TRANE®

AIR CONDITIONER

MITSUBISHI ELECTRIC

2025

R32

Service Handbook

Model

TQRYP072, 096, 120, 144, 168, 192, 216, 2403(4)AMM0AN

TQRYP144, 168, 192, 216, 240, 288, 312, 3363(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.

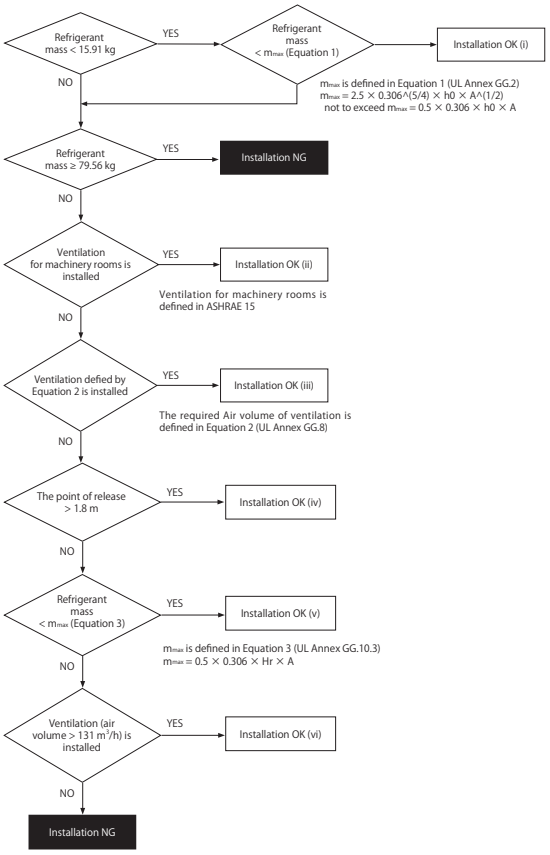
If a leak is suspected, all naked flames shall be removed/extinguished.

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 a FLAMMABLE REFRIGERANT is used, alloys used indoors to join refrigerant containing connections shall have a melting point (liquidus temperature) greater than 427°C [801°F].

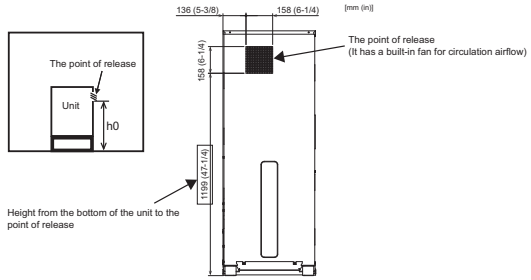
The appliances are installed with secured location with restricted areas where it is inaccessible to the public. Please install the heat source unit in accordance with the following. If necessary, take appropriate safety measures in accordance with UL standards. If there are different safety measure requirements due to building codes or other regulations, please take appropriate measures that take those into account as necessary.

Fig. 1
Installation flow chart according to UL standards



(i) If the amount of refrigerant is less than m_{max} calculated by Equation 1, installation is possible.
$m_{max} = 2.5 \times 0.306^{(5/4)} \times h0 \times A^{(1/2)}$ not to exceed
$m_{max} = 0.5 \times 0.306 \times h0 \times A$ ···Equation 1
h0: The vertical distance from the floor to the point of release (see Fig. 2) when the appliance is installed
A: The room area
m2: 15.91 kg

Fig. 2
h0 and the point of release in appliance



(ii) Requirements for mechanical ventilation for machinery rooms
Ventilation for machinery rooms shall comply with applicable sections of ANSI/ASHRAE 15 (USA) or CSA B52 (Canada).

(iii) The required Air volume of ventilation Q is defined in Equation 2.
Mechanical ventilation shall be made to the outdoors.
$Q = (mc - m_{max}) \times 2 \times 60/(4 \times 0.306)$ ⋯Equation 2
mc: Refrigerant charge in the system
m_{max}: 2.5 × 0.306^(5/4) × h0 × A^(1/2) or m2, whichever is lower
h0: The vertical distance from the floor to the point of release (see Fig. 2) when the appliance is installed
A: The room area
m2: 15.91 kg
When performing ventilation in conjunction with the unit, there are two methods.
For details on the connection methods, refer to the manual of each optional part.
1. Activate ventilation in conjunction with the refrigerant leak sensor detection built into the unit.
Optional part: PAC-SC47SA-E
2. Perform continuous ventilation operation and stop the unit when the ventilation airflow falls below Q.
Optional part: PAC-SC46NA-E

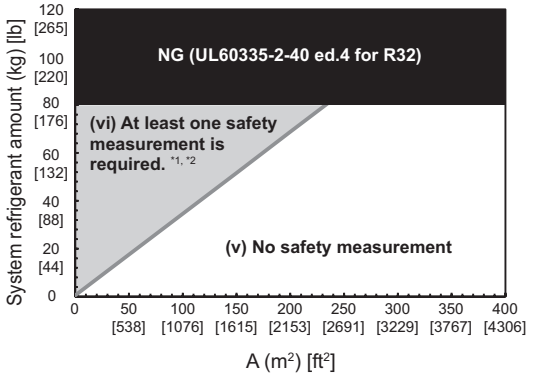
(iv) The vertical distance from the floor to the point of release (h0) > 1.8 m
If h0 is higher than 1.8 m, no any safety measurement is required.
h0: The vertical distance from the floor to the point of release (see Fig. 2) when the appliance is installed

(v), (vi) The vertical distance from the floor to the point of release (h0) < 1.8 m
If the amount of refrigerant is over than m_{max} calculated by Equation 3, please perform ventilation in accordance with UL standards.
Mechanical ventilation shall be made to the outdoors.
(In the case of mechanical ventilation, the ventilation airflow should be greater than 131 m^3/h).
The method for performing mechanical ventilation in conjunction with the unit is the same as (iii).
$m_{max} = 0.5 \times 0.306 \times Hr \times A$ ⋯Equation 3
m_{max}: Maximum refrigerant charge in the system
Hr: The room height (but not more than 2.2 m unless h0 is higher than 2.2 m)
A: Room floor area

Table 1
Refrigerant concentration and required safety measure (the room height = 2.2 m [7-3/16 ft])

Amin		mc			Amin		mc		
m^2	ft^2	kg	lb	oz	m^2	ft^2	kg	lb	oz
10	107.7	3.3	7	4	130	1399.4	43.7	96	5
20	215.3	6.7	14	12	140	1507	47.1	103	13
30	323	10.0	22	0	150	1614.6	50.4	111	1
40	430.6	13.4	29	8	160	1722.3	53.8	118	9
50	538.2	16.8	37	0	170	1829.9	57.2	126	1
60	645.9	20.1	44	5	180	1937.6	60.5	133	6
70	753.5	23.5	51	12	190	2045.2	63.9	140	14
80	861.2	26.9	59	4	200	2152.8	67.3	148	5
90	968.8	30.2	66	9	210	2260.5	70.6	155	10
100	1076.4	33.6	74	1	220	2368.1	74.0	163	2
110	1184.1	37.0	81	9	230	2475.7	77.4	170	10
120	1291.7	40.3	88	13	240	2583.4	79.5	175	4

Fig. 3
Refrigerant concentration and required safety measure
(the room height = 2.2 m [7-3/16 ft])



***1 The system is UL-Listed for the ETRS (Enhanced Tightness Refrigerant System). Therefore, please note that the installation requirements indicated in Fig. 3 are mitigated compared to ASHRAE 15 or local building codes.**
***2 For safety reasons, do not install a shut off valve kit of other manufacturers in the refrigerant circuit to prevent equipment failure.**

[Regulatory requirements for mechanical ventilation]

(1) Mechanical ventilation shall be operated continuously or be switched on by the refrigerant detection system.

(2) During the continuous operation of the fan, the airflow shall be detected or monitored continuously. If the airflow is reduced, the unit operation shall be stopped.

(3) The mechanical ventilation air extracted from the space shall be positioned relative to the mechanical ventilation air intake openings such that the makeup air will mix with the leaked refrigerant.

(4) The lower edge of the air extraction opening from the room shall not be more than 100 mm above the floor. (Installation Pattern iii)

(5) The upper edge of the air extraction opening from the room shall be located equal or below the point of release. (Installation Pattern vi)

(6) When makeup air is supplied from the same space where the ventilation air extracted from the space is discharged, ventilation air discharge openings shall be separated by a sufficient distance, but not less than 3 m, from the makeup air intake openings to prevent re-circulation to the space. (Installation Pattern iii)

When installing an indoor unit or a BC controller, 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 4

mc: Refrigerange in the system

Hr: Height ft charrom the floor to the unit

Table 2

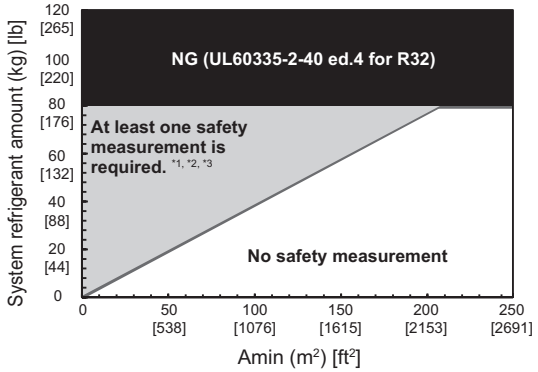
Refrigerant concentration and required safety measure (height of ceiling = 2.5 m [8-3/16 ft])

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 2 are different from the values calculated by Equation 4, 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. 4

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. 4 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 heat source 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.

This unit is equipped with electrically powered safety measures. To be effective, the unit must be electrically powered at all times after installation, other than when servicing.

LEAK DETECTION SYSTEM installed. Unit must be powered except for service. Do not turn the breaker OFF except the case of burning smell, or when performing maintenance or inspection. The power cannot be supplied to the refrigerant sensor mounted in the heat source unit and the indoor unit, and the sensor cannot detect the refrigerant leakage. This may cause fire.

The refrigerant sensor shall only be replaced with manufacture approved sensor.

When a refrigerant leak is detected by the refrigerant sensor, the fan automatically rotates and performs circulation operation.

When the local switch or wiring breaker is OFF, the refrigerant sensor will not detect refrigerant leakage because electricity is not supplied.

When a FLAMMABLE REFRIGERANT is used, alloys used indoors to join refrigerant containing connections shall have a melting point (liquids temperature) greater than 427°C [801°F].

For piping connection, use a mechanical joint (brazing and flare connection, etc.) complying with the latest version of ISO14903. Ensure that the piping installed in a room is securely protected from damage due to an external force.

When the power sources of the heat source unit, indoor unit, BC controller, and Shut off valve kit are different, power the heat source unit last.

This unit is equipped with electrically powered safety measures. To be effective, the unit must be electrically powered at all times after installation, other than when servicing.

Pay special attention to the place of installation, such as basement, etc. where refrigeration gas can accumulate, since refrigerant is heavier than the air.

- Refrigerant stagnation may cause a fire. Take measures on site such as air circulation equipment so that the refrigerant concentration does not exceed the allowable limit.

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[1] Preparation for Piping Work

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). [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○○○ ···

- 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

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.

[2] Handling and Characteristics of Piping Materials, Refrigerant, and Refrigerant Oil

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.

2. Storage of Piping Materials

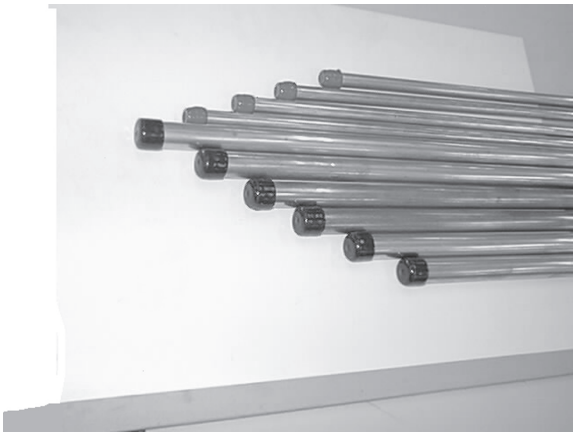
(1) Storage location

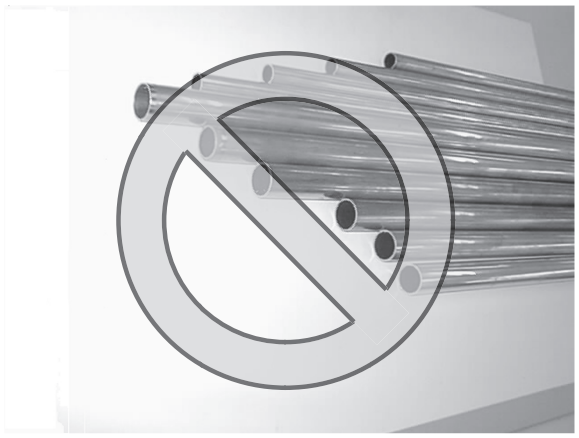




Store the pipes to be used indoors. (Warehouse at site or owner's warehouse)
If they are left outdoors, dust, dirt, or moisture may infiltrate and contaminate the pipe.

(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.

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.

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.

5. Refrigerant Oil

(1) Refrigerant oil for R32 systems

Unlike the mineral oil used in R22 systems, R32 systems use synthetic oil. 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>Cause</th><th colspan="2">Symptoms</th><th>Effects on the refrigerant cycle</th></tr>
<tr><td 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>Air infiltration</td><td>Oxidization</td></tr>
<tr><td rowspan="4">Infiltration of contaminants</td><td rowspan="2">Dust, dirt</td><td>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>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>Sludge formation and adhesion</td><td>Clogged expansion valve and capillary tubes
Poor cooling performance
Compressor overheat</td></tr>
<tr><td>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.

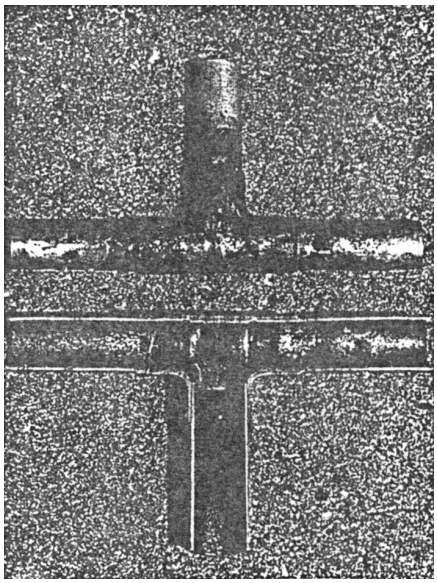
[3] Working with Refrigerant Piping

1. Pipe Brazing

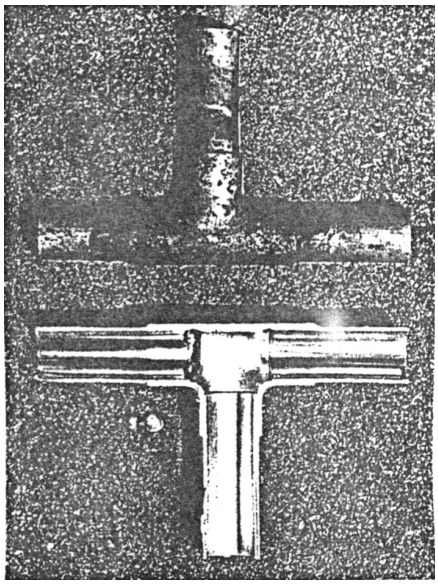
Perform brazing with special care to keep foreign objects (such as oxide scale, copper powder, water, and dust) out of the refrigerant system.

Example: Inside the brazed connection

Use of oxidized solder for brazing



Use of non-oxidized solder for brazing



(1) Items to be strictly observed

- Do not conduct refrigerant piping work outdoors if raining.
- Use 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

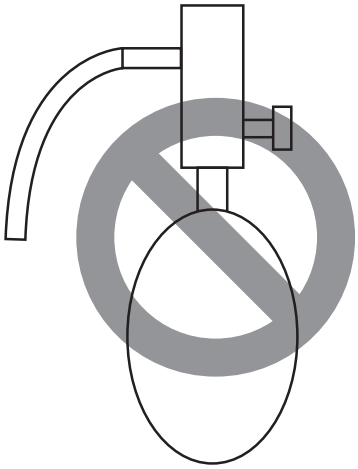
- The new refrigerant oil has over 10 times the water absorption capacity of the older types, and is more likely to cause unit failure if water enters the system.
- Flux typically contains chlorine, and any residual flux within the refrigerant circuit may form sludge.

(3) Notes

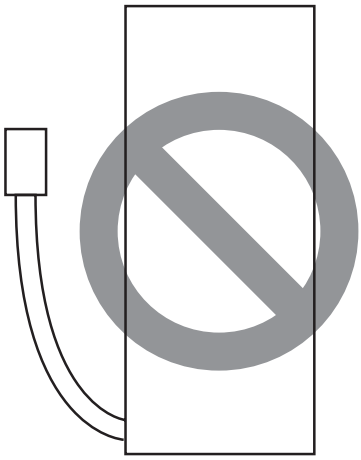
Do not use commercially available antioxidants because they may cause the pipes to corrode or refrigerating machine oil to deteriorate.

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.

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 (Photo1 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 ambient 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 ambient temperature. When performing vacuum drying at a low ambient temperature, use a vacuum gauge appropriate for the temperature range.

Degree of vacuum (reference)

Ambient 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.

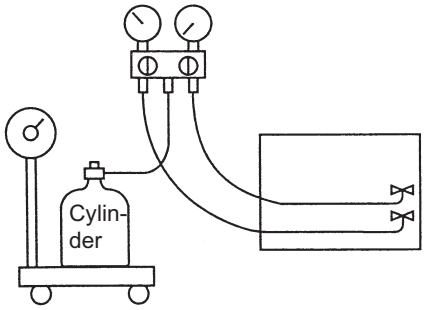
- Evacuate the system to 4 Torr (520 Pa) from both service valves. System manifold gauges must not be used to measure vacuum. A micron gauge must be used at all times. Break the vacuum with Nitrogen (N2) into the discharge service valve to 0 Torr (0 Pa).
- Evacuate the system to 1.5 Torr (195 Pa) from 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

(8) Notes

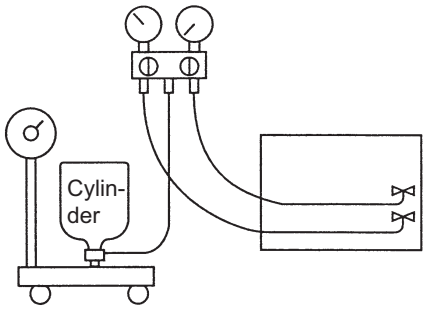
- To evacuate air from the entire system
  Applying a vacuum through the check joints at the refrigerant service valve on the high and low pressure sides (BV1 and 2) is not enough to attain the desired vacuum pressure.
  Be sure to apply a vacuum through the check joints at the refrigerant service valve on the high and low pressure sides (BV1 and 2) and also through the check joints on the high and low pressure sides (CJ1 and 2).
- To evacuate air only from the heat source units
  Apply a vacuum through the check joints on the high and low pressure sides (CJ1 and 2).
- To evacuate air from the indoor units and extension pipes
  Apply a vacuum through the check joints at the refrigerant service valve on the high and low pressure sides (BV1 and 2).
- When performing heat exchanger maintenance (e.g., vacuum drying, pump-down, or refrigerant recovery), run the water-circuit pump to circulate water to prevent the water-side heat exchanger of the heat source unit from freezing.

4. Refrigerant Charging

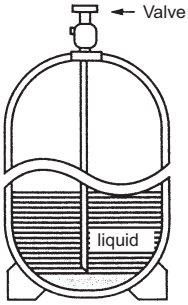
Cylinder with a siphon

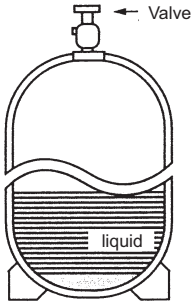


Cylinder without a siphon



Cylinder color R32 is light blue.





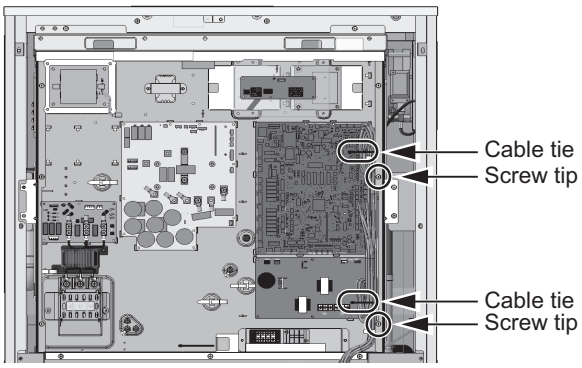
(1) Notes

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). [VIII [5] Refrigerant Leak]
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.
Upon completion of all work, securely tighten all service port caps and shaft caps to prevent refrigerant leakage. When attaching the cap to the service port after charging refrigerant, apply NYLOG BLUE to the sealing part of the valve with a cotton swab, and tighten the cap to prescribed torque, using two spanners and without applying undue force to the pipe.

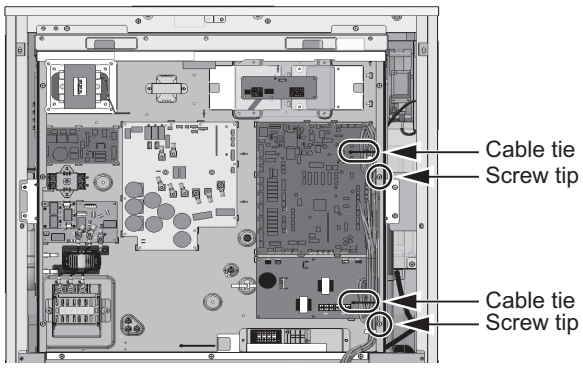
[4] Precautions for Wiring

- 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, check the voltage across the tab terminals FTP and FTN on the INV board to drop to 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 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. Then, turn on the heat source unit and energize the compressor for at least the designated number of hours. For details, refer to the specified page. [VII [1] Items to be checked before a Test Run]
  (Energizing the heater will help evaporate the liquid refrigerant in the compressor, 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 heat source 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 heat source unit. Note that even when the heat source 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 cable ties inside the control box shown in the figures below are removed, ensure that the tips of the screws on the control box cover do not come into contact with the cables.

P072, P096, P120, P144, P168, P192, P216, P2403AMM0AN (208-230V)



P072, P096, P120, P144, P168, P192, P216, P2404AMM0AN (460V)



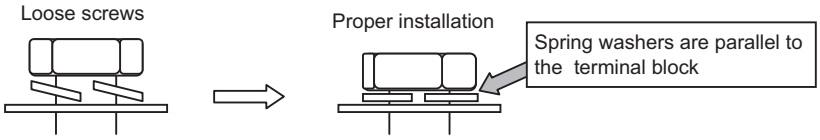
♦When replacing the internal electrical components of the control box, tighten the screws to the recommended tightening torque as specified below.
Recommended tightening torque for the internal electrical components of the control box

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).

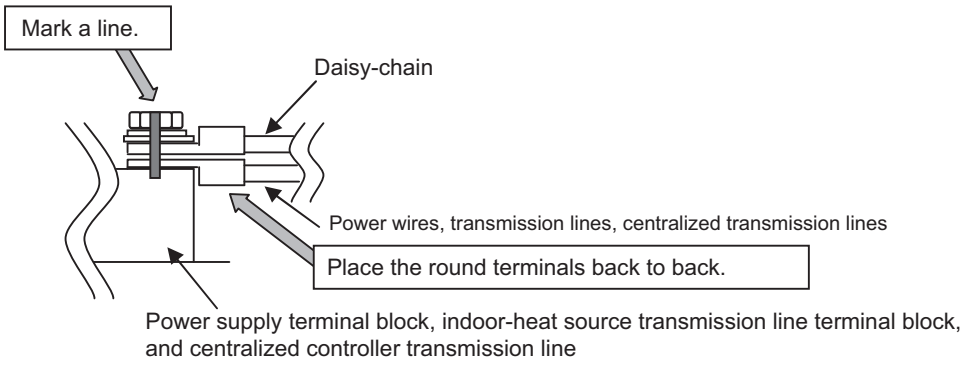
Take the following steps to ensure that the screws are properly tightened.

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) is not installed properly.



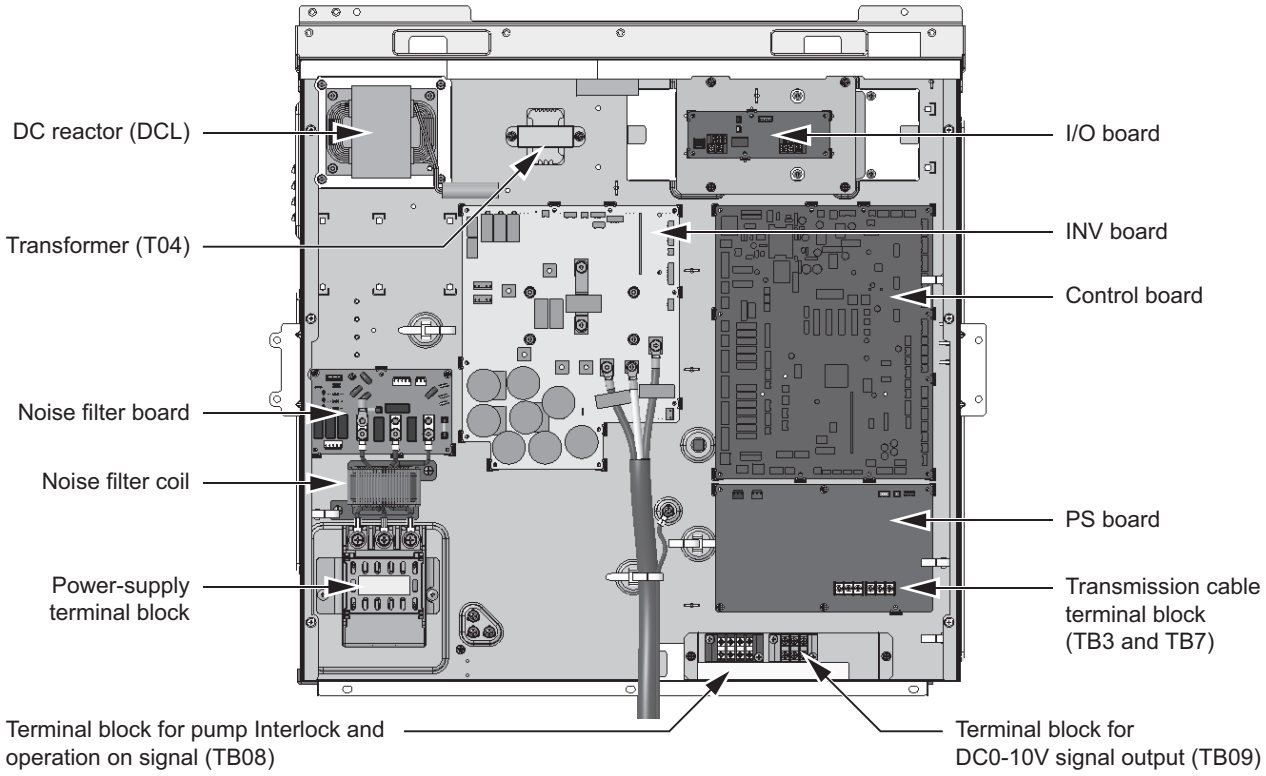
2) Check the wires are securely fastened to the screw terminals.
♦**Screw the screws straight down so as not to damage the screw threads.**
Hold the two round terminals back to back to ensure that the screw will screw down straight.
♦**After tightening the screw, mark a line through the screw head, washer, and terminals with a permanent marker.**

Example

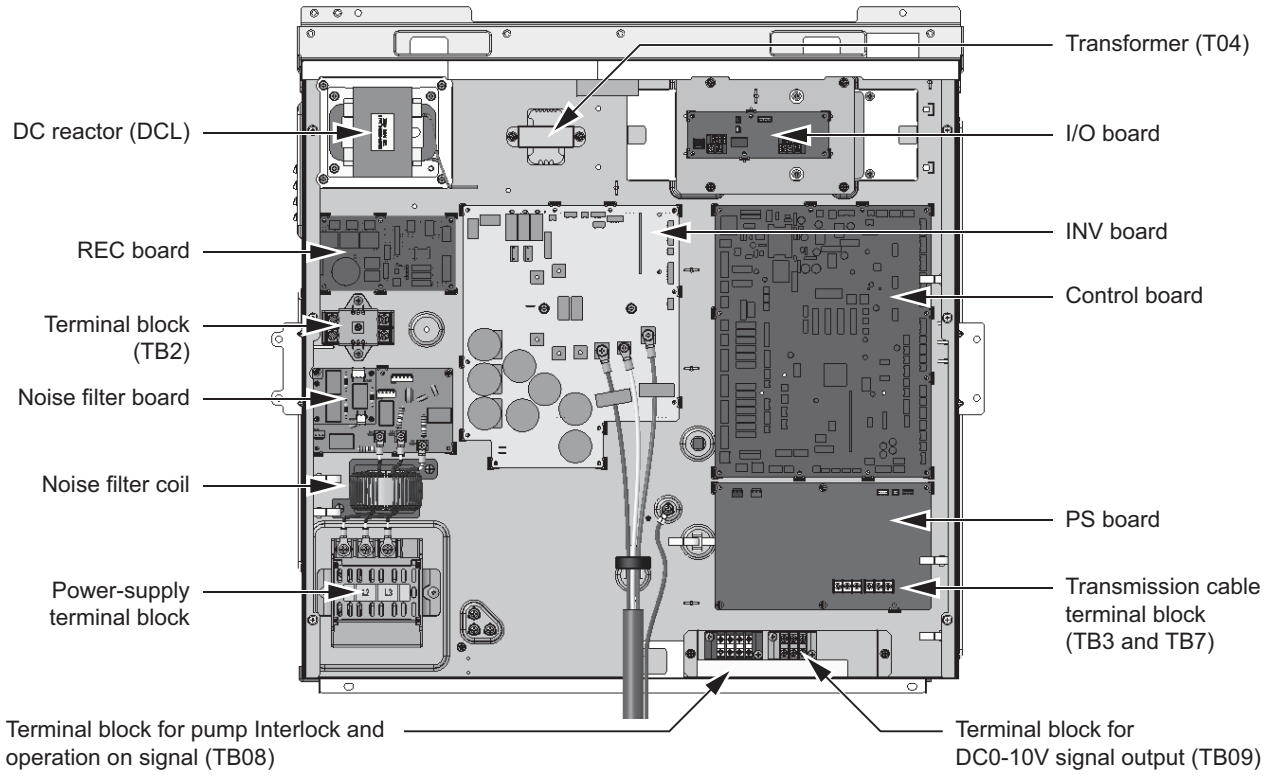


Poor contact caused by loose screws may result in overheating and fire.
Continued use of the damaged circuit board may cause overheating and fire.

TQRYP072, 096, 120, 144, 168, 192, 216, 2403AMM0AN



TQRYP072, 096, 120, 144, 168, 192, 216, 2404AMM0AN



[5] Inspection and Maintenance

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		○	
Electronic expansion valve				○	
Valve				○	
Heat exchanger		5 years		○	
Sensor (thermistor, etc.)		20,000 hours		○	
Electric board		25,000 hours		○	
Smoothing capacitor (mounted on the inverter board)				○	Wide fluctuations in voltage may accelerate the deterioration of the unit.
Refrigerant sensor		5 years		○	
Fan (for circulation airflow)	5 years	-		○	Perform inspection referring to the method described in II-[8] (1).

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.
Electronic expansion valve		♦Operation check using operation data ♦Tactile and auditory operation check	♦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 (thermistor, refrigerant sensor, etc.)		♦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.

II Restrictions

[1] System Configurations 23
[2] Types and Maximum Allowable Length of Cables 24
[3] Switch Settings 26
[4] M-NET Address Settings 27
[5] Demand Control Overview 33
[6] System Connection Example 34
[7] Example System with an MA Remote Controller 35
[8] Safety measures 44
[9] Restrictions on Refrigerant Pipes 46

[1] System Configurations

1. Table of compatible indoor units

The table below summarizes the types of indoor units that are compatible with different types of heat source units.
The ones not listed are incompatible with this series of heat source units. The TQRYP***3AMM0AN and TQRYP***4AMM0AN heat source units cannot be used in combination across the series.

(1) TQRY combinations

Heat source units	Composing units		Maximum total capacity of connectable indoor units	Maximum number of connectable indoor units	Types of connectable indoor units
P0723(4)AMM0AN	-	-	36- 108	14	P004 - P096 models R32 series indoor units
P0963(4)AMM0AN	-	-	48 - 144	19	
P1203(4)AMM0AN	-	-	60 - 180	24	
P1443(4)AMM0AN	-	-	72- 216	29	
P1683(4)AMM0AN	-	-	84 - 252	34	
P1923(4)AMM0AN	-	-	96 - 288	39	
P2163(4)AMM0AN	-	-	108 - 324	44	
P2403(4)AMM0AN	-	-	120 - 360	49	
P1443(4)BMM0AN	P0723(4)AMM0AN	P0723(4)AMM0AN	72 - 216	29	
P1683(4)BMM0AN	P0963(4)AMM0AN	P0723(4)AMM0AN	84 - 252	34	
P1923(4)BMM0AN	P0963(4)AMM0AN	P0963(4)AMM0AN	96 - 288	39	
P2163(4)BMM0AN	P1203(4)AMM0AN	P0963(4)AMM0AN	108 - 324	44	
P2403(4)BMM0AN	P1203(4)AMM0AN	P1203(4)AMM0AN	120 - 360	49	
P2883(4)BMM0AN	P1443(4)AMM0AN	P1443(4)AMM0AN	144 - 432	50	
P3123(4)BMM0AN	P1683(4)AMM0AN	P1443(4)AMM0AN	156 - 468		
P3363(4)BMM0AN	P1683(4)AMM0AN	P1683(4)AMM0AN	168 - 504		

Note

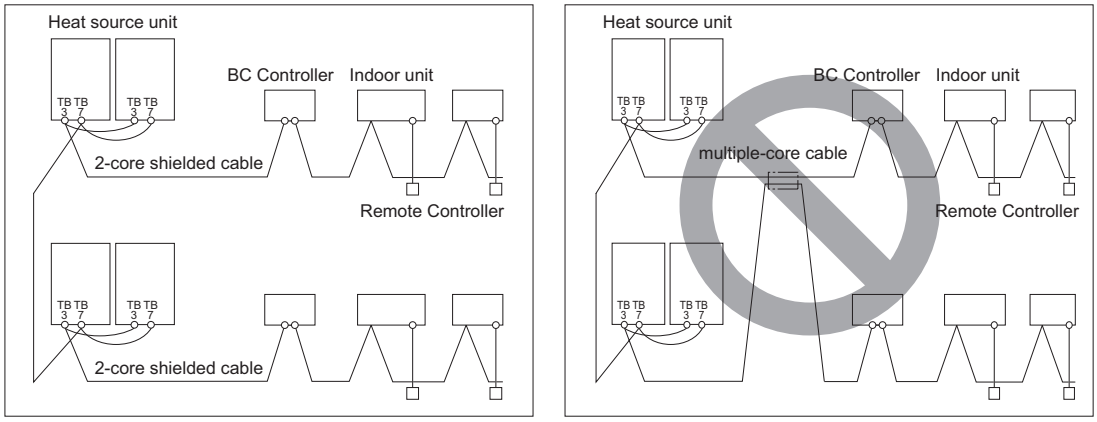
1) "Maximum total capacity of connectable indoor units" refers to the sum of the numeric values in the indoor unit model names.
2) If the total capacity of the indoor units that are connected to a given heat source unit exceeds the capacity of the heat source unit, the indoor units will not be able to 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 heat source unit whenever possible.

[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 heat source unit as required.
4) Run the cable from the electric box of the indoor or heat source 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-heat source 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. Before inspecting the inside of the control box, turn off the power, keep the unit off for at least 10 minutes, and check the voltage across the tab terminals FTP and FTN on the INV board to drop to 20 VDC or lower. (It takes about 10 minutes to discharge electricity after the power supply is turned off.)
9) The control box (inside and rear) contains high-temperature parts. Be careful even after shutting down the power.
10) When connecting wires to TB7, check that the voltage is 20 V DC or less.
11) 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 and turn on the power of the heat source unit. (The liquid refrigerant in the compressor will evaporate by energizing the heater.)
12) When connecting a system controller to the TB7 side of the heat source 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 heat source unit is off so the system controller may log an error and generate a warning.
13) 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). [I [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).
[II [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 heat source units (both centralized control transmission cables and indoor-heat source transmission cables) is 500 m [1640 ft]*1. The maximum allowable length of transmission cables from the power supply unit to each heat source 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].

[3] Switch Settings

1. Switch setting

The necessary switch settings depend on system configuration. Before performing wiring work, refer to the following page(s).
[II [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	Heat source units *3 *4 and Indoor units
LOSSNAY, OA processing unit *1		LC	Heat source units *3 *4 and LOSSNAY
MA remote controller	Main/sub remote controller	MA	Indoor units
CITY MULTI heat source unit*2		OC,OS	Heat source units *3 *4
BC controller	Main	BC	Heat source units *3 *4 and BC controller
	Sub1 - 11	BS1 - 11	Heat source units *3 *4 and BC controller

*1. Applicable when LOSSNAY units are connected to the indoor-heat source transmission line.
*2. The heat source 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 heat source units in the same refrigerant circuit.
*4. When setting the switch SW4 of the control board, set it with the heat source unit power on. Refer to the following page(s). VII [1] Items to be checked before a Test Run (page 133)

[4] M-NET Address Settings

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		Sym-bol	Address setting range	Setting method	Factory address setting
CITY MULTI indoor unit M-NET adapter M-NET control interface Free Plan adapter	Main/sub unit	IC	01 to 50 *1 *3	♦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. ♦In an R2 system with a sub BC controller, make the settings for the indoor units in the following order. (i) Indoor unit to be connected to the main BC controller (ii) Indoor unit to be connected to sub BC controller 1 (iii) Indoor unit to be connected to sub BC controller 2 Make the settings for the indoor units in the way that the formula "(i) < (ii) < (iii)" is true. When using additional BC controllers (3 to 11 BC controllers), make the same settings.	00
LOSSNAY, OA processing unit		LC	01 to 50 *1 *3	Assign an arbitrary but unique address to each of these units after assigning an address to all indoor units.	00
MA remote controller		MA	No address settings required. (The main/sub setting must be made if 2 remote controllers are connected to the system.) *8		Main
CITY MULTI heat source unit		OC OS	51 to 100 *1 *2 *4	♦Assign an address that equals the lowest address of the indoor units in the same refrigerant circuit plus 50. ♦Assign sequential addresses to the heat source units in the same refrigerant circuit. The heat source units in the same refrigerant circuit are automatically designated as OC and OS. *5	00
Auxiliary heat source unit	BC controller (main)	BC	51 to 100 *1 *2 *5	The BC controller address should generally be set to 1 + the address of the outdoor unit and Heat source unit. However, if this would result in it having the same address as another outdoor unit and Heat source unit, set the address between 51 and 100, making sure that it is different from the address of other controllers. * The address automatically becomes “100” if it is set as “01 - 50”.	00
	BC controller (sub)	BS1 BS2 BS3 . . BS11	51 to 100 *2		
System controller	Central controller TE-C400A TW-C50A	TR SC	000, 201 to 250	Assign an arbitrary but unique address within the range listed on the left to each unit.	000

*1. 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. To set the heat source unit address or the auxiliary heat source unit address to "100," set the rotary switches to "50."
*3. Some models of indoor units have two or three control boards.
Assign an address to the No.1, No. 2, and No. 3 control boards so that the No. 2 control board address equals the No. 1 control board address plus 1, and that the No. 3 control board address equals the No. 1 control board address plus 2.
*4. The heat source 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).
*5. No need to change from the factory setting.

2. Heat source 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.

<table>
<tr><th>System configuration</th><th>Connection to the system controller</th><th>Power supply unit for transmission lines</th><th>Group operation of units in a system with multiple heat source units</th><th>Power supply switch connector connection</th></tr>
<tr><td>System with one heat source unit</td><td>–</td><td>–</td><td>–</td><td rowspan="2">CN41 (Factory setting)</td></tr>
<tr><td rowspan="4">System with multiple heat source units</td><td rowspan="2">Not connected</td><td>–</td><td>Not grouped</td></tr>
<tr><td>Not required</td><td>Grouped</td><td rowspan="3">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 heat source units.*2
*Connect the S (shielded) terminal on the terminal block (TB7) on the heat source unit whose CN41 was replaced with CN40 to the ground terminal (⏚) on the electric box.</td></tr>
<tr><td>With connection to the indoor unit system</td><td>Not required</td><td>Grouped/not grouped</td></tr>
<tr><td>With connection to the centralized control system</td><td>Not required*1 (Powered from the heat source unit)</td><td>Grouped/not grouped</td></tr>
<tr><td></td><td>Required *1</td><td>Grouped/not grouped</td><td>CN41 (Factory setting)</td></tr>
</table>

*1. The need for a power supply unit for transmission lines depends on the system configuration.
*2. The replacement of the power jumper connector from CN41 to CN40 must be performed on only one heat source unit in the system.

3. Heat source 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 heat source units in the same refrigerant circuit to the same setting.

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.

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 heat source units. Doing so will cut off the power supply to the compressors and the heater on the heat source 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.

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.

7. Various Control Methods Using the Signal Input/Output Connector on Heat Source 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 heat source unit. * It can be used as the DEMAND control devices for each system.	DEMAND (level)	CN3D*2	Adapter for external input (PAC-SC36NA-E)
	Performs a low level noise operation of the heat source unit by an external input to the heat source unit. * It can be used as the silent operation device for each refrigerant system.	Low-noise mode (level)*3 *4		
	Cooling/heating operation can be changed by an external input to the heat source unit (OC).	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*7 (Shifts evaporating temp. depending on the load)	CN3K	
	Receives interlock operation signal input from the water circuit pump (field-supplied)	Pump interlock operation signal input	TB08 (between poles 3 and 4) *Minimum guaranteed current at no-voltage input contact: 5 mA or below	–
	Receives interlock operation signal input from the mechanical ventilation (field-supplied)	Ventilation interlock operation signal input	CN3Y	Input signal adapter for ventilation interlock (PAC-SC46NA-E)
Output	Outputs signals to perform interlocked operation of heat source unit and water circuit pump Signal output patterns *When DIP SW4 No.917 (SW6-10: ON) is set to OFF (factory setting) Signals are output while the compressor is in operation. *When DIP SW4 No.917 (SW6-10: ON) is set to ON Signals are output while receiving cooling or heating signal from the controller. *Signals are output even if the thermostat is OFF. (when the compressor is not operating)	Pump interlock operation signal	TB08 (between poles 1 and 2) *Contact rating: 208/230VAC 1A or below	–
	How to extract signals from the heat source 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		
	Outputs signals to notify that the refrigerant sensor built into the heat source unit has detected.	Ventilation interlock operation signal output	CN511	Output signal adapter for ventilation interlock (PAC-SC47SA-E)

*1. For detailed drawing, refer to the following page(s). [II [4] 7. (2) Example of wiring connection]

*2. For details, refer to the following page(s). [II [5] Demand Control Overview]

*3. Low-noise mode is valid when Dip SW6-8 on the heat source 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 heat source 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 operation 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
63HS1<32kg/cm^2	63LS>4.6kg/cm^2	63HS1>35kg/cm^2	63LS<3.9kg/cm^2

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

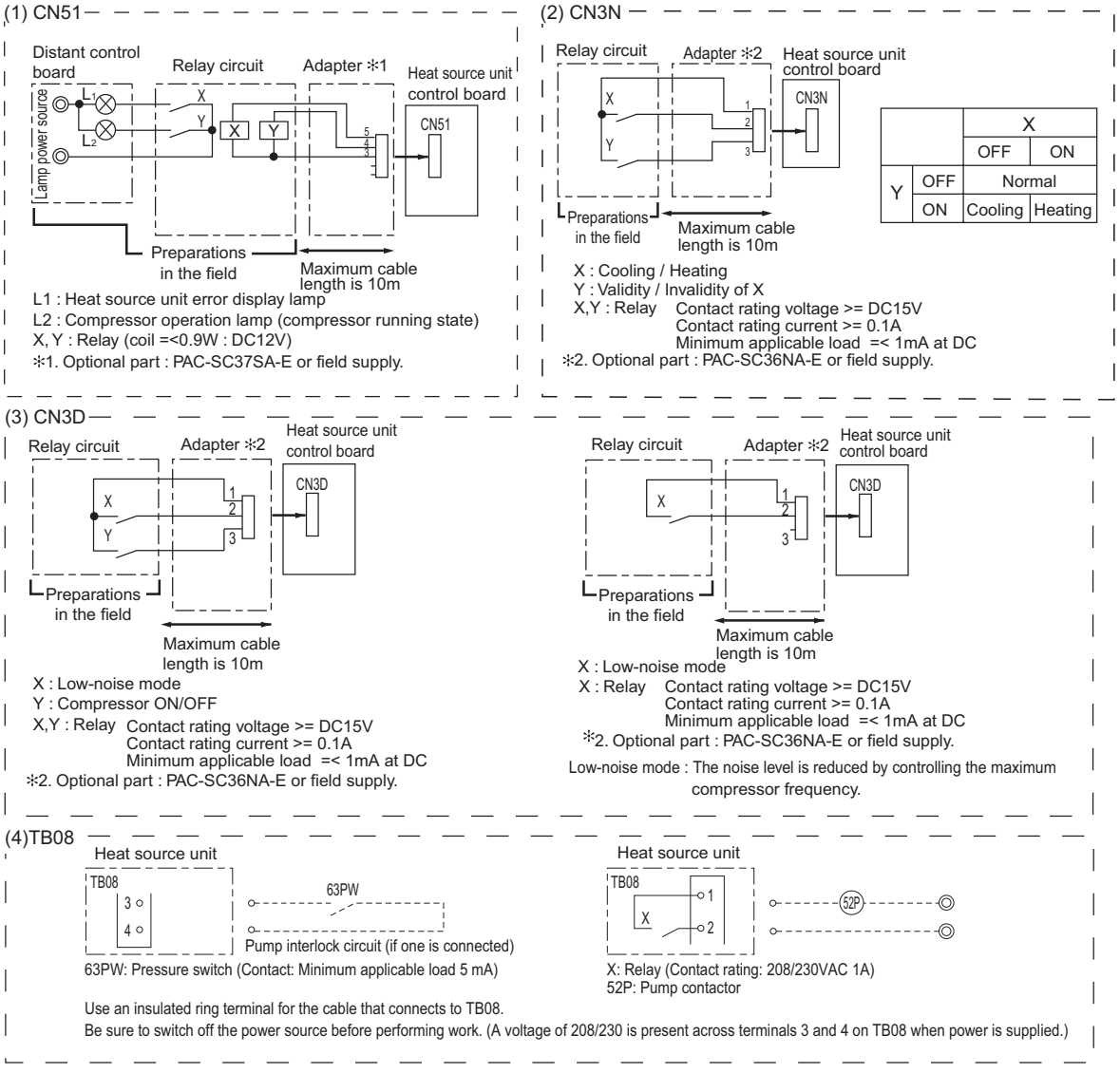
*6. Take out signals from the heat source unit that is designated as OC if multiple heat source units in the same system.

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

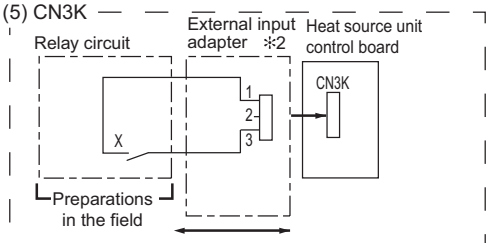
(2) Example of wiring connection

⚠ CAUTION

1) Wiring should be covered by insulation tube with supplementary insulation.
2) Use relays or switches with IEC or equivalent standard.
3) Run the signal cables away from the cables in high-voltage areas. (Do not place them in the same conduit.)

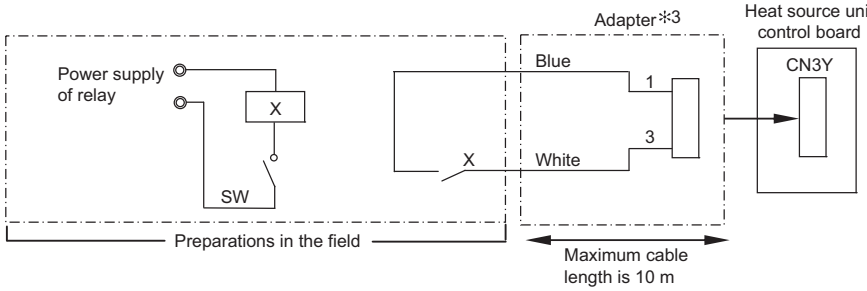


(5) CN3K



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.

(6)CN3Y

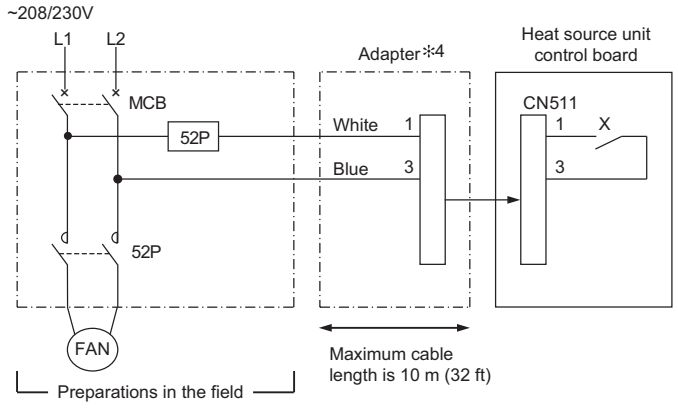


X: Relay (Point of contact rating: DC1 mA)

X (SW)	Ventilation interlock
OPEN	OFF
SHORT	ON

※3. Optional parts：PAC-SC46NA-E or field supply.

(7)CN511



X: Relay (230 VAC, 1A)
52P: Magnetic contactor for ventilation fan
FAN: Ventilation fan
MCB: Circuit breaker

※4. Optional parts：PAC-SC47SA-E or field supply.

[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 heat source units (OC and OS). Between 2 and 8 steps of demand control is possible by setting Dip SW6-8 on the heat source 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
P072-P2403(4)AMM0AN models (single-heat source-unit system) : 2 and 4 steps shown in the rows 1 and 2 in the table above only.
P144-P3363(4)BMM0AN models (two-heat source-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 heat source unit whose SW6-8 is set to ON. When SW6-8 is set to OFF on all heat source units, the signal is input to the CN3D on the OC.
Heat source 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 heat source unit whose SW6-8 is set to OFF. When SW6-8 is set to ON on all heat source units, the following operations cannot be performed.
- Performing 4-step demand in combination with the low-noise operation in a single-heat source-unit system.
- Performing 8-step demand in combination with the low-noise operation in a two-heat source-unit system.

1) Contact input and control content

2-step demand control

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

CN3D	-
1-3	
Open	100%
Close	0%

4-step demand control (When SW6-8 is set to ON on a heat source unit)

Demand capacity is shown below.

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

8-step demand control (When SW6-8 is set to ON on two heat source units)

Demand capacity is shown below.

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

*1. The heat source units whose SW6-8 is set to ON are designated as No. 1 and No. 2 in the order of address from small to large.
Ex) When heat source units whose SW6-8 is set to ON are designated as OC and OS, OC = No. 1 and OS = No. 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.

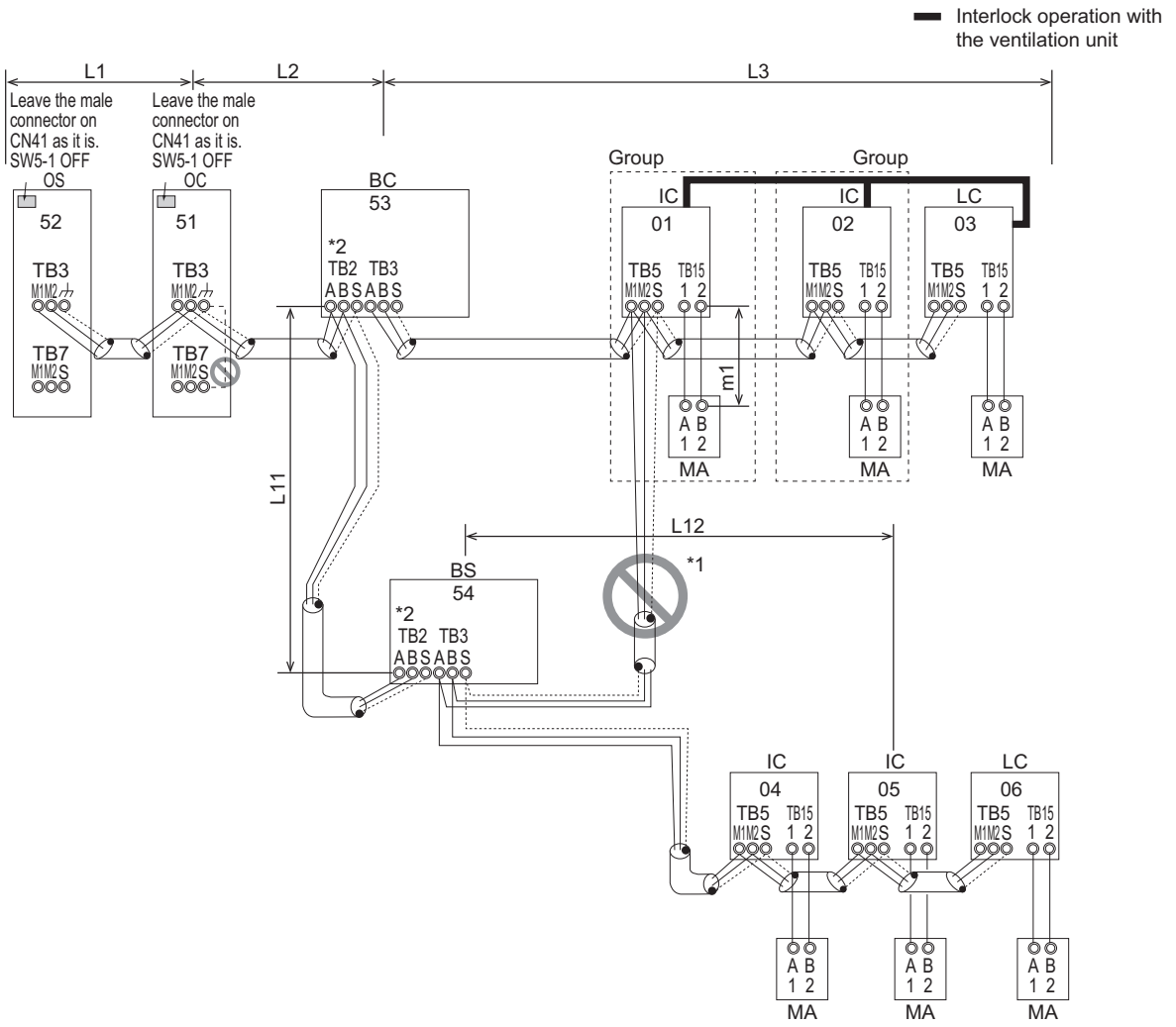
(1) An example of a system to which an MA remote controller is connected

	System configuration	Connection to the system controller	Address start up for indoor and heat source 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-heat source transmission line	Manual address setup	-

[7] Example System with an MA Remote Controller

1. Single Refrigerant System with Two or More LOSSNAY Units

(1) Sample control wiring



(2) Cautions

1) Do not connect the indoor unit transmission cable terminal block TB3 on the BC controller to any indoor units that are not controlled by this BC controller.
2) Up to two cables can be connected to the transmission cable terminal block TB2 (heat source unit/indoor unit/ BC controller) on the BC controller, 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/heat source 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/heat source transmission line
Daisy-chain the following terminals: the M1 and M2 terminals of the indoor-heat source transmission cable terminal block TB3 on the heat source units (OC and OS), and the M1 and M2 terminals of the indoor-heat source transmission cable terminal block TB2 (heat source unit/indoor unit/BC controller) on each BC controller (main: BC, sub: BS). (Non-polarized two-wire)

Note

The heat source 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, and the S terminals of the transmission cable terminal blocks TB2 (heat source unit/indoor unit/BC controller) on each BC controller (main: BC, sub: BS).

2) Indoor unit transmission line
Daisy-chain the following terminals: the M1 and M2 terminals of the indoor-heat source 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 BC controller (main: BC, sub: BS) that controls these indoor units. (Non-polarized two-wire)

Shielded cable connection

To ground the shielded cable, daisy-chain the following terminals: the S terminal of the indoor-heat source 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 BC controller (main: BC, sub: BS) that controls these indoor units.

Shielded cable connection

To ground the shielded cable, daisy-chain the following terminals: the S terminal of the indoor-heat source transmission cable terminal block TB5 on each indoor unit (IC) at which the BC controller and the refrigerant pipe are connected, and the S terminal of the transmission cable terminal block TB3 on the above-mentioned BC controller (BC).

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 2 remote controllers are connected to the system

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

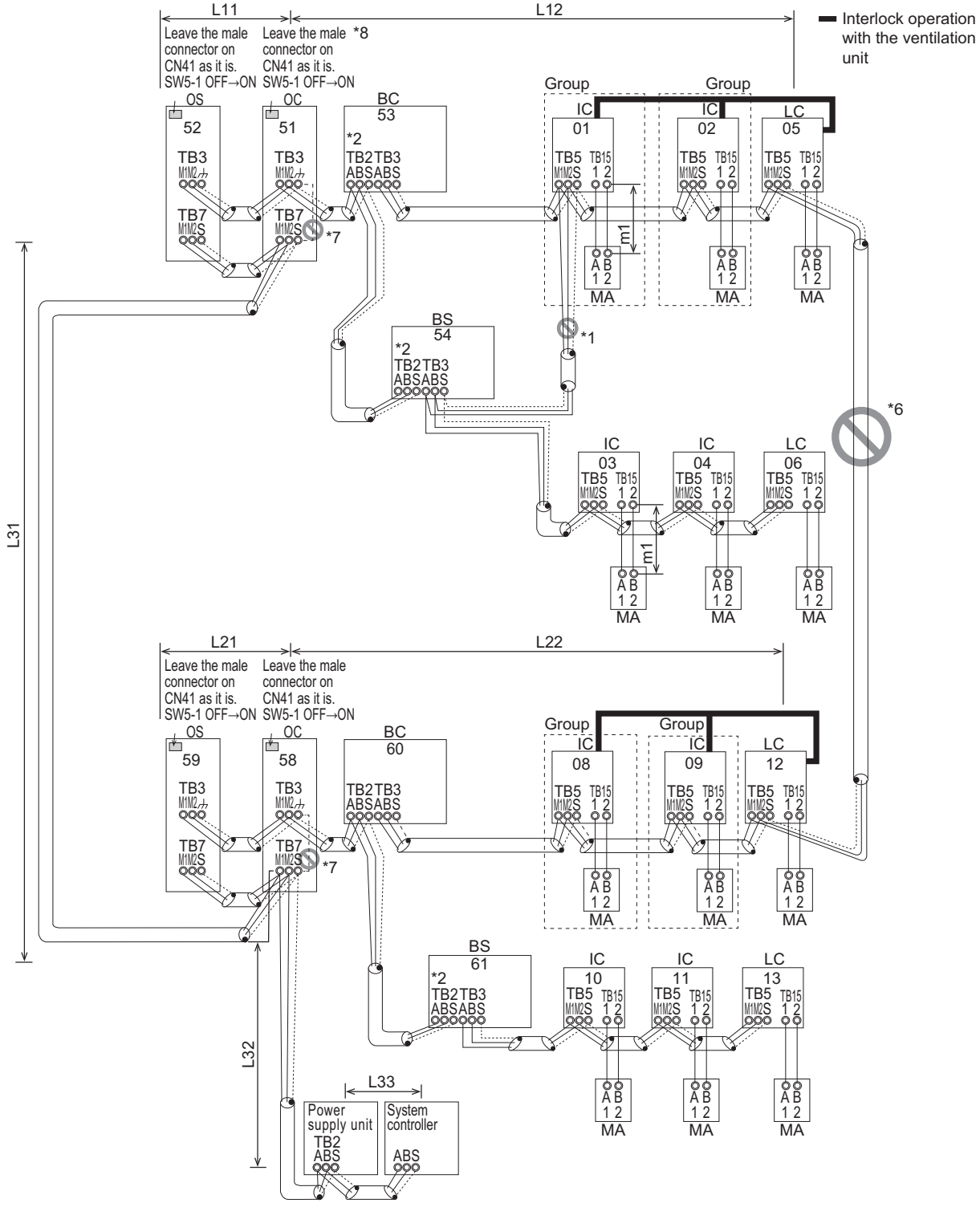
Procedures	Unit or controller			Address setting range	Setting method	Notes	Factory setting
1	Indoor unit	Main unit	IC	01 to 50	Assign the smallest address to the main unit in the group.	Setting the port number is required. If indoor units with different functions operate in the same group, set the unit with the most functions as the main unit.	00
2	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
3	MA remote controller	Main remote controller	MA	No settings required.	-	The sub remote controller issues an alarm when the refrigerant sensor built into the heat source unit detects.	Main
		Supervisor remote controller	MA	Supervisor remote controller	Settings to be made with the Sub/Main switch		
4	Heat source unit		OC OS	51 to 100	♦Assign sequential address to the heat source units in the same refrigerant circuit. ♦The heat source units are automatically designated as OC and OS.(Note 1)	♦To set the address to 100, set the rotary switches to 50. ♦If the addresses that is assigned to the main BC controller overlaps any of the addresses that are assigned to the heat source units or to the sub BC controller, use a different, unused address within the setting range. ♦The use of a sub BC controller requires the connection of a main BC controller.	00
5	BC controller (Main)		BC	51 to 100	The BC controller address should generally be set to 1 + the address of the outdoor unit and Heat source unit. However, if this would result in it having the same address as another outdoor unit and Heat source unit, set the address between 51 and 100, making sure that it is different from the address of other controllers. * The address automatically becomes "100" if it is set as "01 - 50".		
	BC controller (Sub)		BS				

Note

1) The heat source 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. 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 BC controller to any indoor units that are not controlled by this BC controller.
2) Up to two cables can be connected to the transmission cable terminal block TB2 (heat source unit/indoor unit/ BC controller) on the BC controller, 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 BC controllers is not allowed.
6) Do not connect TB5 terminal blocks of indoor units connected to different heat source units.
7) If a power supply unit is connected, do not connect the ground terminal ($\perp$) 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/heat source 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 heat source 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/heat source transmission line
Same as [7] 1.
Grounding shielded cables
Same as [7] 1.
2) Indoor unit transmission line
Same as [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 heat source units (OC) in different refrigerant circuits and on the heat source 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 heat source units.

Note

a) The heat source 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 heat source 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 [7] 1.

When two remote controllers are connected to the system

Same as [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

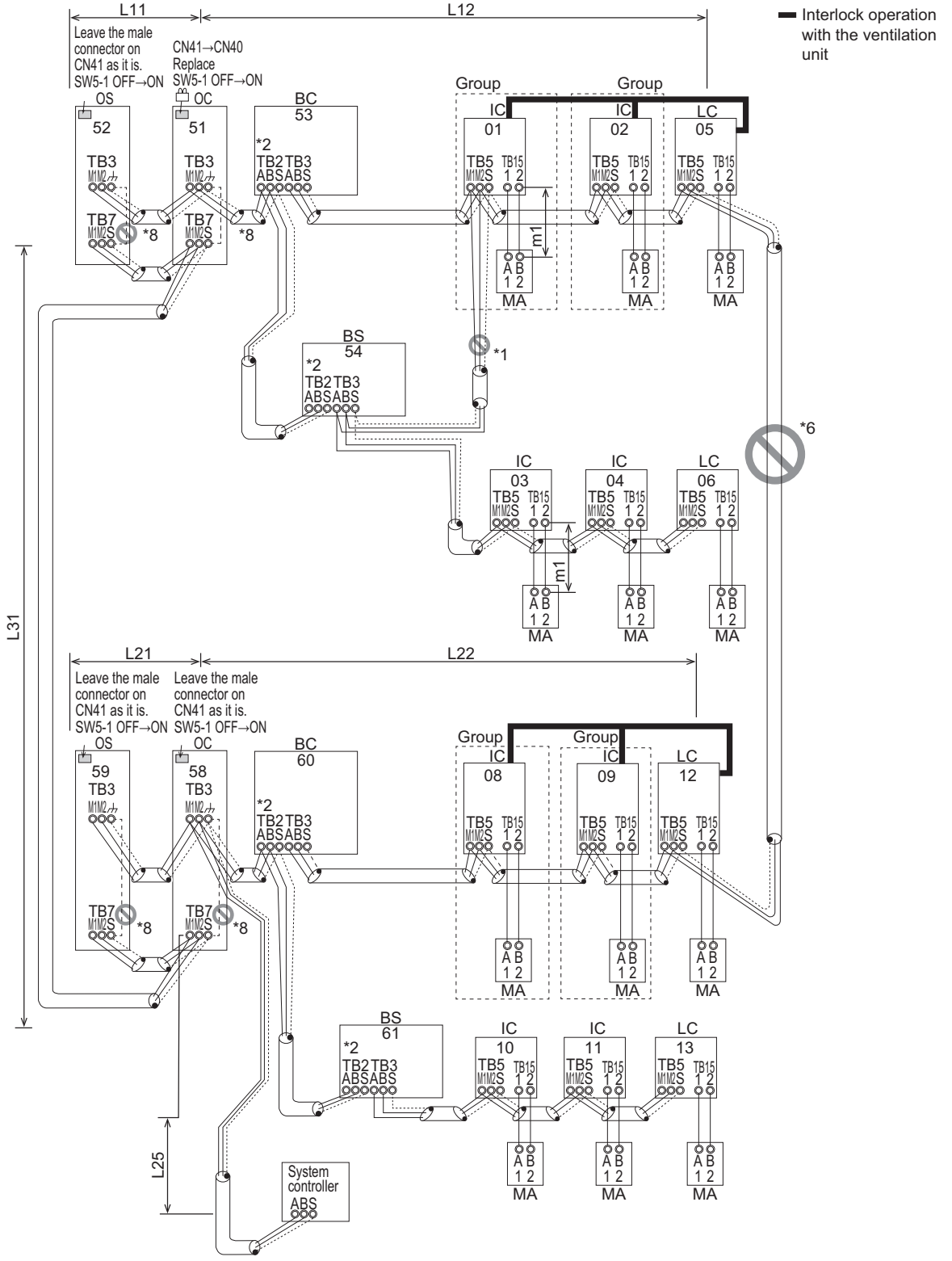
Procedures	Unit or controller			Address setting range	Setting method	Notes	Factory setting
1	Indoor unit	Main unit	IC	01 to 50	Assign the smallest address to the main unit in the group.	Setting the port number is required. If indoor units with different functions operate in the same group, set the unit with the most functions as the main unit.	00
2	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
3	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. The sub remote controller issues an alarm when the refrigerant sensor built into the heat source unit detects.	Main
		Supervisor remote controller	MA	Supervisor remote controller	Settings to be made with the Sub/Main switch		
4	Heat source unit		OC OS	51 to 100	♦Assign sequential address to the heat source units in the same refrigerant circuit. ♦The heat source units are automatically designated as OC and OS.(Note 1)	♦To set the address to 100, set the rotary switches to 50. ♦If the addresses that is assigned to the main BC controller overlaps any of the addresses that are assigned to the heat source units or to the sub BC controller, use a different, unused address within the setting range. ♦The use of a sub BC controller requires the connection of a main BC controller.	00
5	BC controller (Main)		BC	51 to 100	The BC controller address should generally be set to 1 + the address of the outdoor unit and Heat source unit. However, if this would result in it having the same address as another outdoor unit and Heat source unit, set the address between 51 and 100, making sure that it is different from the address of other controllers. * The address automatically becomes "100" if it is set as "01 - 50".		
	BC controller (Sub)		BS				

Note

1) The heat source 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).

3. System with a Connection of System Controller to Indoor-Heat source Transmission Line

(1) Sample control wiring



(2) Cautions

1) Do not connect the indoor unit transmission cable terminal block TB3 on the BC controller to any indoor units that are not controlled by this BC controller.
2) Up to two cables can be connected to the transmission cable terminal block TB2 (heat source unit/indoor unit/ BC controller) on the BC controller, 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 BC controllers is not allowed.
6) Do not connect the terminal blocks TB5 on the indoor units that are connected to different heat source units with each other.
7) Replacement of male power jumper connector CN41 must be performed only on one of the heat source units.
8) Provide grounding to S terminal on the terminal block for transmission line for centralized control TB7 on only one of the heat source units.

(3) Maximum allowable length

1) Indoor/heat source 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 [7] 1.
4) Maximum line distance via heat source 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/heat source transmission line
Same as [7] 1.

Grounding shielded cables
Same as [7] 1.
2) Indoor unit transmission line
Same as [7] 1.
Shielded cable connection
Same as [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 heat source 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 heat source units.
If a system controller exists in the system, turn on the centralized control switch SW5-1 on the control circuit boards of all heat source units.

Note

a) The heat source 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 heat source 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 heat source 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 ($\perp$) and the S terminal on the terminal block TB7 on the heat source unit whose power jumper connector is mated with CN40.
4) MA remote controller wiring
Same as [7] 1.

When two remote controllers are connected to the system

Same as [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.	Setting the port number is required. If indoor units with different functions operate in the same group, set the unit with the most functions as the main unit.	00
2	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
3	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. The sub remote controller issues an alarm when the refrigerant sensor built into the heat source unit detects.	Main
		Supervisor remote controller	MA	Supervisor remote controller	Settings to be made with the Sub/Main switch		
4	Heat source unit		OC OS	51 to 100	♦Assign sequential address to the heat source units in the same refrigerant circuit. ♦The heat source units are automatically designated as OC and OS.(Note 1)	♦To set the address to 100, set the rotary switches to 50. ♦If the addresses that is assigned to the main BC controller overlaps any of the addresses that are assigned to the heat source units or to the sub BC controller, use a different, unused address within the setting range. ♦The use of a sub BC controller requires the connection of a main BC controller.	00
5	BC controller (Main)		BC	51 to 100	The BC controller address should generally be set to 1 + the address of the outdoor unit and Heat source unit. However, if this would result in it having the same address as another outdoor unit and Heat source unit, set the address between 51 and 100, making sure that it is different from the address of other controllers. * The address automatically becomes "100" if it is set as "01 - 50".		
	BC controller (Sub)		BS				

Note

1) The heat source 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).

[8] Safety measures

Since this model uses the mildly flammable refrigerant R32, safety measures against refrigerant leakage are necessary.

Please implement safety measures based on UL60335-2-40. (Refer to Fig. 1 in Section "Safety Precautions" for implementation details.)

Please carry out settings related to safety measures as needed.

(1) Air circulation inspection

This unit is equipped with a fan for circulation airflow in the event of refrigerant leakage. Please refer to Fig. 2 in Section "Safety Precautions" to check the position of the fan.

When the refrigerant sensor built into the unit detects the refrigerant leakage, the fan will activate.

(Safety measures required for installation methods shown in Fig. 1 (iv), (v), (vi) in Section "Safety Precautions")

If you use the installation methods shown in Fig. 1 (iv), (v), (vi) in Section "Safety Precautions", please inspect the fan at least once every five years.

The method for inspecting the fan is described below.

Switch No.	778
Operation	♦Dip Switch No. 778 is OFF (default setting) Fan test operation is disabled (Fan stops except when refrigerant leakage is detected)
	♦Dip Switch No. 778 is ON Fan test operation will be conducted for 5 minutes after the switch is turned ON

SW4 0: OFF, 1: ON									
1	2	3	4	5	6	7	8	9	10
0	1	0	1	0	0	0	0	1	1

(2) Disabling the refrigerant leakage detection sensor

In installation environments where the detection by the unit's built-in refrigerant sensor is not required, it is possible to disable the sensor detection.

(Example where the unit's built-in sensor detection is not required: Installation in a machinery room that complies with ASHRAE 15 requirements)

The setting method is described below.

Switch No.	662
Operation	♦Dip Switch No. 662 is OFF (default setting) Detection by the unit's built-in refrigerant leakage sensor is enabled
	♦Dip Switch No. 662 is ON Detection by the unit's built-in refrigerant leakage sensor is disabled

SW4 0: OFF, 1: ON									
1	2	3	4	5	6	7	8	9	10
1	0	1	1	0	0	0	0	1	1

Note

- ♦The heat source unit and the indoor unit are equipped with a refrigerant sensor. The heat source unit is equipped with air circulation that complies with UL60335-2-40.
- ♦When the refrigerant sensor connected to the indoor unit detects refrigerant leakage or abnormality, the system closes the shut off valve. When the refrigerant sensor connected to the heat source unit detects refrigerant leakage or abnormality, the system stops operation and the FAN for air circulation installed in the heat source unit is activated.
- ♦LEAK DETECTION SYSTEM installed. Unit must be powered except for service. Do not turn the breaker OFF except the case of burning smell, or when performing maintenance or inspection. The power cannot be supplied to the refrigerant sensor mounted in the heat source unit and the indoor unit, and the sensor cannot detect the refrigerant leakage. This may cause fire.
- ♦The sensor must be replaced after it detects a refrigerant leak.
- ♦Refrigerant sensors can be disabled in some indoor units when some requirements are satisfied. Refer to the installation manual of the indoor unit for details of disabling the refrigerant sensor.
- ♦For some indoor units, an alarm will go off when a refrigerant leak is detected. Additionally, an alarm is available by installing the optional MA remote controller with alarm. For details, refer to the manual of each optional part.
- ♦The refrigerant sensor shall only be replaced with manufacture approved sensor.
- ♦When the local switch or wiring breaker is OFF, the refrigerant sensor will not detect refrigerant leakage because electricity is not supplied.
- ♦Avoid installation in an environment where gas equipment such as propane, butane, or methane, sprays such as insecticides,

equipment that generates smoke, paints, or chemicals are used, or where sulfur gas is generated. The refrigerant sensor inside the heat source unit and indoor unit will detect it and display a refrigerant leakage error, which may disable operation.

- When using any aerosol sprays for interior construction, finishing work, or sealing a wall hole, turn off the breaker and ventilate the room well. The refrigerant sensor may react to the gas in the sprays, and it may cause misdetection.
- Replace the refrigerant sensor in indoor unit when the remote controller displays refrigerant leakage error "1521 or 1522" or refrigerant sensor failure "5558."
  Replace the refrigerant sensor in the heat source unit when the remote controller displays refrigerant leak error "1529."
  Please contact the store where you purchased the product. Continuing to use a refrigerant sensor that cannot detect refrigerant leaks can cause a fire in the event of a refrigerant leak.
- When a refrigerant leak is detected by the refrigerant sensor, the fan automatically rotates and performs circulation operation.
- When the breaker is turned on, the fan may suddenly go into operation.
  Note that the fan will automatically go into operation when a refrigerant leak is detected by the refrigerant sensor.
  Keep a safe distance from the fan to avoid injury.
- Do not use a leak detection additive.
- Do not purge refrigerant near the leak detection sensor during refrigerant charging or refrigerant recovery.
  The refrigerant sensor inside the heat source unit and indoor unit will detect it and display a refrigerant leakage error, which may disable operation.

[9] Restrictions on Refrigerant Pipes

1. Restrictions on Refrigerant Pipe Length

"BC controller," "BC controller (Main)," and "BC controller (Sub)" that appear in this section refer to the MA type and MB type.

(1) IF 12 ports or less are in use, i.e., if only one BC controller is in use with no sub BC controller.

Note1. No Header usable on TQRY system.
Note2. Indoor unit sized P072-P096 should be connected to BC controller via Y shape joint CMY-R170M-E.
Note3. Indoor unit sized P072-P096 does NOT share BC controller ports with other Indoor units.
Note4. 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 Number of bent.
Note5. Set DIP-SW 1-1 to ON of BC controller, in case of connected Indoor unit sized P031-P054 with 2 ports.
Note6. Do not connect multiple indoor units to the same port when operating each of them in different mode (cooling, heating, stop, and thermo-off). In case of connecting multiple indoor units to the same port, connecting all indoor units to one remote controller and switching SW1-1 ON in the all connected indoor units (switch to thermostat built in the remote controller) are recommended.
Note7. Indoor capacity is described as its model size. For example, TPEFYP024MA1M0A, its capacity is P024.
Note8. Total down-stream Indoor capacity is the summary of the model size of Indoors down-stream. For example, TPEFYP024MA1M0A + TPEFYP006MA1M0A : Total Indoor capacity = P024 + P006 = P030.
Note9. To connect the BC controller to the main pipe, use the reducer (CMY-R304S-G1).
Note10. Install the pipes correctly referring to the DATA BOOK.

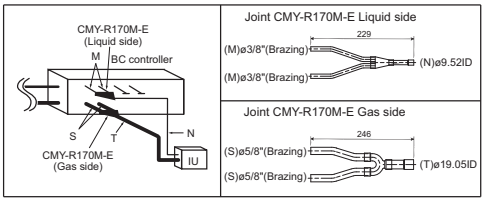


Fig. A

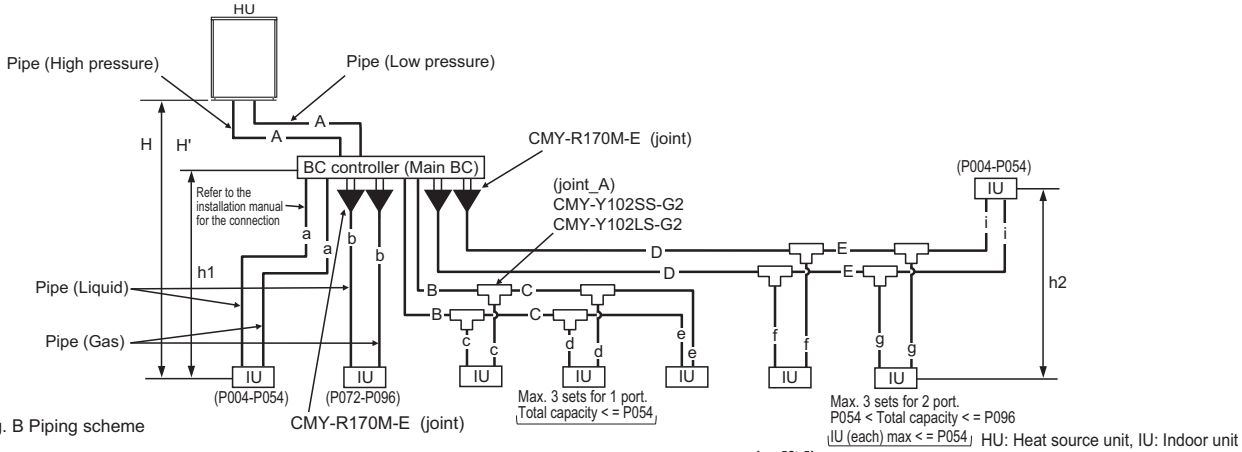


Fig. B Piping scheme

HU: Heat source unit, IU: Indoor unit

Piping length limitation *6 **(m [ft.])**

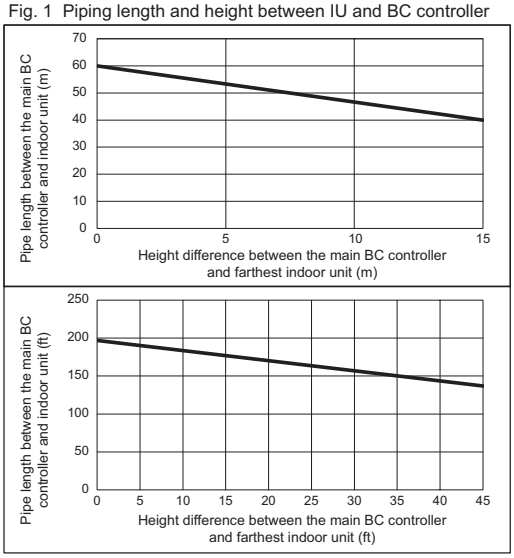
Item	Piping in the figure	Max. length	Max. equivalent length
Total piping length (Total length of high pressure and liquid pipes)	A+B+C+D+E+a+b+c+d+e+f+g+i	*1	-
Farthest IU from HU	A+D+E+i	165 [541]	190 [623]
Distance between HU and BC	A	110 [360] *1	110 [360] *1
Farthest IU from BC controller	D+E+i	60 [197] *2*3	60 [197] *2*3
Height between HU and IU (HU above IU)	H	50 [164]	-
Height between HU and IU (HU under IU)	H'	40 [131]	-
Height between IU and BC	h1	15 [49] (10 [32]) *4	-
Height between IU and IU	h2	30 [98] (20 [65]) *5	-

Bent equivalent length

Heat source Model	M (m/bent [ft./bent])
P0723(4)AMM0AN	0.35 [1.15]
P0963(4)AMM0AN	0.42 [1.38]
P1203(4)AMM0AN	0.47 [1.55]
P1443(4)AMM0AN	0.50 [1.65]
P1683(4)AMM0AN	0.50 [1.65]
P1923(4)AMM0AN	0.50 [1.65]
P2163(4)AMM0AN	0.50 [1.65]
P2403(4)AMM0AN	0.50 [1.65]

HU: Heat source Unit; IU: Indoor Unit; BC: BC controller
*1. Refer to "Total piping length restrictions (m)/Total piping length restrictions (ft.)" section.
*2. Details refer to Fig. 1.
*3. When the P072 or P096 model of indoor units are connected to the system, the maximum distance from the BC controller to the farthest indoor unit (indicated as "D + E + i" in the figure) is 40 m [131 ft.].
*5. Distance of Indoor sized P072, P096 from IU must be less than 20 m [65 ft.], if any.
*6. Total length of high-pressure pipes and liquid pipes
*7. The piping length between the BC controller and the indoor unit is subject to restrictions depending on the installation location and the capacity of the indoor unit. For details, refer to the New Design Tool software of Mitsubishi Electric Corporation/the Diamond System Builder software of Mitsubishi Electric Trane HVAC US.

