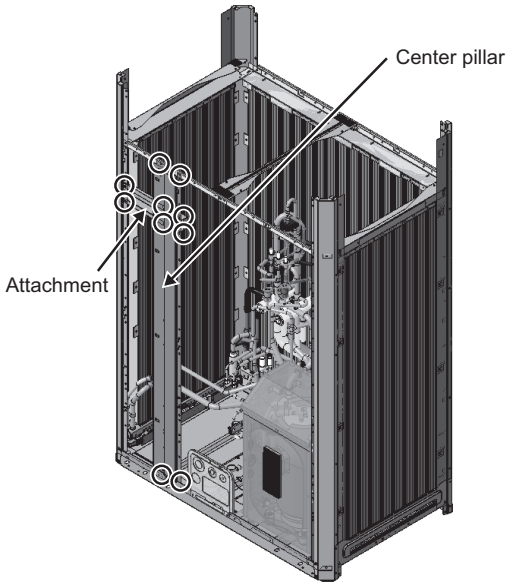


Fig. 38

(11) Remove each frame on the top of the unit.
At this time, remove the screws from all frames before removing the frames.
(Two screws on each of the front, rear, right, and left frames, and six screws on the center frame: Fig. 39)



Rear view

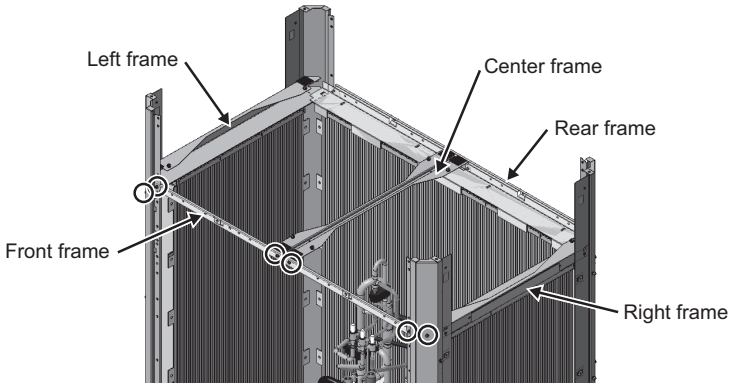


Fig. 39

(12) If the unit comes with fin guards, remove them.
(Eight screws on the left and right: Fig. 40)

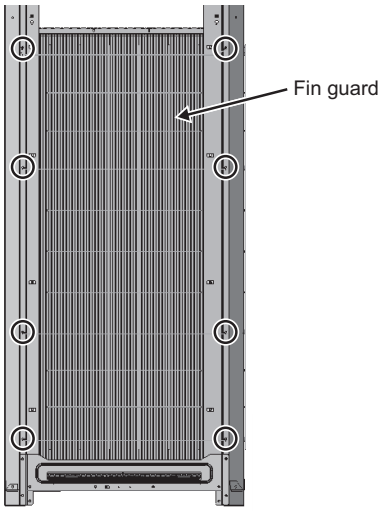


Fig. 40

That's all for removing the various parts.

2-2. When performing services from the front of the unit

(1) When removing the heat exchanger, use the recommended wet felt to avoid burning the aluminum heat exchanger and pipe cover, etc.
Remove the brazed part. (Six areas to remove brazing: Fig. 41, Fig. 42, and Fig. 43)
*It is no problem to cut the piping of the heat exchanger to be replaced and remove the brazing.

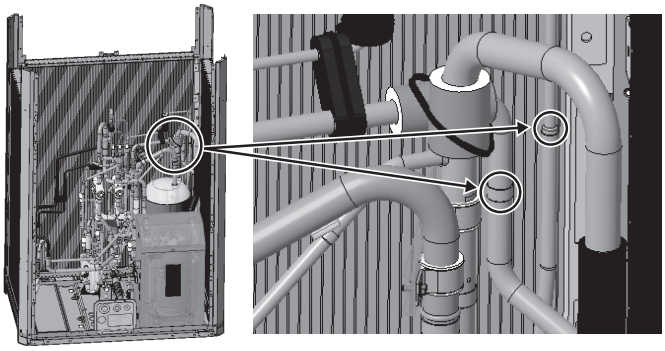


Fig. 41 Brazing point of the right heat exchanger piping

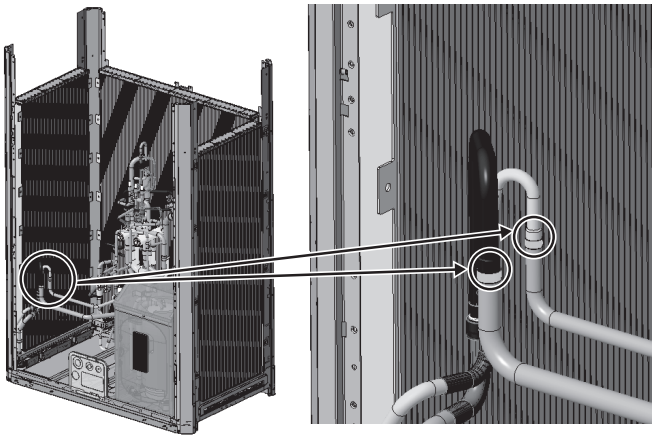


Fig. 42 Brazing point of the left heat exchanger piping

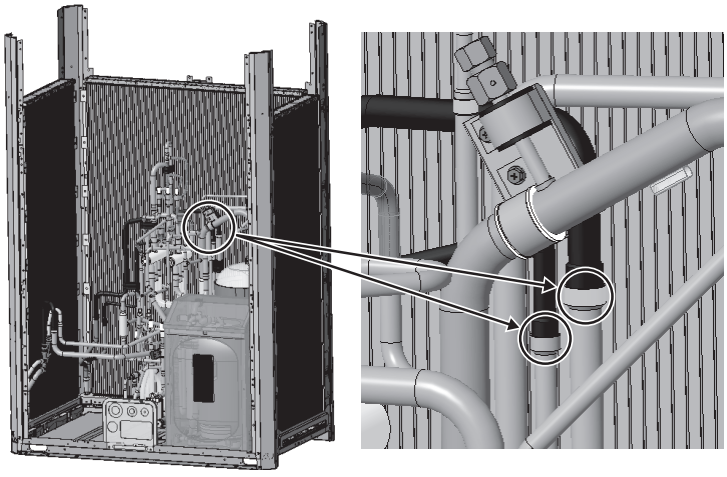


Fig. 43 Brazing point of the rear heat exchanger piping

(2) Remove the right pillar on the front side and the screws that hold the heat exchanger. (Four screws: Fig. 45)
*The left and right sides are symmetrical, so please handle the left pillar in the same way.

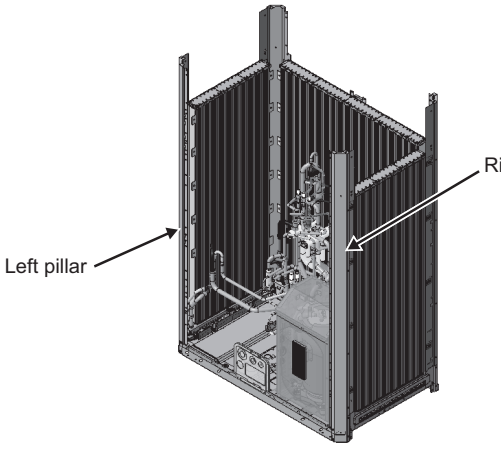


Fig. 44

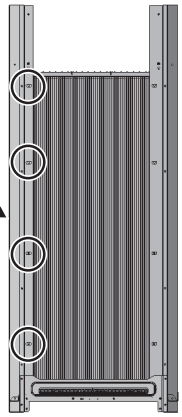


Fig. 45 Right

(3) Remove the screws that secure the right pillar on the front side and remove the pillar. (Six screws: Fig. 46)
*The left and right sides are symmetrical, so please handle the left pillar in the same way.

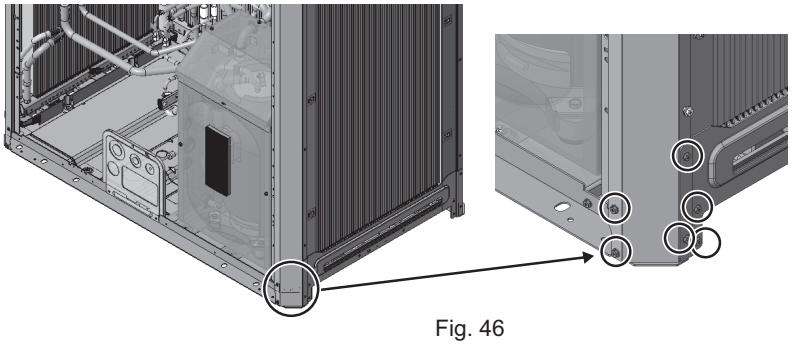


Fig. 46

(4) Access through the front space and remove the screws that secure the right heat exchanger and rear pillars.
(Four screws: Fig. 48)
*Be careful not to hit the piping when moving the heat exchanger. The left and right sides are symmetrical, so please handle the left pillar in the same way.
When holding the heat exchanger, hold the side plates (sheet metal) on both sides. (Fig. 49)

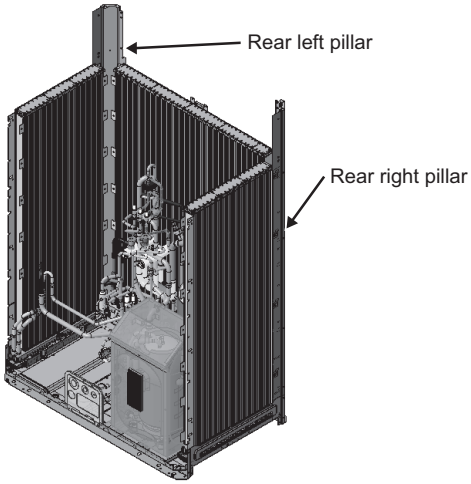


Fig. 47

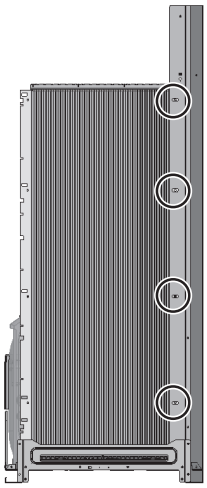


Fig. 48 Right

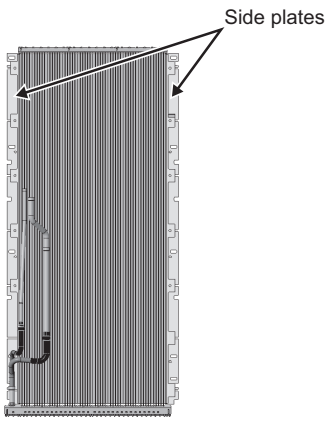


Fig. 49

(5) Remove the rear heat exchanger and the screws that hold the pillars, and remove the heat exchanger.
(Eight screws: Fig. 51)

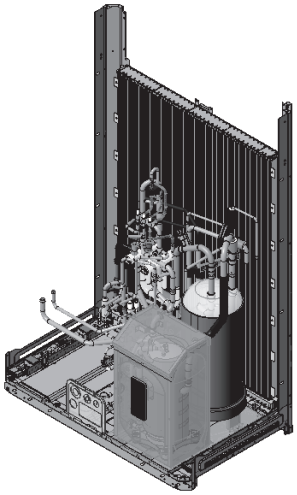


Fig. 50

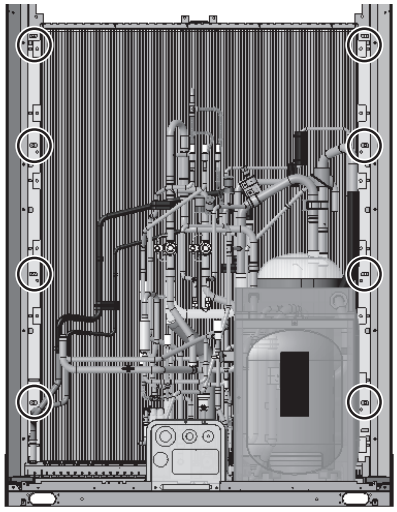


Fig. 51

2-3. When servicing from the rear of the unit, only the rear heat exchanger can be replaced.
(1) Remove the brazing from the piping. (Two areas to remove brazing: Fig. 52)

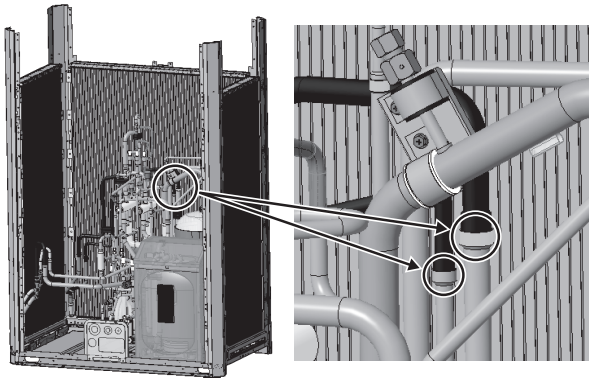


Fig. 52 Brazing point of the rear heat exchanger piping

(2) Remove the rear guard and, if the unit comes with fin guards, remove them.
(Four screws on the guards, and 16 screws on fin guards: Fig. 54)

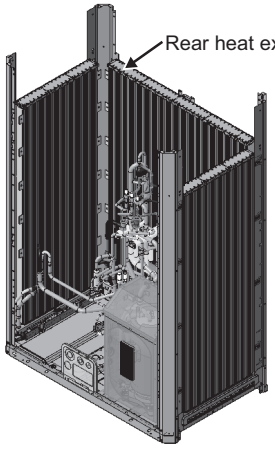


Fig. 53

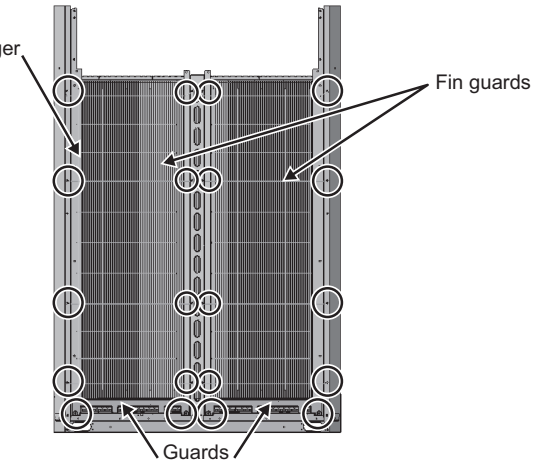


Fig. 54 Rear

(3) Remove the center pillar. (Two screws: Fig. 55)

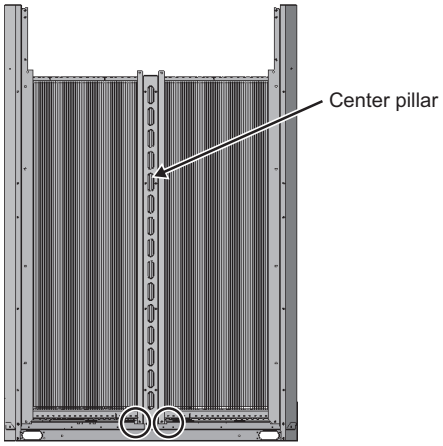


Fig. 55 Rear

(4) Remove the screws that secure the rear and right pillars. (10 screws: Fig. 56 and Fig. 57)
*Be careful not to hit the piping when moving the heat exchanger.
The left and right sides are symmetrical, so please handle the left pillar in the same way.

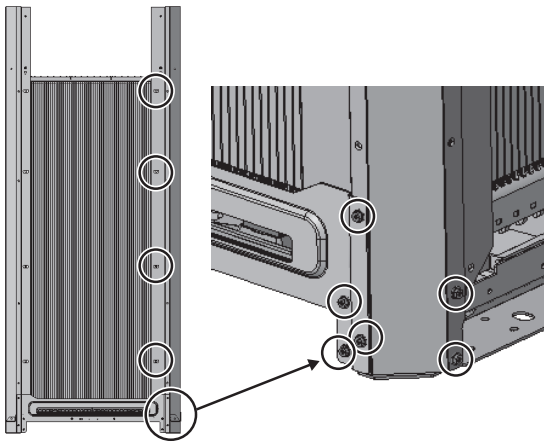


Fig. 56 Right

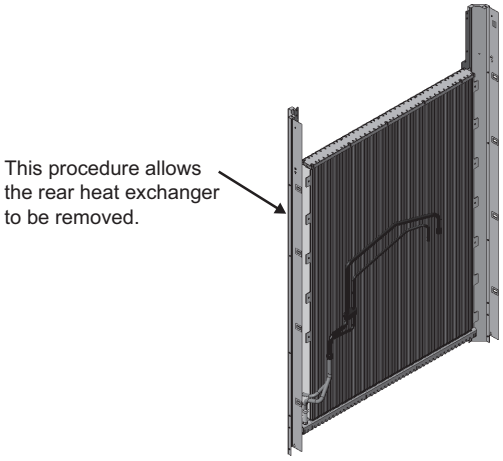


Fig. 57 Rear heat exchanger unit drawing

·When replacing the heat exchanger, use threadlocker-coated screws (service parts). The orange thread-locking agent is applied to the tip of the screw. (Fig. 58)
*Do not reuse the removed screws.
·The tightening torque of the screws when installing the heat exchanger should be 2.7±0.1 N-m.

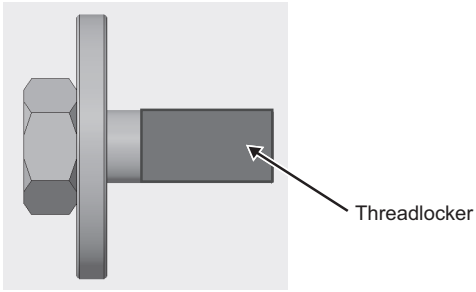


Fig. 58 Threadlocker application range

·After replacing all the heat exchangers, return the parts removed in each process to their original condition.
·In addition, the screw fixing part between the heat exchanger and each pillar is made to have a long hole in consideration of variation.
If it is difficult to fit the fixing holes, installing the upper frame first will make it easier to fix since the pillars are arranged vertically.

Cautions for replacing refrigerant circuit components (heat exchanger)
- Ensure a non-oxidizing brazing is performed.
- When heating the piping, wrap a wet towel around the refrigerant circuit components to keep their temperature below 120°C [248°F].
- After brazing, check the area around the brazing joint for any leaks before performing vacuum drying.
- Beware of the flame direction during brazing, as it may burn the wiring or sheet metal parts inside the unit.
- To protect the heat exchanger, unit piping, and pipe covers from the flame during brazing, place a wet felt around the brazed area. Use the felt recommended below or equivalent.
  Recommended felt: TRUSCO NAKAYAMA Spatter Felt 50CF-11 (5t × 1 m × 1 m)
  Flame retardant testing method for spark droplets from welding and gas cutting on fabric sheets in construction works (JIS A 1323) Type A approved

8-11-7 Transformer box replacement instructions

1. S, L-module (460V models only)

The steps for replacing the transformer box are as follows.
Before replacing the transformer box, ensure a sufficient maintenance space and prepare the refrigerant circuit parts for servicing. For details, refer to Section [8-11-1 Ensuring Maintenance Space (Preparation for the Maintenance of Refrigerant Circuit Parts)]

(1) Remove the band securing the transformer box wiring. (One band: Fig. 1)
(2) Remove the screws from the transformer box. (Four screws: Fig. 1)

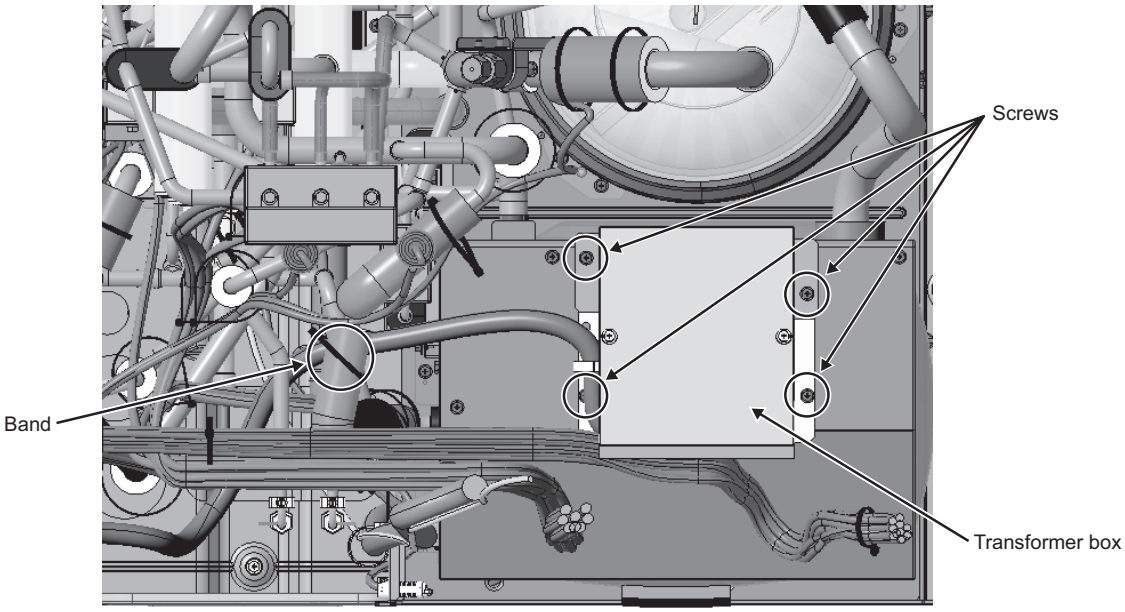


Fig. 1

(3) Remove the transformer box.
(4) The replacement of the transformer box is completed here.
Install the components that were removed in each step back into their original positions.

8-12 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. [8-9-2 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

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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.
Use the USB port only for the following 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 and stored 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.

- Operation data in the multiple-outdoor-unit system will be saved on the OC unit.
- Attempting to collect the operation data from the OS unit will result in an error.