Fig. 1 Piping length and height between IU and BC controller



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

Heat source Model	Pipe(High pressure)	Pipe(Low pressure)
P0723(4)AMM0AN	ø15.88 [5/8]	ø19.05 [3/4]
P096-1203(4)AMM0AN	ø19.05 [3/4]	ø22.20 [7/8]
P144-1923(4)AMM0AN	ø22.20 [7/8]	ø28.58 [1-1/8]
P2163(4)AMM0AN	ø22.20 [7/8]	ø28.58 [1-1/8]
P2403(4)AMM0AN	ø22.20 [7/8]	ø34.93 [1-3/8]

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

Total down-stream Indoor capacity	Pipe(Liquid)	Pipe(Gas)
P054 or less	ø9.52 [3/8]	ø15.88 [5/8]
P055-P072	ø9.52 [3/8]	ø19.05 [3/4]
P073-P096	ø9.52 [3/8]	ø22.20 [7/8]

Piping "a", "b", "c", "d", "e", "f", "g", "i" 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]

Selection criteria for joints_A

Total down-stream Indoor capacity	Joint
-P072	CMY-Y102SS-G2
P073-P096	CMY-Y102LS-G2

(2) IF more than 12 ports are in use, or if there is more than one BC controller in use for one Heat source unit

Note1. No Header usable on TQRY system.
Note2. Indoor unit sized P072-P096 should be connected to BC controller via Y shape joint CMY-R170M-E.
Note3. Indoor unit sized P072-P096 does NOT share BC controller ports with other Indoor units.
Note4. 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 Number of bent.
Note5. Set DIP-SW 1-1 to ON of BC controller, in case of connected Indoor unit sized P031-P054 with 2 ports.
Note6. Do not connect multiple indoor units to the same port when operating each of them in different mode (cooling, heating, stop, and thermo-off). In case of connecting multiple indoor units to the same port, connecting all indoor units to one remote controller and switching SW1-1 ON in the all connected indoor units (switch to thermostat built in the remote controller) are recommended.
Note7. The maximum total capacity of indoor units that can be connected to each sub BC controller TCMBS•MB11MM is 126.
Note8. Indoor capacity is described as its model size. For example, TPEFYP024MA1M0A, its capacity is P024.
Note9. Total down-stream Indoor capacity is the summary of the model size of Indoors down-stream. For example, TPEFYP024MA1M0A + TPEFYP006MA1M0A : Total Indoor capacity = P024 + P006 = P030.
Note10. To connect the BC controller to the main pipe, use the reducer (CMY-R304S-G1).
Note11. To connect the sub BC controller to the main BC controller, use the reducer (CMY-R303S-G1 or CMY-R306S-G).
Note12. Install the pipes correctly referring to the DATA BOOK.
Note13. Up to 11 sub BC controllers can be connected.

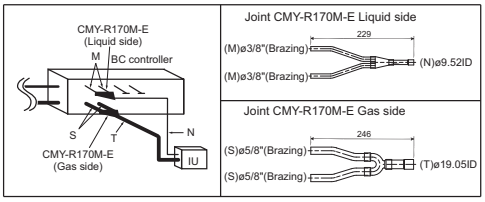


Fig. A

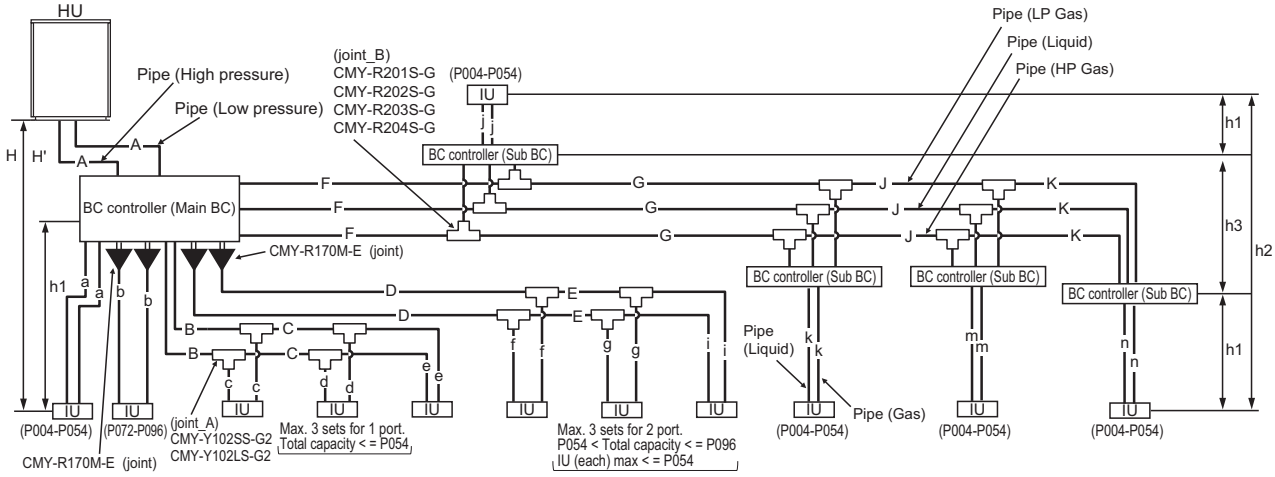


Fig. B Piping scheme

HU: Heat source unit, IU: Indoor unit

Piping length limitation *8

(m [ft.])

Item	Piping in the figure	Max. length	Max. equivalent length
Total piping length (Total length of high pressure and liquid pipes)	A+B+C+D+E+F+G+J+K+a+b+c+d+e+f+g+i+j+k+m+n	*1	-
Farthest IU from HU	A+F+G+J+K+n	165 [541]	190 [623]
Distance between HU and BC	A	110 [360] *1	110 [360] *1
Farthest IU from BC controller	D+E+i	60 [197] *2*3	60 [197] *2*3
Farthest IU from BC controller via Sub BC controller	F+G+J+K+n	90 [295] *7	90 [295] *7
Height between HU and IU (HU above IU)	H	50 [164]	-
Height between HU and IU (HU under IU)	H'	40 [131]	-
Height between IU and BC	h1	15 [49] (10 [32]) *4	-
Height between IU and IU	h2	30 [98] (20 [65]) *5	-
Height between BC(Main or Sub) and BC(Sub)	h3	15 [49] (10 [32]) *6	-

HU: Heat source Unit; IU: Indoor Unit; BC: BC controller
*1. Refer to "Total piping length restrictions (m)/Total piping length restrictions (ft.)" section.
*2. Details refer to Fig. 2.
*3. When the P072 or P096 model of indoor units are connected to the system, the maximum distance from the BC controller to the farthest indoor unit (indicated as "D + E + i" in the figure) is 40 m [131 ft.].
*4. Distance of Indoor sized P072, P096 from BC must be less than 10 m [32 ft.], if any.
*5. Distance of Indoor sized P072, P096 from IU must be less than 20 m [65 ft.], if any.
*6. When using 2 or more Sub BC controllers, max. height "h3" should be considered.
*7. When the piping length or the vertical separation exceeds the limit specified in Fig. 2, connect a sub BC to the system. The restriction for a system with a sub BC connection is shown in Fig. 3. When a given system configuration falls within the shaded area in Fig. 3, increase the size of the high-pressure pipe and the liquid pipe between the main BC and sub BC by one size. When using P012, P015, P018, P036, or P048 model of indoor units, increase the size of the liquid branch pipe between the sub BC and indoor unit by one size.
When using indoor models P054 or larger, the restrictions shown in Fig. 2 cannot be exceeded.
*8. Total length of high-pressure pipes and liquid pipes
*9. The piping length between the BC controller and the indoor unit is subject to restrictions depending on the installation location and the capacity of the indoor unit. For details, refer to the New Design Tool software of Mitsubishi Electric Corporation/the Diamond System Builder software of Mitsubishi Electric Trane HVAC US.

Bent equivalent length

Heat source Model	M (m/bent [ft./bent])
P0723(4)AMM0AN	0.35 [1.15]
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P1203(4)AMM0AN	0.47 [1.55]
P1443(4)AMM0AN	0.50 [1.65]
P1683(4)AMM0AN	0.50 [1.65]
P1923(4)AMM0AN	0.50 [1.65]
P2163(4)AMM0AN	0.50 [1.65]
P2403(4)AMM0AN	0.50 [1.65]

Piping length and height between IU and BC controller

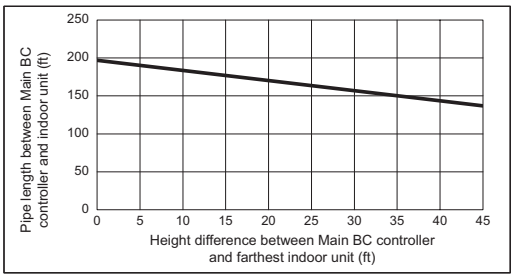


Fig. 2

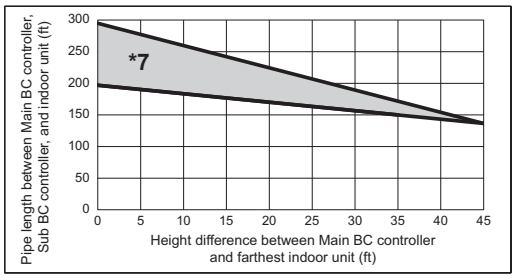
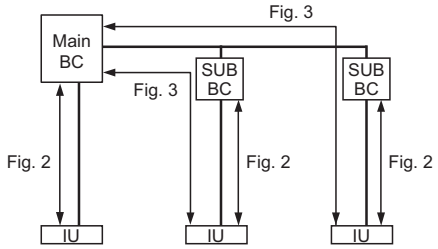


Fig. 3



*7. When the piping length or the vertical separation exceeds the limit specified in Fig. 2, connect a sub BC to the system.
The restriction for a system with a sub BC connection is shown in Fig. 3.
When a given system configuration falls within the shaded area in Fig. 3, increase the size of the high-pressure pipe and the liquid pipe between the main BC and sub BC by one size.
The maximum liquid branch pipe diameter is ø19.05. If a given system already has a ø19.05-pipe between the main BC and sub BC, there is no need to increase the pipe size.
When using P012, P015, P018, P036, or P048 model of indoor units, increase the size of the liquid branch pipe between the sub BC and indoor unit by one size.
When using indoor models P054 or larger, the restrictions shown in Fig. 2 cannot be exceeded.

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

Heat source Model	Pipe(High pressure)	Pipe(Low pressure)
P0723(4)AMM0AN	ø15.88 [5/8]	ø19.05 [3/4]
P096-1203(4)AMM0AN	ø19.05 [3/4]	ø22.20 [7/8]
P144-1923(4)AMM0AN	ø22.20 [7/8]	ø28.58 [1-1/8]
P2163(4)AMM0AN	ø22.20 [7/8]	ø28.58 [1-1/8]
P2403(4)AMM0AN	ø22.20 [7/8]	ø34.93 [1-3/8]

Selection criteria for joints_A

Total down-stream Indoor capacity	Joint
-P072	CMY-Y102SS-G2
P073-P096	CMY-Y102LS-G2

Selection criteria for joints_B

Total down-stream Indoor capacity	Joint
-P126	CMY-R201S-G
P127-P216	CMY-R202S-G
P217-P234	CMY-R203S-G
P235-	CMY-R204S-G

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

Total down-stream Indoor capacity	Pipe(Liquid)	Pipe(Gas)
P054 or less	ø9.52 [3/8]	ø15.88 [5/8]
P055-P072	ø9.52 [3/8]	ø19.05 [3/4]
P073-P096	ø9.52 [3/8]	ø22.20 [7/8]

Piping "a", "b", "c", "d", "e", "f", "g", "i", "j", "k", "m", "n" 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]

Piping "F", "G", "J", "K" size selection rule **(mm [in.])**

Total down-stream Indoor capacity	Pipe(Liquid)	Pipe(HP Gas)	Pipe(LP Gas)
P072 or less	ø9.52 [3/8]	ø15.88 [5/8]	ø19.05 [3/4]
P073 to P108	ø9.52 [3/8]	ø19.05 [3/4]	ø22.20 [7/8]
P109 to P126	ø12.70 [1/2]	ø19.05 [3/4]	ø28.58 [1-1/8]
P127 to P144	ø12.70 [1/2]	ø22.20 [7/8]	ø28.58 [1-1/8]
P145 to P216	ø15.88 [5/8]	ø22.20 [7/8]	ø28.58 [1-1/8]
P217 to P234	ø15.88 [5/8]	ø28.58 [1-1/8]	ø28.58 [1-1/8]
P235 to P288	ø19.05 [3/4]	ø28.58 [1-1/8]	ø34.93 [1-3/8]
P289 or above	ø19.05 [3/4]	ø28.58 [1-1/8]	ø41.28 [1-5/8]

HP: High pressure, LP: Low pressure

(3) IF more than 12 ports are in use, or if there is more than one BC controller in use for two Heat source units

Note1. No Header usable on TQRY system.
Note2. Indoor unit sized P072-P096 should be connected to BC controller via Y shape joint CMY-R170M-E.
Note3. Indoor unit sized P072-P096 does NOT share BC controller ports with other Indoor units.
Note4. 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 Number of bent.
Note5. Set DIP-SW 1-1 to ON of BC controller, in case of connected Indoor unit sized P031-P054 with 2 ports.
Note6. Do not connect multiple indoor units to the same port when operating each of them in different mode (cooling, heating, stop, and thermo-off). In case of connecting multiple indoor units to the same port, connecting all indoor units to one remote controller and switching SW1-1 ON in the all connected indoor units (switch to thermostat built in the remote controller) are recommended.
Note7. The maximum total capacity of indoor units that can be connected to each sub BC controller TCMBS•MB11MM is 126.
Note8. Indoor capacity is described as its model size. For example, TPEFYP024MA1M0A, its capacity is P024.
Note9. Total down-stream Indoor capacity is the summary of the model size of Indoors down-stream. For example, TPEFYP024MA1M0A + TPEFYP006MA1M0A : Total Indoor capacity = P024 + P006 = P030.
Note10. To connect the BC controller to the main pipe, use the reducer (CMY-R304S-G1).
Note11. To connect the sub BC controller to the main BC controller, use the reducer (CMY-R303S-G1 or CMY-R306S-G).
Note12. Install the pipes correctly referring to the DATA BOOK.
Note13. Up to 11 sub BC controllers can be connected.

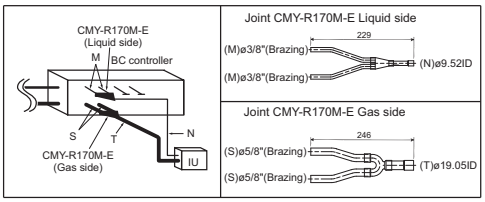


Fig. A

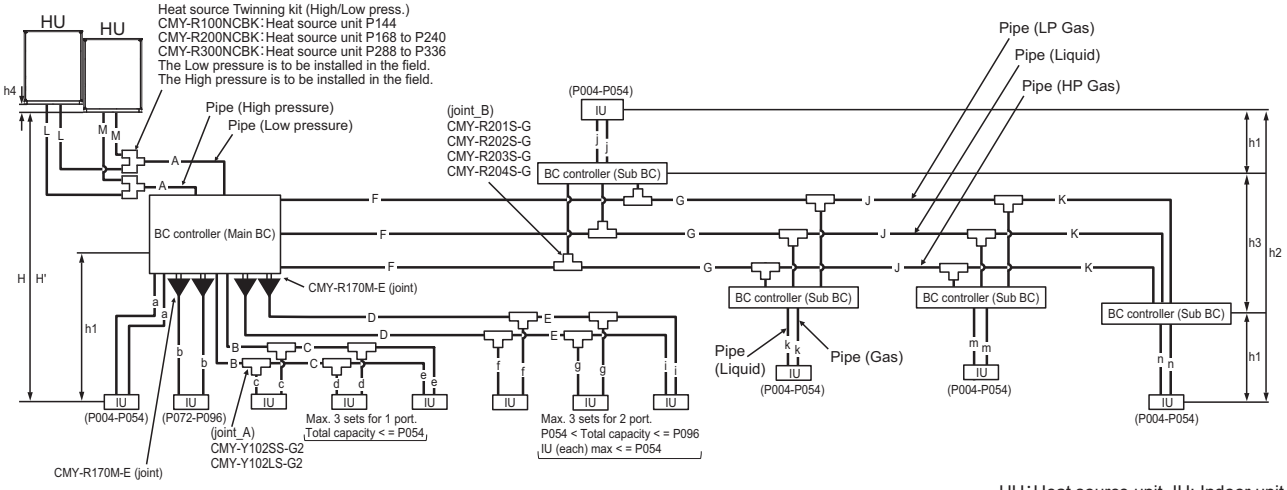


Fig. Piping scheme

HU：Heat source unit, IU: Indoor unit

Piping length limitation *8 (m [ft.])

Item	Piping in the figure	Max. length	Max. equivalent length
Total piping length (Total length of high pressure and liquid pipes)	L+M+A+B+C+D+E+F+G+J+K+a+b+c+d+e+f+g+i+j+k+m+n	*1	-
Farthest IU from HU	L(M)+A+F+G+J+K+n	165 [541]	190 [623]
Distance between HU and BC	L(M)+A	110 [360] *1	110 [360] *1
Farthest IU from BC controller	D+E+i	60 [197] *2 *3	60 [197] *2*3
Farthest IU from BC controller via Sub BC controller	F+G+J+K+n	90 [295] *7	90 [295] *7
Height between HU and IU (HU above IU)	H	50 [164]	-
Height between HU and IU (HU under IU)	H'	40 [131]	-
Height between IU and BC	h1	15 [49] (10 [32]) *4	-
Height between IU and IU	h2	30 [98] (20 [65]) *5	-
Height between BC(Main or Sub) and BC(Sub)	h3	15 [49] (10 [32]) *6	-
Distance between Main unit and Sub unit	L+M	5 [16]	-
Height between Main unit and Sub unit	h4	0.1 [0.3]	-

HU: Heat source Unit; IU: Indoor Unit; BC: BC controller
*1. Refer to "Total piping length restriction (m)/Total piping length restrictions (ft.)" section.
*2. Details refer to Fig. 2.
*3. When the P072 or P096 model of indoor units are connected to the system, the maximum distance from the BC controller to the farthest indoor unit (indicated as "D + E + i" in the figure) is 40 m [131 ft.].
*4. Distance of Indoor sized P072, P096 from BC must be less than 10 m [32 ft.], if any.
*5. Distance of Indoor sized P072, P096 from IU must be less than 20 m [65 ft.], if any.
*6. When using 2 or more Sub BC controllers, max. height "h3" should be considered.
*7. When the piping length or the vertical separation exceeds the limit specified in Fig. 2, connect a sub BC to the system.
The restriction for a system with a sub BC connection is shown in Fig. 3.
When a given system configuration falls within the shaded area in Fig. 3, increase the size of the high-pressure pipe and the liquid pipe between the main BC and sub BC by one size.
When using P012, P015, P018, P036, or P048 model of indoor units, increase the size of the liquid branch pipe between the sub BC and indoor unit by one size.
When using indoor models P054 or larger, the restrictions shown in Fig. 2 cannot be exceeded.
*8. Total length of high-pressure pipes and liquid pipes
*9. The piping length between the BC controller and the indoor unit is subject to restrictions depending on the installation location and the capacity of the indoor unit. For details, refer to the New Design Tool software of Mitsubishi Electric Corporation/the Diamond System Builder software of Mitsubishi Electric Trane HVAC US.

Bent equivalent length

Heat source Model	M (m/bent [ft./bent])
P1443(4)BMM0AN	0.50 [1.65]
P1683(4)BMM0AN	0.50 [1.65]
P1923(4)BMM0AN	0.50 [1.65]
P2163(4)BMM0AN	0.50 [1.65]
P2403(4)BMM0AN	0.50 [1.65]
P2883(4)BMM0AN	0.70 [2.30]
P3123(4)BMM0AN	0.70 [2.30]
P3363(4)BMM0AN	0.80 [2.63]

Piping length and height between IU and BC controller

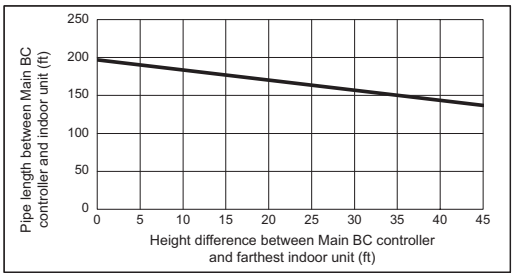


Fig. 2

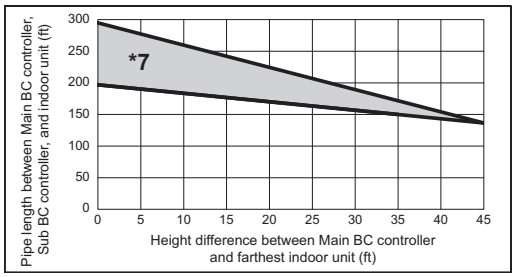
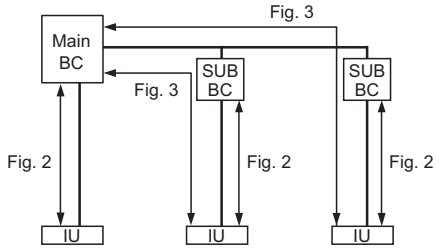


Fig. 3



*7. When the piping length or the vertical separation exceeds the limit specified in Fig. 2, connect a sub BC to the system.
The restriction for a system with a sub BC connection is shown in Fig. 3.
When a given system configuration falls within the shaded area in Fig. 3, increase the size of the high-pressure pipe and the liquid pipe between the main BC and sub BC by one size.
The maximum liquid branch pipe diameter is ø19.05. If a given system already has a ø19.05-pipe between the main BC and sub BC, there is no need to increase the pipe size.
When using P012, P015, P018, P036, or P048 model of indoor units, increase the size of the liquid branch pipe between the sub BC and indoor unit by one size.
When using indoor models P054 or larger, the restrictions shown in Fig. 2 cannot be exceeded.

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

Heat source Model	Pipe(High pressure)	Pipe(Low pressure)
P144-1923(4)BMM0AN	ø22.20 [7/8]	ø28.58 [1-1/8]
P2163(4)BMM0AN	ø22.20 [7/8]	ø28.58 [1-1/8]
P2403(4)BMM0AN	ø22.20 [7/8]	ø34.93 [1-3/8]
P288-3123(4)BMM0AN	ø28.58 [1-1/8]	ø34.93 [1-3/8]
P3363(4)BMM0AN	ø28.58 [1-1/8]	ø41.28 [1-5/8]

Piping "L", "M" size selection rule **(mm [in.])**

Heat source Model	Pipe(High pressure)	Pipe(Low pressure)
P0723(4)AMM0AN	ø15.88 [5/8]	ø19.05 [3/4]
P0963(4)AMM0AN	ø19.05 [3/4]	ø22.20 [7/8]
P1203(4)AMM0AN	ø19.05 [3/4]	ø22.20 [7/8]
P1443(4)AMM0AN	ø22.20 [7/8]	ø28.58 [1-1/8]
P1683(4)AMM0AN	ø22.20 [7/8]	ø28.58 [1-1/8]

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

Total down-stream Indoor capacity	Pipe(Liquid)	Pipe(Gas)
P054 or less	ø9.52 [3/8]	ø15.88 [5/8]
P055-P072	ø9.52 [3/8]	ø19.05 [3/4]
P073-P096	ø9.52 [3/8]	ø22.20 [7/8]

Selection criteria for joints_A

Total down-stream Indoor capacity	Joint
-P072	CMY-Y102SS-G2
P073-P096	CMY-Y102LS-G2

Piping "a", "b", "c", "d", "e", "f", "g", "i", "j", "k", "m", "n" 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]

Selection criteria for joints_B

Total down-stream Indoor capacity	Joint
-P126	CMY-R201S-G
P127-P216	CMY-R202S-G
P217-P234	CMY-R203S-G
P235-	CMY-R204S-G

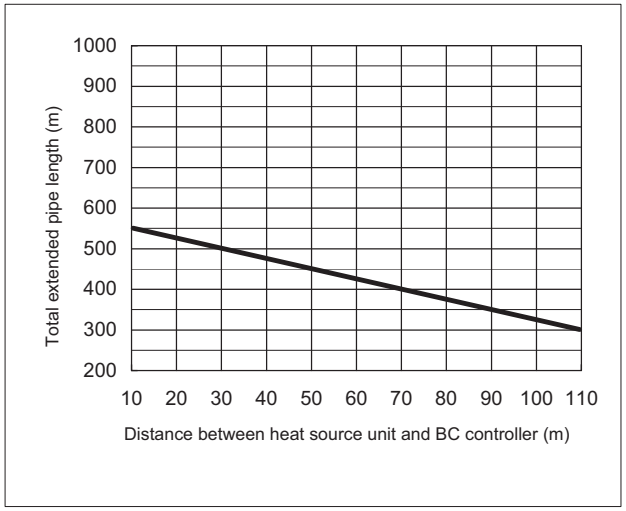
Piping "F", "G", "J", "K" size selection rule **(mm [in.])**

Total down-stream Indoor capacity	Pipe(Liquid)	Pipe(HP Gas)	Pipe(LP Gas)
P072 or less	ø9.52 [3/8]	ø15.88 [5/8]	ø19.05 [3/4]
P073 to P108	ø9.52 [3/8]	ø19.05 [3/4]	ø22.20 [7/8]
P109 to P126	ø12.70 [1/2]	ø19.05 [3/4]	ø28.58 [1-1/8]
P127 to P144	ø12.70 [1/2]	ø22.20 [7/8]	ø28.58 [1-1/8]
P145 to P216	ø15.88 [5/8]	ø22.20 [7/8]	ø28.58 [1-1/8]
P217 to P234	ø15.88 [5/8]	ø28.58 [1-1/8]	ø28.58 [1-1/8]
P235 to P288	ø19.05 [3/4]	ø28.58 [1-1/8]	ø34.93 [1-3/8]
P289 or above	ø19.05 [3/4]	ø28.58 [1-1/8]	ø41.28 [1-5/8]

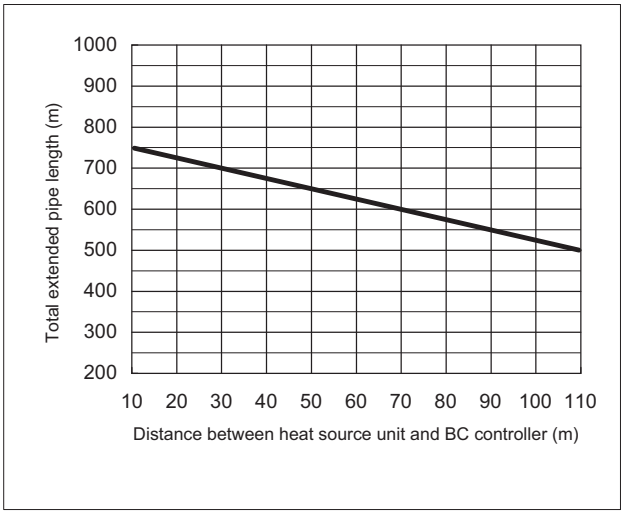
HP: High pressure, LP: Low pressure

(4) Total piping length restrictions (m)

[TQRYP072, 096, 1203(4)AMM0AN]

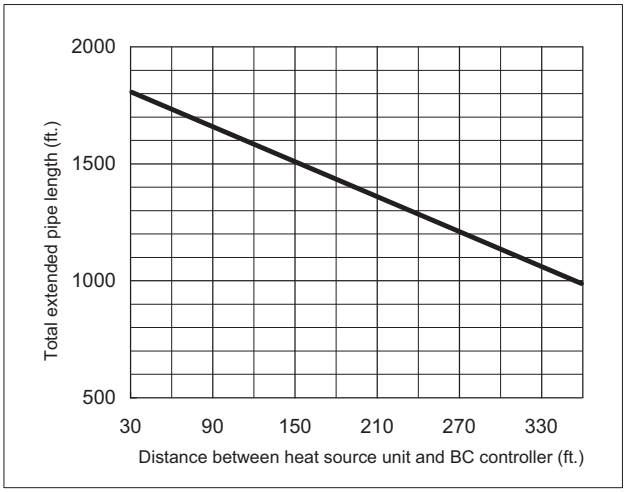


[TQRYP144, 168, 192, 216, 2403(4)AMM0AN]
[TQRYP144, 168, 192, 216, 240, 288, 312, 3363(4)BMM0AN]

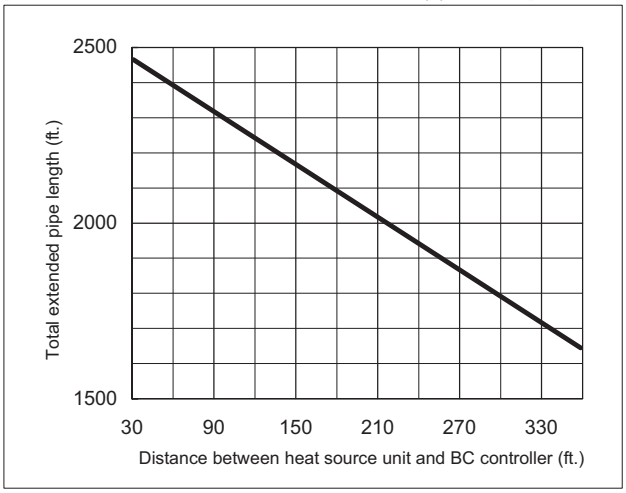


Total piping length restrictions (ft.)

[TQRYP072, 096, 1203(4)AMM0AN]



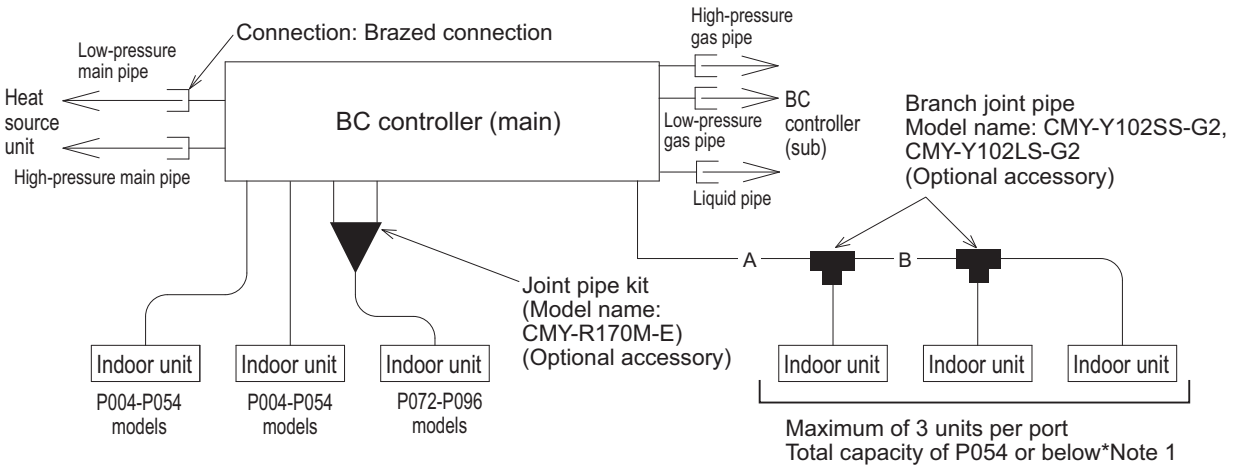
[TQRYP144, 168, 192, 216, 2403(4)AMM0AN]
[TQRYP144, 168, 192, 216, 240, 288, 312, 3363(4)BMM0AN]



2. BC Controller Connection Method

(1) Size of the pipe that fits the main BC controller ports

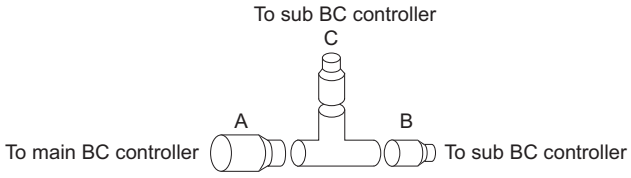
72 - 336 models



*Note 1 Do not connect multiple indoor units to the same port when operating each of them in different mode (cooling, heating, stop, and thermo-off).
The indoor units connected to the same port must be set to operate in the same mode. Set them in the same group to make them run/stop in the same mode all together. For other options, enable the thermo setting on the remote controller, or set the common thermostat (optional) to run/stop the units in the same mode based on a representative temperature.

*Note 2 Use the branch joint (CMY-Y102SS-G2) if the total capacity of the downstream indoor units is 72 or less.
Use the branch joint (CMY-Y102LS-G2) if the total capacity of the downstream indoor units is between 73 and 96.
Use two branch ports to connect to the optional Junction Pipe Kit (CMY-R170M-E) if the total capacity of the downstream indoor units exceeds 54.

1. Connect the liquid and gas pipes of each indoor unit to the same (correct) end connection numbers as indicated on the indoor unit connection section of each BC controller. If connected to wrong end connection numbers, there will be no normal operation.
2. List indoor unit model names in the name plate on the BC controller control box (for identification purposes), and BC controller end connection numbers and address numbers in the name plate on the indoor unit side.
3. Connect sealing pipes to the unused branch ports. (The optional part PAC-KA01PS-E is recommended.)
4. When using indoor unit of total capacity of 55 to 96, use the joint pipe kit (model name: CMY-R170M-E) to connect the units.
5. When using the branch joint between BC and indoor units, or between Main BC and Sub BC controllers, connect it horizontally.
6. Restriction on installing the branch joint between Main BC and Sub BC on the high-pressure piping, low pressure piping, and liquid piping.



- Regarding the 2-Branch Joint Pipe on the high-pressure/low-pressure/liquid piping, A and B must be installed horizontally, and C must be installed upward higher than the horizontal plane of A and B.

7. Be sure to have pipe expansion of indoor unit connecting port by cutting the piping at the cutting point which depends on the indoor unit capacity.
8. Be sure to use non-oxidative brazing where necessary. If you do not use non-oxidative brazing, it may clog the pipes.
While under a nitrogen purge, braze the indoor unit connecting port before brazing the heat source unit connecting port of BC controller.
When brazing the indoor unit connecting port, supply a nitrogen gas into the heat source unit connecting port of BC controller.
When brazing the heat source unit connecting port of BC controller, supply a nitrogen gas into the pipe between the heat source unit and BC controller.
9. After completing pipe connection, support the pipes to ensure that load is not imparted to the BC controller's end connections (particularly to the gas pipes of indoor units).

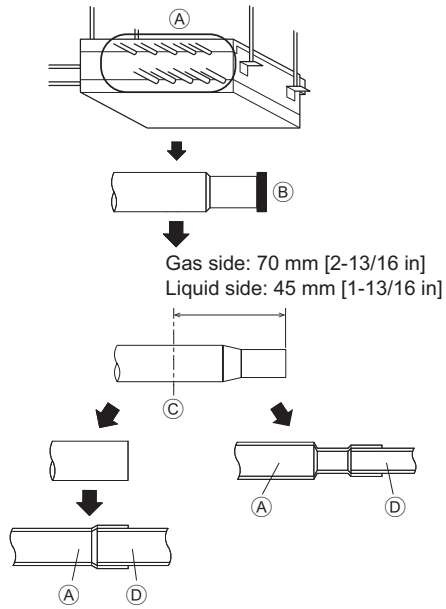
10. Support the on-site pipes near the BC controller at 0.5-meter intervals or less, and at 2-meter intervals or less in other areas. Support the pipes so that the bending part is securely fixed in place.
11. Refrigerant pipes may expand or shrink due to temperature fluctuations of the refrigerant inside the pipes. When installing long straight pipes, provide expansion loops or offsets to absorb the expansion of the pipes.

The ports of the BC controller accommodates the pipes on P024 - P054 models of indoor units. To connect other types of indoor units, follow the procedure below.

1)

Note:
Remove burr after cutting the piping to prevent entering the piping.
Check that there is no crack at the pipe expansion part.

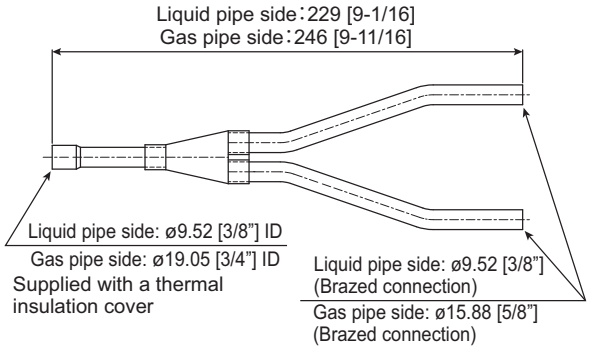
[Fig. 5.2.1]



Ⓐ Indoor unit connecting port
Ⓑ Rubber stopper
Ⓒ Cutting point (Indoor unit model: bigger than 18)
Ⓓ Field pipe

Connect the field piping as follows.
① Cut the connecting port. (Liquid side, Gas side)
② Connect the field piping to the liquid side connecting ports.
③ Connect the field piping to the gas side connecting ports.

2) To connect P072 - P096 models of indoor units (or when the total capacity of indoor units exceeds P055), use a junction pipe kit and merge the two nozzles.



3) To connect multiple indoor units to a port (or to a junction pipe)
- Maximum total capacity of connected indoor units: P054 or below (in a system with a junction pipe: P096 or below)
- Maximum number of connectable indoor units: 3 units
- Branch joint: Use CMY-Y102SS-G2, CMY-Y102LS-G2 (optional accessory).
- (1) Size of the pipe that fits the main BC controller ports (A, B): Select the proper size pipes based on the total capacity of the downstream indoor units, using the table below as a reference.

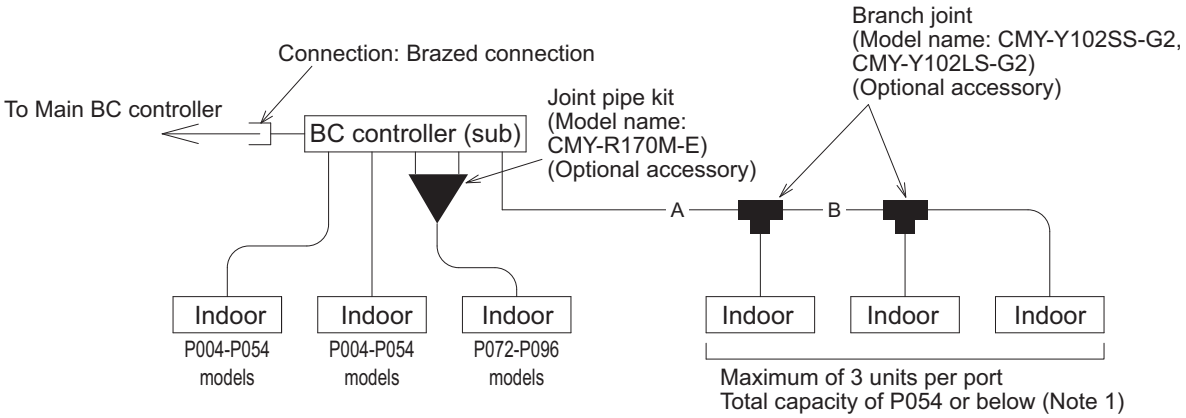
Unit : mm [inch]

Total capacity of indoor units	Liquid pipe	Gas pipe
54 or below	ø9.52 [3/8"]	ø15.88 [5/8"]
55 - 72	ø9.52 [3/8"]	ø19.05 [3/4"]
73 - 96	ø9.52 [3/8"]	ø22.2 [7/8"]

Unit : mm [inch]

<table>
<tr><th colspan="2">Heat source</th><th>High-pressure pipe</th><th>Low-pressure pipe</th></tr>
<tr><td rowspan="12">Heat source unit side</td><td>P072</td><td>ø15.88 [5/8"] (Brazed connection)</td><td>ø19.05 [3/4"] (Brazed connection)</td></tr>
<tr><td>P096</td><td rowspan="2">ø19.05 [3/4"] (Brazed connection)</td><td rowspan="2">ø22.2 [7/8"] (Brazed connection)</td></tr>
<tr><td>P120</td></tr>
<tr><td>P144</td><td rowspan="5">ø22.2 [7/8"] (Brazed connection)</td><td rowspan="4">ø28.58 [1-1/8"] (Brazed connection)</td></tr>
<tr><td>P168</td></tr>
<tr><td>P192</td></tr>
<tr><td>P216</td></tr>
<tr><td>P240</td><td rowspan="4">ø34.93 [1-3/8"] (Brazed connection)</td></tr>
<tr><td>P288</td><td rowspan="3">ø28.58 [1-1/8"] (Brazed connection)</td></tr>
<tr><td>P312</td></tr>
<tr><td>P336</td><td>ø41.28 [1-5/8"] (Brazed connection)</td></tr>
<tr><td colspan="2">Indoor unit side</td><td>ø9.52 [3/8"] (Brazed connection)</td><td>ø15.88 [5/8"] (Brazed connection)</td></tr>
</table>

(2) Size of the pipe that fits the sub BC controller ports



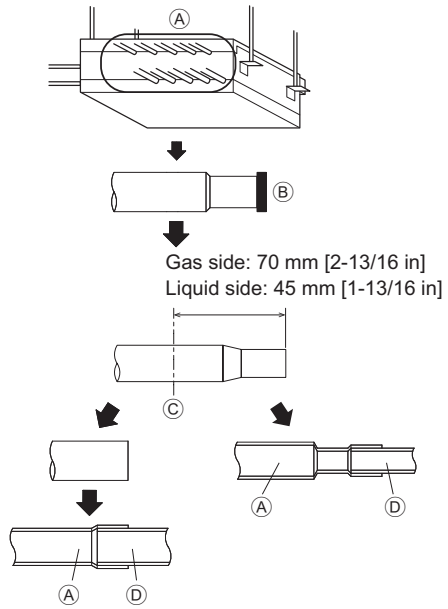
Note 1 Do not connect multiple indoor units to the same port when operating each of them in different mode (cooling, heating, stop, and thermo-off).
The indoor units connected to the same port must be set to operate in the same mode. Set them in the same group to make them run/stop in the same mode all together. For other options, enable the thermo setting on the remote controller, or set the common thermostat (optional) to run/stop the units in the same mode based on a representative temperature.

The ports of the BC controller accommodates the pipes on P024-P054 models of indoor units. To connect other types of indoor units, follow the procedure below.

1)

Note:
Remove burr after cutting the piping to prevent entering the piping.
Check that there is no crack at the pipe expansion part.

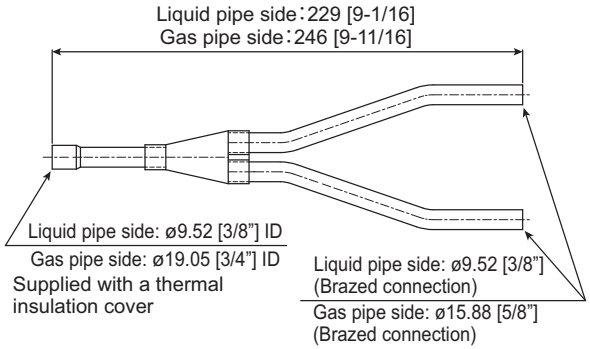
[Fig. 5.2.1]



Ⓐ Indoor unit connecting port
Ⓑ Rubber stopper
Ⓒ Cutting point (Indoor unit model: bigger than 18)
Ⓓ Field pipe

Connect the field piping as follows.
① Cut the connecting port. (Liquid side, Gas side)
② Connect the field piping to the liquid side connecting ports.
③ Connect the field piping to the gas side connecting ports.

2) To connect P072 - P096 models of indoor units (or when the total capacity of indoor units exceeds P055), use a junction pipe kit and merge the two nozzles.



3) To connect multiple indoor units to a port (or to a junction pipe)
- ♦Maximum total capacity of connected indoor units: P054 or below (in a system with a junction pipe: P096 or below)
- ♦Maximum number of connectable indoor units: 3 units
- ♦Branch joint: Use CMY-Y102SS-G2, CMY-Y102LS-G2 (optional accessory).
- ♦(2) Size of the pipe that fits the main BC controller ports (A, B): Select the proper size pipes based on the total capacity of the downstream indoor units, using the table below as a reference.

Unit : mm [inch]

Total capacity of indoor units	Liquid pipe	Gas pipe
54 or below	ø9.52 [3/8"]	ø15.88 [5/8"]
55 - 72	ø9.52 [3/8"]	ø19.05 [3/4"]
73 - 96	ø9.52 [3/8"]	ø22.2 [7/8"]

Unit : mm [inch]

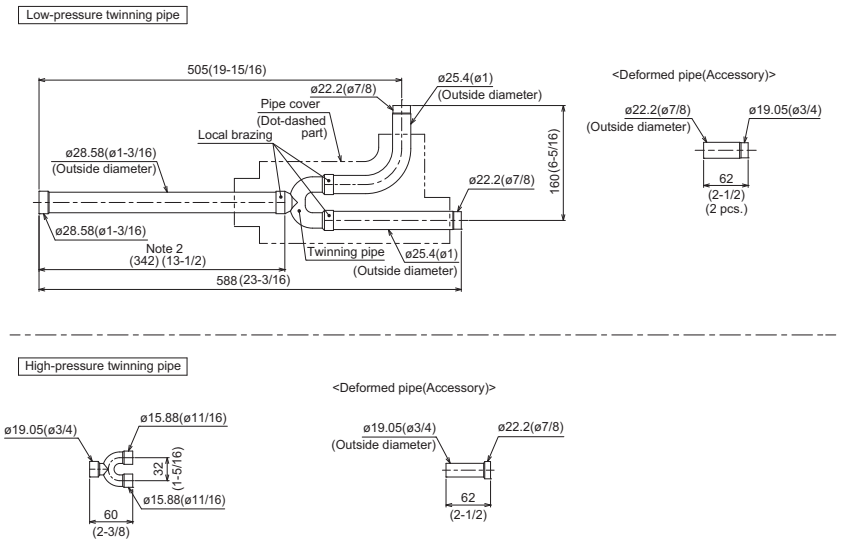
<table>
<tr><th colspan="2">Operation</th><th colspan="3">Pipe sections</th></tr>
<tr><th></th><th>Total capacity of indoor units connected to downstream BC controller</th><th>High-pressure side (gas)</th><th>Low-pressure side (gas)</th><th>Liquid pipe side</th></tr>
<tr><td rowspan="8">Main BC controller side</td><td>- 72</td><td>ø15.88 [5/8"] (Brazed connection)</td><td>ø19.05 [3/4"] (Brazed connection)</td><td rowspan="2">ø9.52 [3/8"] (Brazed connection)</td></tr>
<tr><td>73 - 108</td><td rowspan="2">ø19.05 [3/4"] (Brazed connection)</td><td>ø22.2 [7/8"] (Brazed connection)</td></tr>
<tr><td>109 - 126</td><td rowspan="4">ø28.58 [1-1/8"] (Brazed connection)</td><td rowspan="2">ø12.7 [1/2"] (Brazed connection)</td></tr>
<tr><td>127 - 144</td><td rowspan="2">ø22.2 [7/8"] (Brazed connection)</td></tr>
<tr><td>145 - 216</td><td rowspan="3">ø15.88 [5/8"] (Brazed connection)</td></tr>
<tr><td>217 - 234</td><td rowspan="3">ø28.58 [1-1/8"] (Brazed connection)</td></tr>
<tr><td>235 - 288</td><td>ø34.93 [1-3/8"] (Brazed connection)</td><td rowspan="2">ø19.05 [3/4"] (Brazed connection)</td></tr>
<tr><td>289 -</td><td>ø41.28 [1-5/8"] (Brazed connection)</td></tr>
</table>

3. Heat source unit Twinning Kit

The following optional Heat source unit Twinning Kit is needed to use to combine multiple refrigerant pipes. Refer to section "Piping Design" of the DATA BOOK for the details of selecting a proper twinning kit.

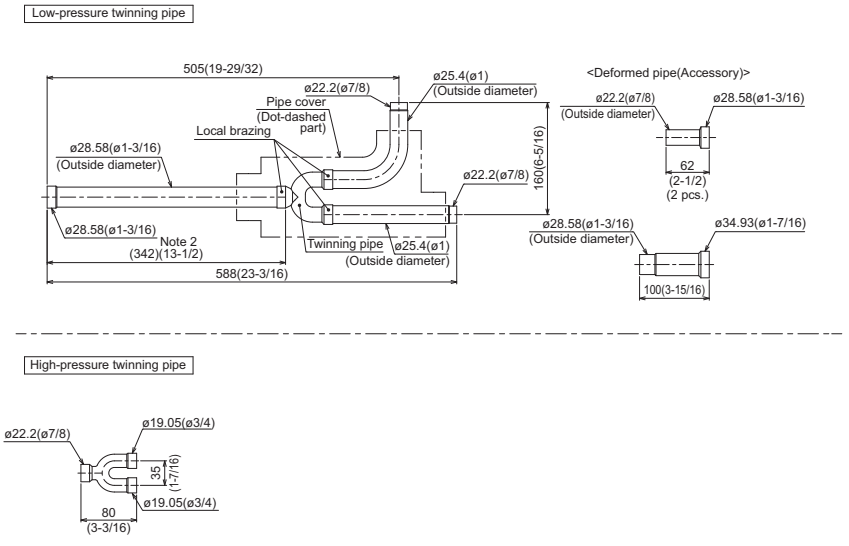
CMY-R100NCBK

Unit: mm (in.)



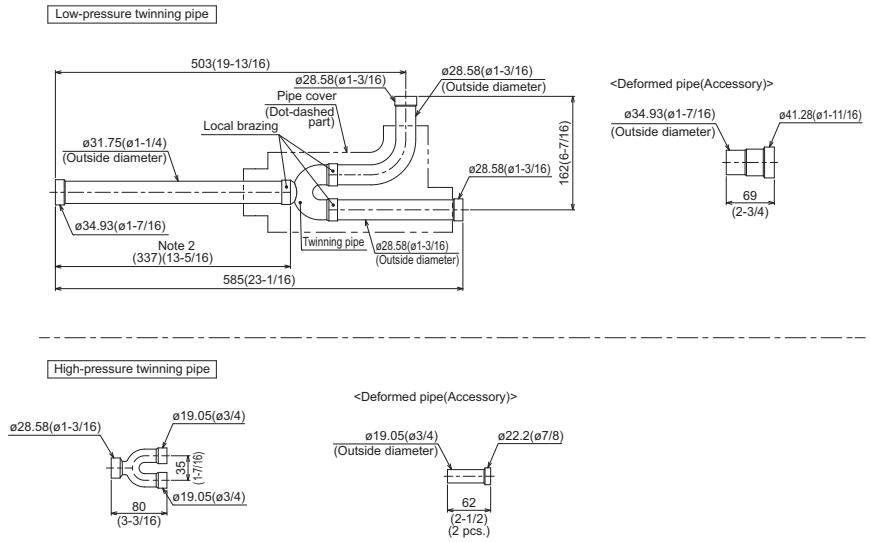
CMY-R200NCBK

Unit: mm (in.)

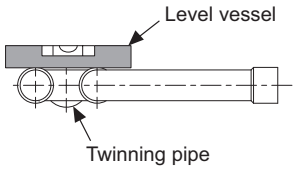


CMY-R300NCBK

Unit: mm (in.)



Note 1. Refer to the figure below for the installation position of the twinning pipe.
The Twinning pipe must be installed horizontally using a level vessel to avoid unit damage.



2. Use the attached pipe to braze the port-opening of the twinning pipe.
3. Pipe diameter is indicated by inside diameter.
4. Only use the twinning pipe by Mitsubishi (optional parts).

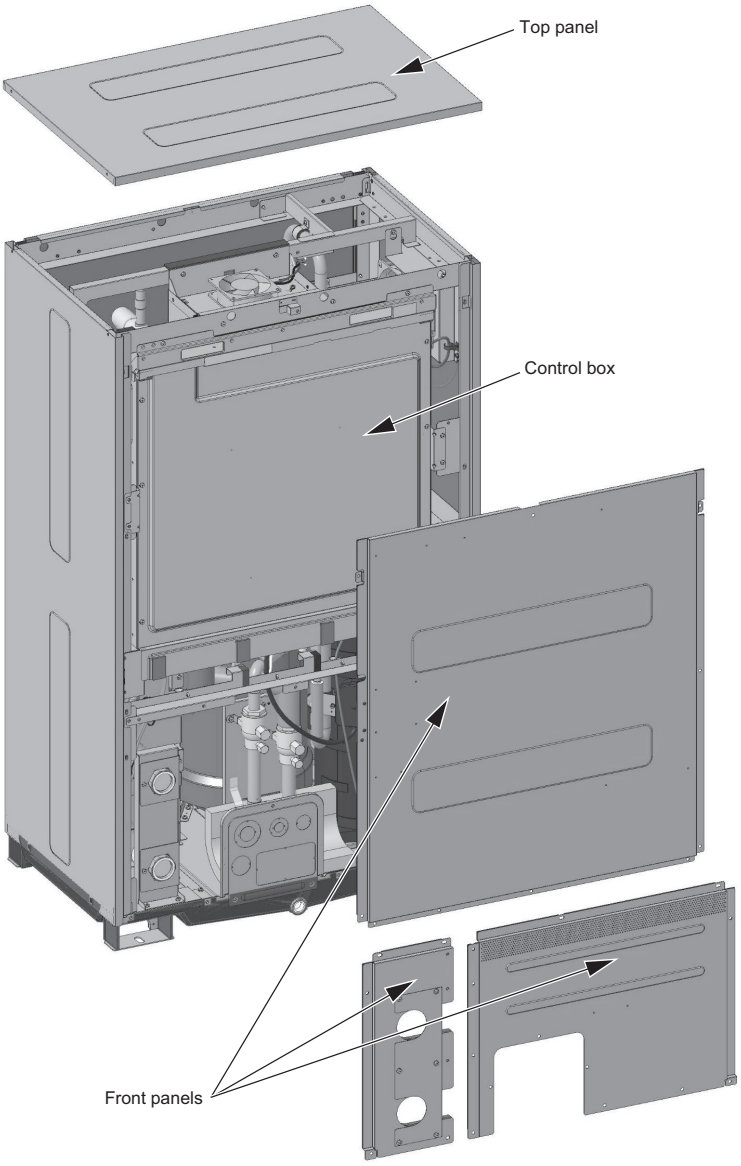
III Heat source Unit Components

[1] Heat source Unit Components and Refrigerant Circuit....61
[2] Control Box of the Heat source Unit....64
[3] Heat source Unit Circuit Board....68
[4] BC Controller Components....76
[5] BC Controller Circuit Board Arrangement....78
[6] BC Controller Circuit Board Components....79

[1] Heat source Unit Components and Refrigerant Circuit

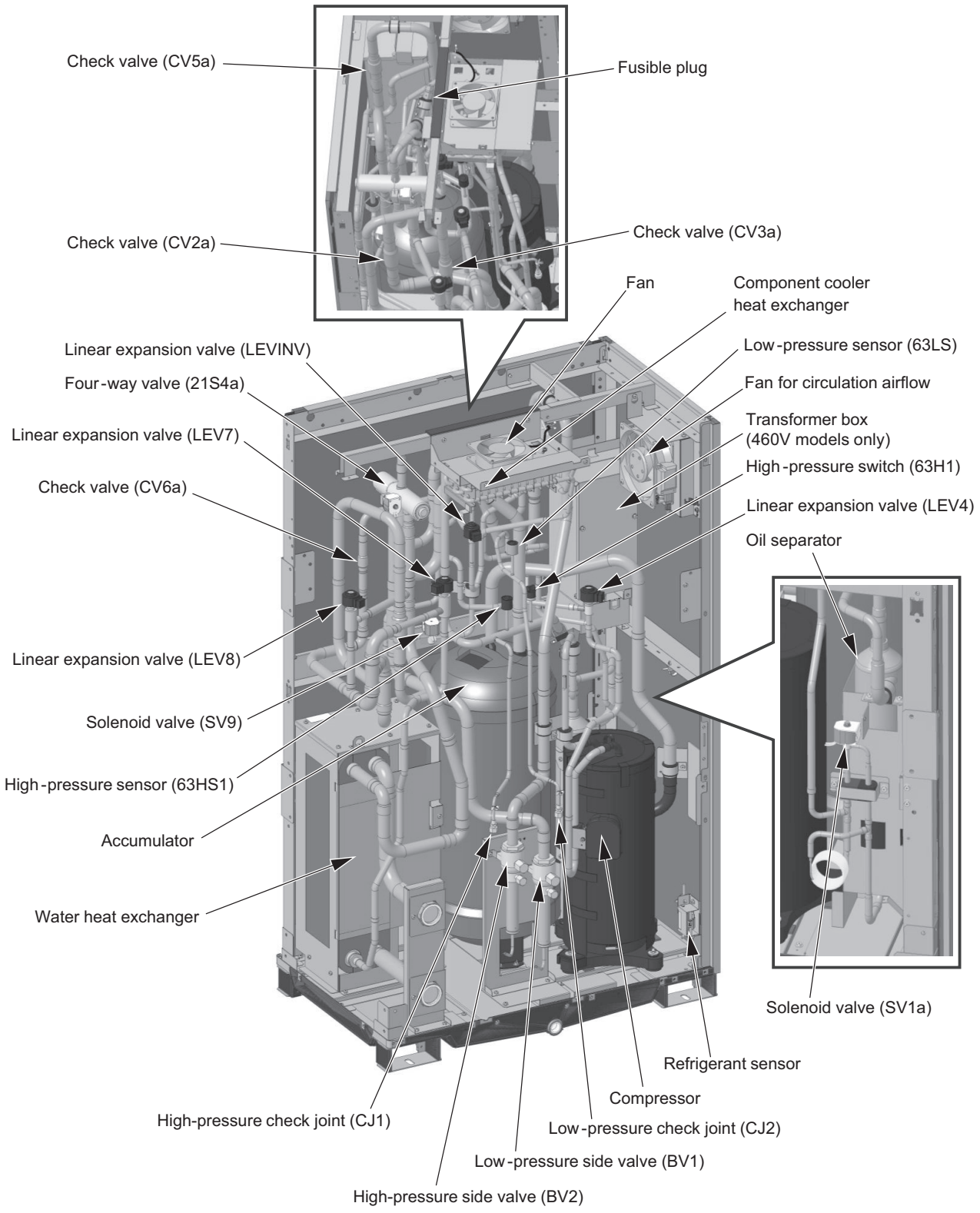
1. External appearance of heat source unit

(1) TQRYP072, 096, 120, 144, 168, 192, 216, 2403AMM0AN
TQRYP072, 096, 120, 144, 168, 192, 216, 2404AMM0AN

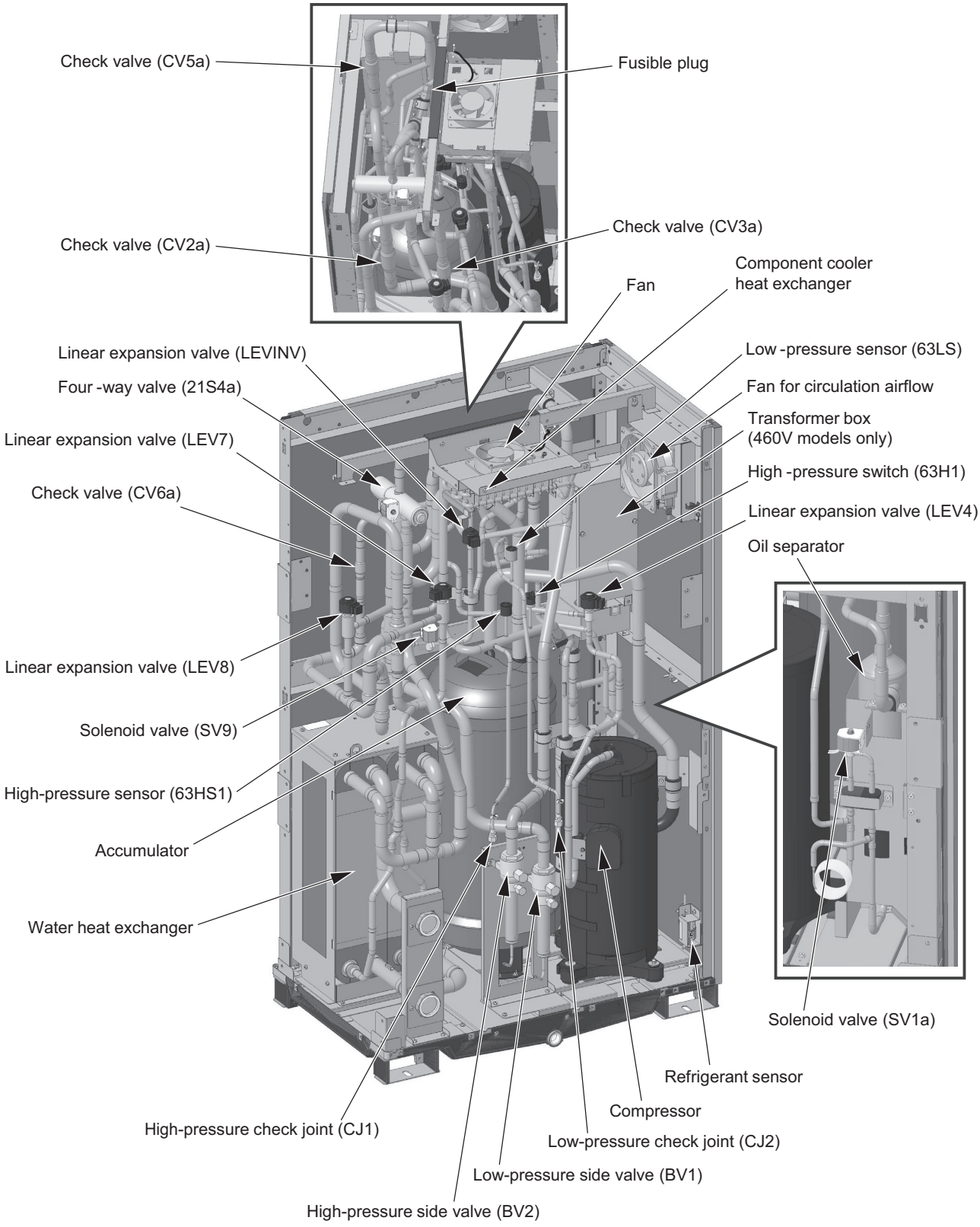


2. Refrigerant circuit

(1) TQRYP072, 096, 120, 144, 168, 1923AMM0AN
TQRYP072, 096, 120, 144, 168, 1924AMM0AN



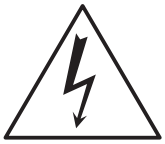
(2) TQRYP216, 2403AMM0AN
TQRYP216, 2404AMM0AN



[2] Control Box of the Heat source Unit

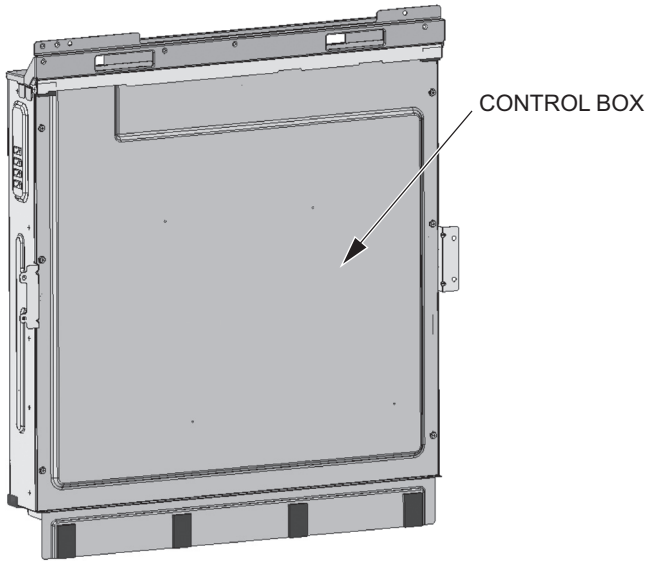
1. Heat source Unit Control Box

<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 check that the voltage of the electrolytic capacitor (Inverter main circuit) is 20VDC or below. (It takes about 10 minutes to discharge electricity after the power supply is turned off.)

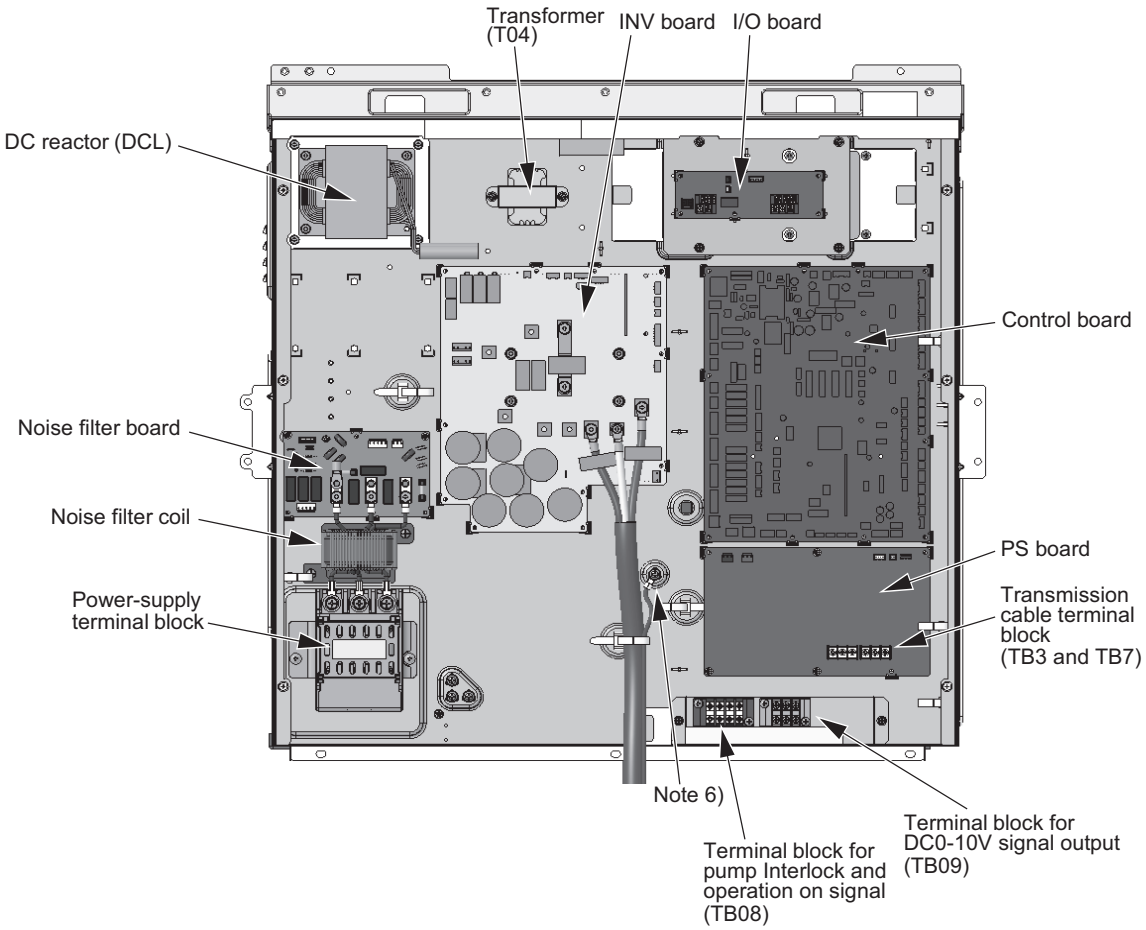
(1) TQRYP072, 096, 120, 144, 168, 192, 216, 2403(4)AMM0AN



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) The rear surface and inside of the control box have many hot areas. Be careful of those areas even after shutting off the power.
3) When connecting a cable to TB7, ensure the voltage is 20 VDC or lower.
4) 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 heat source unit.
   Energizing the heater will help evaporate the liquid refrigerant accumulated inside the compressor.
5) Do not remove the ground wire even during servicing.

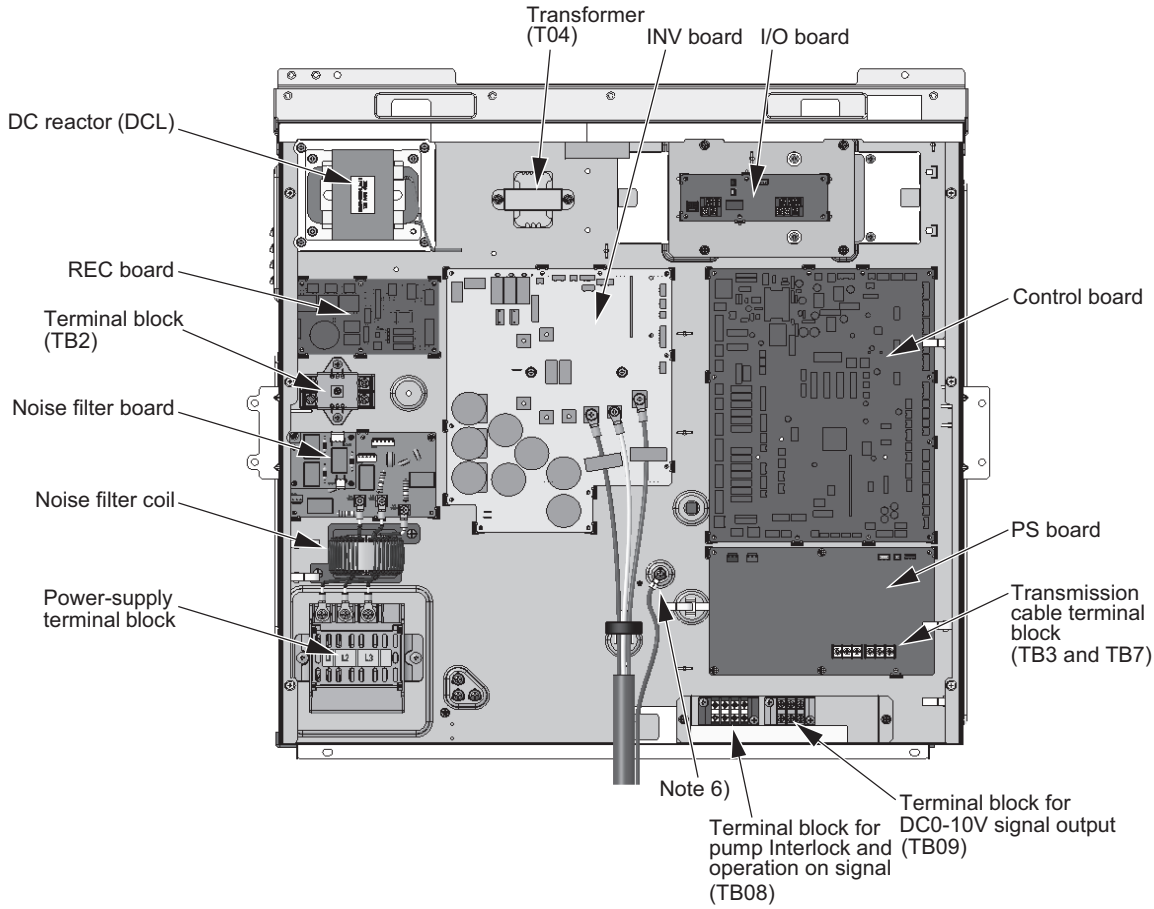
(2) TQRYP072, 096, 120, 144, 168, 192, 216, 2403AMM0AN



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) The rear surface and inside of the control box have many hot areas. Be careful of those areas even after shutting off the power.
4) When connecting a cable to TB7, ensure the voltage is 20 VDC or lower.
5) 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 heat source unit.
   Energizing the heater will help evaporate the liquid refrigerant accumulated inside the compressor.
6) Do not remove the ground wire even during servicing.

(3) TQRYP072, 096, 120, 144, 168, 192, 216, 2404AMM0AN

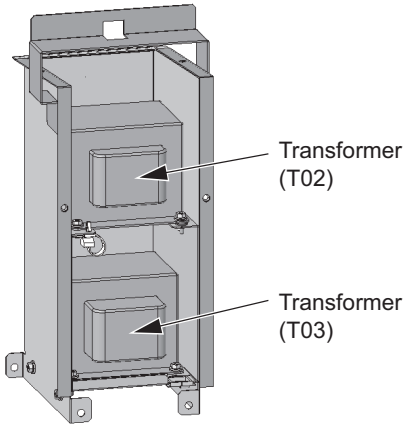


Note

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) 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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   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 heat source unit.
   Energizing the heater will help evaporate the liquid refrigerant accumulated inside the compressor.
6) Do not remove the ground wire even during servicing.