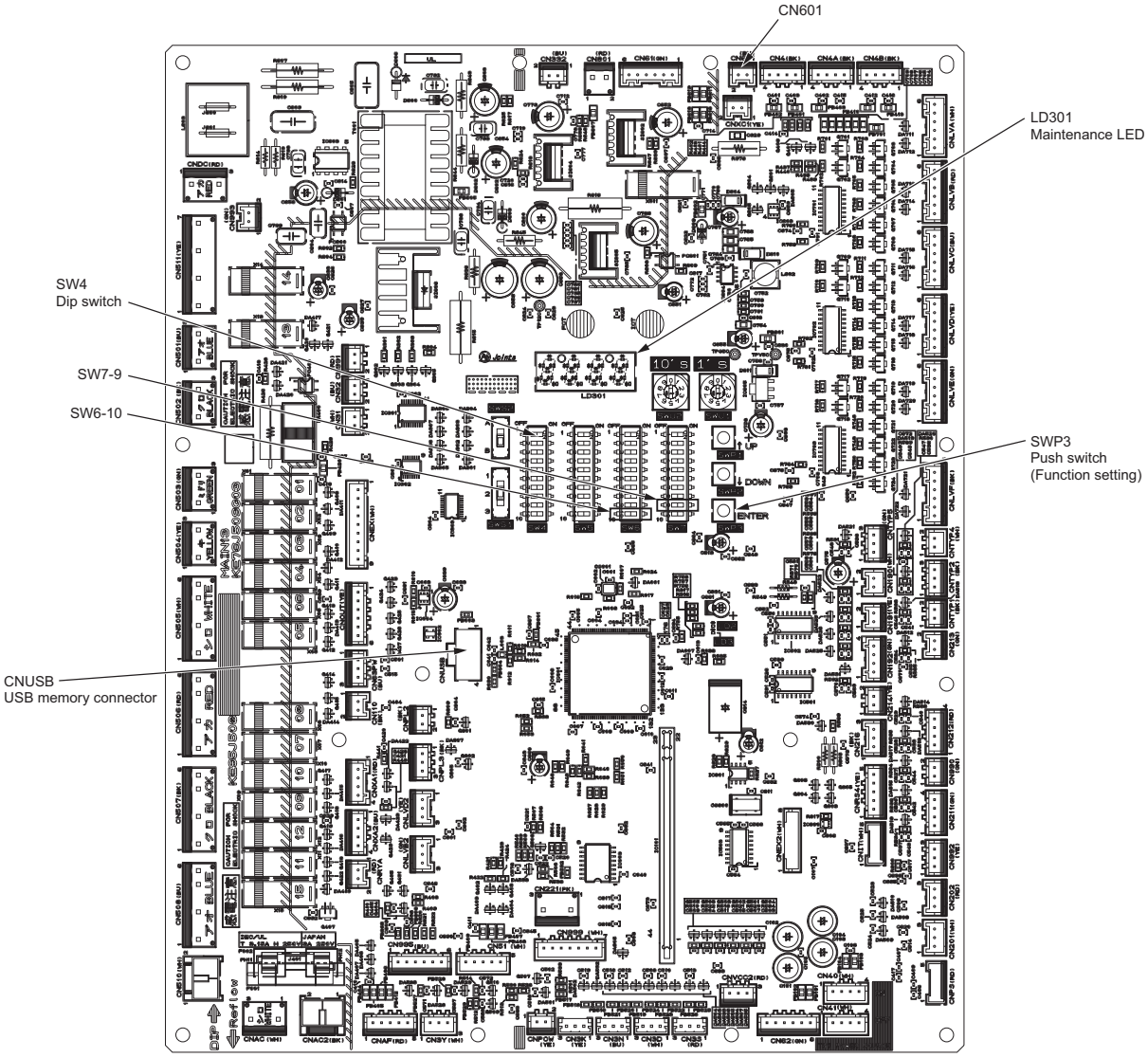
2. Software rewrite function

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)
- Supports the low current mode
  A battery charger not compatible with the low current mode may turn off while the data are being collected or while the S/W is being re-written, and these actions may not be completed successfully.

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 can also 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 named "MNTXXX.MT." XXX represents a serial number from 000 to 100. Since files named "MNT101.MT" 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. Wait for five seconds until the USB memory stick is recognized.
- 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.
- [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.

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	0011100000	Data being collected	-	-	Anytime after power-on	OC setting necessary
ON	NO.817	1000110011	Data collection enabled	Enabled	Disabled	Anytime after power-on	OC setting necessary
ON	NO.818	0100110011	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 TE-C400/TW-C50 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 shown below.

1. Operation procedure

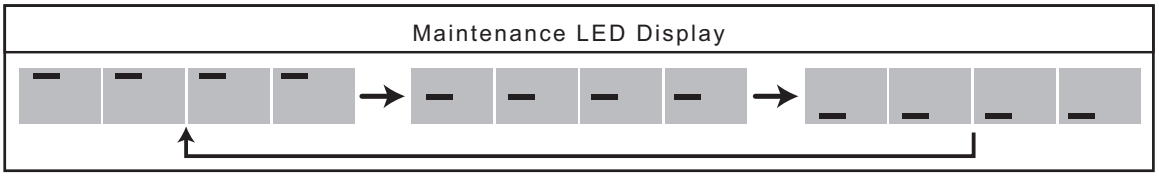
(1) Starting software rewrite mode

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. Wait for five seconds until the USB memory stick is recognized.
4) Connect the portable battery charger to the XA connector (CN601) for the PCB.
   The power of the control board will turn on.
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.
- Use a portable charger that supports the low current mode.
- 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 the switch 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.
- A battery charger not compatible with the low current mode may turn off while the data are being collected or while the S/W is being re-written, and these actions may not be completed successfully.

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” 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 to 99 is displayed. Status of the data storage to the USB memory stick is shown by the progress rate.
3		Storage completed		“END” The storage process has been completed successfully.
4		Error (USB memory side)		“Er01” The storage process cannot be started due to failure of the USB memory stick. See Section [9-4-2 Troubleshooting]1- (3).
				“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” 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” 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” Collection of operation data is suspended.
8		Flash memory error		“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” 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).

- Collect data from both OC and OS from multiple-outdoor unit systems.
  System operation data are stored on OC, and compressor operation time of OS and switch settings are stored on OS.
- When importing the OS data to the Maintenance Tool, an import error may appear. This error indicates that no data are available for import and does not indicate equipment failure.

3. Rewriting software

No.	Switch	Meaning	Maintenance LED Display	Description
10	SW7-9: ON	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		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 four items 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 TE-C400/TW-C50 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 (Outdoor unit)

(1) Maintenance LED does not display "Pro."

(Meaning or Cause)

The system is not started in Software Rewrite Mode.
Switches SW7-9 (Outdoor unit) on the control board may not be in the ON position, or the portable charger may not be charged sufficiently.
The power-supply units (Outdoor unit/transmission booster) may not be turned off.

(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.

Check that the power-supply units (Outdoor units/transmission booster) are turned off.

(2) Pressing the switch SWP3 for rewriting software 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 (Outdoor unit) 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 control board 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 five items above, the USB memory stick may be broken. Replace it with a new one. After the check is completed, 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.

(7) Service monitor LED lights off while the S/W is being re-written, and the process cannot be completed.

(Meaning or Cause)

The re-writing process may not have been completed due to a power-supply interruption from the battery charger.

(Solution)

- Make sure the battery charger is compatible with the low-current mode.
- If a battery charger that is compatible with the low-current mode is not available, re-write the S/W using a ROM writer.

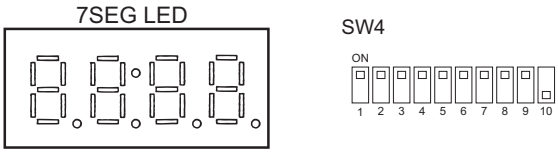
Chapter 10 LED Status Indicators

10-1 LED Status Indicators (Outdoor unit) 1
10-1-1 How to Read the LED 1
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10-1-3 Clock Memory Function 3
10-2 LED Status Indicators Table 4

10-1 LED Status Indicators (Outdoor unit)

10-1-1 How to Read the LED

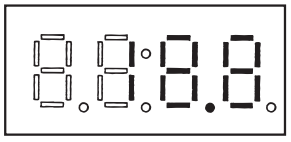
By setting the DIP SW 4-1 through 4-10 and SW6-9 (Set SW6-10 to OFF.)(Switch number 10 is represented by 0), the operating condition of the unit can be monitored on the service monitor. (Refer to the table on the following pages for DIP SW settings.)
The service monitor uses 4-digit 7-segment LED to display numerical values and other types of information.



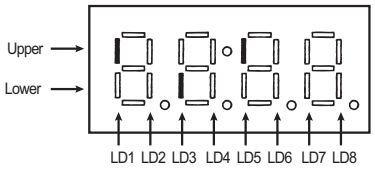
♦In the example above, 1 through 9 are set to ON, and 10 is set to OFF.

Pressure and temperature are examples of numerical values, and operating conditions and the on-off status of solenoid valve are examples of flag display.

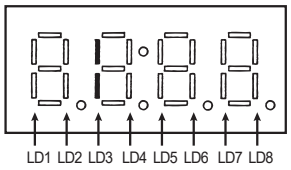
1) Display of numerical values
   Example: When the pressure data sensor reads 18.8kg/cm^2 (Item No. 58)
   ♦The unit of pressure is in kg/cm^2
   ♦ Use the following conversion formula to convert the displayed value into a value in SI unit.
   Value in SI unit (MPa) = Displayed value (kg/cm^2) x 0.098



2) Flag display
   Example: When 21S4a, 21S4b, SV1a are ON. (Item No. 3)

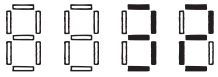
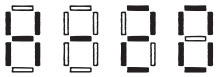
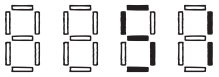


   Example: 3-minutes restart mode (Item No. 14)



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	HP	Model
8	72	32	312
10	96	34	336
12	120	36	360
14	-	38	-
16	144	40	384
18	168	42	-
20	192	44	-
22	216	46	-
24	240	48	-
26	-	50	-
28	264	52	-
30	288	54	-

10-1-3 Clock Memory Function

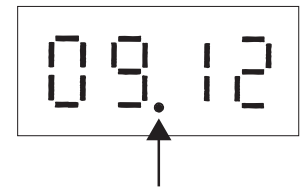
The outdoor unit has a simple clock function that enables the unit to calculate the current time with an internal timer by receiving the time set by the system controller, such as TE-C400.
If an error (including a preliminary error) occurs, the error history data and the error detection time are stored 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 TE-C400 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 TE-C400, 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.)

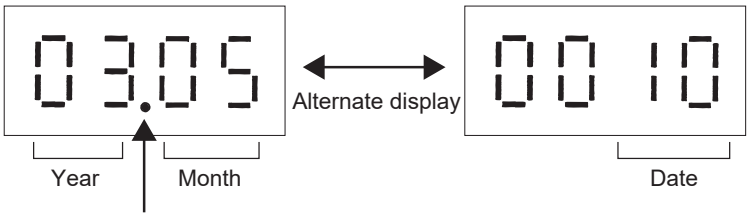
(1) Reading the time data:

1) Time display
   Example: 12 past 9



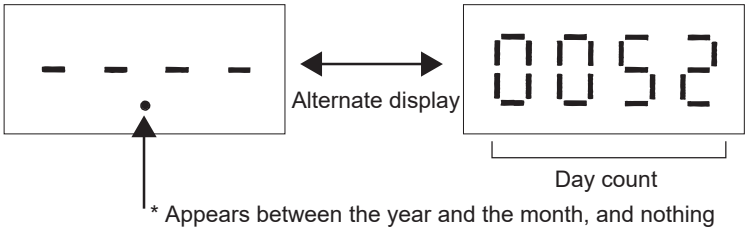
* Disappears if the time data is deviated due to a power failure, or if a system controller that sets the time is not connected.

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 Table

Current data

No.	SW4 (SW6 - 9: OFF, SW6-10: OFF)	Item		Display								Unit (A, B) *1		Remarks
	1234567890			LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
0	0000000000	Relay output display 1 Lighting		Comp in operation			System response setting enabled	72C		OC	CPU in operation	A	A	
		Check (error) display 1 OC/OS error		0000 to 9999 (Address and error codes highlighted)								B	B	
1	1000000000	Check (error) display 2 OC/OS error		0000 to 9999 (Address and error codes highlighted)								A	A	Display of the latest preliminary error If no preliminary errors are detected, "----" appears on the display.
2	0100000000	Check (error) display 3 (Including IC and BC)		0000 to 9999 (Address and error codes highlighted)								B		If no errors are detected, "----" appears on the display.
3	1100000000	Relay output display 2	Top	21S4a		CH11	SV12	SV1a		SV2		A	A	
			Bottom			21S4b								
4	0010000000	Relay output display 3	Top								Supply power	A	A	
			Bottom						SV13	SV16				
5	1010000000	Relay output display 4	Top	Optional 200 V output								A	A	
			Bottom											
7	1110000000	Special control		Retry operation	Emergency operation					Communication error between the OC and OS	Communication error 3-minute restart delay mode	B	B	
9	1001000000	Communication demand capacity		0000 to 9999								B	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	A	
12	0011000000	External signal (Open input contact point)									Low-noise mode (Quiet priority)	A	A	
13	1011000000	External signal										A	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	A	
15	1111000000	OC/OS identification		OC/OS-1/OS-2								A	A	

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Current data

No.	SW4 (SW6 - 9: OFF, SW6-10: OFF)	Item		Display								Unit (A, B) *1		Remarks
	1234567890			LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
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	A	
43	1101010000			Warm-up mode	Refrigerant recovery							A	A	
45	1011010000	TH4		-99.9 to 999.9								A	A	The unit is [°C]
46	0111010000	TH3		-99.9 to 999.9								A	A	
47	1111010000	TH7		-99.9 to 999.9								A	A	
48	0000110000	TH6		-99.9 to 999.9								A	A	
49	1000110000	TH2		-99.9 to 999.9								A	A	
50	0100110000	TH5		-99.9 to 999.9								A	A	
56	0001110000	THHS1		-99.9 to 999.9								A	A	The unit is [°C]
58	0101110000	High-pressure sensor data		-99.9 to 999.9								A	A	The unit is [kgf/cm^2]
59	1101110000	Low-pressure sensor data		-99.9 to 999.9								A	A	
62	0111110000	TH15		-99.9 to 999.9								A	A	The unit is [°C]
78	0111001000	∑ Qj		0000 to 9999								B	B	

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.



10 LED Status Indicators

10 LED Status Indicators

Current data

No.	SW4 (SW6 - 9: OFF, SW6-10: OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
79	1111001000	∑ Qjc	0000 to 9999								B	B	
80	0000101000	∑ Qjh	0000 to 9999								B	B	
81	1000101000	Target Tc	-99.9 to 999.9								B		The unit is [°C]
82	0100101000	Target Te	-99.9 to 999.9								B		
83	1100101000	Tc	-99.9 to 999.9								A	A	
84	0010101000	Te	-99.9 to 999.9								A	A	
86	0110101000	Total frequencies (OC+OS)	0000 to 9999								B		Control data [Hz]
87	1110101000	Total frequency of each unit	0000 to 9999								A	A	
88	0001101000	COMP frequency	0000 to 9999								A	A	
89	1001101000	THHS(FAN1)	-99.9 to 999.9								A	A	
90	0101101000	THHS(FAN2)	-99.9 to 999.9								A	A	
91	1101101000	COMP operating frequency	0000 to 9999								A	A	The unit is [rps] Output frequency of the inverter depends on the type of compressor and equals the integer multiples (x1, x2 etc.) of the operating frequency of the compressor
92	0011101000	Number of times error occurred during IH crankcase heating by compressor motor	0000 to 9999								A	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	A	
95	1111101000	FAN1	0000 to 9999								A	A	Fan output [%]
96	0000011000	Fan inverter output rpm (FAN1)	0000 to 9999								A	A	[rpm]
97	1000011000	FAN2	0000 to 9999								A	A	Fan output [%]
98	0100011000	Fan inverter output rpm (FAN2)	0000 to 9999								A	A	[rpm]
103	1110011000	LEV1	0000 to 9999								A	A	Outdoor LEV opening (Fully open: 480)
104	0001011000	LEV2a	0000 to 9999								A	A	Outdoor LEV opening (Fully open: 3000)
105	1001011000	LEV4	0000 to 9999								A	A	
108	0011011000	COMP operating current (DC)	00.0 to 999.9								A	A	Peak value [A]
109	1011011000	LEV2b	0000 to 9999								A	A	Outdoor LEV opening (Fully open: 3000)
111	1111011000	COMP bus voltage	00.0 to 999.9								A	A	The unit is [V]
116	0010111000	Number of times the unit went into the mode to remedy wet vapor suction	0000 to 9999								B		
117	1010111000	COMP Operation time Upper 4 digits	0000 to 9999								A	A	The unit is [h]
118	0110111000	COMP Operation time Lower 4 digits	0000 to 9999								A	A	
121	1001111000	Backup mode	Abnormal pressure rise	High-pressure drop	Low-pressure drop	Abnormal Td rise					A	A	Stays lit for 90 seconds after the completion of backup control

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Current data

No.	SW4 (SW6 - 9: OFF, SW6-10: OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
123	1101111000	COMP number of start-stop events Upper 4 digits	0000 to 9999								A	A	Count-up at start-up The unit is [Time]
124	0011111000	COMP number of start-stop events Lower 4 digits	0000 to 9999								A	A	
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	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 history 1: detail codes	Error history 1: detail codes (0001 to 0120)								A	A	
180	0010110100	Error history 2	0000 to 9999								B	B	
181	1010110100	Error history 2: detail codes	Error history 2: detail codes (0001 to 0120)								A	A	
182	0110110100	Error history 3	0000 to 9999								B	B	
183	1110110100	Error history 3: detail codes	Error history 3: detail codes (0001 to 0120)								A	A	
184	0001110100	Error history 4	0000 to 9999								B	B	
185	1001110100	Error history 4: detail codes	Error history 4: detail codes (0001 to 0120)								A	A	
186	0101110100	Error history 5	0000 to 9999								B	B	
187	1101110100	Error history 5: detail codes	Error history 5: detail codes (0001 to 0120)								A	A	
188	0011110100	Error history 6	0000 to 9999								B	B	
189	1011110100	Error history 6: detail codes	Error history 6: detail codes (0001 to 0120)								A	A	
190	0111110100	Error history 7	0000 to 9999								B	B	
191	1111110100	Error history 7: detail codes	Error history 7: detail codes (0001 to 0120)								A	A	
192	0000001100	Error history 8	0000 to 9999								B	B	
193	1000001100	Error history 8: detail codes	Error history 8: detail codes (0001 to 0120)								A	A	
194	0100001100	Error history 9	0000 to 9999								B	B	
195	1100001100	Error history 9: detail codes	Error history 9: detail codes (0001 to 0120)								A	A	
196	0010001100	Error history 10	0000 to 9999								B	B	
197	1010001100	Error history 10: detail codes	Error history 10: detail codes (0001 to 0120)								A	A	
198	0110001100	Error history of inverter (At the time of last data back-up before error)	0000 to 9999								B	B	
199	1110001100	Error history (data saved before error): detail codes	Error history (data saved before error): detail codes (0001 to 0120)								A	A	

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10 LED Status Indicators

Error history

No.	SW4 (SW6 - 9: OFF, SW6-10: OFF)	Item		Display								Unit (A, B) *1		Remarks
	1234567890			LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
201	1001001100	Outdoor unit operation status			Warm-up mode	3-minutes restart mode	Compressor in operation	Preliminary error	Error	3-minutes restart after instanta-neous power fail-ure	Preliminary low pressure error	A	A	
202	0101001100	OC/OS identification		OC/OS-1								A	A	
205	1011001100	Outdoor unit Operation mode		Permissible stop	Standby	Cooling		Heating				A	A	
208	0000101100	Outdoor unit control mode		Stop	Thermo OFF	Abnormal stop	Scheduled con-trol	Initial start up	Defrost	Oil balance	Low frequency oil recovery	A	A	
209	1000101100	Outdoor unit control mode			Refrigerant re-covery							A	A	
211	1100101100	Relay output display 1 Lighting		COMP in opera-tion				72C		OC	Always lit	A	A	
212	0010101100	Relay output display 2 Lighting	Top	21S4a		CH11	SV12	SV1a		SV2		A	A	
			Bottom			21S4b								
213	1010101100	Relay output display 3 Lighting	Top								Supply power	A	A	
			Bottom						SV13	SV16				
214	0110101100	Relay output display 4	Top	Optional 200 V output								A	A	
			Bottom											
216	0001101100	TH4		-99.9 to 999.9								A	A	The unit is [°C]
217	1001101100	TH3		-99.9 to 999.9								A	A	
218	0101101100	TH7		-99.9 to 999.9								A	A	
219	1101101100	TH6		-99.9 to 999.9								A	A	
220	0011101100	TH2		-99.9 to 999.9								A	A	
221	1011101100	TH5		-99.9 to 999.9								A	A	
227	1100011100	THHS1		-99.9 to 999.9								A	A	The unit is [°C]
229	1010011100	High-pressure sensor data		-99.9 to 999.9								A	A	The unit is [kgf/cm^2]
230	0110011100	Low-pressure sensor data		-99.9 to 999.9								A	A	
233	1001011100	TH15		-99.9 to 999.9								A	A	The unit is [°C]
249	1001111100	∑ Qj		0000 to 9999								B	B	
250	0101111100	∑ Qjc		0000 to 9999								B	B	
251	1101111100	∑ Qjh		0000 to 9999								B	B	
252	0011111100	Target Tc		-99.9 to 999.9								B		The unit is [°C]
253	1011111100	Target Te		-99.9 to 999.9								B		
254	0111111100	Tc		-99.9 to 999.9								A	A	The unit is [°C]
255	1111111100	Te		-99.9 to 999.9								A	A	
257	1000000010	Total frequencies (OC+OS)		0000 to 9999								B		Control data [Hz]
258	0100000010	Total frequency of each unit		0000 to 9999								A	A	
259	1100000010	COMP frequency		0000 to 9999								A	A	
260	0010000010	THHS(FAN1)		-99.9 to 999.9								A	A	
261	1010000010	THHS(FAN2)		-99.9 to 999.9								A	A	
262	0110000010	COMP operating frequency		0000 to 9999								A	A	The unit is [rps]
264	0001000010	All AK (OC+OS)		0000 to 9999								B		

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Error history

No.	SW4 (SW6 - 9: OFF, SW6-10: OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
265	1001000010	AK	0000 to 9999								A	A	
266	0101000010	FAN1	0000 to 9999								A	A	Fan inverter output [%]
267	1101000010	Fan inverter output rpm (FAN1)	0000 to 9999								A	A	[rpm]
268	0011000010	FAN2	0000 to 9999								A	A	Fan inverter output [%]
269	1011000010	Fan inverter output rpm (FAN2)	0000 to 9999								A	A	[rpm]
274	0100100010	LEV1	0000 to 9999								A	A	Outdoor LEV opening (Fully open: 480)
275	1100100010	LEV2a	0000 to 9999								A	A	Outdoor LEV opening (Fully open: 3000)
276	0010100010	LEV4	0000 to 9999								A	A	
279	1110100010	COMP operating current (DC)	00.0 to 999.9								A	A	
282	0101100010	COMP bus voltage	00.0 to 999.9								A	A	The unit is [V]
283	1101100010	LEV2b	0000 to 9999								A	A	Outdoor LEV opening (Fully open: 3000)
288	0000010010	COMP Operation time Upper 4 digits	0000 to 9999								A	A	The unit is [h]
289	1000010010	COMP Operation time Lower 4 digits	0000 to 9999								A	A	
294	0110010010	COMP number of start-stop events Upper 4 digits	0000 to 9999								A	A	Count-up at start-up The unit is [Time]
295	1110010010	COMP number of start-stop events Lower 4 digits	0000 to 9999								A	A	
300	0011010010	Integrated operation time of compressor (for rotation purpose)	0000 to 9999								B		The unit is [h]

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10 LED Status Indicators

Current data

No.	SW4 (SW6 - 9: OFF, SW6-10: OFF)	Item	Display								Unit (A, B)*1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
301	1011010010	Power supply unit	OC/OS-1/OS-2 ↔ Address								B		
302	0111010010	Start-up unit	OC/OS-1/OS-2 ↔ Address								B		

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Setting data

No.	SW4 (SW6 - 9: OFF, SW6-10: OFF)	Item	Display								Unit (A, B)*1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
512	0000000001	Self-address	Alternate display of self address and unit model								A	A	
513	1000000001	IC/FU address	Count-up display of number of connected units								B		
514	0100000001	RC address	Count-up display of number of connected units								B		
516	0010000001	OS address	Count-up display of number of connected units								B		
517	1010000001	Version/Capacity	S/W version → Refrigerant type → Model and capacity → Communication address								A	A	
518	0110000001	OC address	OC address display									B	

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Data on indoor unit system

No.	SW4 (SW6 - 9: OFF, SW6-10: OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
523	1101000001	IC1 Gas pipe temperature	-99.9 to 999.9								B		The unit is [°C]
524	0011000001	IC2 Gas pipe temperature	-99.9 to 999.9										
525	1011000001	IC3 Gas pipe temperature	-99.9 to 999.9										
526	0111000001	IC4 Gas pipe temperature	-99.9 to 999.9										
527	1111000001	IC5 Gas pipe temperature	-99.9 to 999.9										
528	0000100001	IC6 Gas pipe temperature	-99.9 to 999.9										
529	1000100001	IC7 Gas pipe temperature	-99.9 to 999.9										
530	0100100001	IC8 Gas pipe temperature	-99.9 to 999.9										
531	1100100001	IC9 Gas pipe temperature	-99.9 to 999.9										
532	0010100001	IC10 Gas pipe temperature	-99.9 to 999.9										
533	1010100001	IC11 Gas pipe temperature	-99.9 to 999.9										
534	0110100001	IC12 Gas pipe temperature	-99.9 to 999.9										
535	1110100001	IC13 Gas pipe temperature	-99.9 to 999.9										
536	0001100001	IC14 Gas pipe temperature	-99.9 to 999.9										
537	1001100001	IC15 Gas pipe temperature	-99.9 to 999.9										
538	0101100001	IC16 Gas pipe temperature	-99.9 to 999.9										
539	1101100001	IC17 Gas pipe temperature	-99.9 to 999.9										
540	0011100001	IC18 Gas pipe temperature	-99.9 to 999.9										
541	1011100001	IC19 Gas pipe temperature	-99.9 to 999.9										
542	0111100001	IC20 Gas pipe temperature	-99.9 to 999.9										
543	1111100001	IC21 Gas pipe temperature	-99.9 to 999.9										
544	0000010001	IC22 Gas pipe temperature	-99.9 to 999.9										
545	1000010001	IC23 Gas pipe temperature	-99.9 to 999.9										
546	0100010001	IC24 Gas pipe temperature	-99.9 to 999.9										
547	1100010001	IC25 Gas pipe temperature	-99.9 to 999.9										
548	0010010001	IC26 Gas pipe temperature	-99.9 to 999.9										
549	1010010001	IC27 Gas pipe temperature	-99.9 to 999.9										
550	0110010001	IC28Gas pipe temperature	-99.9 to 999.9										
551	1110010001	IC29 Gas pipe temperature	-99.9 to 999.9										
552	0001010001	IC30 Gas pipe temperature	-99.9 to 999.9										
553	1001010001	IC31 Gas pipe temperature	-99.9 to 999.9										
554	0101010001	IC32 Gas pipe temperature	-99.9 to 999.9										
555	1101010001	IC33 Gas pipe temperature	-99.9 to 999.9										
556	0011010001	IC34 Gas pipe temperature	-99.9 to 999.9										
557	1011010001	IC35 Gas pipe temperature	-99.9 to 999.9										
558	0111010001	IC36 Gas pipe temperature	-99.9 to 999.9										
559	1111010001	IC37 Gas pipe temperature	-99.9 to 999.9										
560	0000110001	IC38 Gas pipe temperature	-99.9 to 999.9										
561	1000110001	IC39 Gas pipe temperature	-99.9 to 999.9										
562	0100110001	IC40 Gas pipe temperature	-99.9 to 999.9										
563	1100110001	IC41 Gas pipe temperature	-99.9 to 999.9										
564	0010110001	IC42 Gas pipe temperature	-99.9 to 999.9										

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Data on indoor unit system

No.	SW4 (SW6 - 9: OFF, SW6-10: OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
565	1010110001	IC43 Gas pipe temperature	-99.9 to 999.9								B		The unit is [°C]
566	0110110001	IC44 Gas pipe temperature	-99.9 to 999.9										
567	1110110001	IC45 Gas pipe temperature	-99.9 to 999.9										
568	0001110001	IC46 Gas pipe temperature	-99.9 to 999.9										
569	1001110001	IC47 Gas pipe temperature	-99.9 to 999.9										
570	0101110001	IC48 Gas pipe temperature	-99.9 to 999.9										
571	1101110001	IC49 Gas pipe temperature	-99.9 to 999.9										
572	0011110001	IC50 Gas pipe 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										
607	1111101001	IC35SH	-99.9 to 999.9										

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10 LED Status Indicators

10 LED Status Indicators

Data on indoor unit system

No.	SW4 (SW6 - 9: OFF, SW6-10: OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
608	0000011001	IC36SH	-99.9 to 999.9								B		The unit is [°C]
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										
650	0101000101	IC28SC	-99.9 to 999.9										

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Data on indoor unit system

No.	SW4 (SW6 - 9: OFF, SW6-10: OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
651	1101000101	IC29SC	-99.9 to 999.9								B		The unit is [°C]
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 (SW6 - 9: OFF, SW6-10: OFF)	Item	Display								Unit (A, B)*1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
676	0010010101	INV board S/W version	0.00 to 99.99								A	A	
679	1110010101	Fan board (address 5) S/W version	0.00 to 99.99								A	A	
680	0001010101	Fan board (address 6) S/W version	0.00 to 99.99								A	A	
688	0000110101	Current time	00:00 to 23:59								A	A	Hour: minute
689	1000110101	Current time -2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
690	0100110101	Time of error detection 1	00:00 to 23:59										Hour: minute
691	1100110101	Time of error detection 1-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
692	0010110101	Time of error detection 2	00:00 to 23:59										Hour: minute
693	1010110101	Time of error detection 2-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
694	0110110101	Time of error detection 3	00:00 to 23:59										Hour: minute
695	1110110101	Time of error detection 3-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
696	0001110101	Time of error detection 4	00:00 to 23:59										Hour: minute
697	1001110101	Time of error detection 4-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
698	0101110101	Time of error detection 5	00:00 to 23:59										Hour: minute
699	1101110101	Time of error detection 5-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
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	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

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Data on indoor unit system

No.	SW4 (SW6 - 9: OFF, SW6-10: OFF)	Item	Display								Unit (A, B)*1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
714	0101001101	IC1 LEV opening	0000 to 9999								B		Fully open: 2000
715	1101001101	IC2 LEV opening	0000 to 9999										
716	0011001101	IC3 LEV opening	0000 to 9999										
717	1011001101	IC4 LEV opening	0000 to 9999										
718	0111001101	IC5 LEV opening	0000 to 9999										
719	1111001101	IC6 LEV opening	0000 to 9999										
720	0000101101	IC7 LEV opening	0000 to 9999										
721	1000101101	IC8 LEV opening	0000 to 9999										
722	0100101101	IC9 LEV opening	0000 to 9999										
723	1100101101	IC10 LEV opening	0000 to 9999										
724	0010101101	IC11 LEV opening	0000 to 9999										
725	1010101101	IC12 LEV opening	0000 to 9999										
726	0110101101	IC13 LEV opening	0000 to 9999										
727	1110101101	IC14 LEV opening	0000 to 9999										
728	0001101101	IC15 LEV opening	0000 to 9999										
729	1001101101	IC16 LEV opening	0000 to 9999										
730	0101101101	IC17 LEV opening	0000 to 9999										
731	1101101101	IC18 LEV opening	0000 to 9999										
732	0011101101	IC19 LEV opening	0000 to 9999										
733	1011101101	IC20 LEV opening	0000 to 9999										
734	0111101101	IC21 LEV opening	0000 to 9999										
735	1111101101	IC22 LEV opening	0000 to 9999										
736	0000011101	IC23 LEV opening	0000 to 9999										
737	1000011101	IC24 LEV opening	0000 to 9999										
738	0100011101	IC25 LEV opening	0000 to 9999										
739	1100011101	IC26 LEV opening	0000 to 9999										
740	0010011101	IC27 LEV opening	0000 to 9999										
741	1010011101	IC28 LEV opening	0000 to 9999										
742	0110011101	IC29 LEV opening	0000 to 9999										
743	1110011101	IC30 LEV opening	0000 to 9999										
744	0001011101	IC31 LEV opening	0000 to 9999										
745	1001011101	IC32 LEV opening	0000 to 9999										
746	0101011101	IC33 LEV opening	0000 to 9999										
747	1101011101	IC34 LEV opening	0000 to 9999										
748	0011011101	IC35 LEV opening	0000 to 9999										
749	1011011101	IC36 LEV opening	0000 to 9999										
750	0111011101	IC37 LEV opening	0000 to 9999										
751	1111011101	IC38 LEV opening	0000 to 9999										
752	0000111101	IC39 LEV opening	0000 to 9999										
753	1000111101	IC40 LEV opening	0000 to 9999										
754	0100111101	IC41 LEV opening	0000 to 9999										
755	1100111101	IC42 LEV opening	0000 to 9999										

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.



10 LED Status Indicators

Data on indoor unit system

No.	SW4 (SW6 - 9: OFF, SW6-10: OFF)	Item	Display								Unit (A, B)*1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
756	0010111101	IC43 LEV opening	0000 to 9999								B		Fully open: 2000
757	1010111101	IC44 LEV opening	0000 to 9999										
758	0110111101	IC45 LEV opening	0000 to 9999										
759	1110111101	IC46 LEV opening	0000 to 9999										
760	0001111101	IC47 LEV opening	0000 to 9999										
761	1001111101	IC48 LEV opening	0000 to 9999										
762	0101111101	IC49 LEV opening	0000 to 9999										
763	1101111101	IC50 LEV opening	0000 to 9999										
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											

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Data on indoor unit system

No.	SW4 (SW6 - 9: OFF, SW6-10: OFF)	Item	Display								Unit (A, B)*1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
797	1011100011	IC34 Operation mode	0000: Stop 0001: Ventilation 0002: Cooling 0003: Heating 0004: Dry								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											
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										

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.



10 LED Status Indicators

Data on indoor unit system

No.	SW4 (SW6 - 9: OFF, SW6-10: OFF)	Item	Display								Unit (A, B)*1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
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										

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Other types of data

No.	SW4 (SW6 - 9: OFF, SW6-10: OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
871	1110011011	U-phase current effective value 1	-99.9 to 999.9								A	A	The unit is [A]
872	0001011011	W-phase current effective value 1	-99.9 to 999.9								A	A	
873	1001011011	Power factor phase angle 1	-99.9 to 999.9								A	A	The unit is [deg]
880	0000111011	Control board Reset counter	0 to 254								A	A	The unit is [time]
881	1000111011	INV board Reset counter	0 to 254								A	A	
884	0010111011	Fan board (address 5) reset counter	0 to 254								A	A	The unit is [time]
885	1010111011	Fan board (address 6) reset counter	0 to 254								A	A	
980	0010101111	M-NET processor S/W version	0.00 to 99.99								A	A	

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Data on indoor unit system

No.	SW4 (SW6 - 9: ON, SW6-10: OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
1851	1101110011	IC1 intake-air temperature	-99.9 to 999.9								B		Displayed alternately every 5 seconds
1852	0011110011	IC2 intake-air temperature	-99.9 to 999.9								B		
1853	1011110011	IC3 intake-air temperature	-99.9 to 999.9								B		
1854	0111110011	IC4 intake-air temperature	-99.9 to 999.9								B		
1855	1111110011	IC5 intake-air temperature	-99.9 to 999.9								B		
1856	0000001011	IC6 intake-air temperature	-99.9 to 999.9								B		
1857	1000001011	IC7 intake-air temperature	-99.9 to 999.9								B		
1858	0100001011	IC8 intake-air temperature	-99.9 to 999.9								B		
1859	1100001011	IC9 intake-air temperature	-99.9 to 999.9								B		
1860	0010001011	IC10 intake-air temperature	-99.9 to 999.9								B		
1861	1010001011	IC11 intake-air temperature	-99.9 to 999.9								B		The unit is [°C]
1862	0110001011	IC12 intake-air temperature	-99.9 to 999.9								B		
1863	1110001011	IC13 intake-air temperature	-99.9 to 999.9								B		
1864	0001001011	IC14 intake-air temperature	-99.9 to 999.9								B		
1865	1001001011	IC15 intake-air temperature	-99.9 to 999.9								B		
1866	0101001011	IC16 intake-air temperature	-99.9 to 999.9								B		
1867	1101001011	IC17 intake-air temperature	-99.9 to 999.9								B		
1868	0011001011	IC18 intake-air temperature	-99.9 to 999.9								B		
1869	1011001011	IC19 intake-air temperature	-99.9 to 999.9								B		
1870	0111001011	IC20 intake-air temperature	-99.9 to 999.9								B		
1871	1111001011	IC21 intake-air temperature	-99.9 to 999.9								B		
1872	0000101011	IC22 intake-air temperature	-99.9 to 999.9								B		
1873	1000101011	IC23 intake-air temperature	-99.9 to 999.9								B		
1874	0100101011	IC24 intake-air temperature	-99.9 to 999.9								B		
1875	1100101011	IC25 intake-air temperature	-99.9 to 999.9								B		
1876	0010101011	IC26 intake-air temperature	-99.9 to 999.9								B		
1877	1010101011	IC27 intake-air temperature	-99.9 to 999.9								B		
1878	0110101011	IC28 intake-air temperature	-99.9 to 999.9								B		
1879	1110101011	IC29 intake-air temperature	-99.9 to 999.9								B		
1880	0001101011	IC30 intake-air temperature	-99.9 to 999.9								B		
1881	1001101011	IC31 intake-air temperature	-99.9 to 999.9								B		
1882	0101101011	IC32 intake-air temperature	-99.9 to 999.9								B		
1883	1101101011	IC33 intake-air temperature	-99.9 to 999.9								B		
1884	0011101011	IC34 intake-air temperature	-99.9 to 999.9								B		
1885	1011101011	IC35 intake-air temperature	-99.9 to 999.9								B		
1886	0111101011	IC36 intake-air temperature	-99.9 to 999.9								B		
1887	1111101011	IC37 intake-air temperature	-99.9 to 999.9								B		
1888	0000011011	IC38 intake-air temperature	-99.9 to 999.9								B		
1889	1000011011	IC39 intake-air temperature	-99.9 to 999.9								B		
1890	0100011011	IC40 intake-air temperature	-99.9 to 999.9								B		
1891	1100011011	IC41 intake-air temperature	-99.9 to 999.9								B		

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Data on indoor unit system

No.	SW4 (SW6 - 9: ON, SW6-10: OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
1892	0010011011	IC42 intake-air temperature	-99.9 to 999.9								B		
1893	1010011011	IC43 intake-air temperature	-99.9 to 999.9								B		
1894	0110011011	IC44 intake-air temperature	-99.9 to 999.9								B		
1895	1110011011	IC45 intake-air temperature	-99.9 to 999.9								B		
1896	0001011011	IC46 intake-air temperature	-99.9 to 999.9								B		
1897	1001011011	IC47 intake-air temperature	-99.9 to 999.9								B		
1898	0101011011	IC48 intake-air temperature	-99.9 to 999.9								B		
1899	1101011011	IC49 intake-air temperature	-99.9 to 999.9								B		
1900	0011011011	IC50 intake-air temperature	-99.9 to 999.9								B		
1901	1011011011	IC1 liquid pipe temperature	-99.9 to 999.9								B		The unit is [°C]
1902	0111011011	IC2 liquid pipe temperature	-99.9 to 999.9								B		
1903	1111011011	IC3 liquid pipe temperature	-99.9 to 999.9								B		
1904	0000111011	IC4 liquid pipe temperature	-99.9 to 999.9								B		
1905	1000111011	IC5 liquid pipe temperature	-99.9 to 999.9								B		
1906	0100111011	IC6 liquid pipe temperature	-99.9 to 999.9								B		
1907	1100111011	IC7 liquid pipe temperature	-99.9 to 999.9								B		
1908	0010111011	IC8 liquid pipe temperature	-99.9 to 999.9								B		
1909	1010111011	IC9 liquid pipe temperature	-99.9 to 999.9								B		
1910	0110111011	IC10 liquid pipe temperature	-99.9 to 999.9								B		
1911	1110111011	IC11 liquid pipe temperature	-99.9 to 999.9								B		
1912	0001111011	IC12 liquid pipe temperature	-99.9 to 999.9								B		
1913	1001111011	IC13 liquid pipe temperature	-99.9 to 999.9								B		
1914	0101111011	IC14 liquid pipe temperature	-99.9 to 999.9								B		
1915	1101111011	IC15 liquid pipe temperature	-99.9 to 999.9								B		
1916	0011111011	IC16 liquid pipe temperature	-99.9 to 999.9								B		
1917	1011111011	IC17 liquid pipe temperature	-99.9 to 999.9								B		
1918	0111111011	IC18 liquid pipe temperature	-99.9 to 999.9								B		
1919	1111111011	IC19 liquid pipe temperature	-99.9 to 999.9								B		
1920	0000000111	IC20 liquid pipe temperature	-99.9 to 999.9								B		
1921	1000000111	IC21 liquid pipe temperature	-99.9 to 999.9								B		
1922	0100000111	IC22 liquid pipe temperature	-99.9 to 999.9								B		
1923	1100000111	IC23 liquid pipe temperature	-99.9 to 999.9								B		
1924	0010000111	IC24 liquid pipe temperature	-99.9 to 999.9								B		
1925	1010000111	IC25 liquid pipe temperature	-99.9 to 999.9								B		
1926	0110000111	IC26 liquid pipe temperature	-99.9 to 999.9								B		
1927	1110000111	IC27 liquid pipe temperature	-99.9 to 999.9								B		
1928	0001000111	IC28 liquid pipe temperature	-99.9 to 999.9								B		
1929	1001000111	IC29 liquid pipe temperature	-99.9 to 999.9								B		
1930	0101000111	IC30 liquid pipe temperature	-99.9 to 999.9								B		
1931	1101000111	IC31 liquid pipe temperature	-99.9 to 999.9								B		
1932	0011000111	IC32 liquid pipe temperature	-99.9 to 999.9								B		
1933	1011000111	IC33 liquid pipe temperature	-99.9 to 999.9								B		
1934	0111000111	IC34 liquid pipe temperature	-99.9 to 999.9								B		

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.



Data on indoor unit system

No.	SW4 (SW6 - 9: ON, SW6-10: OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
1935	1111000111	IC35 liquid pipe temperature	-99.9 to 999.9								B		
1936	0000100111	IC36 liquid pipe temperature	-99.9 to 999.9								B		
1937	1000100111	IC37 liquid pipe temperature	-99.9 to 999.9								B		
1938	0100100111	IC38 liquid pipe temperature	-99.9 to 999.9								B		
1939	1100100111	IC39 liquid pipe temperature	-99.9 to 999.9								B		
1940	0010100111	IC40 liquid pipe temperature	-99.9 to 999.9								B		
1941	1010100111	IC41 liquid pipe temperature	-99.9 to 999.9								B		
1942	0110100111	IC42 liquid pipe temperature	-99.9 to 999.9								B		
1943	1110100111	IC43 liquid pipe temperature	-99.9 to 999.9								B		
1944	0001100111	IC44 liquid pipe temperature	-99.9 to 999.9								B		
1945	1001100111	IC45 liquid pipe temperature	-99.9 to 999.9								B		
1946	0101100111	IC46 liquid pipe temperature	-99.9 to 999.9								B		
1947	1101100111	IC47 liquid pipe temperature	-99.9 to 999.9								B		
1948	0011100111	IC48 liquid pipe temperature	-99.9 to 999.9								B		
1949	1011100111	IC49 liquid pipe temperature	-99.9 to 999.9								B		
1950	0111100111	IC50 liquid pipe temperature	-99.9 to 999.9								B		
1951	1111100111	IC1 address/capacity code	0000 to 9999				0000 to 9999				B		Displayed alternately every 5 seconds
1952	0000010111	IC2 address/capacity code	0000 to 9999				0000 to 9999				B		
1953	1000010111	IC3 address/capacity code	0000 to 9999				0000 to 9999				B		
1954	0100010111	IC4 address/capacity code	0000 to 9999				0000 to 9999				B		
1955	1100010111	IC5 address/capacity code	0000 to 9999				0000 to 9999				B		
1956	0010010111	IC6 address/capacity code	0000 to 9999				0000 to 9999				B		
1957	1010010111	IC7 address/capacity code	0000 to 9999				0000 to 9999				B		
1958	0110010111	IC8 address/capacity code	0000 to 9999				0000 to 9999				B		
1959	1110010111	IC9 address/capacity code	0000 to 9999				0000 to 9999				B		
1960	0001010111	IC10 address/capacity code	0000 to 9999				0000 to 9999				B		
1961	1001010111	IC11 address/capacity code	0000 to 9999				0000 to 9999				B		
1962	0101010111	IC12 address/capacity code	0000 to 9999				0000 to 9999				B		
1963	1101010111	IC13 address/capacity code	0000 to 9999				0000 to 9999				B		
1964	0011010111	IC14 address/capacity code	0000 to 9999				0000 to 9999				B		
1965	1011010111	IC15 address/capacity code	0000 to 9999				0000 to 9999				B		
1966	0111010111	IC16 address/capacity code	0000 to 9999				0000 to 9999				B		
1967	1111010111	IC17 address/capacity code	0000 to 9999				0000 to 9999				B		
1968	0000110111	IC18 address/capacity code	0000 to 9999				0000 to 9999				B		
1969	1000110111	IC19 address/capacity code	0000 to 9999				0000 to 9999				B		
1970	0100110111	IC20 address/capacity code	0000 to 9999				0000 to 9999				B		
1971	1100110111	IC21 address/capacity code	0000 to 9999				0000 to 9999				B		
1972	0010110111	IC22 address/capacity code	0000 to 9999				0000 to 9999				B		
1973	1010110111	IC23 address/capacity code	0000 to 9999				0000 to 9999				B		
1974	0110110111	IC24 address/capacity code	0000 to 9999				0000 to 9999				B		
1975	1110110111	IC25 address/capacity code	0000 to 9999				0000 to 9999				B		
1976	0001110111	IC26 address/capacity code	0000 to 9999				0000 to 9999				B		
1977	1001110111	IC27 address/capacity code	0000 to 9999				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.