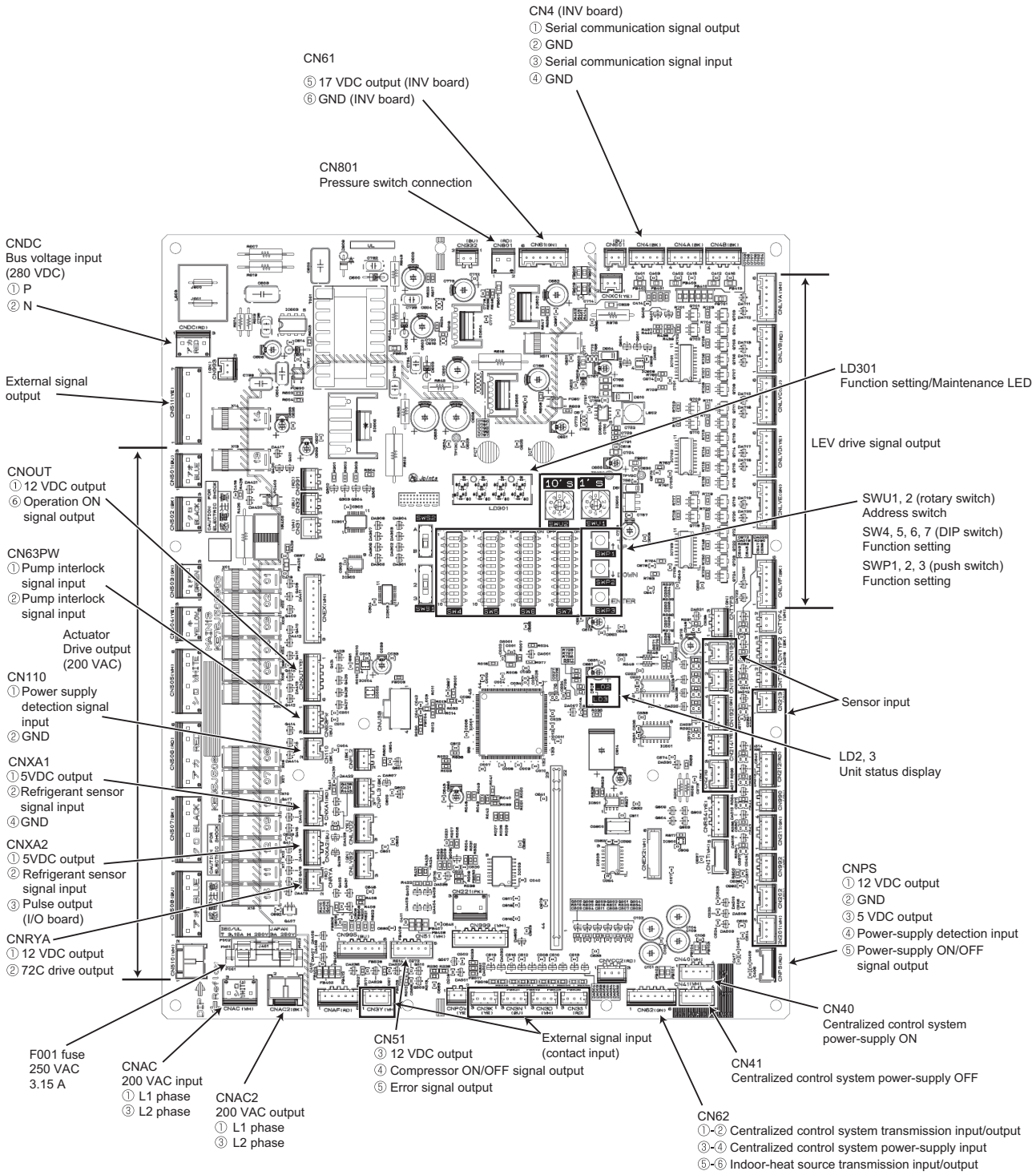
2. Transformer Box

(1) TQRYP072, 096, 120, 144, 168, 192, 216, 2404AMM0AN



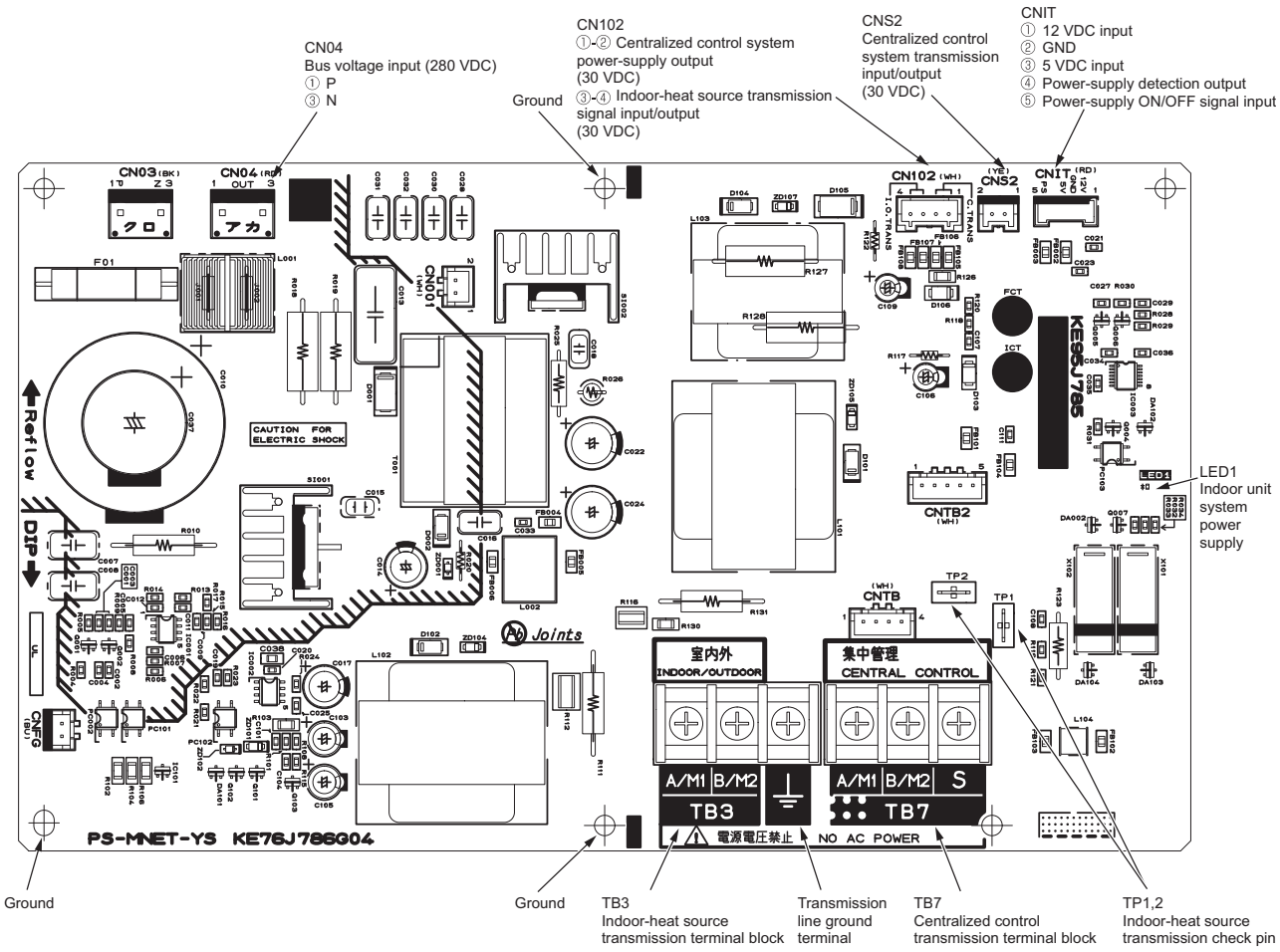
[3] Heat source Unit Circuit Board

1. Control Board



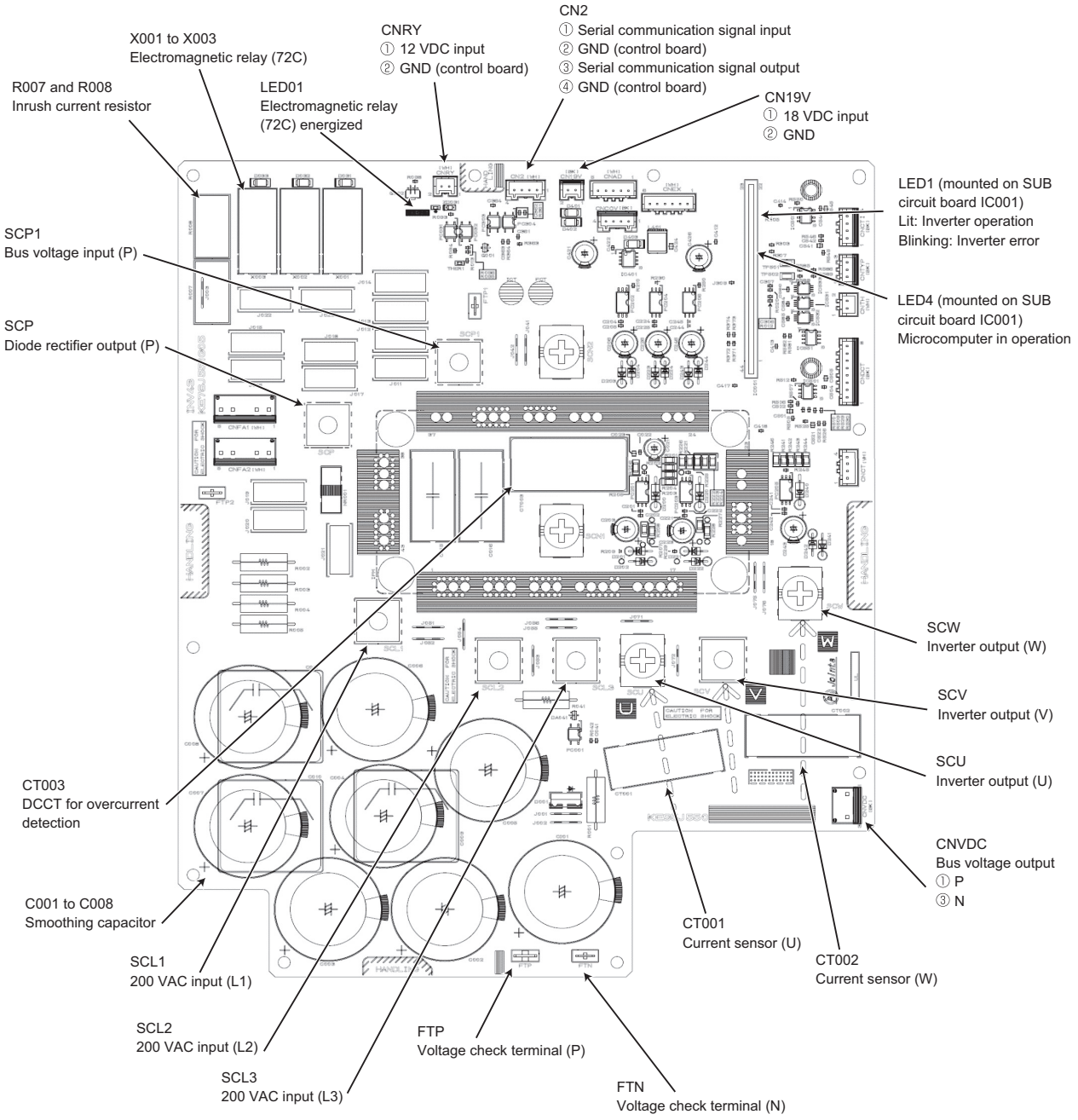
*For information about the display of SW4 function settings, refer to the following page(s). [VI [1] Functions and Factory Settings of the Dipswitches]

2. Power-supply board (PS Board)

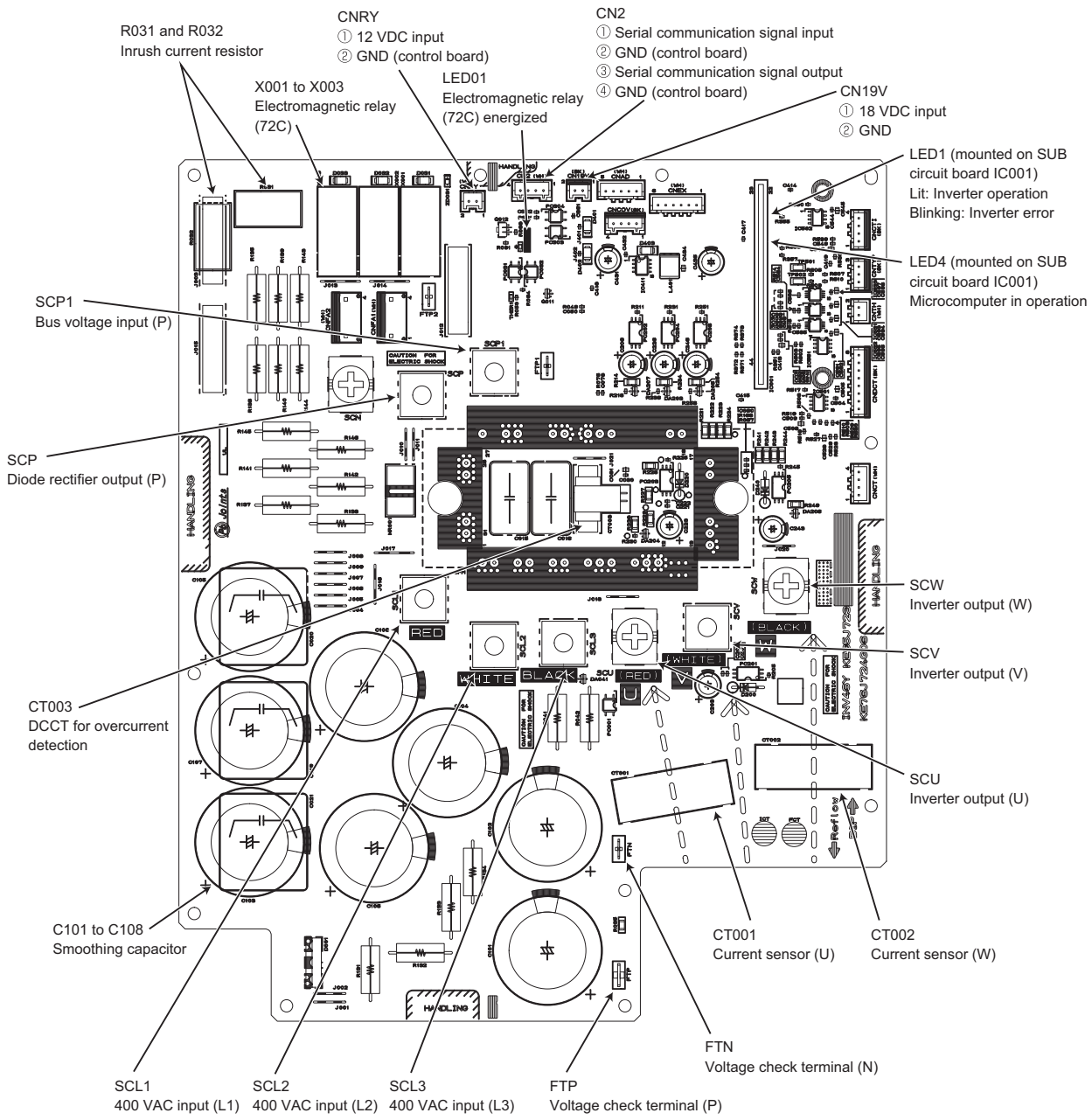


3. Inverter Board (INV Board)

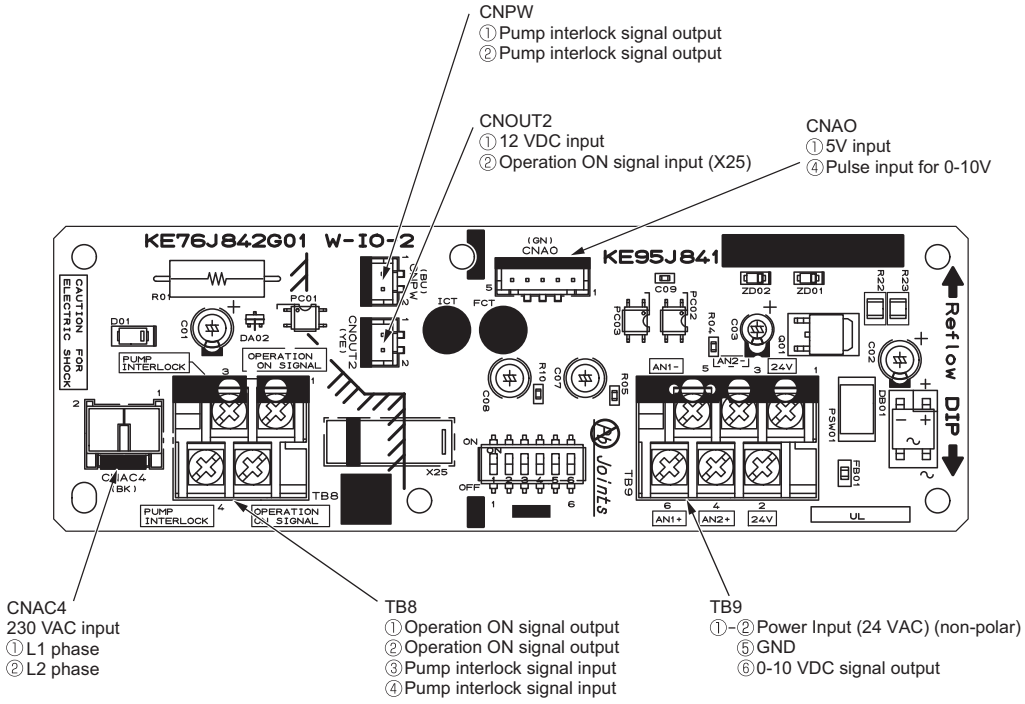
(1) TQRYP072, 096, 120, 144, 168, 192, 216, 2403AMM0AN



(2) TQRYP072, 096, 120, 144, 168, 192, 216, 2404AMM0AN

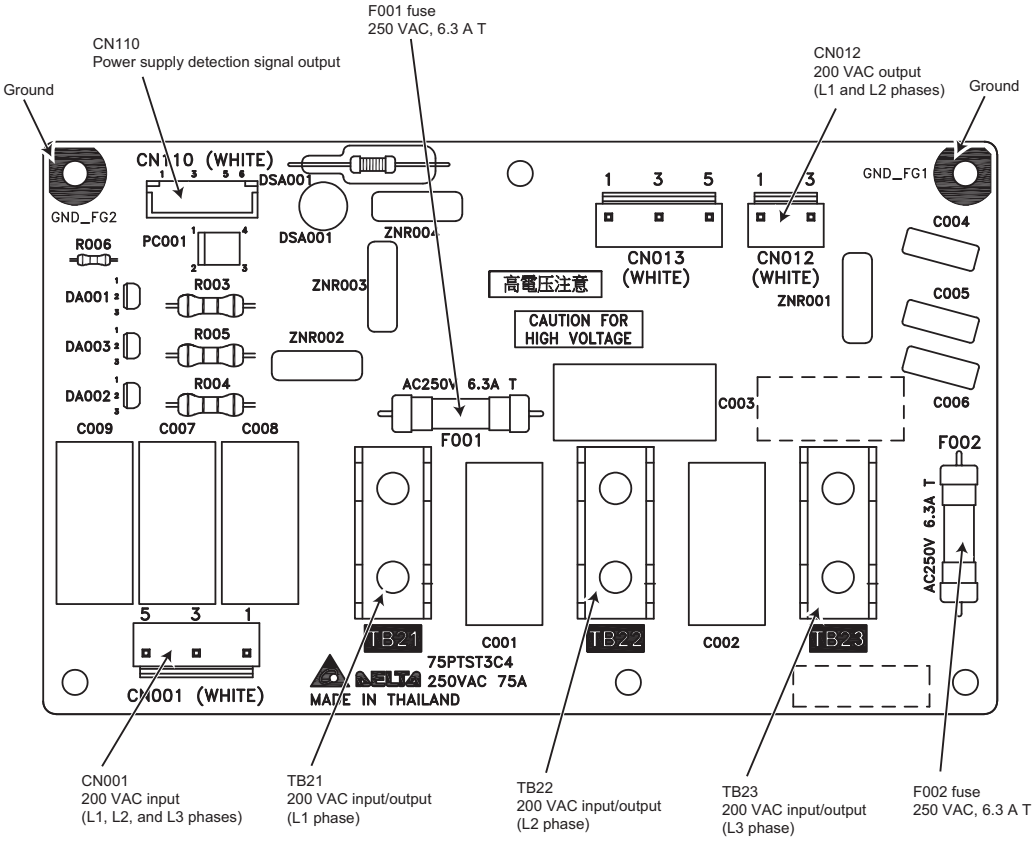


4. I/O board

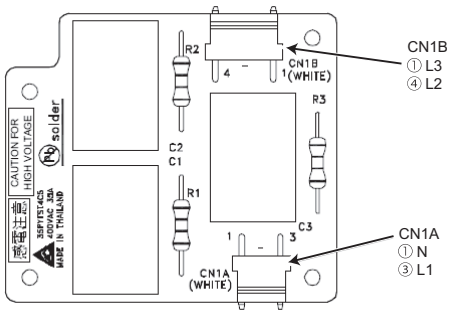

CNPW
① Pump interlock signal output
② Pump interlock signal output
CNOUT2
① 12 VDC input
② Operation ON signal input (X25)
CNAO
① 5V input
④ Pulse input for 0-10V
KE76J842G01 W-IO-2
KE95J841
CAUTION FOR ELECTRIC SHOCK
PUMP INTERLOCK
OPERATION ON SIGNAL
Reflow DIP
CNAC4
230 VAC input
① L1 phase
② L2 phase
TB8
① Operation ON signal output
② Operation ON signal output
③ Pump interlock signal input
④ Pump interlock signal input
TB9
①-② Power Input (24 VAC) (non-polar)
⑤ GND
⑥ 0-10 VDC signal output

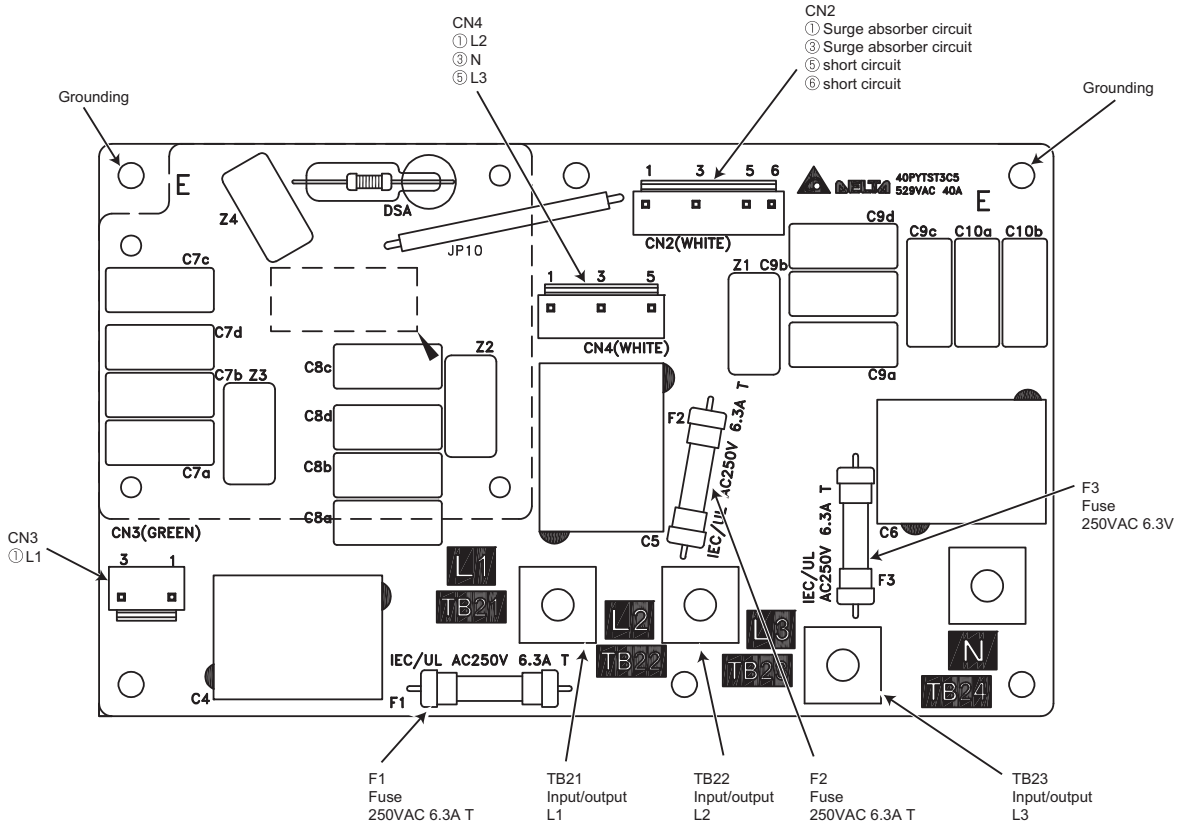
5. Noise Filter

(1) TQRYP072, 096, 120, 144, 168, 192, 216, 2403AMM0AN

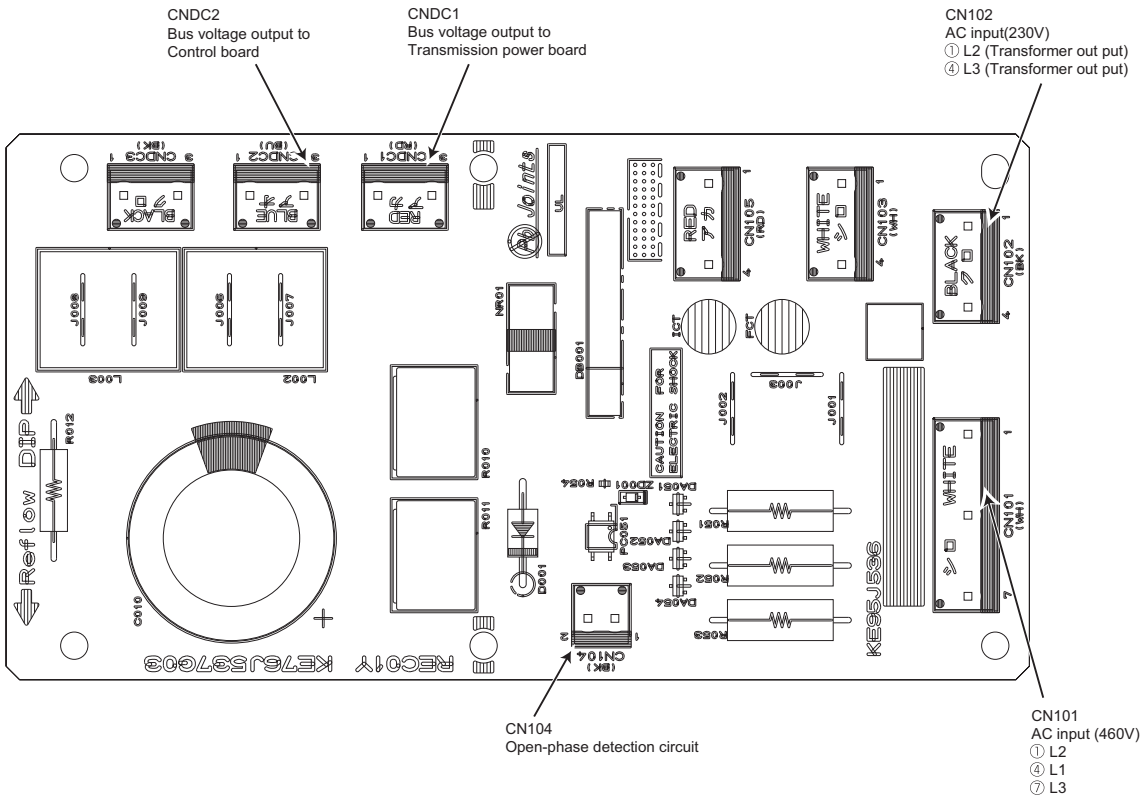


(2) TQRYP072, 096, 120, 144, 168, 192, 216, 2404AMM0AN





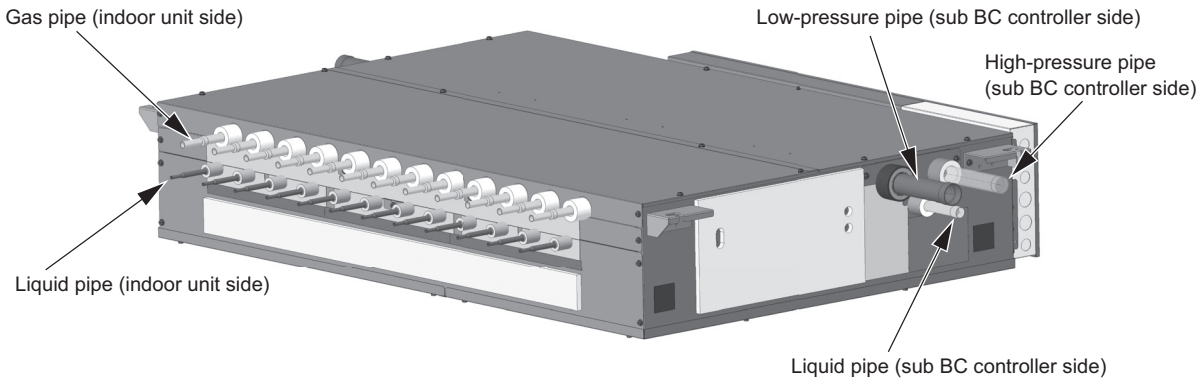
6. REC board


CNDC2
Bus voltage output to
Control board
CNDC1
Bus voltage output to
Transmission power board
CN102
AC input(230V)
① L2 (Transformer out put)
④ L3 (Transformer out put)
CN104
Open-phase detection circuit
CN101
AC input (460V)
① L2
④ L1
⑦ L3

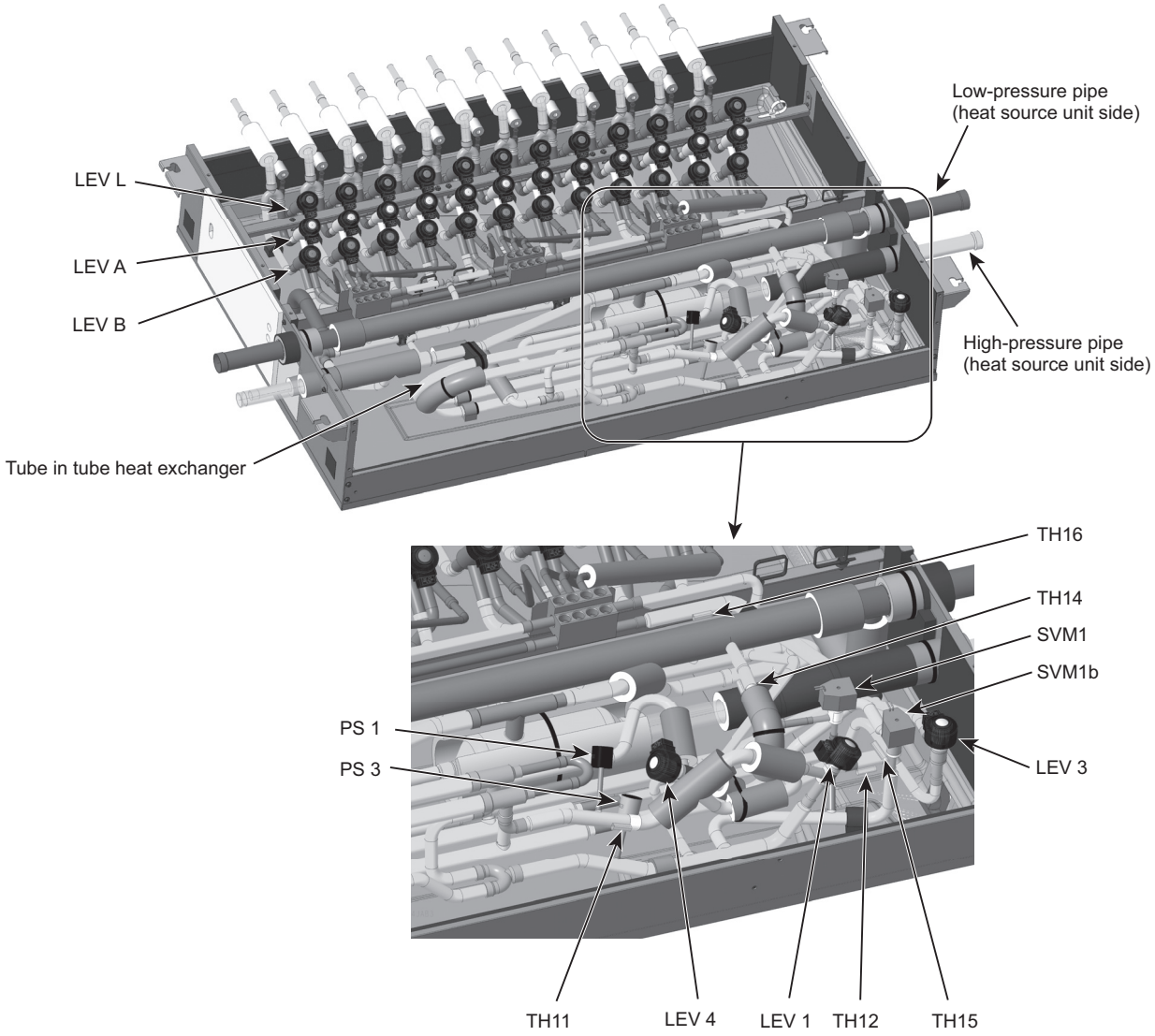
[4] BC Controller Components

1. TCMBM_MA11MM

(1) Front view

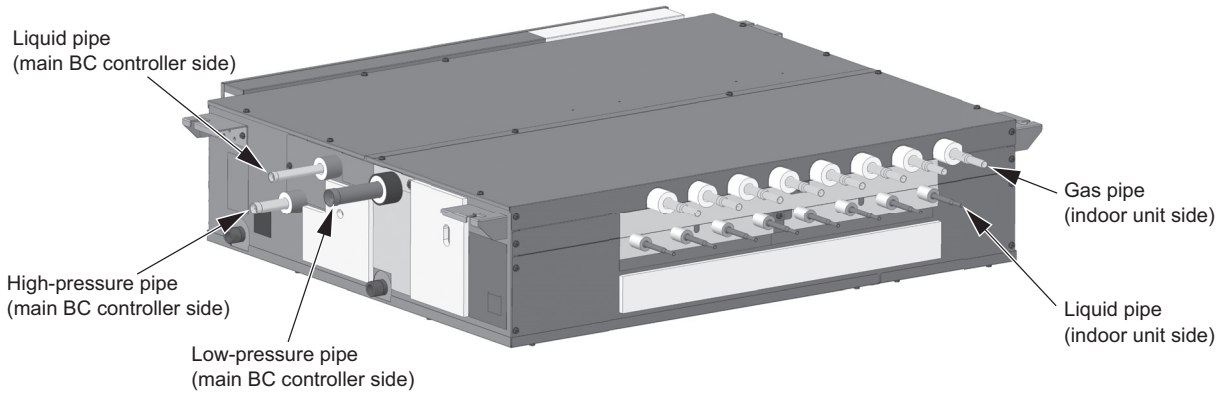


(2) Rear view

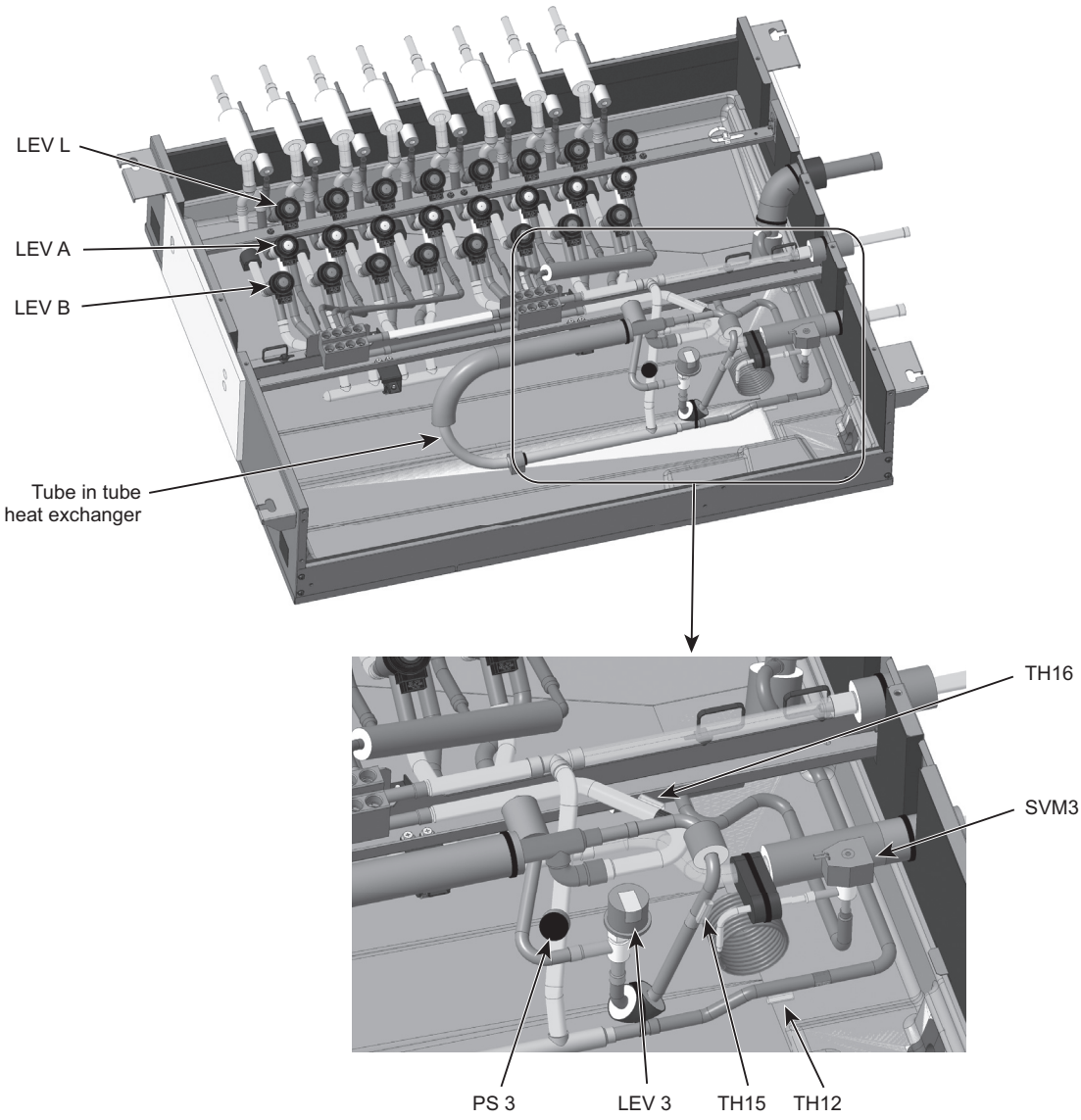


2. TCMBS_MB11MM

(1) Front view

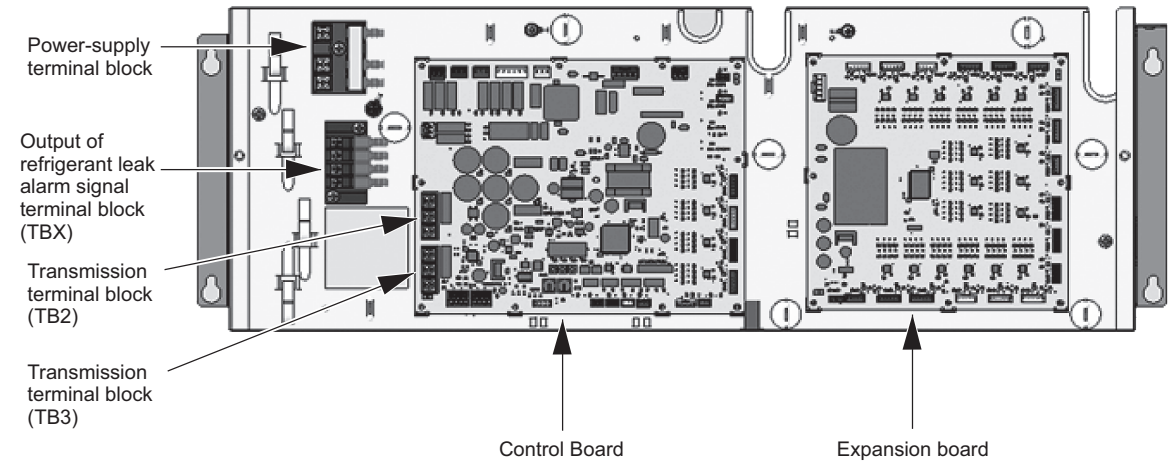


(2) Rear view

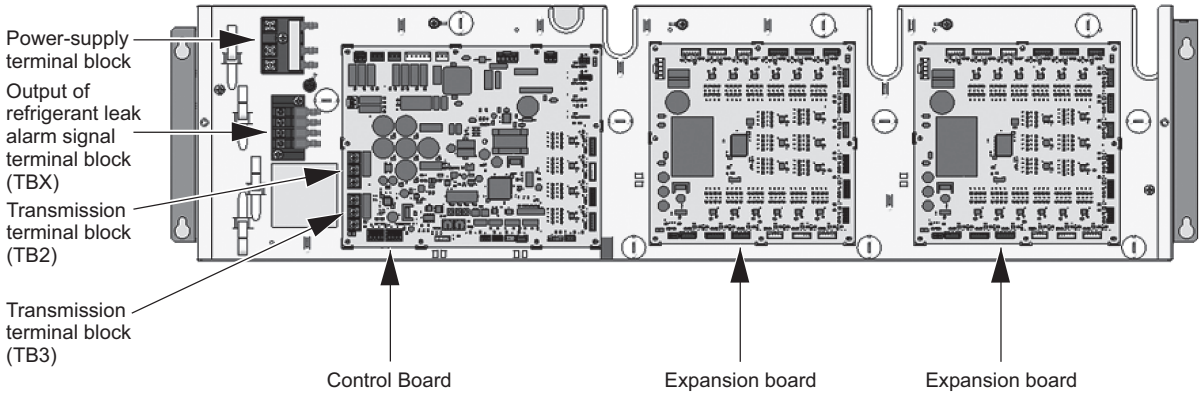


[5] BC Controller Circuit Board Arrangement

1. TCMBM0104, 0106MA11MM, TCMBS0104MB11MM



2. TCMBM0108, 1012MA11MM, TCMBS0108MB11MM



[6] BC Controller Circuit Board Components

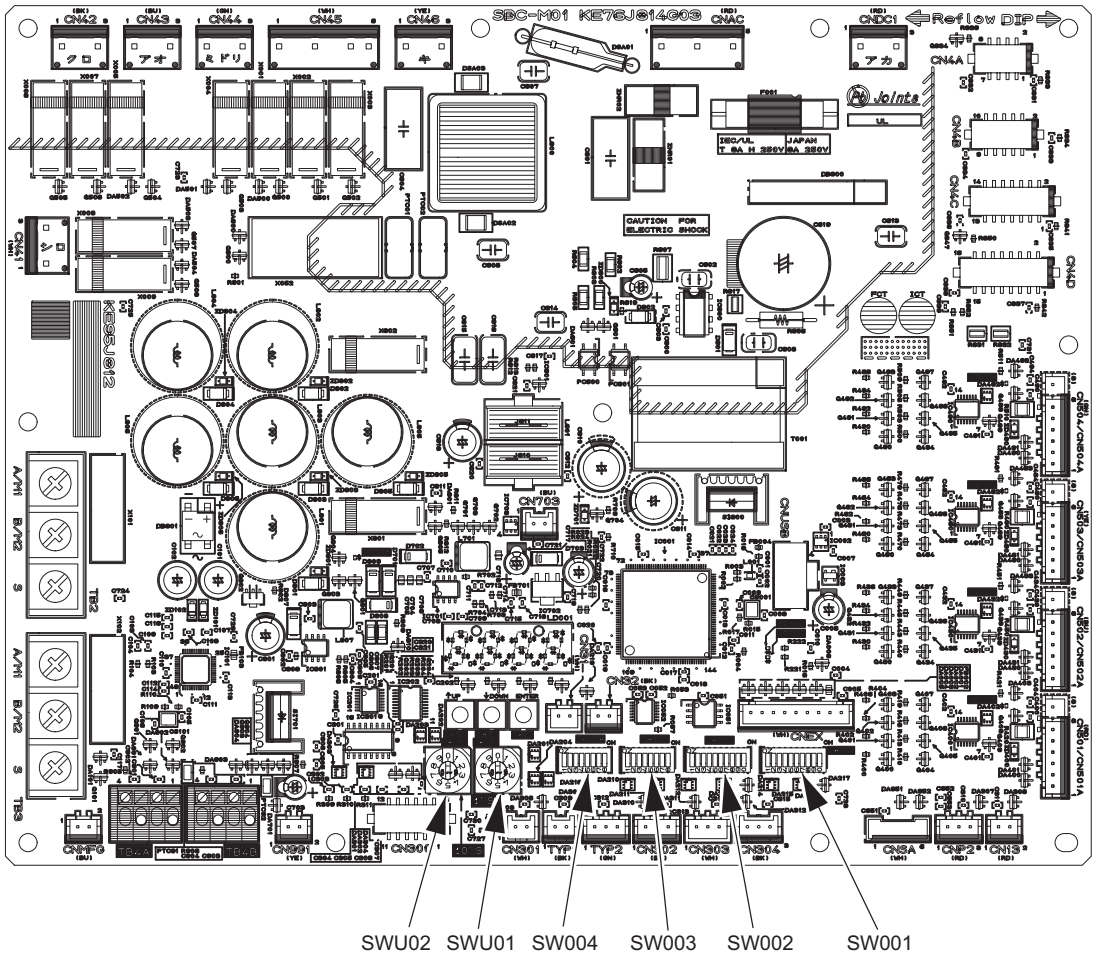
1. Control Board

Abbreviated name of connector color

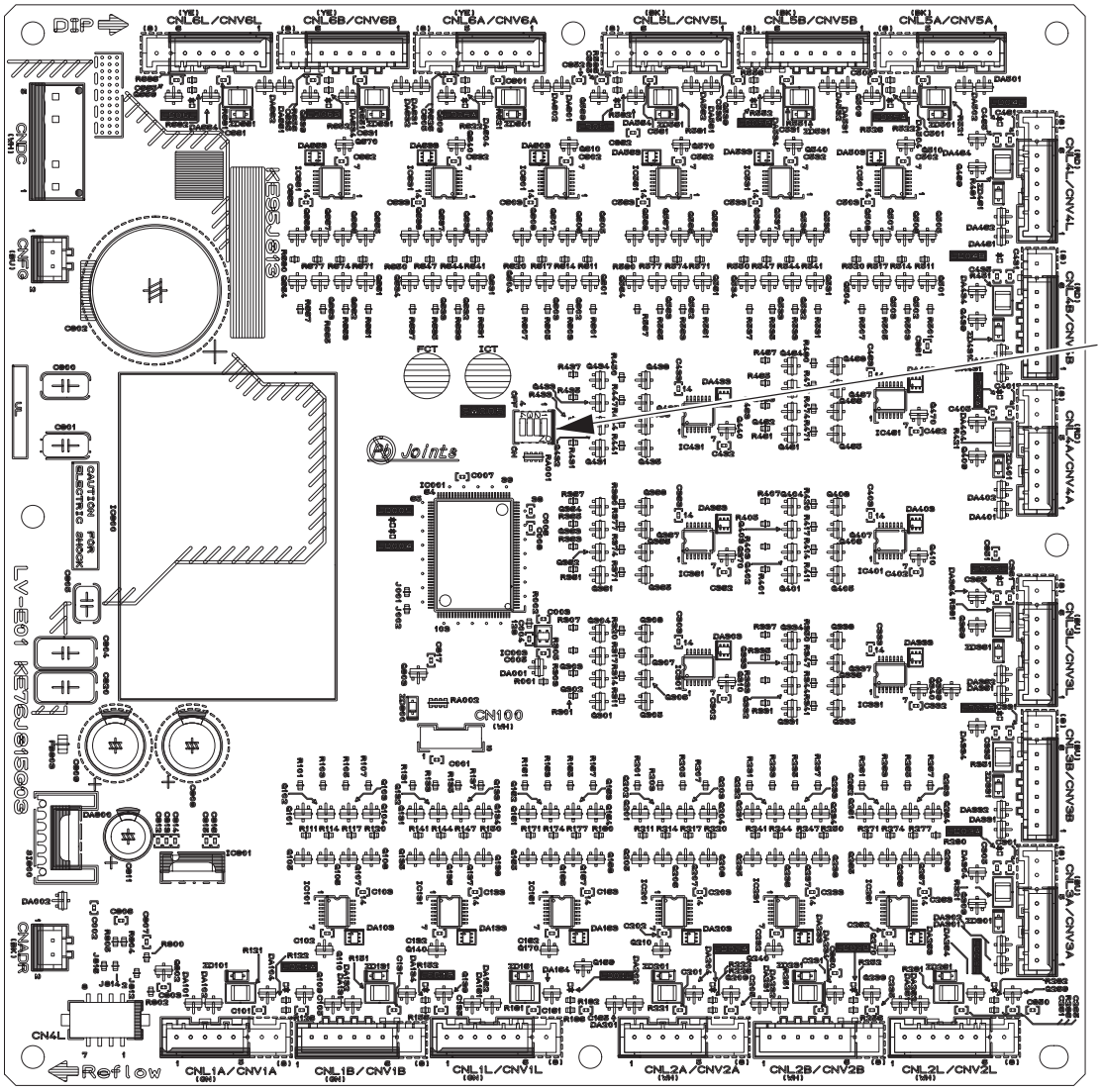
Examples
BU : BLUE
BK : BLACK
GN : GREEN
YE : YELLOW
WH : WHITE
RD : RED

Example: (BU) above CN601 indicates that the connector is blue.




SBC-M01 KE76J814G03
Reflow DIP
CN42
CN43
CN44
CN45
CN46
CNAC
CNDC
CN4A
CN4B
CN4C
CN4D
CN4E
CN4F
CN4G
CN4H
CN4J
CN4K
CN4L
CN4M
CN4N
CN4P
CN4Q
CN4R
CN4S
CN4T
CN4U
CN4V
CN4W
CN4X
CN4Y
CN4Z
CN701
CN702
CN703
CN704
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2. Expansion Board

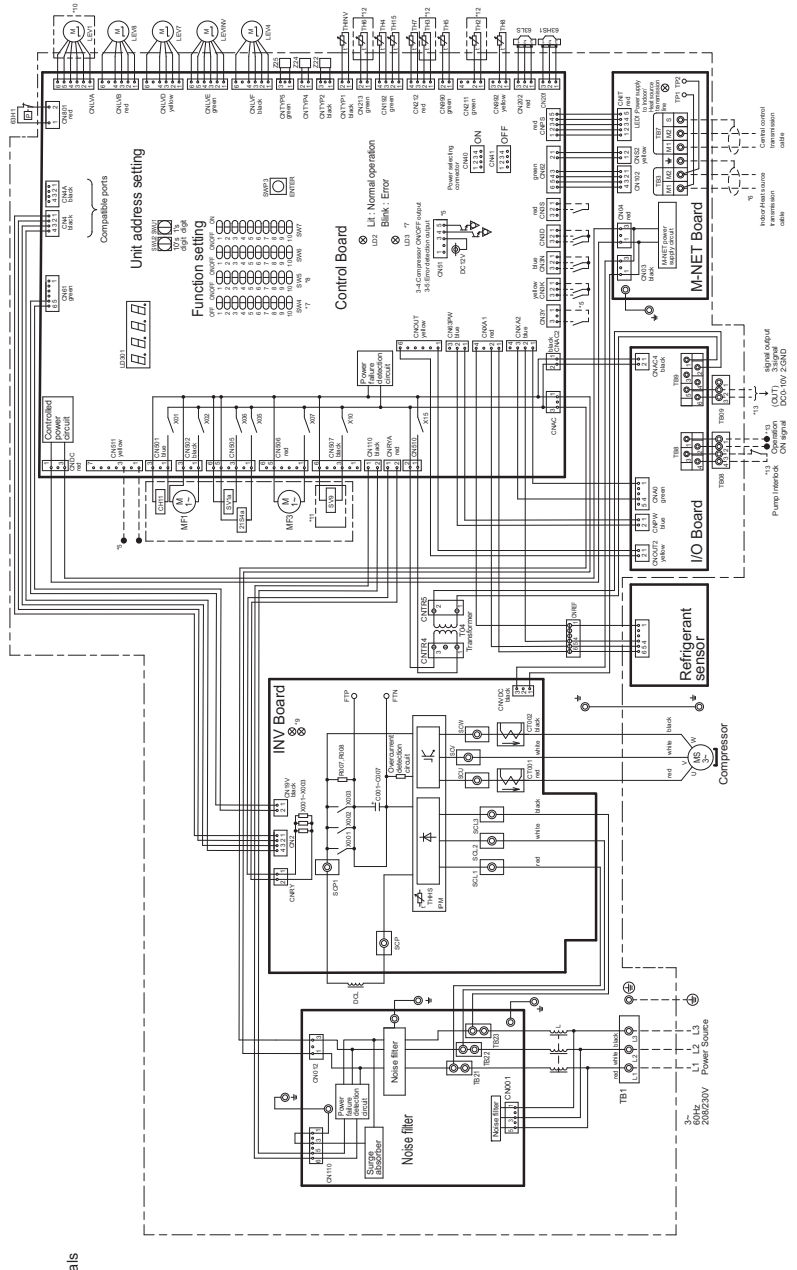


Ⅳ Electrical Wiring Diagram

[1] Electrical Wiring Diagram of the Heat source Unit....83
[2] Electrical Wiring Diagram of the BC Controller....85
[3] Electrical Wiring Diagram of Transmission Booster....91

[1] Electrical Wiring Diagram of the Heat source Unit

(1) TQRYP072, 096, 120, 144, 168, 192, 216, 2403AMM0AN



*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 Heat source 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
TQHY	*10 exist
TQRY	*10 do not exist

*11.Difference of appliance

Model name	Appliance
TQHY	*11 do not exist
TQRY	*11 exist

*12.Difference of appliance

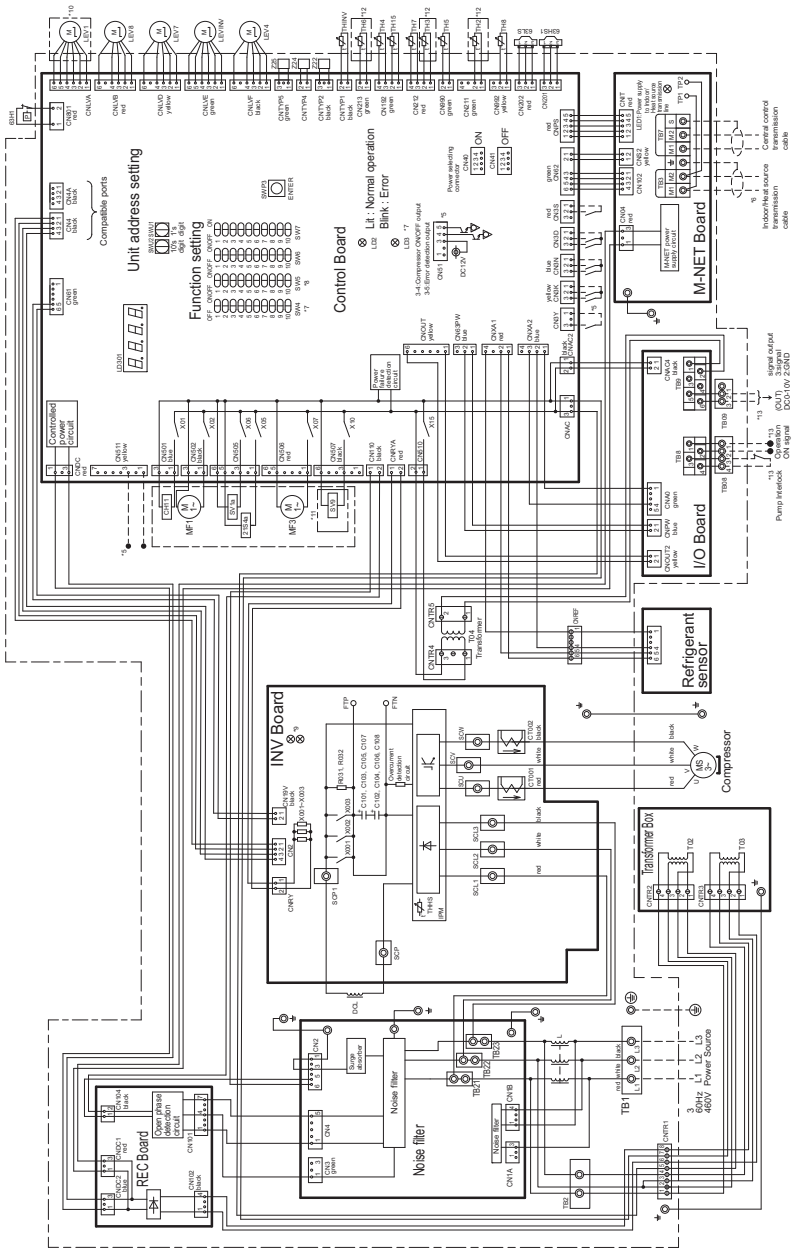
Model name	Appliance
TQHY	*12 exist
TQRY	*12 do not exist

*13.Refer to the Data book for wiring terminal block for Pump Interlock, Operation ON signal and DC 0-10V signal output.

<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
63H1	Pressure switch	High pressure protection)	SV9		For opening/closing the bypass circuit
63HS1	Pressure sensor	Discharge pressure	TB1	Terminal block	Power supply
63LS		Low pressure	TB3		Indoor/Outdoor transmission cable
X001~X003	Magnetic relay	(Inverter main circuit)*2C	TB7		Central control transmission cable
CH11~CH07	Capacitor	(Inverter main circuit)	TB08		Operation ON signal, Pump Interlock
CT001, 002	Current sensor	(For heating the compressor)	TB09		Power input and signal output for variable water flow valve
DCL	DC reactor	(For power factor enhancement)	TH2	Thermistor	HIC bypass outlet temperature
L	Choke coil	(For high-frequency noise reduction)	TH3		Pipe temperature
LEV1	Linear expansion valve	HIC bypass Controls refrigerant flow in HIC circuit.	TH4		Discharge pipe temperature
LEV4		For opening/closing the injection circuit.	TH5		ACC inlet pipe temperature
LEV7		Heat exchanger capacity control.	TH6		Subcooled liquid refrigerant temperature
LEV8		Heat exchanger capacity control.	TH7		Water inlet temperature
LEV9		Heat exchanger capacity control.	TH8		Water outlet temperature
LEVINV		Heat exchanger for inverter.	TH15		Detection of compressor lower shell temperature
MF1	Fan motor	(Radiator panel)	THHS		IPM temperature
MF3	Fan motor		THINV		Outlet temp. detect of heat exchanger for inverter
R007, 008	Resistor	Inrush current prevension	Z22, Z24, Z25		Function setting connector

(2) TQRYP072, 096, 120, 144, 168, 192, 216, 2404AMM0AN



*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 Heat source 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
TQHY	*10 exist
TQRY	*10 do not exist

*11. Difference of appliance

Model name	Appliance
TQHY	*11 do not exist
TQRY	*11 exist

*12. Difference of appliance

Model name	Appliance
TQHY	*12 exist
TQRY	*12 do not exist

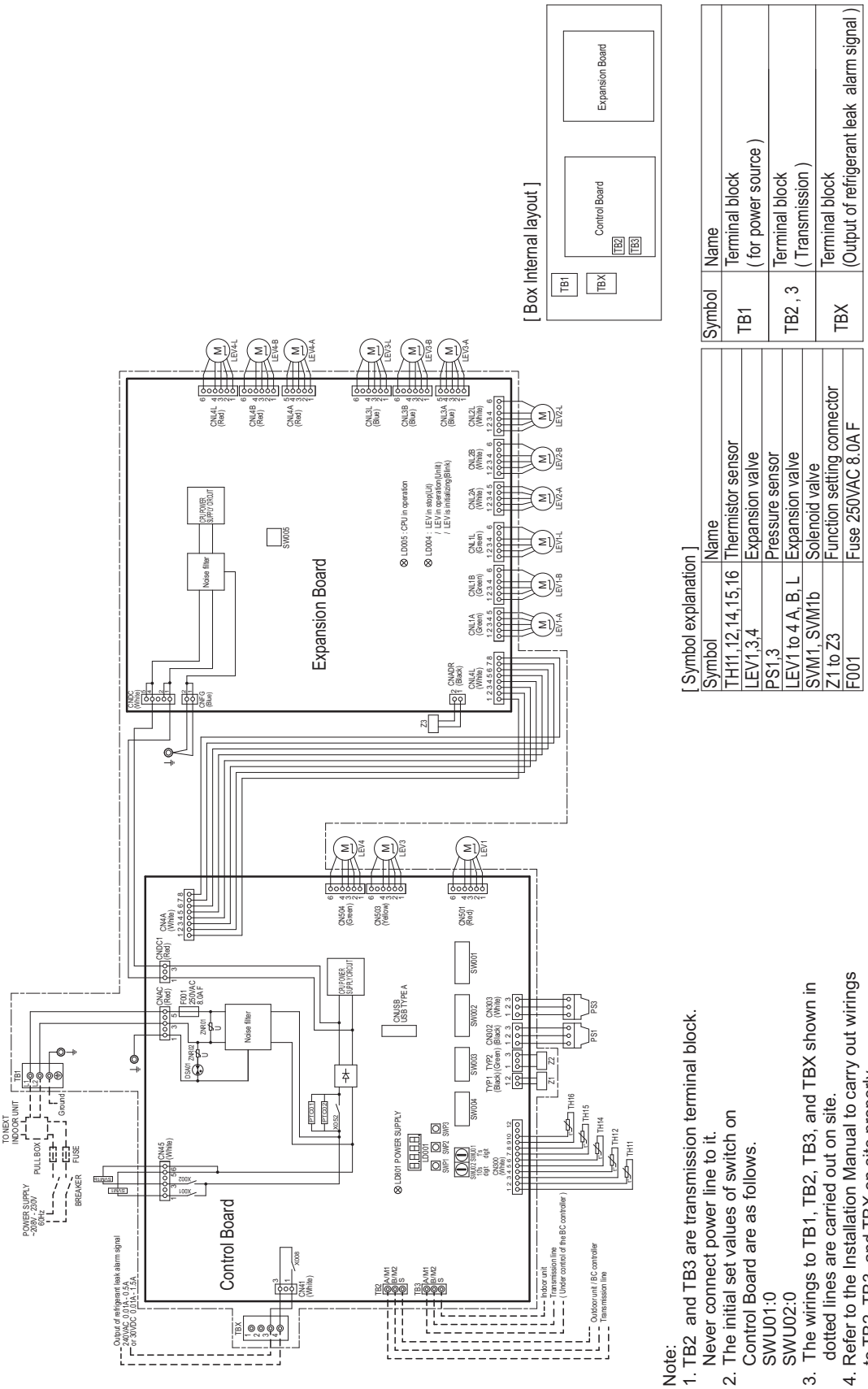
*13. Refer to the Data book for wiring terminal block for Pump Interlock, Operation ON signal and DC 0-10V signal output.

<Symbol explanation>

Symbol	Explanation	Symbol	Explanation
21S4a	4-way valve	Cooling/Heating switching	SV1a	Solenoid	For opening/closing the bypass circuit under the O/S
63H1	Pressure switch(High pressure protection)	SV9	valve	For opening/closing the bypass circuit
63HS1	Pressure	Discharge pressure	TB1	Terminal	Power supply
63LS	sensor	Low pressure	TB3	block	Indoor/Outdoor transmission cable
X001~X003	Magnetic relay(Inverter main circuit)72C		TB7		Central control transmission cable
C101~C108	Capacitor(inverter main circuit)		TB08		Operation ON signal, Pump interlock
CH11	Crankcase heater(For heating the compressor)		TB09		Power input and signal output for variable water flow valve
CT001, 002	Current sensor		TH2	Thermistor	HIC bypass outlet temperature
DCL	DC reactor(For power factor enhancement)		TH3		Pipe temperature
L	Choke coil(For high-frequency noise reduction)		TH4		Discharge pipe temperature
LEV1	Linear	HIC bypass Controls refrigerant flow in HIC circuit	TH5		ACC inlet pipe temperature
LEV4	expansion	For opening/closing the injection circuit.	TH6		Subcooled liquid refrigerant temperature
LEV7	valve	Heat exchanger capacity control.	TH7		Water inlet temperature
LEV8		Heat exchanger capacity control.	TH8		Water outlet temperature
LEVINV		Heat exchanger for inverter.	TH15		Detection of compressor lower shell temperature
MF1	Fan motor(Radiator panel)		THHS		IPM temperature
MF3	Fan motor		THINV		Outlet temp. detect of heat exchenger for inverter
R077, 078	Resistor	Inrush current prevension	Z22, Z24, Z25	Function setting connector	

[2] Electrical Wiring Diagram of the BC Controller

(1) TCMBM0104MA11MM



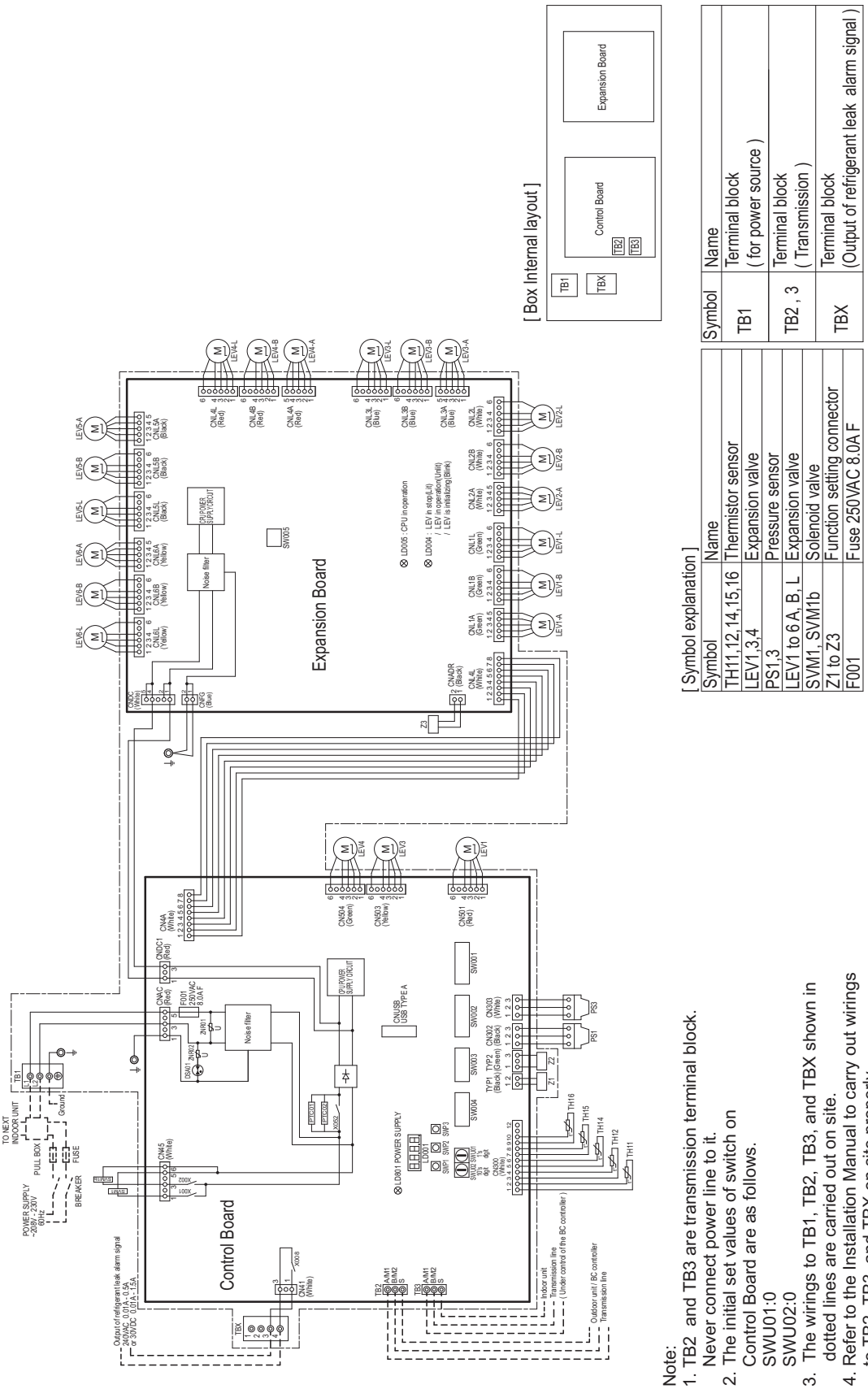
[Symbol explanation]

Symbol	Name
TH11,12,14,15,16	Thermistor sensor
LEV1,3,4	Expansion valve
PS1,3	Pressure sensor
LEV1 to 4 A, B, L	Expansion valve
SVM1, SVM1b	Solenoid valve
Z1 to Z3	Function setting connector
F001	Fuse 250VAC 8.0A F

Symbol	Name
TB1	Terminal block (for power source)
TB2 , 3	Terminal block (Transmission)
TBX	Terminal block (Output of refrigerant leak alarm signal)

Note:
1. TB2 and TB3 are transmission terminal block. Never connect power line to it.
2. The initial set values of switch on Control Board are as follows.
   SWU01:0
   SWU02:0
3. The wirings to TB1, TB2, TB3, and TBX shown in dotted lines are carried out on site.
4. Refer to the Installation Manual to carry out wirings to TB2, TB3, and TBX on site properly.
5. Dot-dash lines indicate the control box boundaries.
6. 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 and the power to the indoor units.
   When turning on the power, start the BC controller and indoor units first, and then start the outdoor unit or heat source unit.

(2) TCMBM0106MA11MM



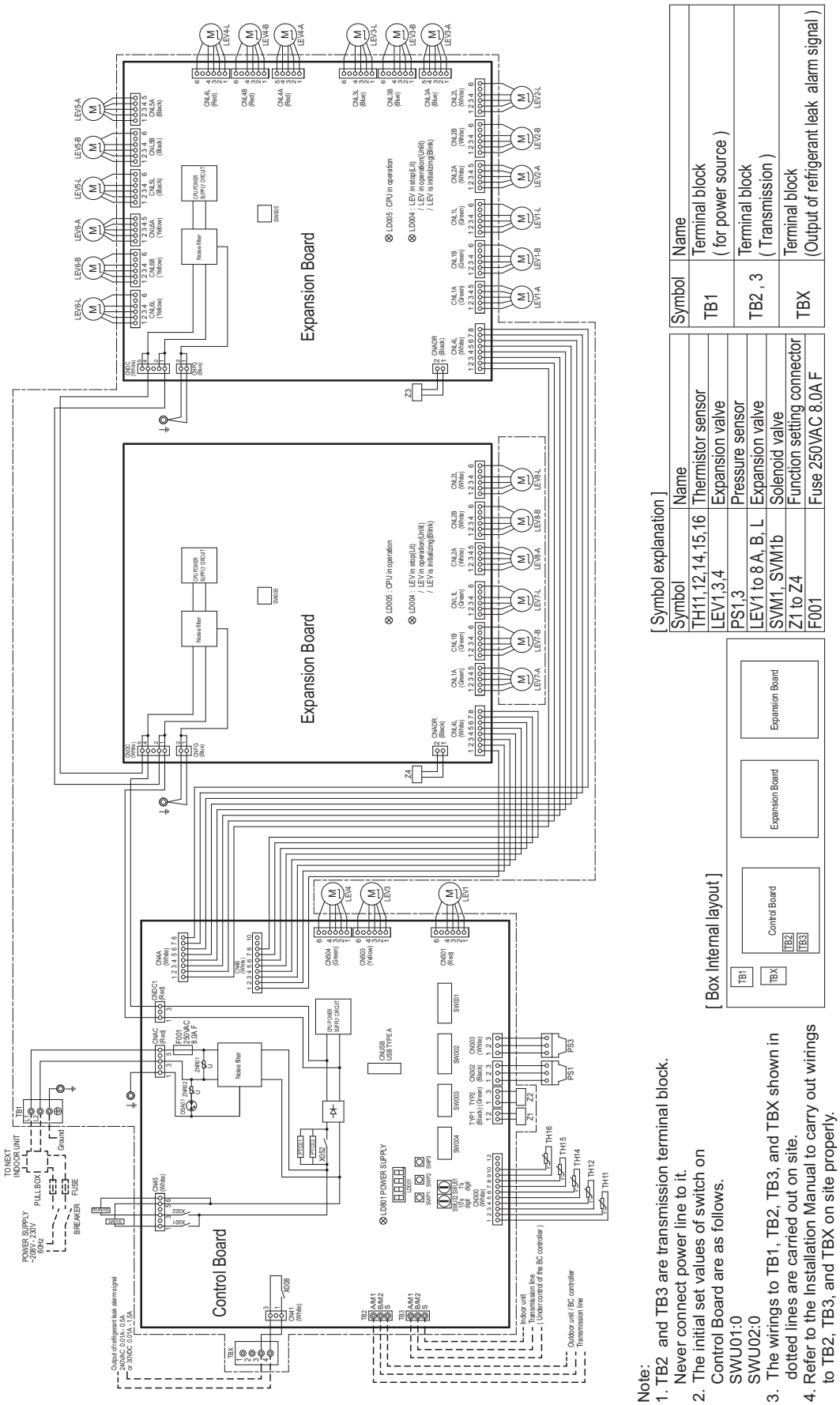
[Symbol explanation]

Symbol	Name
TH11,12,14,15,16	Thermistor sensor
LEV1,3,4	Expansion valve
PS1,3	Pressure sensor
LEV1 to 6 A, B, L	Expansion valve
SVM1, SVM1b	Solenoid valve
Z1 to Z3	Function setting connector
F001	Fuse 250VAC 8.0A F

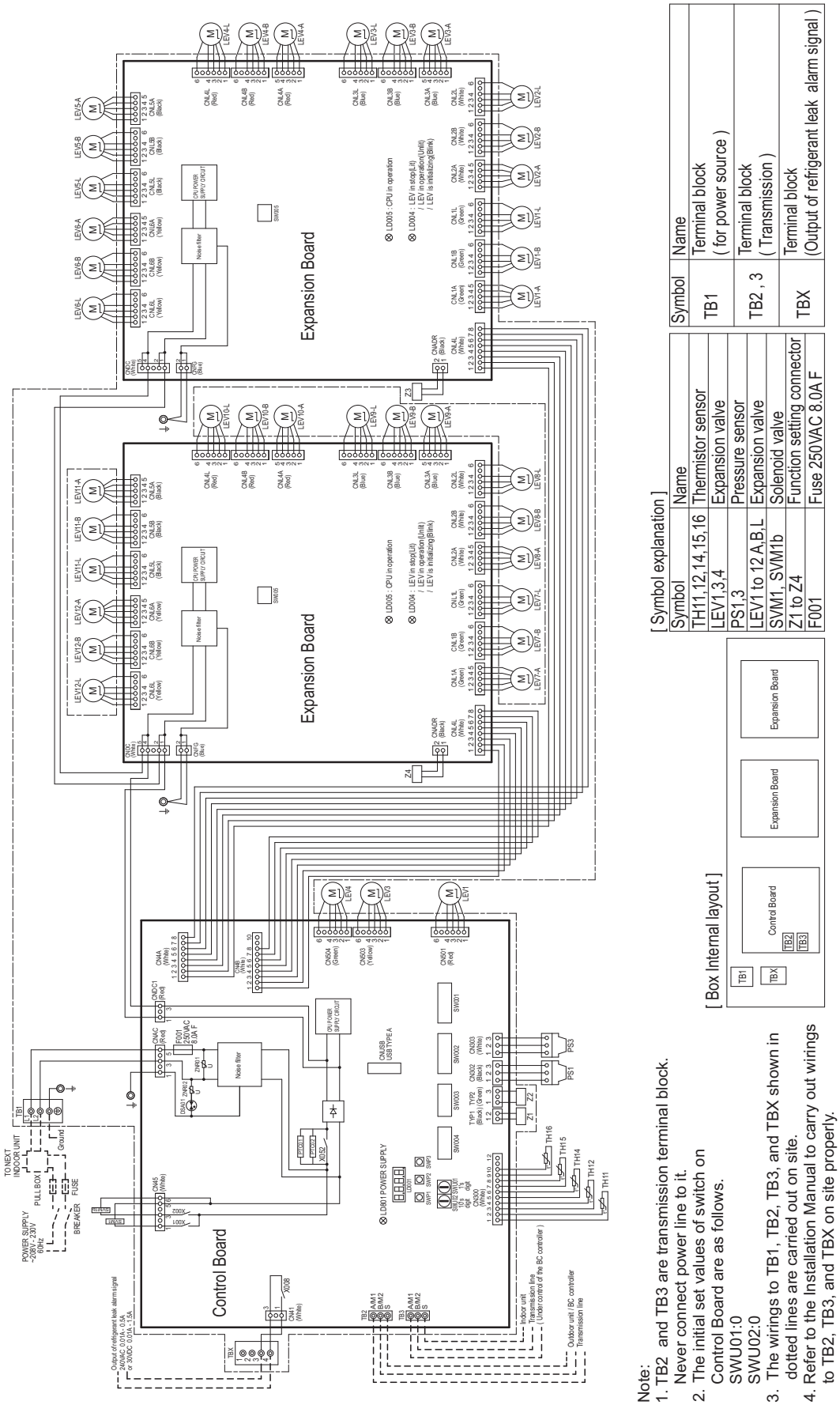
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6. If an airtightness test, vacuum drying, refrigerant recovery, or refrigerant charging is necessary with the power off, turn off the power to the outdoor unit or heat source unit first, and then turn off the power to the BC controller and the power to the indoor units.
   When turning on the power, start the BC controller and indoor units first, and then start the outdoor unit or heat source unit.

(3) TCMBM0108MA11MM


Control Board
Expansion Board
Expansion Board
Expansion Board
POWER SUPPLY 220V~240V 50Hz
PULL BOX
BREAKER
FUSE
Ground
TO NEXT INDOOR UNIT
Output of refrigerant leak alarm signal 250VAC 0.01A~1.5A or 30VDC 0.01A~1.5A
Indoor unit Transmission line (Under control of the BC controller)
Outdoor unit / BC controller Transmission line
LD005 : CPU in operation
LD004 : LEV in stop(Lit) / LEV is operation(Unit) / LEV is initializing(Blink)
LD801 POWER SUPPLY
CN1 POWER SUPPLY CIRCUIT
Noise filter
SW005
SW001
SW002
SW003
SW004
CN5B USB TYPE A
CN5C (White)
CN5 (Red)
CN6 (Blue)
CN4A (White)
CN4B (White)
CN4C (Red)
CN4D (Red)
CN4E (White)
CN4F (Red)
CN4G (Yellow)
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(4) TCMBM1012MA11MM



[Box Internal layout]

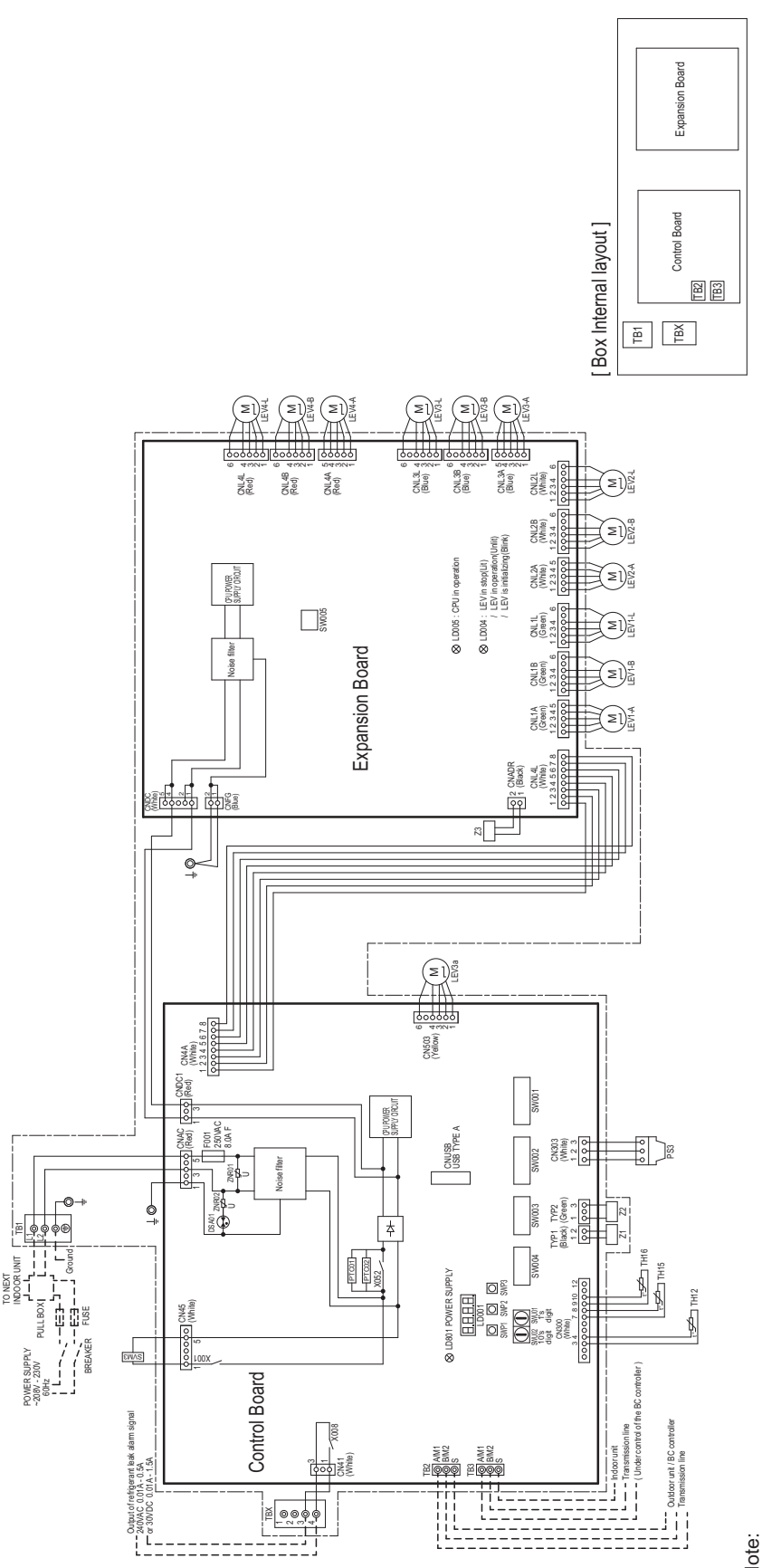
[Symbol explanation]

Symbol	Name
TH11,12,14,15,16	Thermistor sensor
LEV1,3,4	Expansion valve
PS1,3	Pressure sensor
LEV1 to 12 A,B,L	Expansion valve
SVM1, SVM1b	Solenoid valve
Z1 to Z4	Function setting connector
F001	Fuse 250VAC 8.0A F

Symbol	Name
TB1	Terminal block (for power source)
TB2 , 3	Terminal block (Transmission)
TBX	Terminal block (Output of refrigerant leak alarm signal)

Note:
1. TB2 and TB3 are transmission terminal block. Never connect power line to it.
2. The initial set values of switch on Control Board are as follows.
   SWU01:0
   SWU02:0
3. The wirings to TB1, TB2, TB3, and TBX shown in dotted lines are carried out on site.
4. Refer to the Installation Manual to carry out wirings to TB2, TB3, and TBX on site properly.
5. Dot-dash lines indicate the control box boundaries.
6. 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 and the power to the indoor units.
   When turning on the power, start the BC controller and indoor units first, and then start the outdoor unit or heat source unit.

(5) TCMBS0104MB11MM



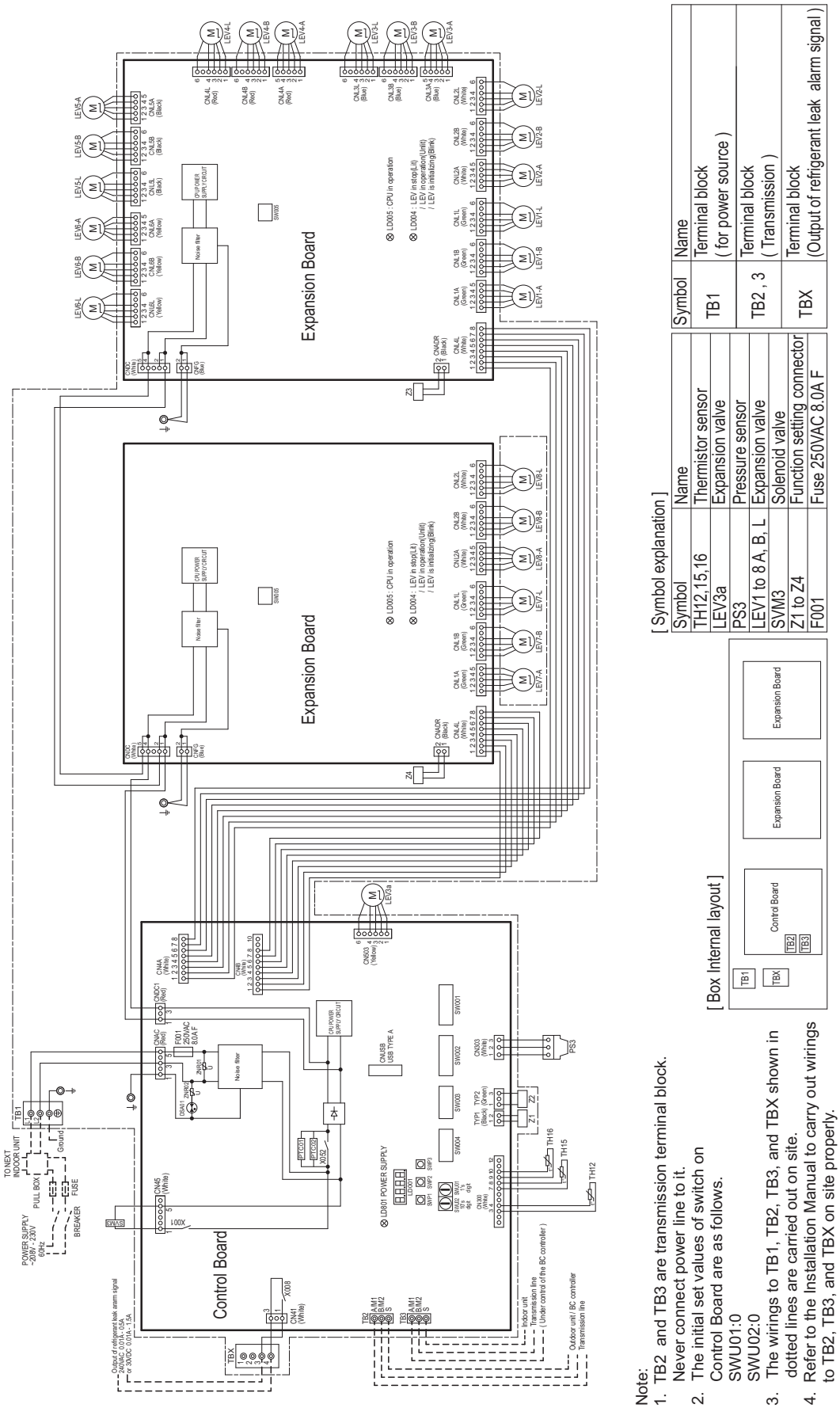
[Symbol explanation]

Symbol	Name
TH12,15,16	Thermistor sensor
LEV3a	Expansion valve
PS3	Pressure sensor
LEV1 to 4 A, B, L	Expansion valve
SVM3	Solenoid valve
Z1 to Z3	Function setting connector
F001	Fuse 250VAC 8.0A F

Symbol	Name
TB1	Terminal block (for power source)
TB2 , 3	Terminal block (Transmission)
TBX	Terminal block (Output of refrigerant leak alarm signal)

Note:
1. TB2 and TB3 are transmission terminal block.
   Never connect power line to it.
2. The initial set values of switch on Control Board are as follows.
   SWU01:0
   SWU02:0
3. The wirings to TB1, TB2, TB3, and TBX shown in dotted lines are carried out on site.
4. Refer to the Installation Manual to carry out wirings to TB2, TB3, and TBX on site properly.
5. Dot-dash lines indicate the control box boundaries.
6. 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 and the power to the indoor units.
   When turning on the power, start the BC controller and indoor units first, and then start the outdoor unit or heat source unit.