Data on indoor unit system

No.	SW4 (SW6 - 9: ON, SW6-10: OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
1978	0101110111	IC28 address/capacity code	0000 to 9999				0000 to 9999				B		
1979	1101110111	IC29 address/capacity code	0000 to 9999				0000 to 9999				B		
1980	0011110111	IC30 address/capacity code	0000 to 9999				0000 to 9999				B		
1981	1011110111	IC31 address/capacity code	0000 to 9999				0000 to 9999				B		
1982	0111110111	IC32 address/capacity code	0000 to 9999				0000 to 9999				B		
1983	1111110111	IC33 address/capacity code	0000 to 9999				0000 to 9999				B		
1984	0000001111	IC34 address/capacity code	0000 to 9999				0000 to 9999				B		
1985	1000001111	IC35 address/capacity code	0000 to 9999				0000 to 9999				B		
1986	0100001111	IC36 address/capacity code	0000 to 9999				0000 to 9999				B		
1987	1100001111	IC37 address/capacity code	0000 to 9999				0000 to 9999				B		
1988	0010001111	IC38 address/capacity code	0000 to 9999				0000 to 9999				B		
1989	1010001111	IC39 address/capacity code	0000 to 9999				0000 to 9999				B		
1990	0110001111	IC40 address/capacity code	0000 to 9999				0000 to 9999				B		
1991	1110001111	IC41 address/capacity code	0000 to 9999				0000 to 9999				B		
1992	0001001111	IC42 address/capacity code	0000 to 9999				0000 to 9999				B		
1993	1001001111	IC43 address/capacity code	0000 to 9999				0000 to 9999				B		
1994	0101001111	IC44 address/capacity code	0000 to 9999				0000 to 9999				B		
1995	1101001111	IC45 address/capacity code	0000 to 9999				0000 to 9999				B		
1996	0011001111	IC46 address/capacity code	0000 to 9999				0000 to 9999				B		
1997	1011001111	IC47 address/capacity code	0000 to 9999				0000 to 9999				B		
1998	0111001111	IC48 address/capacity code	0000 to 9999				0000 to 9999				B		
1999	1111001111	IC49 address/capacity code	0000 to 9999				0000 to 9999				B		
2000	0000101111	IC50 address/capacity code	0000 to 9999				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.



Chapter 11 Safety for Leak

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11-1 Introduction

This chapter is for the following models that use R32 refrigerant.
*For the latest applicable models, check with local distributors.

Outdoor unit

Category	Model
Heat Recovery R2-Series (High efficiency)	TURYE3AMM0AN
	TURYE4AMM0AN
Hyper Heating Inverter R2-Series	TURYH3AMM0AN
	TURYH4AMM0AN
Heat Pump Y-Series (High efficiency)	TUHYE3AMM0AN
	TUHYE4AMM0AN
Hyper Heating Inverter Y-Series	TUHYH3AMM0AN
	TUHYH4AMM0AN

BC Controller

Category	Model
Main BC Controller	TCMBM_MA11MM
Sub BC Controller	TCMBS_MB11MM

Indoor unit

Category	Model
Ceiling cassette (4-way flow type)	TPLFYP_FM1M0A
	TPLFYP_EM1M0A
Ceiling concealed (Low static pressure type)	TPEFYP_MS1M0A
Ceiling concealed (Medium static pressure type)	TPEFYP_MA1M0A
Vertical-concealed	TPVFYP_AM1M0A
Ceiling suspended	TPCFYP_KM1M0A
Wall mounted	TPKFYP_LM1M0A
	TPKFYP_KM1M0A

11-2 Refrigerant Emission Reduction

Dispose of recovered refrigerant according to local regulations such as the Code of Federal Regulations.

11-3 Safety for Servicing

Follow the precautions listed below when handling R32-type refrigerant even more strictly than when handling conventional types of refrigerant (R410A, R407C, and R22).

- Safety measures that comply with UL60335-2-40 ed.4 are required when the maximum refrigerant leak concentration exceeds LFL × 1/2.
  *LFL: Lower Flammability Limit (kg/m^3)
- Never use other types of refrigerant than R32 for the packaged air conditioners using R32.
- As with other refrigerant, R32 is heavier than air, so it tends to stagnate at the bottom (near the floor). R32 stagnated in the bottom area of room may reach the burning concentration. Maintain the safe work environment to avoid burning by appropriately ventilating the room. Be sure to prevent refrigerant stagnation especially when working in basements, closed rooms, or outdoor environments that easily cause refrigerant stagnation, by carrying a mobile gas leak detector in operation, operating local exhaust systems, or taking other measures.
  When a refrigerant leak is found in a room or place with no adequate ventilation, avoid using fire and do not operate work until the work environment improves with appropriate ventilation.
- Appropriate ventilation is also required for brazing work to avoid refrigerant burning. Additionally, make sure that there is no hazardous materials or flammable materials nearby and take fire prevention measures.
  If refrigerant leaks during brazing work, put out the fire, such as that of torches, immediately.
- Ventilate workplaces when refrigerant leaks during work.
- Keep ignition sources, such as gas burning appliances and electric heaters, sufficiently away from workplaces where installation, repair, or relocation is conducted.
- Do not mix R32 with other materials, such as air, in the refrigerant circuit when installing, repairing, or relocating the air conditioner. If it is mixed with other materials, such as air, the pressure inside the refrigeration circuit becomes abnormally high, causing bursting or injuries.
- Make sure that the refrigerant gas is not leaking after the installation work. The refrigerant gas leaking in a room may generate toxic gases or cause fire when coming into contact with fire from heating equipment, such as fan heaters and stoves.
- Make sure that installation work, repair, relocation, and other work are correctly conducted by specialists who can safely handle slightly flammable refrigerant according to the Installation Manual. Any failure may result in abnormal refrigeration cycles, water leak, electric shock, fire, or other dangerous accidents.
- When recovering refrigerant, be sure to connect the refrigerant hose correctly to prevent a refrigerant leak from joints. After refrigerant recovery, check if the residual pressure increases again. If it does, perform refrigerant recovery again.
- Never modify the air conditioner.

11-4 Installation Requirements for R32 Refrigerant

11-4-1 Safety measures against refrigerant leaks specified in UL60335-1 and UL60335-2-40

Since R32 refrigerant is slightly flammable, refrigerant charge limits or installation of safety devices as shown below, are required to avoid the risk of fire in the room if the refrigerant leaks.
The installation of safety devices is required if the refrigerant concentration exceeds LFL × 1/2 in the room in case of a refrigerant leak (in ENHANCED TIGHTNESS REFRIGERATING SYSTEMS).

Refrigerant gas charge limit

$$m \leqq \frac{G}{2} \times A \times h_r$$

m : Refrigerant gas amount (kg)
G : LFL: Lower Flammability Limit (kg/m^3)
A : Floor area (m^2)
h_r : Leakage height (m)

or

Implementing safety measures

Shut off device or Circulation airflow system or Ventilation system or Natural ventilation

* LFL: Lower Flammability Limit (kg/m^3)
refers to the minimum concentration of refrigerant that can propagate a flame when uniformly mixed with air.
R32: 0.306(kg/m^3)
LFL×1/2(R32): 0.153(kg/m^3)

Note
What is UL60335-1/UL60335-2-40?
→Safety Standard for Household and Similar Electrical Appliances
- UL60335-1: General requirements of Safety Standard for Household and Similar Electrical Appliances
- UL60335-2-40: Particular Requirements for Electrical Heat Pumps, Air Conditioners and Dehumidifiers of Safety Standard for Household and Similar Electrical Appliances

11-4-2 Compliance of Mitsubishi City Multi air conditioning systems with UL60335-1/ UL60335-2-40

To comply with UL60335-1/UL60335-2-40, Mitsubishi R32-compatible City Multi air conditioning systems have optional safety devices listed below. The following shut off devices comply with the requirements for ENHANCED TIGHTNESS REFRIGERATING SYSTEMS.

Shut off device

- Shut off valve kit (CMR-M100KT-NA) *For Y-Series
- BC controller (TCMBM***MA11MM/TCMBS***MB11MM) *For R2-Series

Detector/Alarm

- Alarm: MA remote controller (TAR-43MAAUB and later)
- Detector: The indoor units are equipped with a built-in refrigerant sensor. (For applicable models, refer to the catalogs.)

For your reference, the following shows the selection flow of R32-compatible City Multi air conditioning systems and safety equipment, as well as installation illustrations of the safety devices against refrigerant leaks into the room.

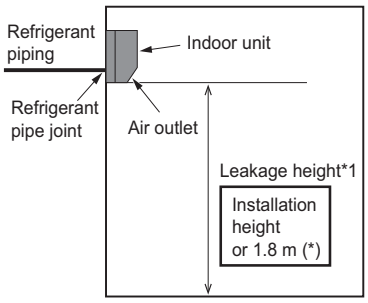
Note
Check the following when selecting or installing safety devices.
- The M-NET remote controller (ME remote controller) cannot be connected to R32 air conditioning systems.
- Reassess the safety measures if you change the room layout.
- Check whether each indoor unit is used in large space or with a safety device.
- Shut off devices used as safety devices differ between the City Multi Y-Series and R2-Series.

Leakage height refers to the distance from the floor to a potential refrigerant leak point, and is defined as the lesser of either the installation height of the indoor unit or the installation height of the refrigerant piping joint (excluding brazed joints) connected to the indoor unit. For details, see the illustrations below. The installation height of the indoor unit is the distance from the floor to the bottom of the air outlet.

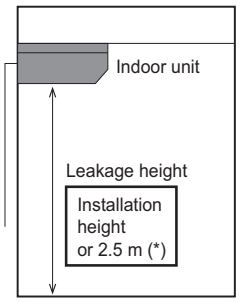
*Ensure that the leakage height is 1.8 m or higher from the floor before installation. (For the installation height requirements for each indoor unit model, refer to the Installation Manual.)

*When installing a duct for ceiling concealed models, the leakage height is defined as the lowest among the installation height of the duct air outlet, the ceiling, and the indoor unit.

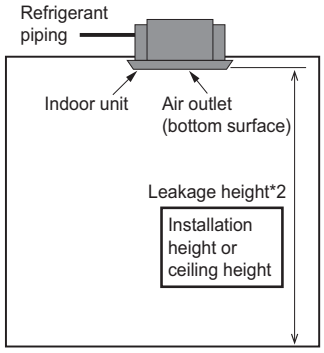
(1) Leakage height for wall-mounted indoor unit



(2) Leakage height for ceiling suspended indoor unit



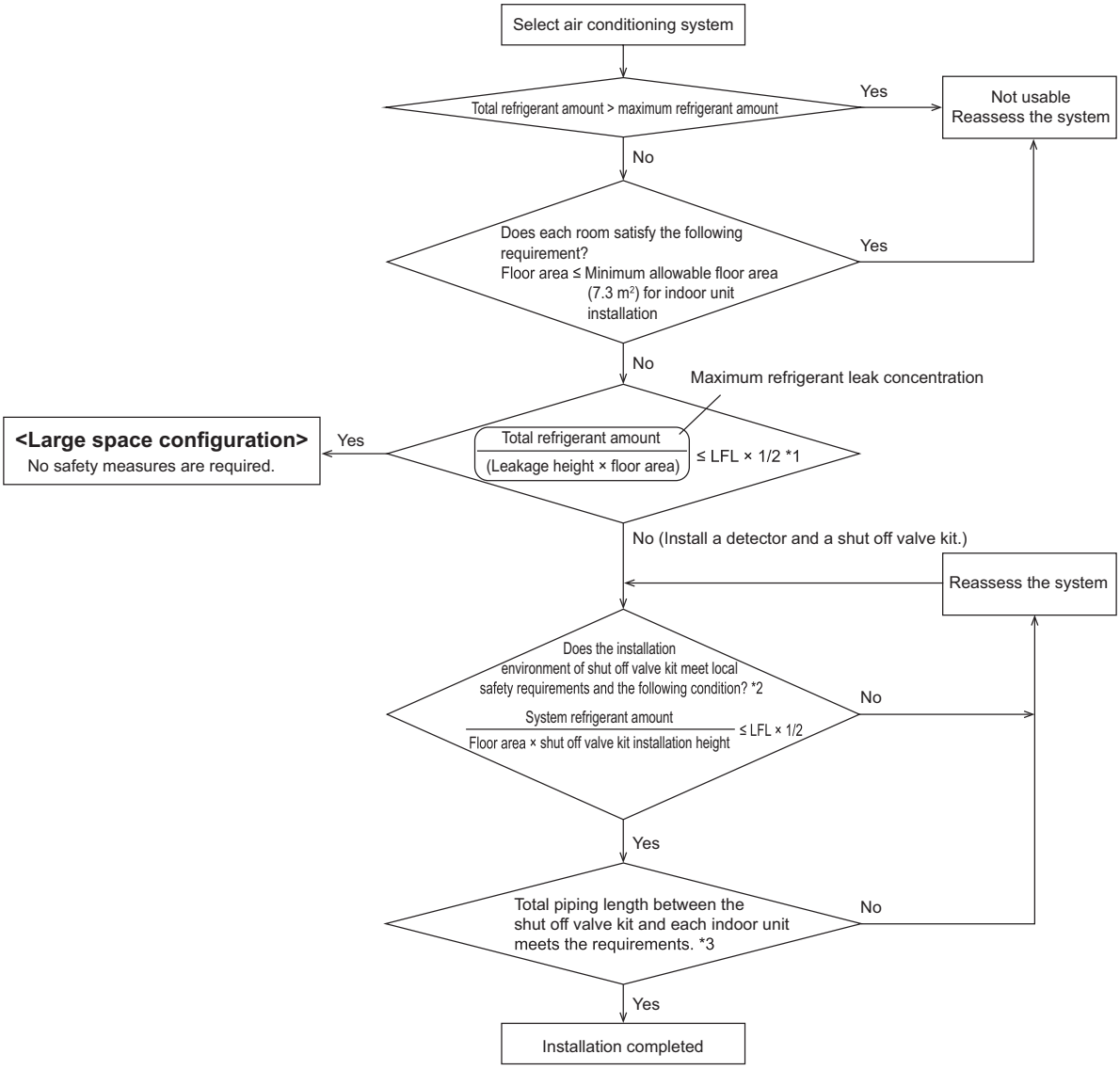
(3) Leakage height for ceiling cassette indoor unit



*1 If the installation height is unknown, the value marked with (*) in the above illustration is considered as the leakage height.
If the actual installation height is lower than the value marked with (*) in the above illustration, the actual installation height is considered as the leakage height.

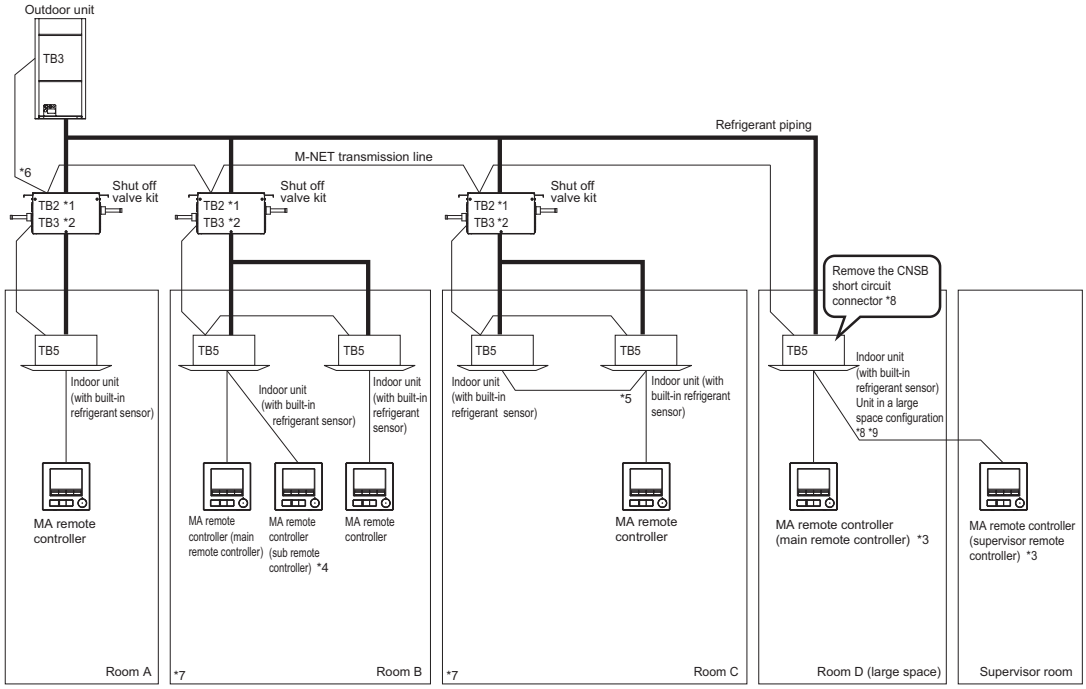
*2 The installation height or the ceiling height, whichever is lower, is considered as the leakage height.

■City Multi Y-Series
<Safety measure selection flow>



*1 For details, refer to **11-4-4 1. "[1] Determining the necessity of the shut off valve kit"**.
*2 For details, refer to **11-4-4 1. "[2] Shut off valve kit installation requirements"**.
*3 For details, refer to **11-4-4 1. "[3] Shut off valve kit installation requirements (for piping length)"**.
* Regardless of whether an air conditioning system is installed in the lowest basement or not, ensure that the total refrigerant amount of the air conditioning system with the highest refrigerant amount in the building, when divided by the volume of the lowest basement, does not exceed the LFL. For details, refer to **11-4-3. "Refrigerant leakage prevention for the lowest basement"**.
* Installation requirements may be defined by the New Design Tool Software of Mitsubishi Electric Corporation or the Diamond System Builder Software of Mitsubishi Electric Trane HVAC US.

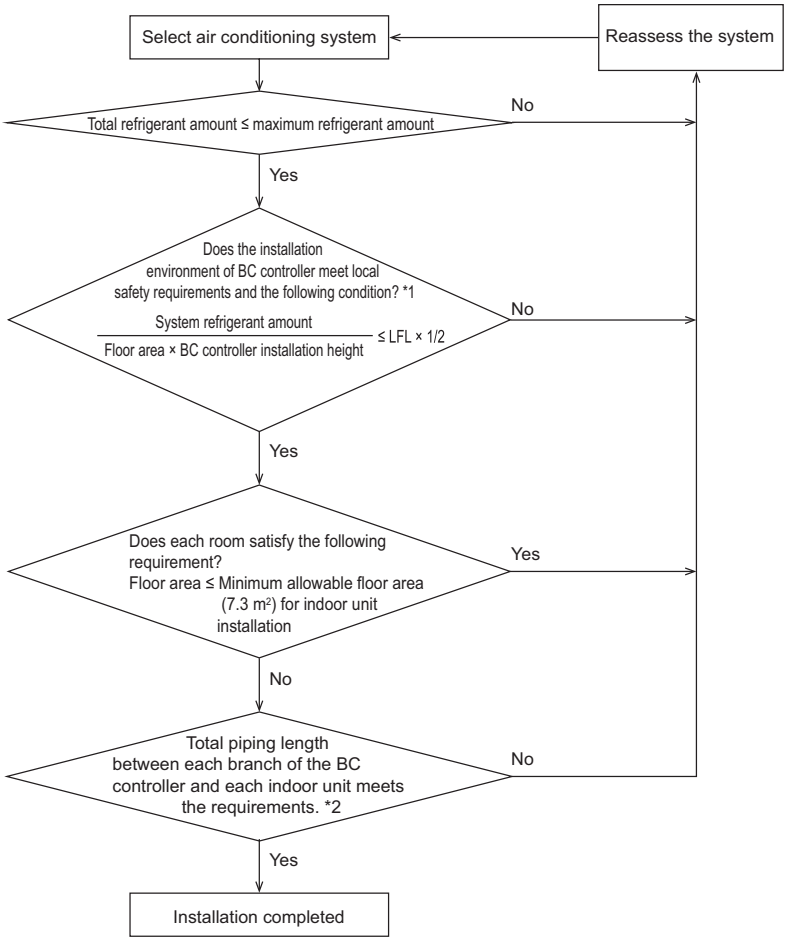
<System diagram>
When using shut off device



Room A: A shut off valve kit is connected to one indoor unit.
Room B: A shut off valve kit is connected to multiple indoor units (the diagram illustrates two indoor units).
Room C: A shut off valve kit is connected to multiple indoor units (the diagram illustrates two indoor units).
Room D: For use in large space.
→ No safety devices are required.

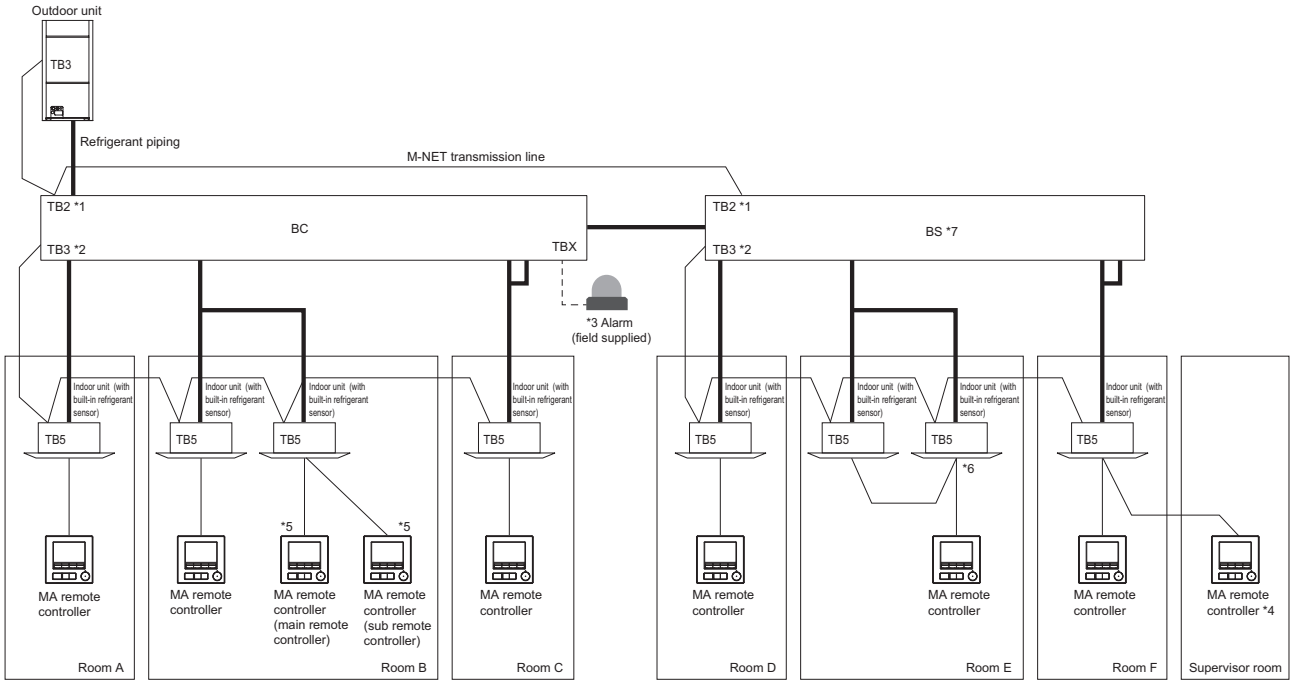
*1 Connect the outdoor unit, indoor unit, and shut off valve kit to TB2 on the shut off valve kit.
*2 Up to 8 indoor units can be connected to TB3 on the shut off valve kit.
*3 When using a supervisor remote controller, connect two MA remote controllers (TAR-43MAAUB or later), and set one as the main controller and the other as the supervisor remote controller using the Main/Sub setting.
The main controller cannot be used as a supervisor remote controller.
A supervisor remote controller can be connected to any indoor unit.
*4 For requirements for pairing MA remote controllers, refer to **11-4-6. "Precautions for installing alarm device (MA remote controller, model name: TAR-43MAAUB or later)"**.
*5 For requirements for grouping indoor units, refer to **11-4-6. "Precautions for installing alarm device (MA remote controller, model name: TAR-43MAAUB or later)"**.
*6 The quantity of connectible shut off valve kits depends on the equivalent power supply of the connected outdoor unit.
Calculate the number of the shut off valve kit by referring to the Data Book for the outdoor unit or MELANS Centralized Controller Technical Manual.
*7 One shut off valve kit can be connected to indoor units installed in multiple rooms.
*8 For large space configuration, remove the CNSB short circuit connector on the indoor unit circuit board to disable the built-in refrigerant sensor in the indoor unit.
For ceiling concealed models, however, do not use large space configuration.
For the conditions for removal of the CNSB short circuit connector, refer to **11-4-5. "[2] Enable/disable settings for refrigerant sensor (CNSB short circuit connector)"**.
*9 If disabled, the built-in refrigerant sensor in the indoor unit does not issue refrigerant leak alarm.

■City Multi R2-Series
<Safety measure selection flow>



*1 For details, refer to **11-4-4 2. "[1] BC controller installation requirements"**.
*2 For details, refer to **11-4-4 2. "[2] Branch piping length requirements for indoor units controlled by BC controller with a built-in shut off valve"**.
* Regardless of whether an air conditioning system is installed in the lowest basement or not, ensure that the total refrigerant amount of the air conditioning system with the highest refrigerant amount in the building, when divided by the volume of the lowest basement, does not exceed the LFL. For details, refer to **11-4-3. "Refrigerant leakage prevention for the lowest basement"**.
* Installation requirements may be defined by the New Design Tool Software of Mitsubishi Electric Corporation or the Diamond System Builder Software of Mitsubishi Electric Trane HVAC US.

<System diagram>



Room A: One indoor unit is connected to one branch port of the BC controller.
Room B: Two or more indoor units are connected to one branch port of the BC controller.
Room C: One indoor unit is connected to two branch ports of the BC controller.
(If the total capacity of downstream indoor units is 55 or above, two branch ports must be used. For details, refer to the Installation Manual of BC controller.)
Room D-F: Indoor units are connected to the sub BC controllers. (Connection restrictions are the same as when connected to the main BC controller.)

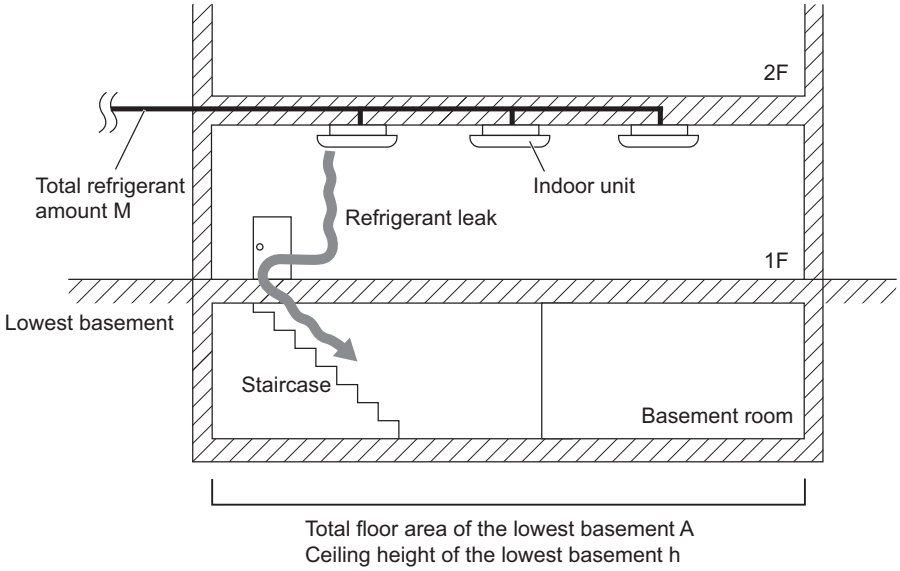
*1 Connect an outdoor unit or another BC controller to TB2 of the BC controller.
*2 Connect an indoor unit controlled by the BC controller to TB3 of the same BC controller.
*3 A field-supplied building-wide alarm can be installed in case an indoor unit detects a refrigerant leak. For the setup, refer to the Installation Manual for the BC controller.
*4 When using a supervisor remote controller, connect two MA remote controllers (TAR-43MAAUB or later), and set one as the main controller and the other as the supervisor remote controller using the main/sub setting.
The main remote controller cannot be used as an a supervisor remote controller.
A supervisor remote controller can be connected to any indoor unit.
*5 For requirements for pairing MA remote controllers, refer to **11-4-6. "Precautions for installing alarm device (MA remote controller, model name: TAR-43MAAUB or later)"**.
*6 For requirements for grouping indoor units, refer to **11-4-6. "Precautions for installing alarm device (MA remote controller, model name: TAR-43MAAUB or later)"**.
*7 Up to 11 sub BC controllers can be connected.

11-4-3 Refrigerant leakage prevention for the lowest basement

Regardless of whether an air conditioning system is installed in the lowest basement or not, ensure that the total refrigerant amount of the air conditioning system with the highest refrigerant amount in the building, when divided by the volume of the lowest basement, does not exceed the LFL.

$$\frac{M}{A \times h} \leqq LFL$$

M : Total refrigerant amount (kg)
A : Total floor area of the lowest basement (m^2)
h : Ceiling height of the lowest basement (m)
LFL : Lower Flammability Limit (kg/m^3), 0.306 (kg/m^3) for R32



*If the calculated result exceeds the LFL, additional safety measures should be implemented according to the local building code.

11-4-4 Precautions for shut off devices (Shut off valve kit [CMR-M100K-NA] and BC controller [TCMBM-MA11MM/TCMBS-MB11MM])

Installation of shut off devices is required if the concentration of leaked refrigerant in the room exceeds 1/2 of the LFL. Read through the following and consider the necessity and installation location of the shut off valve kit, installation location of the BC controller, and length of branch piping.

1. Shut off device for Y-series (Shut off valve kit)

[1] Determining the necessity of the shut off valve kit

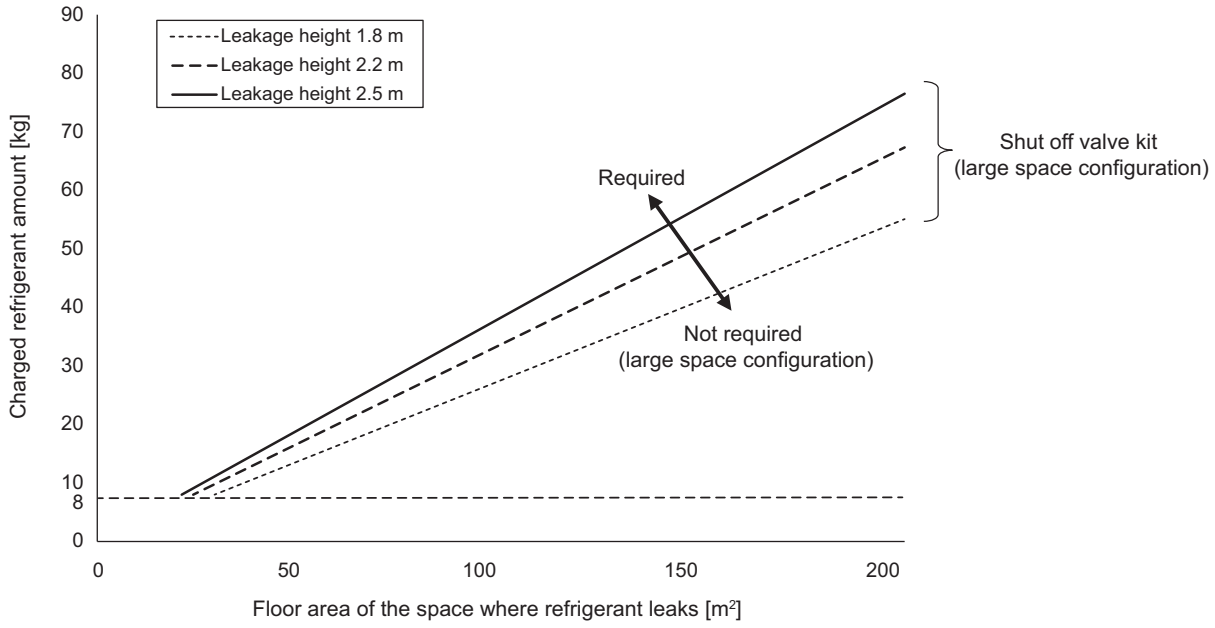
Determine whether the shut off valve kit is required in each room using the formula below.

Necessity of the shut off valve kit (in large space)

Installation of the shut off valve kit is not required if the following formula is satisfied.

$$R_f = \frac{m}{A \times h_r} \leqq LFL \times \frac{1}{2}$$

- R_f : Maximum refrigerant leak concentration (kg/m^3)
- m : Charged refrigerant amount (total refrigerant amount) (kg)
- A : Floor area (m^2)
- h_r : Leakage height (m)
- LFL : Lower Flammability Limit (kg/m^3), 0.306 (kg/m^3) for R32



[2] Shut off valve kit installation requirements

⚠WARNING

(When R32 refrigerant is used)

- When installing the unit in the ceiling space, the floor area of the room under the unit is referenced.
- The unit shall be installed, operated and stored in a room with a floor area according to the following figure.
- When installing the shut off valve kit, if the floor area of the installation site falls below the minimum area (Amin) defined in Equation 1, change the system or location of the kit.
- If the installation height of the shut off valve kit is not 2.5 m, install the shut off valve kit according to Equation 1.
- If the minimum area (Amin) is over 250 m^2, review the safety measures and the installation location.

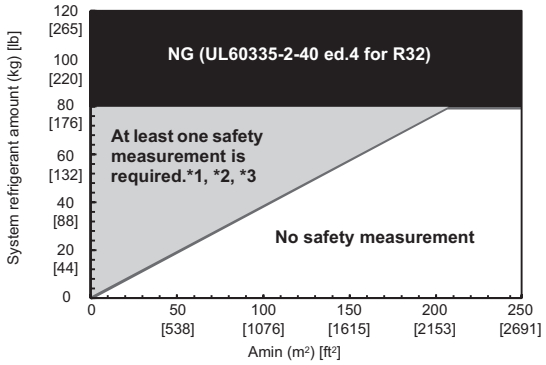
Amin = mc/(0.5 × 0.306 × Hr) …Equation 1
mc: Refrigerant charge in the system
Hr: Height from the floor to the shut off valve kit

Table1
Refrigerant concentration and required safety measure
(height of ceiling = 2.5 m [8-3/16 ft])

Amin		mc			Amin		mc		
m^2	ft^2	kg	lb	oz	m^2	ft^2	kg	lb	oz
5	53.9	1.9	4	3	110	1184.1	42.0	92	9
10	107.7	3.8	8	6	120	1291.7	45.9	101	3
20	215.3	7.6	16	12	130	1399.4	49.7	109	9
30	323.0	11.4	25	2	140	1507.0	53.5	117	15
40	430.6	15.3	33	11	150	1614.6	57.3	126	5
50	538.2	19.1	42	1	160	1722.3	61.2	134	14
60	645.9	22.9	50	7	170	1829.9	65.0	143	4
70	753.5	26.7	58	13	180	1937.6	68.8	151	10
80	861.2	30.6	67	7	190	2045.2	72.6	160	0
90	968.8	34.4	75	13	200	2152.8	76.5	168	10
100	1076.4	38.2	84	3	210	2260.5	79.5	175	4

* If the values of Table1 are different from the values calculated by Equation 1, use the results calculated by the New Design Tool software of Mitsubishi Electric Corporation or the Diamond System Builder software of Mitsubishi Electric Trane HVAC US.

Fig. 1
Refrigerant concentration and required safety measure (height of ceiling space = 2.5 m [8-3/16 ft])



*1 Please be aware that this product does not have built-in safety measures for installation.
*2 The system is UL-Listed for the ETRS (ENHANCED TIGHTNESS REFRIGERATING SYSTEM). Therefore, please note that the installation requirements indicated in Fig. 1 are mitigated compared to ASHRAE 15 or local building codes.
*3 For safety reasons, do not install a shut off valve kit of other manufacturers in the refrigerant circuit to prevent equipment failure.

Note

For the amount of additional charge of R32 and its maximum amount within the system, refer to the Data Book.

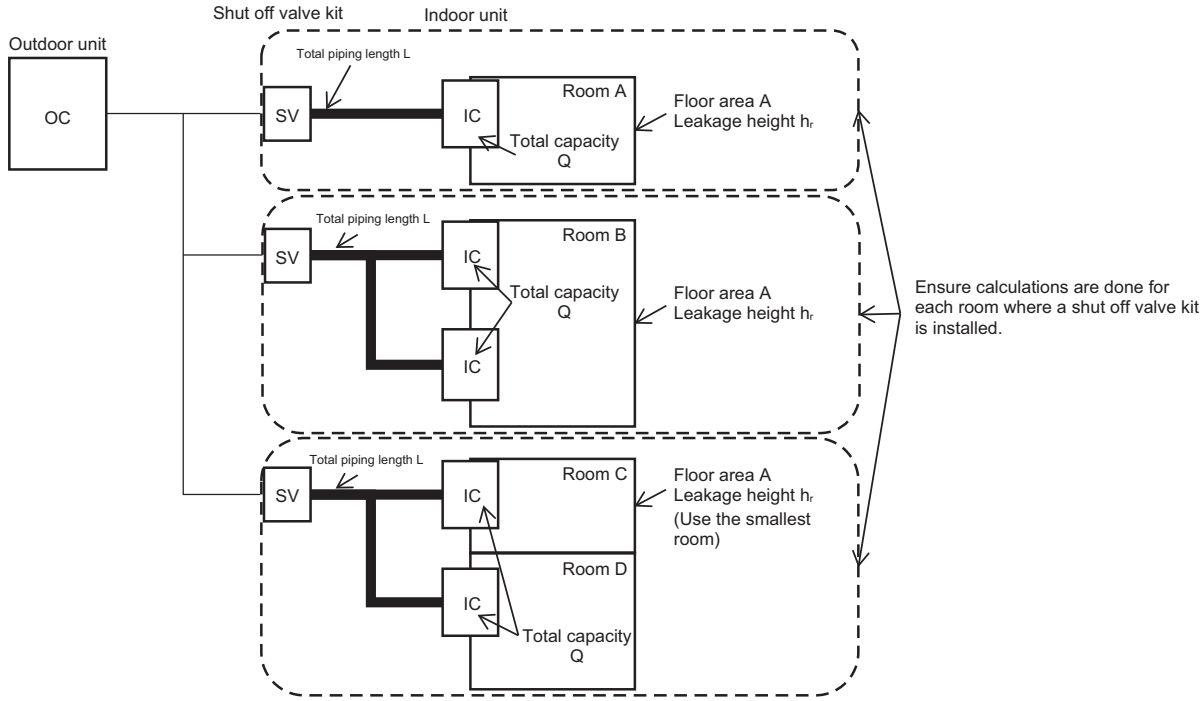
[3] Shut off valve kit installation requirements (for piping length)

If the maximum concentration of leaked refrigerant exceeds 1/2 of the LFL, the shut off valve kit must be installed in a location where the concentration of the refrigerant after shut off does not exceed 1/2 of the LFL. Therefore, install the shut off valve kit within the total piping length L as shown in the illustrations below.

*For the selection of indoor or outdoor units and requirements on the total piping length and furthest piping length for the systems, refer to the Data Book.

*Installation requirements are defined by the New Design Tool Software of Mitsubishi Electric Corporation or the Diamond System Builder Software of Mitsubishi Electric Trane HVAC US.

<System diagram>



L : Total piping length (m)
→ Total piping length between the shut off valve kit and each indoor unit

Q : Total capacity
→ The total capacity and quantity of indoor units connected to a shut off valve kit are as follows: the total maximum capacity is 96, and the total quantity is 8.

A : Floor area (m^2)
→ In the actual calculation, use the room, of which volume obtained by multiplying the floor area by the leakage height is the smallest.

h_r : Leakage height (m)

[4] Equivalent piping length of shut off valve kit

When shut off valve kit is used in a system, the equivalent piping length of the shut off valve kit should be added to the equivalent piping length calculation. For details, refer to section "Piping Design" of the Data Book.

2. Shut off device for R2-series (BC controller)

[1] BC controller installation requirements

Check that the difference of elevation between indoor and outdoor units and the length of refrigerant piping are within the limitations provided by Data Book.

⚠WARNING

- If the minimum area (Amin) is over 250 m^2, review the safety measures and the installation location.
- If the BC controller is installed above the ceiling, and the boundary with the living space is unclear, use the floor area of the room directly below the BC controller and the height from the floor of that room to the ceiling for the calculation. Refer to the Data Book for the details.
- If the BC controller is installed at a height of 1.8 m or less from the floor, install a device equipped with air circulation equipment in accordance with local regulations.
- The unit shall be installed, operated and stored in a room with a floor area according to the following figure.
- Table 1 and Fig. 1 show the floor area of the BC controller installation site and system refrigerant amount when the height from the floor to the BC controller is 2.5 m [8-3/16 ft]. However, if the height is not 2.5 m, please keep the minimum area (Amin) calculated by Equation 1.
- When installing a BC controller, if the floor area of the BC controller installation site falls below the minimum area (Amin) defined in Equation 1, please take appropriate safety measures in accordance with UL standards.

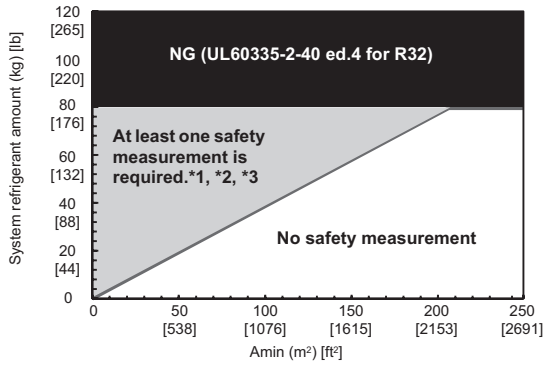
Amin = mc/(0.5 × 0.306 × Hr) ...Equation 1
mc: Refrigerant charge in the system
Hr: Height from the floor to the BC controller

Table1
Refrigerant concentration and required safety measure
(height of ceiling = 2.5 m [8-3/16 ft])

Amin		mc			Amin		mc		
m^2	ft^2	kg	lb	oz	m^2	ft^2	kg	lb	oz
5	53.9	1.9	4	3	110	1184.1	42.0	92	9
10	107.7	3.8	8	6	120	1291.7	45.9	101	3
20	215.3	7.6	16	12	130	1399.4	49.7	109	9
30	323.0	11.4	25	2	140	1507.0	53.5	117	15
40	430.6	15.3	33	11	150	1614.6	57.3	126	5
50	538.2	19.1	42	1	160	1722.3	61.2	134	14
60	645.9	22.9	50	7	170	1829.9	65.0	143	4
70	753.5	26.7	58	13	180	1937.6	68.8	151	10
80	861.2	30.6	67	7	190	2045.2	72.6	160	0
90	968.8	34.4	75	13	200	2152.8	76.5	168	10
100	1076.4	38.2	84	3	210	2260.5	79.5	175	4

* If the values of Table 1 are different from the values calculated by Equation 1, use the results calculated by the New Design Tool software of Mitsubishi Electric Corporation or the Diamond System Builder software of Mitsubishi Electric Trane HVAC US.

Fig. 1
Refrigerant concentration and required safety measure (height of ceiling space = 2.5 m [8-3/16 ft])



*1 Please be aware that this product does not have built-in safety measures for installation.
*2 The system is UL-Listed for the ETRS (Enhanced Tightness Refrigerating System). Therefore, please note that the installation requirements indicated in Fig. 1 are mitigated compared to ASHRAE 15 or local building codes.
*3 For safety reasons, do not install a shut off valve kit of other manufacturers in the refrigerant circuit to prevent equipment failure.