(6) TCMBS0108MB11MM



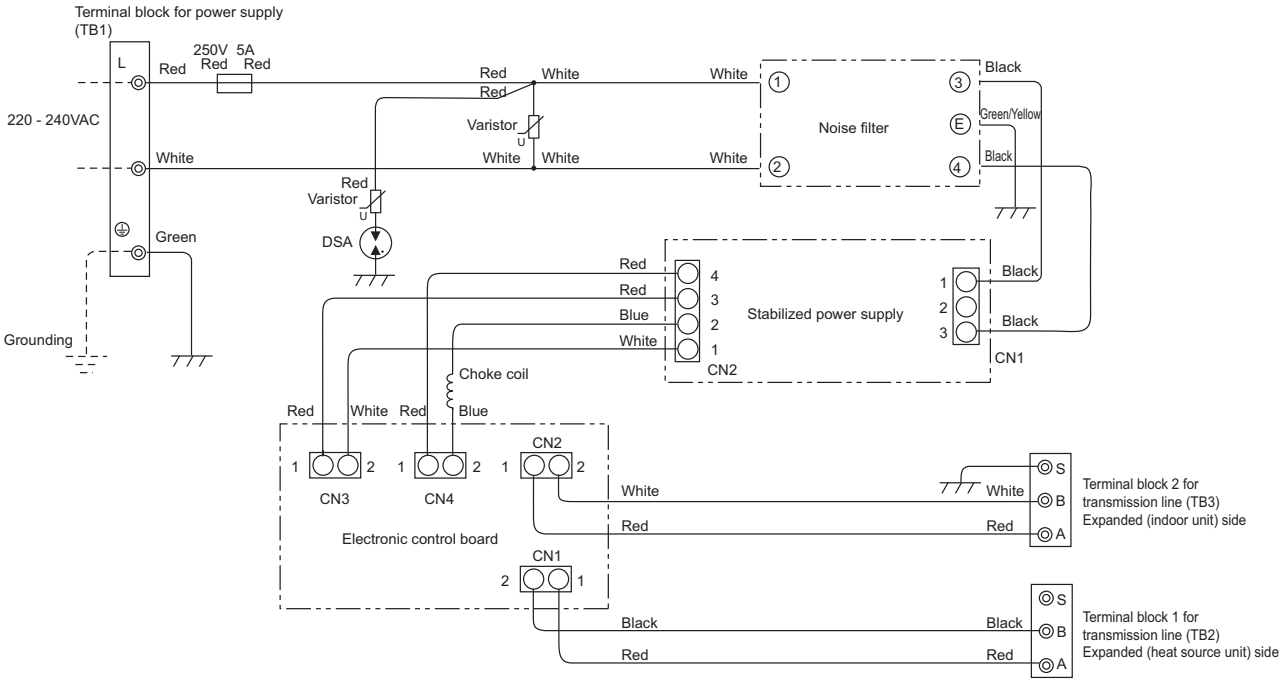
[Symbol explanation]

Symbol	Name
TH12,15,16	Thermistor sensor
LEV3a	Expansion valve
PS3	Pressure sensor
LEV1 to 8 A, B, L	Expansion valve
SVM3	Solenoid valve
Z1 to Z4	Function setting connector
F001	Fuse 250VAC 8.0A F

Symbol	Name
TB1	Terminal block (for power source)
TB2 , 3	Terminal block (Transmission)
TBX	Terminal block (Output of refrigerant leak alarm signal)

Note:
1. TB2 and TB3 are transmission terminal block.
   Never connect power line to it.
2. The initial set values of switch on Control Board are as follows.
   SWU01:0
   SWU02:0
3. The wirings to TB1, TB2, TB3, and TBX shown in dotted lines are carried out on site.
4. Refer to the Installation Manual to carry out wirings to TB2, TB3, and TBX on site properly.
5. Dot-dash lines indicate the control box boundaries.
6. 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 and the power to the indoor units.
   When turning on the power, start the BC controller and indoor units first, and then start the outdoor unit or heat source unit.

[3] Electrical Wiring Diagram of Transmission Booster



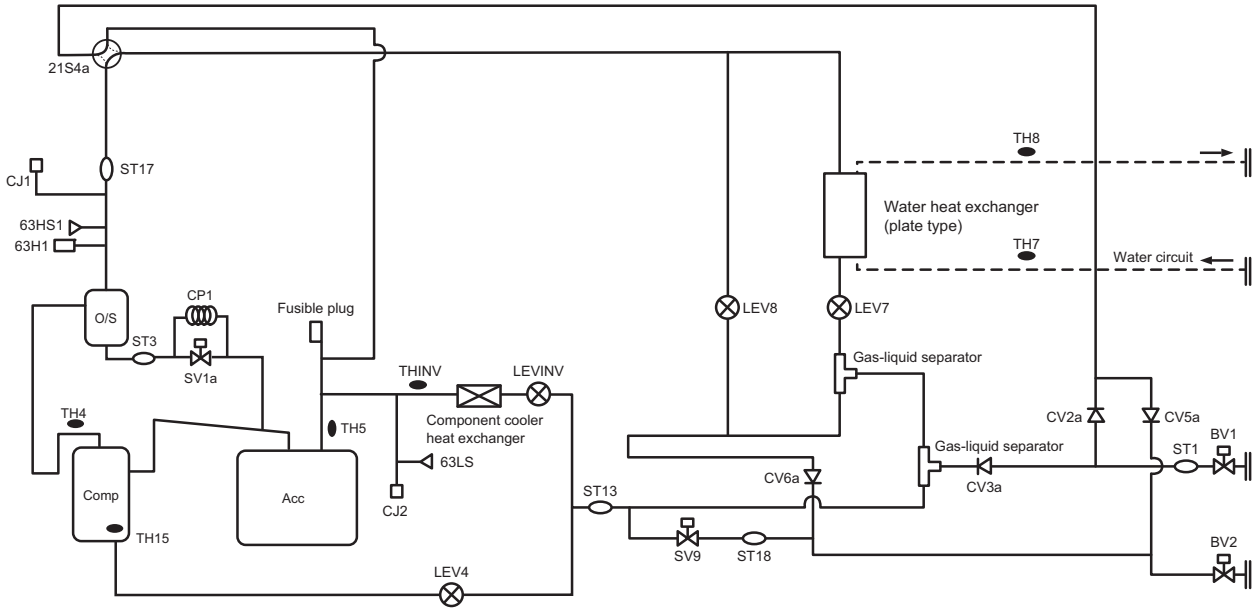
Ⅴ Refrigerant Circuit

[1] Refrigerant Circuit Diagram 95
[2] Principal Parts and Functions 97

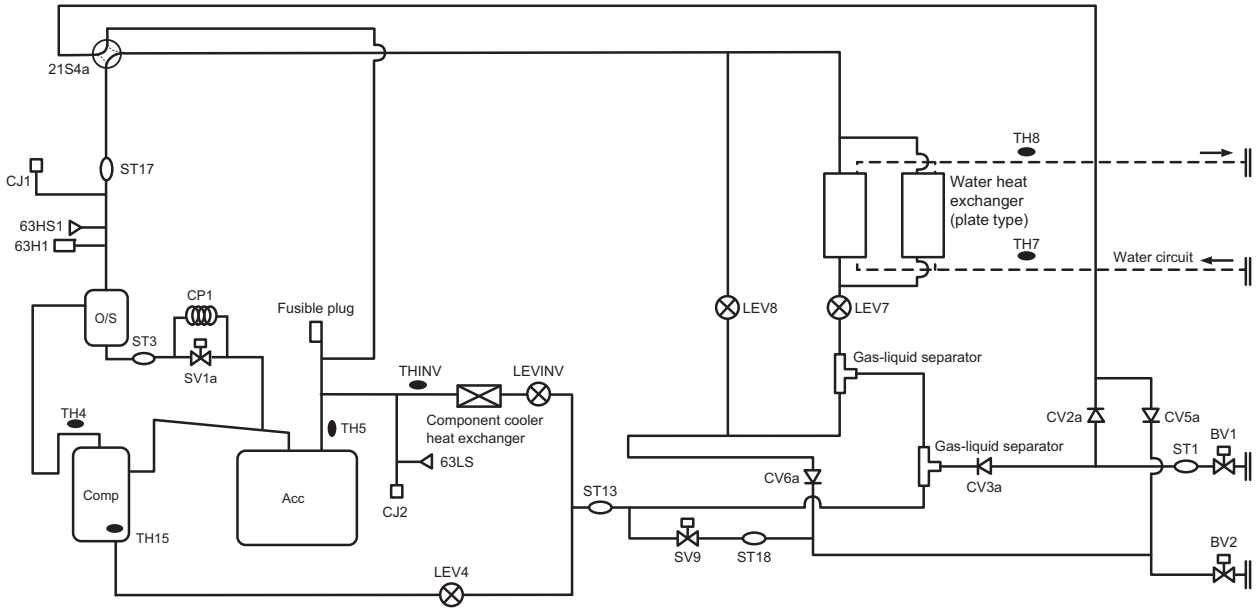
[1] Refrigerant Circuit Diagram

1. Heat source unit

(1) TQRYP072, 096, 120, 144, 168, 1923(4)AMM0AN models

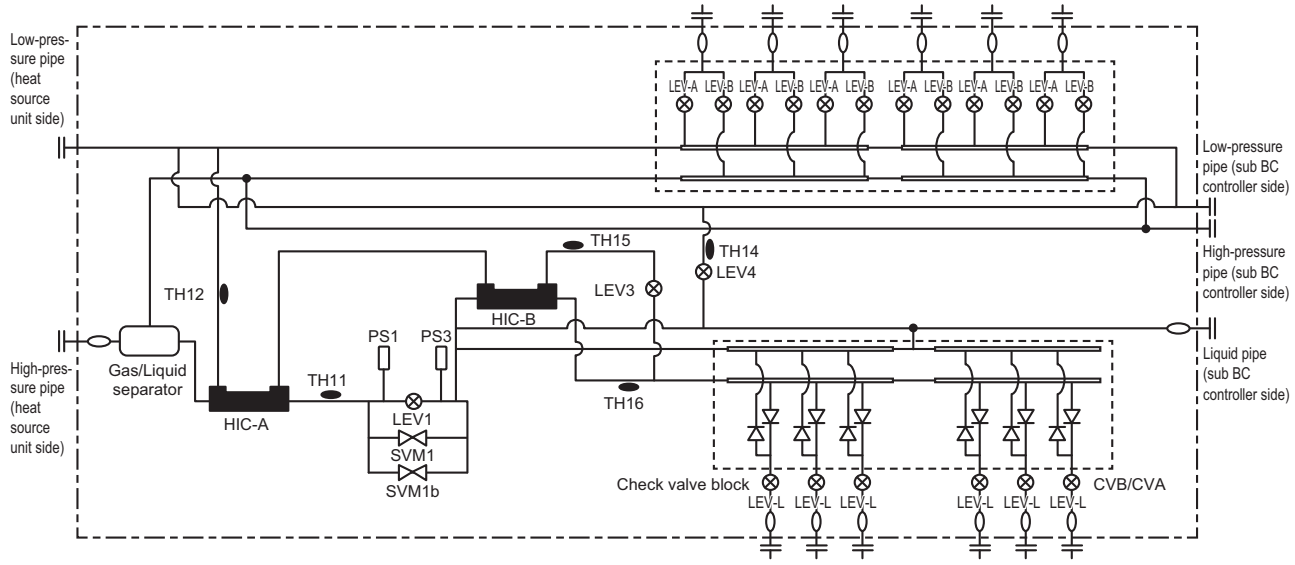


(2) TQRYP216, 2403(4)AMM0AN models

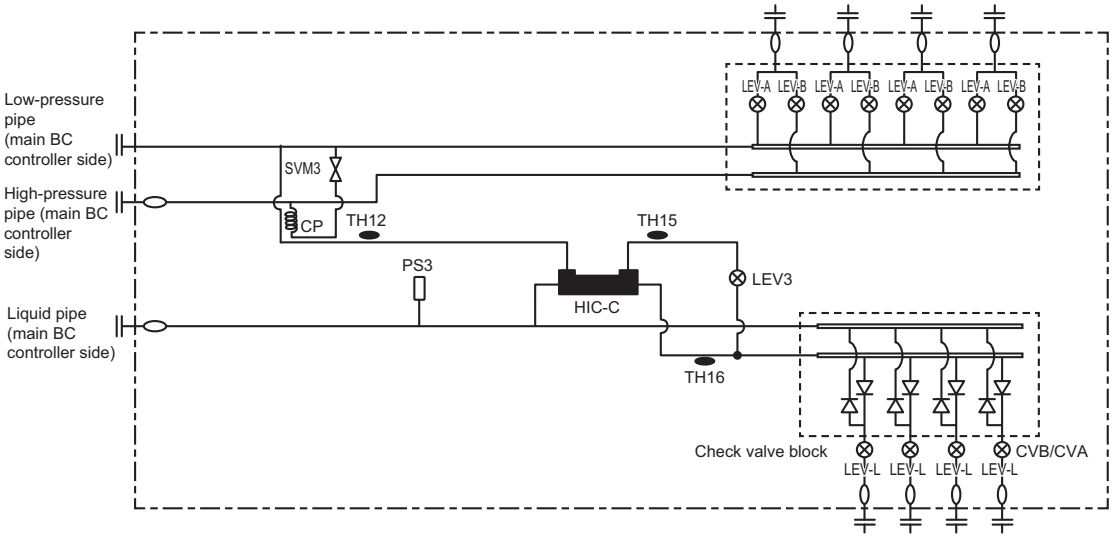


2. BC controller

(1) TCMBM0104, 0106, 0108, 1012MA11MM (main)

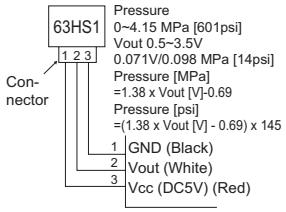
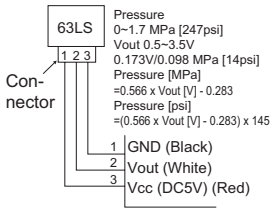


(2) TCMBS0104, 0108MB11MM (sub)

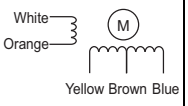


[2] Principal Parts and Functions

1. Heat source unit

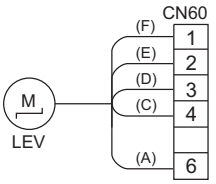
Part name	Symbols (functions)	Notes	Usage	Specifications	Inspection
Compressor	MC1 (Comp1)		Adjusts the amount of circulating refrigerant by adjusting the operating frequency based on the operating pressure data	♦P072, P096, P120, P144, P168, P192 Low-pressure shell scroll compressor Wirewound resistance 20°C [68°F]: 0.431Ω (460V), 0.124Ω (208-230V) ♦P216, P240 Low-pressure shell scroll compressor Wirewound resistance 20°C [68°F]: 0.212Ω (460V), 0.079Ω (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		
Pressure switch	63H1		1) Detects high pressure 2) Provides high-pressure protection	4.15MPa[601psi] OFF setting	
Thermistor	TH4 (Discharge)		1) Detects discharge air temperature 2) Provides high-pressure protection 0°C [32°F] :643kΩ 10°C [50°F] :395kΩ 20°C [68°F] :250kΩ 30°C [86°F] :162kΩ 40°C [104°F] :107kΩ 50°C [122°F] : 73kΩ 60°C [140°F] : 50kΩ 70°C [158°F] : 35kΩ 80°C [176°F] : 25kΩ 90°C [194°F] :18.1kΩ 100°C [212°F] :13.3kΩ 110°C [230°F] : 9.9kΩ	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

Part name	Symbols (functions)	Notes	Usage	Specifications	Inspection
Thermistor	TH7 (Water inlet temperature)		1) Detects water inlet temperature 2) Protects water heat exchanger from high and low temperatures 3) Controls water heat exchanger	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]: 15kΩ 10°C [50°F]: 9.7kΩ 20°C [68°F]: 6.4kΩ 25°C [77°F]: 5.3kΩ 30°C [86°F]: 4.3kΩ 40°C [104°F]: 3.1kΩ	Resistance check
	TH8 (Water outlet temperature)		1) Detects water inlet temperature 2) Protects water heat exchanger from freezing up		
	TH5		Water heat exchanger is controlled based on the 63LS and TH5 values.		
	TH15 (Compressor shell bottom temperature)		Detects compressor shell bottom temperature		
	THINV		Determines the LEV that controls refrigerant flow on the component cooler		
	THHS Inverter heat sink temperature		Controls inverter cooling fan based on THHS temperature	Degrees Celsius R_{50} = 17kΩ $R_{25/120}$ = 4016 $R_t = 17\exp\{4016\ (\frac{1}{273+t} - \frac{1}{323})\}$ 0°C [32°F]: 161kΩ 10°C [50°F]: 97kΩ 20°C [68°F]: 60kΩ 25°C [77°F]: 48kΩ 30°C [86°F]: 39kΩ 40°C [104°F]: 25kΩ	
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
	SV9		High-pressure-rise prevention	208 - 230 VAC Closed while being powered/ open while not being powered	
Crankcase heater	CH11		Heat the compressor shell to make liquid refrigerant in the compressor evaporate.	♦P072, P096, P120, P144, P168, P192 240 VAC, 45W ♦P216, P240 240 VAC, 48W	Continuity check with a tester
4-way valve	21S4a		Changeover between heating and cooling	208 - 230 VAC Dead: cooling cycle Live: heating cycle	Continuity check with a tester

Part name	Symbols (functions)	Notes	Usage	Specifications	Inspection
Electronic expansion valve	LEVINV		Controlling the refrigerant flow in the inverter cooling heat exchanger	12 VDC Stepping motor driven valve opening 0 - 480 pulses (direct driven)	Continuity between white and orange. Continuity between yellow, brown, and blue. 
	LEV4		Injection amount control	12 VDC Stepping motor driven valve opening 41 - 3000 pulses	Continuity Test with a Tester. Continuity between white, red and orange. Continuity between yellow, red, and blue.
	LEV7		Controls heat source unit heat exchanger capacity	12 VDC Stepping motor driven valve opening 20 - 6000 pulses	
	LEV8				
Power supply transformer	Transformer	460 V models only	Decreases the power supply voltage (460 V) supplied to the circuit board	Primary rated voltage: 460 V, 50/60 Hz Secondary rated voltage: 229 V (No-load voltage)	
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: ø3.1 mm	

2. Indoor Unit

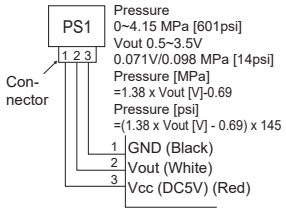
<table>
<tr><th>Part Name</th><th>Symbol (functions)</th><th>Notes</th><th>Usage</th><th>Specification</th><th>Inspection</th></tr>
<tr><td>Linear expansion valve</td><td>LEV</td><td></td><td>1) Adjusts superheat at the indoor heat exchanger outlet during cooling
2) Adjusts subcool at the indoor unit heat exchanger outlet during heating</td><td>12 VDC
Opening of stepping motor driving valve 0-(1400) 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>

(A) Red (E) Yellow
(C) Blue (F) White
(D) Orange</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 = $15\exp\{3460(\frac{1}{273+t}-\frac{1}{273})\}$
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</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>

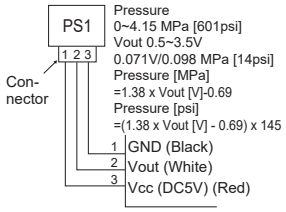
*1. Indicates gas pipe temperature on the TPKFYP_KM1M0A model.

3. BC controller

(1) MA type

Part name	Symbols (functions)	Notes	Usage	Specifications	Inspection
Pressure sensor	PS1 (high pressure side)		1) Detects high pressure 2) Controls LEV		
	PS3 (intermediate pressure)		1) Detects intermediate pressure 2) Controls LEV		
Thermistor	TH11 (liquid inlet temperature)		Controls LEV (liquid level)	$R_0 = 15k\Omega$ $R_{0/80} = 3460$ $R_t = 15\exp\{3460\ (\frac{1}{273+t} - \frac{1}{273})\}$ 0°C [32°F] : 15 kΩ 10°C [50°F] :9.7 kΩ 20°C [68°F] :6.4 kΩ 25°C [77°F] :5.3 kΩ 30°C [86°F] :4.3 kΩ 40°C [104°F] :3.1 kΩ	
	TH12 (bypass outlet temperature)		Controls LEV (superheat)		
	TH14 (bypass temperature)		Detects LEV failure		
	TH15 (bypass inlet temperature)		Controls LEV (superheat)		
	TH16 (liquid temperature)		Controls LEV (subcooling)		
Solenoid valve	SVM1		Opens during cooling or defrosting	208-230 VAC Opens when energized Closes when not energized	Continuity check with a tester
	SVM1b		Opens during cooling or defrosting		
LEV	LEV1		1) Controls liquid level 2) Controls differential pressure 3) Controls subcooling	12-VDC stepping motor Opening of stepping motor driving valve: 41 to 3,000 pulses	Same as indoor LEV
	LEV3				
	LEV4				
	LEVA		Supplies refrigerant to the indoor units during cooling operation / serves as a shut off valve for gas refrigerant	12-VDC stepping motor Opening of stepping motor driving valve: 20 to 6,000 pulses	Continuity Test with a Tester. Continuity between white, red and orange. Continuity between yellow, red, and blue.
	LEVB		Supplies refrigerant to the indoor units during heating operation / serves as a shut off valve for gas refrigerant		
	LEVL		Serves as a shut off valve for liquid refrigerant		

(2) MB type

Part name	Symbols (function)	Notes	Usage	Specifications	Inspection
Pressure sensor	PS3 (intermediate pressure)		1) Detects intermediate pressure 2) Controls LEV		
Thermistor	TH12 (bypass outlet temperature)		Controls LEV (superheat)	$R_0 = 15k\Omega$ $R_{0/80} = 3460$ $R_t = 15\exp\{3460\ (\frac{1}{273+t} - \frac{1}{273})\}$ 0°C [32°F] : 15 kΩ 10°C [50°F] :9.7 kΩ 20°C [68°F] :6.4 kΩ 25°C [77°F] :5.3 kΩ 30°C [86°F] :4.3 kΩ 40°C [104°F] :3.1 kΩ	
	TH15 (bypass inlet temperature)		Controls LEV (superheat)		
	TH16 (liquid temperature)		Controls LEV (subcooling)		
Solenoid valve	SVM3		Opens when refrigerant returns	208-230 VAC Opens when energized Closes when not energized	Continuity check with a tester
LEV	LEV3		Controls differential pressure	12-VDC stepping motor Opening of stepping motor driving valve: 60 to 2,000 pulses	Same as indoor LEV
	LEVA		Supplies refrigerant to the indoor units during cooling operation / serves as a shut off valve for gas refrigerant	12-VDC stepping motor Opening of stepping motor driving valve: 20 to 6,000 pulses	Continuity Test with a Tester. Continuity between white, red and orange. Continuity between yellow, red, and blue.
	LEVB		Supplies refrigerant to the indoor units during heating operation / serves as a shut off valve for gas refrigerant		
	LEVL		Serves as a shut off valve for liquid refrigerant		

VI Control

[1] Functions and Factory Settings of the Dipswitches 105
[2] Controlling the Heat source Unit 113
[3] Controlling BC Controller 124
[4] Operation Flow Chart 125

[1] Functions and Factory Settings of the Dipswitches

1. Heat source unit

(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			-
	4	-				-
	5	-				-
	6	-				-
	7	-				-
SW6	6	-	Preset before shipment			-
	7	Performance-priority/low-noise mode setting	Performance-priority mode (Note 3)	Quiet-priority mode	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	Self-diagnosis/ function setting No. display setting	Refer to Note 6.	Refer to Note 6.	Anytime after power on	C
	10					
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
	3	-	-	-	-	-
	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 "-" or where the cells are blank, 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 seeing 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: Ambient temperature or the low pressure is low.(page 31)
4) Operation noise is reduced by controlling the compressor frequency.
   Requires CN3D to be set.(page 31)
5) Settings in the shaded areas are factory settings.
6)

	SW6-10: ON	SW6-10: OFF
SW6-9: ON	-	LED (7seg) No. 1024 to 2047
SW6-9: OFF	Function setting No. 0 to 1023	LED (7seg) No. 0 to 1023

7) Keep SW7-1 set to OFF during normal operation. Leaving these switches to ON will disable the error-detection function and can lead to equipment damage.

Switch			Function		Function according to switch setting		Switch setting timing	Units that require switch setting (Note 2)
					OFF (LD3 Unlit)	ON (LD3 Lit)		
SW4 SW6-10: OFF	1-10		Self-diagnosis/operation monitor		Refer to the LED monitor display on the heat source unit heat source unit board.		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 IC	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 start-up/becomes ineffective 60 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	Anytime after power on (OFF→ON)	C
	No.17	1000100000	Pump down function		Normal control	Pump down operation	After being energized and while the compressor is stopped	A
	No.20	0010100000	Clear the history of completing initial control		Retained	Cleared	After being energized and while the compressor is stopped * Effective only OFF to ON	C
	No.768	0000000011	System response		Disabled	Enabled	Anytime after power on	B
	No.778	0101000011	Heat source unit circuit inspection switch		Disabled	Enabled	After being energized and while the compressor is stopped	A
	No.781	1011000011	Heat source unit refrigerant leak detection effective switch		Enabled	Disabled	After being energized and while the compressor is stopped	A
	No.782	0111000011	Heat source unit ventilation interlock effective switch		Disabled	Enabled	After being energized and while the compressor is stopped	A
	No.810	0101010011	Outputs circulating water flow rate control signal		0 V: Fully open 10 V: Fully closed	0 V: Fully closed 10 V: Fully open	After power on and while the compressor is stopped	C
	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 9) (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 9) (Factory setting: OFF)		Anytime after power on	A
	No.897	1000000111	High sensible heat operation setting		Depends on the combined setting with No. 900 (Note 10)		Anytime after power on	A
	No.900	0010000111	High sensible heat operation setting		Depends on the combined setting with No. 897 (Note 10)		Anytime after power on	A
	No.901	1010000111	Changes signal output when all heat source units (OC/OS) go into Thermo-OFF		Water flow rate control valve remains open when all heat source units (OC/OS) go into Thermo-OFF. (Minimum water flow rate)	Water flow rate control valves will close when all heat source units (OC/OS) go into Thermo-OFF.	After power on and while the compressor is stopped	C

Switch			Function	Function according to switch setting		Switch setting timing	Units that require switch setting (Note 2)
				OFF (LD3 Unlit)	ON (LD3 Lit)		
SW4 1-10 [0:OFF, 1:ON] (Note 1) SW6-10: ON	No.914	0100100111	CN51-3,5 signal output switch	Heat source unit error output	Water heat exchanger coupling prevention output	Anytime after power on	C
	No.917	1010100111	Power on signal output switch	Signals are output while the compressor is in operation.	Signals are output while receiving cooling or heating signal from the controller. *Signals are output even if the thermostat is OFF. (when the compressor is not operating)	Anytime after power on	A
	No.921	1001100111	Temperature/pressure unit selection	°C/kgf/cm^3	°F/psi	Anytime after power on	C
	No.932	0010010111	Heating backup	Disabled	Enabled	Anytime after power on	A
	No.935	1110010111	COP priority setting (at low ambient temperature)	COP priority mode	Heating capacity priority control mode	Anytime after power on	A
	No.981	1010101111	Water heat exchanger freeze prevention	Ineffective	Effective Note 4	Anytime after power on	A
	No.982	0110101111	Target evaporation temperature setting	Refer to Note 8).		Anytime after power on	A
	No.997	1010011111	Multiple-stage low-noise setting	See Note 11 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).
   LD3 will light up when the switch setting is ON, and lights off when OFF.
   Use the LD3 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 seeing 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) 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 heat source 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.
4) If the inlet water temperature (TH7) drops below 5ºC [41ºF] while the compressor is stopped, or the outlet water temperature (TH8) drops below 3ºC [37ºF], Cooling-only operation will be performed to prevent freeze-ups.
   This operation will terminate when one of the following conditions is met: 1) Both the TH7 and TH8 readings (water temperature) exceed 10ºC [50ºF], 2) Two hours have passed since the beginning of the Cooling-only operation, or 3) Signal to resume normal operation is received.
5) To use the functions above, be sure to set the switches in the following combinations.
   *Set SW4(901) to OFF and SW4(917) to ON to keep the pumps on all heat source units (OC/OS) to operate during Thermo-OFF and to keep the water flow rate control valve open.
   *Set SW4(901) to ON and SW4(917) to OFF to stop the pumps on all heat source units (OC/OS) during Thermo-OFF and to close the water flow rate control valve.
6) When performing the maintenance work, such as vacuum drying, pumping down, or refrigerant recovery, on the heat-source unit, operate the water circuit pump and circulate the water to prevent the water side of the heat exchanger from freezing.
7) Settings in the shaded areas are factory settings.

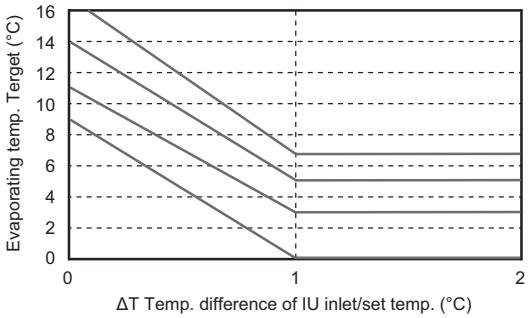
8) The table below shows how the target evaporation temperature is set with SW4 (982).

SW4(982)	OFF → ON → OFF → ON → OFF → ON
Target evaporating temperature	0℃ [32°F] → -2℃ [28°F] → 0℃ [32°F] → -4℃ [25°F] → 0℃ [32°F] → -6℃ [21°F]

*SW4 (982) setting will not automatically be restored after the control board is replaced. (The function of SW4 is explained in Note 1.) When using the function of SW4, write down the SW4 (982) setting on the control board panel, and manually reset the setting after the control board is replaced.

9) 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). [II [4] 7. Various Control Methods Using the Signal Input/Output Connector on Heat Source 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]



10) 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]

11) 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%

2. Function of the switch (Indoor unit)

(1) Dipswitches

1) SW1,3

Switch		Function	Function according to switch setting		Switch setting timing	Notes
			OFF	ON		
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

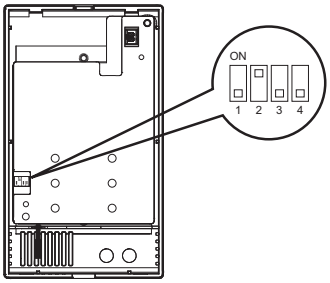
Actual indoor unit address setting varies in different systems. Refer to the installation manual for the heat source unit for details on how to make the address setting.
Each address is set with a combination of the settings for the 10's digit and 1's digit.
(Example)

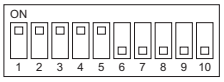
When setting the address to "3", set the 1's digit to 3, and the 10's digit to 0.
When setting the address to "25", set the 1's digit to 5, and the 10's digit to 2.

3. Function of the switch <Remote controller>

(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.

4. Switch functions <BC controller> (Control board)

Switch		Function	Function according to switch setting		Switch setting timing
			OFF	ON	
SWU	1 - 2	Unit address setting	Set to 00 or 51 - 100 with the dial switch.		Before power on
SW001	1	-	-	-	-
	2	Number of ports setting	1	2	Before power on
	3	-	-	-	-
	4	-	-	-	-
	5	-	-	-	-
	6	-	-	-	-
	7	-	-	-	-
	8	-	-	-	-
	9	-	-	-	-
	10	USB writer rewrite mode switch	Normal startup mode	USB writer rewrite mode	Before power on
SW002	1	-	-	-	-
	2	-	-	-	-
	3	-	-	-	-
	4	-	-	-	-
	5	-	-	-	-
	6	-	-	-	-
	7	-	-	-	-
	8	-	-	-	-
	9	-	-	-	-
	10	-	-	-	-
SW003	1	-	-	-	-
	2	-	-	-	-
	3	-	-	-	-
	4	-	-	-	-
	5	-	-	-	-
	6	-	-	-	-
	7	-	-	-	-
	8	-	-	-	-
SW004	1	-	-	-	-
	2	-	-	-	-
	3	-	-	-	-
	4	-	-	-	-
	5	-	-	-	-
	6	-	-	-	-
	7	-	-	-	-
	8	-	-	-	-

Note

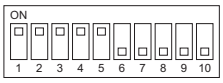
Shaded areas ( ) indicate factory settings.

[2] Controlling the Heat source Unit

-1- Outline of Control Method

- The heat source 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 heat source unit can be verified by using the self-diagnosis switch SW4 (SW6-10: OFF).

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

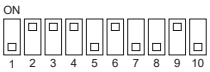


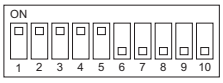
The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

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

-2- Startup sequence rotation

- At the initial startup, heat source units start up in the order of "OC and OS".
- 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 heat source 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 inlet water temperature, that unit will stop and the other unit will go into operation.
- Refer to [-10-Control at Initial Start-up] for the 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 heat source units can be checked with the self-diagnosis switch SW4 (SW6-10: OFF) 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.

-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 heat source unit's control board displays S/W version -> refrigerant type -> heat pump -> cooling only and capacity -> and communication address in turn every second.

-4- Control at Start-up

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

-5- Bypass Control

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

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

Operation	SV1a	
	ON	OFF
When the compressor on each heat source unit starts up	ON for 4 minutes.	
After the restoration of thermo or 3 minutes after restart	ON for 4 minutes.	
During cooling or heating operation with the compressor stopped	Always ON. Exception: OFF when 63HS1-63LS is 0.2MPa[29psi] or less	
After the operation has stopped	ON for 3 minutes. Exception: OFF when 63HS1-63LS is 0.2MPa[29psi] or less	
While the compressor is operating at the minimum frequency and when the low pressure (63LS) drops (3 or more minutes after compressor startup)	When low pressure (63LS) drops below 0.23MPa[33psi].	When low pressure (63LS) exceeds 0.38MPa[55psi].
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 minuites 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 63HS1 exceeds 3.62MPa[525psi]	When 63HS1 is or below 3.43MPa[497psi] and 30 seconds have passed

(2) Bypass solenoid valve (SV9) (ON = Close)

Operation	SV9	
	OFF	ON
After the operation has stopped	OFF while the unit is stopped	ON while the unit is in operation

-6- Compressor Frequency Control

- Depending on the capacity required, the frequency of the compressor is controlled to keep constant evaporation temperature (0°C [32°F] = 0.71 MPa [103 psi]) during cooling operation, and condensing temperature (49°C [120°F] = 2.88 MPa [418 psi]) during heating operation.
- The table below summarizes the operating frequency ranges of the inverter compressor during normal operation.
- The OS in the multiple-heat source-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
P072 model	37	16	32	16
P096 model	51	16	40	16
P120 model	62	16	52	16
P144 model	79	16	60	16
P168 model	93	16	73	16
P192 model	109	16	85	16
P216 model	130	27	100	27
P240 model	149	27	112	27

Note

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

(1) Pressure limit

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

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

(2) Discharge temperature limit

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

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

(3) Periodic frequency control

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

Periodic control cycle

Periodic control is performed after the following time has passed

- 30 seconds after compressor start-up
- 30 seconds after frequency control based on discharge temperature or pressure limit

The amount of frequency change

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

-7- Refrigerant Recovery Control

Refrigerant recovery is performed for each BC port during heating operation to prevent the refrigerant from accumulating inside the units that are stopped (in the fan mode), in the cooling mode, or in the heating Thermo-OFF mode.
It is also performed during cooling operation to prevent an excessive amount of refrigerant from accumulating in the heat exchanger of heat source unit.

Starting criteria for the refrigerant recovery cycle (during Cooling-only, Cooling-main, Heating-only, or Heating-main mode)

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

1) When 5 minutes have passed in the Heating-only or Heating-main mode or 45 seconds have passed in the Cooling-only or Cooling-main mode since the completion of the previous refrigerant recovery cycle AND the when following conditions are met.
   TH4 > 105°C [221°F]
2) When the port is not in the 4-minute restart delay mode

Starting criteria for the refrigerant recovery cycle (during Cooling-only, Cooling-main, Heating-only, or Heating-main mode)

1) The opening of LEV1 and LEV3 is increased.

-8- Capacity Control of Heat Exchanger

(1) Control method

- Depending on the capacity required, the heat exchanger capacity of the heat source unit is controlled by the LEV to keep a constant condensing temperature of (water temperature +10°C [18°F]) during cooling operation and a constant evaporation temperature of (4°C [39°F] =0.80 <Pa [116psi]) during heating operation.
- The OS in the multiple-heat source-unit system operates at the actual heat exchanger capacity control value that is calculated by the OS based on the preliminary heat exchanger capacity control value that the OC determines.

(2) Heat source unit heat exchanger capacity control patterns

Model	Operation mode	Operation pattern	LEV	
			LEV7	LEV8
P072-P120 models	Cooling-only Cooling-main	1-9	1289 pulse	1058-2300 pulses
	Cooling-only	10		20 pulse
	Heating-only Heating-main	1	20-5000 pulses	20-1400 pulses
P144-P240 models	Cooling-only Cooling-main	1-24	1695 pulse	1058-3300 pulses
	Cooling-only	25		20 pulse
	Heating-only Heating-main	1	20-5000 pulses	20-1400 pulses

-9- Injection Control (Linear Expansion Valve <LEV4>)

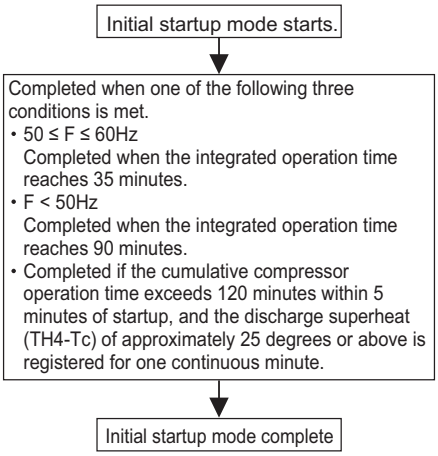
♦LEV4 opening is adjusted every 30 seconds to keep the discharge temperature (TH4) within the predetermined range.

-10- Control at Initial Start-up

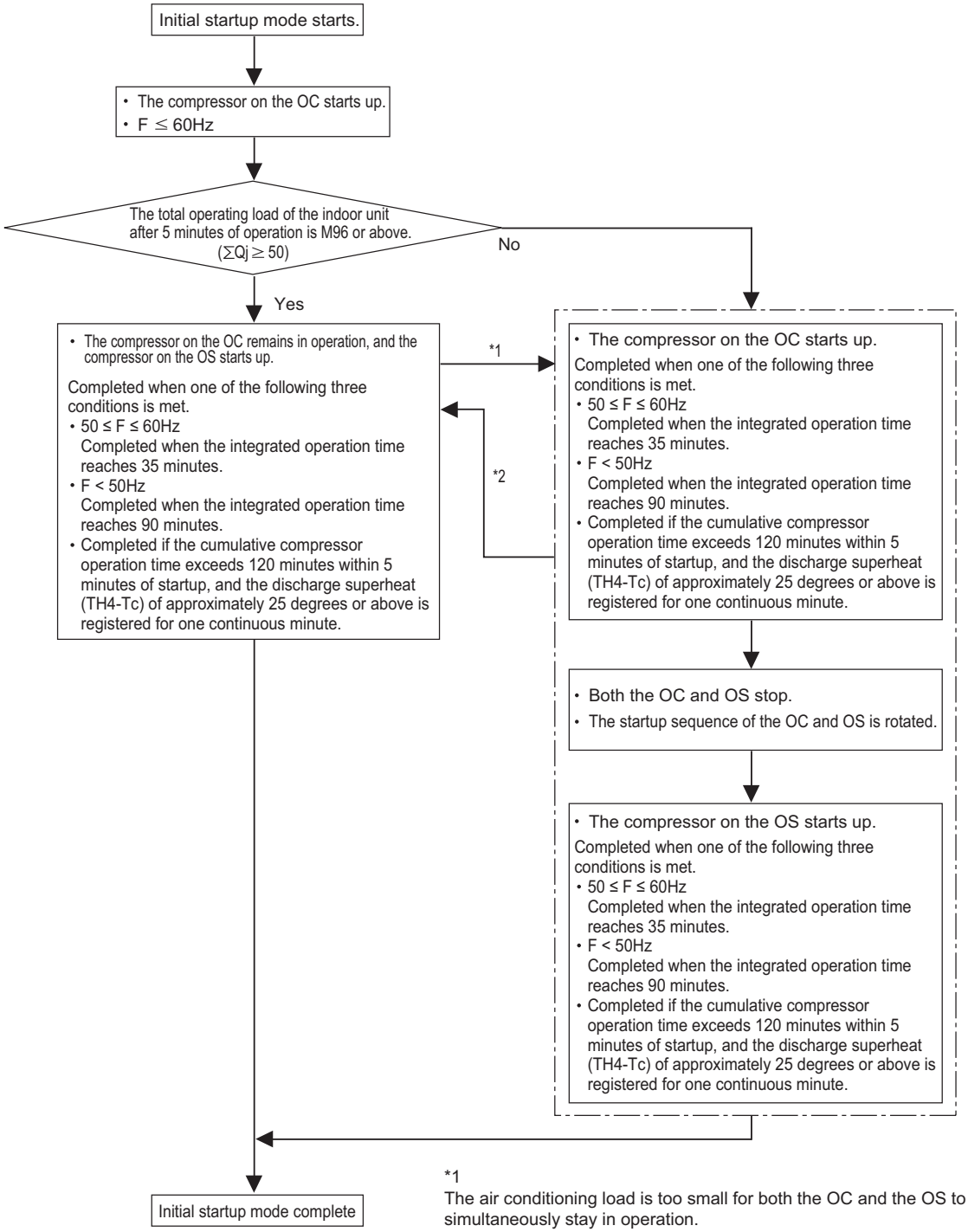
♦When started up for the first time before 12 hours have elapsed after power on, the unit goes into the initial startup mode.
♦At the completion of the initial operation mode on the OC and OS, they will go into the normal control mode.

1. Flowchart of initial operation

(1) System with a single heat-source unit



(2) System with two heat-source units



*1
The air conditioning load is too small for both the OC and the OS to simultaneously stay in operation.
*2
The air conditioning load is high enough for both OC and OS to simultaneously stay in operation.

-11- Emergency Operation Mode

1. Problems with the heat source unit

- Emergency operation mode is a temporary operation mode in which the heat source unit that is not in trouble operates when one of the heat source units in the system with two heat-source units is in trouble.
- 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 Inverter		0403	Serial communication error
		1550	Liquid back failure (detected by current sensor)
		4220	Bus voltage drop
		4230	Heatsink overheat protection
		4240	Overload protection
		4250	Overcurrent relay trip
		5110	Heatsink temperature sensor failure (THHS)
		5301	Current sensor/circuit failure
Thermistor	TH4	5104	Discharge temperature sensor failure
	TH7	5107	Water inlet temperature sensor failure
	TH8	5108	Water outlet temperature sensor fault
	TH15	5115	Compressor shell bottom temperature sensor fault
Power		4102	Open phase
		4115	Power supply sync signal abnormality
Pump interlock circuit		2000	Pump interlock error

* 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 heat source 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 heat source units are turned off

This is a temporary operation mode in which the heat source unit that is not in trouble operates when communication circuit failure occurs or when some of the heat source 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 heat source units is off	6607	No acknowledgement error
	6608	No response error

Emergency operation pattern (2 heat source 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 heat source units	

Note

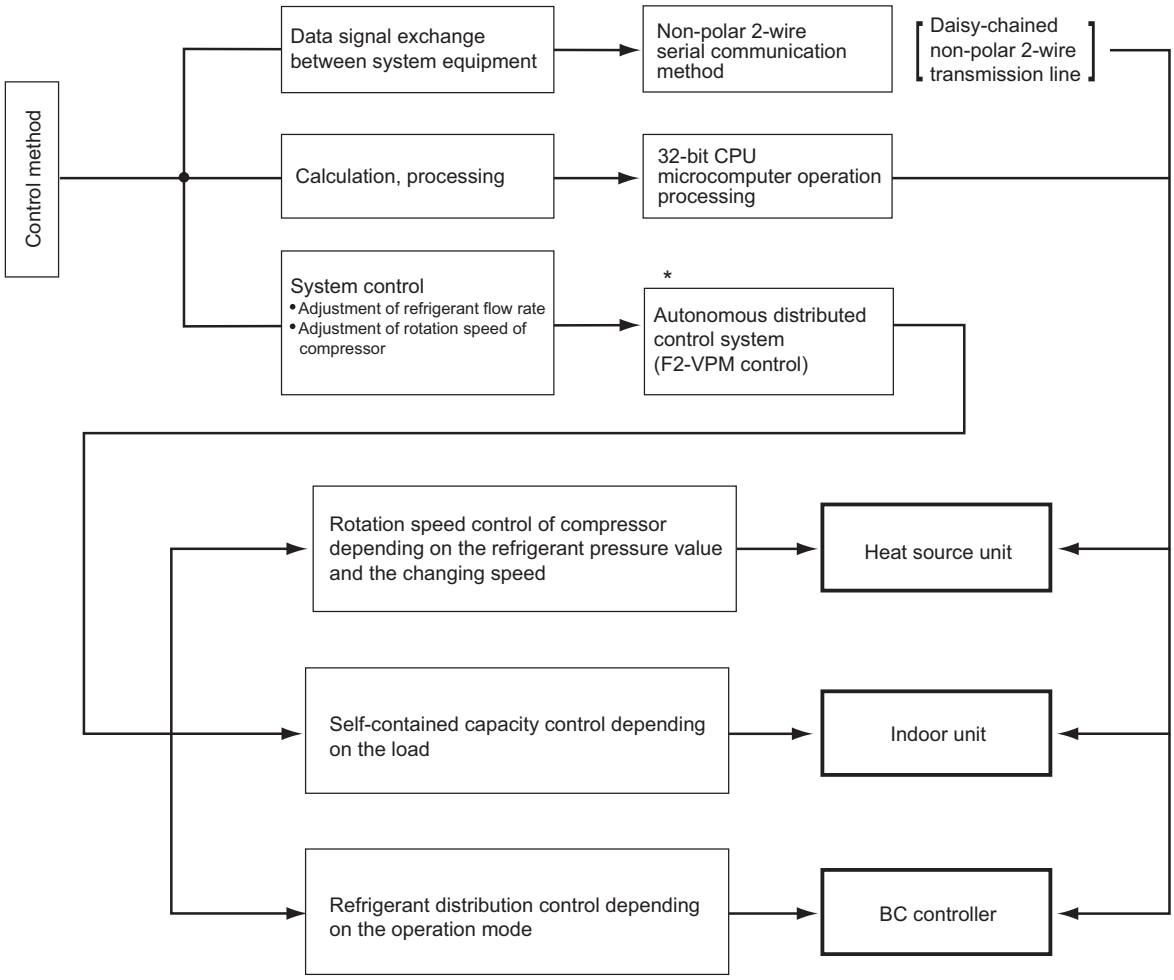
1) If an attempt is made to put into operation a group of indoor units whose total capacity exceeds the maximum allowable capacity, some of the indoor units will go into the same condition as Thermo-OFF.

(3) Ending the emergency operation

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

-12- Control Method

The control system configuration for the TQRY models is shown in the chart below.



Autonomous distributed control system : A system that consists of three independent sub control systems, instead of a single centralized control system, that work together to maintain the overall control of the entire system.

-13- Operation Mode

(1) Indoor unit operation mode

The operation mode can be selected from the following 6 modes using the remote controller.

1	Cooling mode
2	Heating mode
3	Dry mode
4	Automatic cooling/heating mode
5	Fan mode
6	Stopping mode

(2) Heat source unit operation mode

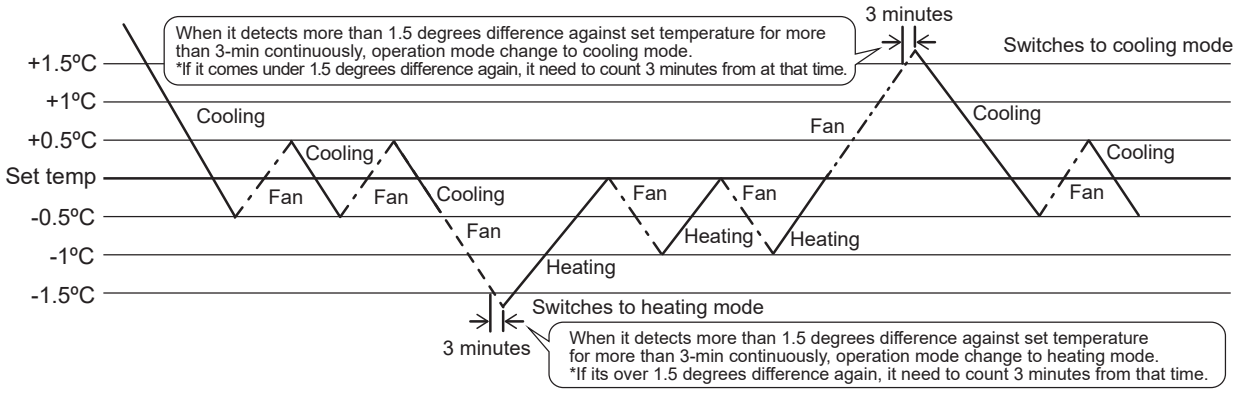
1	Cooling only mode	All indoor units in operation are in cooling mode.
2	Heating only mode	All indoor units in operation are in heating mode.
3	Cooling main mode	Coexistence of units in cooling and heating modes.
4	Heating main mode	Coexistence of units in cooling and heating modes.
5	Stopping mode	All indoor units are in fan mode or stopping mode.

Note

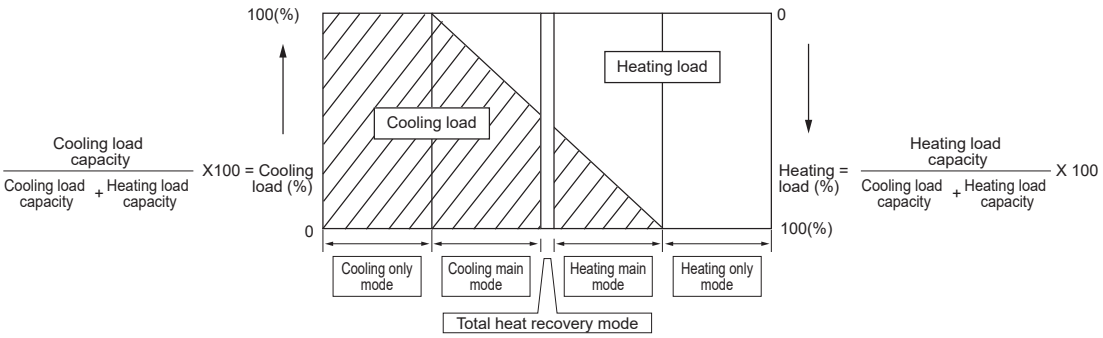
When units in cooing and heating coexist, the operation mode (cooling main mode or heating main mode) will be determined by the heat source unit, based on the refrigerant pressure and speed variation data.

(3) Operation pattern for automatic cooling/heating mode

When the automatic cooling/heating mode is selected from remote controller functions, the indoor temperature will be detected in pattern as shown in the figure below, and the operation mode (cooling or heating) will automatically be selected.



(4) Relationship between the operation mode and the load capacity (kW) (within a system)



-14- DEMAND Control

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

Refer to Chapter II [4] 7. Various Control Methods Using the Signal Input/Output Connector on Heat Source Unit.

-15- Control of Crankcase Heater

A crankcase heater is used to heat the compressor motor on the stopped heat source 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

[3] Controlling BC Controller

1. Control of LEV-A, LEV-B, and LEV-L

Depending on the operation mode of the branch port, the openings (sj) of LEV-A, LEV-B, and LEV-L change as shown below.

		Mode			
		Cooling	Heating	Stop	Defrost*1
Branch port	LEV-A	6,000	20	160	20
	LEV-B	20	6,000	20	20
	LEV-L	6,000	6,000	6,000	6,000

*1. The operation of LEV-A, LEV-B, and LEV-L may vary depending on the defrosting method or operational status.

*2. When a refrigerant leak is detected, the openings of LEV-A, LEV-B, and LEV-L corresponding to the relevant branch port become 20 pulses.

2. Control of SVM1, SVM1b, and SVM3

	Operation mode	Cooling only	Cooling main	Heating only	Heating main	Defrost*2	Stop
MA type	SVM1, SVM1b	ON	Pressure differential control*1	OFF	OFF	OFF	OFF
MB type	SVM3	OFF*3	OFF*3	OFF*3	OFF*3	OFF	OFF

*1. Pressure differential control: The detected differential pressure (dPHM = PS1 - PS3) is monitored and adjusted every minute to maintain it within a specific range.

*2. The operation of SVM1, SVM1b, and SVM3 may vary depending on the defrosting method and operational status.

*3. The SVM1, SVM1b, and SVM3 may be turned ON to prevent the refrigerant from stagnating excessively inside the BC controller.

3. Control of LEV

LEV opening (sj) is controlled as follows depending on the operation mode.

	Operation mode	Cooling only	Cooling main	Heating only	Heating main	Defrost*5	Stop
MA type	LEV1	3000	Liquid level control*1 Pressure differential control*2	120*3	120*3	3,000	900
	LEV3	Superheat control*4		Pressure differential control*2	Pressure differential control*2	3,000	41
	LEV4	41	41	Pressure differential control*2	Pressure differential control*2	3,000	41
MB type	LEV3	Liquid level control*6 Superheat control*4	Liquid level control*6 Superheat control*4	Pressure differential control*2	Pressure differential control*2	60	60

*1. Liquid level control: The liquid level detected by the liquid inlet temperature (TH11 sensor) is controlled so as to be within a certain range.

*2. Pressure differential control: The detected differential pressure (PS1 and PS3) is controlled every minute so as to be within a certain range.

*3. Can be 120 or more due to pressure rise on the liquid side (PS1).

*4. Superheat control: The amount of superheat that is calculated on the bypass inlet and outlet temperature (TH12, TH15) is controlled every minute so as to be within a certain range.

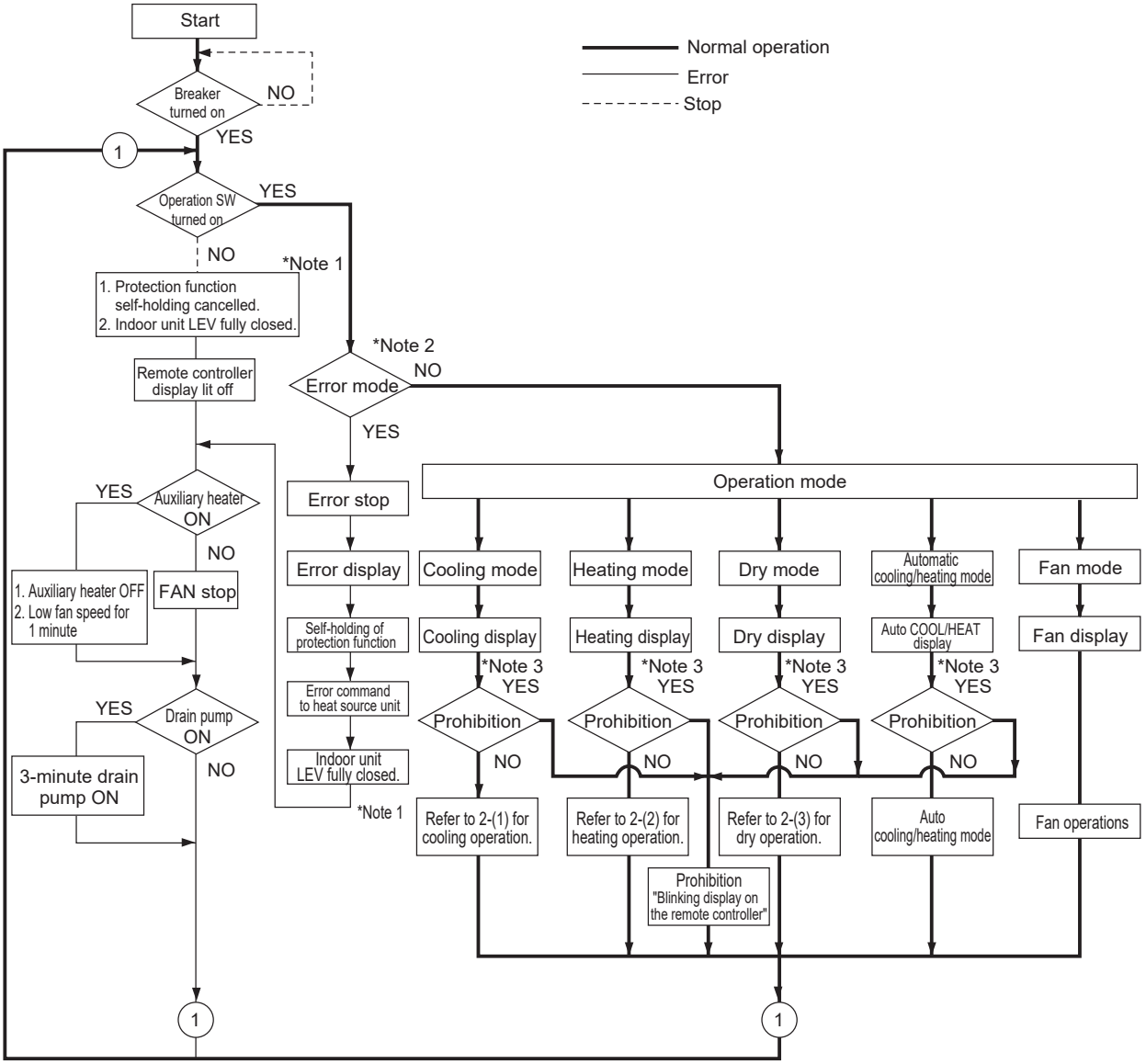
*5. The operation of the LEV may vary depending on the defrosting method and operational status.

*6. Liquid level control: The liquid level detected by the MA and MB types is controlled so as to be within the same range.

[4] Operation Flow Chart

1. Mode determination flowchart

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

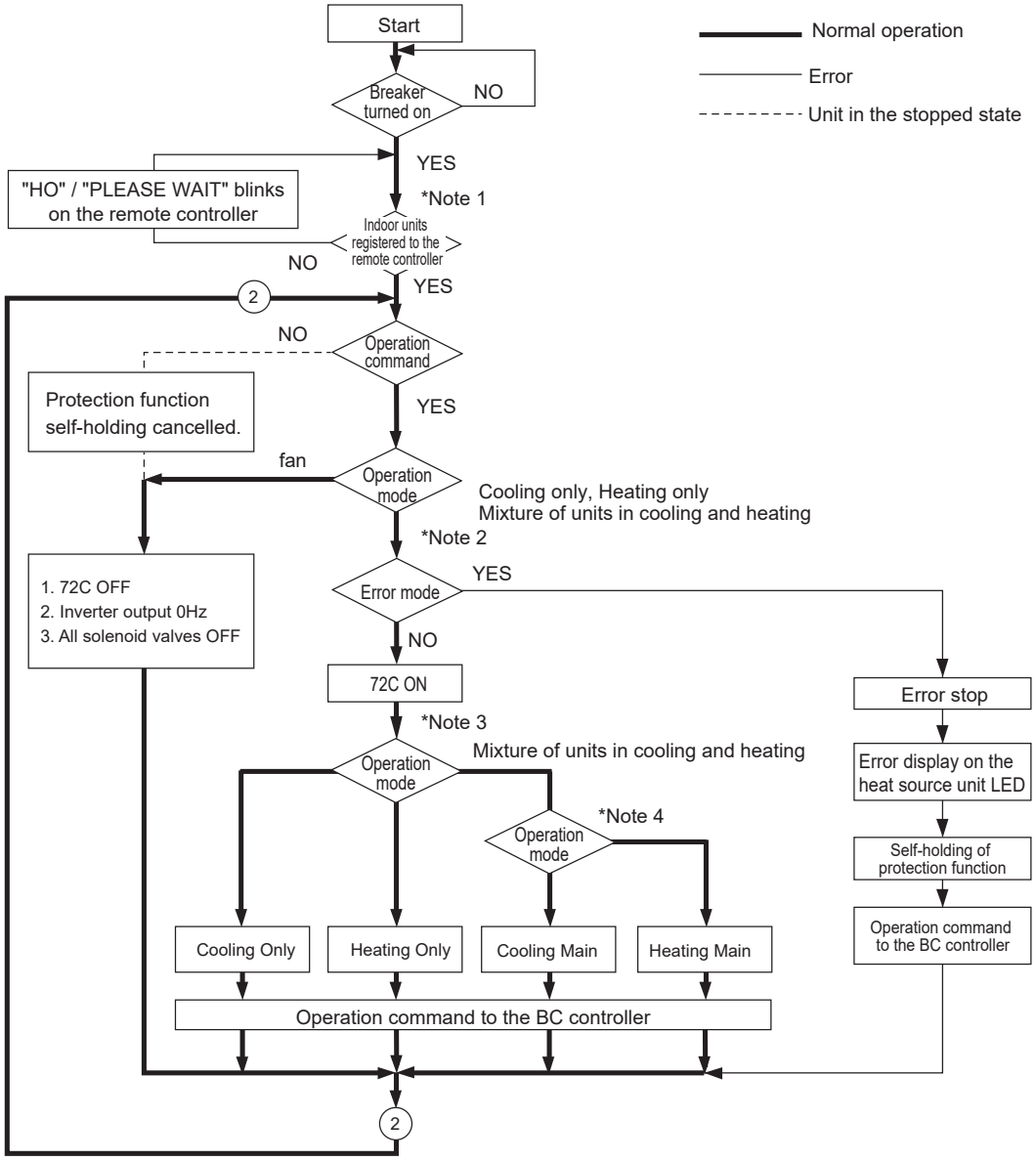


*Note 1. Indoor unit LEV fully closed : Opening 41.

*Note 2. The system may go into the error mode on either the indoor unit side or the BC controller or heat source unit side. If some of the indoor units are experiencing a problem, only those indoor units that are experiencing the problem will stop. If the BC controller or the heat source unit is experiencing a problem, all the connected units will stop.

*Note 3. If multiple indoor units are connected to a port and there is a discrepancy in the operation mode between the indoor unit and the port, the operation will be prohibited. (Operation mode blinks on the remote controller, the Fan stops, indoor unit LEV becomes fully closed.)

(2) Heat source unit (cooling only, heating only, cooling main and heating main modes)



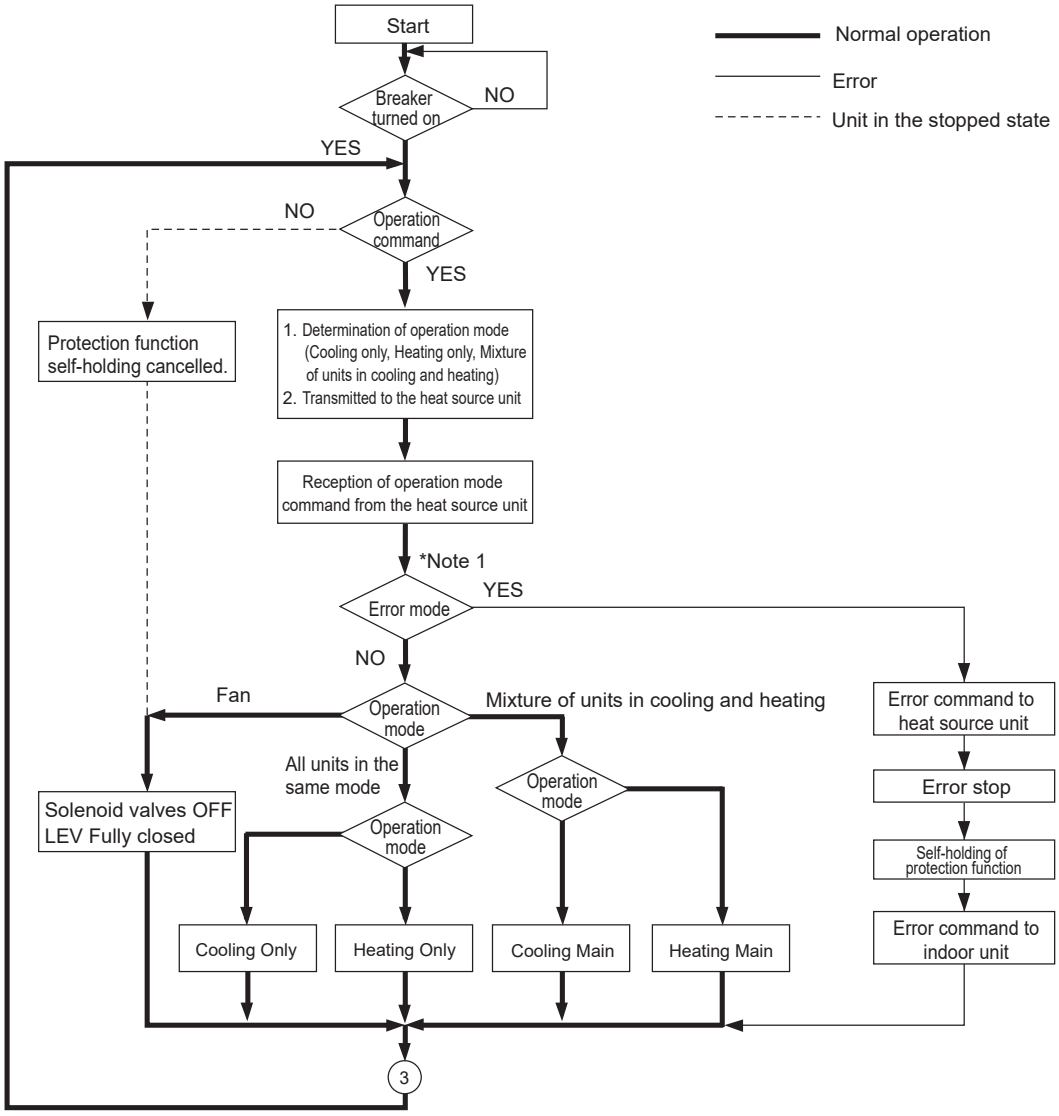
*Note 1. For about 3 minutes after power on, search for the indoor unit address, for the remote controller address, and for the group information will start. During this, "HO"/ "PLEASE WAIT" blinks on the display of the remote controller. When the indoor unit to be controlled by the remote controller is missing, "HO"/ "PLEASE WAIT" keeps blinking on the display of the remote controller even after 3 or more minutes after power on.

*Note 2. The system may go into the error mode on either the indoor unit or the heat source unit side. The heat source unit stops only when all of the connected indoor units are experiencing problems. The operation of even a single indoor unit will keep the heat source unit running. The error will be indicated on the LED display.

*Note 3. The units will follow the operation mode commands from the BC controller

*Note 4. When the operation mode commands from the BC controllers are mixed (both cooling and heating), the actual operation mode is determined by the heat source unit.

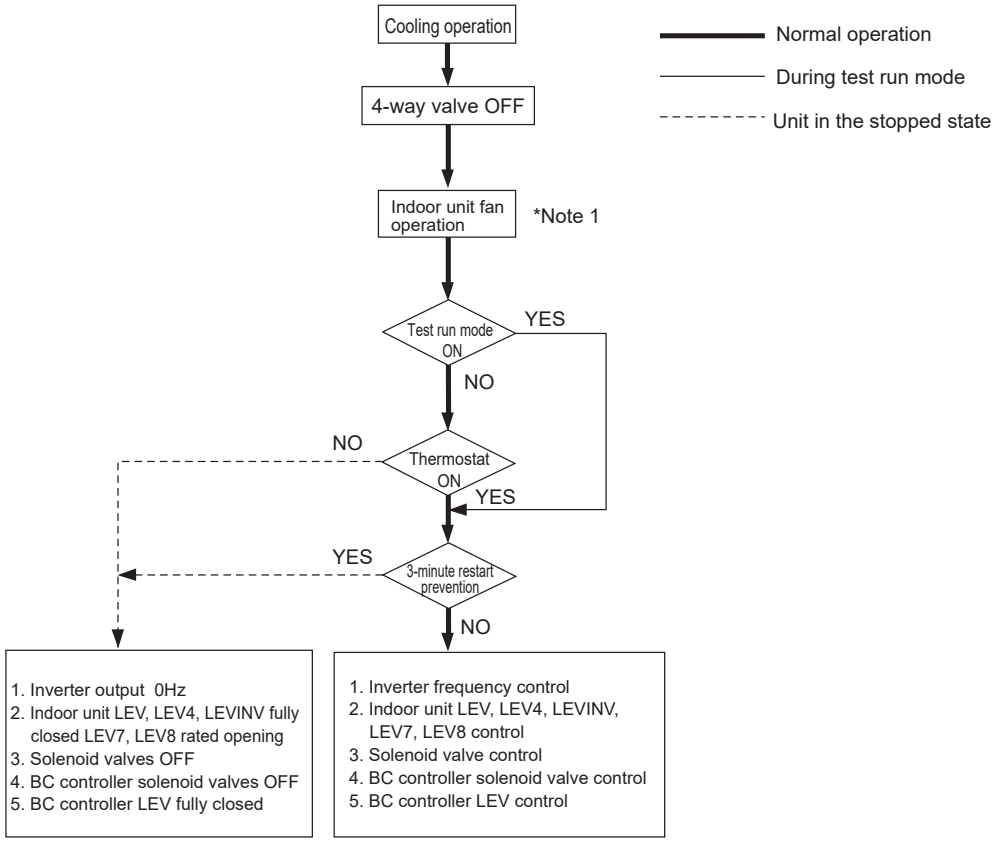
(3) BC controller (cooling only, heating only, cooling main and heating main modes)



Note 1. The system may go into the error mode on either the indoor unit side or the BC controller or heat source unit side. If some of the indoor units are experiencing a problem, only those indoor units that are experiencing the problem will stop. If the BC controller or the heat source unit is experiencing a problem, all the connected units will stop.

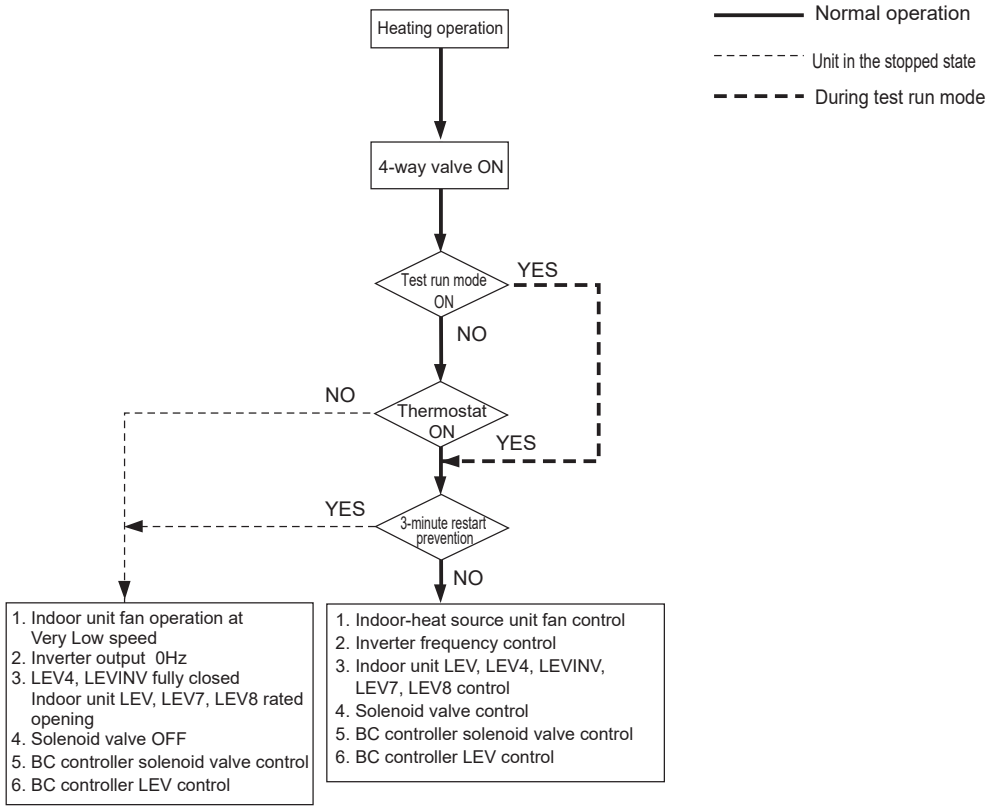
2. Operations in each mode

(1) Cooling operation

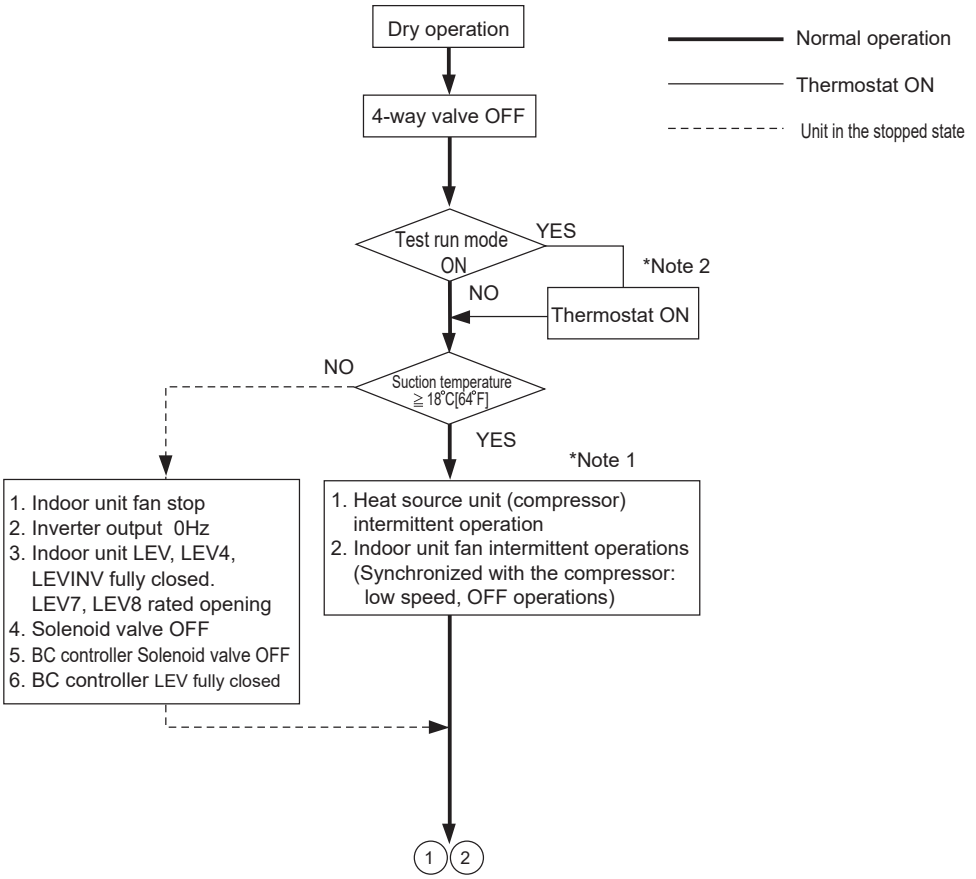


*Note 1. The indoor fan operates at the set notch under cooling mode regardless of the ON/OFF state of the thermostat.

(2) Heating operation



(3) Dry operation



*Note 1.When the indoor unit inlet temperature exceeds 18˚C [64˚F], the heat source unit (compressor) and the indoor unit fan start the intermittent operation simultaneously. When the indoor unit inlet temperature becomes 18˚C [64˚F],or less, the fan always runs (at low speed). The heat source unit, the indoor unit, and the solenoid valve operate in the same way as they do in the cooling operation when the compressor is turned on.

*Note 2.Thermostat is always kept on during test run mode, and indoor and heat source unit intermittent operation (ON) time is a little longer than that of normal operation.

VII Test Run Mode

[1] Items to be checked before a Test Run 133
[2] Operating Characteristic and Refrigerant Amount 134
[3] Adjusting the Refrigerant Amount 134
[4] Refrigerant Amount Adjust Mode 138
[5] The following symptoms are normal. 140

[1] Items to be checked before a Test Run

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

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

Note

- Before inspecting the inside of the control box, turn off the power, keep the unit off for at least 10 minutes, and confirm that tab terminals FTP and FTN on the INV board to drop to 20 VDC or lower. (It takes about 10 minutes to discharge electricity after the power supply is turned off.)
- Control box houses high temperature parts. Be well careful even after turning off the power source.
- To connect wiring to TB7, check that the voltage is 20 VDC or below.

(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 MΩ.

Note

- Do not operate the unit if the insulation resistance is below 1 MΩ.
- 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 1 MΩ immediately after installation or when the power is kept off for an extended period of time because of the accumulation of refrigerant in the compressor.
- If insulation resistance reads below 1 MΩ, by turning on the main power and powering the crankcase heater for at least 12 hours, the refrigerant in the compressor will evaporate and the insulation resistance will go up.
- Do not measure the insulation resistance of the terminal block for transmission line for the unit remote controller.

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

Note

- Before turning on the power, disconnect all power supply wires from the compressor terminal block, and measure the insulation resistance of the compressor.
- Check the compressor for a ground fault. If the insulation resistance is below 1 MΩ, connect all power supply wires to the compressor and turn on the power to the heat source unit. (The liquid refrigerant in the compressor will evaporate by energizing the heater.)

(5) Check that the valve on the high-pressure pipe and low-pressure pipe are fully open.

Note

Securely tighten the cap.

(6) 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.

(7) [When a transmission booster is connected]
Turn on the transmission booster before turning on the heat source units.

Note

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

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

Note

Insufficient powering time may result in compressor damage.

(9) 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

(10) 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 (1) in [VI [1] Functions and Factory Settings of the Dipswitches] 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.

[2] Operating Characteristic and Refrigerant Amount

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

1. Operating characteristic and refrigerant amount

The following shows items of particular importance.

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

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

[3] Adjusting the Refrigerant Amount

1. Symptoms

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

The system comes to an abnormal stop, displaying 1500/1550 (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.	

2. Amount of refrigerant

(1) To be checked during operation

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

Symptoms	Conclusion
Discharge temperature is high. (Normal discharge temperature is below 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.

3. Additional refrigerant charge

(1) Factory charged-amount and maximum additional amount of refrigerant

The amount necessary for extended pipe (field piping) is not included and must be added on site.
When the amount obtained by the calculation formula (2) exceeds the "Charged on site" values in the table below, restructure the system so that the additional refrigerant amount does not exceed those values.

For TQRYP-3(4)A(B)MM0AN

Total index of the heat source units	P0723(4)A	P0963(4)A	P1203(4)A	P1443(4)A	P1683(4)A	P1923(4)A	P2163(4)A
Factory charged	4.5 kg	4.5 kg	4.5 kg	4.5 kg	4.5 kg	4.5 kg	7.5 kg
Charged on site	25.7 kg	30.5 kg	31.5 kg	41.8 kg	41.8 kg	41.8 kg	38.8 kg
Total for system	30.2 kg	35.0 kg	36.0 kg	46.3 kg	46.3 kg	46.3 kg	46.3 kg
Factory charged	9 lbs 15 oz	9 lbs 15 oz	9 lbs 15 oz	9 lbs 15 oz	9 lbs 15 oz	9 lbs 15 oz	16 lbs 9 oz
Charged on site	56 lbs 11 oz	67 lbs 4 oz	69 lbs 8 oz	92 lbs 3 oz	92 lbs 3 oz	92 lbs 3 oz	85 lbs 9 oz
Total for system	66 lbs 10 oz	77 lbs 3 oz	79 lbs 6 oz	102 lbs 2 oz	102 lbs 2 oz	102 lbs 2 oz	102 lbs 2 oz

Total index of the heat source units	P2403(4)A	P1443(4)B	P1683(4)B	P1923(4)B	P2163(4)B	P2403(4)B	P2883(4)B
Factory charged	7.5 kg	9.0 kg	9.0 kg	9.0 kg	9.0 kg	9.0 kg	9.0 kg
Charged on site	40.9 kg	50.0 kg	51.0 kg	52.0 kg	53.0 kg	55.0 kg	69.0 kg
Total for system	48.4 kg	59.0 kg	60.0 kg	61.0 kg	62.0 kg	64.0 kg	78.0 kg
Factory charged	16 lbs 9 oz	19 lbs 14 oz	19 lbs 14 oz	19 lbs 14 oz	19 lbs 14 oz	19 lbs 14 oz	19 lbs 14 oz
Charged on site	90 lbs 3 oz	110 lbs 4 oz	112 lbs 7 oz	114 lbs 11 oz	116 lbs 14 oz	121 lbs 5 oz	152 lbs 2 oz
Total for system	106 lbs 12 oz	130 lbs 2 oz	132 lbs 5 oz	134 lbs 8 oz	136 lbs 11 oz	141 lbs 2 oz	171 lbs 16 oz

Total index of the heat source units	P3123(4)B	P3363(4)B
Factory charged	9.0 kg	9.0 kg
Charged on site	69.8 kg	69.8 kg
Total for system	78.8 kg	78.8 kg
Factory charged	19 lbs 14 oz	19 lbs 14 oz
Charged on site	153 lbs 15 oz	153 lbs 15 oz
Total for system	173 lbs 12 oz	173 lbs 12 oz

(2) Calculation formula

- Piping length from heat source unit to the farthest indoor unit ≤ 30.5 m [100 ft]: Use table [A].
- Piping length from heat source unit to the farthest indoor unit > 30.5 m [100 ft]: Use table [B].