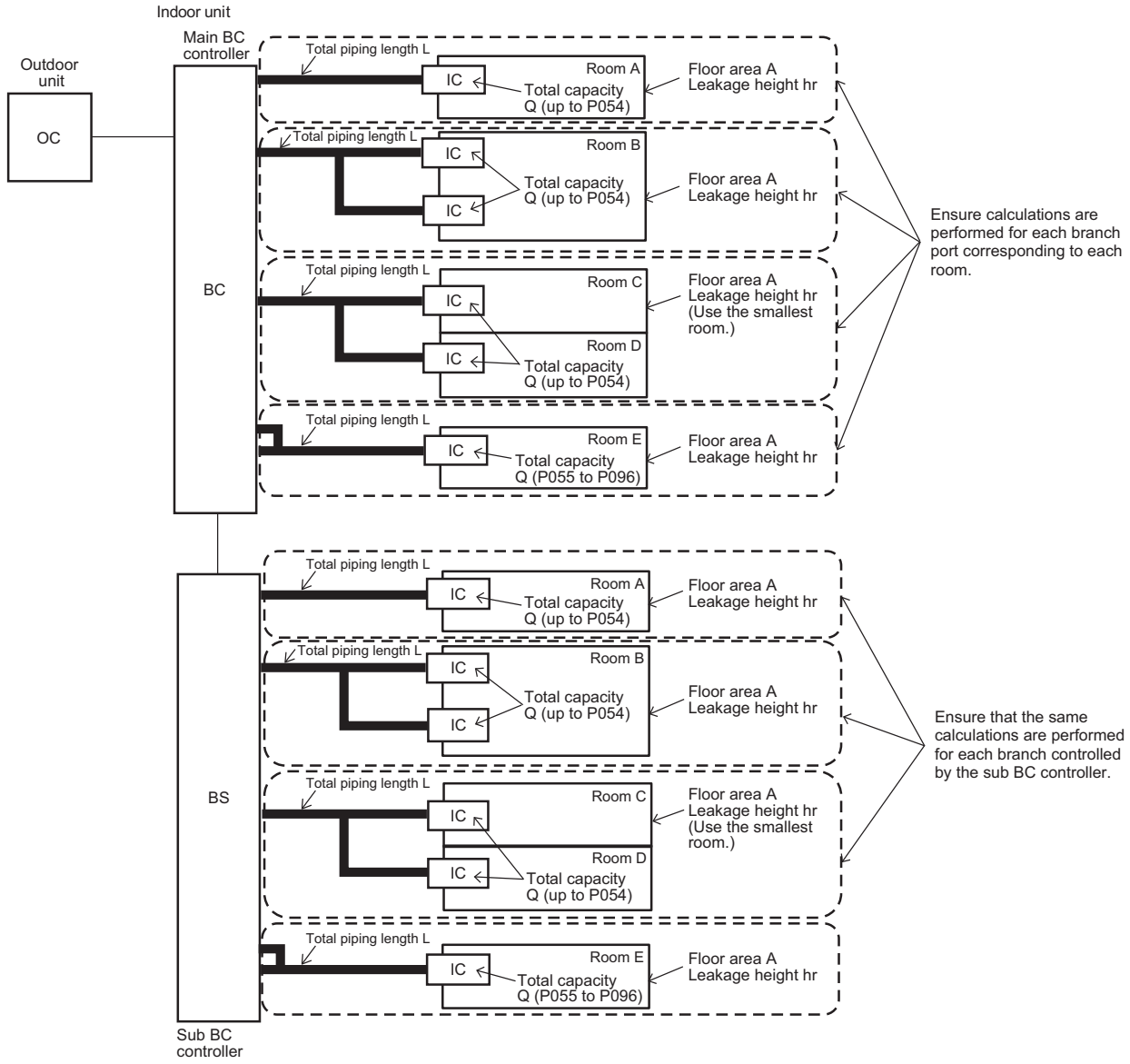
[2] Branch piping length requirements for indoor units controlled by BC controller with a built-in shut off valve

The BC controller with a built-in shut off valve is equipped with an internal shut off valve. The length of the branch pipe running from the shut off valve must meet the requirements to ensure that the maximum refrigerant concentration after shut off does not exceed 1/2 of the LFL.

*For the selection of indoor or outdoor units and requirements on the total piping length and furthest piping length for the systems, refer to the Data Book.

*Installation requirements are defined by the New Design Tool Software of Mitsubishi Electric Corporation or the Diamond System Builder Software of Mitsubishi Electric Trane HVAC US.

<System diagram>



L : Total piping length (m)
→ Total piping length between each branch of the BC controller and each indoor unit

Q : Total capacity
→ The total capacity and quantity of the indoor units connected to each branch of the BC controller are as follows: the total maximum capacity is 54(*), and the total quantity is 3.

A : Floor area (m^2)
→ In the actual calculation, use the room, of which volume obtained by multiplying the floor area by the leakage height is the smallest.

h_r : Leakage height (m)

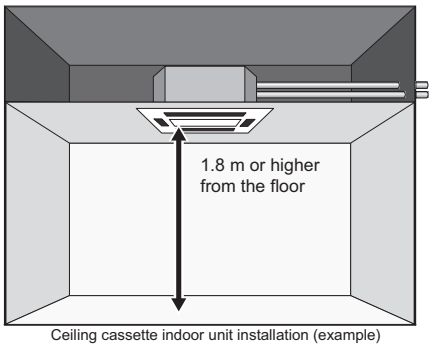
* When using indoor units with P055 to P096 capacity, connect them to two branch ports.

11-4-5 Precautions for installing indoor units

[1] Indoor unit installation location

- Do not use gas appliances or spray products near the unit.
  The refrigerant sensor may be triggered by propane, butane, and fluorinated gases contained in spray products, acetone and ethanol in drug or antiseptic solutions, dichloromethane in paint, and smoke from charcoal. In such cases, the sensor may need to be replaced.
- Install the indoor unit at a height of 1.8 m or higher from the floor, as shown in the figure on the right. (This height requirement applies to ceiling cassette, ceiling suspended, and wall-mounted types.)
  For duct installation, the requirements below must be satisfied.
  *Ceiling height must comply with building codes.

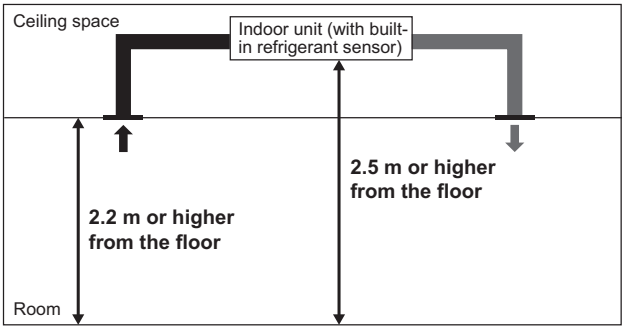
  For details, refer to the Installation Manual for the indoor unit.



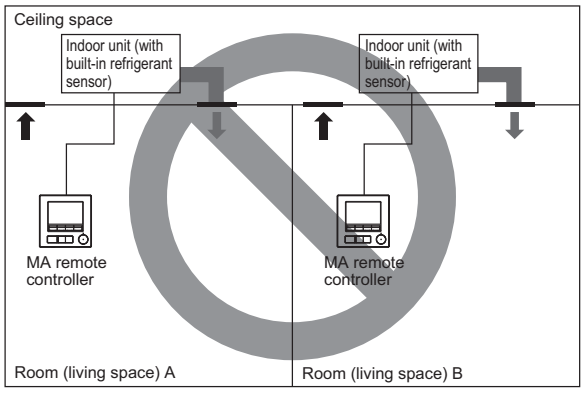
Ceiling cassette indoor unit installation (example)

■Duct installation requirements for ceiling concealed model

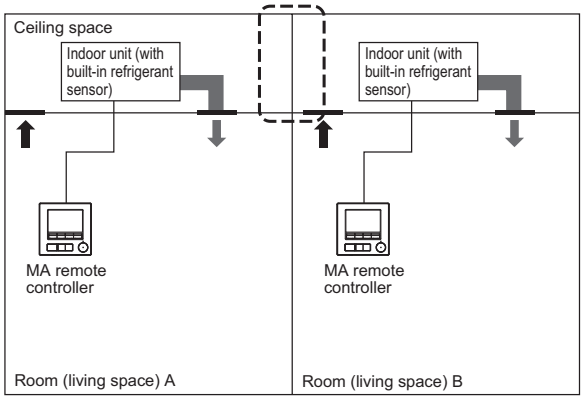
- Install the indoor unit at a height of 2.5 m or higher.
- Ensure the ceiling height (duct opening) is 2.2 m or higher.



- If two different rooms share the same space above the ceiling from which the indoor unit draws air, install a partition above the ceiling.

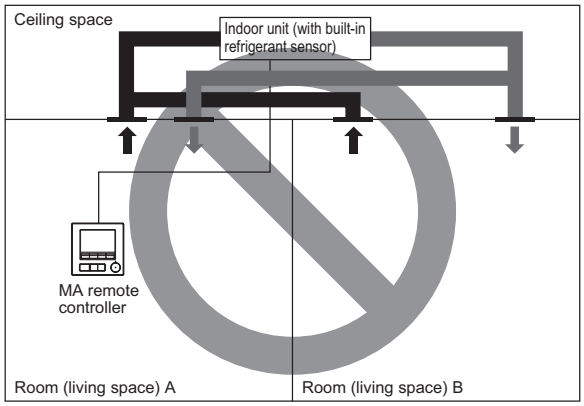


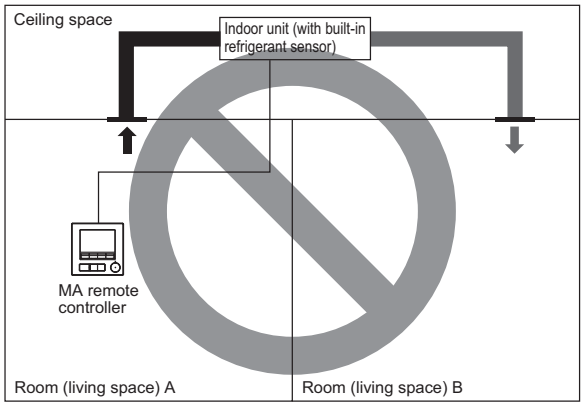
Partition the ceiling space into two for Rooms A and B.



*Install the partition in accordance with building codes.

♦Do not use a duct to draw in or blow out air from/to multiple rooms.





♦Operation when ducted indoor units connected to the BC controller or shut off valve kit are installed in the same room as other indoor units (including ductless units)

If the indoor units are installed as follows, change function setting No. 174 from "1" to "2" for the ducted indoor units.

(1) Indoor units (including ductless indoor units) connected to different ports on the same BC controller are installed in the same room.
Note that if those indoor units are connected to the same ports, there is no need to change the setting.

(2) Indoor units (including ductless indoor units) connected to different shut off valve kits are installed in the same room.

Note

If the refrigerant sensors in any of the indoor units detect a refrigerant leak or if the refrigerant sensors fail, the fans on all ducted indoor units to which this setting is applied will start.

[2] Enable/disable settings for refrigerant sensor (CNSB short circuit connector)

If the following condition is met, remove the CNSB short circuit connector from the indoor unit to disable the built-in refrigerant sensor. (Models that are not equipped with a built-in refrigerant sensor do not have the CNSB short circuit connector.)

Conditions for removal of the CNSB short circuit connector

Condition	Indoor unit
Safety device is not required (in large space).	Remove the CNSB short circuit connector *1
(For reference) Built-in refrigerant sensor on the indoor unit is used.	Do not remove the CNSB short circuit connector.

*1 Removing the CNSB short circuit connector will disable the built-in refrigerant sensor on the indoor unit.

11-4-6 Precautions for installing alarm device (MA remote controller, model name: TAR-43MAAUB or later)

[1] Installation location

Install the MA remote controller as an alarm device in a location where a facility manager works, such as a supervisor room or any room that requires safety devices. (This is not mandatory.)

*If the MA remote controller is used in a supervisor room, set the remote controller as a supervisor remote controller using the Main/Sub setting. For details, refer to the MA remote controller Installation Manual.

[2] Behavior of alarm device

Once the MA remote controller detects a refrigerant leak, it will issue an alarm and sound, and the operation lamp and backlight will blink.

[3] Connection of alarm device

Connect one MA remote controller (TAR-43MAAUB or later) to one indoor unit.

A table below shows the requirements for grouping of indoor units and connecting of multiple remote controllers to a group.

<MA remote controller (TAR-43MAAUB or later)>

Applicable system	Grouping of indoor units	Connection of multiple remote controllers to a group
R32 indoor units equipped with built-in refrigerant sensors	Allowed (*1) (*2) (*3)	Allowed *Do not use a sub remote controller as an alarm device. *Up to two remote controllers can be connected.
R32 indoor units set for large spaces	Allowed (*1)	

*1 Grouping connections between different refrigerant systems or between different system configurations are not allowed.

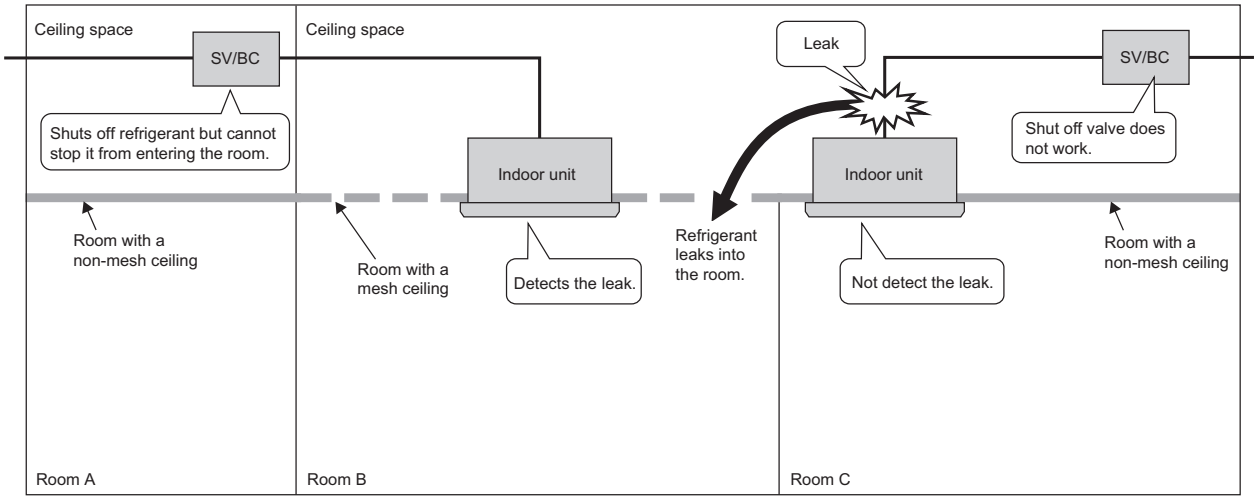
*2 Grouping connections across rooms are not allowed.

*3 The supervisor remote controller cannot be connected to grouped indoor units.

11-4-7 Precautions for mesh ceiling

For rooms with a mesh ceiling, note the following points for unit selection and determination of pipe locations.

- If refrigerant leaks from the unit or pipe above the ceiling, it may enter the room through the mesh ceiling.
- In the case shown below, if refrigerant leaks, the leak may be detected in a room with the mesh ceiling, but the shut off valve kit cannot stop the refrigerant leak.



11-4-8 Restrictions on installation environment of outdoor units

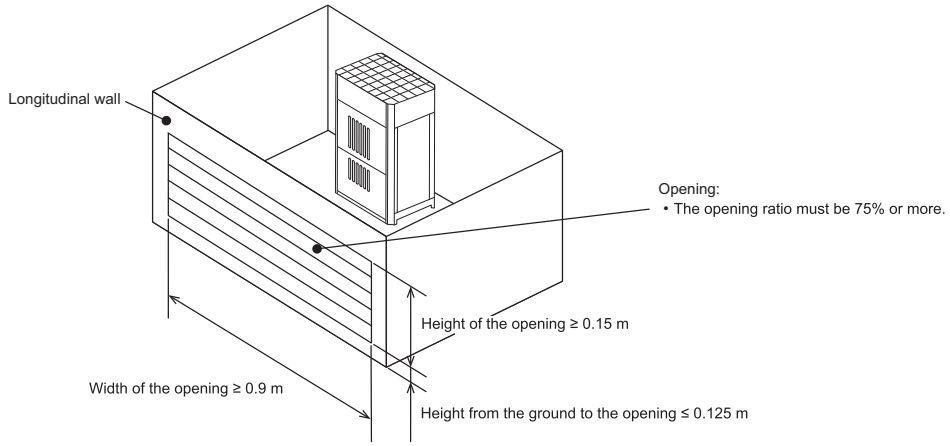
If the outdoor unit is installed in a place where the refrigerant easily stagnates, the refrigerant may burn in the case of refrigerant leakage. Be sure to follow the installation restrictions below.
When installing the outdoor units in such places, do not install combustion appliances such as boilers together. Leaked refrigerant may catch fire.

1. Restrictions when installing outdoor units in a machine room

If the outdoor unit is installed in a machine room, refer to the latest ANSI/ASHRAE 15 or CSA B52 standards and install the unit in accordance with UL60335-2-40 (Fourth Edition) GG.5DV.

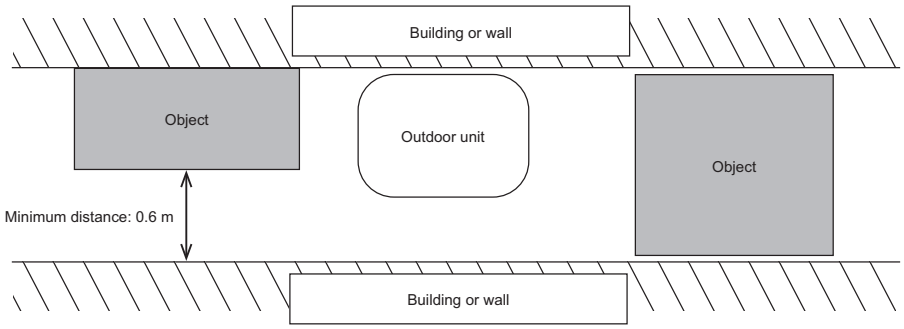
2. Restrictions when installing outdoor units in louvered space

When installing the outdoor unit in louvered space as shown in the figure below, follow the conditions for the openings described in the figure.



3. Restrictions when installing outdoor units in a confined space

When installing the outdoor unit in a confined space as shown in the figure below, be sure to leave a clearance of at least 0.6 m to prevent the stagnating refrigerant from reaching a high concentration and becoming flammable.
Refer to the Installation Manual or the Data Book of the outdoor unit for details on the required surrounding space for the outdoor unit.

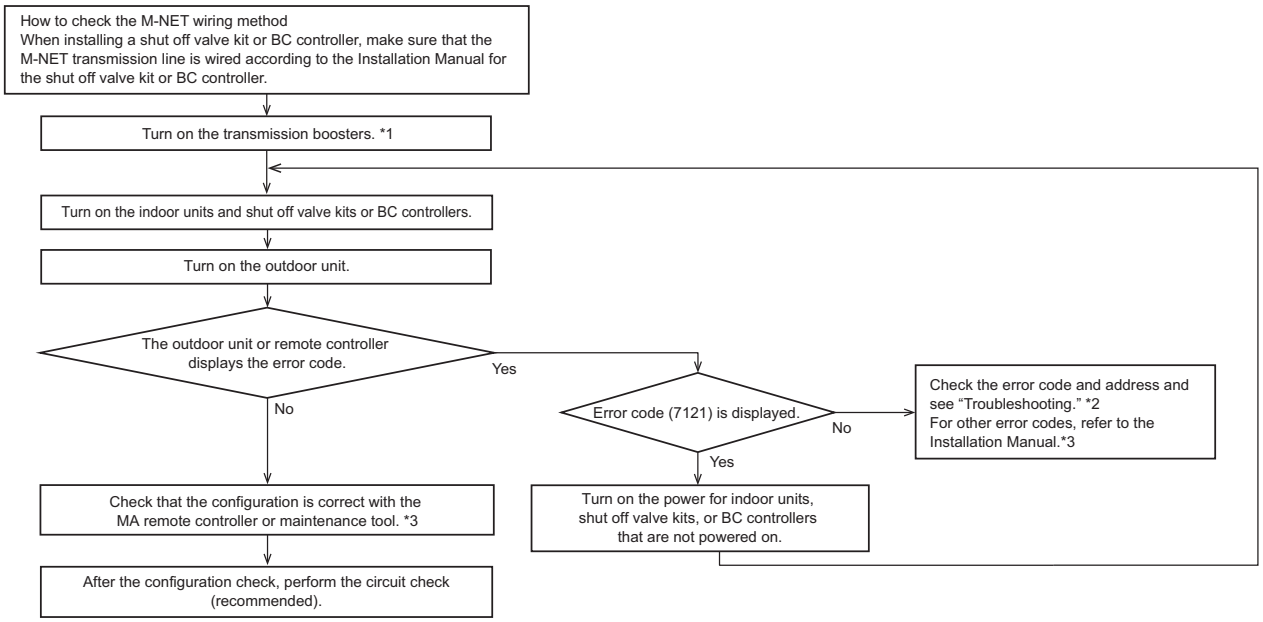


11-5 Precautions for Test Run

[Note]

- Turn on the outdoor units **after turning on the indoor units, shut off valve kits or BC controllers, and transmission boosters.**
- After turning on the system power, perform the circuit check (recommended) and test run.
  The system power refers to the power to all units in the same refrigerant circuit system (outdoor units, indoor units, shut off valve kits or BC controllers, and transmission boosters).
- Check the M-NET wiring according to the check flowchart before the circuit check and test run.
- The device managers are required to inform air conditioner users of necessary information by explaining it, posting it, or other means, so that they can handle a refrigerant leak according to [11-7 Actions to Take When Refrigerant Leaks]

<Check flowchart>



*1 Do this only when a transmission booster is used.
*2 For details, refer to the specified page. [11-9 Troubleshooting]
*3 For details, refer to the specified page. [11-9-2 Checking and Changing the System Configuration]

11-6 Precautions for Servicing

11-6-1 Check before Servicing

- In a service call, check the type of device refrigerant.
  Type of refrigerant charged in the product: R32
- In a service call, check the device symptoms.
  If you will perform the service for refrigeration cycle systems, be sure to check the symptoms with the issued Data Book and Service Handbook.
- Check of required tools: Tools to be used need to be selected according to the type of refrigerant. For details, refer to the specified page. [1-1-2 Tool Preparation]
- Check of piping to connect: Check the type of refrigerant used in the device to be relocated or replaced.
- If the refrigerant gas leaks during servicing and the residual gas comes into contact with a flame, toxic gases, ignition, and fire may result. Ventilate workplaces sufficiently during work.
- Check with the contractor if an insufficient amount of refrigerant has been charged to the specified amount during installation.
- Ensure safety in brazing work space by ventilating the space and carrying a potable refrigerant leak detector before starting the work.