Additional refrigerant charge	
[A]	(kg)[oz]
[B]	(kg)[oz]

=

High-pressure pipe size Total length of ø28.58 mm [1-1/8 in]	
[A]	(m)×0.32 (kg/m) (ft)×3.45 (oz/ft)
[B]	(m)×0.30 (kg/m) (ft)×3.23 (oz/ft)

+

High-pressure pipe size Total length of ø22.2 mm [7/8 in]	
[A]	(m)×0.20 (kg/m) (ft)×2.16 (oz/ft)
[B]	(m)×0.19 (kg/m) (ft)×2.05 (oz/ft)

+

High-pressure pipe size Total length of ø19.05 mm [3/4 in]	
[A]	(m)×0.14 (kg/m) (ft)×1.51 (oz/ft)
[B]	(m)×0.13 (kg/m) (ft)×1.40 (oz/ft)

+

High-pressure pipe size Total length of ø15.88 mm [5/8 in]	
[A]	(m)×0.099 (kg/m) (ft)×1.07 (oz/ft)
[B]	(m)×0.090 (kg/m) (ft)×0.97 (oz/ft)

+

Liquid pipe size Total length of ø19.05 mm [3/4 in]	
[A]	(m)×0.26 (kg/m) (ft)×2.80 (oz/ft)
[B]	(m)×0.24 (kg/m) (ft)×2.59 (oz/ft)

+

Liquid pipe size Total length of ø15.88 mm [5/8 in]	
[A]	(m)×0.17 (kg/m) (ft)×1.83 (oz/ft)
[B]	(m)×0.16 (kg/m) (ft)×1.73 (oz/ft)

+

Liquid pipe size Total length of ø12.7 mm [1/2 in]	
[A]	(m)×0.11 (kg/m) (ft)×1.19 (oz/ft)
[B]	(m)×0.10 (kg/m) (ft)×1.08 (oz/ft)

+

Liquid pipe size Total length of ø9.52 mm [3/8 in]	
[A]	(m)×0.054 (kg/m) (ft)×0.59 (oz/ft)
[B]	(m)×0.050 (kg/m) (ft)×0.54 (oz/ft)

+

Liquid pipe size Total length of ø6.35 mm [1/4 in]	
[A]	(m)×0.020 (kg/m) (ft)×0.22 (oz/ft)
[B]	(m)×0.018 (kg/m) (ft)×0.20 (oz/ft)

+

Main or Sub BC controller	Amount
MA-type	3.1 kg/unit [110 oz/ft]
MB-type	0.8 kg/unit [29 oz/ft]

+

Total capacity of connected indoor units	Amount (to be added for indoor units)
- 27	1.8 kg [64 oz]
28 - 54	2.3 kg [82 oz]
55 - 126	2.7 kg [96 oz]
127 - 144	3.2 kg [113 oz]
145 - 180	4.1 kg [145 oz]
181 - 234	4.5 kg [159 oz]
235 - 273	5.4 kg [191 oz]
274 - 307	7.2 kg [254 oz]
308 - 342	8.1 kg [286 oz]
343 - 411	9.0 kg [318 oz]
412 - 450	10.8 kg [381 oz]
451 -	12.6 kg [445 oz]

*If the following (1) and (2) are met, add 0.46 kg [17 oz] of refrigerant per indoor unit.
(1) When only TPEFYP018/024/030MA1M0A are connected
(2) When the total number of connected indoor units is 6 or less

*When connecting TPLFYP018/024/036EM1M0A, add 0.61 kg [22 oz] of refrigerant per indoor unit.

*Round up the calculation result to the nearest 0.1 kg (0.1 oz).

*The refrigerant amount in the high-pressure piping between the main and sub BC is not included in the calculation of the total additional refrigerant amount.

■Sample calculation

Units "m" and "kg"

Indoor	1: 18	A: ø28.58	40 m	a: ø6.35	10 m
	2: 96	B: ø9.52	10 m	b: ø9.52	10 m
	3: 06	C: ø12.7	20 m	c: ø6.35	5 m
	4: 06	D: ø9.52	5 m	d: ø6.35	5 m
	5: 48	E: ø9.52	5 m	e: ø9.52	5 m
	6: 36	F: ø9.52	5 m	f: ø9.52	5 m
	7: 30	G: ø22.2	3 m	g: ø9.52	5 m
	8: 18	H: ø22.2	1 m	h: ø6.35	10 m

Heat source P288

Main BC controller TCMBM0108MA11MM

Sub BC controller TCMBS0104MB11MM × 4

The total length of each liquid line as follows:
ø28.58: A = 40 m
ø22.2: G = 4 m
ø12.70: C = 20 m
ø9.52: B + D + E + F + b + e + f + g = 50 m
ø6.35: a + c + d + h = 30 m
<Calculation example>
Additional refrigerant charge
= 40 × 0.30 + 4 × 0.19
+ 20 × 0.10 + 50 × 0.050 + 30 × 0.018 + 3.1 + 0.8 × 4 + 5.4
= 29.5 kg

Units "ft" and "oz"

Indoor	1: 18	A: ø1-1/8	131 ft	a: ø1/4	32 ft
	2: 96	B: ø3/8	32 ft	b: ø3/8	32 ft
	3: 06	C: ø1/2	65 ft	c: ø1/4	16 ft
	4: 06	D: ø3/8	16 ft	d: ø1/4	16 ft
	5: 48	E: ø3/8	16 ft	e: ø3/8	16 ft
	6: 36	F: ø3/8	16 ft	f: ø3/8	16 ft
	7: 30	G: ø7/8	9 ft	g: ø3/8	16 ft
	8: 18	H: ø7/8	3 ft	h: ø1/4	32 ft

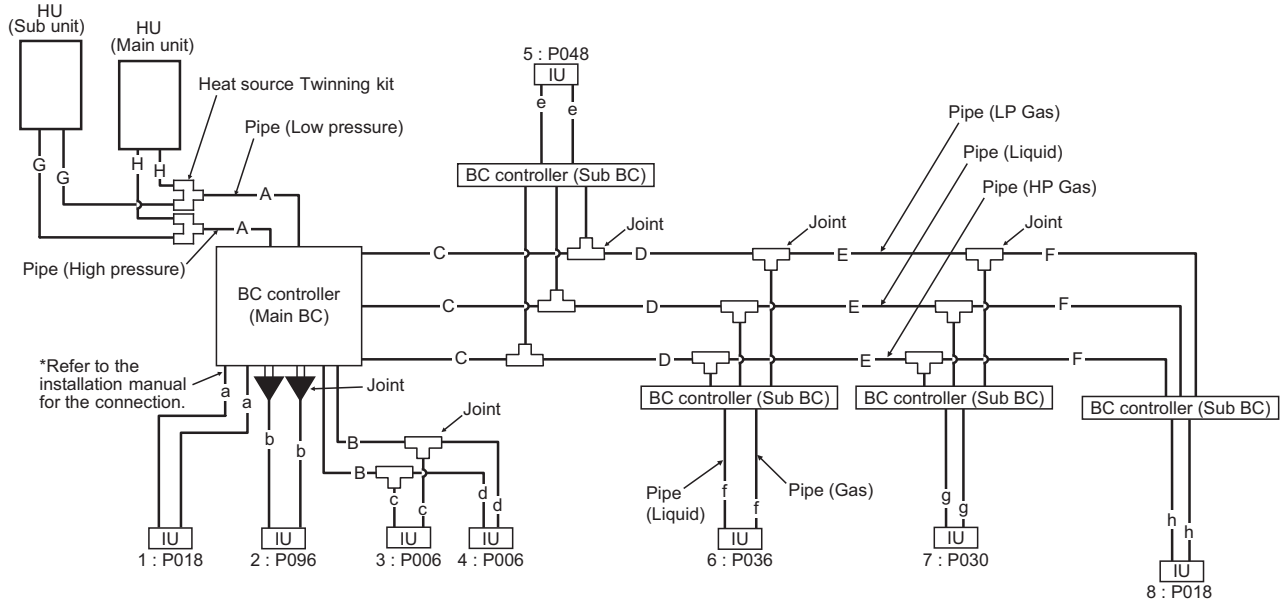
Heat source P288

Main BC controller TCMBM0108MA11MM

Sub BC controller TCMBS0104MB11MM × 4

The total length of each liquid line as follows:
ø1-1/8: A = 131 ft
ø7/8: G = 12 ft
ø1/2: C = 65 ft
ø3/8: B + D + E + F + b + e + f + g = 160 ft
ø1/4: a + c + d + h = 96 ft
<Calculation example>
Additional refrigerant charge
= 131 × 3.23 + 12 × 2.05
+ 65 × 1.08 + 160 × 0.54 + 96 × 0.20 + 110 + 29 × 4 + 191
= 1040.6 (1040.53) oz

Sample connection (with 5 BC controllers and 8 indoor units) (TQRYP2884BMM)



[4] Refrigerant Amount Adjust Mode

1. Procedures

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

When the function switch SW4 No.3 (SW6-10: ON) on the main board on the heat source unit (OC only) is turned to ON, the unit goes into the refrigerant amount adjust mode, and the following sequence is followed.

Note

(1) SW4-3 on the OS is invalid, and the unit will not go into the refrigerant amount adjust mode.

(2) For how to set SW4, refer to the following page(s). [VI [1] 1. Heat source unit]

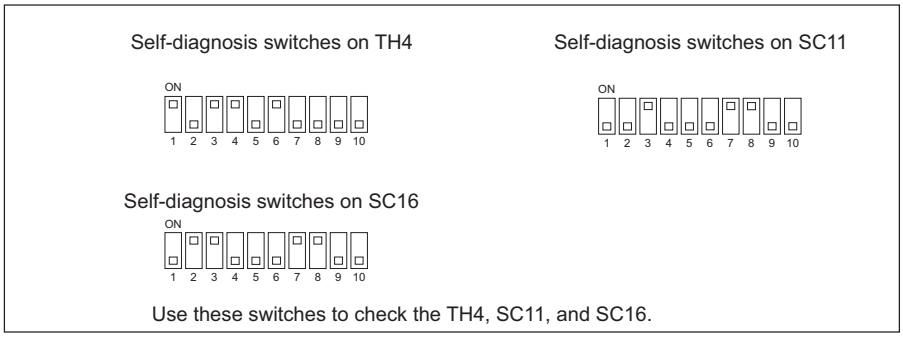
Operation

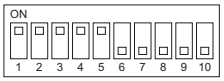
When the unit is in the refrigerant amount adjust mode, the LEV on the indoor unit does not open as fully as it normally does during cooling operation to secure subcooling.

Note

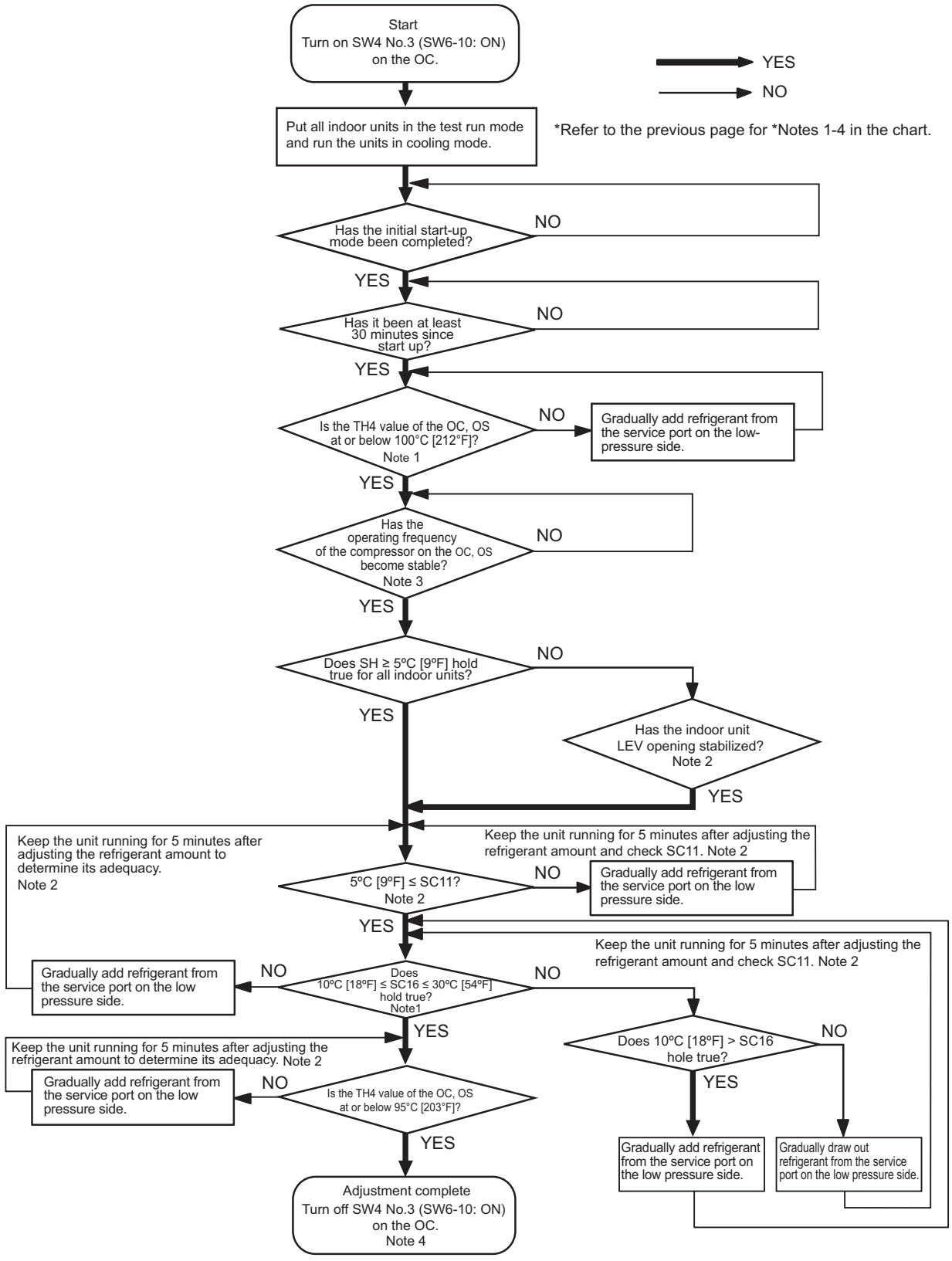
1) Adjust the refrigerant amount based on the TH4 value, following the flowchart below. Check the TH4, SC11, SC16, and Tc values on the OC, OS by following the flowchart. The TH4, SC11, and SC16 values can be displayed by setting the self-diagnosis switch SW4 (as follows) on the main board on the OC, OS.
   - TH4 (SW6-9: OFF, SW6-10: OFF)
   - SC11, SC16 (SW6-9: ON, SW6-10: OFF)
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.
   Subcool (SC11 and SC16) of the BC controller 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.
   Subcool (SC11 and SC16) of the BC controller is 5°C [9°F] or less and SH on the indoor unit is 5°C [9°F] or less.
   Wait until the Subcool (SC11 and SC16) of the BC controller 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.
   - SC11: Subcool of liquid refrigerant at BC controller inlet; SC16: Subcool of liquid refrigerant at BC controller outlet
3) High pressure must be at least 2.0MPa [290psi] to enable a proper adjustment of refrigerant amount to be made.
4) Refrigerant amount adjust mode automatically ends 90 minutes after beginning. When this happens, by turning off the SW4 No.3 (SW6-10: ON) and turning them back on, the unit will go back into the refrigerant amount adjust mode.





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



⚠ CAUTION

Do not release the extracted refrigerant into the air.

⚠ CAUTION

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

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

[5] 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 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 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 and BC controller make 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.

VIII Troubleshooting

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[1] Error Code Lists

Error Code	Preliminary error code	Error (preliminary) detail code	Error code definition	Searched unit					Notes
				Heat source unit	Indoor unit	BC controller	LOSSNAY	Remote controller	
0403	4300	01	Serial communication error/Panel communication error	○	○				
0404	-	-	Indoor unit EEPROM abnormality		○				
0910	-	-	Circuit check (detected unit)		○	○			
0911	-	-	Circuit check (other units)		○	○			
1102	1202	-	Discharge temperature fault	○					
1301	-	-	Low pressure fault	○					
1302	1402	-	High pressure fault	○					
1500	1600	-	Liquid back error (detected by refrigerant temperature)	○					
-	1605	-	Preliminary suction pressure fault	○					
1521	-	-	Refrigerant leak error (self detection of the unit)	○	○				
1522	-	-	Refrigerant leak error (other units)		○	○			
1525	1625	-	Refrigerant sensor lifetime detection 1	○					
1529	-	-	Gas leak error 6 *Heat source unit gas leak detection	○					
1550	1650	001	Liquid back error (Instantaneous overcurrent detected by current sensor)	○					
		002	Liquid back error (Overcurrent effective value shut-off error detected by current sensor)	○					
		003	Liquid back error (ACCT overcurrent error detected by current sensor)	○					
-	1625	-	Refrigerant sensor maintenance (indoor unit)		○				
2000	2100	-	Pump interlock error	○					
2134	2234	-	Abnormal water temperature	○					
2135	2235	-	Water heat exchanger freeze up	○					
2500	-	-	Drain sensor submergence		○				
2502	-	-	Drain pump fault		○	○			
2503	-	-	Drain sensor (Thd) fault		○		○		
2600	-	-	Water leakage				○		
2601	-	-	Water supply cutoff				○		
4102	4152	-	Open phase	○					
4106	-	-	Transmission power supply fault	○					
4109	-	-	Fan operation status detection error		○				
4114	-	-	Indoor unit fan motor error		○				
4116	-	-	RPM error/Motor error		○		○		
4121	4171	-	Function setting error	○					
4124	-	-	Electric system not operate due to damper abnormality		○				
4136	-	xx (*)	Safety shut-off valve circuit error			○			

Error Code	Prelimi-nary error code	Error (prelim-inary) detail code	Error code definition		Searched unit					Notes
					Heat source unit	Indoor unit	BC controller	LOSSNAY	Remote controller	
4220	4320	[0]	Backup operation		○					
		[108]	Abnormal bus voltage drop		○					
		[109]	Abnormal bus voltage rise		○					
		[111]	Logic error		○					
		[112]	Logic error		○					
		[129]	Control power-supply fault		○					
		[131]	Low bus voltage at startup		○					
4230	4330	[125]	Heatsink overheat protection		○					
4240	4340	-	Overload protection		○					
4250	4350	[0]	Backup operation		○					
		[101]	IPM error		○					
		[104]	Short-circuited IPM/Ground fault		○					
		[105]	Overcurrent error due to short-circuited motor		○					
		[106]	Instantaneous overcurrent (S/W detection)		○					
		[107]	Overcurrent (effective value)(S/W detection)		○					
4260	-	-	Heatsink overheat protection at startup		○					
5101	1202	-	Temperature sensor fault	Return air temperature (TH21)		○				
				OA processing unit inlet temperature (TH4)				○		
5102	1217	-	Temperature sensor fault	Indoor unit pipe temperature (TH22)		○				
				OA processing unit pipe temperature (TH2)				○		
5103	1205	00	Temperature sensor fault	Indoor unit gas-side pipe temperature (TH23)		○				
				OA processing unit gas-side pipe temperature (TH3)				○		
5104	1202	-	Temperature sensor fault	OA processing unit intake air temperature (TH1)				○		
				Outside temperature (TH24)		○				Detectable only by the All-Fresh type indoor units
				Heat source unit discharge temperature (TH4)	○					
5105	1204	-	Temperature sensor fault	Accumulator inlet temperature (TH5)	○					
5107	1221	-	Temperature sensor fault	Water inlet pipe (TH7)	○					
5108	1218	-	Temperature sensor fault	Water outlet pipe (TH8)	○					
5112	1215	-	Temperature sensor fault	Component cooler heat exchanger outlet (THINV)	○					

Error Code	Prelimi-nary error code	Error (prelim-inary) detail code	Error code definition		Searched unit					Notes
					Heat source unit	Indoor unit	BC controller	LOSSNAY	Remote controller	
5110	1214	01	Temperature sensor fault	Heatsink temperature (THHS)	○					
5111	-	-	Temperature sensor fault	Liquid inlet temperature (TH11)			○			
5112	-	-		Bypass outlet temperature (TH12)			○			
5114	-	-		LEV4 outlet temperature (TH14)			○			
5115	1203	-		Compressor shell bottom temperature (TH15)	○					
	-	-		LEV3 outlet temperature (TH15)			○			
5116	-	-		LEV3 inlet temperature (TH16)			○			
5201	1402	-	High-pressure sensor fault (63HS1)		○					
5201	-	-	High-pressure sensor fault (Heat source unit HPS/BC controller PS1)		○		○			
5203	-	-	Intermediate pressure sensor fault (BC controller PS3)				○			
5301	4300	[115]	ACCT sensor fault		○					
		[117]	ACCT sensor circuit fault		○					
		[119]	Open-circuited IPM/Loose ACCT connector		○					
		[120]	Faulty ACCT wiring		○					
5558	-	-	Refrigerant sensor error/CFC gas alarm device error			○				
5601	-	-	Local ventilation fault		○					
5701	-	-	Loose float switch connector			○				
6201	-	-	Remote controller board fault (nonvolatile memory error)						○	
6202	-	-	Remote controller board fault (clock IC error)						○	
6600	-	-	Address overlaps		○	○	○	○	○	
6601	-	-	Polarity setting error		○					
6602	-	-	Transmission processor hardware error		○	○	○	○	○	
6603	-	-	Transmission line bus busy error		○	○	○	○	○	
6606	-	-	Communication error between device and transmission processors		○	○	○	○	○	
6607	-	-	No ACK error		○	○	○	○	○	
6608	-	-	No response error		○	○	○	○	○	
6815	-	-	Supervisor remote controller communication error			○			○	
6831	-	-	MA controller signal reception error (No signal reception)			○			○	
6832	-	-	MA remote controller signal transmission error (Synchronization error)			○			○	
6833	-	-	MA remote controller signal transmission error (H/W error)			○			○	
6834	-	-	MA controller signal reception error (Start bit detection error)			○			○	
7100	-	-	Total capacity error		○					
7101	-	-	Capacity code setting error		○	○		○		
7102	-	-	Wrong number of connected units		○		○			
7105	-	-	Address setting error		○					

Error Code	Prelimi-nary error code	Error (prelim-inary) detail code	Error code definition	Searched unit					Notes
				Heat source unit	Indoor unit	BC controller	LOSSNAY	Remote controller	
7106	-	-	Attribute setting error				○		
7107	-	-	Port setting error			○			
7110	-	-	Connection information signal transmission/reception error	○					
7111	-	-	Remote controller sensor fault		○		○		
7113	-	-	Function setting error	○					
7117	-	-	Model setting error	○					
7118	-	-	Refrigerant leak safety device configuration error		○	○			
7119	-	-	M-NET wiring connection error (detected unit)		○				
7120	-	-	M-NET wiring connection error (other units)		○				
7121	-	-	Power-off detection		○				
7122	-	-	Incomplete interlock error	○	○				
7124	-	-	Refrigerant sensor misinstallation	○					
7130	-	-	Incompatible unit combination	○					
7134	-	-	Abnormal stop due to other causes			○			

model	Overload protection Imax (Arms)	Current effective value error (Arms)	Current peak value error (Apeak)	Temperature protection TOL (°C)
TQRYP0723AMM0AN	35	42	91	95
TQRYP0963AMM0AN	35	42	91	95
TQRYP1203AMM0AN	35	42	91	95
TQRYP1443AMM0AN	45	54	91	95
TQRYP1683AMM0AN	45	54	91	95
TQRYP1923AMM0AN	45	54	91	95
TQRYP2163AMM0AN	53	64	108	95
TQRYP2403AMM0AN	53	64	108	95
TQRYP0724AMM0AN	19	23	49	95
TQRYP0964AMM0AN	19	23	49	95
TQRYP1204AMM0AN	19	23	49	95
TQRYP1444AMM0AN	24	29	49	95
TQRYP1684AMM0AN	24	29	49	95
TQRYP1924AMM0AN	24	29	49	95
TQRYP2164AMM0AN	27	33	56	95
TQRYP2404AMM0AN	27	33	56	95

[2] Responding to Error Display on the Remote Controller

1. Error Code

0403

Serial communication error

2. Error definition and error detection method

[Heat source unit]

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

[BC controller]

Serial communication error between the control board and the expansion board
Detail code X1: Between the control board and the expansion board (on the right)
Detail code X2: Between the control board and the expansion board (on the left*1)
*1 For 8-branch models only.

3. Cause, check method and remedy

[Heat source unit]

(1) Faulty wiring

Check the following wiring connections.

1) Between Control board and INV board

Control board	INV board
CN4	CN2
CN61	CV19V

(2) INV board failure and Control board failure

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

Note

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

[BC controller]

Check the following wiring connections.

(1) Faulty wiring

First, check the communication address of the detected unit to identify which of the units (the BC controller and sub BC controllers 1 to 11) is causing the problem.
Then, check the connectors between the control board and expansion board in the identified unit.

Control board side	Expansion board side	
	Connector	Board position
CN4A	CN4L	Right
CN4B		Left

(2) Expansion board failure, control board failure

If the problem persists after the power to the BC controller is reset, replace the expansion board or control board.

(3) Incorrect address setting for the expansion board

Check the CNADR connector on the expansion board on the right or left.
(The connector may be disconnected, short-circuited, or has a contact failure.)

1. Error Code

0403

Panel communication error (Indoor unit)

2. Error definition and error detection method

This error is detected when indoor units cannot successfully receive the signals from the Auto filter cleaning unit for one minute.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Incorrect switch setting on the indoor unit circuit board	Check SW3-3 on the indoor unit circuit board Set SW3-3 to ON only when connecting an auto filter cleaning unit.
(2) Power wire that connects the circuit board on the indoor unit and the circuit board on the cleaning unit is loose.	Check the LED1 (cleaning unit circuit board (microcomputer power)). Lit: Power is supplied properly. Unlit: Check for loose or disconnected power wire between the indoor unit circuit board (CNAC) and the cleaning unit circuit board (CN3A).
(3) Communication wire that connects the circuit board on the indoor unit and the circuit board on the cleaning unit is loose. (4) Panel transceiver circuit fault (cleaning unit) (5) Panel transceiver circuit fault (indoor unit) (6) Electrical interference on the cleaning unit's communication cable	Check the LED4 (cleaning unit circuit board (communication)). Blinking: Normal communication Unlit: Check for loose or disconnected communication wire between the indoor unit circuit board (CN3G) and the cleaning unit circuit board (CN3G). If the LED blinks at irregular intervals (normally blinks at 0.5-second intervals), electrical interference is suspected. Check the items above, turn the power off, and turn the power back on. If the error persists, replace either the cleaning unit circuit board or the indoor unit circuit board.

1. Error Code

0404

A control communication reception error

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 to the service handbook for the indoor unit.

1. Error Code

0910

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.

1. Error Code

0911

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 heat source 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.

1. Error Code

1102

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 heat source 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 5 minutes after the second stop of the heat source unit described above, the mode will be changed to 3 - minute restart mode, then the heat source unit will restart in 3 minutes.
3) If the discharge temperature of 120°C [248°F] or more is detected (the third detection within 5 minutes after the stop of the heat source unit described above, the heat source 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 5 minutes after the previous stop of the heat source unit, the detection is regarded as the first detection, and the operation described in step 1 above will start.
5) For 5 minutes after the stop (e.g. the first stop or the second stop) of the heat source 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). [VII [3] Adjusting the Refrigerant Amount]
(2) Overload operation	Check operating conditions and operation status of indoor/ heat source units.
(3) LEV failure on the indoor unit (4) BC controller LEV malfunction Cooling only : LEV3 Cooling main : LEV1, 3 Heating only or heating main : LEV3, 4 (5) BC controller SVM1 and 1b malfunction → Cooling only (6) BC controller LEV-A malfunction → Cooling only or cooling main (7) BC controller LEV-B malfunction → Heating only or heating main (8) Heat source unit LEV7, LEV8 actuation failure	Perform a heating operation and check the operation. Cooling: LEV on the indoor unit BC controller LEV1, 3 Heat source unit LEV7 BC controller SVM1, 1b BC controller LEV-A Heating: LEV on the indoor unit Heat source unit LEV7, LEV8 BC controller LEV3, 4 BC controller LEV-B Refer to the following page(s). [VIII [4] -6- Inverter] [VIII [4] -5- 3. Troubleshooting Flowchart for LEVs]
(9) Port address setting error.	Confirm the port address of the indoor unit.
(10) Closed ball valve	Confirm that the ball valve is fully open.
(11) Insufficient heat source water flow, heat source water supply cutoff, dirty or clogged water heat exchanger → Heating	Check the water heat exchanger for clogging. Check the heat source water circulation pump.
(12) 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.
(13) Thermistor failure (TH4)	Check the thermistor resistor.
(14) Input circuit failure on the controller board thermistor	Check the inlet air temperature on the LED monitor.

1. Error Code

1301

Low pressure fault

2. Error definition and error detection method

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

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Inner pressure drop due to a leakage.	Refer to the following page(s). [VIII [4] -2- Low-Pressure Sensor (63LS)]
(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.

1. Error Code

1302

High pressure fault 1 (Heat source 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 heat source 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 heat source unit, the heat source 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 16th detection) within 30 minutes of the second stop of the heat source unit, the heat source 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 heat source 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 heat source unit, preliminary errors will be displayed on the LED display.
6) The heat source 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)	Indoor unit LEV actuation failure → Heating	Perform a heating operation and check the operation. Cooling: LEV on the indoor unit Heat source unit LEV7, LEV8 BC controller LEV1, 3 BC controller SVM1, 1b BC controller LEV-A Heating: LEV on the indoor unit Heat source unit LEV7, LEV8 BC controller LEV3 Refer to the following page(s). [VIII [4] -4- LEV] [VIII [4] -5- 4. Troubleshooting Flowchart for Solenoid Valves]
(2)	BC controller LEV malfunction Heating only or heating main: Indoor LEV3, 4	
(3)	BC controller SVM1 and 1b malfunction → Cooling only	
(4)	BC controller LEV-A malfunction → Cooling only or cooling main	
(5)	BC controller LEV-B malfunction → Heating only or heating main	
(6)	Heat source unit LEV7, LEV8 actuation failure →Cooling	
(7)	Port address setting error.	Confirm the port address of the indoor unit.
(8)	Refrigerant service valve actuation failure	Confirm that the refrigerant service valve is fully open.
(9)	Short cycle on the indoor unit side	Check the indoor units for problems and correct them, if any.
(10)	Clogged filter on the indoor unit	
(11)	Reduced air flow due to dirty fan on the indoor unit fan	
(12)	Dirty heat exchanger of the indoor unit	
(13)	Insufficient heat source water flow	Check the water heat exchanger for clogging. Check the heat source water circulation pump.
(14)	Heat source water supply cutoff	
(15)	Dirty or clogged water heat exchanger Items (13) through (15) above reduce the condensing capability of the unit, resulting in high-pressure rise during heating operation.	
(16)	Solenoid valve (SV1a) malfunction The by-pass valve (SV1a) can not control rise in high pressure.	Refer to the following page(s). [VIII [4] -3- Solenoid Valve]
(17)	Thermistor failure (TH7)	Check the thermistor resistor.
(18)	Pressure sensor failure	Refer to the following page(s). [VIII [4] -1- High-Pressure Sensor (63HS1, PS1, PS3)]
(19)	Failure of the thermistor input circuit and pressure sensor input circuit on the controller board	Check the sensor temperature/pressure on the LED monitor.
(20)	Thermistor mounting problem (TH7)	Check the sensor temperature/pressure on the LED monitor.
(21)	Disconnected male connector on the pressure switch (63H1) or disconnected wire	

Cause	Check method and remedy
(22) Voltage drop caused by unstable power supply voltage	Check the input voltage at the power supply terminal TB1.
(23) SW4(810) setting error	When using the water flow rate control valve, check the type of valve and setting the switch in the following. *SW4(810) is OFF: 0 V (Fully open), 10 V (Fully closed) *SW4(810) is ON: 0 V (Fully closed), 10 V (Fully open)
(24) Broken the water flow rate control valve	Replace the water flow rate control valve

1. Error Code

1302

High pressure fault 2 (Heat source unit)

2. Error definition and error detection method

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

3. Cause, check method and remedy

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

1. Error Code

1500

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 heat source 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 heat source 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 heat source unit, the same sequence as Item 1) above (first detection) is followed.
4) For 40 minutes after the stop of the heat source unit, preliminary errors will be displayed on the LED display.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Overcharged refrigerant	Refer to the following page(s). [VII [3] Adjusting the Refrigerant Amount]
(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)	Heat source unit LEV7 and LEV8 actuation failure →Heating Heat source unit actuation failure LEV4 →Cooling, heating	Refer to the following page(s). [VIII [4] -4- LEV]

Note

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

1. Error Code

1521

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 CFCs may have leaked in the room. Take the remedies according to [XI [7] 3. Flowchart for Refrigerant Leak].

Note

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

1. Error Code

1522

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 heat source 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, 1524) and take the remedies. Take the remedies according to [XI [7] 3. Flowchart for Refrigerant Leak].

1. Error Code

1525

Refrigerant sensor maintenance (indoor unit, heat source 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.

1. Error Code

1529

Refrigerant leak error (self detection of the unit)

2. Error definition and error detection method

The error is detected when the heat source 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 CFCs may have leaked in the room where the heat source unit is installed. Follow the instructions in [XI [7] 3. Flowchart for Refrigerant Leak] to address the issue.

1. Error Code

1550

Liquid back error (detected with the 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 heat source LEVs, distributors, and compressors).
(2) Inverter output-related problems	Refer to the following page(s). [VIII [4] Troubleshooting Principal Parts for error codes related to the inverter]
(3) The setting for the heat source unit model selection switch is incorrect (control boards SW5-3 to 5-8).	Check the heat source unit model selection switch (control boards SW5-3 to 5-8). For details of the switch settings, refer to the following page(s). [VI [1] Functions and Factory Settings of the Dip-switches]

Action flow for the error 1550

Handle the error 1550 according to the following flowchart.



1. Error Code

1625

Refrigerant sensor maintenance (indoor unit, heat source unit)

2. Error definition and error detection method

1) Time to replace the built-in refrigerant sensor in the indoor unit
2) Time to replace the built-in refrigerant sensor in the heat source 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 or the heat source unit)

1. Error Code

2000

Pump interlock error

2. Error definition and error detection method

1) This error is detected by the pump interlock circuit (TB08 3-4).
2) If it is detected that the pump interlock circuit (TB08 3-4) is open (first detection) during operation or immediately before start-up, the heat source unit stops and goes into the 3-minute restart delay mode.
3) If the pump interlock circuit (TB08 3-4) has remained open for continuous 10 minutes (second detection) since the first stoppage of the heat source unit, the unit will make an abnormal stop, and the error code "2000" appears on the LED.
4) For the 10 minutes from the time the heat source stopped is considered a preliminary error, and it is indicated on the LED. During pump interlock preliminary error, while the pump interlock circuit (TB08 3-4) is open, the compressor isn't operated.
5) This error is indicated on the LED only when Dip switch SW4 No.919(SW6-10: ON) on the control board of the heat source unit is set to OFF.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Heat source water circulation pump fault	Operate the pump, and check for proper operation.
(2) Broken wire	Check the field wiring for proper installation and conduction.
(3) Loose connectors or contact failure	Check the control board connector CNOUT, CN63PW, CNAC2, CN510, and I/O board connector CNOUT2, CN-PW, CNAC4, TB9 for proper connection.
(4) Interlock signal input circuit fault on the I/O board	Replace the I/O board. If the problem persists, replace the control board.
(5) Interlock signal input circuit fault on the control board	
(6) SW4(917) setting error	When using pump operation ON signal, set SW4(917) to ON.
(7) SW4(901) and SW4(917) setting error	When using the water flow rate control valve, check the setting the switches in the following combinations. *Set SW4(901) to OFF and SW4(917) to ON *Set SW4(901) to ON and SW4(917) to OFF
(8) SW4(810) setting error	When using the water flow rate control valve, check the type of valve and setting the switch in the following. *SW4(810) is OFF: 0 V (Fully open), 10 V (Fully closed) *SW4(810) is ON: 0 V (Fully closed), 10 V (Fully open)
(9) Broken the water flow rate control valve	Replace the water flow rate control valve
(10) Broken the water flow switch	Replace the water flow switch

1. Error Code

2134

Abnormal water temperature

2. Error definition and error detection method

1) If a water inlet pipe temperature (TH7) of 5°C[41ºF] or below OR 50°C[122ºF] or above OR a water outlet temperature (TH8) of 70°C[158ºF] or above is detected (first detection) during operation, the heat source unit stops, goes into the 3-minute restart delay mode, and automatically restarts after three minutes.
2) If a water inlet pipe temperature (TH7) of 5°C[41ºF] or below OR 50°C[122ºF] or above OR a water outlet temperature (TH8) of 70°C[158ºF] or above is detected again (second detection) within 30 minutes of the first stoppage of the heat source unit, the unit will make an abnormal stop, and the error code "2134" appears on the LED.
3) If a water inlet pipe temperature (TH7) of 5°C[41ºF] or below OR 50°C[122ºF] or above OR a water outlet temperature (TH8) of 70°C[158ºF] or above is detected after 30 minutes of the first stoppage of the heat source unit, this is considered as the first detection, and the sequence as described in section 1) above is followed.
4) The period of 30 minutes after a stoppage of the heat source unit is considered a preliminary error, and a preliminary error code appears on the LED display.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Heat source water circulation pump fault	Operate the pump, and check for proper operation.
(2) Cooling tower or heater problem	Check the cooling tower and heater, and correct any problems found.
(3) Thermistor fault (TH7, TH8)	Check thermistor resistance.
(4) Thermistor signal input circuit fault on the control board	Check the sensor reading on the LED.
(5) Improper installation of thermistor (TH7, TH8)	Check the sensor reading on the LED.

1. Error Code

2135

Water heat exchanger freeze up

2. Error definition and error detection method

1) If either of the following conditions is detected (first detection) during operation, the heat source unit stops, goes into the 3-minute restart delay mode, and automatically restarts after three minutes.
   - ∗Water outlet pipe temperature (TH8) of 4°C[39ºF] or below is detected.
   - ∗All of the following conditions are continuously met for three minutes during Heating-only or Heating-main operation: Compressor frequency < Minimum frequency + 20 AND Evaporation temperature (Te) < -2ºC[28°F] AND Accumulator inlet pipe temperature (TH5) ≤ 3°C[37ºF].
2) If the conditions above 1) are met again within 60 minutes of the first stoppage of the heat source unit (second detection), the unit will make an abnormal stop, and the error code "2135" will appear on the LED.
3) If the conditions above 1) are met again after 60 minutes of the first stoppage of the heat source unit, it is considered the first detection, and the sequence as described in section 1) above is followed.
4) For the 60 minutes from the time the heat source stopped is considered a preliminary error, and it is indicated on the LED.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Heat source water circulation pump fault	Operate the pump, and check for proper operation.
(2)	Heater problem	Check the heater, and correct any problems found.
(3)	Poorly maintained field-installed water pipes	Identify and remove the cause of water flow reduction, such as a clogged strainer or cavitation.
(4)	Dirty or clogged water heat exchanger	Check the pressure difference between the unit's inlet and outlet.
(5)	Thermistor fault (TH5, TH8)	Check thermistor resistance.
(6)	Thermistor signal input circuit fault on the control board	Check the sensor reading on the LED.
(7)	Improper installation of thermistor (TH5, TH8)	Check the sensor reading on the LED.
(8)	SW4(810) setting error	When using the water flow rate control valve, check the type of valve and setting the switch in the following. *SW4(810) is OFF: 0 V (Fully open), 10 V (Fully closed) *SW4(810) is ON: 0 V (Fully closed), 10 V (Fully open)
(9)	Broken the water flow rate control valve	Replace the water flow rate control valve

Note

In case of error code 2135, the causes must be determined and appropriate corrective actions must be taken. If you repeat resetting the error without eliminating the causes and taking appropriate actions, the heat exchanger (HEX), refrigerant piping, or surrounding equipment may be damaged. Failure to follow this caution may void the unit's warranty. For any questions, contact the customer service at your local dealer.

1. Error Code

2500

Drain sensor submergence (Models with a drain sensor)

2. Error definition and error detection method

1) If an immersion of the drain sensor in the water is detected while the unit is in any mode other than the Cool/Dry mode and when the drain pump goes from OFF to ON, this condition is considered preliminary water leakage. While this error is being detected, humidifier output cannot be turned on.(Applicable to the units manufactured in or after October 1996)
2) If the immersion of the sensor in the water is detected four consecutive times at an hour interval, this is considered water leakage, and "2500" appears on the monitor.
3) Detection of water leakage is also performed while the unit is stopped.
4) Preliminary water leakage is cancelled when the following conditions are met:
   ∗One hour after the preliminary water leakage was detected, it is not detected that the drain pump goes from OFF to ON.
   ∗The operation mode is changed to Cool/Dry.
   ∗Liquid pipe temperature - inlet temperature ≦ -10°C[-18°F]

3. Cause, check method and remedy

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

1. Error Code

2500

Drain sensor submergence (Models with a float switch)

2. Error definition and error detection method

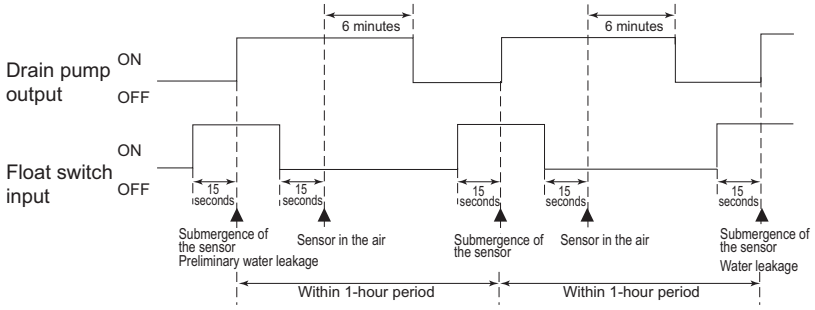
1) If an immersion of the float switch in the water is detected while the unit is in any mode other than the Cool/Dry mode and when the drain pump goes from OFF to ON, this condition is considered preliminary water leakage. While this error is being detected, humidifier output cannot be turned on.
2) 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.
   ∗Liquid pipe temperature - inlet temperature ≤ - 10°C[-18°F]

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)



1. Error Code

2502

Drain pump fault (Models with a drain sensor)

2. Error definition and error detection method

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

Note

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

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Drain pump failure	Check for proper functioning of the drain pump.
(2) Drain water drainage problem ♦Clogged drain pump ♦Clogged drain piping	Check for proper drainage.
(3) Adhesion of water drops to the drain sensor ♦Trickling of water along the lead wire ♦Rippling of drain water caused by filter clogging	1) Check for proper lead wire installation. 2) Check for clogged filter.
(4) Indoor unit control board failure ♦Drain pump drive circuit failure ♦Drain heater output circuit failure	If the above item checks out OK, replace the indoor unit control board.
(5) Items (1) through (4) above and an indoor unit electronic valve closure failure (leaky valve) occurred simultaneously.	Check the solenoid valves on the indoor unit for leaks.
(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.

1. Error Code

2502

Drain pump fault (Models with a float switch)

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 heat source 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 heat source unit.
5) The indoor unit that detected the conditions that are listed in item 4) above brings the heat source unit in the same refrigerant circuit to an error stop (compressor operation prohibited), and the heat source 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.
6) Forced stoppage of the heat source unit
   Detection timing: The error is detected whether the unit is in operation or stopped.
   This error is detected whether the unit is in operation or stopped.
7) Ending criteria for the forced stoppage of heat source unit
   Power reset the indoor unit that was identified as the error source and the heat source unit that is connected to the same refrigerant circuit.
   Forced stoppage of the heat source 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.

1. Error Code

2503

Drain sensor (Thd) fault

2. Error definition and error detection method

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

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

3. Cause, check method and remedy

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

1. Error Code

2600

Water leakage

2. Cause, check method and remedy

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

1. Error Code

2601

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.

1. Error Code

4102

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 (6) in section [VII [1] Items to be checked before a 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.

1. Error Code

4106

<Transmission power supply fault error detail FF (Heat source unit)>

2. Error definition and error detection method

Transmission power output failure

3. Cause

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

4. Check method and remedy

Check the items in VIII [4] -7- (2) Troubleshooting Problems with Heat Source Unit Transmission Power Supply Circuit on all heat source units in the same refrigerant circuit.

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

2. Error definition and error detection method

Transmission power reception failure

3. Cause

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

4. Check method and remedy

Check the items in VIII [4] -7- (2) Troubleshooting Problems with Heat Source Unit Transmission Power Supply Circuit on all heat source units in the same refrigerant circuit.

1. Error Code

4109

Indoor unit fan operation error

2. Error definition and error detection method

During operation, it has been continuously detected for 100 seconds that the auxiliary relay (X13) for fan fault detection is not excited.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Auxiliary relay (X13) fault	Coil failure, disconnected coil
(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.

1. Error code

4114

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.

1. Error Code

4116

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 (3) Solenoid switch malfunction	Check for the motor and the solenoid switch.

1. Error Code

4121

Function setting error

2. Error source, cause, check method and remedy

Error source	Cause	Check method and remedy
Heat source 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.

1. Error Code

4124

Electric system not operate due to damper abnormality

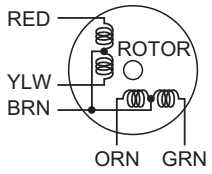
2. Error definition and error detection method

When the damper is not located at the designated position.

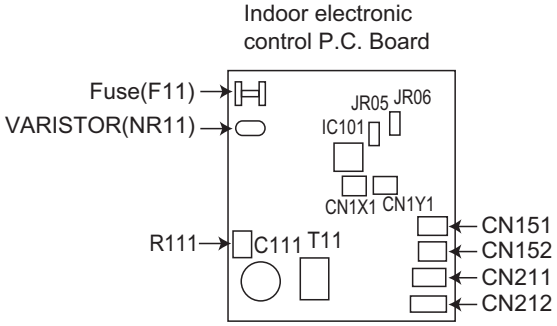
3. Cause, check method and remedy

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.



1. Error Code

4136

Safety shut-off valve circuit error

2. Error definition and error detection method

If the BC controller detects an abnormal control signal from the safety shut-off valve.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Connection failure	♦Check the communication address of the detected unit to identify which of the units (the BC controller and sub BC controllers 1 to 11) is causing the problem. ♦Check the connectors (CNL1 to 6A), (CNL1 to 6B), or (CNL1 to 6L) on the expansion board of the BC controller. Refer to "Detail No. and corresponding connector" below to identify the faulty connector.
(2) Circuit board failure	Replace the expansion board or control board of the BC controller.

Detail No. and corresponding connector

Detail No. *1		Connector
011	012	CNL1A
021	022	CNL1B
031	032	CNL1L
041	042	CNL2A
051	052	CNL2B
061	062	CNL2L
071	072	CNL3A
081	082	CNL3B
091	092	CNL3L
101	102	CNL4A
111	112	CNL4B
121	122	CNL4L
131	132	CNL5A
141	142	CNL5B
151	152	CNL5L
161	162	CNL6A
171	172	CNL6B
181	182	CNL6L

*1 Check the expansion board on the right if the last digit of the detail No. is 1 and that on the left if the last digit is 2.

1. Error Code

4220 **(460V models)**

Abnormal bus voltage drop (Detail code 108)

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 (6) in section [VII [1] Items to be checked before a 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

- 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.

(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). [VIII [4] Troubleshooting Principal Parts for error codes related to the inverter]

1. Error Code

4220 **(208-230V models)**

Abnormal bus voltage drop (Detail code 108)

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 (6) in section [VII [1] Items to be checked before a 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

- 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.

(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). [VIII [4] Troubleshooting Principal Parts for error codes related to the inverter]

1. Error Code

4220

Abnormal bus voltage rise (Detail code 109)

2. Error definition and error detection method

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

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.
In the case of 4220: INV board

Note

For inverter-related error codes, refer to the following page(s). [VIII [4] Troubleshooting Principal Parts for error codes related to the inverter]

1. Error Code

4220

Logic error (Detail code 111, 112)

2. Error definition and error detection method

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

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	External noise	Refer to the following page(s). [VIII [4] Troubleshooting Principal Parts for error codes related to the inverter]
(2)	INV board failure	

Note

For inverter-related error codes, refer to the following page(s). [VIII [4] Troubleshooting Principal Parts for error codes related to the inverter]

1. Error Code

4220

Control power supply error (Detail code 129)(heat source 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). [VIII [4] Troubleshooting Principal Parts for error codes related to the inverter]

1. Error Code

4220 **(460V models)**

Low bus voltage at startup (Detail code 131)

2. Error definition and error detection method

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

3. Cause, check method and remedy

(1) Inverter main circuit failure

Same as detail code 108 of 4220 error

Note

For inverter-related error codes, refer to the following page(s). [VIII [4] Troubleshooting Principal Parts for error codes related to the inverter]

1. Error Code

4220 **(208-230V models)**

Low bus voltage at startup (Detail code 131)

2. Error definition and error detection method

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

3. Cause, check method and remedy

(1) Inverter main circuit failure

Same as detail code 108 of 4220 error

Note

For inverter-related error codes, refer to the following page(s). [VIII [4] Troubleshooting Principal Parts for error codes related to the inverter]

1. Error Code

4230

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

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Inverter heatsink cooling fan failure	Check the Inverter heatsink cooling fan for proper operation.
(2) Air passage blockage	Check that the heat sink cooling air passage is not blocked.
(3) THHS failure	1) Check the applicable power modules and heatsink for proper mounting. 2) Check the THHS sensor reading on the LED monitor. → Replace the INV board if the THHS value is abnormal.

Note

For inverter-related error codes, refer to the following page(s). [VIII [4] Troubleshooting Principal Parts for error codes related to the inverter]

1. Error Code

4240 **(460V models)**

Overload protection

2. Error definition and error detection method

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

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	The control board SW7-1 is on with the inverter output wiring connected.	Check the status of the control board SW7-1.
(2)	Air passage blockage	Check that the heat sink cooling air passage is not blocked.
(3)	Power supply environment	Power supply voltage is 414 V or above.
(4)	Inverter failure	Refer to the following page(s). [VIII [4] Troubleshooting Principal Parts for error codes related to the inverter]
(5)	Compressor failure	Check that the compressor has not overheated during operation. → Check the refrigerant circuit (oil return section). Refer to the following page(s). [VIII-[4]-6-(2)-[2] Check for compressor ground fault and winding error.]
(6)	Inverter heatsink cooling fan failure	Check if the inverter heatsink cooling fan is locked.
(7)	The setting for the heat source unit model selection switch is incorrect (control boards SW5-3 to 5-8).	Check the heat source unit model selection switch (control boards SW5-3 to 5-8). For switch settings, refer to the following page(s). [VIII [2] Error Code [7101]]

Note

For inverter-related error codes, refer to the following page(s). [VIII [4] Troubleshooting Principal Parts for error codes related to the inverter]

1. Error Code

4240 **(208-230V models)**

Overload protection

2. Error definition and error detection method

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

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	The control board SW7-1 (control board SW7-2) is on with the inverter output wiring connected.	Check the status of the control board SW7-1.
(2)	Power module contact failure	Check if the applicable power module is in contact with the heat sink. (Remove the applicable inverter and check the contact status between the power module and heat dissipation grease.)
(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). [VIII-[4] Troubleshooting Principal Parts for error codes related to the inverter]
(6)	Compressor failure	Check that the compressor has not overheated during operation. → Check the refrigerant circuit (oil return section). Refer to the following page(s). [VIII-[4]-6-(2)-[2] Check for compressor ground fault and winding error.]
(7)	Inverter heatsink cooling fan failure	Check if the inverter heatsink cooling fan is locked.
(8)	The setting for the heat source unit model selection switch is incorrect (control boards SW5-3 to 5-8).	Check the heat source unit model selection switch (control boards SW5-3 to 5-8). For switch settings, refer to the following page(s). [VIII-[2] Error Code [7101]]

Note

For inverter-related error codes, refer to the following page(s). [VIII-[4] Troubleshooting Principal Parts for error codes related to the inverter]

1. Error Code

4250

IPM error (Detail code 101)

2. Error definition and error detection method

If an overcurrent is detected by the overcurrent detection circuit on the INV board.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Inverter output related	Refer to the following page(s). [VIII-[4]-6-(2)-[1] Check the INV board error detection circuit.] [VIII-[4]-6-(2)-[2] Check for compressor ground fault and winding error.] [VIII-[4]-6-(2)-[3] Check whether the inverter is damaged. (No load)] [VIII-[4]-6-(2)-[4] Check whether the inverter is damaged. (During compressor operation)] Check the IGBT module resistance value of the INV board, if no problems are found. [VIII-[4]-6-(7) Troubleshooting for IGBT Module]
(2)	The model selection switches (SW5-3 - 5-8 on the heat source unit control board) on the heat source unit are set incorrectly.	Check the setting for the model selection switch on the heat source unit (SW5-3 - 5-8 on the heat source unit control board). For switch settings, refer to the following page(s). [VIII-[2] Error Code [7101]]
(3)	Open phase in the power-supply due to improper power-supply wiring.	Refer to item (6) in section [VII-[1] Items to be checked before a Test Run].

Note

For inverter-related error codes, refer to the following page(s). [VIII-[4] Troubleshooting Principal Parts for error codes related to the inverter]

1. Error Code

4250

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

Cause		Check method and remedy
(1)	Grounding fault compressor	Refer to the following page(s). [VIII-[4]-6-(2)-[2] Check for compressor ground fault and winding error.]
(2)	Inverter output related	Refer to the following page(s). [VIII-[4]-6-(2)-[1] Check the INV board error detection circuit.] [VIII-[4]-6-(2)-[3] Check whether the inverter is damaged. (No load)] [VIII-[4]-6-(2)-[4] Check whether the inverter is damaged. (During compressor operation)]
(3)	Open phase in the power-supply due to improper power-supply wiring	Refer to item (6) in section [VII-[1] Items to be checked before a Test Run]

Note

For inverter-related error codes, refer to the following page(s). [VIII-[4] Troubleshooting Principal Parts for error codes related to the inverter]

1. Error Code

4250

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 just before starting the inverter operation.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Short-circuited compressor winding	Refer to the following page(s). [VIII-[4]-6-(2)-[2] Check for compressor ground fault and winding error.]
(2)	Inverter output wiring	Check for a short circuit.

Note

For inverter-related error codes, refer to the following page(s). [VIII-[4] Troubleshooting Principal Parts for error codes related to the inverter]

1. Error Code

4250

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). [VIII [1] Error Code List] 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). [VIII-[4]-6-(2)-[1] Check the INV board error detection circuit.] [VIII-[4]-6-(2)-[3] Check whether the inverter is damaged. (No load)] [VIII-[4]-6-(2)-[4] Check whether the inverter is damaged. (During compressor operation)] Check the IGBT module resistance value of the INV board, if no problems are found. [VIII-[4]-6-(7) Troubleshooting for IGBT Module]
(2)	The model selection switches (SW5-3 - 5-8 on the heat source unit control board) on the heat source unit are set incorrectly.	Check the setting for the model selection switch on the heat source unit (Dip-switches SW5-3 - 5-8 on the heat source unit control board). For switch settings, refer to the following page(s). [VIII-[2] Error Code [7101]]

Note

For inverter-related error codes, refer to the following page(s). [VIII-[4] Troubleshooting Principal Parts for error codes related to the inverter]

1. **Error Code**

   4260

   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

1. Error Code

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 heat source unit turns to anti-restart mode for 3 minutes. When the error is not restored after 3 minutes (if restored, the heat source unit runs normally), the heat source unit makes an error stop.
  Short: detectable at 90°C [194°F] or higher
  Open: detectable at -40°C [-40°F] or lower
- Sensor error at gas-side cannot be detected under the following conditions.
  - During heating operation
  - During cooling operation for 3 minutes after the compressor turns on.

3. Cause, check method and remedy

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

1. Error Code

5104

Discharge temperature sensor (TH4) fault (Heat source unit)

5105

Accumulator inlet temperature sensor (TH5) fault (Heat source unit)

5107

Water inlet temperature sensor (TH7) fault (Heat source unit)

5108

Water outlet temperature sensor (TH8) fault (Heat source unit)

5112

Component cooler heat exchanger outlet (THINV) fault (Heat source unit)

5115

Compressor shell bottom temperature sensor (TH15) fault (Heat source 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 heat source 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 heat source unit, the heat source 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 heat source unit, the heat source unit makes an error stop.
- When a short or an open of the thermistor is detected just before the restart of the heat source unit, the heat source unit makes an error stop, and the error code "5104", "5105", "5107", "5108", or "5112" 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.

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
TH4	240°C [464°F] and above (0.57 kΩ)	0°C [32°F] and below (698 kΩ)
TH5	70°C [158°F] and above (0.4 kΩ)	-40°C [-40°F] and below (130 kΩ)
TH7	110°C [230°F] and above (0.4 kΩ)	-40°C [-40°F] and below (130 kΩ)
TH8	110°C [230°F] and above (0.4 kΩ)	-40°C [-40°F] and below (130 kΩ)
THINV	110°C [230°F] and above (0.4 kΩ)	-40°C [-40°F] and below (130 kΩ)

1. Error Code

5110

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

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

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

Note

For inverter-related error codes, refer to the following page(s). [VIII-[4] Troubleshooting Principal Parts for error codes related to the inverter]

1. Error Code

5111

Liquid inlet temperature sensor (TH11) fault (BC controller)

5112

Bypass outlet temperature sensor (TH12) fault (BC controller)

5114

LEV4 outlet temperature sensor (TH14) fault (BC controller)

5115

LEV3(a) outlet temperature sensor (TH15) fault (BC controller)

5116

LEV3(a) inlet temperature sensor (TH16) fault (BC controller)

2. Error definition and error detection method

- If a shorted (high temperature intake) or open (low temperature intake) thermistor (TH11, TH12, TH14, TH15, or TH16) is detected during operation, and an error code "5111," "5112," "5114," "5115," or "5116" appears on the display. The unit makes no error stop and backup operation is performed with other sensors.
- Detection of a short- or open-circuit as described above is suspended for 3 minutes after the operation mode is changed.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Thermistor failure	Check thermistor resistance.
(2)	Pinched lead wire	Check for pinched lead wire.
(3)	Torn wire coating	Check for wire coating.
(4)	A pin on the male connector is missing or contact failure	Check connector.
(5)	Disconnected wire	Check for wire.
(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
TH11	110°C [230°F] and above (0.57 kΩ)	-40°C [-40°F] and below (130 kΩ)
TH12	110°C [230°F] and above (0.57 kΩ)	-40°C [-40°F] and below (130 kΩ)
TH14	110°C [230°F] and above (0.57 kΩ)	-40°C [-40°F] and below (130 kΩ)
TH15	110°C [230°F] and above (0.57 kΩ)	-40°C [-40°F] and below (130 kΩ)
TH16	110°C [230°F] and above (0.57 kΩ)	-40°C [-40°F] and below (130 kΩ)

1. Error Code

5201

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 heat source 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 heat source 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.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	High pressure sensor failure	Refer to the page on the troubleshooting of the high pressure sensor. [VIII [4] -1- High-Pressure Sensor (63HS1, PS1, PS3)]
(2)	Pressure drop due to refrigerant leak	
(3)	Torn wire coating	
(4)	A pin on the male connector is missing or contact failure	
(5)	Disconnected wire	
(6)	High pressure sensor input circuit failure on the control board	

1. Error Code

5201

High-pressure sensor fault (BC controller PS1)

5203

Intermediate pressure sensor fault (BC controller PS3)

2. Error definition and error detection method

When a pressure sensor reading of 4.06 MPa [589 psi] or above OR 0.098Mpa[142psi] or below is detected, error codes "5201" OR "5203" will appear.
The unit will continue its operation by using other sensors as a backup.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	High pressure sensor failure	Refer to the following page(s). [VIII [4] -1- High-Pressure Sensor (63HS1, PS1, PS3)]
(2)	Torn wire coating	Check for damaged wire coating
(3)	A pin on the male connector is missing or contact failure	Check whether a connector pin is missing
(4)	Disconnected wire	Check for disconnected or broken wire
(5)	High pressure sensor input circuit failure on the control board	Check the temperature detected by the sensor from the LED monitor. If the temperature is significantly different from the actual temperature, replace the control board.

1. Error Code

5301 **(460V models)**

ACCT sensor fault (Detail code 115)

2. Error definition and error detection method

When the formula "output current < 1.8 Arms" remains satisfied for 10 seconds while the inverter is in operation.

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). [VIII-[4]-6-(2)-[2] Check for compressor ground fault and winding error.]
(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). [VIII-[4] Troubleshooting Principal Parts for error codes related to the inverter]

1. Error Code

5301 **(208-230V models)**

ACCT sensor fault (Detail code 115)

2. Error definition and error detection method

When the formula "output current < 2.0 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). [VIII-[4]-6-(2)-[2] Check for compressor ground fault and winding error.]
(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). [VIII-[4] Troubleshooting Principal Parts for error codes related to the inverter]

1. Error Code

5301

ACCT sensor circuit fault (Detail code 117)

2. Error definition and error detection method

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

3. Cause, check method and remedy

Cause	Check method and remedy
(1) INV board failure	Refer to the following page(s). [VIII-[4]-6-(2)-[1] Check the INV board error detection circuit.] [VIII-[4]-6-(2)-[3] Check whether the inverter is damaged. (No load)] [VIII-[4]-6-(2)-[4] Check whether the inverter is damaged. (During compressor operation)]
(2) Compressor failure	Refer to the following page(s). [VIII-[4]-6-(2)-[2] Check for compressor ground fault and winding error.]

Note

For inverter-related error codes, refer to the following page(s). [VIII-[4] Troubleshooting Principal Parts for error codes related to the inverter]

1. Error Code

5301

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

2. Error definition and error detection method

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

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Inverter output wiring 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). [VIII-[4]-6-(2)-[3] Check whether the inverter is damaged. (No load)] [VIII-[4]-6-(2)-[4] Check whether the inverter is damaged. (During compressor operation)]
(3) Compressor failure	Refer to the following page(s). [VIII-[4]-6-(2)-[2] Check for compressor ground fault and winding error.]

Note

For inverter-related error codes, refer to the following page(s). [VIII-[4] Troubleshooting Principal Parts for error codes related to the inverter]

1. Error Code

5301

Faulty ACCT wiring (Detail code 120)

2. Error definition and error detection method

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

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). [VIII-[4]-6-(2)-[3] Check whether the inverter is damaged. (No load)] [VIII-[4]-6-(2)-[4] Check whether the inverter is damaged. (During compressor operation)]
(3)	Compressor failure	Refer to the following page(s). [VIII-[4]-6-(2)-[2] Check for compressor ground fault and winding error.]

Note

For inverter-related error codes, refer to the following page(s). [VIII-[4] Troubleshooting Principal Parts for error codes related to the inverter]

1. Error Code

5558

Refrigerant sensor error/CFC gas alarm device error

2. Error definition and error detection method

If the indoor unit refrigerant sensor or CFC gas alarm device has an error.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Refrigerant sensor failure	Replace the refrigerant sensor.
(2)	CFC gas alarm device failure	Replace the alarm board of the CFC gas alarm device.
(3)	Wiring failure	♦Check the wiring of the refrigerant sensor and CFC gas alarm device. ♦Check the terminal block status on the boards of the shut off valve kit and the CFC gas alarm device interfaces. ♦Check the terminal block status in the CFC gas alarm device.
(4)	A disconnected connector of the built-in refrigerant sensor in the indoor unit	Check the connector status (CNSA) on the indoor unit board.
(5)	If the refrigerant sensor or CFC gas alarm device is removed.	♦Install the refrigerant sensor or CFC gas alarm device. ♦When removing the refrigerant sensor or CFC gas alarm device, refer to the following page(s). [XI [9] 2. Checking and Changing the System Configuration]
(6)	Incorrect settings of the DIP switch on the board in the CFC gas alarm device	Set the DIP switch on the board in the CFC gas alarm device correctly.

1. Error Code

5601

Ventilation interlock error

2. Error definition and error detection method

If it is detected that the Ventilation interlock circuit(CN3Y 1-3PIN) is open, it will trigger an abnormal stop, and error code "5601" will be displayed.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Local ventilation equipment failure.	Operate the local ventilation, and check for proper operation
(2)	Broken wire	Check the field wiring for proper installation and conduction.
(3)	Interlock signal input circuit fault on the control board	Replace the control board.
(4)	SW4(782) setting error	If the ventilation interlock function is not used, set SW4(782) to OFF
(5)	Broken the local ventilation equipment	Repair the local ventilation equipment

1. Error Code

5701

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.

1. Error Code

6201

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.

1. Error Code

6202

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.

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1. Error Code

6600

Address overlaps

2. Error definition and error detection method

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

Note

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

3. Cause, check method and remedy

Cause	Check method and remedy
Two or more of the following have the same address: Heat source units, indoor units, LOSSNAY units, controllers such as M-NET remote controllers. <Example> 6600 "01" appears on the remote controller Unit #01 detected the error. Two or more units in the system have 01 as their address.	Find the unit that has the same address as that of the error source. **Once the unit is found, correct the address. Then, turn off the heat source units, indoor units, and LOSSNAY units, keep them all turned off for at least five minutes, and turn them back on.**

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1. Error Code

6601

Polarity setting error

2. Error definition and error detection method

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

3. Cause, check method and remedy

Cause	Check method and remedy
(1) No voltage is applied to the M-NET transmission line. (2) M-NET transmission line is short-circuited.	Check if power is supplied to the M-NET transmission line and correct any problem found.

1. Error Code

6602

Transmission processor hardware error

2. Error definition and error detection method

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

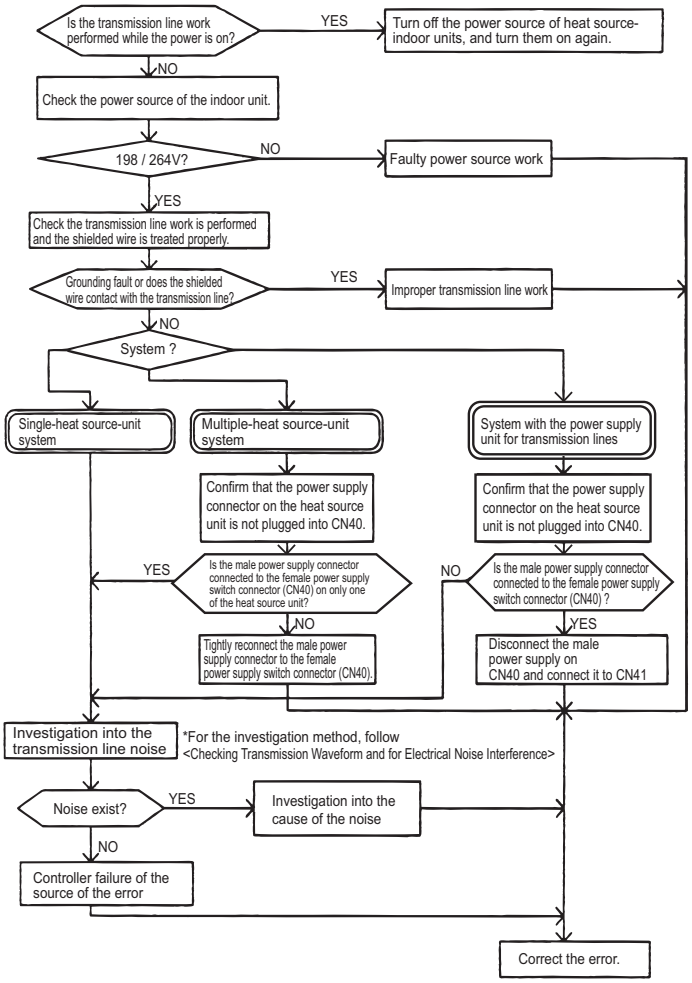
Note

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

3. Cause

1) When the wiring work of or the polarity of either the indoor or heat source 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 heat source units, the male power supply connectors on the multiple heat source 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 heat source 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 heat source units or in case of the system connected with MELANS)

4. Check method and remedy



1. Error Code

6603

Transmission line bus busy error

2. Error definition and error detection method

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

Note

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

3. Cause, check method and remedy

Cause	Check method and remedy
(1) The transmission processor cannot be transmitted as the short-wavelength voltage like noise exists consecutively on the transmission line.	No noise indicates that the error source controller is a failure. If noise exists, investigate the noise. → No noise indicates that the error source controller is a failure. → If noise exists, investigate the noise.
(2) Error source controller failure	

1. Error Code

6606

Communication error between device and transmission processors

2. Error definition and error detection method

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

Note

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

3. Cause, check method and remedy

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

1. Error Code

6607

No ACK error

2. Error definition and error detection method

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

Note

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

3. System configuration

(1) System with one heat source unit

Error source address	Error display	Detection method	Cause	Check method and remedy
Heat source unit (OC)	MA remote controller (MA)	No acknowledgement (ACK) at IC transmission to OC	(1) Contact failure of transmission line of OC or IC (2) Decrease of transmission line voltage/signal by exceeding acceptable range of transmission wiring. Farthest:200 m [656ft] or less Remote controller wiring: 10m [32ft] or less (3) Erroneous sizing of transmission line (Not within the range below). Wire diameter: 1.25mm^2 [AWG16] or more (4) Heat source unit control board failure	Turn off the power source of the heat source unit, and turn it on again. If the error is accidental, it will run normally. If not, check the causes (1) - (4).
BC controller (BC)	MA remote controller (MA)	No acknowledgement (ACK) at IC transmission to BC	(1) When BC controller address is changed or modified during operation. (2) Faulty or disconnected transmission wiring of BC controller (3) Disconnected connector of BC controller (CN02) (4) Faulty control board of BC controller	Turn off the heat source-indoor units for 5 or more minutes, and turn them on again. If the error is accidental, they will run normally. If not, check the causes (1) - (4).
Indoor unit (IC)	MA remote controller (MA)	No acknowledgement (ACK) at RC transmission to IC	(1) When IC unit address is changed or modified during operation. (2) Faulty or disconnected IC transmission wiring (3) Disconnected IC connector (CN2M) (4) Indoor unit controller failure	Turn off the heat source-indoor units for 5 or more minutes, and turn them on again. If the error is accidental, they will run normally. If not, check the causes (1) - (4).
LOSSNAY (LC)	MA remote controller (MA)	No acknowledgement (ACK) at IC transmission to LC	(1) The power source of LOSSNAY has been shut off. (2) When the address of LOSSNAY is changed in the middle of the operation (3) Faulty or disconnected transmission wiring of LOSSNAY (4) Disconnected connector (CN1) on LOSSNAY (5) Controller failure of LOSSNAY	Turn off the power source of LOSSNAY and turn it on again. If the error is accidental, it will run normally. If not, check the causes (1) - (5).

1. Error Code

6607

No ACK error

2. Error definition and error detection method

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

Note

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

3. System configuration

(2) Grouping of units in a system with multiple heat source units

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

1. Error Code

6607

No ACK error

2. Error definition and error detection method

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

Note

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

3. System configuration

(2) Grouping of units in a system with multiple heat source units

Error source address	Error display	Detection method	Cause	Check method and remedy
LOSSNAY (LC)	MA remote controller (MA)	No acknowledgement (ACK) at IC transmission to LC	(1) Factors (1) through (5) in the "Factors in system with one heat source unit" (When performing an interlocked operation of the LOSSNAY unit and the indoor units that are connected to different heat source units.)	1) Turn off the power source of heat source unit for 5 or more minutes, and turn it on again. If the error is accidental, it will run normally.If not, check the cause 2).
			(2) Disconnection or short circuit of the transmission line for the heat source unit on the terminal block for centralized control line connection (TB7)	2) Check the causes of (1) - (5). If the cause is found, correct it. If no cause is found, check 3).
			(3) When multiple heat source units are connected and the power source of one of the heat source units has been shut off.	3) Same cause as that for indoor unit described in 3)
			(4) The male power supply connector of the heat source unit is not connected to the female power supply switch connector (CN40).	
			(5) The male power supply connectors on 2 or more heat source units are connected to the female power supply switch connector (CN40) for centralized control.	
			If an error occurs, after the unit runs normally once, the following causes may be considered. ♦Total capacity error (7100) ♦Capacity code error (7101) ♦Error in the number of connected units (7102) ♦Address setting error (7105)	

1. Error Code

6607

No ACK error

2. Error definition and error detection method

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

Note

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

3. System configuration

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

Error source address	Error display	Detection method	Cause	Check method and remedy
Heat source unit (OC)	System controller (SC) MA remote controller (MA)	No acknowledgement (ACK) at IC transmission to OC	Same cause as that for system with one heat source unit	Same remedy as that for system with one heat source unit
BC controller (BC)	system controller (SC) MA remote controller (MA)	No acknowledgement (ACK) at IC transmission to BC	Same cause as that for system with one heat source unit	Same remedy as that for system with one heat source unit

1. Error Code

6607

No ACK error

2. Error definition and error detection method

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

Note

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

3. System configuration

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

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

1. Error Code

6607

No ACK error

2. Error definition and error detection method

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

Note

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

3. System configuration

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

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

1. Error Code

6608

No response error

2. Error definition and error detection method

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

Note

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

3. Cause

1) The transmission line work is performed while the power is on, the transmitted data will collide, and the wave shape will be changed.
2) The transmission is sent and received repeatedly due to noise.
3) Decrease of transmission line voltage/signal by exceeding acceptable range of transmission wiring.
   Farthest:200m [656ft] or less
   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 heat source unit, indoor unit, BC controller, 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 transmission wave shape/ noise on trans-mission line by following "VIII [3] Checking Transmission Waveform and for Electrical Noise Interference" .

   Noise is the most possible cause of the error "6608".

1. Error Code

6815

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 heat source 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.

1. Error Code

6831

MA controller signal reception error (No signal reception)

2. Error definition and error detection method

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

3. Cause

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

4. Check method and remedy

1) Check for disconnected or loose transmission lines for the indoor units or MA remote controllers.
2) Confirm that the power is supplied to the main power source and the remote controller line.
3) Confirm that MA remote controller's capacity limit is not exceeded.
4) Check the sub/main setting of the MA remote controllers. One of them must be set to MAIN.
5) Diagnose the remote controller (described in the remote controller installation manual).
   [OK]: no problems with the remote controller (check the wiring regulations)
   [NG]: Replace the MA remote controller.
   [6832, 6833, ERC]: Due to noise interference <Go to 6)>
6) Check wave shape/noise on MA remote controller line by following "VIII [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.

1. Error Code

6832

MA remote controller signal transmission error (Synchronization error)

2. Error definition and error detection method

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

3. Cause

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

4. Check method and remedy

1) Check for disconnected or loose transmission lines for the indoor units or MA remote controllers.
2) Confirm that the power is supplied to the main power source and the remote controller line.
3) Confirm that MA remote controller's capacity limit is not exceeded.
4) Check the sub/main setting of the MA remote controllers. One of them must be set to MAIN.
5) Diagnose the remote controller (described in the remote controller installation manual).
   [OK]: no problems with the remote controller (check the wiring regulations)
   [NG]: Replace the MA remote controller.
   [6832, 6833, ERC]: Due to noise interference <Go to 6)>
6) Check wave shape/noise on MA remote controller line by following "VIII [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.

1. Error Code

6833

MA remote controller signal transmission error (Hardware error)

2. Error definition and error detection method

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

3. Cause

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

4. Check method and remedy

1) Check for disconnected or loose transmission lines for the indoor units or MA remote controllers.
2) Confirm that the power is supplied to the main power source and the remote controller line.
3) Confirm that MA remote controller's capacity limit is not exceeded.
4) Check the sub/main setting of the MA remote controllers. One of them must be set to MAIN.
5) Diagnose the remote controller (described in the remote controller installation manual).
   [OK]: no problems with the remote controller (check the wiring regulations)
   [NG]: Replace the MA remote controller.
   [6832, 6833, ERC]: Due to noise interference <Go to 6)>
6) Check wave shape/noise on MA remote controller line by following "VIII [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.

1. Error Code

6834

MA controller signal reception error (Start bit detection error)

2. Error definition and error detection method

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

3. Cause

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

4. Check method and remedy

1) Check for disconnected or loose transmission lines for the indoor units or MA remote controllers.
2) Confirm that the power is supplied to the main power source and the remote controller line.
3) Confirm that MA remote controller's capacity limit is not exceeded.
4) Check the sub/main setting of the MA remote controllers. One of them must be set to MAIN.
5) Diagnose the remote controller (described in the remote controller installation manual).
   [OK]: no problems with the remote controller (check the wiring regulations)
   [NG]: Replace the MA remote controller.
   [6832, 6833, ERC]: Due to noise interference <Go to 6)>
6) Check wave shape/noise on MA remote controller line by following "VIII [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.

1. Error Code

7100

Total capacity error

2. Error definition and error detection method

The model total of indoor units in the system with one heat source 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">Heat source unit</td><td>(1) The model total of indoor units in the system with one heat source unit exceeds the following table.

<TQRY>
<table><tr><th>Model</th><th>Capacity Total</th></tr><tr><td>P072 model</td><td>108</td></tr><tr><td>P096 model</td><td>144</td></tr><tr><td>P120 model</td><td>180</td></tr><tr><td>P144 model</td><td>216</td></tr><tr><td>P168 model</td><td>252</td></tr><tr><td>P192 model</td><td>288</td></tr><tr><td>P216 model</td><td>324</td></tr><tr><td>P240 model</td><td>360</td></tr><tr><td>P288 model</td><td>432</td></tr><tr><td>P312 model</td><td>468</td></tr><tr><td>P336 model</td><td>504</td></tr></table></td><td>1) Check the model total (capacity code total) of units connected.

2) Check the model name (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 heat source and the indoor units, and change the setting of the model name (capacity code).</td></tr>
<tr><td>(2) The model selection switches (SW5-3 - 5-6) on the heat source unit are set incorrectly.

<table><tr><th rowspan="2">Model</th><th colspan="4">SW5</th></tr><tr><th>3</th><th>4</th><th>5</th><th>6</th></tr><tr><td>72 model</td><td>OFF</td><td>ON</td><td>OFF</td><td>OFF</td></tr><tr><td>96 model</td><td>ON</td><td>ON</td><td>OFF</td><td>OFF</td></tr><tr><td>120 model</td><td>OFF</td><td>OFF</td><td>ON</td><td>OFF</td></tr><tr><td>144 model</td><td>ON</td><td>ON</td><td>ON</td><td>OFF</td></tr><tr><td>168 model</td><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td></tr><tr><td>192 model</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td></tr><tr><td>216 model</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td></tr><tr><td>240 model</td><td>ON</td><td>ON</td><td>OFF</td><td>ON</td></tr></table></td><td>Check the setting for the model selection switch on the heat source unit (Dipswitches SW5-3 - 5-6 on the heat source unit control board).</td></tr>
<tr><td>(3) The heat source unit and the auxiliary unit (OS) that is connected to the same system are not properly connected.</td><td>Confirm that the TB3 on the OC and OS are properly connected.</td></tr>
</table>

1. Error Code

7101

Capacity code setting error

2. Error definition and error detection method

Connection of incompatible (wrong capacity code) indoor unit or heat source unit

3. Error source, cause, check method and remedy

<table>
<tr><th>Error source</th><th>Cause</th><th>Check method and remedy</th></tr>
<tr><td>Heat source 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 (SW4 operation(SW6-10: OFF)) of the heat source 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 heat source and the indoor units, and change the setting of the capacity code.</td></tr>
<tr><td>Heat source unit</td><td>(2) The model selection switches (SW5-3 - 5-6) on the heat source unit are set incorrectly.
<table>
<tr><th rowspan="2">Model</th><th colspan="4">SW5</th></tr>
<tr><th>3</th><th>4</th><th>5</th><th>6</th></tr>
<tr><td>72 model</td><td>OFF</td><td>ON</td><td>OFF</td><td>OFF</td></tr>
<tr><td>96 model</td><td>ON</td><td>ON</td><td>OFF</td><td>OFF</td></tr>
<tr><td>120 model</td><td>OFF</td><td>OFF</td><td>ON</td><td>OFF</td></tr>
<tr><td>144 model</td><td>ON</td><td>ON</td><td>ON</td><td>OFF</td></tr>
<tr><td>168 model</td><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td></tr>
<tr><td>192 model</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td></tr>
<tr><td>216 model</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>240 model</td><td>ON</td><td>ON</td><td>OFF</td><td>ON</td></tr>
</table></td><td>Check the setting for the model selection switch on the heat source unit (Dipswitches SW5-3 - 5-6 on the heat source unit control board).</td></tr>
</table>

1. Error Code

7102

Wrong number of connected units

2. Error definition and error detection method

The number of connected indoor units is "0" or exceeds the allowable value.

3. Error source, cause, check method and remedy

<table>
<tr><th>Error source</th><th>Cause</th><th>Check method and remedy</th></tr>
<tr><td>Heat source unit</td><td>(1) Number of indoor units connected to the heat source terminal block (TB3) for indoor-heat source 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：P072 model
19：P096 model
24：P120 model
29：P144 model
34：P168 model
39：P192 model
44：P216 model
49：P240 model
50：P288 - P336 models</td></tr>
<tr><td>Number of Main BC controllers</td><td>0 or 1</td></tr>
<tr><td>Number of Sub BC controllers</td><td>0 - 11</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 heat source units</td><td>1 : P072 - P240 models
2 : P144 - P336 models</td></tr>
</table>
(2) Disconnected transmission line from the heat source unit or BC controller
(3) Short-circuited transmission line
When (2) and (3) apply, the following display will appear.
♦MA remote controller
"HO" or "PLEASE WAIT" blinks.
(4) The model selection switch (SW5-7) on the heat source unit is set to OFF. (Normally set to ON)
(5) Heat source unit or BC controller address setting error. The heat source units in the same refrigerant circuit do not have sequential address numbers.</td><td>1) Check whether the number of units connected to the heat source terminal block (TB3) for indoor-heat source transmission lines does not exceed the limitation. (See (1) and (2) on the left.)
2) Check (2) - (3) on the left.
3) Check whether the transmission line for the terminal block for centralized control (TB7) is not connected to the terminal block for the indoor-heat source transmission line (TB3).
4) Check the setting for the model selection switch on the heat source unit (Dipswitches SW5-7 on the heat source unit control board).</td></tr>
<tr><td>BC controller</td><td>(1) The heat source unit is not R32-compatible</td><td>1) Check the model of the heat source unit to see if it is R32-compatible.</td></tr>
</table>

1. Error Code

7105

Address setting error

2. Error definition and error detection method

Erroneous setting of OC unit address
Erroneous setting of BC controller address

3. Cause, check method and remedy

Error source	Cause	Check method and remedy
Heat source unit BC controller	Erroneous setting of OC unit address The address of heat source unit is not being set to 51 - 100. The address of BC controller is not set to 51 - 100.	Check that the heat source unit and BC controller addresses are set to 00 or a number between 51 and 100. If the heat source unit address is out of the valid range, reset the address with the power to the heat source unit turned off. If the BC controller address is out of the valid range, reset the address with the power to both the heat source unit and BC controller turned off.

1. Error Code

7106

Attribute setting error

2. Error definition and error detection method

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

1. Error Code

7107

Port setting error

2. Error definition and error detection method

The port with wrong number is connected to the indoor unit.The model total connected to the port is greater than the specification. Detail code indicates the port number where the error was detected.

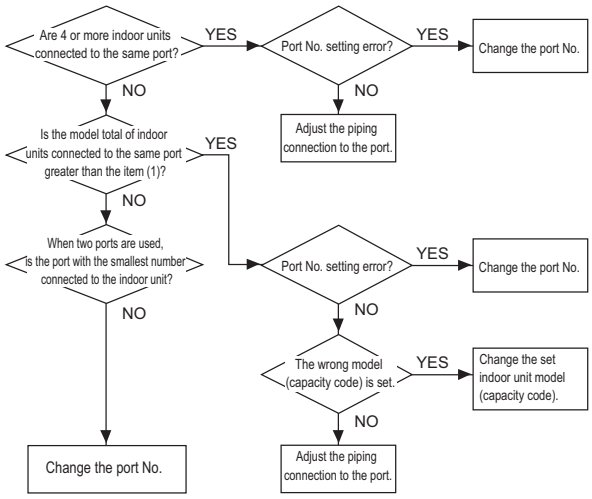
3. Cause, check method and remedy

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="2">BC controller</td><td>(1) Model total of indoor units per each port or per each port merge is greater than the specification.

<table><tr><td>Total port number</td><td>Model total</td></tr><tr><td>Single branching</td><td>54</td></tr><tr><td>Two branches merge</td><td>96</td></tr></table>
(2) 4 or more indoor units are connected to the same port.

(3) When two ports are used, the port with the smaller number is not connected to the indoor unit.

(4) For the address of the BC controller (Sub 1 - 11), 50 is not added to the smallest indoor unit address, which is connected to the BC controller (Sub 1 - 11).</td><td>Before resetting the port number using the port number setting switch or the model using the model (capacity code) setting switch, turn off the power of the heat source unit, the BC controller and the indoor unit.</td></tr>
<tr><td colspan="2">
</td></tr>
</table>

1. Error Code

7110

Connection information signal transmission/reception error

2. Error definition and error detection method

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

3. Error source, cause, check method and remedy

Error source	Cause	Check method and remedy
Heat source 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 heat source unit.	→ Reset the power to the heat source 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 heat source unit (Dipswitch SW5-7 on the control board.).
	(5) The model selection switch (SW5-7) on the heat source unit is set to OFF. (Normally set to ON)	

1. Error Code

7111

Remote controller sensor fault

2. Error definition and error detection method

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

3. Error source, cause, check method and remedy

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

1. Error Code

7113

Function setting error (improper connection of CNTYP)

2. Error source, cause, check method and remedy

Error source	Cause	Check method and remedy
Heat source unit	(1) Wiring fault (2) Loose connectors, short-circuit, contact failure	(Detail code 15) 1) Check the connector CNTYP5 on the control board for proper connection. 2) Check the connector CNTYP4 on the control board for proper connection.
	(3) Incompatible control board and INV board (replacement with a wrong circuit board) (4) DIP SW setting error on the control board	(Detail code 14) 1) Check the 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) Make sure the INV board has been properly replaced.
		(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 section on Error code 0403 in VIII [2] Responding to Error Display on the Remote Controller. 5) Make sure the INV 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 section on Error code 0403 in VIII [2] Responding to Error Display on the Remote Controller. 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.

Error source	Cause	Check method and remedy
BC controller	(1) Wiring fault (2) Loose connectors, short-circuit, contact failure	(Detail code 1) 1) Check the connector TYP1 on the control board for proper connection. (Detail code 12, 32) 1) Check the connector TYP2 on the control board for proper connection.

1. Error Code

7117

Model setting error

2. Error source, cause, check method and remedy

Error source	Cause	Check method and remedy
Heat source 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) Make sure the INV board has been properly replaced.
		(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 section on Error code 0403 in VIII [2] Responding to Error Display on the Remote Controller. 4) Make sure the INV 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 section on Error code 0403 in VIII [2] Responding to Error Display on the Remote Controller. 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.

1. Error Code

7118

Refrigerant leak safety device configuration error

2. Error definition and error detection method

1) If the switch settings for the CFC gas alarm device are incorrect.
2) If the CFC gas alarm device is added to the shut off valve kit or CFC gas alarm device interfaces after the interlock inspection.
3) If the indoor unit connected to the shut-off device (TUMY outdoor unit, shut off valve kit) detects an insufficient number of detectors or alarm devices.
4) If the duplicate address definition error is detected when the indoor unit address was not set (automatic address setting).
5) If the indoor unit board, including the power to the heat source/outdoor unit and transmission booster, is replaced during live line work.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Incorrect settings of the DIP switch on the board in the CFC gas alarm device	Set the DIP switch on the board in the CFC gas alarm device correctly.
(2)	The CFC gas alarm device was added after the interlock inspection	Remove the added CFC gas alarm device. When adding the CFC gas alarm device, refer to the following page(s). [XI [9] 2. Checking and Changing the System Configuration]
(3)	A detector or alarm device is not connected to the indoor unit connected to the shut-off device (TUMY outdoor unit, shut off valve kit)	Connect a lacking device (detector or alarm device) to the indoor unit connected to the shut-off device (TUMY outdoor unit, shut off valve kit).
(4)	If a configuration error judgement is performed before communication with the safety device was established	The error is canceled when the system configuration is confirmed via communication. Cancel the error using the remote controller and check that it does not reoccur.
(5)	The connector (CNSB) of the indoor unit connected to the shut off valve kit is not connected	Check the connector (CNSB) on the indoor unit board.

1. Error Code

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 BC controller TB3 terminal to understand the refrigerant shut off area of the shut off valve kit or BC controller. 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 or shut off valve kit with the same address are connected to multiple shut off valve kit or BC controllers
2) The error detected when multiple shut off valve kit or BC controllers are connected to a single indoor unit
3) The error detected when no indoor unit is connected to the shut off valve kit or BC controller TB3 terminal
4) The error detected when the shut off valve kit or BC controller is connected to the TB3 terminal of another shut off valve kit or BC controller
5) The error detected when the heat source unit is connected to the shut off valve kit or BC controller TB3 terminal

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Duplicate M-NET address for the indoor units or shut off valve kit	⬧ If the indoor unit address is 00, wait for 10 minutes and check that the error is no longer displayed. ⬧ The error code (7119) is displayed on multiple remote controllers. Change the address and turn the heat source 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 heat source unit back on. ⬧The M-NET line connects the indoor unit TB5 terminal to two or more BC controller or 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 BC controller 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 BC controller TB3 terminal. Connect the indoor unit to be protected from refrigerant leak to the shut off valve kit or BC controller TB3 terminal before turning the heat source unit back on.

1. Error Code

7121

Power-off detection

2. Error definition and error detection method

If the power-off of the indoor units and shut off valve kit or BC controllers are detected

3. Cause, check method and remedy

Cause	Check method and remedy
(1) The indoor units, shut off valve kit or BC controllers are off	Turn on all indoor units and shut off valve kit or BC controllers in the refrigerant system before turning the heat source unit back on. If the remedy above does not reset the error, turn off the power of the BC controller and leave it off for at least one minute, and then perform the remedy above again.

1. Error Code

7122

Incomplete interlock error

2. Error definition and error detection method

1) The error detected when operation of the indoor unit was started before completing the interlock inspection
2) The maintenance error code detected when operation of the indoor units is started while there is an indoor unit that has not completed the interlock inspection in the refrigerant system

3. Cause, check method and remedy

Cause	Check method and remedy
(1) There is an indoor unit that has not completed the interlock inspection in the refrigerant system.	Complete the interlock inspection on all indoor units in the refrigerant system before starting operation of them. Wait for approximately one minute after completing the interlock inspection on all indoor units in the refrigerant system, and then start operation of them.

1. Error Code

7124

Refrigerant leak detection sensor misinstallation error

2. Error definition and error detection method

The check code will be displayed when the sensor for detecting different refrigerant types are connected.

3. Error source, cause, check method and remedy

Error source	Cause	Check method and remedy
Heat source unit	(1) The connected sensor is exclusively for use with R454B. An incompatible sensor is connected.	Check the color label of the connected sensor. (R32/R454B compatible: orange)

1. Error Code

7130

Incompatible unit combination

2. Error definition and error detection method

The check code will appear when the indoor units with different refrigerant systems are connected or when the combination of the heat source units is not as per [II[1] System Configurations].

3. Error source, cause, check method and remedy

Error source	Cause	Check method and remedy
Heat source 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 refrigerant leak sensor built in the indoor unit does not support the type of the refrigerant used.	Check the connected indoor unit model. Check whether the connecting adapter for M-NET is not connected to the indoor unit. (Connect the connecting adapter for M-NET to the heat source unit.)
	(2) Combination of heat source units The combination of the heat source units is not as per [II [1] System Configurations]. In addition, the connected heat source units cannot mix old and new model names.	Check the model name of the heat source units (OC) and (OS). Check whether the combination of the heat source units is as per [II [1] System Configurations].
	(3) Combination of BC controllers Wrong models of BC controllers are connected.	Check the model names of the BC controllers. Check if the combination of the BC controllers conforms to the combination specified in [2-1 System Configurations].
BC controller	(1) The BC controller is connected to heat source units (3(4)AL42AN or earlier models) that do not support the refrigerant leak detection system.	Connect the heat source units (3(4)AMM0AN or later models) that support the refrigerant leak detection system.

1. Error Code

7134

Error due to other causes

2. Error definition and error detection method

An error code is displayed when this unit cannot be operated due to an error in other units or other causes.

3. Error source, cause, check method and remedy

Error source	Cause	Check method and remedy
BC controller	An error is occurring in other unit.	An error code other than 7134 is occurring in other unit. Identify the unit and eliminate the causes of the error.

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

In the case of MA remote controller

1. Phenomena

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

(1) Cause

1) The power is not supplied to the indoor unit.
   - The main power of the indoor unit is not on.
   - The connector on the indoor unit board has come off.
   - The fuse on the indoor unit board has melted.
   - Transformer failure and disconnected wire of the indoor unit.
2) Incorrect wiring for the MA remote controller
   - Disconnected wire for the MA remote controller or disconnected line to the terminal block.
   - Short-circuited MA remote controller wiring
   - Incorrect wiring of the MA remote controller cables
   - Incorrect connection of the MA remote wiring to the terminal block for transmission line (TB5) on the indoor unit
   - Wiring mixup between the MA remote controller cable and 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 heat source unit or reversed polarity connection of the relay.
6) The indoor unit board failure
7) MA remote controller failure

(2) Check method and remedy

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

   If no cause is found, refer to 2).
2) Remove the wire for the remote controller from the terminal block (TB13) on the MA remote controller for the indoor unit, and check voltage among 1 to 3.
   - If the voltage is between DC 9 and 12 V, check the causes 2) and 4) and if the cause is found, correct it.
   - If no voltage is applied, check the cause 1) and if the cause is found, correct it.

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

In the case of MA remote controller

2. Phenomena

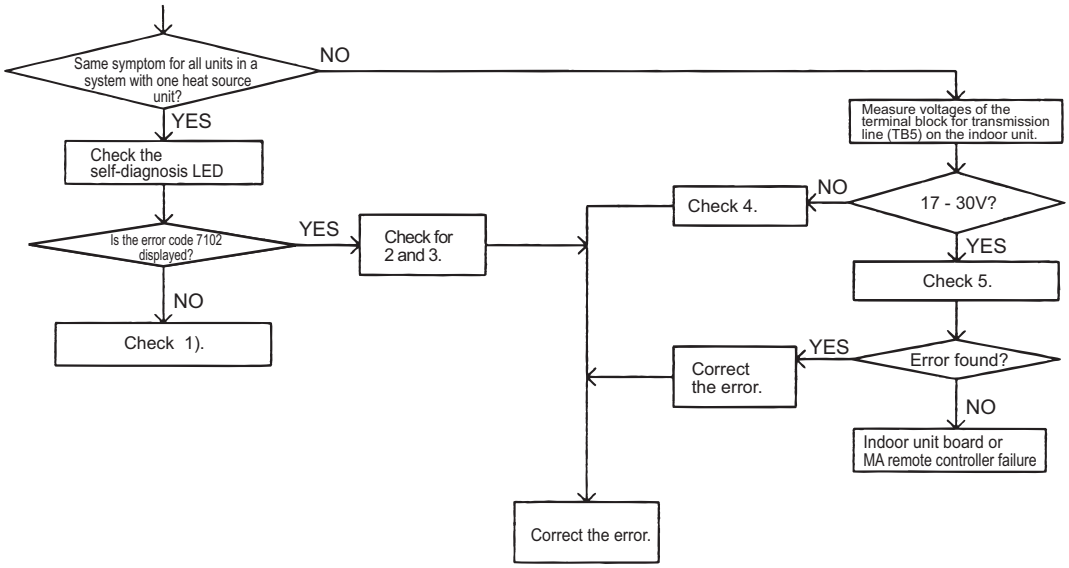
When the remote controller operation SW is turned on, the operation status briefly appears on the display, then it goes off, and the display lights out immediately, and the unit stops.

(1) Cause

1) The power for the M-NET transmission line is not supplied from the heat source unit.
2) Short circuit of the transmission line.
3) Incorrect wiring of the M-NET transmission line on the heat source 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 heat source 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 heat source unit.
4) Disconnected M-NET transmission line on the indoor unit side.
5) Disconnected wire between the terminal block for M-NET line (TB5) of the indoor unit and the indoor unit board (CN2M) or disconnected connector.

(2) Check method and remedy

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



Refer to VIII [4] -7- (2) Troubleshooting Problems with Heat Source Unit Transmission Power Supply Circuit for how to check item 1 in the flow chart above.

In the case of MA remote controller

3. Phenomena

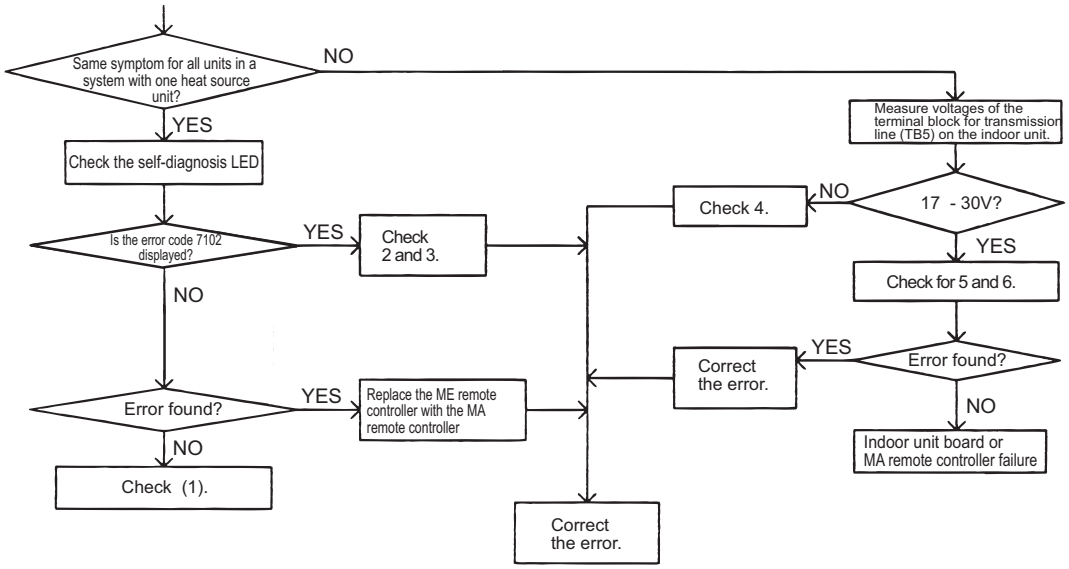
"HO" or "PLEASE WAIT" display on the remote controller does not disappear, and no operation is performed even if the button is pressed. ("HO" or "PLEASE WAIT" display will normally turn off 5 minutes later after the power on.)

(1) Cause

1) The power for the M-NET transmission line is not supplied from the heat source unit.
2) Short-circuited transmission line
3) Incorrect wiring of the M-NET transmission line on the heat source 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 heat source 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 heat source unit
4) Disconnected M-NET transmission line on the indoor unit.
5) Disconnected wire between the terminal block for M-NET line (TB5) of the indoor unit and the indoor unit board (CN2M) or disconnected connector.
6) Incorrect wiring for the MA remote controller
   - Short-circuited wire for the MA remote controller
   - Disconnected wire for the MA remote controller (No.2) and disconnected line to the terminal block.
   - Reversed daisy-chain connection between groups
   - Incorrect wiring for the MA remote controller to the terminal block for transmission line connection (TB5) on the indoor unit
   - The M-NET transmission line is connected incorrectly to the terminal block (TB13) for the MA remote controller.
7) The sub/main setting of the MA remote controller is set to sub.
8) 2 or more main MA remote controllers are connected.
9) Indoor unit board failure (MA remote controller communication circuit)
10) Remote controller failure
11) Heat source unit failure (Refer to IX [9] Troubleshooting Using the Heat source Unit LED Error Display.)

(2) Check method and remedy

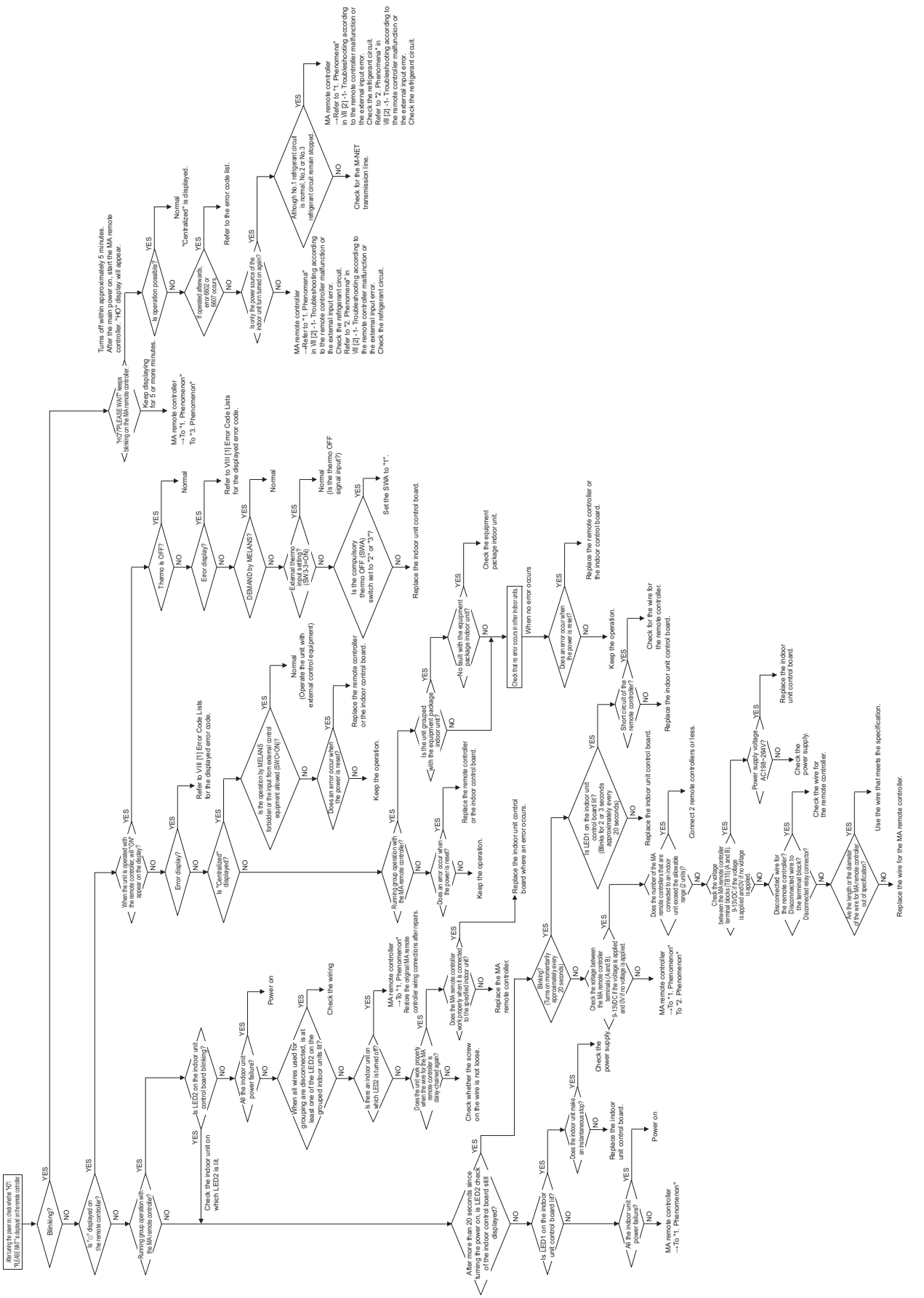
1) **When 2) and 3) above apply, check code 7102 will be displayed on the self-diagnosis LED on the heat source unit.**



Refer to VIII [4] -7- (2) Troubleshooting Problems with Heat Source Unit Transmission Power Supply Circuit for how to check item 1 in the flow chart above.

Flow chart

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

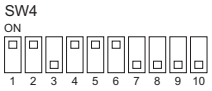


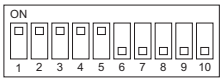
Both for MA remote controller

1. Phenomena

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

(1) Cause, check method and remedy

Cause	Check method and remedy
1. Compressor frequency does not rise sufficiently. ♦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. ♦The high temperature of the heatsink on the INV board triggers the protection mechanism that keeps the compressor frequency from rising.	(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). [VIII [4] -1- High-Pressure Sensor (63HS1, PS1, PS3)] [VIII [4] -2- Low-Pressure Sensor (63LS)] Note: Lower inlet pressure by the low pressure sensor than the actual pressure causes insufficient capacity. SW4 setting (SW6-10: OFF) High pressure sensor  Low pressure sensor  (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  Target evaporating temperature Tem  Note: Protection works and compressor frequency does not rise even at higher Te than Tem due to high discharge temperature and high pressure. At high discharge temperature: Refer to the section on Error code 1102 in VIII [2] Responding to Error Display on the Remote Controller. At high pressure: Refer to the section on Error code 1302 in VIII [2] Responding to Error Display on the Remote Controller. (3) Fan problem, fan connection fault Check to see if the fan is rotating while the heat-source unit is in operation. If the fan is rotating ->Check the items listed under 4230. If the fan is not rotating -> Check the fan wires for proper connection. If the fan wires are properly connected, check that the voltage at the connector CN502 on the control board is 188 V or above (with the heat-source unit in operation). If this value is normal, there is a problem with the fan.
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). [VIII [4] -4- LEV]



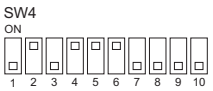
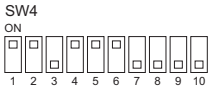
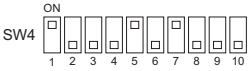
The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

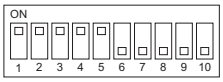
Cause	Check method and remedy
3. Long piping length The cooling capacity varies greatly depending on the pressure loss. (When the pressure loss is large, the cooling capacity drops.)	Check the piping length to determine if it is contributing to performance loss. Piping pressure loss can be estimated from the temperature difference between the indoor unit heat exchanger outlet temperature and the saturation temperature (Te) of 63LS. ->Correct the piping.
4. Piping size is not proper (thin)	
5. 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). [VII [3] Adjusting the Refrigerant Amount]
6. 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.
7. 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.
8. 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.
9. LEV3 malfunction Sufficient liquid refrigerant is not be supplied to the indoor unit as sufficient sub cool cannot be secured due to LEV3 malfunction.	Refer to the following page(s). [VIII [4] -4- LEV] It most likely happens when there is little difference or no difference between TH12 and TH15.
10. TH12, TH15 and 63HS1 sensor failure or faulty wiring LEV3 is not controlled normally.	♦Check the thermistor. ♦Check wiring.

2. Phenomena

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

(1) Cause, check method and remedy

Cause	Check method and remedy
1. Compressor frequency does not rise sufficiently. ♦Faulty detection of pressure sensor. ♦Protection works and compressor frequency does not rise due to high discharge temperature ♦Protection works and compressor frequency does not rise due to high pressure. ♦The high temperature of the heatsink on the INV board triggers the protection mechanism that keeps the compressor frequency from rising.	(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). [VIII [4] -1- High-Pressure Sensor (63HS1, PS1, PS3)] [VIII [4] -2- Low-Pressure Sensor (63LS)] Note: Higher inlet pressure by the high pressure sensor than the actual pressure causes insufficient capacity. SW4 setting (SW6-10: OFF) High pressure sensor  Low pressure sensor  (2) Check the difference between the condensing temperature (Tc) and the target condensing temperature (Tcm) with self-diagnosis LED. Note: Higher Tc than Tcm causes insufficient capacity. SW4 setting (SW6-10: OFF) Condensing temperature Tc  Target condensing temperature Tcm  Note: Protection works and compressor frequency does not rise even at lower Tc than Tcm due to high discharge temperature and high pressure. At high discharge temperature: Refer to the section on Error code 1102 in VIII [2] Responding to Error Display on the Remote Controller. At high pressure: Refer to the section on Error code 1302 in VIII [2] Responding to Error Display on the Remote Controller. (3) Fan problem, fan connection fault Check to see if the fan is rotating while the heat-source unit is in operation. If the fan is rotating → Check the items listed under 4230. If the fan is not rotating → Check the fan wires for proper connection. If the fan wires are properly connected, check that the voltage at the connector CN502 on the control board is 188 V or above (with the heat-source unit in operation). If this value is normal, there is a problem with the fan.



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). [VIII [4] -4- LEV]
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. Insulation failure of the refrigerant piping	
5. 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
6. Piping size is not proper (thin)	
7. 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.
8. 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.
9. 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). [VII [3] Adjusting the Refrigerant Amount]
10. Compressor failure (same as in case of cooling)	Check the discharge temperature.
11. LEV3 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). [VIII [4] -4- LEV]

3. Phenomena

Heat source unit stops at times during operation.

(1) Cause, check method and remedy

Cause		Check method and remedy	
	The first stop is not considered as an error, as the unit turns to anti-restart mode for 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		
4	Thermistor failure		→ Refer to the reference page for each error mode.
5	Pressure sensor failure		*Display the indoor piping temperature with SW4 to check whether the freeze proof operation runs properly, and check the temperature.
6	Over-current break		
7	Refrigerant overcharge		
Note1:	Frost prevention tripping only under cooling mode may be considered in addition to the above. (Freeze protection is detected by one or all indoor units.)		
Note2:	Even the second stop is not considered as an error when some specified errors occur. (eg. The third stop is considered as an error when the thermistor error occurs.)		

[3] Checking Transmission Waveform and for Electrical Noise Interference

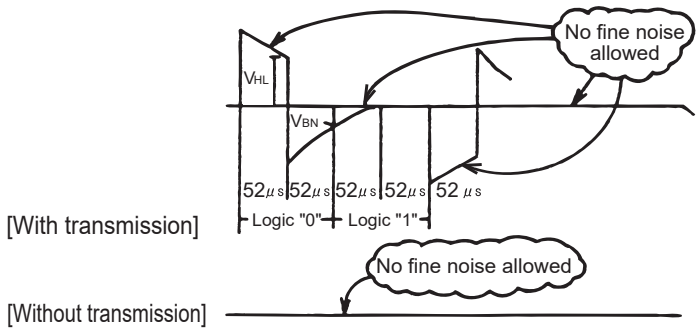
1. M-NET transmission

Control is performed by exchanging signals between the heat source 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
	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-heat source transmission cable grounded to the earth terminal on the heat source unit?	Connect the shield of the indoor-heat source transmission cable to the earth terminal ($\perp$) on the heat source 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 heat source 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 heat source 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 heat source 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 heat source 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
9. Heat source unit circuit board failure	Replace the heat source unit control board or the power supply board for the transmission line.
10. Indoor unit circuit board failure or remote controller failure	Replace the indoor unit circuit board or the remote controller.
11. The MA remote controller is connected to the M-NET transmission line.	Connect the MA remote controller to the terminal block for MA remote controller (TB15).

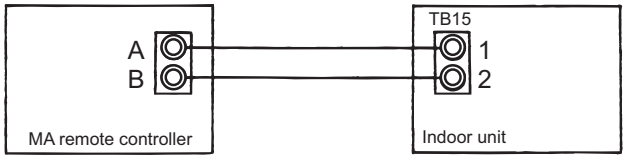
2. MA remote controller transmission

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

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

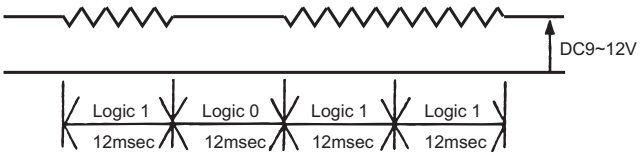
If noise is generated on the transmission line, and the communication between the MA remote controller and the indoor unit is interrupted for 3 minutes in a row, MA transmission error (6831) will occur.

(2) Confirmation of transmission specifications and wave pattern



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

Transmission waveform (Across terminal No.1 - 2)



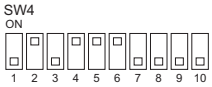
① Satisfies the formula
12 msec/bit ± 5%
② Voltage among terminals must be between DC9 and 12 V.

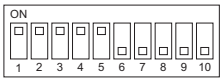
[4] Troubleshooting Principal Parts

-1- High-Pressure Sensor (63HS1, PS1, PS3)

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

By configuring the digital display setting switch SW4 (SW6-10: OFF) as shown in the figure below, the pressure as measured by the high-pressure sensor appears on the LD301 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 LD301.

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 LD301 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 LD301 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 LD301 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 LD301 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 LD301.

1) When the pressure displayed on self-diagnosis LD301 is between 0 and 0.098MPa [14psi], the high pressure sensor has a problem.
2) When the pressure displayed on self-diagnosis LD301 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, PS1, PS3) to check the pressure with self-diagnosis LD301.

1) When the pressure displayed on the self-diagnosis LD301 exceeds 4.15MPa [601psi], the high pressure sensor has a problem.
2) If other than 1), the control board has a problem.

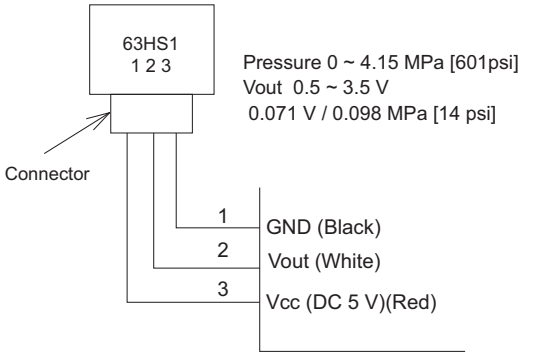
2. Pressure sensor configuration

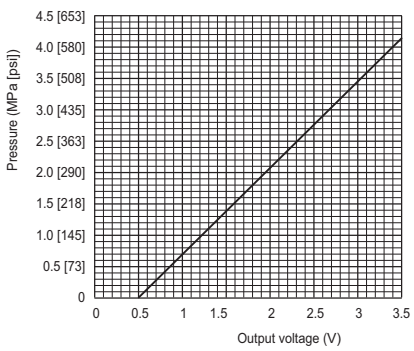
The high pressure sensor consists of the circuit shown in the figure below. If DC 5V is applied between the red and the black wires, voltage corresponding to the pressure between the white and the black wires will be output, and the value of this voltage will be converted by the microcomputer. The output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

Note

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

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

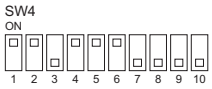


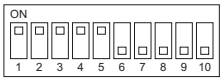


-2- Low-Pressure Sensor (63LS)

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

By configuring the digital display setting switch SW4 (SW6-10: OFF) as shown in the figure below, the pressure as measured by the low-pressure sensor appears on the LD301 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 LD301.

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 LD301 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 LD301 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 LD301 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 LD301 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 LD301 display.

1) When the pressure displayed on the self-diagnosis LD301 is between 0 and 0.098MPa [14psi], the low pressure sensor has a problem.
2) When the pressure displayed on self-diagnosis LD301 is approximately 1.7MPa [247psi], the control board has a problem.
   - When the ambient temperature is 30°C [86°F] or less, the control board has a problem.
   - When the ambient 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 LD301.

1) When the pressure displayed on the self-diagnosis LD301 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 LD301.

1) When the pressure displayed on the self-diagnosis LD301 exceeds 1.7MPa [247psi], the control board has a problem.
2) If other than 1), the control board has a problem.

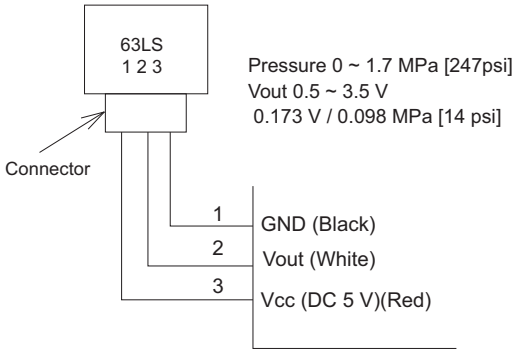
2. Low-pressure sensor configuration

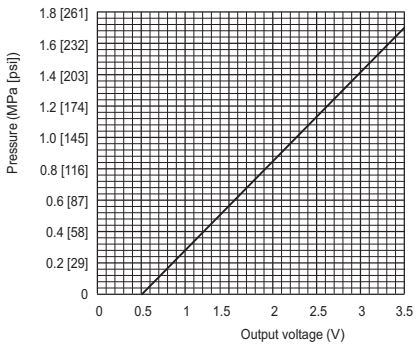
The low pressure sensor consists of the circuit shown in the figure below. If DC5V is applied between the red and the black wires, voltage corresponding to the pressure between the white and the black wires will be output, and the value of this voltage will be converted by the microcomputer. The output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

Note

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

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



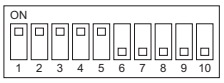


-3- Solenoid Valve

Check whether the output signal from the control board and the operation of the solenoid valve match.
Setting the self-diagnosis switch SW4 (SW6-10: OFF) 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		SV1a			
	Lower								
	Upper							SV9	Supply power
	Lower								



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

About this 4-way valve
When not powered:
Conducts refrigerant between the oil separator outlet and heat exchanger AND 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) In case of SV1a (Bypass valve)

This solenoid valve opens when powered (Relay ON).

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

(3) In the case of SV9 (Bypass valve)

This solenoid valve opens when energized (when the relay is on)
This valve turns on when the value of 63HS1 is greater than 3.5 MPa [507psi] during Heating-only or Heating-main operation at the minimum frequency. The valve position can be determined by measuring and monitoring the changes in the pipe temperature on the downstream of SV9 while the unit is energized. When the valve is open, high-temperature gas refrigerant passes through the pipe. Do not attempt to check the pipe temperature by touching the pipe.

-4- LEV

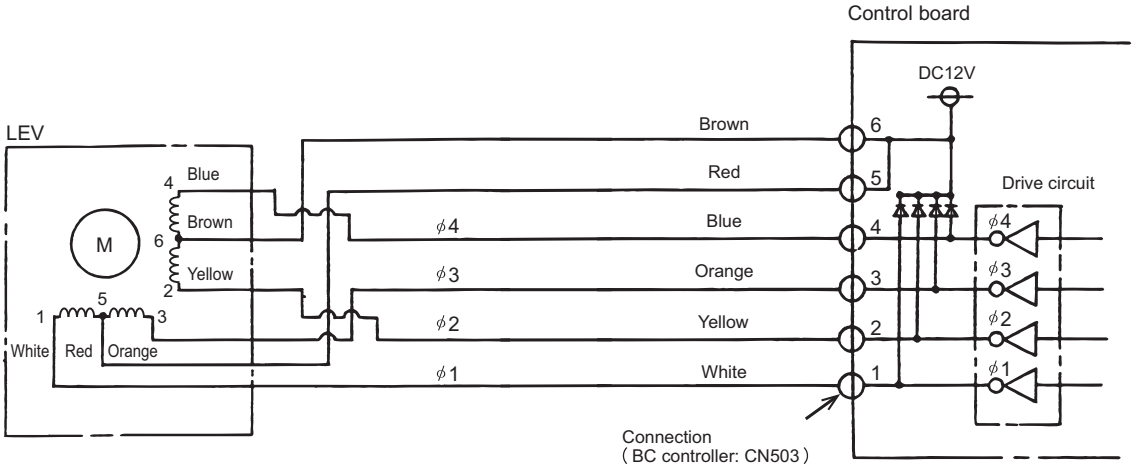
LEV operation

LEV are stepping-motor-driven valves that operate by receiving the pulse signals from the indoor and heat source unit control boards.

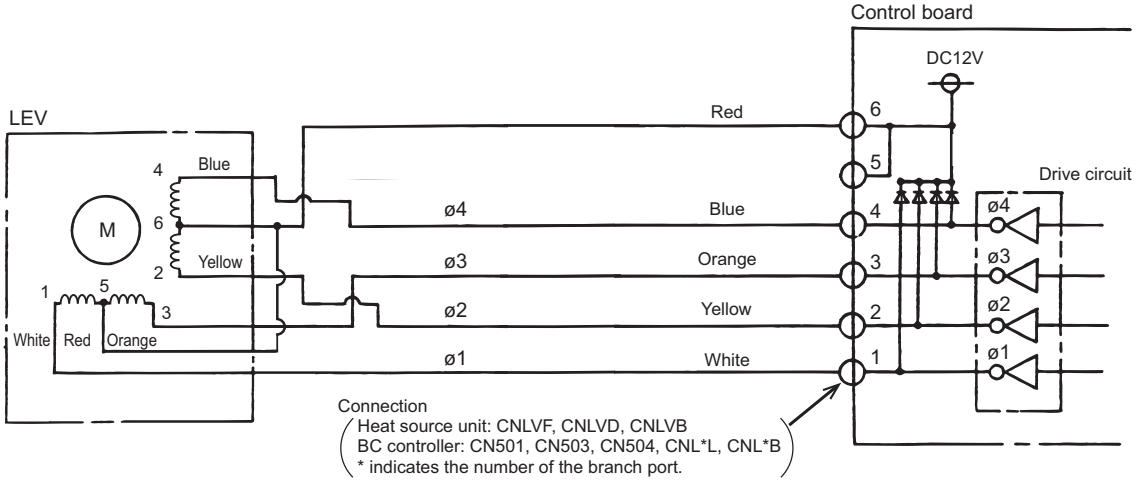
(1) Heat source LEV (LEV4, LEV7, LEV8) and BC controller LEV (LEV1, LEV3, LEV4, LEV-L, LEV-A, LEV-B)

The valve opening changes according to the number of pulses.

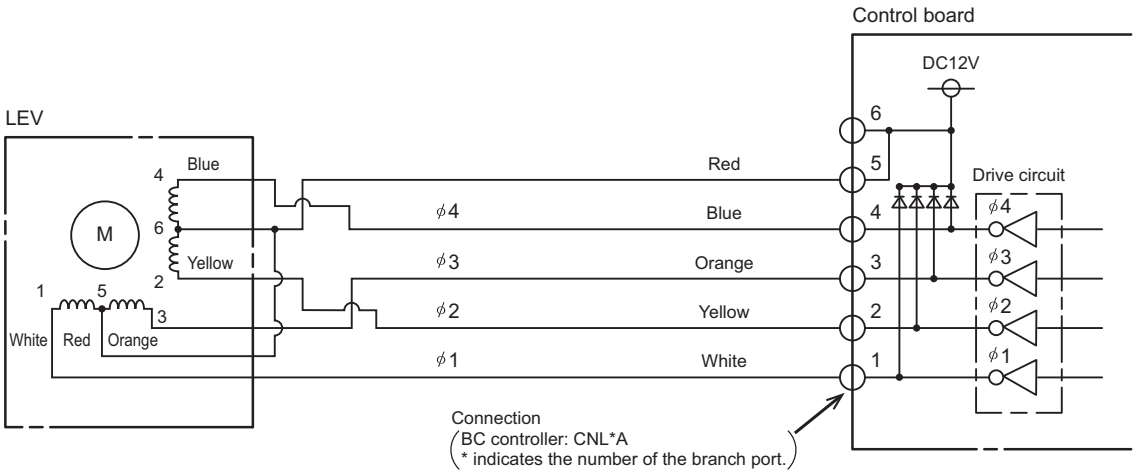
1) Control boards (BC controller) and LEV (BC controller LEV 3 (MB type))



2) Control boards (Heat source unit and BC controller) and LEV (BC controller LEV(LEV1, LEV3 (MA type), LEV4, LEV-L, LEV-B)) and the heat source unit LEV (LEV4, LEV7, LEV8)



3) Control boards (BC controller) and LEV (BC controller LEV (LEV-A))



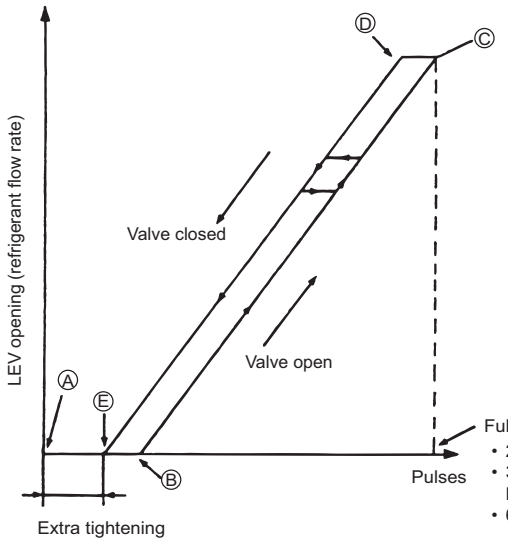
4) Pulse signal output and valve operation

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 vibra

5) LEV valve closing and opening operation



*Upon power on, the circuit board sends a 2200 pulse closing signal (BC controller LEV (LEV3 (MB type))), a 3200 pulse closing signal (BC controller LEV (LEV1, LEV3 (MA type), LEV4, LEV-L, LEV-A, LEV-B)), a 6200 pulse closing signal (heat source unit LEV (LEV4, LEV7, LEV8)) to the 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, the circuit board sends a 20-pulse signal (heat source unit LEV (LEV7, LEV8)), 41-pulse signal (heat source unit LEV (LEV4) and BC controller LEV (LEV1, LEV3 (MA type), LEV4, LEV-L, LEV-A, LEV-B)) ,60-pulse signal (BC controller LEV (LEV3 (MB type)) to bring the LEV opening to the position as indicated by Ⓑ in the diagram.

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

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

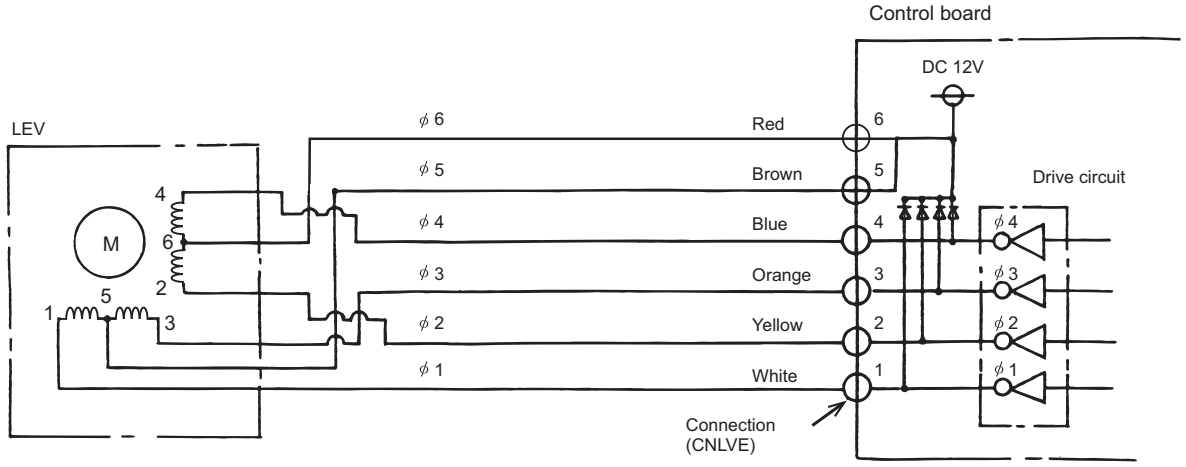
*1 The LEV opening may become greater depending on the operation status.

Fully open*1
- 2000 pulses (BC controller LEV (LEV3 (MB type))
- 3000 pulses (heat source unit LEV (LEV4)), BC controller LEV(LEV1, LEV3 (MA type), LEV4, LEV-L, LEV-A, LEV-B)
- 6000 pulses (heat source unit LEV (LEV7, LEV8)

(2) Heat source LEV (LEVINV)

The valve opening changes according to the number of pulses.

1) Connections between the heat source control board and LEV



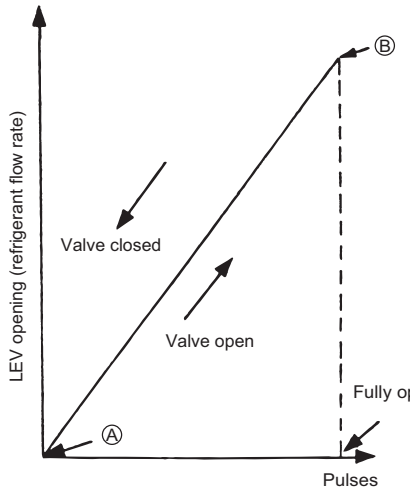
2) Pulse signal output and valve operation

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

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

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

3) LEV valve closing and opening operation



*When the power is turned on, the valve closing signal of 520 pulses will be output from the circuit board to LEV to fix the valve position. It must be fixed at point Ⓐ.
(Pulse signal is output for approximately 17 seconds.)

When the valve operates smoothly, there is no sound from the LEV and no vibration occurs, but when the valve is locked, noise is generated.

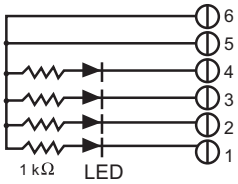
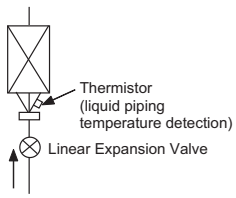
*Whether a sound is generated or not can be determined by holding a screwdriver against it, then placing your ear against the handle.

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

(3) Judgment methods and possible failure mode

Note

The specifications of the heat source unit (heat source LEV), indoor unit (indoor LEV),and BC controller (BC controller LEV) differ.Therefore, remedies for each failure may vary. Check the remedy specified for the appropriate LEV as indicated in the right column.

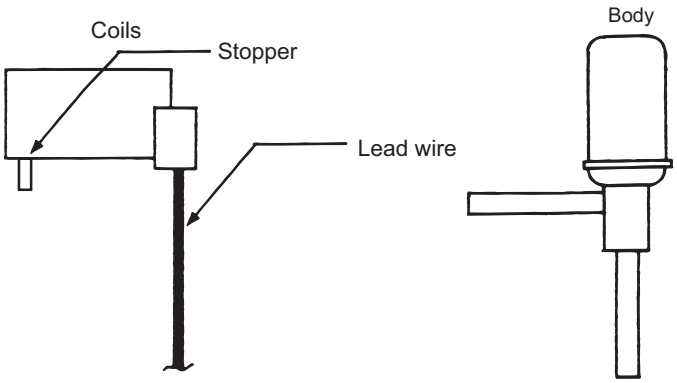
Malfunction mode	Judgment method	Remedy	Target LEV
Microcomputer driver circuit failure	Disconnect the control board connector and connect the check LED as shown in the figure below.  resistance : 0.25W 1kΩ LED : DC15V 20mA or more When the main power is turned on, the indoor unit circuit board outputs pulse signals to the indoor unit LEV for 10 seconds, the heat source unit circuit board outputs pulse signals to the heat source unit LEV for 32 seconds, and the BC controller circuit board outputs pulse signals to the BC controller LEV for 32 seconds (LEV-L, LEV-A, LEV-B) and 17 seconds (LEV1, LEV3 (MA type), LEV4), 12 seconds (LEV3 (MB type)). 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 Heat source BC controller
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 Heat source BC controller
Disconnected or short-circuited LEV motor coil	Measure resistance between the coils (red - white, red -orange, brown - yellow, brown - blue) using a tester. They are normal if resistance is 200ohm ± 10%.	Replace the LEV coils.	BC controller (LEV3 (MB type))
	Measure the resistance between coils (red-white, red-orange, red-yellow, red-blue) with a tester. When the resistance is in the range of 100ohm ± 10%, the LEV is normal.	Replace the LEV coils.	Heat source (LEV4, LEV7, LEV8) BC controller (LEV1, LEV3 (MA type), LEV4, LEV-L, LEV-A, LEV-B)
	Measure resistance between the coils (red - white, red -orange, brown - yellow, brown - blue) using a tester. They are normal if resistance is 46ohm ± 3%.	Replace the LEV coils.	Heat source (LEVINV)
Incomple sealing (leak from the valve)	When checking the refrigerant leak from the indoor LEV, run the target indoor unit in the fan mode, and the other indoor units in the cooling mode. Then, check the liquid temperature (TH22) with the self-diagnosis LED. When the unit is running in the fan mode, the LEV is fully closed, and the temperature detected by the thermistor is not low. If there is a leak, however, the temperature will be low. If the temperature is extremely low compared with the inlet temperature displayed on the remote controller, the LEV is not properly sealed, however, if there is a little leak, it is not necessary to replace the LEV when there are no effects to other parts. 	If there is a large amount of leakage, replace the LEV.	Indoor

Malfunction mode	Judgment method	Remedy	Target LEV
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 Heat source BC controller

(4) Heat source unit LEV (LEVINV) coil removal procedure

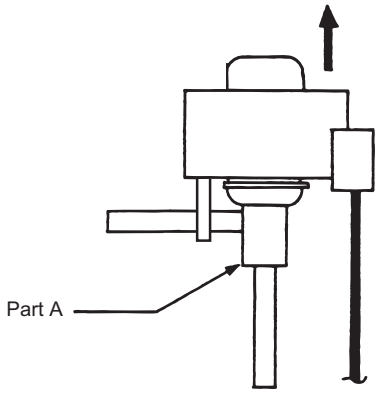
1) LEV component

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



2) Removing the coils

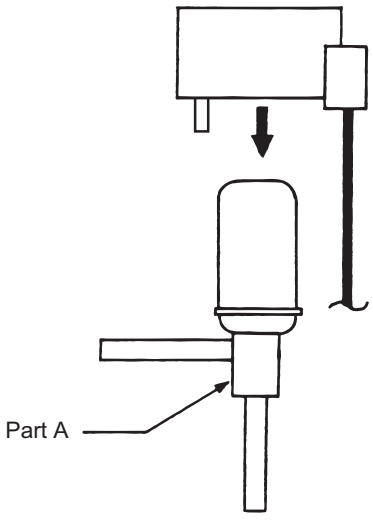
Fasten the body tightly at the bottom (Part A in the figure) so that the body will not move, then pull out the coils toward the top.If the coils are pulled out without the body gripped, undue force will be applied and the pipe will be bent.



3) Installing the coils

Fix the body tightly at the bottom (Part A in the figure) so that the body will not move, then insert the coils from the top, and insert the coil stopper securely in the pipe on the body. Hold the body when installing the coils to prevent so that the pipe will not be bent.

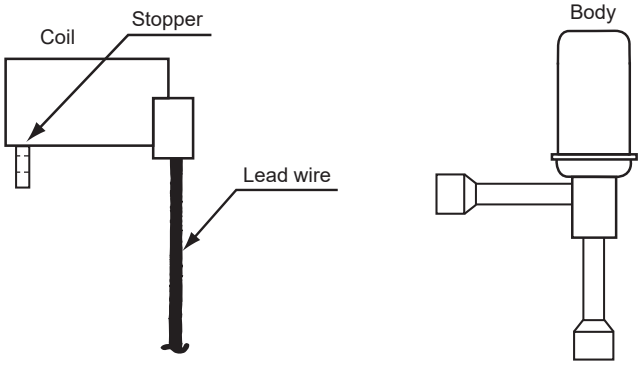
If the coils are pushed without the body gripped, undue force will be applied and the pipe will be bent. Hold the body when installing the coils to prevent so that the pipe will not be bent.



(5) Heat source unit LEV (LEV4, LEV7, LEV8) and BC controller coil removal procedure

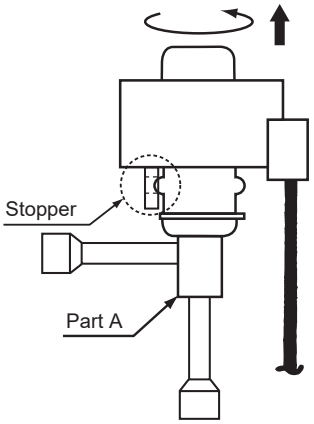
1) Components

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



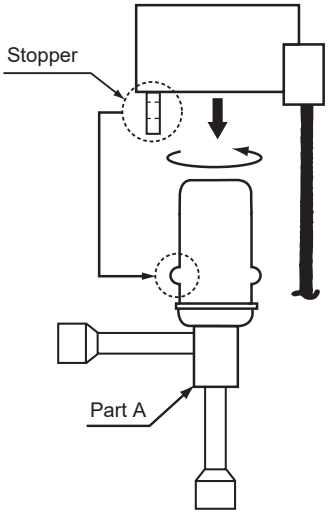
2) Removing the coil

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.

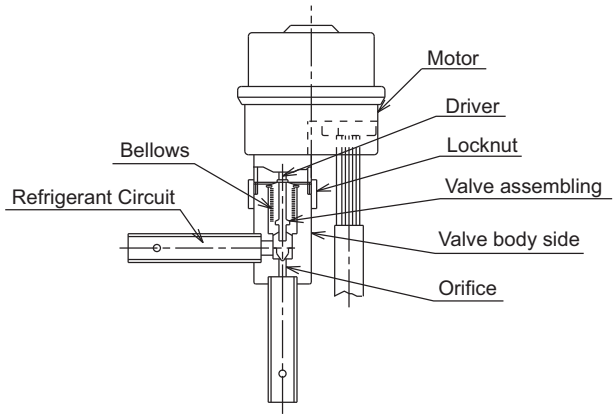


3) Installing the coil

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 installing the coils, hold the LEV body securely to prevent undue force from being placed on the pipe and bending the pipe.

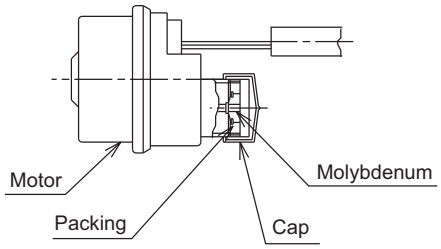


(6) Indoor unit LEV, BC controller LEV coil removal procedure



Notes on the procedure

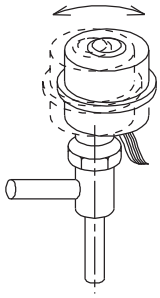
1) Do not put undue pressure on the motor.
2) Do not use motors if dropped.
3) Do not remove the cap until immediately before the procedure.
4) Do not wipe off any molybdenum.
5) Do not remove the packing.
6) Do not apply any other than specified liquid such as screw lock agent, grease and etc.



Replacement procedure

1) Stop the air conditioner. After checking that the air conditioner is stopped, turn off the power of the heat source unit.
2) Prepare two spanners. Hold the valve body with one spanner and loosen the locknut with another one.
   Turning the locknut counter-clockwise from motor side view can loosen it.
   Two spanners must be used.
   Do not hold the motor with one hand and loosen the locknut with only one spanner.
3) Turning the locknut several times. The locknut will come off and then the motor can be removed.
4) Prepare a motor replacement. Use only factory settings, which the head part of the driver does not come out.**Use of other than factory settings may result in malfunction and failure of valve flow rate control.**
5) Keep dust, contaminants, and water out of the space between the motor and the valve body during replacement. (The space is the mechanical section of the valve.) Do not damage the junction with tools.
   After removing the motor, **blow N_2 gas or etc. into bellows in order to blow off water from inside.**
6) Remove the cap of the motor replacement. Joint the axis of the motor and the one of the valve body with the locknut to stick precisely. **Apply screw lock agent to whole part of the screw. Do not introduce screw lock agent into the motor.**Use new motors if problems are found on the motor during the replacement.
7) After rotating the locknut 2~3 times by hands, hold the valve body with the spanner, and tighten the locknut with the specified torque with a torque wrench. Apply the tightening torque of 15N · m (150kgf · cm) (administration value 15 ± 1 N · m (150 ± 10kgf · cm)).
   Note that undue tightening may cause breaking a flare nut.
8) When tightening the locknut, hold the motor with hands so that undue rotary torque and load can not be applied.
9) The differences of relative position after assembling the motor and the valve body do not affect the valve control and the switching function.
   Do not relocate the motor and the valve body after tightening the locknut. Even the relative position is different from before and after assembling.

Difference in rotational direction is acceptable.



   The motor may not be fixed with clamp because of the changing of the motor configuration. However, the fixing is not necessary due to the pipe fixing.
10) Connect the connector. Do not pull hard on the lead wire. Make sure that the connector is securely inserted into the specified position, and check that the connector does not come off easily.
11) Turn on the indoor unit, and operate the air conditioner. Check that no problems are found.

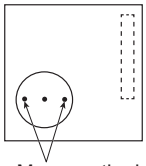
(7) Refrigerant sensor

Measure the resistance between the terminals with a multimeter.

Normal	Abnormal
Below 10 Ω	Open (10 Ω or more)

After turning off the indoor unit breaker and leaving it for 5 minutes, measure the resistance value between the sensor terminals.

<Back side of the sensor>

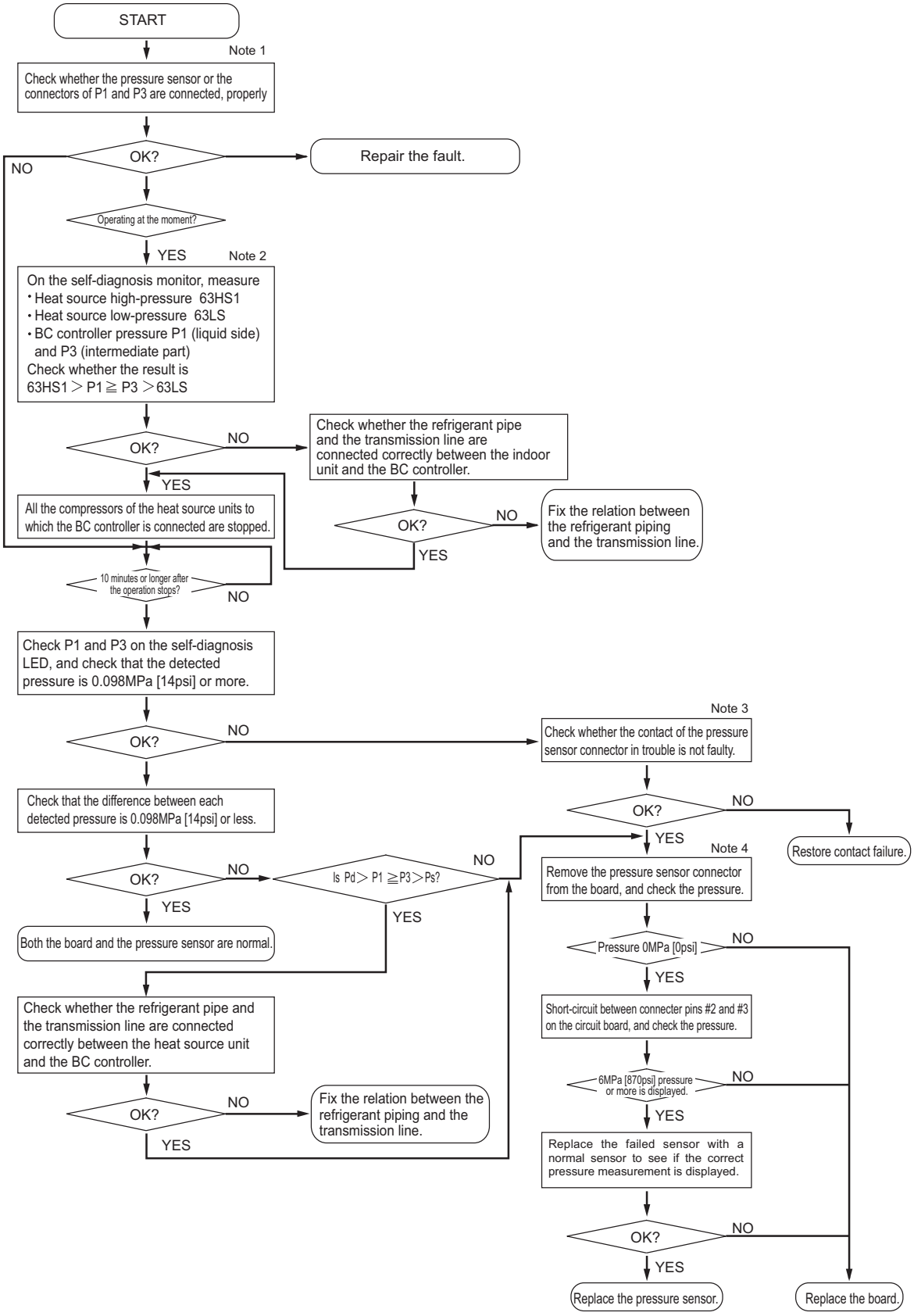


Measure the both sides of the sensor pin.

-5- Troubleshooting Problems with Major Components on BC Controller

1. Pressure Sensor

Troubleshooting flow chart for pressure sensor



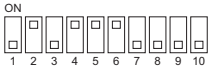
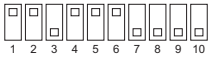
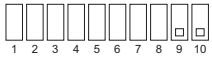
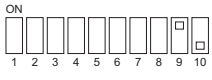
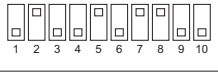
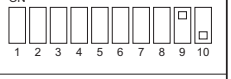
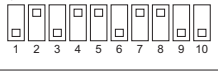
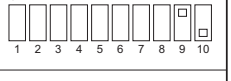
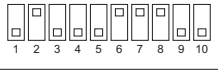
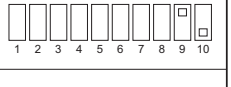
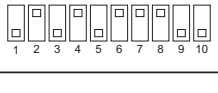
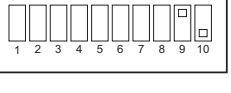
Note

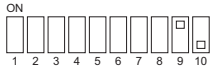
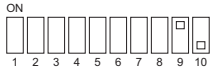
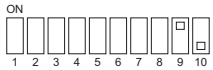
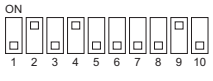
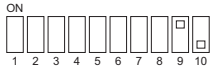
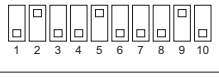
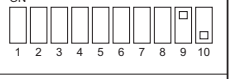
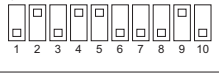
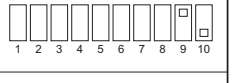
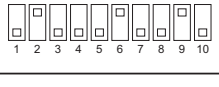
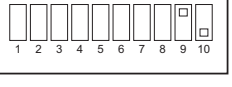
1) BC controller: Phenomena when the pressure sensor is connected wrongly (reverse connection of P1 and P3) to the board.

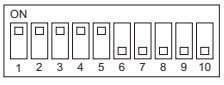
Symptoms						
Cooling-only	Cooling-main		Heating only		Heating main	
Normal	Non-cooling	SC11 large SC16 small △PHM large	Indoor heating SC small Heating indoor Thermo ON Especially noise is large.	SC11 large SC16 small △PHM large	Non-cooling Indoor heating SC small Heating indoor Thermo ON Especially noise is large.	SC11 large SC16 small △PHM large

Note

2) Check the self-diagnosis switch (Heat source control board SW4 and SW6).

Measurement data	Symbol	SW4 setting value	SW6 setting value
Heat source high pressure	63HS1		
Heat source low pressure	63LS		
BC controller pressure (liquid side)	PS1		
BC controller pressure (intermediate part)	PS3		
Sub BC controller pressure (intermediate part) (Sub 1)	PS3		
Sub BC controller pressure (intermediate part) (Sub 2)	PS3		
Sub BC controller pressure (intermediate part) (Sub 3)	PS3		
Sub BC controller pressure (intermediate part) (Sub 4)	PS3		

Measurement data	Symbol	SW4 setting value	SW6 setting value
Sub BC controller pressure (intermediate part) (Sub 5)	PS3		
Sub BC controller pressure (intermediate part) (Sub 6)	PS3		
Sub BC controller pressure (intermediate part) (Sub 7)	PS3		
Sub BC controller pressure (intermediate part) (Sub 8)	PS3		
Sub BC controller pressure (intermediate part) (Sub 9)	PS3		
Sub BC controller pressure (intermediate part) (Sub 10)	PS3		
Sub BC controller pressure (intermediate part) (Sub 11)	PS3		



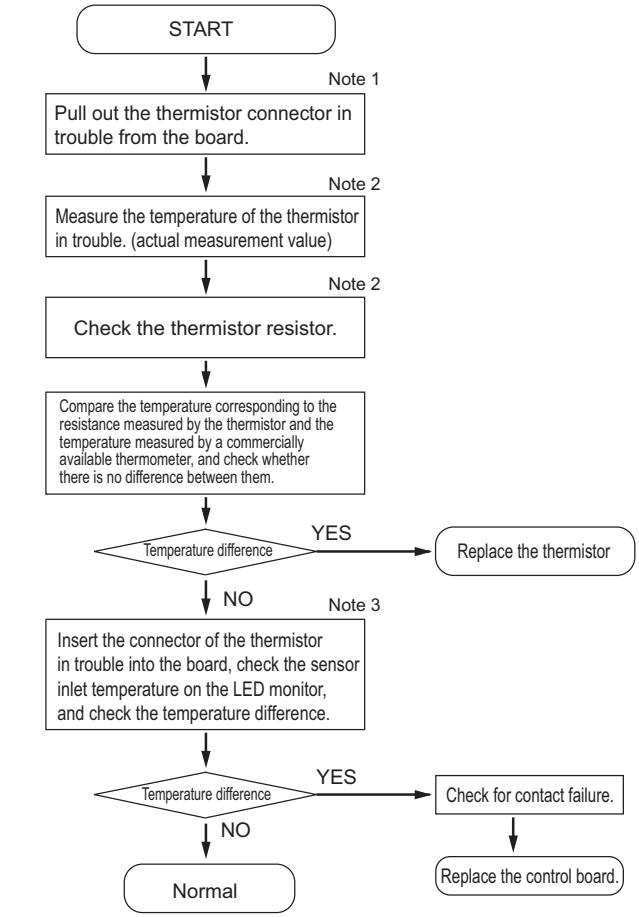
The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

Note

3) Check whether CN302 (liquid side) connector on the BC controller control board and the connector CN303 (intermediate part) are not disconnected or not loose.
4) Check the pressure value on the self-diagnosis switch (same as note 2) with the connector of the applied pressure sensor is disconnected from the board.

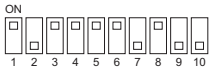
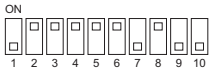
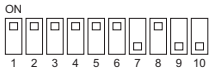
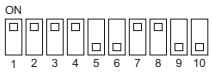
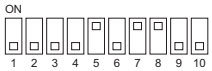
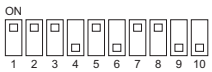
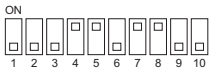
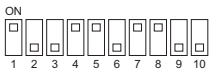
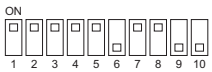
2. Temperature Sensor

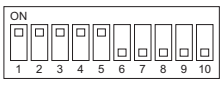
Troubleshooting instructions for thermistor



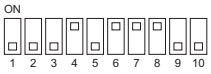
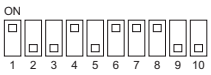
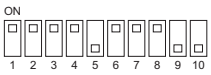
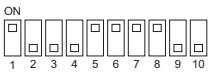
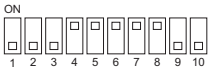
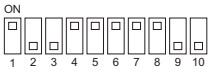
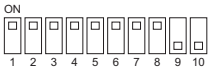
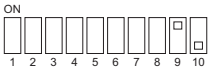
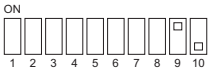
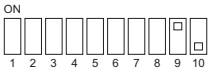
Note

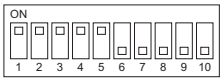
1) For the connectors on the board, TH11 through TH16 are connected to CN300. Disconnect the connector in trouble, and check the sensor of each number.
2)
   - Pull out the sensor connector from the I/O board, Do not pull the sensor by holding the lead wire.
   - Measure the resistance with such as a tester.
   - Compare the measured value with that shown in the table below. When the result is ±10%, it is normal.
3) Check the self-diagnosis switch (Heat source control board SW4 and SW6).

	Measurement data	Symbol	SW4 setting value	SW6 setting value
MA (Standard / main)	Liquid inlet temperature	TH11		
	Bypass outlet temperature	TH12		
	LEV4 outlet temperature	TH14		
	LEV3(a) outlet temperature	TH15		
	LEV3(a) inlet temperature	TH16		
MB (Sub 1)	Bypass outlet temperature	TH12		
	LEV3(a) outlet temperature	TH15		
	LEV3(a) inlet temperature	TH16		
MB (Sub 2)	Bypass outlet temperature	TH12		
	LEV3(a) outlet temperature	TH15		
	LEV3(a) inlet temperature	TH16		
MB (Sub 3)	Bypass outlet temperature	TH12		
	LEV3(a) outlet temperature	TH15		
	LEV3(a) inlet temperature	TH16		

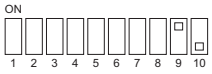
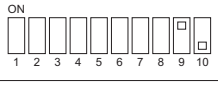
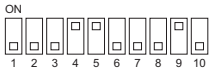
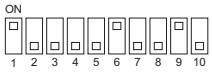


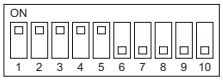
The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

	Measurement data	Symbol	SW4 setting value	SW6 setting value
MB (Sub 4)	Bypass outlet temperature	TH12		
	LEV3(a) outlet temperature	TH15		
	LEV3(a) inlet temperature	TH16		
MB (Sub 5)	Bypass outlet temperature	TH12		
	LEV3(a) outlet temperature	TH15		
	LEV3(a) inlet temperature	TH16		
MB (Sub 6)	Bypass outlet temperature	TH12		
	LEV3(a) outlet temperature	TH15		
	LEV3(a) inlet temperature	TH16		
MB (Sub 7)	Bypass outlet temperature	TH12		
	LEV3(a) outlet temperature	TH15		
	LEV3(a) inlet temperature	TH16		
MB (Sub 8)	Bypass outlet temperature	TH12		
	LEV3(a) outlet temperature	TH15		
	LEV3(a) inlet temperature	TH16		



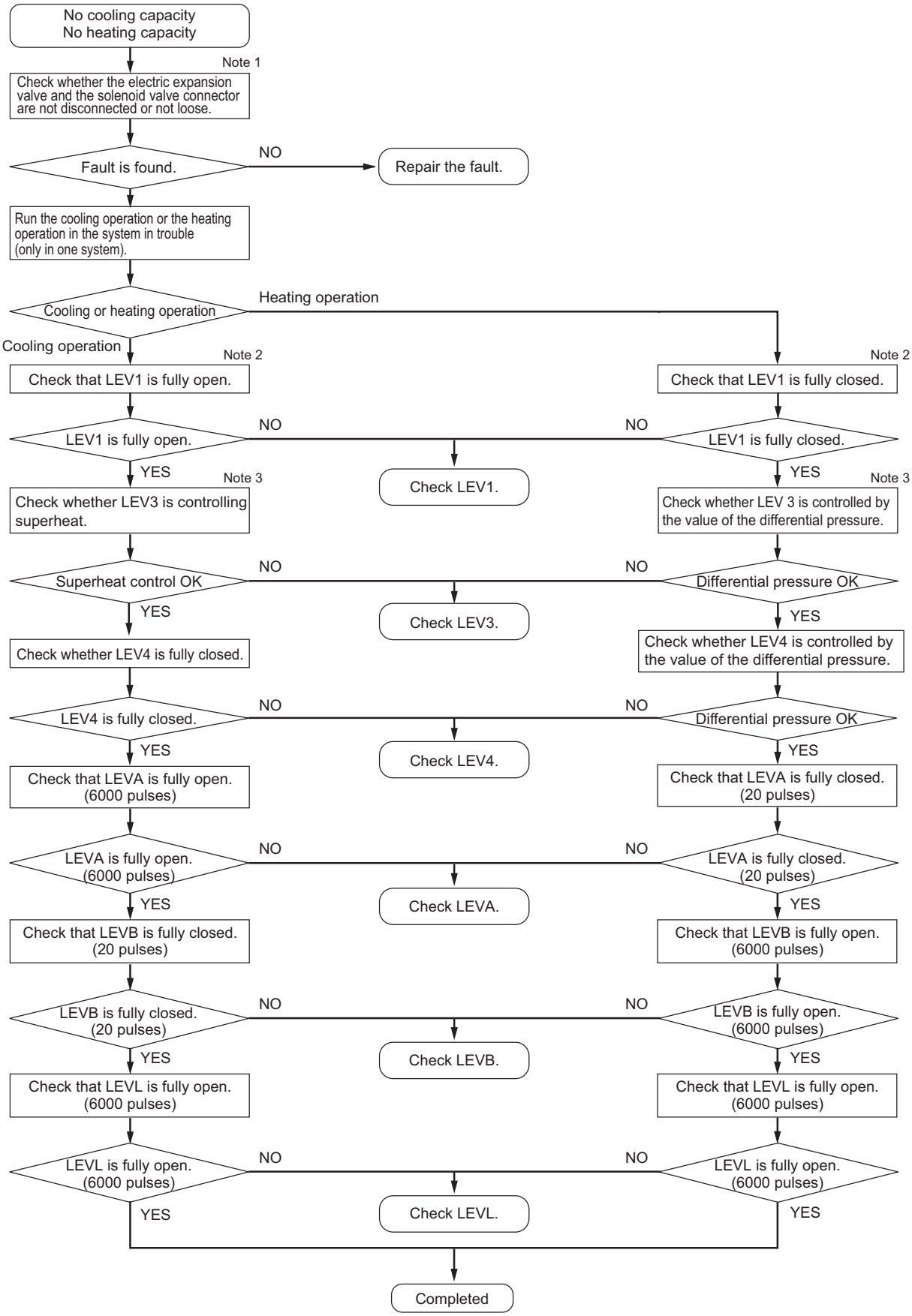
The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

	Measurement data	Symbol	SW4 setting value	SW6 setting value
MB (Sub 9)	Bypass outlet temperature	TH12		
	LEV3(a) outlet temperature	TH15		
	LEV3(a) inlet temperature	TH16		
MB (Sub 10)	Bypass outlet temperature	TH12		
	LEV3(a) outlet temperature	TH15		
	LEV3(a) inlet temperature	TH16		
MB (Sub 11)	Bypass outlet temperature	TH12		
	LEV3(a) outlet temperature	TH15		
	LEV3(a) inlet temperature	TH16		



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

3. Troubleshooting Flowchart for LEVs



Note

1) BC controller: Phenomena when LEV is connected wrongly (reverse connection of LEV1 and LEV3 or LEV4) to the board.

Phenomena			
Cooling-only	Cooling-main	Heating only	Heating main
Non-cooling SH12 small, SC11 small SC16 small, branch pipe SC small BC controller sound	Non-cooling and non-heating SH12 small, SC11 small SC16 large, but branch pipe SC small BC controller sound △ PHM large	Indoor heating SC small △ PHM large	Non-cooling Indoor heating SC small △ PHM large

2) BC controller: Phenomena when LEV is connected wrongly (reverse connection of LEV3 and LEV4) to the board

Phenomena			
Cooling-only	Cooling-main	Heating only	Heating main
Non-cooling SH12 large, SC11 small SC16 small, branch pipe SC small	Non-cooling SH12 large, SC11 small SC16 small, branch pipe SC small	SH12 large	Non-cooling SH12 large, SC16 small

3) BC controller: Phenomena when LEV is connected wrongly (reverse connection of LEVA, LEVB, and LEVL) to the board

This fails to control refrigerant to the indoor units with applicable branches, disabling cooling and heating.
LEVA, LEVB, and LEVL fully open (6,000 pulses) or fully close (20 pulses) according to the indoor unit operation mode. Measure the temperature at the upstream and downstream pipes of the check branch LEV during cooling and heating to check that LEV behaves as specified with no wrong wiring.
When fully open: There is no temperature difference between the upstream and downstream pipes.
When fully closed: There is a temperature difference between the upstream and downstream pipes (with no refrigerant flowing sound).

		Mode			
		Cooling	Heating	Stop	Defrosting*1
Branch inlet	LEVA	Fully open (6,000)	Fully closed (20)	Slightly open (160)	Fully closed (20)
	LEVB	Fully closed (20)	Fully open (6,000)	Fully closed (20)	Fully closed (20)
	LEVL	Fully open (6,000)	Fully open (6,000)	Fully open (6,000)	Fully open (6,000)

*1 Behavior may differ according to the defrosting method and operation conditions.
*2 When refrigerant leak is detected, LEVA, LEVB, and LEVL at related branch inlets fully close (20 pulses).

4) Check method of fully open state or fully closed state of LEV

- Check LEV opening (pulse) on the self-diagnosis LED (Heat source control board SW1).

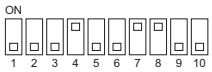
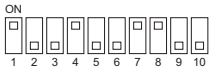
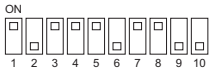
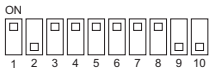
LEV1, 3, 4
Full open: 3000 pulses
Fully closed: 41 pulses (In the case of heating-only mode, however, the pulse may become 41 or more.)
LEVA, B, L
Full open: 6000 pulses
Fully closed: 20 pulses

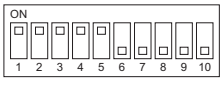
- When LEV is fully open, measure the temperature at the upstream and downstream pipes of LEV, and make sure that there is no temperature difference.
- When LEV is fully closed, check that there is no refrigerant flowing sound.