11-6-2 Refrigerant Charging during Servicing

- When a part or compressor in the refrigerant circuit is replaced
  Recover the existing refrigerant in the system completely to the outside of the system. After replacing a part or compressor, check for leakage and perform vacuum drying and then recharge the refrigerant to the specified amount.

  Key points for work

  After removing a part, immediately attach a replacement part to the piping.
  When cooling parts or piping, do not allow water or moisture to enter the refrigerant circuit.

11-6-3 Circuit Check

The following two points can be checked with the circuit check.
It is recommended to perform the circuit check in a test run.

- Whether the alarm is activated with the leak detection signal
- Whether the shut off valve is activated when the refrigerant leaks

11-6-4 How to Perform the Circuit Check

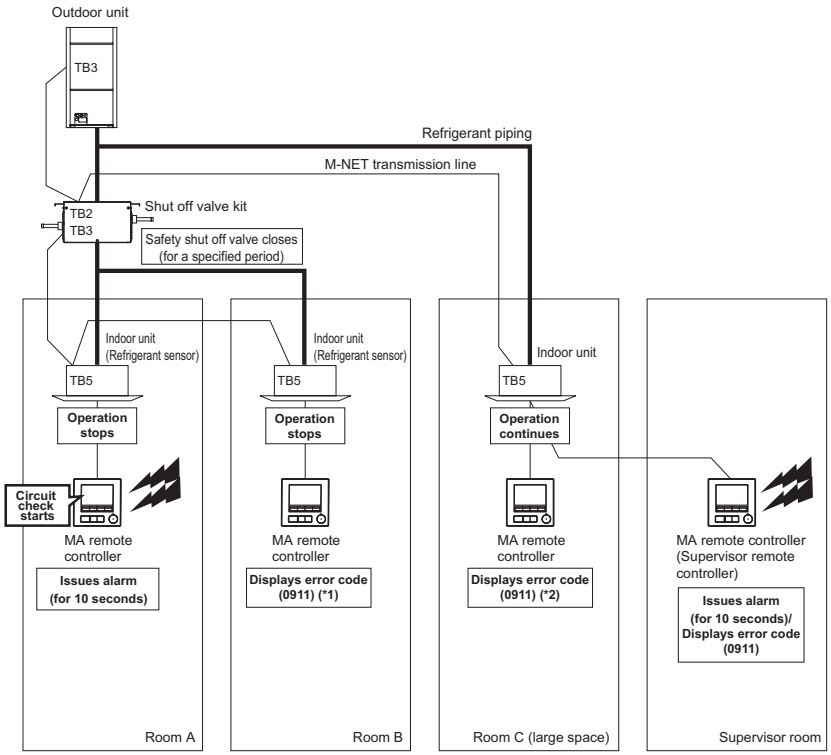
[Note]

- Note that the check method differs according to the system configuration.
- If the supervisor remote controller is installed, check if the alarm of the supervisor remote controller is functioning to ensure that the safety device is appropriately operating. After checking, turn on and off the start/stop button of the main remote controller to cancel the error code (0911) and perform the following circuit check.
- Do not perform the circuit check simultaneously from multiple devices. Additionally, do not operate other devices during the circuit check.

[For Y series]

The following diagrams show the systems during the circuit check.
The circuit check is performed on the MA remote controllers of Rooms A and B.

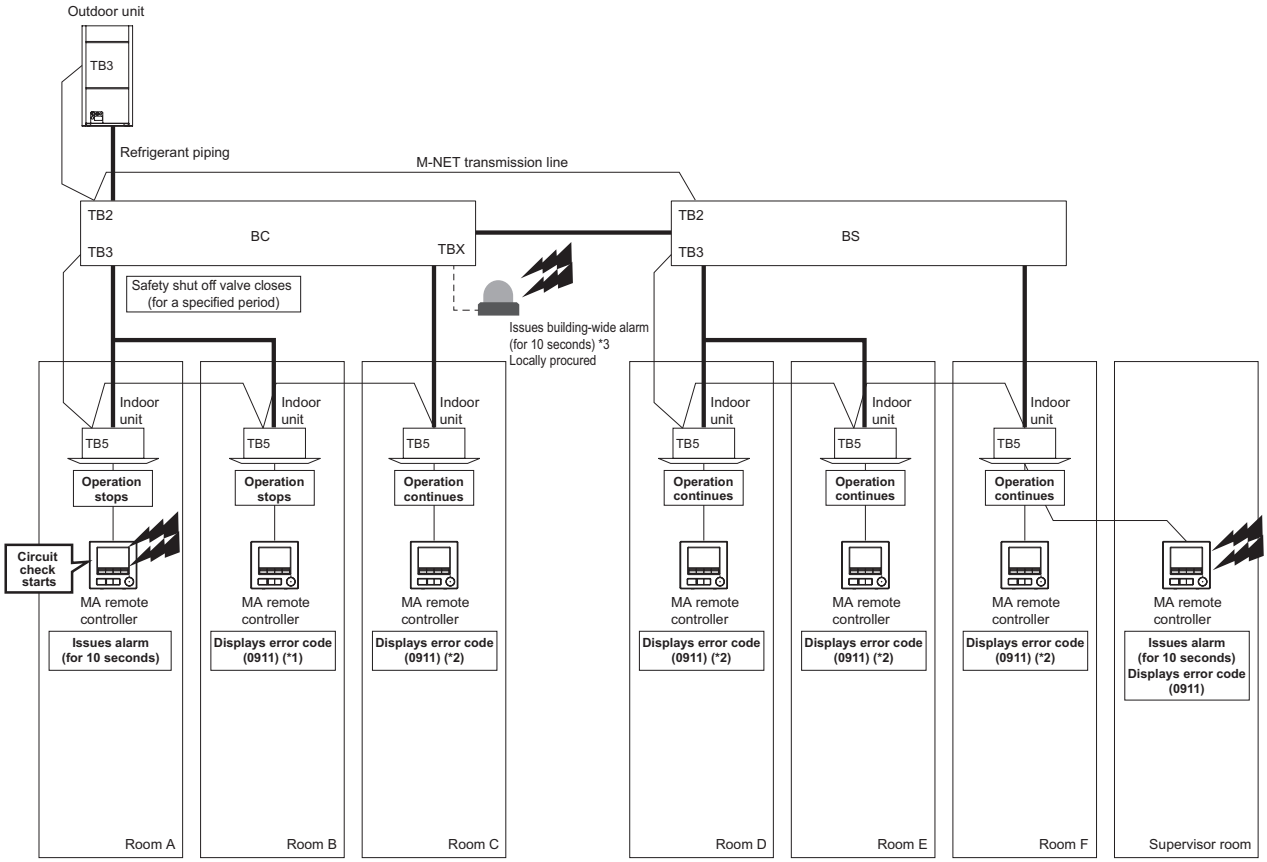
[Circuit check with the configuration using the built-in refrigerant sensor of the indoor unit (diagram of the circuit check of Room A)]



*1 While the indoor unit is stopped, the error code (0911) may not be displayed depending on the check start timing.

*2 While the indoor unit is in operation, the error code (0911) is displayed at the upper left of the remote controller screen.
While the indoor unit is stopped, the error code (0911) is not displayed.

[For R2 series]

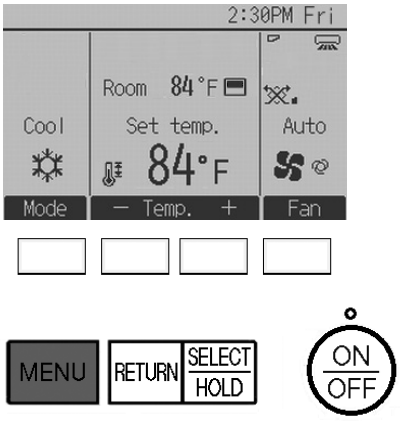


*1 While the indoor unit is stopped, the error code (0911) may not be displayed depending on the check start timing.
*2 While the indoor unit is in operation, the error code (0911) is displayed at the upper left of the remote controller screen. While the indoor unit is stopped, the error code (0911) is not displayed.
*3 A field-supplied building-wide alarm can be installed in case an indoor unit detects a refrigerant leak. For the setup, refer to the Installation Manual for the BC controller.

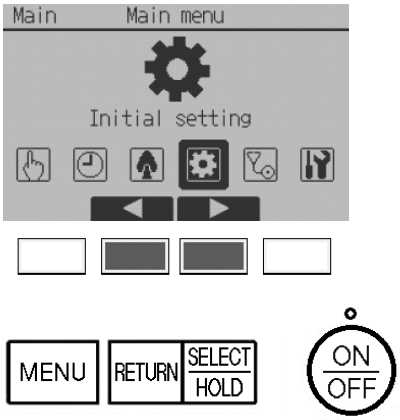
1. When the circuit check is performed from the MA remote controller (TAR-43MAAUB)

[Procedure]

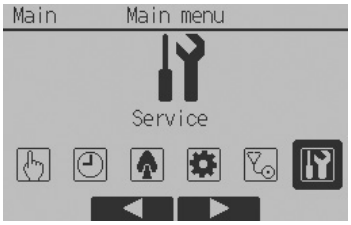
1) Press the **MENU** button on the main screen.
The main menu screen appears.



2) Press the **F2** or **F3** button to select the item.
Pressing the **F2** button moves the cursor to the left.
Pressing the **F3** button moves the cursor to the right.



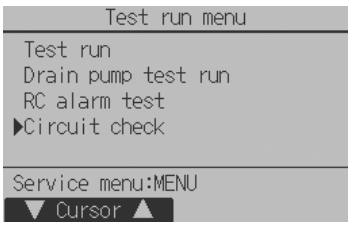
3) Select the service menu icon with the cursor and press the **SELECT/HOLD** button.
Each menu item is displayed.



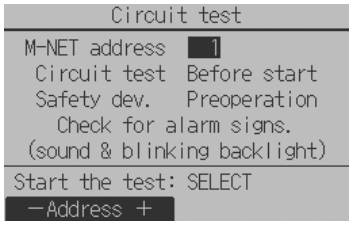
4) Select “Test run” with the cursor and press the **SELECT/HOLD** button.



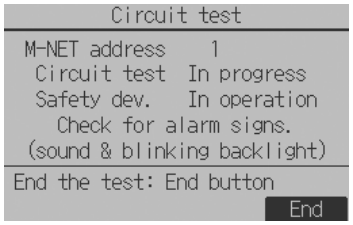
5) Select “Circuit check” with the cursor and press the **SELECT/HOLD** button.



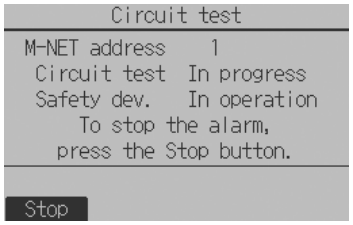
6) Check the circuit check start screen and press the **SELECT/HOLD** button.
The circuit check starts.



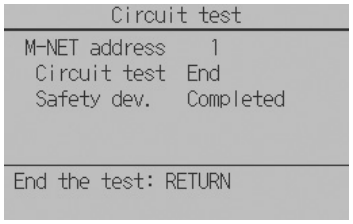
- ♦The MA remote controller will issue an alarm and sound, and the operation lamp and backlight will blink. (For approximately 10 seconds)
  * The operation duration of the safety shut off valve differs according to the system. (Approximately 10 seconds to 2 minutes)
  * If the supervisor remote controller is connected, it will also issue an alarm and sound, and the operation lamp and backlight will blink. (For approximately 10 seconds)



- ♦Press the **[Stop]** button to stop the alarm.
  After the stop button is pressed, the stop confirmation screen appears.
- ♦Select [Stop].
  The alarm stops.



7) After the safety shut off valve operation completion is displayed, press the **RETURN** button.
The circuit check is complete.



[Troubleshooting]

- ♦**When the circuit check is stopped**
  - ♦The circuit check is stopped and the check is incomplete.
  - ♦If the error of the error code (0911) has occurred in the units other than the circuit check target units, cancel the error. For details of the error code, refer to the specified page. [7 Troubleshooting Using Error Codes]
  - ♦If the supervisor remote controller is installed, turn on and off the start/stop button of the main remote controller to cancel the error of the error code (0911).
- ♦**When the circuit check result is abnormal**

  There may be an abnormality detection or power failure. Check the unit statuses.
- ♦**If an alarm is not issued or the operation lamp and backlight fail to blink**

  The remote controller may be malfunctioning. Stop using it and contact your dealer (installer, service shop).
- ♦**How to delete the error display on the supervisor remote controller**

  Turn on and off the start/stop button of the main remote controller.
  * The error display will disappear in five minutes after the circuit check ends.
- ♦**If "Cannot start circuit check" is displayed**

  If the system configuration does not need safety measures, the circuit check cannot be performed.

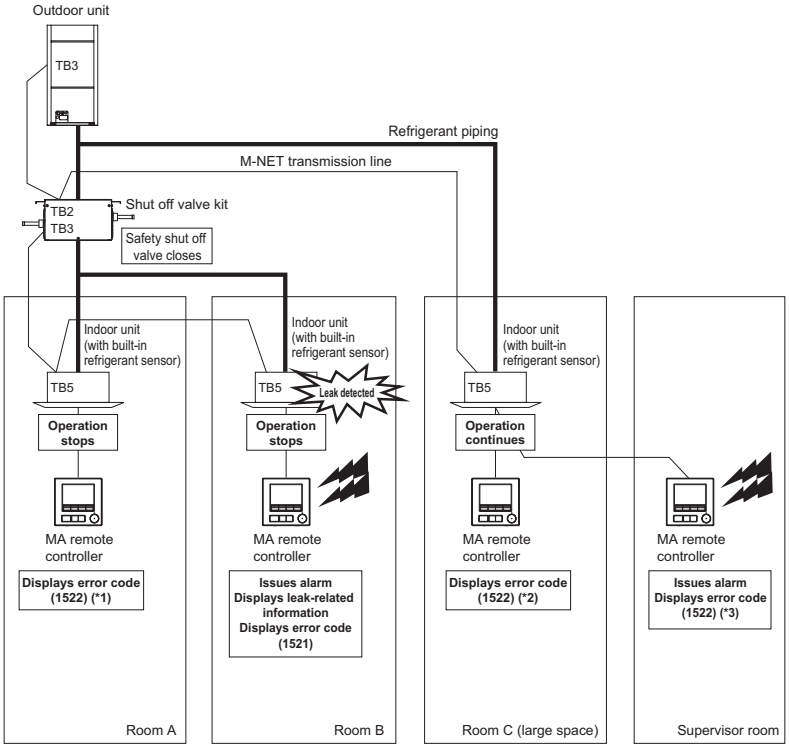
11-7 Actions to Take When Refrigerant Leaks

[Note]

- When refrigerant leaks, ventilate the place sufficiently by opening the windows and doors or other means. Then, immediately report the alarm issuance to the device manager.

The following diagrams show the systems when refrigerant leaks.

[For Y series]

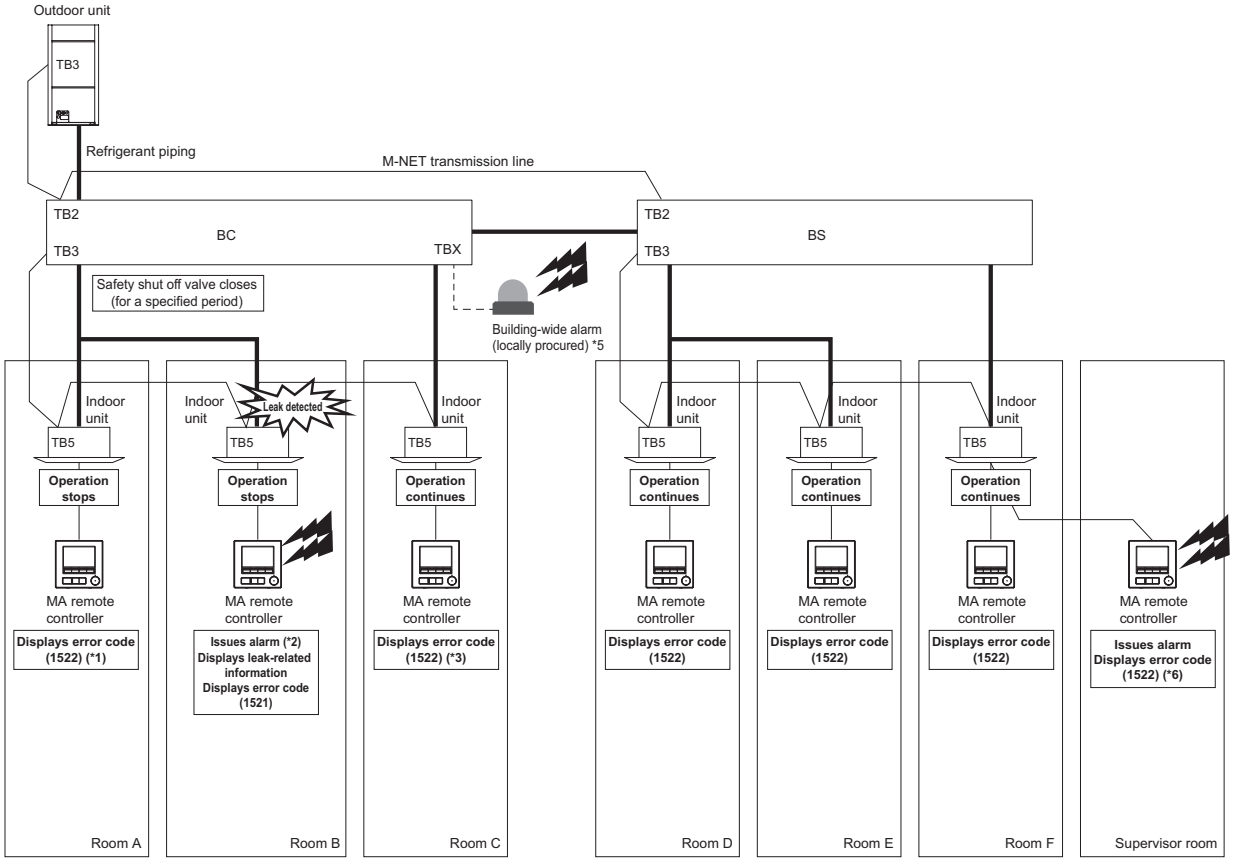


*1 While the indoor unit is stopped, the error code (1522) may not be displayed depending on the leak detection timing.

*2 While the indoor unit is in operation, the error code (1522) is displayed at the upper left of the remote controller screen.
While the indoor unit is stopped, the error code (1522) is not displayed.

*3 Since the error codes (1521/1524/ 5558) are prioritized, the error code (1522) may not be displayed.

[For R2 series]

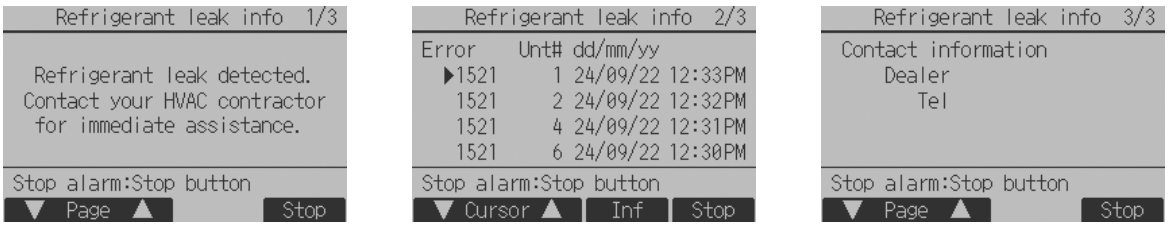


*1 While the indoor unit is stopped, the error code (1522) may not be displayed depending on the leak detection timing.
*2 While the indoor unit is in operation, the error code (1522) is displayed at the upper left of the remote controller screen. While the indoor unit is stopped, the error code (1522) is not displayed.
*3 Alarm issuance can be disabled. For how to disable the alarm issuance, refer to the Installation Manual for the MA remote controller.
*4 Indoor units not connected to the branch that is connected to the indoor unit that has detected the leak can continue to operate.
*5 A field-supplied building-wide alarm can be installed in case an indoor unit detects a refrigerant leak. For the setup, refer to the Installation Manual for the BC controller.
*6 Since the error codes (1521/1524/ 5558) are prioritized, the error code (1522) may not be displayed.

11-7-1 In Case of the Alarm in a Room

If the MA remote controller is used

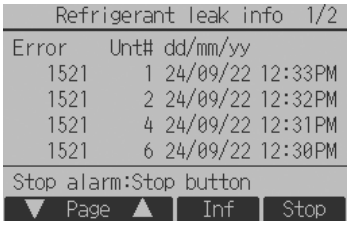
- The remote controller of the detected indoor unit sounds an alarm, the operation lamp and backlight blink, and the following screen appears.

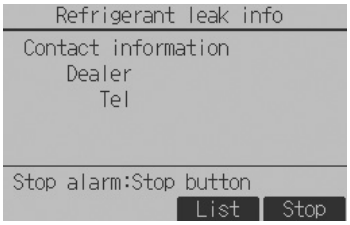


- Ventilate the room sufficiently by opening the windows and doors or other means and immediately report the alarm issuance to the device manager.
- Follow the on-screen instructions to stop the alarm.
  * This stops the alarm but does not cancel the error.
- After the alarm stops, the error can be canceled. However, if the error is canceled with the causes unremoved, the remote controller will detect the error again and sound an alarm.
- Check the refrigerant leak according to [11-7-3 Flowchart for Refrigerant Leak].

11-7-2 In Case of the Alarm in the Supervisor Room

♦The remote controller sounds an alarm, the operation lamp and backlight blink, and the following screen appears.