5) Refer to the chart below to judge LEV opening controlled by the values of the differential pressure and of the superheat. (BC controller LEV basic operation characteristic)

	Part	Malfunction mode	Operation mode	Content	Standards of judgment on unit stable operation
MA type	LEV1	Inclined to close	Heating only Heating-main Cooling-main	Difference between high pressure (P1) and intermediate pressure (P3) is large.	0.3 to 0.4MPa [44 to 58 psi]
		Inclined to open		Difference between high pressure (P1) and intermediate pressure (P3) is small.	
	LEV3	Inclined to close	Cooling-only Cooling-main	SH12 is large.	SH12 < 20°C [36°F]
			Heating only Heating-main	Difference between high pressure (P1) and intermediate pressure (P3) is small.	0.3 to 0.4MPa [44 to 58 psi]
		Inclined to open	Cooling-only Cooling-main	SC16 and SH12 are small.	SC16 > 3°C [5.4°F] SH12 > 3°C [5.4°F]
			Heating only Heating-main	Difference between high pressure (P1) and intermediate pressure (P3) is large.	0.3 to 0.4MPa [44 to 58 psi]
	LEV4	Inclined to close	Heating-only Heating-main	Difference between high pressure (P1) and intermediate pressure (P3) is small.	0.3 to 0.4MPa [44 to 58 psi]
		Inclined to open	Cooling-only Cooling-main Heating-only Heating-main	SC16 is small.	SC16 > 3°C [5.4°F]
				Difference between high pressure (P1) and intermediate pressure (P3) is large.	0.3 to 0.4MPa [44 to 58 psi]
MB type	LEV3	Inclined to close	Cooling-only Cooling-main	SH12 is large.	SH12 < 20°C [36°F]
		Inclined to open	Cooling-only Cooling-main	SH12 is small.	SH12 > 3°C [5.4°F]

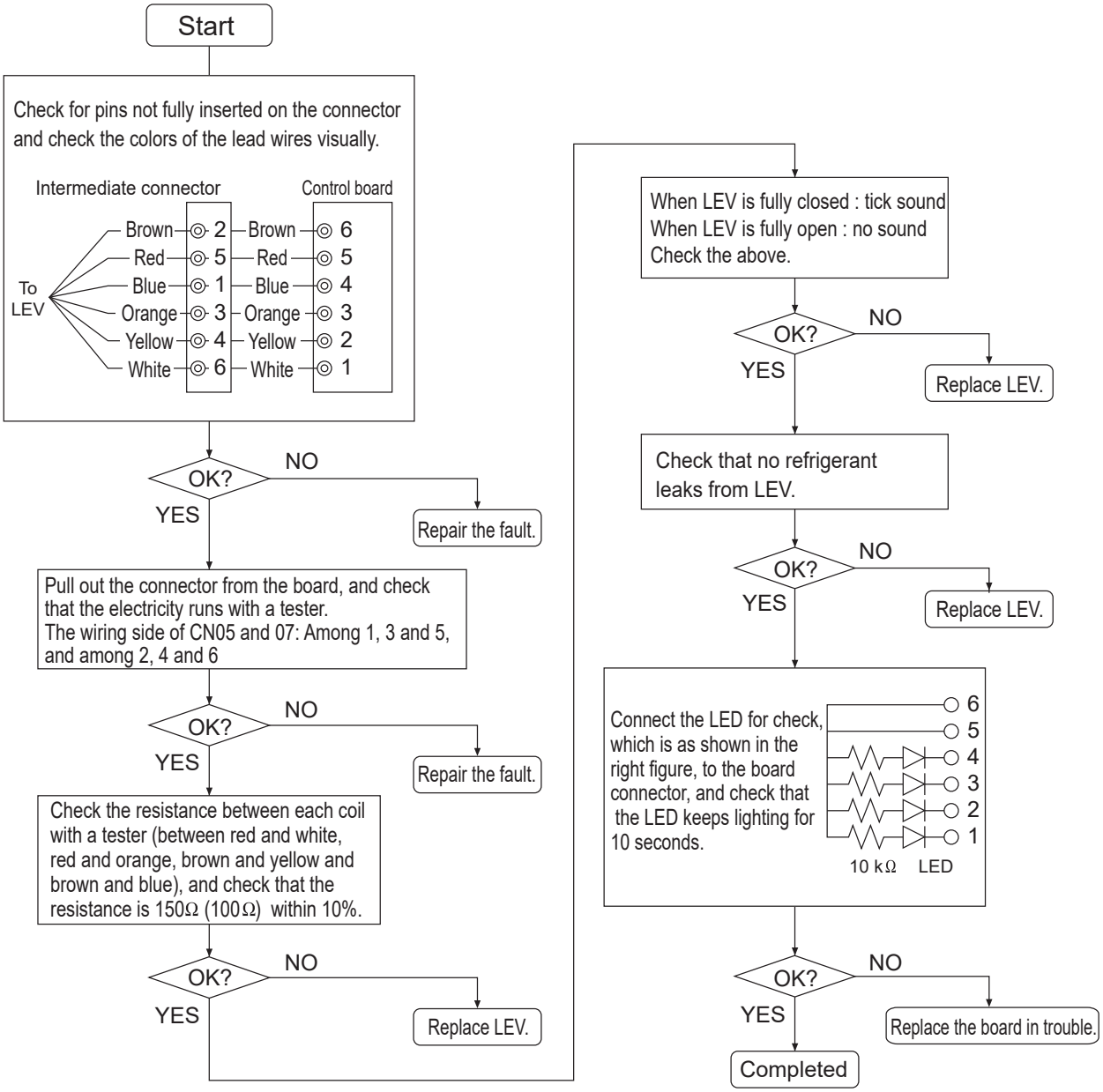
Self-diagnosis LED

	Measurement data	Symbol	SW4 setting value	SW6 setting value
MA (Standard / main)	LEV1 opening	-		
	LEV3 opening	-		
	LEV4 opening	-		
	BC controller bypass outlet superheat	SH12		
	BC controller intermediate part subcool	SC16		
	BC controller liquid-side subcool	SC11		
MB (Sub 1)	LEV3 opening	-		
MB (Sub 2)	LEV3 opening	-		
MB (Sub 3)	LEV3 opening	-		
MB (Sub 4)	LEV3 opening	-		
MB (Sub 5)	LEV3 opening	-		
MB (Sub 6)	LEV3 opening	-		
MB (Sub 7)	LEV3 opening	-		
MB (Sub 8)	LEV3 opening	-		
MB (Sub 9)	LEV3 opening	-		
MB (Sub 10)	LEV3 opening	-		
MB (Sub 11)	LEV3 opening	-		



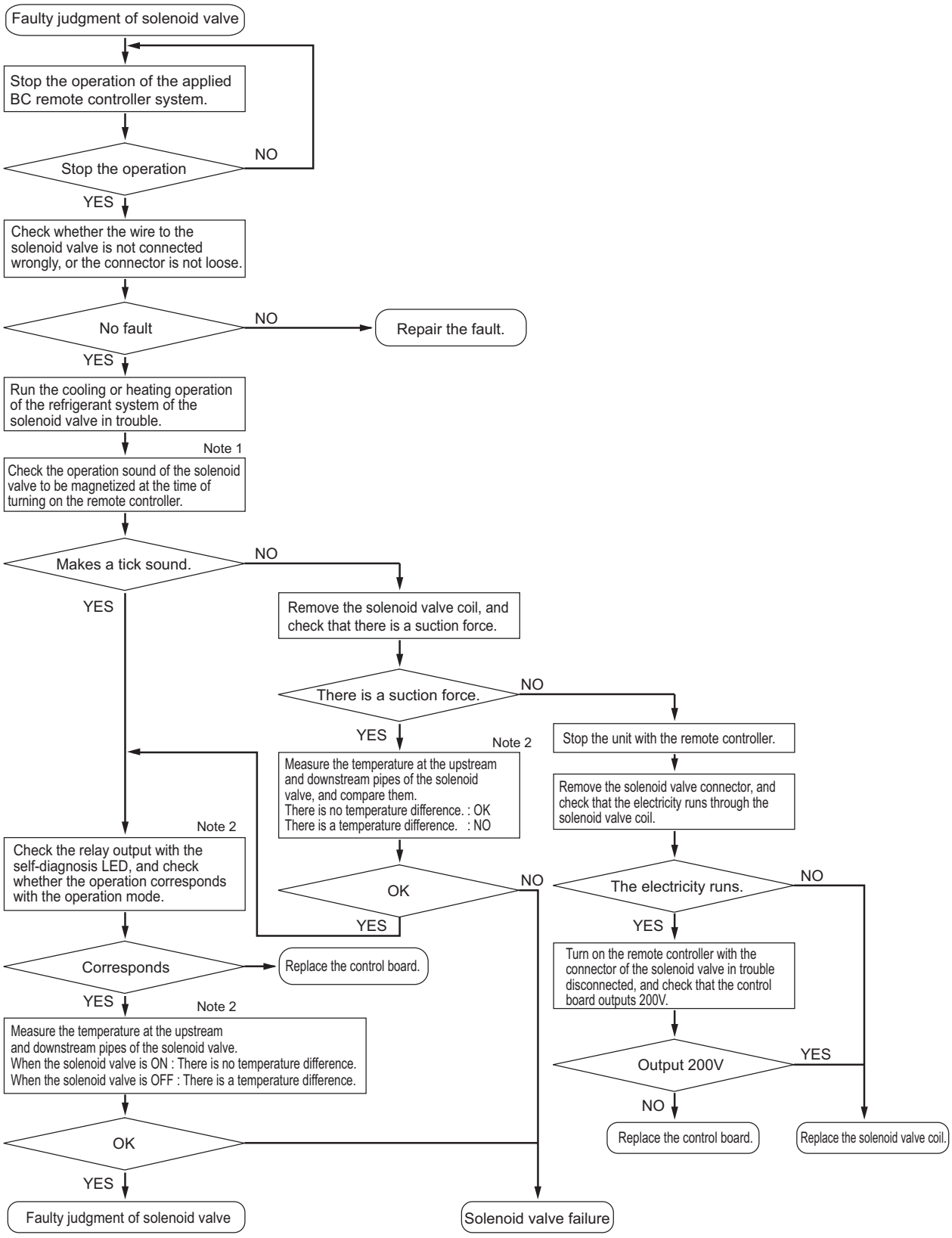
The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

Troubleshooting Flowchart for LEV



4. Troubleshooting Flowchart for Solenoid Valves

(1) Solenoid valve



Check whether the BC board output signal corresponds with the solenoid valve operation correspond.

Note

1) SVM1, SVM1b
SVM1 and SVM1b turn on or off according to the indoor unit operation mode.

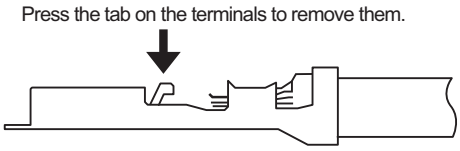
Operation mode	Cooling only	Cooling main	Heating only	Heating main	Defrost	Stopped
SVM1, SVM1b	ON	Pressure differential control OFF or ON	OFF	OFF	ON	OFF

-6- Inverter

- Replace only the compressor if only the compressor is found to be defective. (Overcurrent will flow through the inverter if the compressor is damaged, however, the power supply is automatically cut when overcurrent is detected, protecting the inverter from damage. Make sure that the model selection switches on the heat source unit (Dip switches SW5-3 through 5-8 on the heat source unit control board) are set correctly. For switch settings, refer to the following page(s). VIII [2] Responding to Error Display on the Remote Controller)
- Replace the defective components if the inverter is found to be defective.
- If both the compressor and the inverter are found to be defective, replace the defective component(s) of both devices.

(1) Inverter-related problems: Troubleshooting and remedies

1) The INV board has a large-capacity electrolytic capacitor, in which residual voltage remains even after the main power is turned off, **posing a risk of electric shock.** Before checking the inverter-related components, turn off the power source, leave it turned off for at least 10 minutes, and make sure that the electrolytic capacitor (inverter's main circuit) voltage has dropped to 20 VDC or below. It will take approximately 10 minutes after the power is turned off and before the voltage is discharged.
2) The control box contains high-temperature parts. Be careful even after shutting down the power.
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) The IPM on the inverter becomes damaged if there are loose screws are connectors. If a problem occurs after replacing some of the parts, mixed up wiring is often the cause of the problem. Check for proper connection of the wiring, screws, connectors, and Faston terminals.
5) To avoid damage to the circuit board, do not connect or disconnect the inverter-related connectors with the main power turned on.
6) 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.



7) 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. Wipe off any grease that may get on the wiring terminal to avoid terminal contact failure.
8) Faulty wiring to the compressor damages the compressor. Connect the wiring in the correct phase sequence.
9) When the power is turned on, the compressor or heater is energized even while the compressor is not operating. Before turning on the power, disconnect all power supply wires from the compressor terminal block, and measure the insulation resistance of the compressor. Check the compressor for a ground fault. If the insulation resistance is below 1 MΩ, connect all power supply wires to the compressor and turn on the power to the heat source unit. The liquid refrigerant in the compressor will evaporate by energizing the compressor or heater.
10) Read Chapter I [4] Precautions for Wiring, and tighten screws to the appropriate torque.Loose screws and poor contact can result in overheating and fire.

	Error display / Symptom	Measure/inspection item
[1]	Inverter-related error 0403, 1550, 4220, 4230, 4240, 4250, 4260, 5110, 5301	Check the details of the inverter error in the error history as specified under [X LED Monitor Display on the Heat source Unit Board]. Perform the necessary actions as specified in [VIII [2]Responding to Error Display on the Remote Controller] 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 [VIII [4] -6- (4) 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 [VIII [4] -6- (5) 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 [VIII [4] -6- Inverter].
[5]	The compressor vibrates constantly or makes abnormal noise.	See (2) - [4] under [VIII [4] -6- Inverter].
[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 [VIII [1] Error Code Lists].
		<2> Check for power supply voltage imbalance problems. (Standard: 2% or less)
[7]	Noise is present in peripheral equipment.	<1> Check for any peripheral equipment power source wiring, etc. close to the heat source 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 [VIII [4] -6- Inverter].
		* Consult a Mitsubishi Electric factory for situations other than the above.
[8]	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 heat source 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 [VIII [2] 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 [VIII [1] Error Code Lists].	See the action flow for the error 1550 in [VIII [2] 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 heat source 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 heat source 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.
[5] On-site installation condition check	(1) Check the charged refrigerant amount. (2) Check the installation conditions of the heat source unit branch pipe.	The amount of charged refrigerant exceeds the specified amount.	Reduce it to the specified amount.
		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°)

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

(3) Checking the Installation Conditions

Items to be checked	Phenomena	Remedy
(1) Check refrigerant charge.	Overcharge of refrigerant	Return to correct refrigerant charge.
(2) Check heat source unit branch installation.	The branch approach <500 mm.	Make branch approach >500mm
	Is the branch angle < ±15° to horizontal?	Make branch angle < ±15°

(4) 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). [VIII [4] -6-(6) 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 heat source unit and check that it operates normally.	1) Operates normally without tripping the main breaker.	a) The wiring may have been short-circuited. Search for the wire that short-circuited, and repair it. b) If item a) above is not the cause of the problem, the compressor may be faulty. Check the compressor for ground fault and coil failure according to VIII [4] -6-(2).
		2) Main power breaker trip	

Note

The insulation resistance could go down to close to 1 MΩ after installation or when the power is kept off for an extended period of time because of the accumulation of refrigerant in the compressor. If the insulation resistance is below 1 MΩ, please use the following procedure to take care of this.

- Connect all power supply wires to the compressor and turn on the power to the heat source unit.
- By turning on the main power and keeping it on for at least 12 hours, the refrigerant in the compressor will evaporate and the insulation resistance will go up.
- Turn off the main power and leave it for at least 10 minutes.
- Disconnect the power supply wires from the compressor, measure the compressor's insulation resistance, and confirm that the resistance has recovered to 1 MΩ or greater.

Earth leakage current measurement method

- For easy on-site measurement of the earth leakage current, enable the filter with a measurement instrument that has filter functions as below, clamp all the power supply wires, and measure.
  Recommended measurement instrument: CLAMP ON LEAK HiTESTER 3283 made by HIOKI E.E. CORPORATION
- When measuring one device alone, measure near the device's power supply terminal block.

(5) 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). [VIII [4] -6- (6) Simple Check on Inverter Circuit Components] [VIII [4] -6- (7) 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.

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.

(6) 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: 1 Ω or lower (almost 0 Ω) Measure the resistance between terminals and the chassis: ∞

(7) Troubleshooting Problems with IGBT Module

Measure the resistance across each pair of terminals on the INV 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.

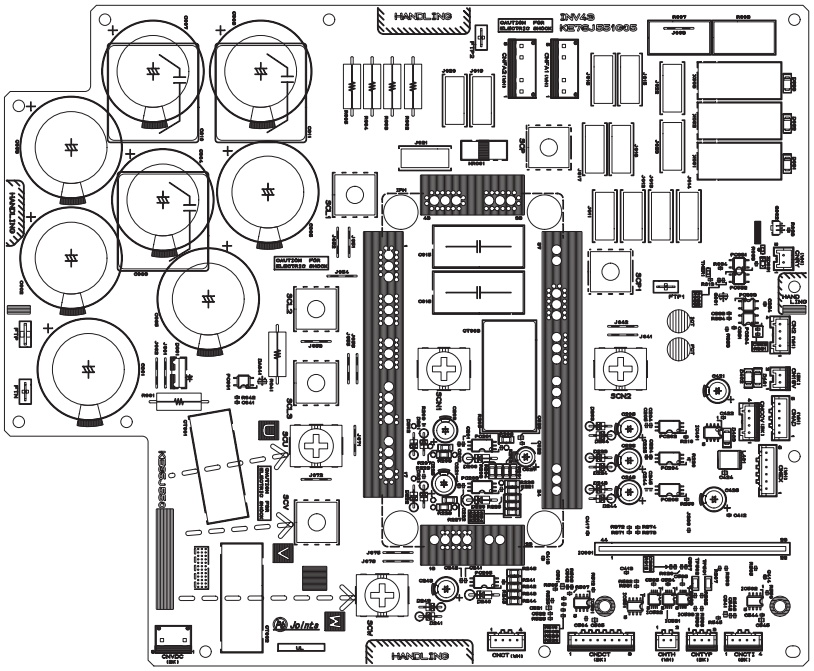
<208-230V models>

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



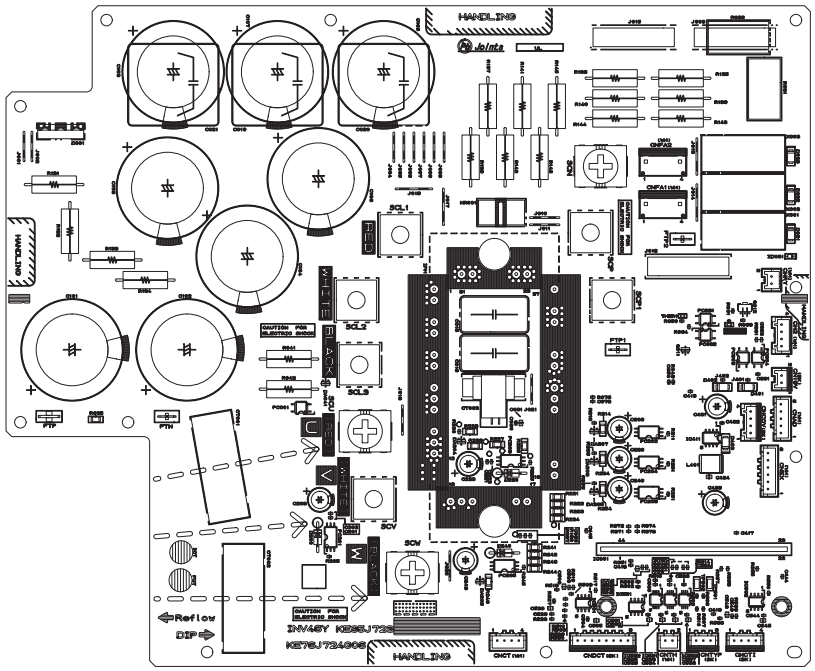
<460V models>

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	∞	∞	-	-	-

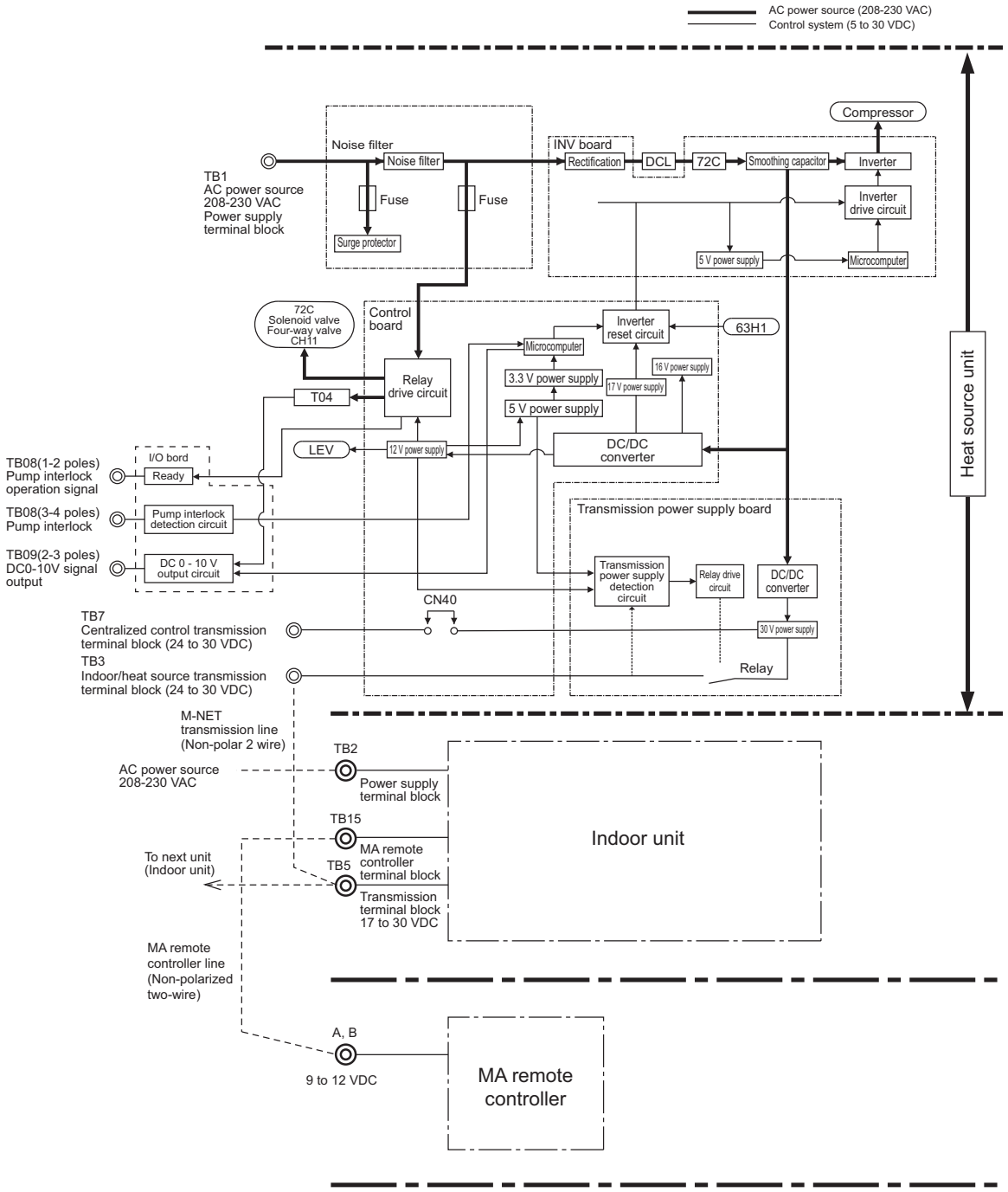
INV board outline drawing



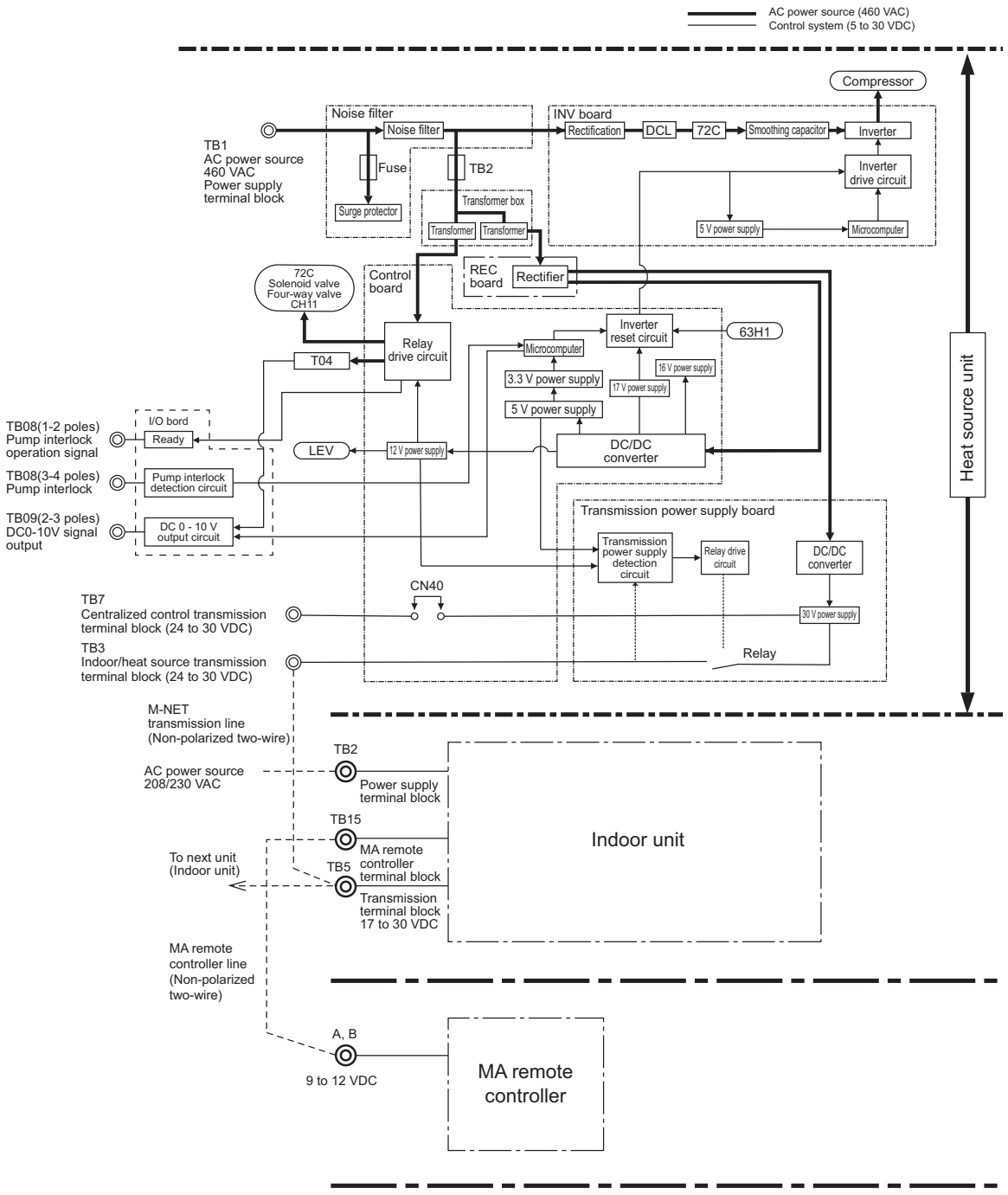
-7- Control Circuit

(1) Control Power Supply Function Block

1) TQRYP072, 096, 120, 144, 168, 192, 216, 2403AMM0AN

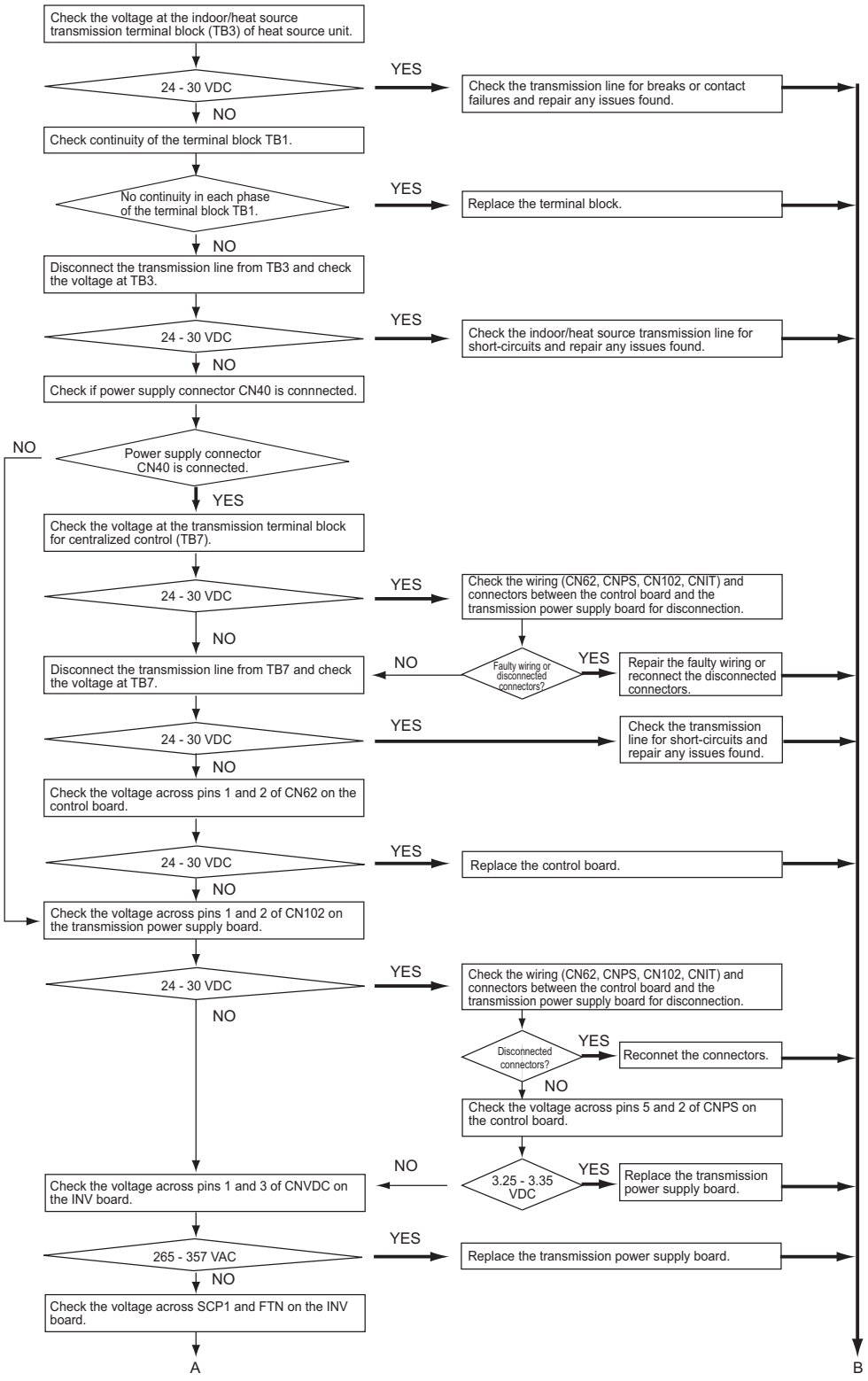


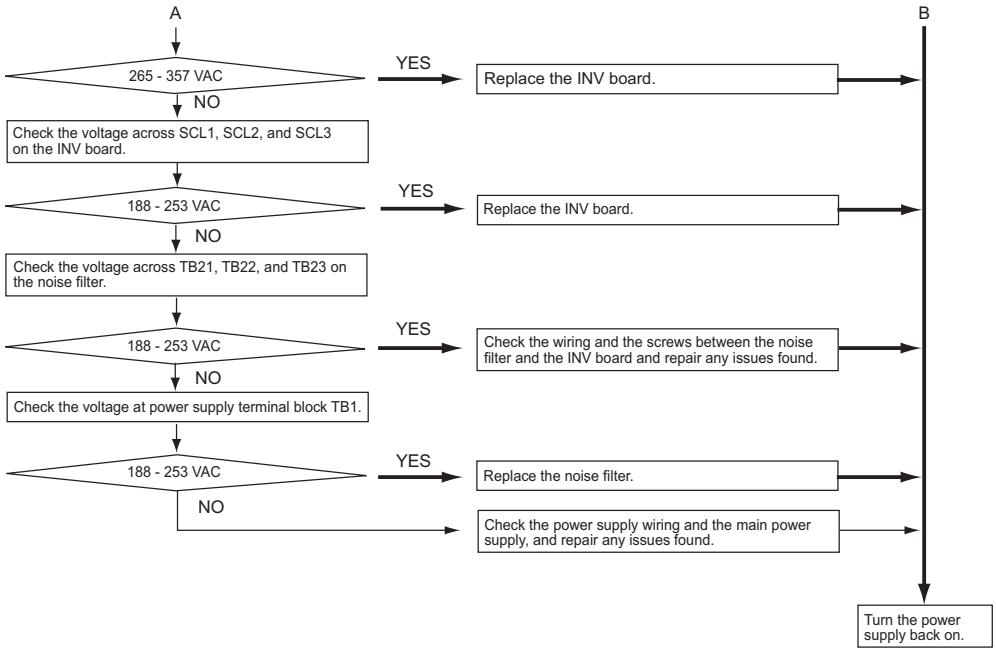
2) TQRYP072, 096, 120, 144, 168, 192, 216, 2404AMM0AN



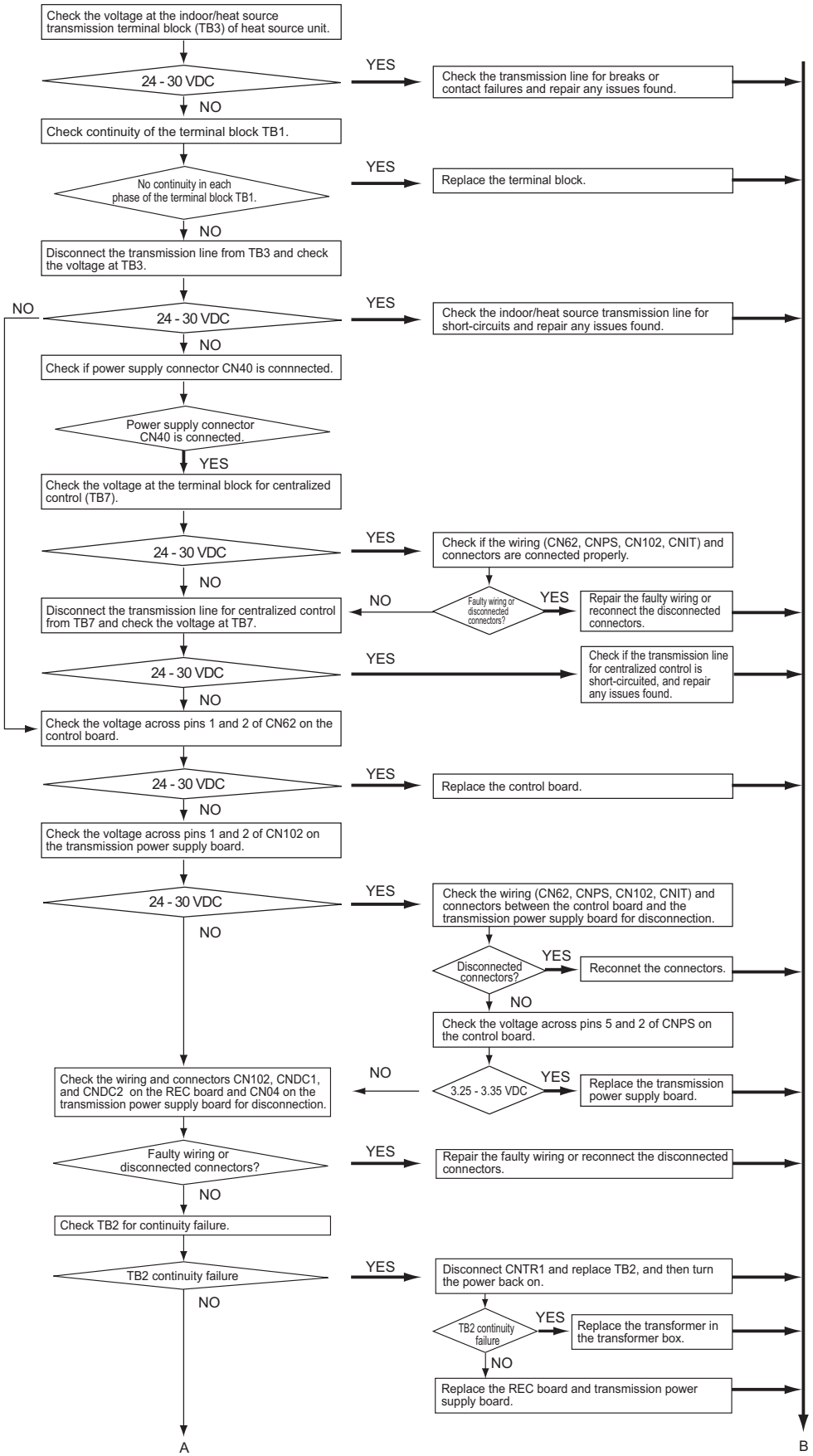
(2) Troubleshooting Problems with Heat Source Unit Transmission Power Supply Circuit

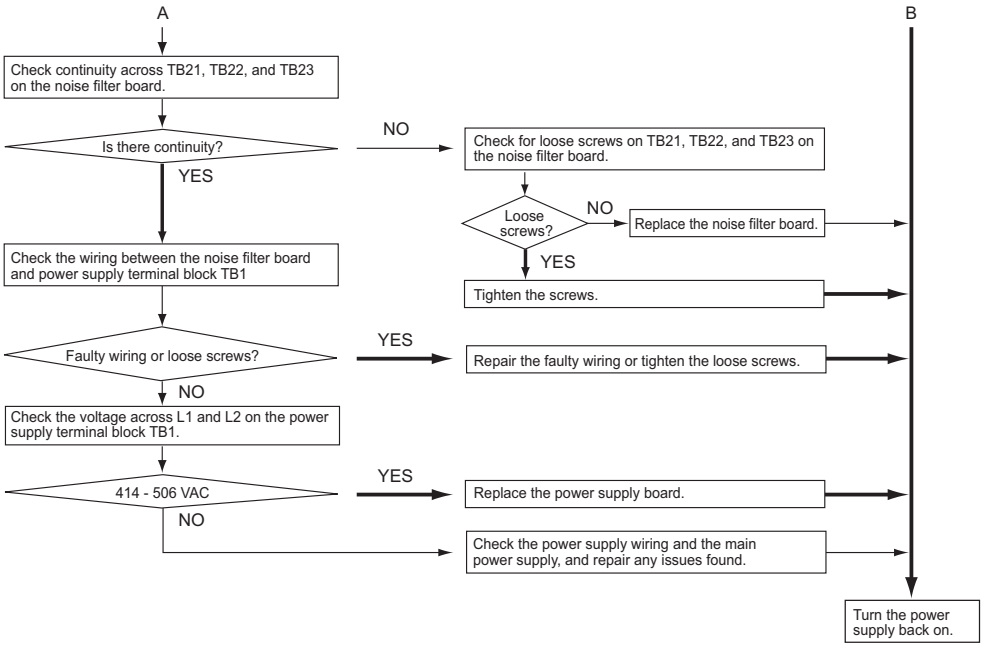
1) TQRYP072, 096, 120, 144, 168, 192, 216, 2403AMM0AN




A
B
265 - 357 VAC
YES
Replace the INV board.
NO
Check the voltage across SCL1, SCL2, and SCL3 on the INV board.
188 - 253 VAC
YES
Replace the INV board.
NO
Check the voltage across TB21, TB22, and TB23 on the noise filter.
188 - 253 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.
188 - 253 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) TQRYP072, 096, 120, 144, 168, 192, 216, 2404AMM0AN




A
Check continuity across TB21, TB22, and TB23 on the noise filter board.
Is there continuity?
NO
Check for loose screws on TB21, TB22, and TB23 on the noise filter board.
YES
Loose screws?
NO
Replace the noise filter board.
YES
Tighten the screws.
Check the wiring between the noise filter board and power supply terminal block TB1
Faulty wiring or loose screws?
YES
Repair the faulty wiring or tighten the loose screws.
NO
Check the voltage across L1 and L2 on the power supply terminal block TB1.
414 - 506 VAC
YES
Replace the power supply board.
NO
Check the power supply wiring and the main power supply, and repair any issues found.
B
Turn the power supply back on.

[5] Refrigerant Leak

Note

Refer to the relevant sections of the manual for how to set SW4 on the control board.

1. Leak spot: In the case of extension pipe for indoor unit (Cooling season)<TQRY>

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 high-pressure side refrigerant service valve (BV2) on the heat source unit while the compressor is being stopped.
3) Stop all the indoor units; turn on SW4 No.17 (SW6-10: ON) on the heat source 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 No.17 (SW6-10: ON) 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 service ball valve (BV1) on the low-pressure pipe on the heat source unit.
6) Collect the refrigerant that remains in the extended pipe for the indoor unit. Do not discharge refrigerant into the atmosphere when it is collected.
7) Repair the leak.
8) After repairing the leak, vacuum*1 the extension pipe and the indoor unit.
9) To adjust refrigerant amount, open the ball valves (BV1 and BV2) inside the heat source unit and turn off SW4 No.912 (SW6-10: ON).

2. Leak spot: In the case of heat source unit (Cooling season)<TQRY>

(1) Run all the indoor units in the cooling test run mode.

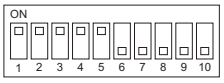
1) To run the indoor unit in test run mode, turn on SW4 No.1 (SW6-10: ON) on the heat source control board.
2) Change the setting of the remote controller for all the indoor units to the cooling mode.
3) Check that all the indoor units are performing a cooling operation.

(2) Check the SC16 value.
(This valve can be displayed on the LED by setting the self-diagnosis switch (SW4(SW6-10: OFF)) on the heat source unit control board.)

1) When SC16 is 10°C [18°F] or above: Go to the next item (3).
2) When the SC16 value is below 10°C [18°F] : After the compressor has stopped, extract the refrigerant in the system, repair the leak, evacuate the air from the system *1, and charge the system with refrigerant. (If the leak is in the heat source unit, follow the same procedure as listed under "heating season.")

SC16 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 No.769 (SW6-10: ON) from ON to OFF on the heat source control board.
2) Check that all the indoor units are being stopped.

(4) Close the ball valves (BV1 and BV2).

(5) Collect the refrigerant that remains inside the heat source unit.Do not discharge refrigerant into air into the atmosphere when it is collected.

(6) Repair the leak.

(7) After repairing the leak, replace the dryer with the new one, and perform evacuation *1 inside the heat source unit.

(8) To adjust refrigerant amount, open the ball valves (BV1 and BV2) inside the heat source unit.

Note

When performing the maintenance work, such as vacuum drying, pumping down, or refrigerant recovery, on the heat-source unit, operate the water circuit pump and circulate the water to prevent the water side of the heat exchanger from freezing.

*1. Refer to Chapter I [3] 3. Vacuum Drying (Evacuation) for detailed procedure.

3. Leak spot: In the case of extension pipe for indoor unit (Heating season) <TQRY>

(1) Run all the indoor units in heating test run mode.

1) To run the indoor unit in test run mode, turn on SW4 No.769 (SW6-10: ON) on the heat source 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 No.769 (SW6-10: ON) from ON to OFF on the heat source control board.
2) Check that all the indoor units are stopped.

(3) Close the ball valves (BV1 and BV2).

(4) Collect the refrigerant that remains inside the indoor unit. Do not discharge refrigerant into air into the atmosphere when it is collected.

(5) Repair the leak.

(6) After repairing the leak, perform evacuation of the extension pipe*1 for the indoor unit, and open the ball valves (BV1 and BV2) to adjust refrigerant.

4. Leak spot: In the case of heat source unit (Heating season) <TQRY>

1) Collect the refrigerant in the entire system (heat source unit, extended pipe and indoor unit).Do not discharge refrigerant into the atmosphere when it is collected.
2) Repair the leak.
3) Repair the leak, and evacuate the air from the entire system *1 . Then, calculate the proper amount of refrigerant to be added (heat source unit + extension pipe + indoor unit), and charge the system with that amount. Refer to Chapter VII [3] Adjusting the Refrigerant Amount.

Note

When performing the maintenance work, such as vacuum drying, pumping down, or refrigerant recovery, on the heat-source unit, operate the water circuit pump and circulate the water to prevent the water side of the heat exchanger from freezing.

*1. Refer to Chapter I [8] Vacuum Drying (Evacuation) for detailed procedure.

[6] Compressor Replacement Instructions

1. Parts Replacement Instructions

Compressor Replacement Procedure

[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.

● When replacing the compressor, remove each component following the steps (1) to (10) below.
When reinstalling the removed components, follow these steps in reverse order.

(1) Remove the front panels of the casing. (24 screws: Fig. 1)

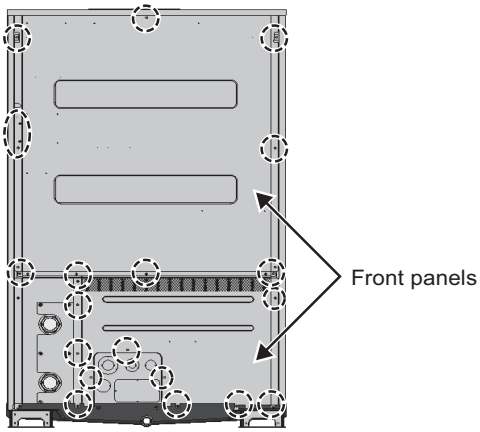


Fig. 1

(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. (Seven screws: Fig. 3)

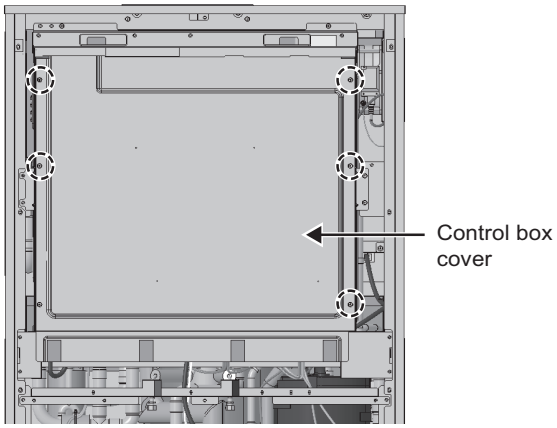


Fig. 2

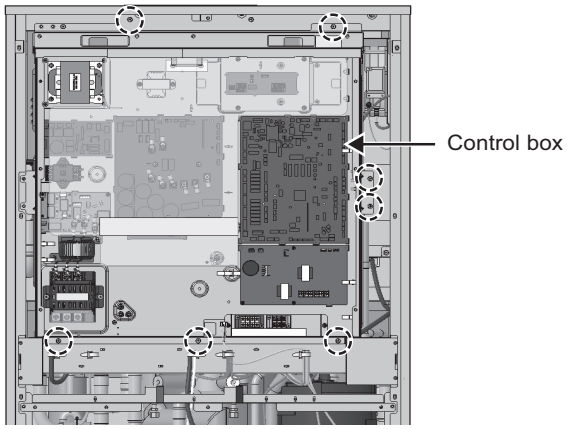


Fig. 3

(4) Remove the cable straps and plastic clips from the frame.
(16 cable straps (five on the front side and 11 on the back side), two plastic clips: Fig. 4)
(5) Remove the frame. (Six screws: Fig. 4)

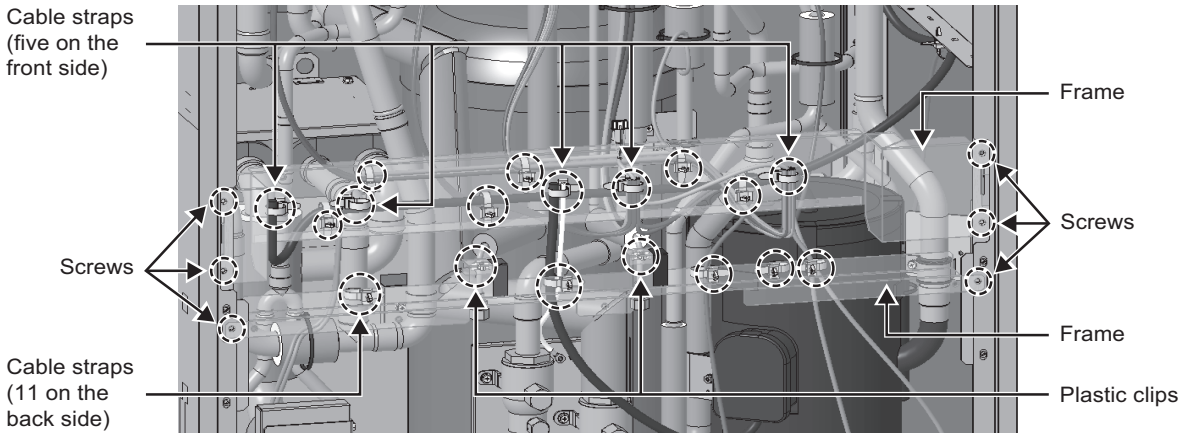


Fig. 4

(6) Remove the soundproofing material. (Fig. 5)
(7) Remove the compressor cable, thermistor (TH15), crankcase heater (CH11), saddle, and pipe cover. (Three screws: Fig.5)
Remove the saddle following the procedure shown in Fig. 6.
* Save the removed components for later use.

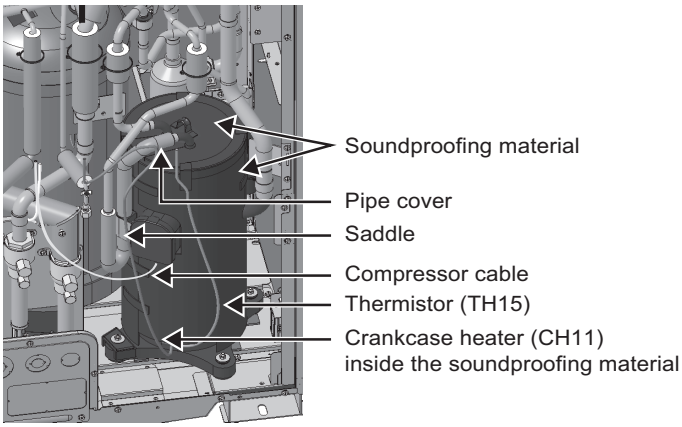


Fig. 5

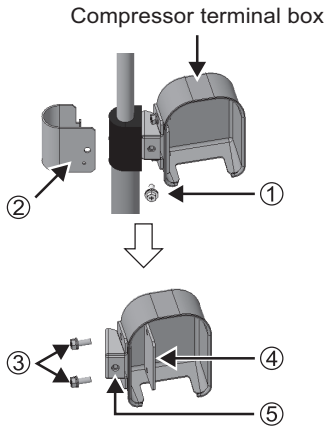


Fig. 6

* 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, sheet metal, or insulation material inside the unit.
- To protect the unit piping, pipe covers, and insulation material 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) Before removing the brazing from the pipes, protect the insulation material, pipe cover, and wiring from burning by using a wet felt cloth, such as the recommended felt. (Three areas to remove brazing: Fig. 7)

(9) Remove the compressor securing nuts. (Three bolts: Fig. 8)
* Seal the pipes to prevent oil from leaking when the compressor is tilted.

(10) After replacing the compressor, protect the insulation material, pipe cover, and wiring by using a wet felt cloth in the same manner as removal of the brazing, and then braze the pipes. (Three areas to braze: Fig. 7)
*Tighten the compressor securing nuts using a torque-setting tool. Recommended tightening torque is 5.0 N・m. (Fig. 8)

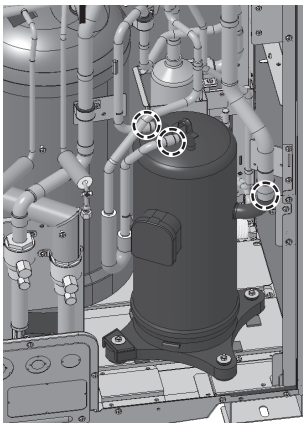


Fig. 7

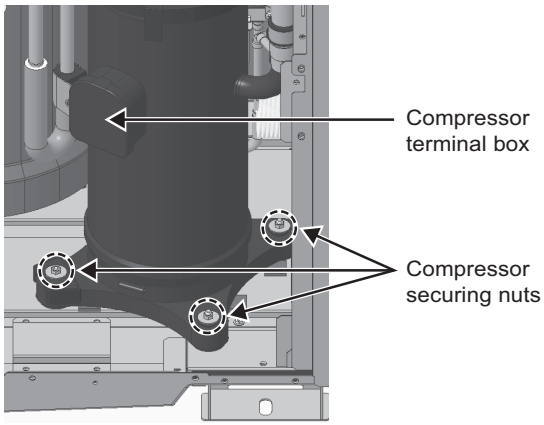


Fig. 8

The replacement of the compressor is completed here. Reinstall the components that were removed in each step to their original positions.

* Tighten the screws on the power supply terminal block inside the compressor terminal box using a torque-setting tool. Recommended tightening torque is 2.2 to 2.6 N・m. (Fig. 8)

[7] Accumulator Replacement Instructions

[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.

● When replacing the accumulator, follow steps (1) to (13) below to remove the components.
When reinstalling the removed components, follow the procedure in reverse order of (1) through (13) below.

1. To ensure a clear workspace for servicing, follow the steps below.

(1) Remove the front panels of the casing. (24 screws: Figure 1)

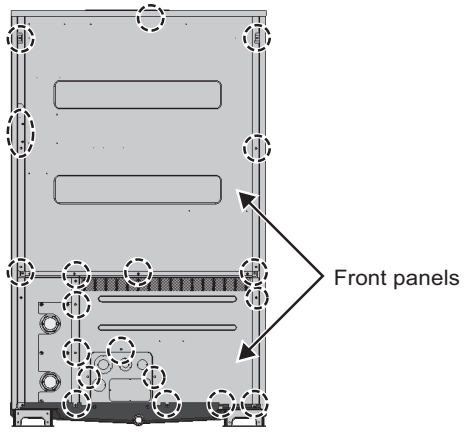


Figure 1

(2) Remove the control box cover and the wiring connected to the unit from the control box. (Six screws: Figure 2)

(3) Remove the control box. (Seven screws: Figure 3)

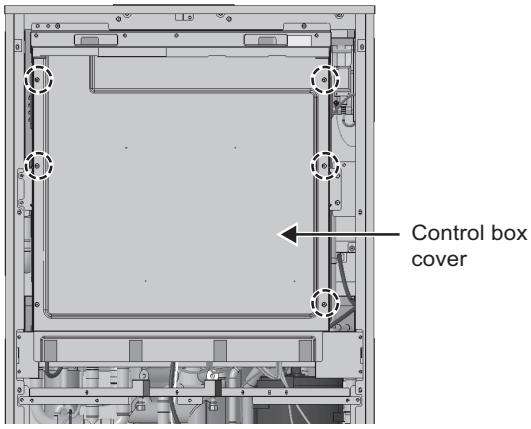


Figure 2

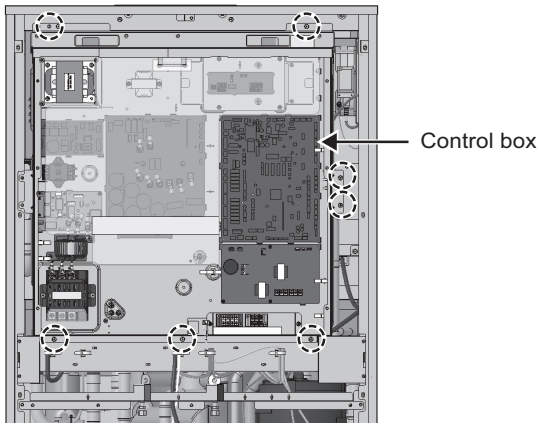


Figure 3

(4) Remove the duct. (Four screws: Figure 4)

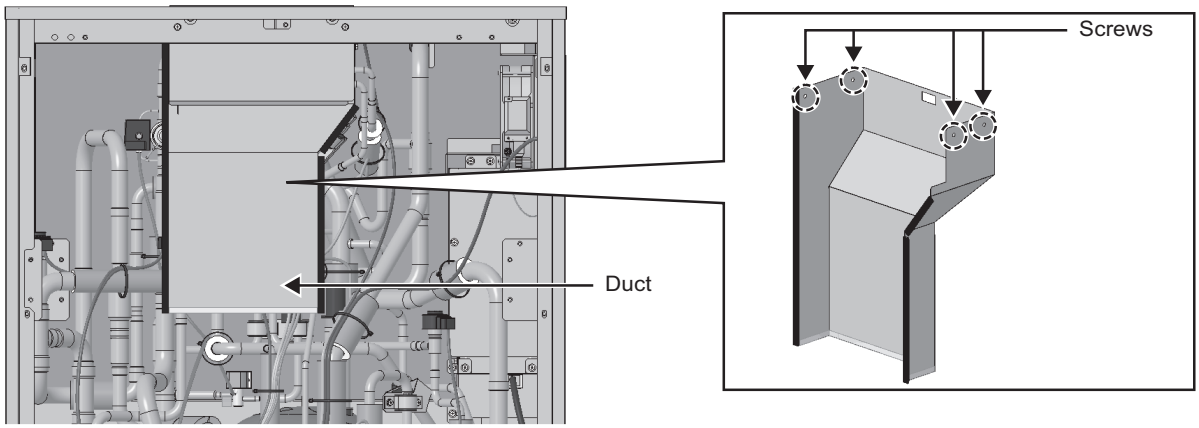


Figure 4

(5) Remove all the cable straps and plastic clips from the frames.
(16 cable straps (five on the front side and 11 on the back side), two plastic clips: Figure 5)
(6) Remove the frames. (Six screws: Figure 5)

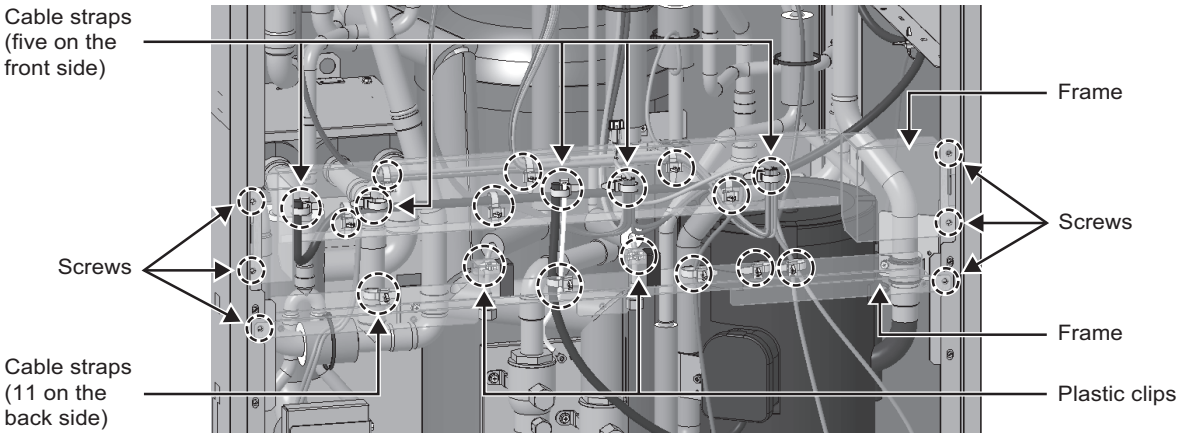


Figure 5

2. The steps for replacing the accumulator are as follows.

(7) Remove the pipe covers, bands, soundproofing material for the compressor, packings/saddles, sheet metal, and coil covers shown in the figure below. (Figure 6)

* Save the removed components for later use.

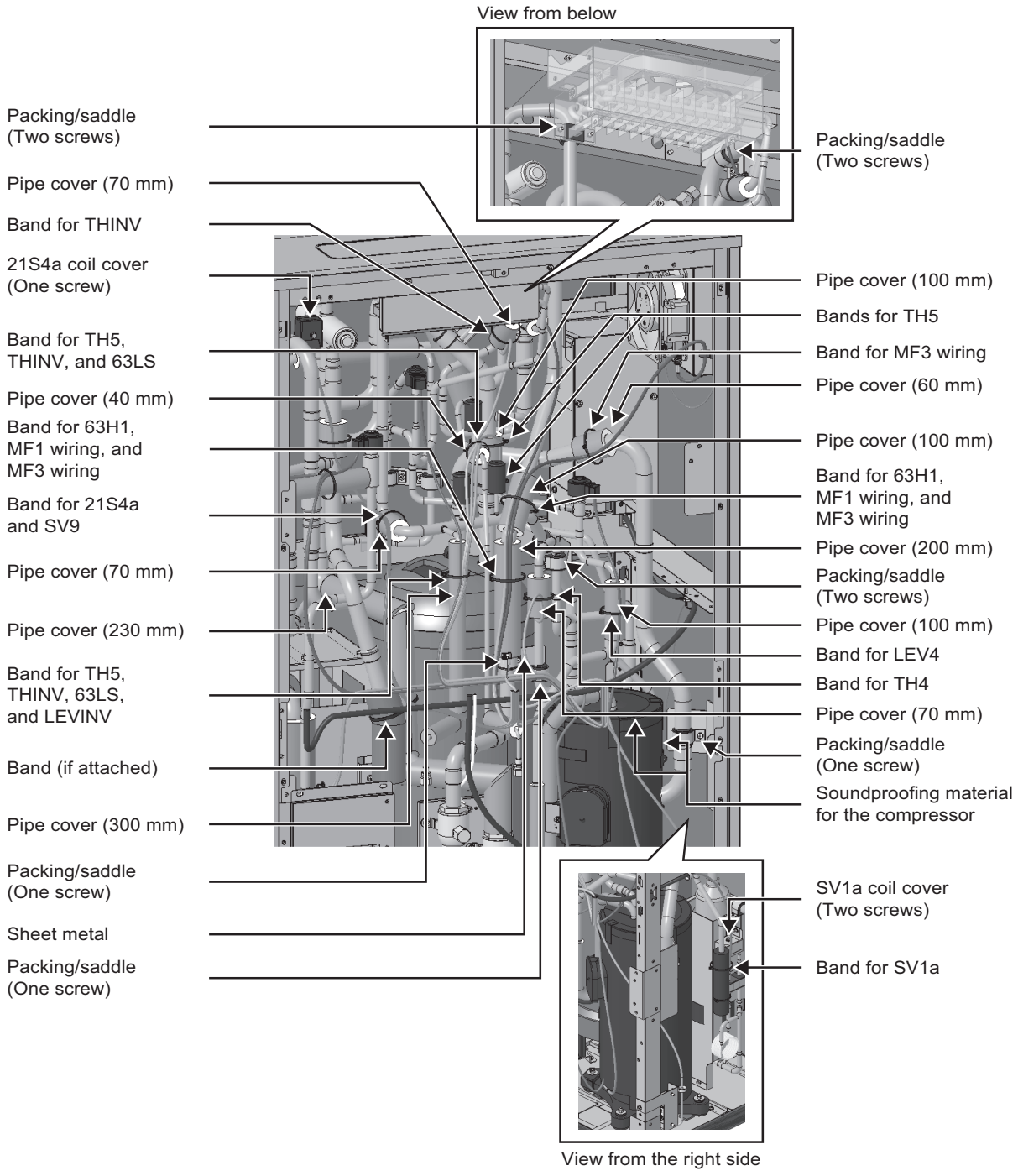


Figure 6

(8) Remove the following components.
TH4, TH5, TH15, THINV, LEV4 coil, LEVINV coil, SV1a coil, and 21S4a coil (Figure 7)

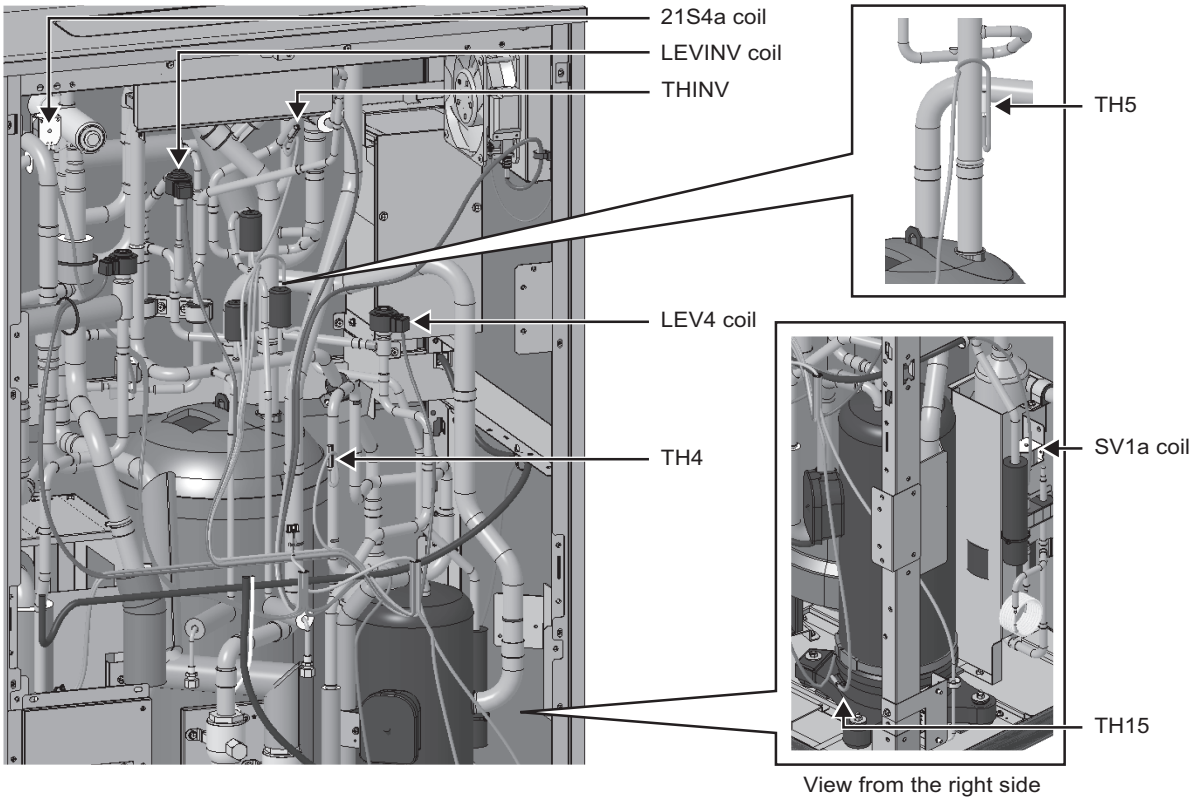


Figure 7

* 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, sheet metal parts, or insulating material inside the unit.
- To protect the water heat exchanger, unit piping, pipe cover, and fusible plug 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 (5 t × 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

(9) Remove the brazing from the circled areas and remove the pipes.
Remove the screws that are securing the service valve to the sheet metal. (Four screws)
(Remove brazing at 18 areas: Figure 8) (Remove eight pipes: Figure 9)

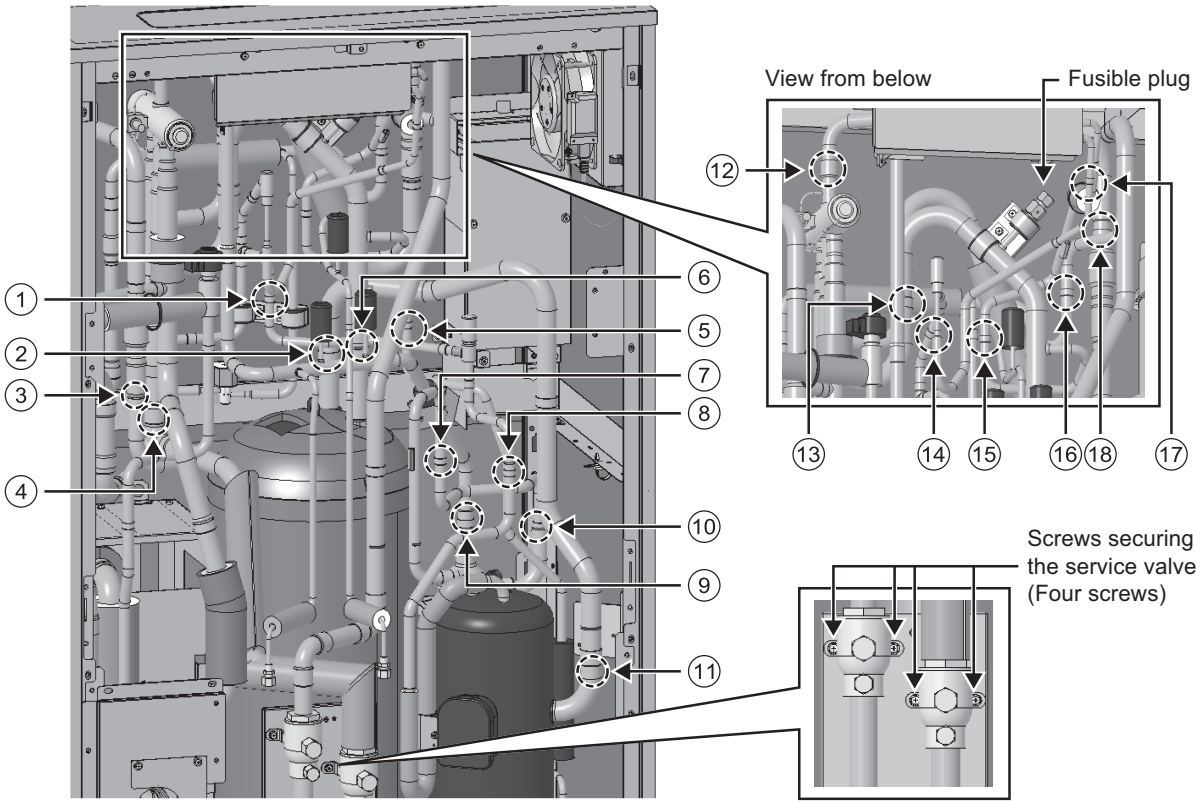


Figure 8

<Removed pipes>

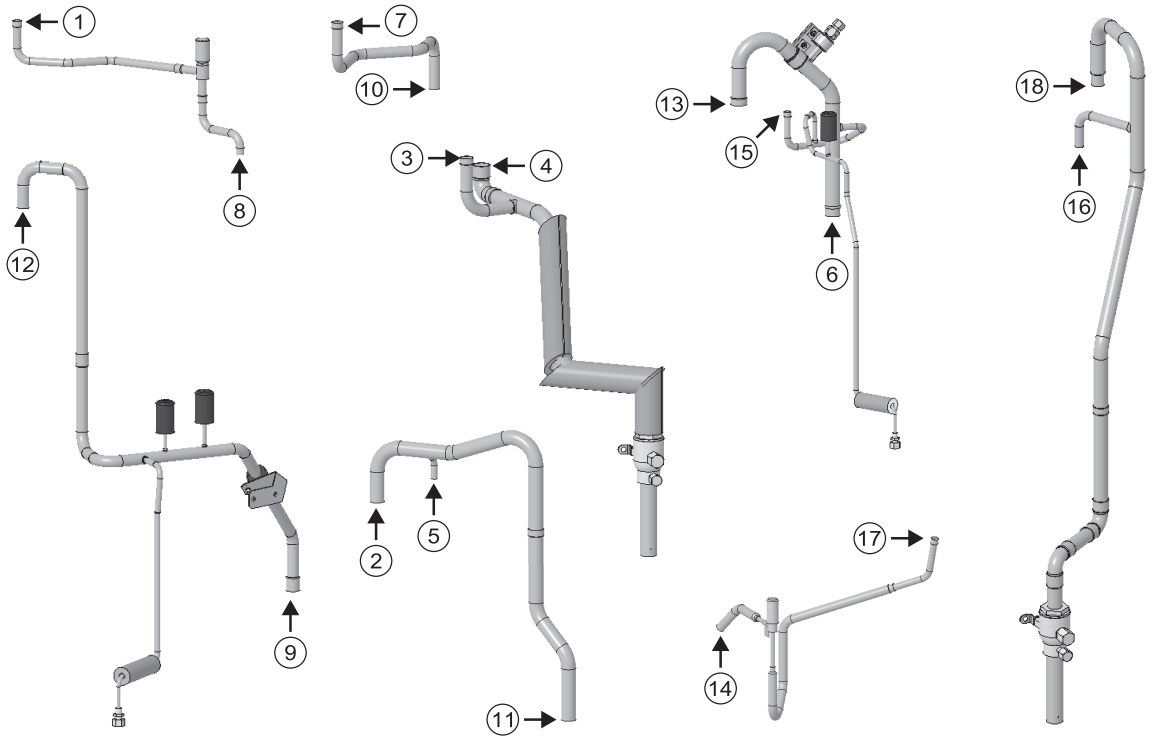


Figure 9

(10) Remove the sheet metal that is securing the service valve. (Two screws: Figure 10)
(11) Remove the compressor. (Three nuts: Figure 10)

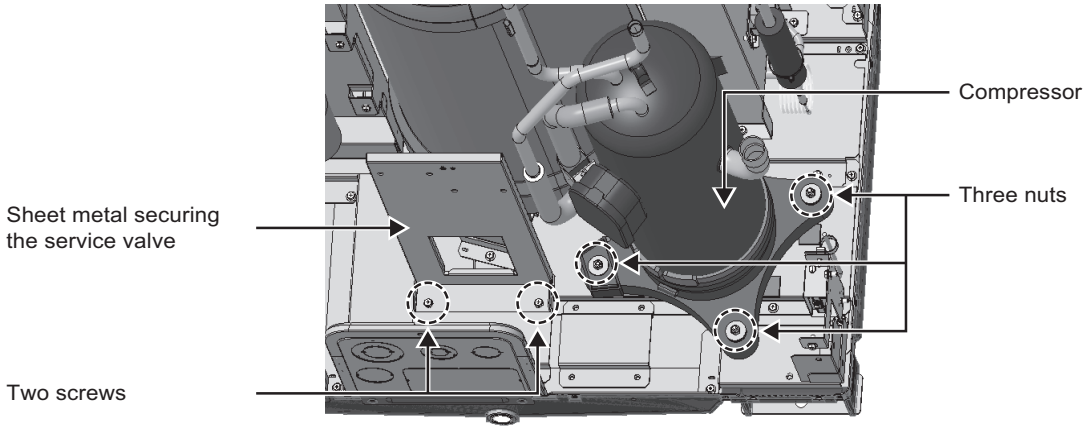


Figure 10

(12) Remove the screws from the leg of the accumulator, and replace the accumulator. (Six screws: Figure 11)
(13) After replacing the accumulator, attach the supplied insulator. (Figure 11)

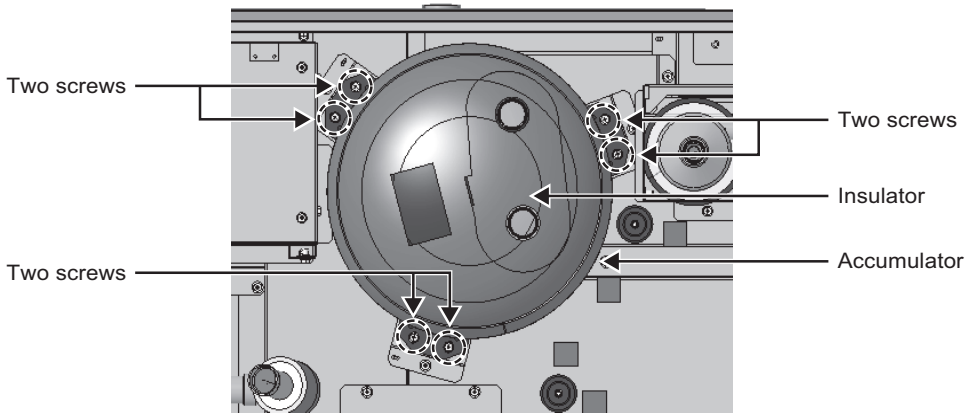


Figure 11

The replacement of the accumulator is completed here.
Reinstall the components that were removed in each step to their original positions.

[8] Water-cooled heat exchanger Replacement Instructions

1. Applicable models

- TQRYP072, 096, 120, 144, 168, 1923AMM0AN, TQRYP072, 096, 120, 144, 168, 1924AMM0AN

[Item list]

No.	Item	Qty
1	- Replacement Instructions	1
	- Water heat exchanger	1
	- Pipe cover A	1
	- Pipe cover B	1
	- Pipe cover C	1
	- Pipe cover D	1
	- Pipe cover E	1
	- Band	4

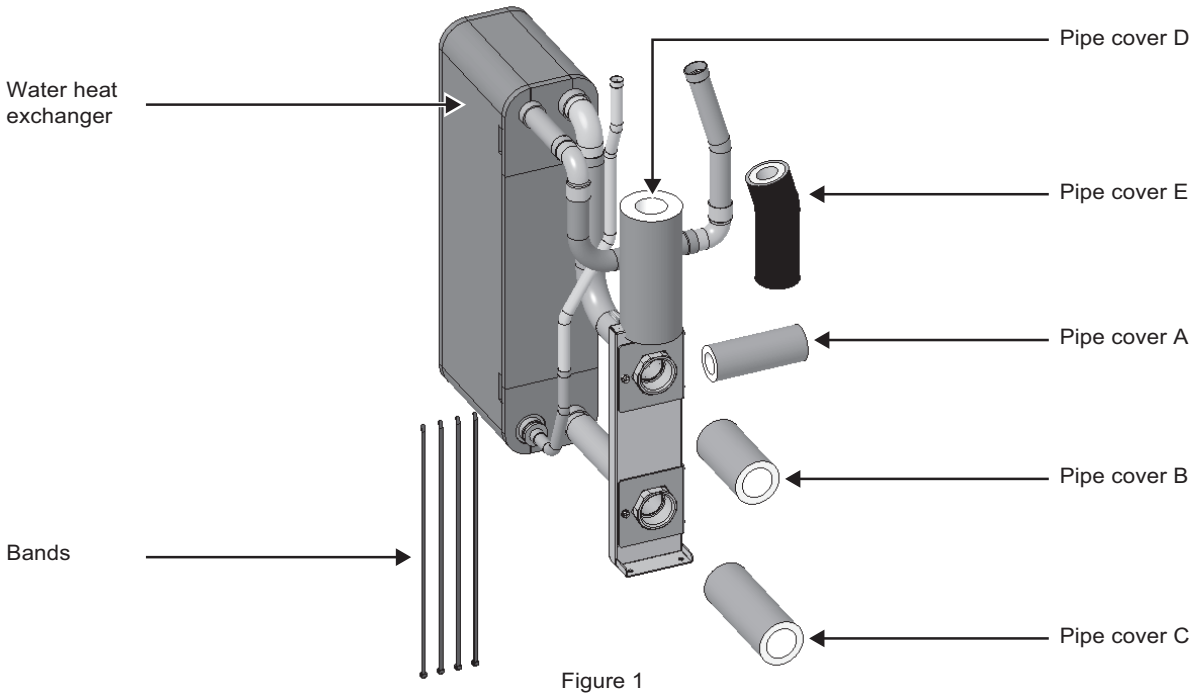


Figure 1

[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.

● When replacing the water heat exchanger, follow steps (1) to (15) below to remove the components.
When reinstalling the removed components, follow the procedure in reverse order of (1) through (15) below.

1-1. To ensure a clear workspace for servicing, follow the steps below.

(1) Remove the front panels of the casing. (32 screws: Figure 2)

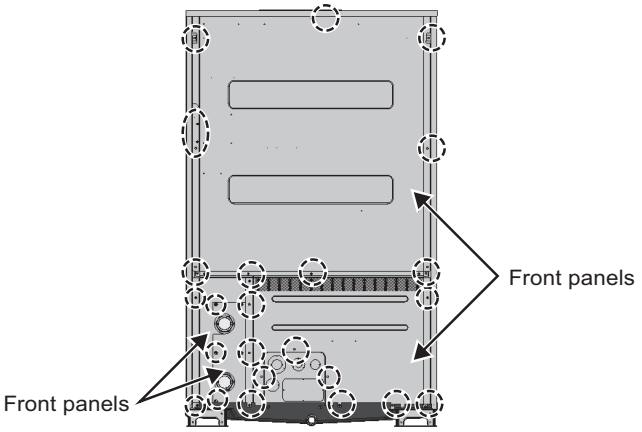


Figure 2

(2) Remove the control box cover and the wiring connected to the unit from the control box. (Six screws: Figure 3)

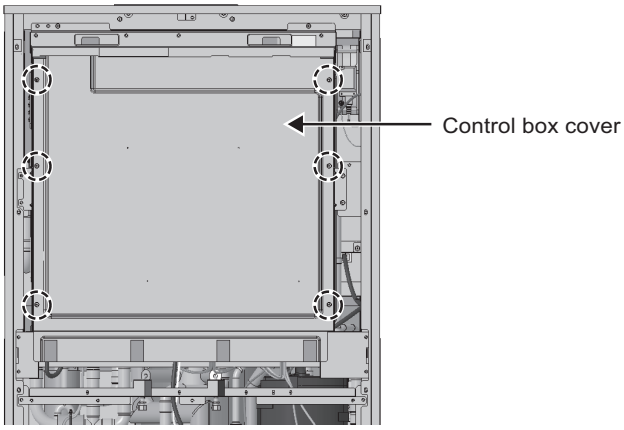


Figure 3

(3) Remove the control box. (Seven screws: Figure 4)

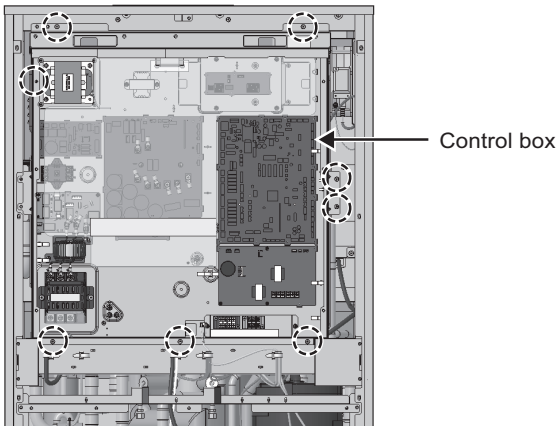


Figure 4

(4) Remove all the cable straps and plastic clips from the frames.
(16 cable straps (five on the front side and 11 on the back side), two plastic clips: Figure 5)
(5) Remove the frames. (Six screws: Figure 5)

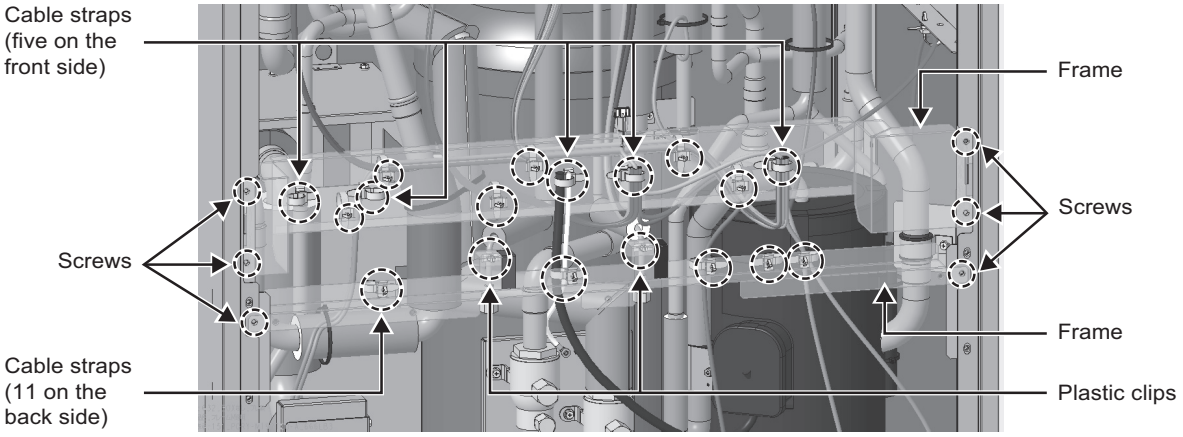


Figure 5

1-2. To ensure a clear workspace for servicing, follow the steps below.
(6) Remove the socket support. (Two screws: Figure 6)
(7) Remove the pipe covers. (Four bands, five pipe covers: Figure 7)
(8) Remove TH7 and TH8. (Figure 7)

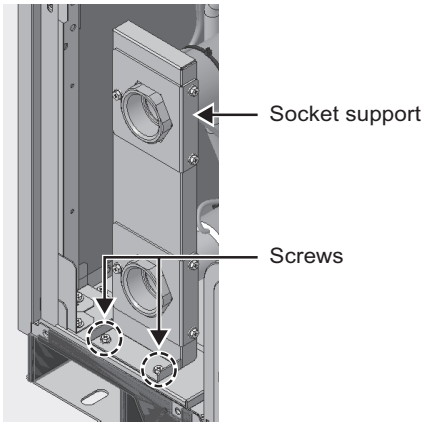


Figure 6

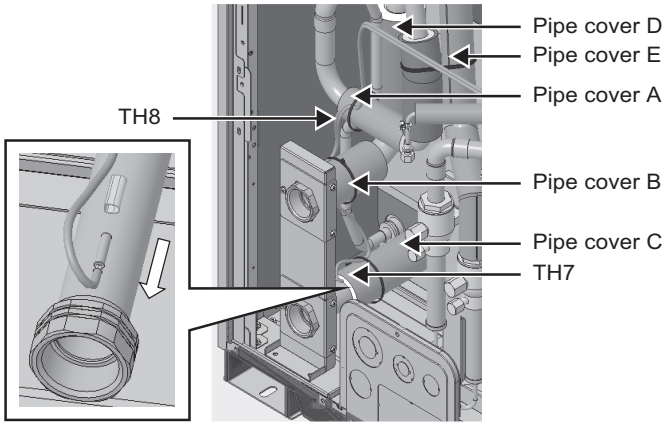


Figure 7

* Cautions for replacing a water 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, sheet metal parts, or insulating material inside the unit.
- To protect the water 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 (5 t × 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

(9) Remove the brazing from the piping. (Two areas: Figure 8)

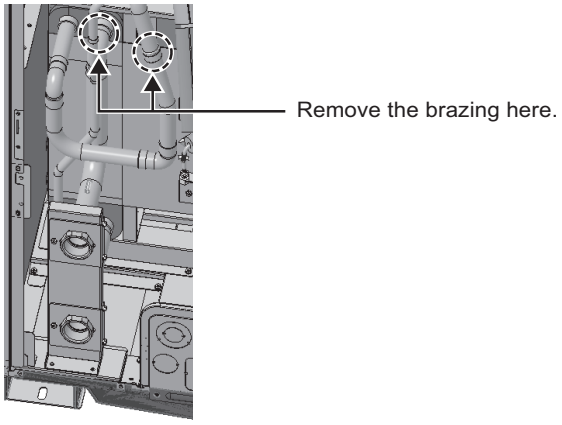


Figure 8

(10) Remove the front panel. (Two screws: Figure 9)

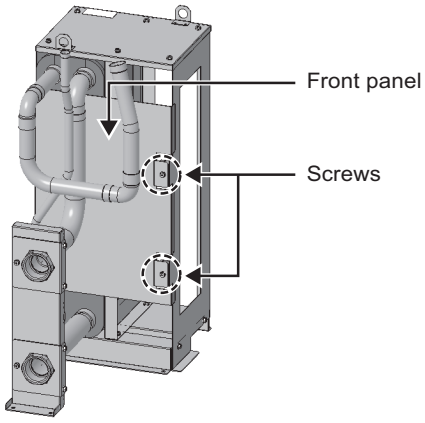


Figure 9

(11) Remove the screws from the top panel. (Six screws: Figure 10-①)
(12) Remove the screws from the dividing panel. (Two screws: Figure 10-②)
(13) Move the dividing panel to the right. (Figure 10)
(14) With the top panel lifted, pull the water heat exchanger forward. (Figure 11)

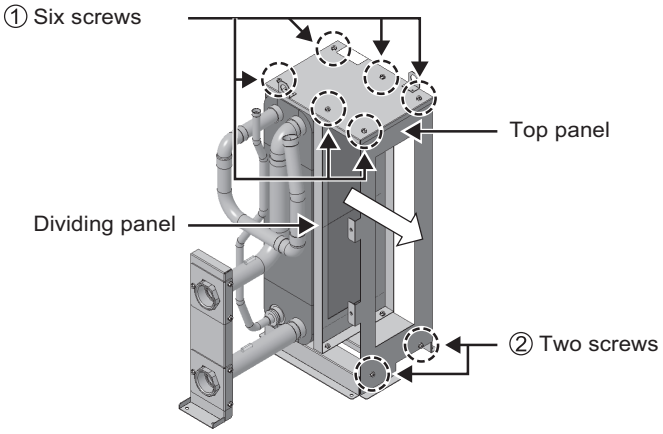


Figure 10

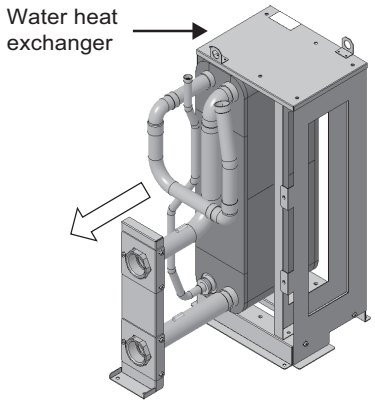


Figure 11

(15) Reverse the above procedure to install the new water heat exchanger.