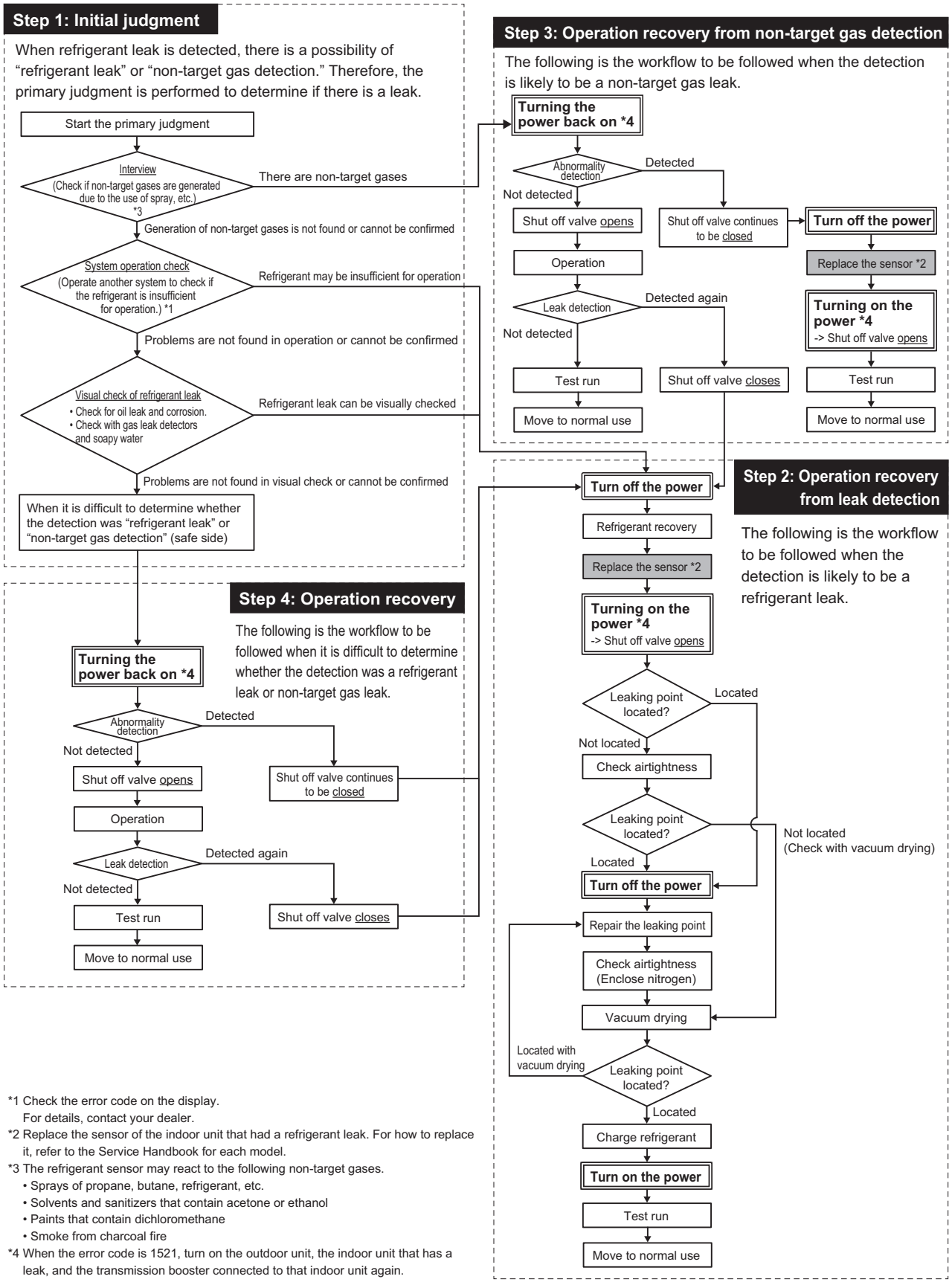




♦Check the detected indoor unit and ventilate the room sufficiently by opening the windows and doors or other means.
♦Follow the on-screen instructions to stop the alarm.
* This stops the alarm but does not cancel the error.
♦Check the refrigerant leak according to [11-7-3 Flowchart for Refrigerant Leak].

11-7-3 Flowchart for Refrigerant Leak

[For Y series]



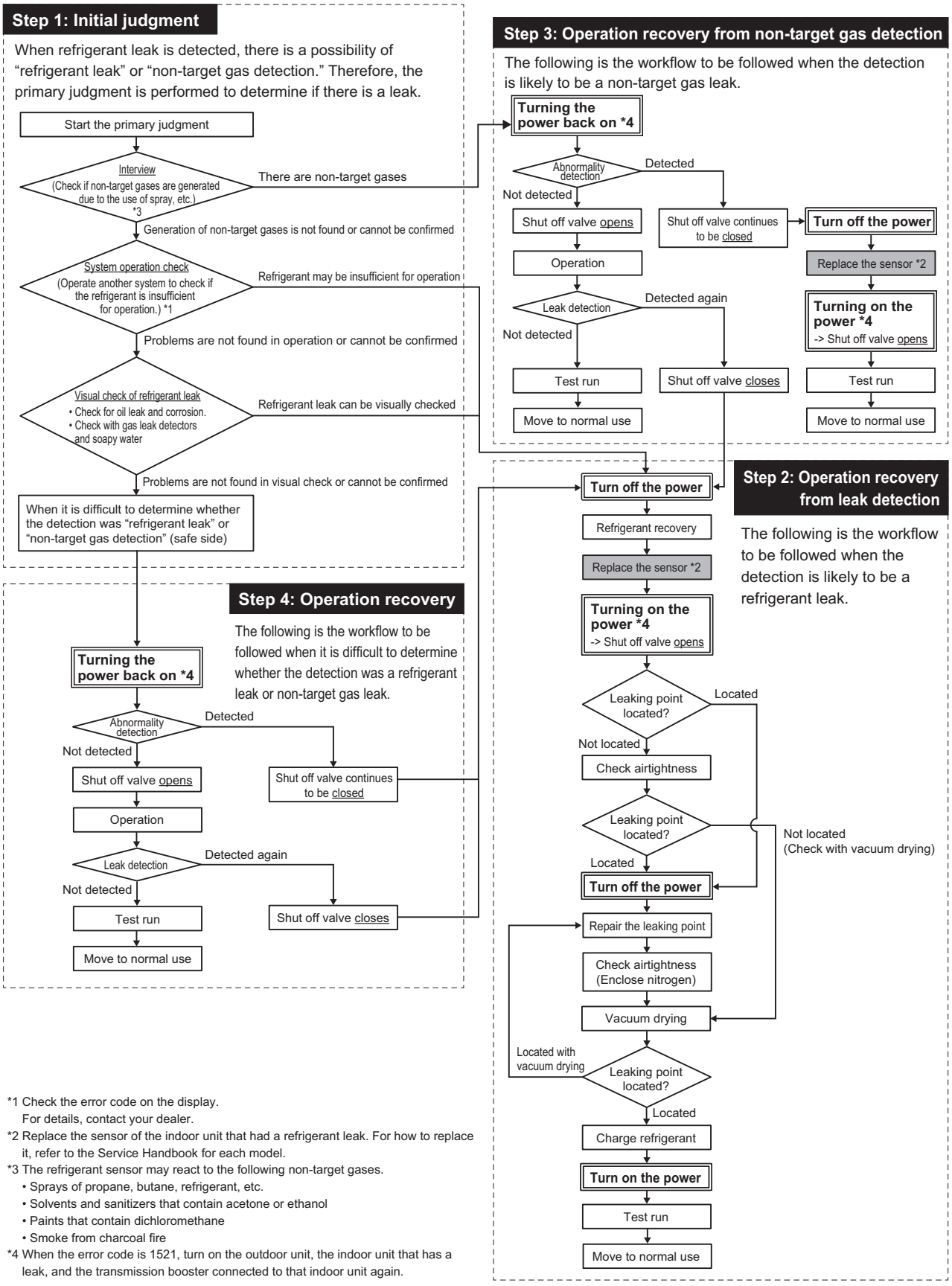
*1 Check the error code on the display.
For details, contact your dealer.

*2 Replace the sensor of the indoor unit that had a refrigerant leak. For how to replace it, refer to the Service Handbook for each model.

*3 The refrigerant sensor may react to the following non-target gases.
- Sprays of propane, butane, refrigerant, etc.
- Solvents and sanitizers that contain acetone or ethanol
- Paints that contain dichloromethane
- Smoke from charcoal fire

*4 When the error code is 1521, turn on the outdoor unit, the indoor unit that has a leak, and the transmission booster connected to that indoor unit again.

[For R2 series]



*1 Check the error code on the display.
For details, contact your dealer.

*2 Replace the sensor of the indoor unit that had a refrigerant leak. For how to replace it, refer to the Service Handbook for each model.

*3 The refrigerant sensor may react to the following non-target gases.
- Sprays of propane, butane, refrigerant, etc.
- Solvents and sanitizers that contain acetone or ethanol
- Paints that contain dichloromethane
- Smoke from charcoal fire

*4 When the error code is 1521, turn on the outdoor unit, the indoor unit that has a leak, and the transmission booster connected to that indoor unit again.

11-8 Other Services

1. List of services

Check the contents of servicing and maintenance and perform work with safety in mind.

Contents	Procedures
(1) Replacement of indoor unit boards (with manual address setting)	This page below
(2) Replacement of indoor unit refrigerant sensors	This page below
(3) Replacement of MA remote controllers	This page below

(1) Replacement of indoor unit boards (with manual address setting)

[Procedure]

1) Turn off the target indoor unit.
2) Remove the control box cover.
3) Replace the board.
   Set the same address as the removed board for the indoor unit after replacement.
4) Turn on the indoor unit.

* Be sure to replace the boards one by one.
* For details of the replacement procedure, refer to the Service Handbook for the indoor unit.

(2) Replacement of indoor unit refrigerant sensors

[Procedure]

1) Turn off the target indoor unit.
2) Replace the refrigerant sensor.
3) Turn on the indoor unit.

* For details of the replacement procedure, refer to the Service Handbook for the indoor unit.
* In case of refrigerant leak, proceed with the replacement work according to [11-7-3 Flowchart for Refrigerant Leak].

(3) Replacement of MA remote controllers

[Procedure]

1) Turn off the target indoor unit.
2) Replace the remote controller.
3) Turn on the indoor unit.

* For servicing, refer to the Installation Manual (Installation) for the remote controller.

11-9 Troubleshooting

[Memo]
The system power refers to the power to all units in the same refrigerant circuit system (outdoor units, indoor units, shut off valve kits, BC controllers, and transmission boosters).

11-9-1 Troubleshooting List

Item	Symptom	Remedy
When the first power-on was performed in an incorrect order		
When the outdoor unit was tuned on before the indoor units and shut off valve kits/BC controllers were turned on	The seven-segment LED display of the outdoor unit and the remote controller show the error code (7121).	Turn the power back on in the following order. (After turning on the indoor units and the shut off valve kits/BC controllers, turn on the outdoor unit.)
When the power was shut off by mistake (including power failures)		
When the power to the entire system was shut off	-	Turn the power back on in the following order. (After turning on the indoor units and the shut off valve kits, turn on the outdoor unit/BC controllers.)
When the power to the outdoor unit was shut off	The remote controller displays the error code (6607).	Turn the power back on.
When the power to the shut off valve kit was shut off	♦The safety shut off valve closes. ♦The indoor unit turns off the thermostat, disabling cooling and heating.	Turn the power back on.
When the power to the BC controller was shut off	♦The built-in shut off valve closes. ♦The indoor units in the system turn off the thermostats.	Turn the power back on.
When the power to the indoor unit was shut off	No operation takes place.	Turn the power back on.
When the power to the indoor unit and shut off valve kit was shut off	♦The safety shut off valve closes. ♦No operation takes place.	Turn the power back on.
When the connection configuration, including partitioning, was changed		
When the number of indoor units was changed	-	For details, refer to the specified page. [11-9-2 Checking and Changing the System Configuration]
When the number of shut off valve kits was changed	-	
When the M-NET wiring connections were changed without changing the numbers of indoor units and shut off valve kits	-	
When an air tightness test and vacuum drying are required (When the shut off valve needs to be opened) When the power to the shut off valve kit/BC controller is shut off, the safety shut off valve closes, making it impossible to perform air tightness tests and vacuum drying.	-	[When the power is on] After shutting off the power to the outdoor unit, shut off the power to the shut off valve kit/BC controller and indoor unit. [When the power is off] Turn on the shut off valve kit/BC controller and the indoor unit connected to that shut off valve kit/BC controller. * The product is shipped with the safety shut off valves of the shut off valve kit and BC controller opened. If the power has never been turned on after shipment, air tightness tests and vacuum drying can be performed without the power-on procedure.
The alarm was activated due to the use of sprays, etc.	The system responds in the same way as it detects a leak.	For details, refer to the specified page. [11-7 Actions to Take When Refrigerant Leaks]

Item	Symptom	Remedy
When the remote controller installed in the supervisor room has not been set as the supervisor remote controller	The remote controller may fail to sound an alarm when the system detects a leak and during the circuit check.	Refer to the Installation Manual (Settings) for the MA remote controllers to set the remote controller as the supervisor remote controller.
When the refrigerant is recovered	-	For details, refer to the specified page. [11-10 Other Precautions]

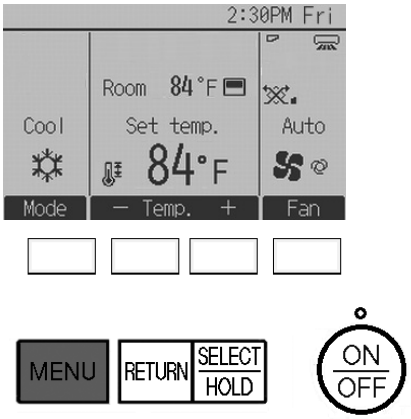
11-9-2 Checking and Changing the System Configuration

1. Checking the system configuration

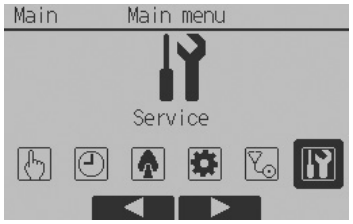
The system configuration can be checked by operating the MA remote controller (TAR-43MAAUB or later) after the interlock inspection.
Check it in the following procedure.

[Procedure]

1) Press the **MENU** button on the main screen.
The main menu screen appears.



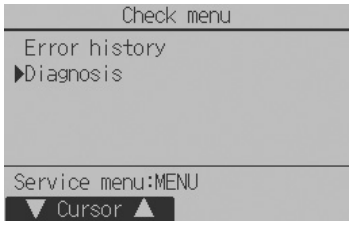
2) Select the service menu icon with the cursor and press the **SELECT/HOLD** button.
Each menu item is displayed.



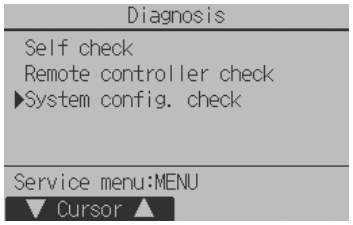
3) Select “Check” with the cursor and press the **SELECT/HOLD** button.
The check menu is displayed.



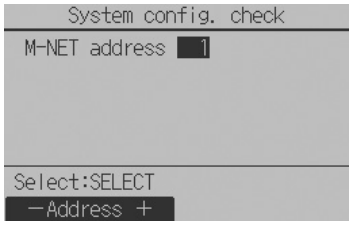
4) Select “Diagnosis” with the cursor and press the **SELECT/HOLD** button.
The diagnosis menu is displayed.



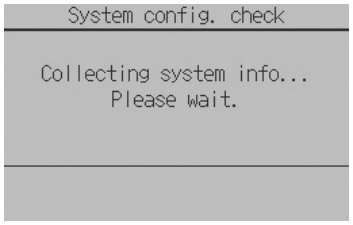
5) Select “System config. check” with the cursor and press the **SELECT/HOLD** button.



6) Check the system configuration check screen and press the **SELECT/HOLD** button.
Check the indoor unit address.

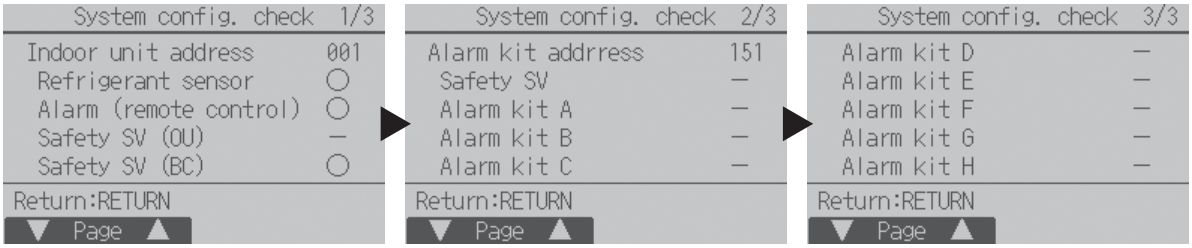


7) The system configuration information collection starts.

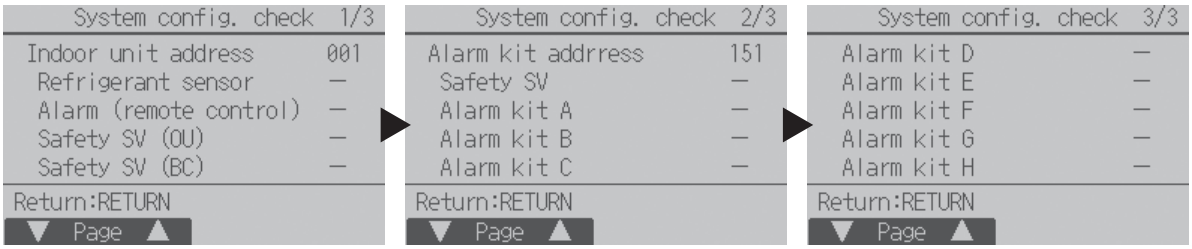


8) When the information collection ends, the following system configuration check screens are displayed.
Note that the screens to be displayed differ according to the system configuration.
"○" represents the enabled status and "–" represents the disabled status.

[Configuration with the built-in refrigerant sensor of the indoor unit]



[Configuration that needs no safety measure (use with large space configuration)]



* When safety measures are not required, the refrigerant sensor and alarm (remote controller) functions are disabled.

1. Changing the system configuration

[Memo]

The system power refers to the power to all units in the same refrigerant circuit system (outdoor units, indoor units, shut off valve kits, BC controllers, and transmission boosters).

[Note]

This section summarizes the procedures. For details of the work, such as plumbing, refer to the corresponding pages of each Installation Manual and this Manual.

<table>
<tr><th>Item</th><th>Procedure</th></tr>
<tr><td>When the unit is removed
* Before shutting off the system power, recover the refrigerant. For details, refer to the specified page. [11-10 Other Precautions]</td><td>■ When the indoor unit and shut off valve kit are removed
1. Shut off the system power.
2. Remove the target units.
3. Turn the system power back on. Turn on the outdoor unit last.</td></tr>
<tr><td rowspan="5">When a unit is added
* Before shutting off the system power, recover the refrigerant. For details, refer to the specified page. [11-10 Other Precautions]</td><td>For Y series</td></tr>
<tr><td>■ When an indoor unit that needs no safety device is added
1. Shut off the system power.
2. Install a new indoor unit.
3. Turn the system power back on. Turn on the outdoor unit last.</td></tr>
<tr><td>■ When an indoor unit to be connected to the shut off valve kit is added
1. Shut off the system power.
2. Install a new indoor unit.
3. Turn the system power back on. Turn on the outdoor unit last.</td></tr>
<tr><td>■ When a shut off valve kit and an indoor unit to be connected to that shut off valve kit are added together
1. Shut off the system power.
2. Install a new shut off valve kit and indoor unit.
3. Turn the system power back on. Turn on the outdoor unit last.</td></tr>
<tr><td>For R2 series</td></tr>
<tr><td>When the M-NET wiring is changed without changing the number of units</td><td>■ When an indoor unit to be connected to the BC controller (BC/BS) is added
1. Shut off the system power.
2. Install a new indoor unit.
3. Turn the system power back on. Turn on the outdoor unit last.</td></tr>
<tr><td></td><td>For Y series</td></tr>
<tr><td></td><td>■ When the terminal connected to the M-NET wiring of the indoor unit is changed from the TB3 terminal of one shut off valve kit to that of another shut off valve kit
■ When the terminal connected to the M-NET wiring of the indoor unit is changed from the TB3 terminal of the outdoor unit to that of the shut off valve kit
■ When the terminal connected to the M-NET wiring of the indoor unit is changed from the TB3 terminal of the shut off valve kit to that of the outdoor unit
* If the error code 7102, 7119, 7120, or 7121 is displayed, steps 3 to 6 are not required.
1. Shut off the system power.
2. Change the terminal connected to the M-NET wiring of the indoor unit.
3. Turn on the DIP switch (SW 5-2) on the outdoor unit control board.
4. Turn on the outdoor unit and wait for five minutes.
5. Shut off the power to the outdoor unit and wait for five minutes.
6. Turn off the DIP switch (SW 5-2) on the outdoor unit control board.
7. Turn the system power back on. Turn on the outdoor unit last.</td></tr>
</table>

11-10 Other Precautions

11-10-1 Precautions for Refrigerant Recovery, Vacuum Drying, and Air Tightness Test

Recover the refrigerant without shutting off the system power.
If an airtightness test, vacuum drying, refrigerant recovery, or refrigerant charging is necessary with the power off, turn off the power to the outdoor unit or heat source unit first, and then turn off the power to the BC controller/the shut off valve kit and the power to the indoor units. When turning on the power, start the BC controller/the shut off valve kit and indoor units first, and then start the outdoor unit or heat source unit. (If the BC controller/the shut off valve kit or indoor unit is turned off first, the shut off valve may close, resulting in inadequate refrigerant recovery and potential injuries from a refrigerant burst or similar incidents while removing the unit.)

11-10-2 Precautions That Must Be Taken for Maintenance

Device managers must make sure that the environment of installed safety measures is maintained.
Strictly follow [11-3 Safety for Servicing] when performing maintenance work.

11-10-3 Precautions That Must Be Taken for Removal and Disposal

You must be careful about the stagnation of leaked refrigerant depending on the installation conditions. Follow the instructions below.

- When removing the indoor unit, be sure to perform refrigerant recovery or pump down before dismounting the piping to ensure there is no residual refrigerant in the circuit. Never use heat or fire when removing the indoor unit. If you must use fire, ensure there is no residual refrigerant in the circuit.
- When removing the outdoor unit, be sure to perform refrigerant recovery or pump down before dismounting the piping to ensure there is no residual refrigerant in the circuit. Never use heat or fire when removing the outdoor unit. If you must use fire, ensure there is no residual refrigerant in the circuit.
- Strictly follow [11-3 Safety for Servicing] when removing and discarding units.

Service Handbook

Model

TUHYE072, E096, E120, E144, E168, E1923(4)AMM0AN
TUHYE264, E288, E312, E336, E360, E3843(4)BMM0AN

TUHYH072, H096, H1203(4)AMM0AN
TUHYH144, H192, H2403(4)BMM0AN

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