The replacement of the water heat exchanger is completed here. Reinstall the components that were removed in each step to their original positions.

2. Applicable models

- TQRYP216, 2403AMM0AN, TQRYP216, 2404AMM0AN

[Item list]

No.	Item	Qty
1	- Replacement Instructions	1
	- Water heat exchanger A (with thermistor holder)	1
	- Water heat exchanger B	1
	- Pipe cover A	1
	- Pipe cover B	1
	- Pipe cover C	1
	- Pipe cover D	1
	- Pipe cover E	1
	- Pipe cover F	1
	- Band	3
	- Insulator A	2
	- Insulator B	2
	- Insulator C	2

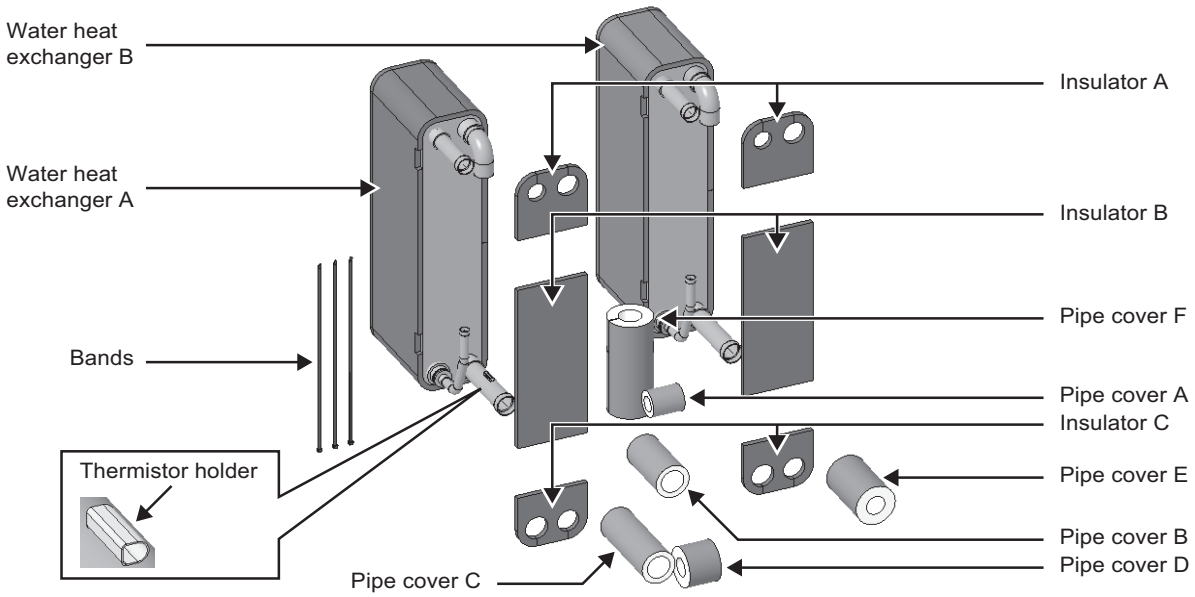


Figure 1

[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.

● When replacing the water heat exchanger, follow steps (1) to (16) below to remove the components.
When reinstalling the removed components, follow the procedure in reverse order of (1) through (16) below.

2-1. To ensure a clear workspace for servicing, follow the steps below.

(1) Remove the front panels of the casing. (32 screws: Figure 2)

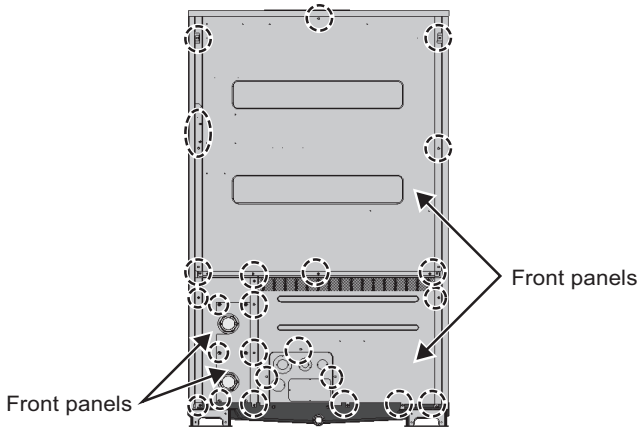


Figure 2

(2) Remove the control box cover and the wiring connected to the unit from the control box. (Six screws: Figure 3)

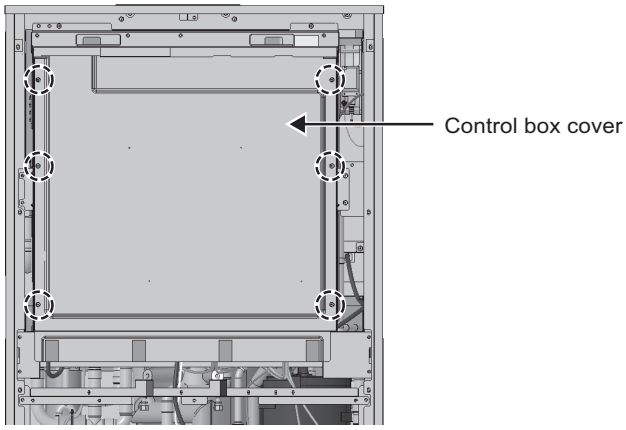


Figure 3

(3) Remove the control box. (Seven screws: Figure 4)

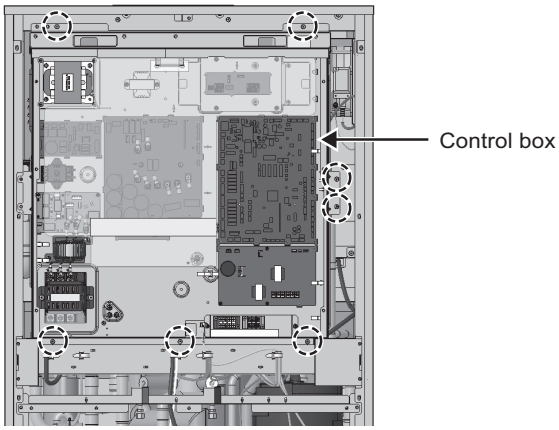


Figure 4

(4) Remove all the cable straps and plastic clips from the frames.
(16 cable straps (five on the front side and 11 on the back side), two plastic clips: Figure 5)
(5) Remove the frames. (Six screws: Figure 5)

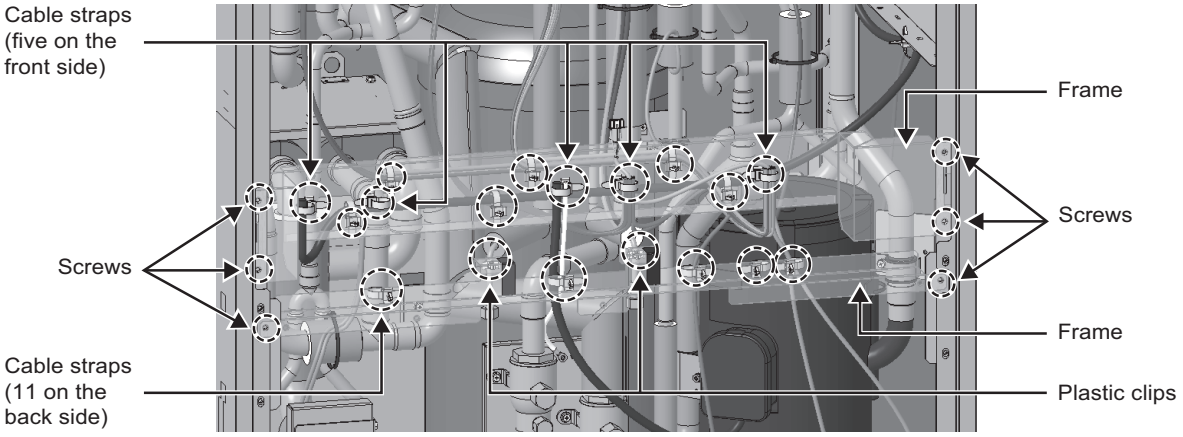


Figure 5

2-2. The steps for replacing the water heat exchanger are as follows.
(6) Remove the socket support. (Eight screws: Figure 6)
(7) Remove the pipe cover. (Three bands, six pipe covers: Figure 7)
(8) Remove TH7 and TH8. (Figure 7)

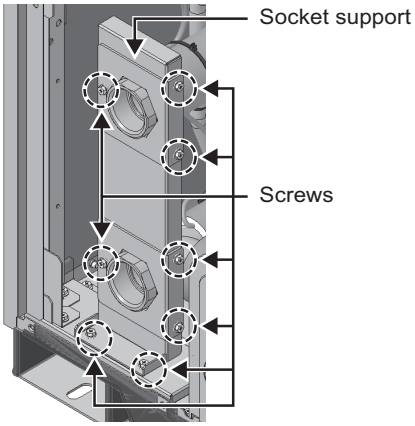


Figure 6

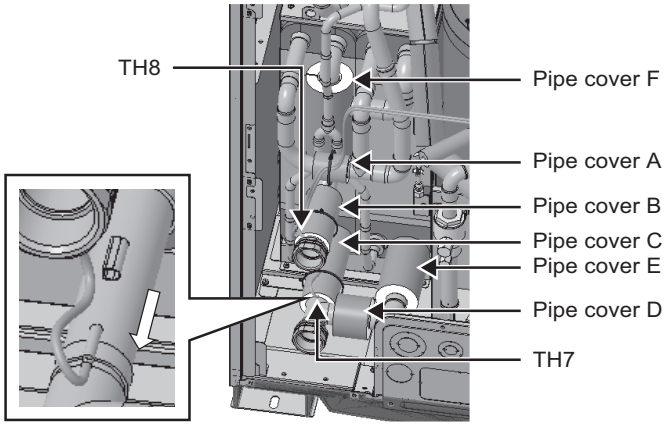


Figure 7

* Cautions for replacing a water 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, sheet metal parts, or insulating material inside the unit.
- To protect the water 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 (5 t × 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

(9) Remove the brazing from the piping and remove the piping. (Three areas: Figure 8)

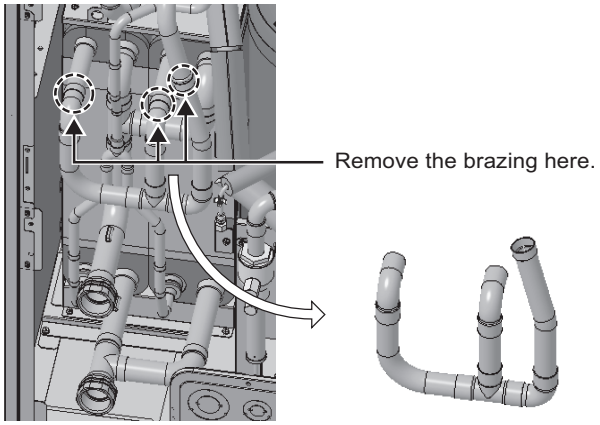


Figure 8

(10) Remove the brazing from the piping and remove the piping. (Three areas: Figure 9)

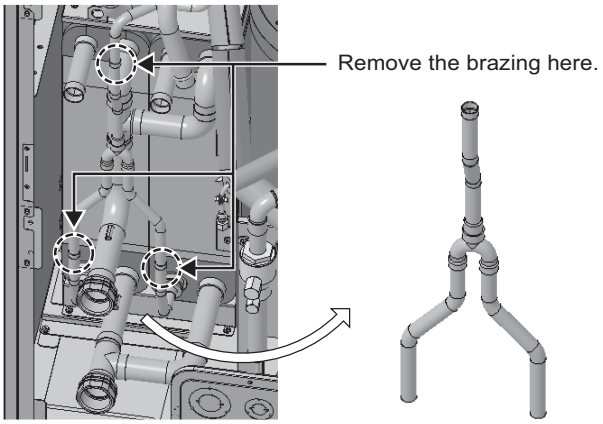


Figure 9

(11) Remove the brazing from the piping and remove the piping. (Four areas: Figure 10)

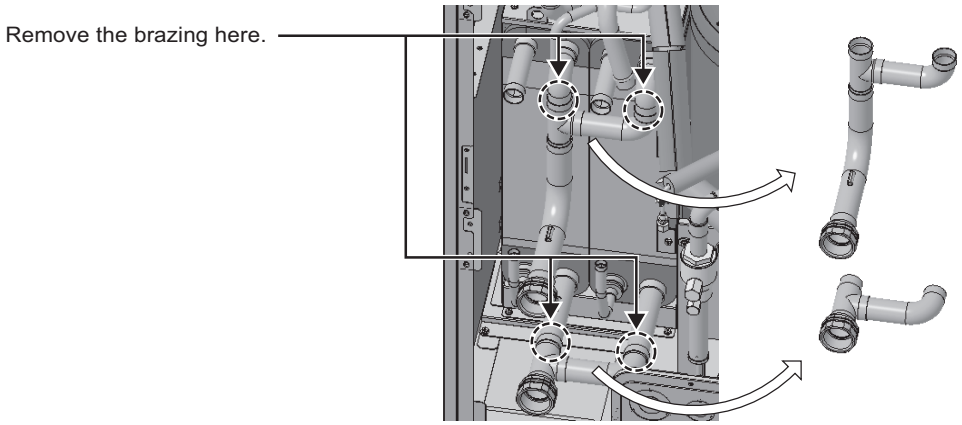


Figure 10

(12) Remove the front panel. (Two screws: Figure 11)

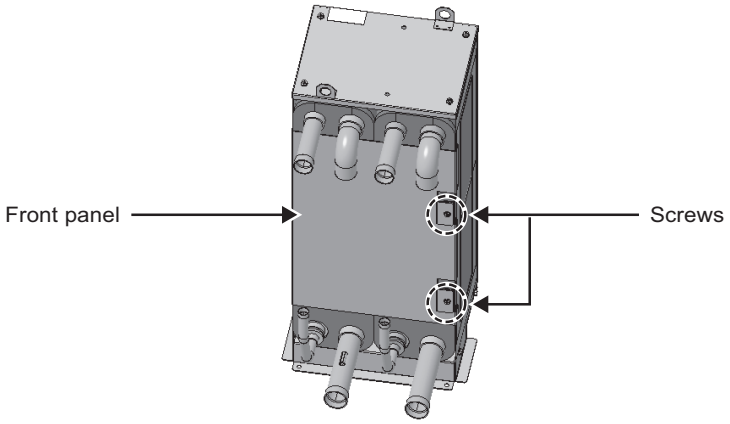


Figure 11

(13) Remove the screws from the top panel. (Four screws: Figure 12-①)
(14) With the top panel lifted, pull the water heat exchanger A forward. (Figure 12-②)
(15) Pull the water heat exchanger B forward. (Figure 12-③)

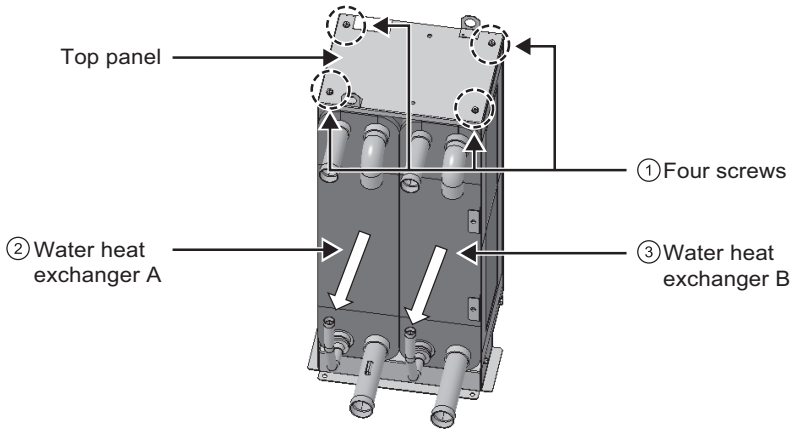


Figure 12

(16) Reverse the above procedure to install the new water heat exchanger.
* Attach supplied insulators A, B, and C to water heat exchangers A and B.

The replacement of the water heat exchanger is completed here. Reinstall the components that were removed in each step to their original positions.

[9] Refrigerant Sensor Replacement Instructions

● When replacing the refrigerant sensor, follow steps (1) to (6) below to remove the components.
When reinstalling the removed components, follow the procedure in reverse order of (1) through (6) below.

1. To ensure a clear workspace for servicing, follow the steps below.

(1) Remove the front panels of the casing. (24 screws: Figure 1)

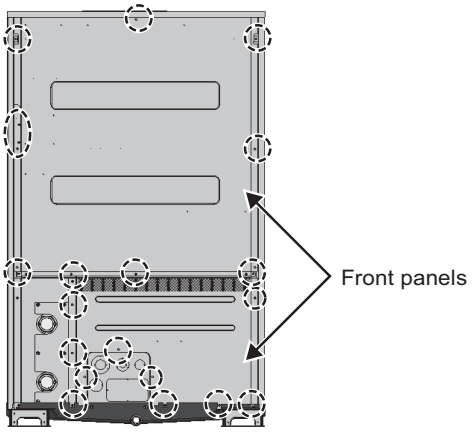


Figure 1

(2) Remove the control box cover. (Six screws: Figure 2)

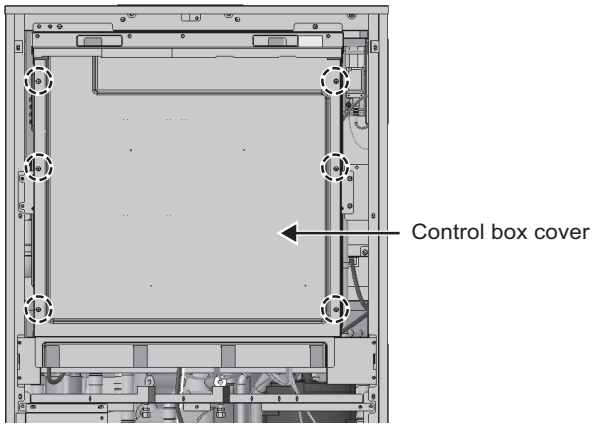


Figure 2

2. The steps for replacing the refrigerant sensor are as follows.

(3) Disconnect the relay connector from the wiring of the refrigerant sensor. (Figure 3)
(4) Remove the wiring of the refrigerant sensor from the cable strap. (Three cable straps: Figure 4)
(5) Remove the refrigerant sensor from the fixing brackets. (Two screws: Figure 4)

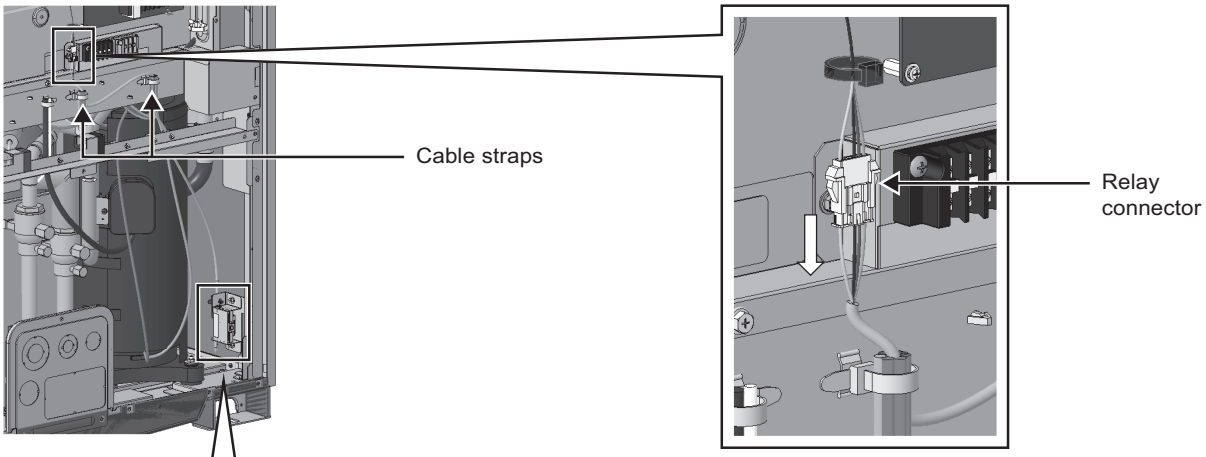


Figure 3

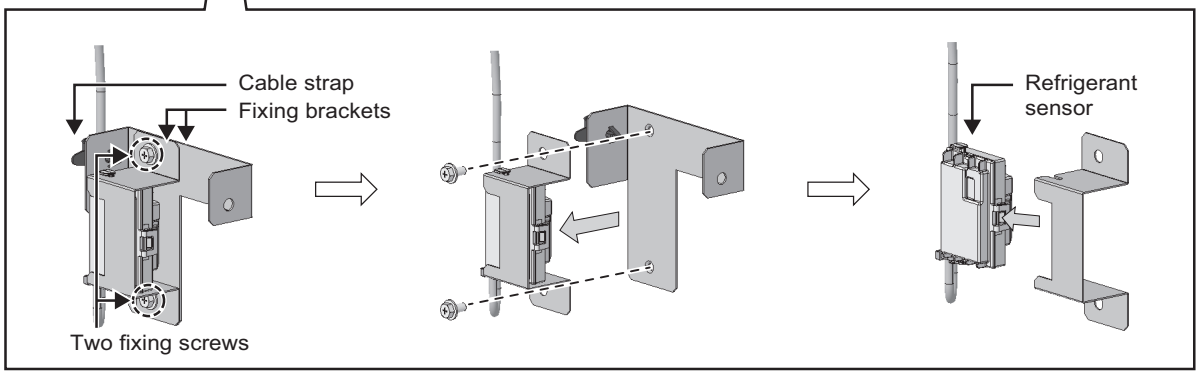


Figure 4

(6) Reverse the above procedure to install the new refrigerant sensor.
* Wiring should be secured with cable straps (at three points) and securely connected to the relay connector until it clicks into place.

The replacement of the refrigerant sensor is completed here. Reinstall the components that were removed in each step to their original positions.

[10] Fan for Circulation Airflow (MF3) Replacement Instructions

● When replacing the fan for circulation airflow (MF3), follow steps (1) to (7) below to remove the components. When reinstalling the removed components, follow the procedure in reverse order of (1) through (7) below.

1. To ensure a clear workspace for servicing, follow the steps below.

(1) Remove the front panel of the casing. (13 screws: Figure 1)

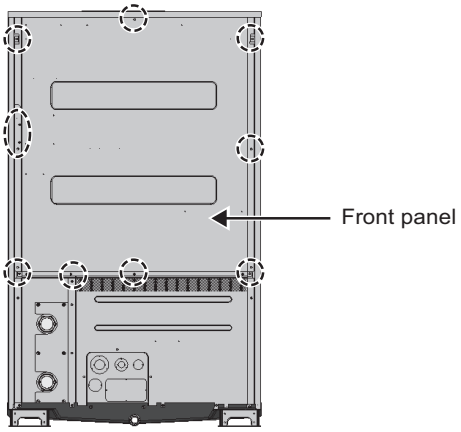


Figure 1

(2) Remove the control box cover and the wiring connected to the unit from the control box. (Six screws: Figure 2)

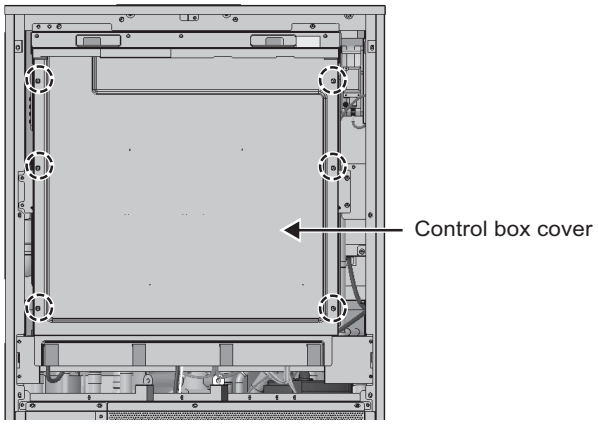


Figure 2

(3) Remove the control box. (Seven screws: Figure 3)

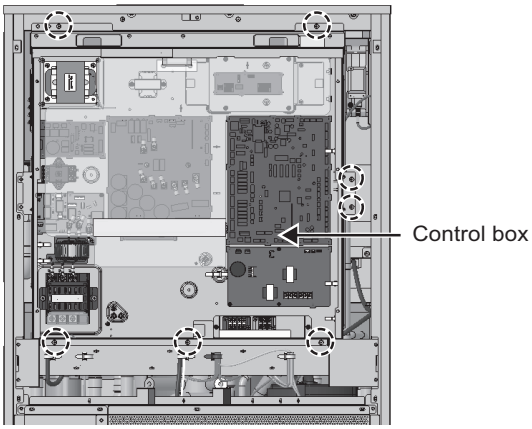


Figure 3

2. The steps for replacing the fan for circulation airflow (MF3) are as follows.

(4) Remove the bands. (Three bands: Figure 4)

(5) Remove the grounding wire. (Two screws: Figure 5)

(6) Remove the fan for circulation airflow (MF3). (Four screws: Figure 5)

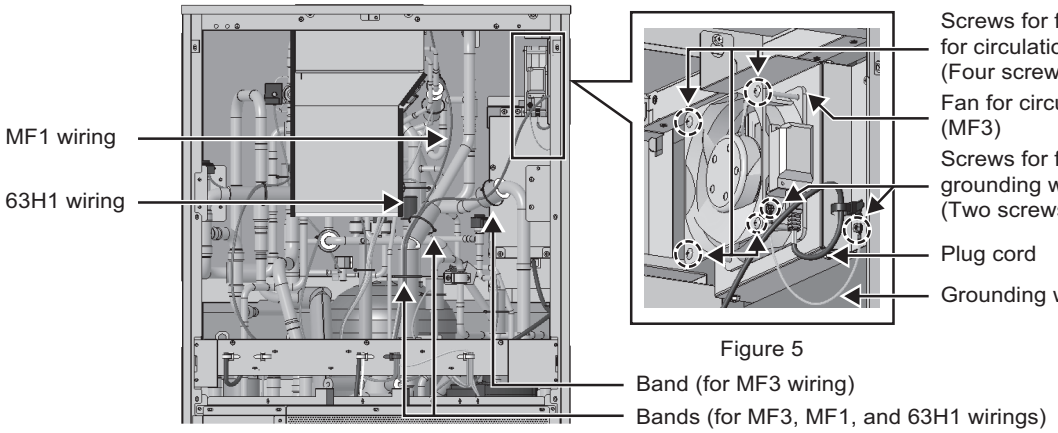


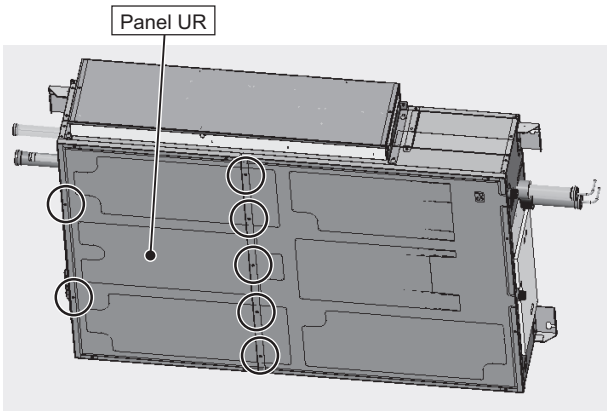
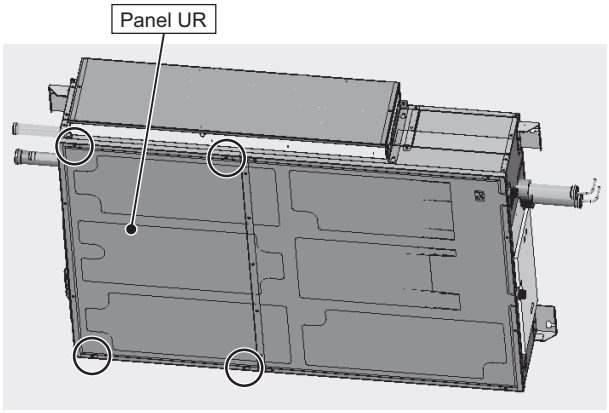
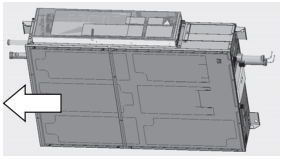
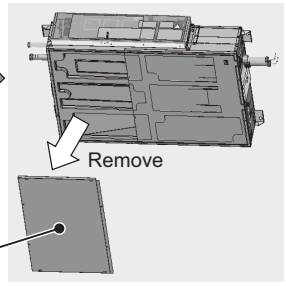
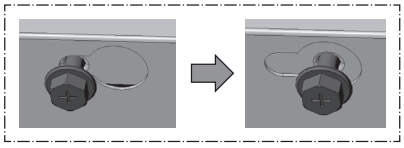
Figure 4

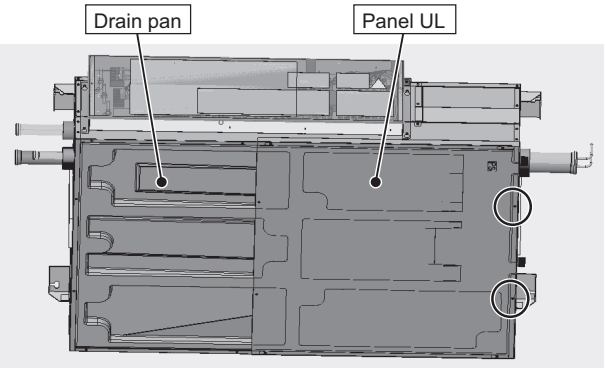
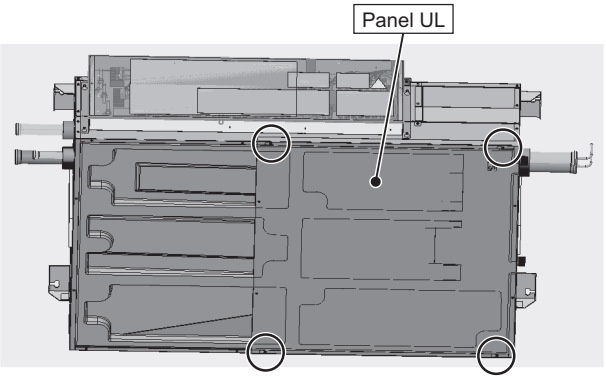
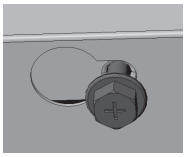
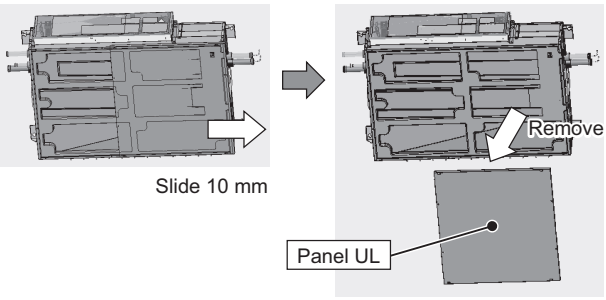
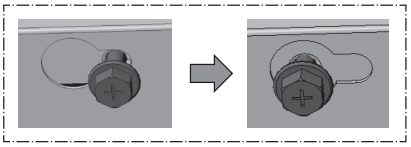
Figure 5

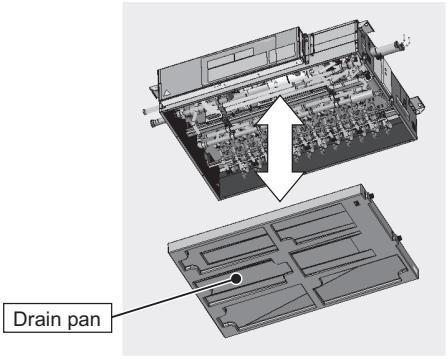
(7) Reverse the above procedure to install the new fan for circulation airflow (MF3).
The replacement of the fan for circulation airflow (MF3) is completed here.
Reinstall the components that were removed in each step to their original positions.
* Ensure that the grounding wire is connected to the control box and the fan for circulation airflow (MF3).

[11] BC Controller Maintenance Instructions

1. Drain pan replacement

Procedure	Illustration
(1) Remove Panel UR.	
1) Remove the seven screws other than the keyhole screws.	 ○ : Screws to remove
2) Loosen the four keyhole screws. *Do not remove the screws to prevent the panel from falling.	 ○ : Screws to loosen  Shape of keyhole
3) Slide Panel UR 10 mm away from the unit to remove it.	 Slide 10 mm   Shape of keyhole after sliding 10 mm

Procedure	Illustration
(2) Remove Panel UL.	
1) Remove the two screws other than the keyhole screws.	 ◯ : Screws to remove
2) Loosen the four keyhole screws. *Do not remove the screws to prevent the panel from falling.	  Shape of keyhole ◯ : Screws to loosen
3) Slide Panel UL 10 mm away from the unit to remove it.	  Shape of keyhole after sliding 10 mm

Procedure	Illustration
(3) Replace the drain pan.	
Lower the drain pan and replace it.	
(4) Reassemble the components.	
Reassemble the components in the reverse order.	

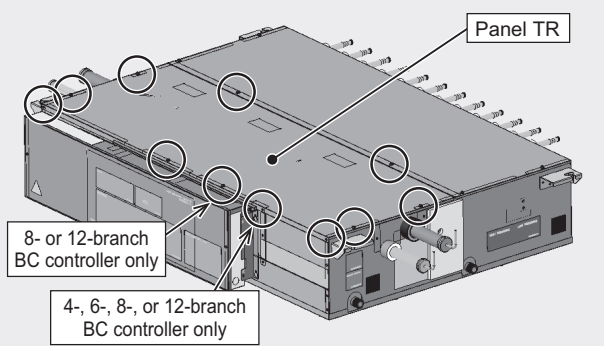
2. Panel UR replacement

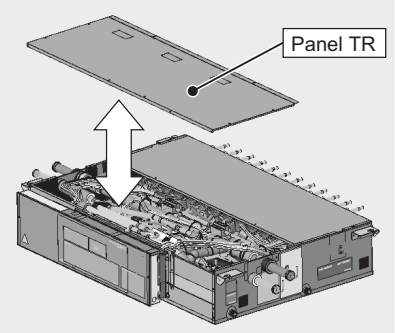
Procedure
(1) Replace Panel UR.
Follow step (1) in 1. Drain pan replacement to replace Panel UR.
(2) Reassemble the components.
Reassemble the components in the reverse order.

3. Panel UL replacement

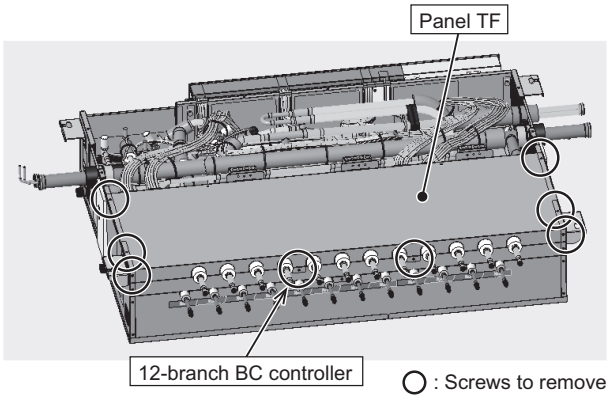
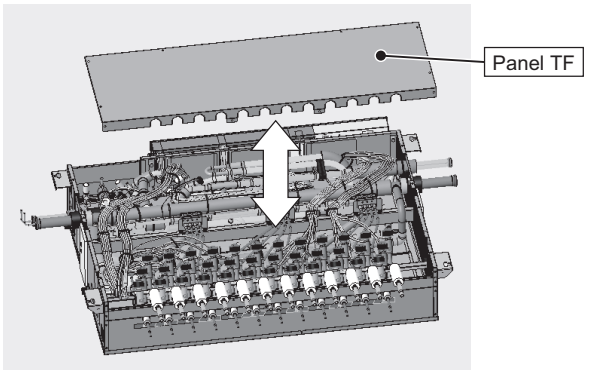
Procedure
(1) Replace Panel UL.
Follow step (1) and (2) in 1. Drain pan replacement to replace Panel UL.
(2) Reassemble the components.
Reassemble the components in the reverse order.

4. Panel TR replacement

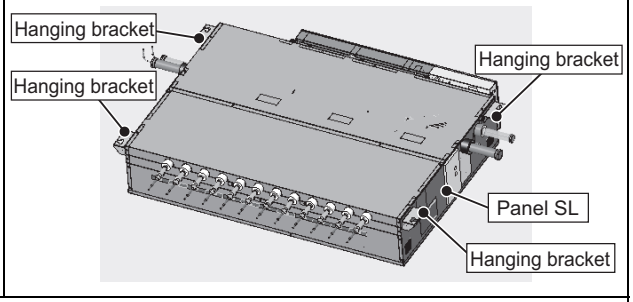
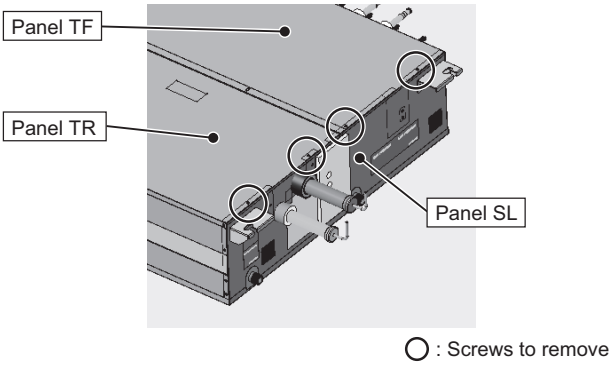
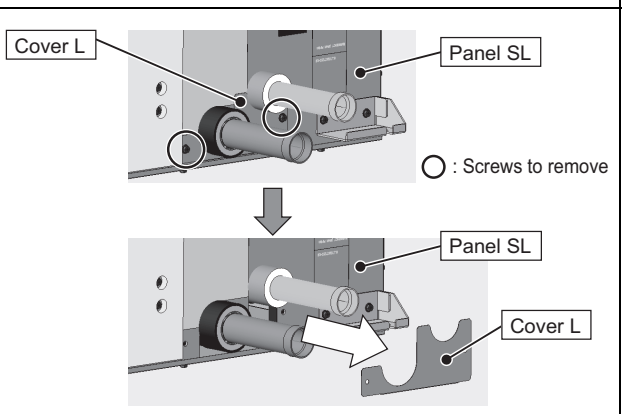
Procedure	Illustration
(1) Replace Panel TR.	
1) Remove the screws. [Number of screws to remove] ♦12-branch BC controller: 11 screws ♦Other controllers: 10 screws	

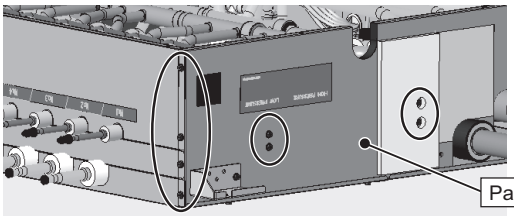
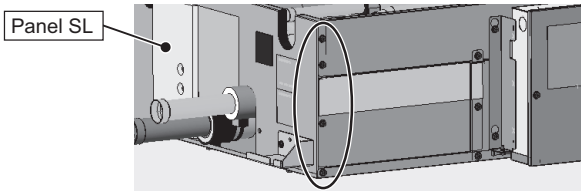
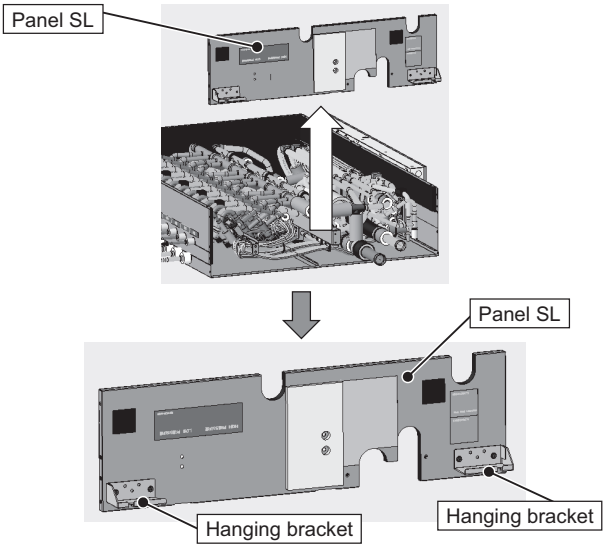
Procedure	Illustration
2) Replace Panel TR.	
(2) Reassemble the components.	
Reassemble the components in the reverse order.	

5. Panel TF replacement

Procedure	Illustration
(1) Remove Panel TR.	
Follow the procedure in 4. Panel TR replacement to remove Panel TR.	
(2) Replace Panel TF.	
1) Remove the screws. [Number of screws to remove] ♦12-branch BC controller: 8 screws ♦Other controllers: 7 screws	
2) Replace Panel TF.	
(3) Reassemble the components.	
Reassemble the components in the reverse order.	

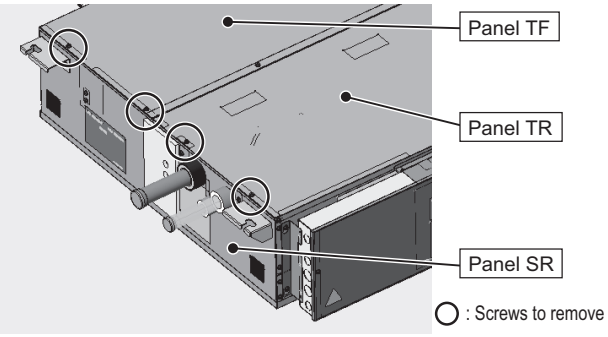
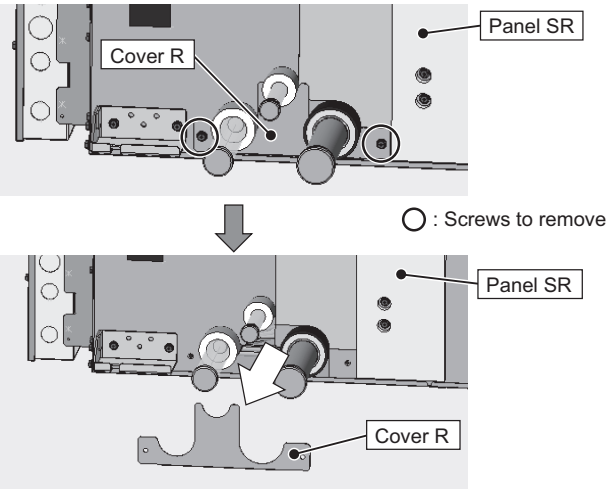
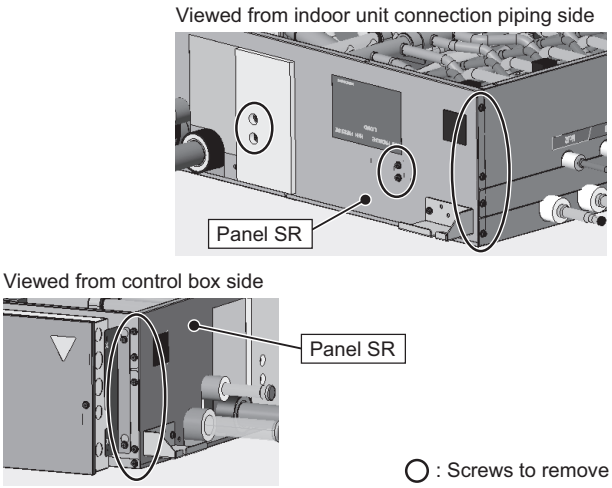
6. Panel SL replacement

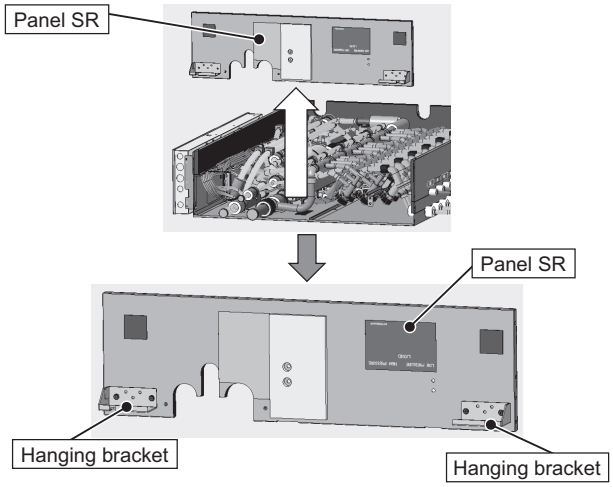
Procedure	Illustration
(1) Recover the refrigerant.	
(2) Lower the unit from the ceiling.	
Panel SL is directly connected to the hanging brackets, so the unit must be lowered from the ceiling.	
(3) Remove the Panel TR and Panel TF screws.	
Remove the four screws.	
(4) Turn the unit over.	
Turn the unit over so that Panel UR and Panel UL face up.	
(5) Remove Panel UR, Panel UL, and the drain pan.	
Follow the procedure in 1. Drain pan replacement to remove Panel UR, Panel UL, and the drain pan.	
(6) Remove Cover L.	
Remove the two screws to remove Cover L.	

Procedure	Illustration
(7) Remove the screws from Panel SL.	
Remove the 12 screws.	Viewed from indoor unit connection piping side  Viewed from control box side  ○ : Screws to remove
(8) Replace Panel SL.	
Slide Panel SL upward and remove the hanging brackets to replace Panel SL.	
(9) Reassemble the components.	
Reassemble the components in the reverse order.	

7. Panel SR replacement

Procedure	Illustration
(1) Recover the refrigerant.	
(2) Lower the unit from the ceiling.	
Panel SR is directly connected to the hanging brackets, so the unit must be lowered from the ceiling.	

Procedure	Illustration
(3) Remove the Panel TR and Panel TF screws.	
Remove the four screws.	
(4) Turn the unit over.	
Turn the unit over so that Panel UR and Panel UL face up.	
(5) Remove Panel UR, Panel UL, and the drain pan.	
Follow the procedure in 1. Drain pan replacement to remove Panel UR, Panel UL, and the drain pan.	
(6) Remove Cover R. (Main unit only)	
Remove the two screws to remove Cover R.	
(7) Remove the screws from Panel SR.	
Remove the 13 screws.	

Procedure	Illustration
(8) Replace Panel SR.	
Slide Panel SR upward and remove the hanging brackets to replace Panel SR.	
(9) Reassemble the components.	
Reassemble the components in the reverse order.	

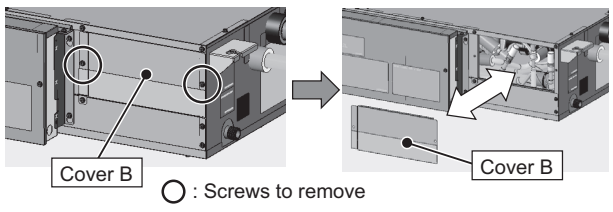
8. Cover L replacement

Procedure
(1) Replace Cover L.
Follow step (6) in 6. Panel SL replacement to replace Cover L.
(2) Reassemble the components.
Reassemble the components in the reverse order.

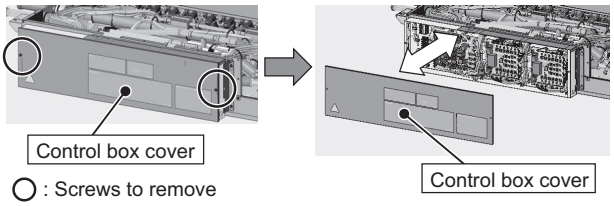
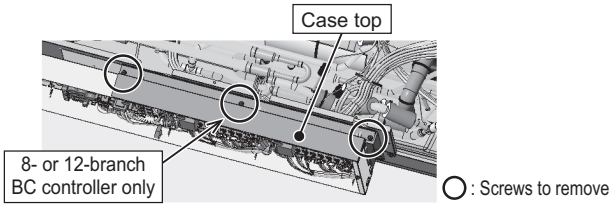
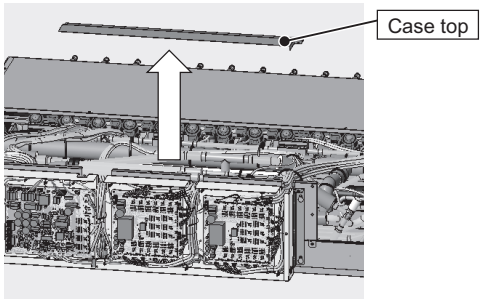
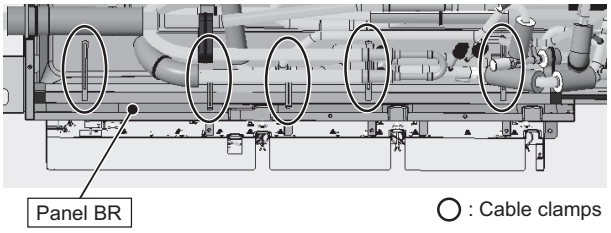
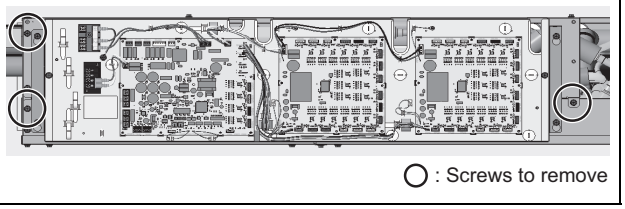
9. Cover R replacement (Main unit only)

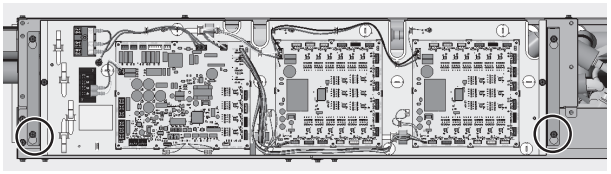
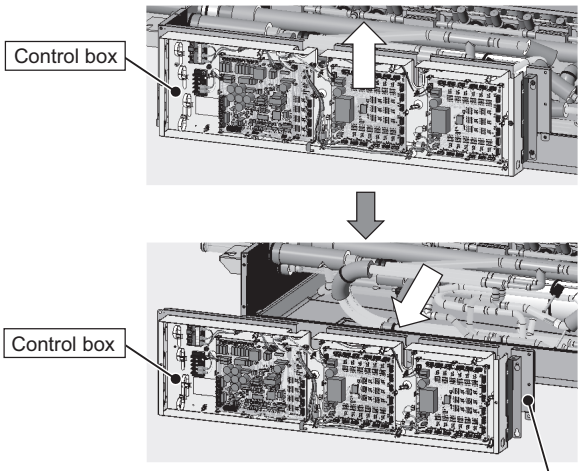
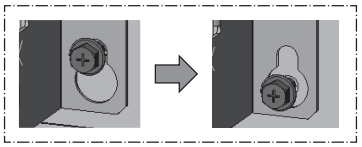
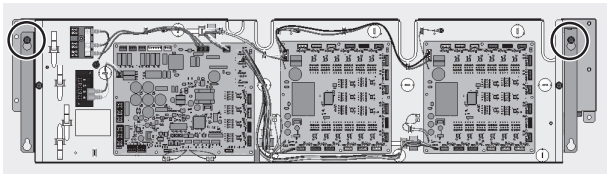
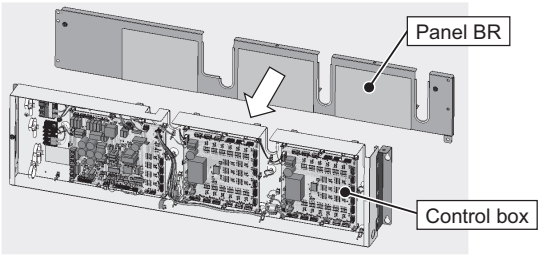
Procedure
(1) Replace Cover R.
Follow step (6) in 7. Panel SR replacement to replace Cover R.
(2) Reassemble the components.
Reassemble the components in the reverse order.

10. Cover B replacement (4-, 6-, or 12-branch BC controller only)

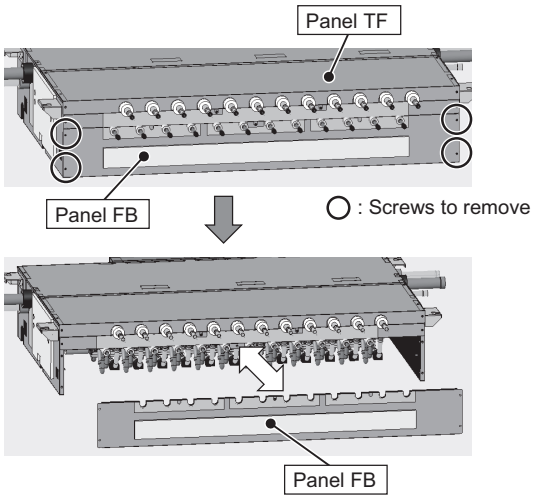
Procedure	Illustration
(1) Replace Cover B.	
Remove the two screws to replace Cover B.	
(2) Reassemble the components.	
Reassemble the components in the reverse order.	

11. Panel BR replacement

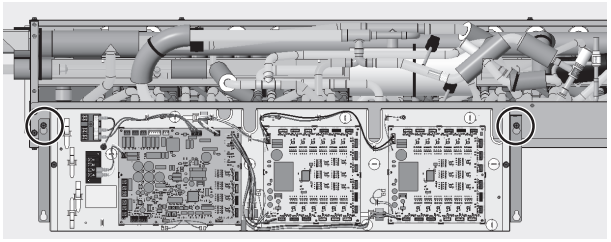
Procedure	Illustration
(1) Remove Panel TR.	
Follow the procedure in 4. Panel TR replacement to remove Panel TR.	
(2) Remove Cover B. (4-, 6-, or 12-branch BC connectors only)	
Follow the procedure in 10. Cover B replacement to remove Cover B.	
(3) Remove the control box cover.	
Remove the two screws to remove the control box cover.	
(4) Remove the case top.	
1) Remove the screws. [Number of screws to remove] ♦4- or 6-branch BC controller: 2 screws ♦8- or 12-branch BC controller: 3 screws	
2) Remove the case top.	
(5) Remove the wiring from the cable clamps in the Panel BR unit.	
Remove all wiring secured by cable clamps.	
(6) Remove Panel BR and the control box.	
1) Remove the three screws other than the keyhole screws.	

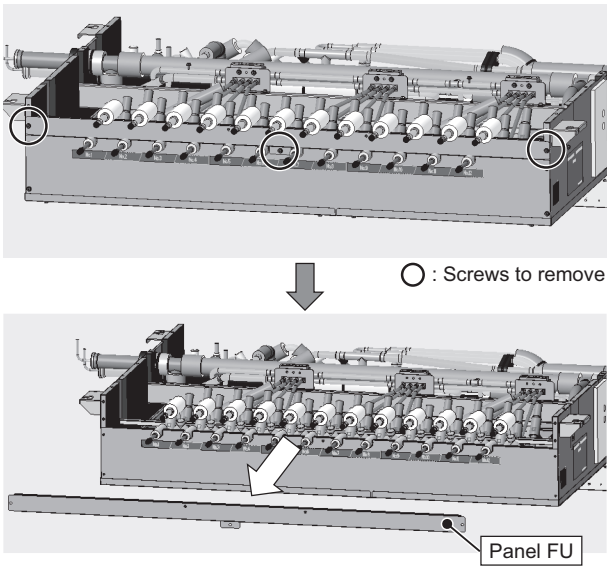
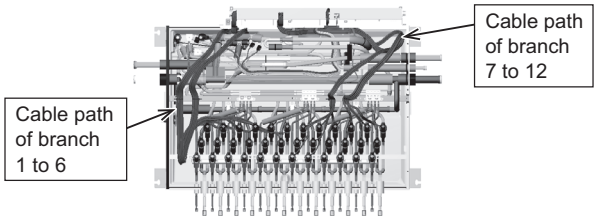
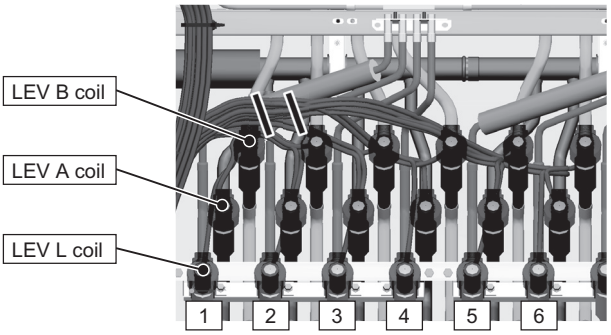
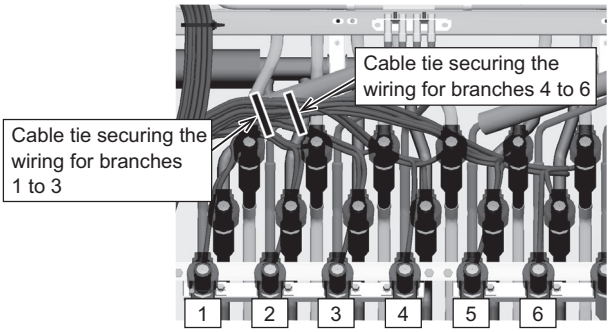
Procedure	Illustration
2) Loosen the two keyhole screws.	 ○ : Screws to loosen
3) Lift the control box up 10 mm and remove it together with Panel BR.	  Shape of keyhole after lifting 10 mm
4) Loosen the two keyhole screws, and then remove and replace Panel BR.	 ○ : Screws to loosen 
(7) Reassemble the components.	
Reassemble the components in the reverse order.	

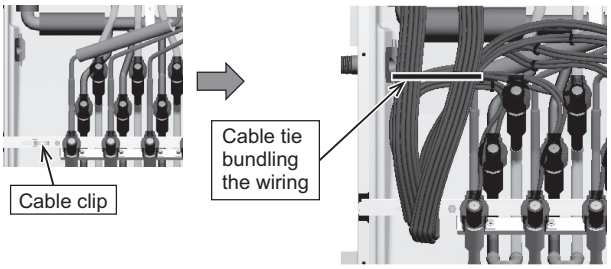
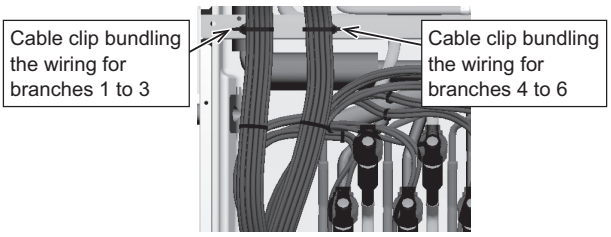
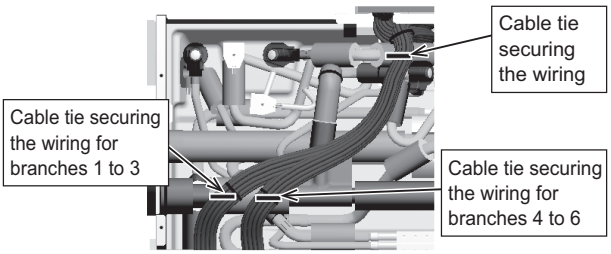
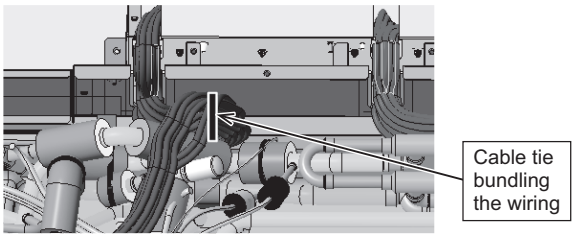
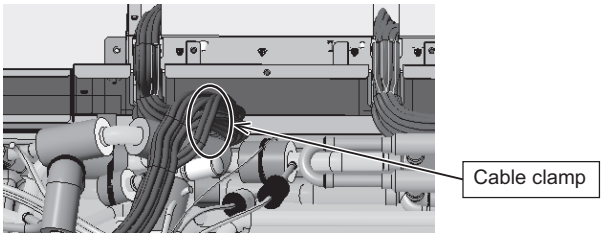
12. Panel FB replacement

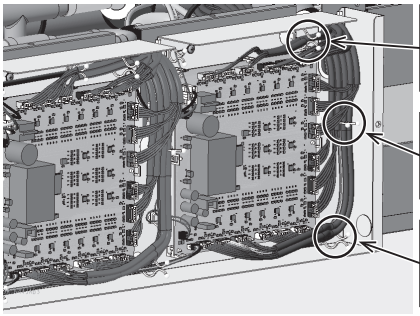
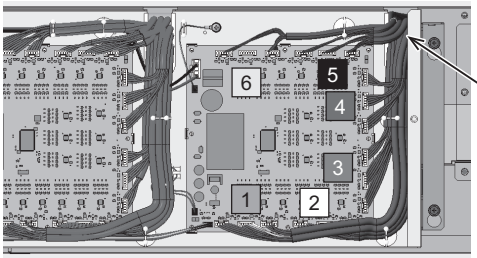
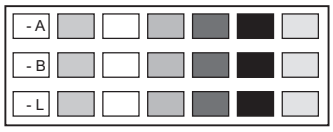
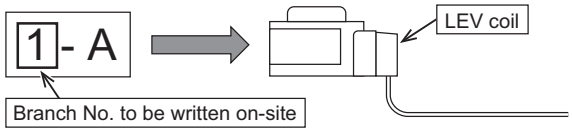
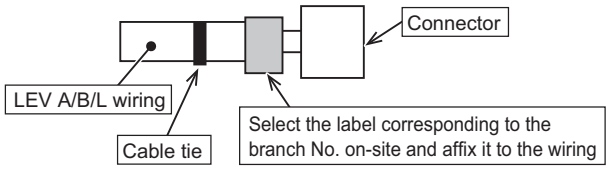
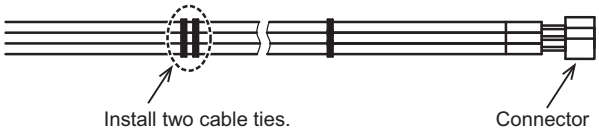
Procedure	Illustration
(1) Remove Panel UL, Panel UR, and the drain pan.	
Follow the procedure in 1. Drain pan replacement to remove Panel UL, Panel UR, and the drain pan.	
(2) Replace Panel FB.	
Remove the screws to replace Panel FB.	

13-1-1. Main 12-branch BC controller LEV A/B/L coil (branches 1 to 6) replacement

Procedure	Illustration
(1) Remove Panel TR, Cover B, and Panel BR.	
Follow the procedure in 11. Panel BR replacement to remove Panel TR, Cover B, and Panel BR.	
(2) Temporarily place the control box.	
Temporarily place the control box by hooking it on the screws loosened in 11. Panel BR replacement.	
(3) Remove Panel TF.	
Follow the procedure in 5. Panel TF replacement to remove Panel TF.	

Procedure	Illustration
(4) Remove Panel FU.	
Remove the three screws to remove Panel FU.	
LEV A/B/L coil cable path	
	
(5) Remove the LEV A/B/L coils to be replaced.	
Remove the LEV A/B/L coils collectively.	
(6) Remove the cable ties and clips securing the wiring.	
1) Cut and remove the cable ties securing the wiring.	

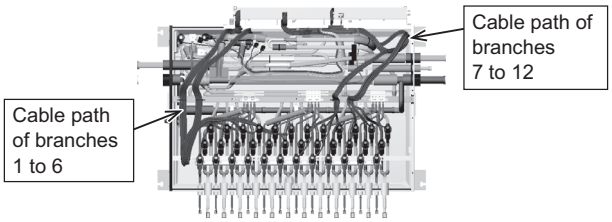
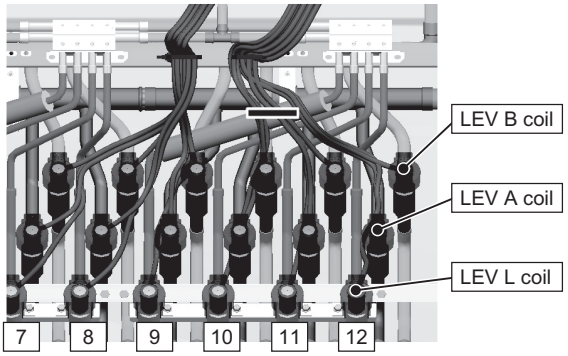
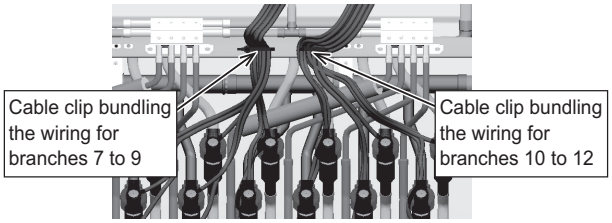
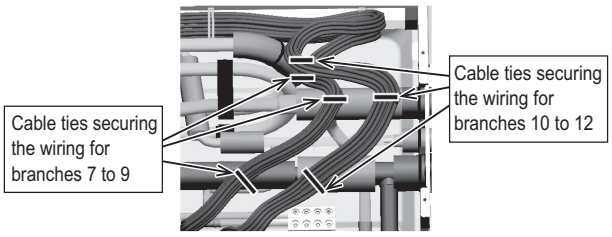
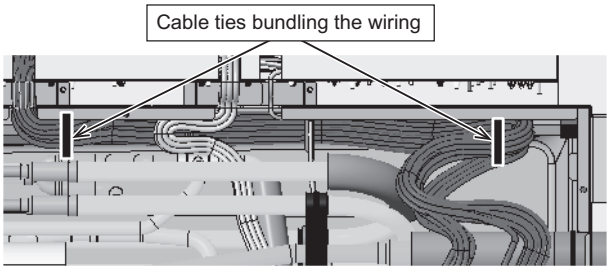
Procedure	Illustration
2) Remove the wiring from the cable clip and cut the cable tie bundling the wiring.	
3) Cut the cable clips and remove the wiring. Remove the cut cable clips from the sheet metal. (Cable clips are supplied.)	
4) Cut and remove the cable ties securing the wiring.	
5) Cut and remove the cable tie bundling the wiring.	
6) Remove the wiring from the cable clamp.	

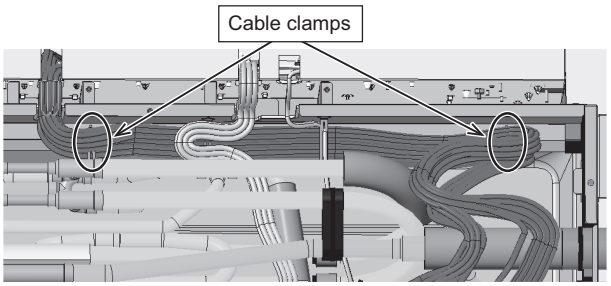
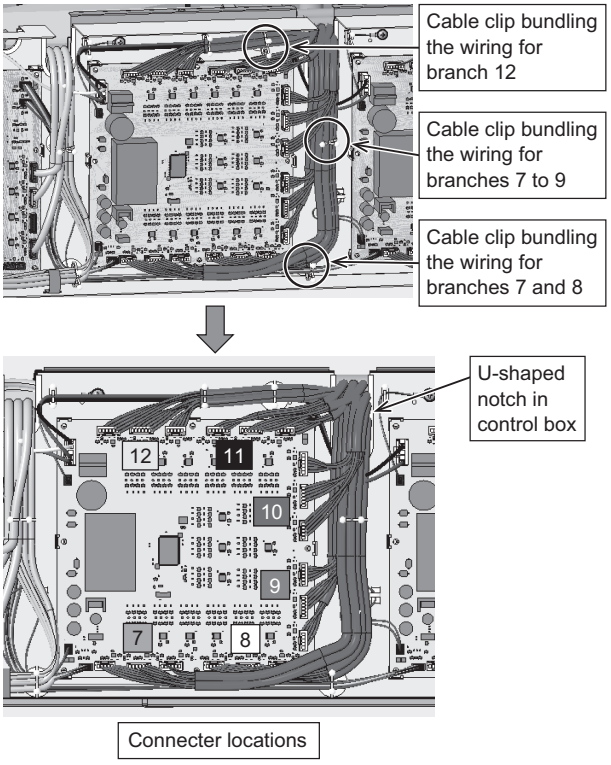
Procedure	Illustration
(7) Replace the LEV A/B/L coils.	
1) Remove the appropriate connectors to remove the LEV A/B/L coils.	  Connecter locations
2) Write the branch number on the label and attach it to the coil. Then, attach the colored label corresponding to the branch number to the wire near the connector.	Supplied label sheet  Affix the branch No. label to the coil  Attach the colored label to the wiring 
3) Install two cable ties on the wiring as positioning markers.	
(8) Reassemble the components.	
Reassemble the components in the reverse order.	

Branch No.		Connector color
1	7	Green
2	8	White
3	9	Blue
4	10	Red
5	11	Black
6	12	Yellow

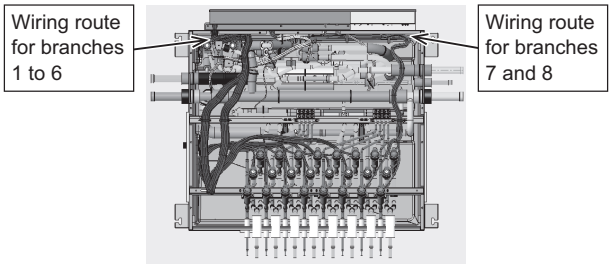
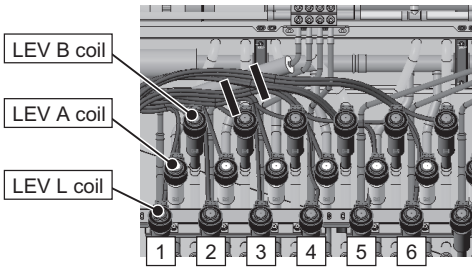
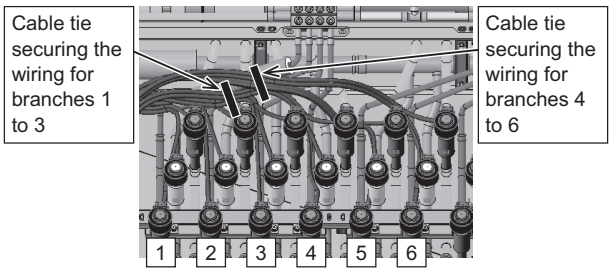
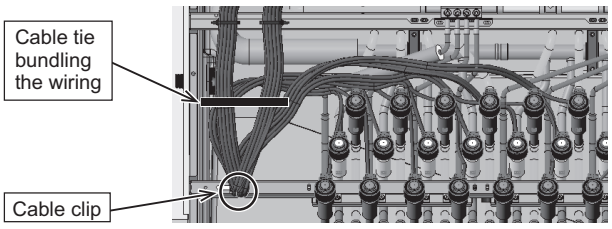
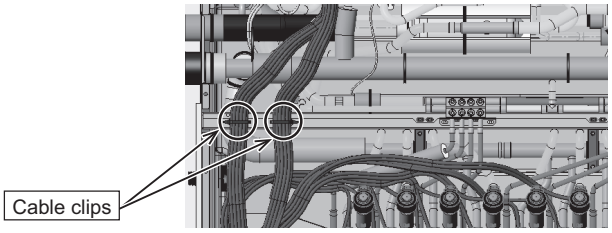
Branch No.	Dimension A [mm (in.)]	Branch No.	Dimension A [mm (in.)]
1	550 (21-11/16)	7	500 (19-11/16)
2	500 (19-11/16)	8	470 (18-9/16)
3	400 (15-3/4)	9	370 (14-5/8)
4	350 (13-13/16)	10	320 (12-5/8)
5	350 (13-13/16)	11	320 (12-5/8)
6	400 (15-3/4)	12	320 (12-5/8)

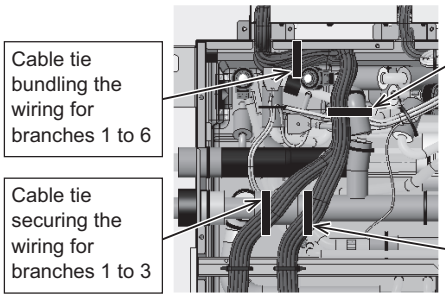
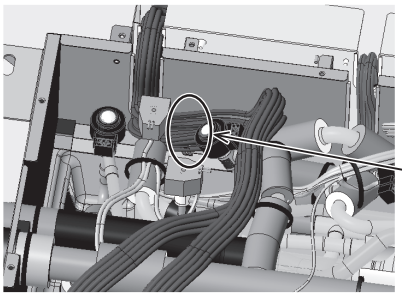
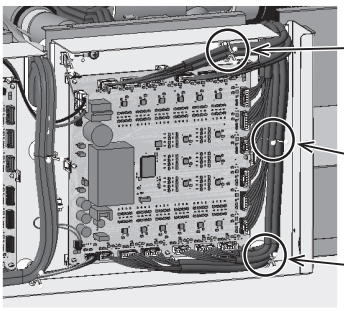
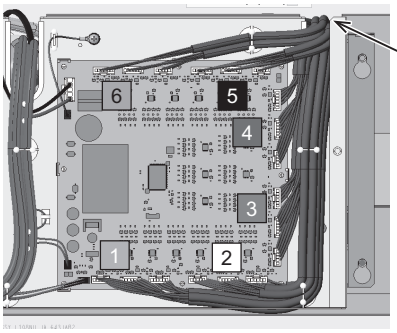
13-1-2. Main 12-branch BC controller LEV A/B/L coil (branches 7 to 12) replacement

Procedure	Illustration
(1) Remove Panel TR, Cover B, Panel BR, Panel TF, and Panel FU, and then temporarily place the control box.	
Follow steps (1) to (4) in 13-1-1. Main 12-branch BC controller LEV A/B/L coil (branches 1 to 6) replacement to remove Panel TR, Cover B, Panel BR, Panel TF, and Panel FU, and then temporarily place the control box.	
LEV A/B/L coil cable path	
	
(2) Remove the LEV A/B/L coils to be replaced.	
Remove the LEV A/B/L coils to be replaced collectively.	
(3) Remove the cable ties and clips securing the wiring.	
1) Cut the cable clips and remove the wiring. Remove the cut cable clips from the sheet metal. (Cable clips are supplied.)	
2) Cut and remove the cable ties securing the wiring.	
3) Cut and remove the cable ties bundling the wiring.	

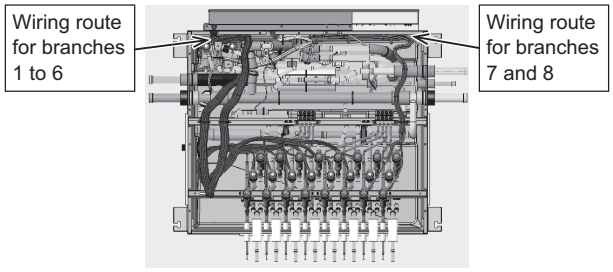
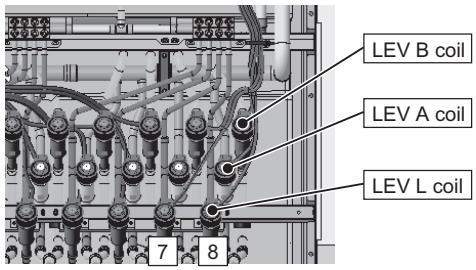
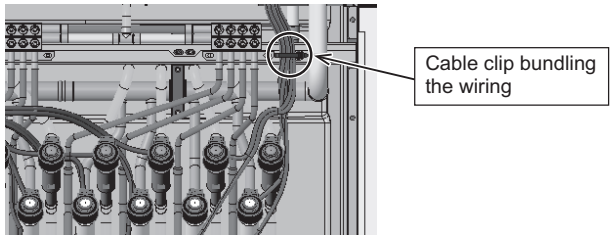
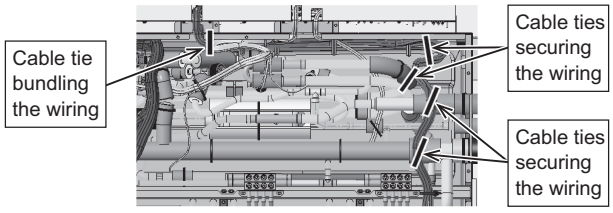
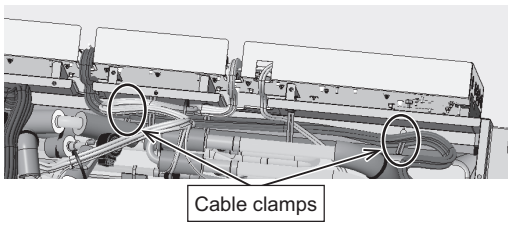
Procedure	Illustration
4) Remove the wiring from the cable clamps.	
(4) Replace the LEV A/B/L coils.	
1) Remove the appropriate connectors to replace the LEV A/B/L coils.	
2) Follow the procedure in 13-1-1. Main 12-branch BC controller LEV A/B/L coil (branches 1 to 6) replacement to attach the supplied labels to the coils and replace the coils.	
(5) Reassemble the components.	
Reassemble the components in the reverse order.	

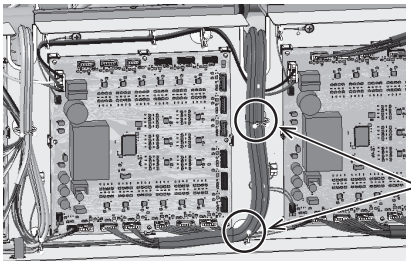
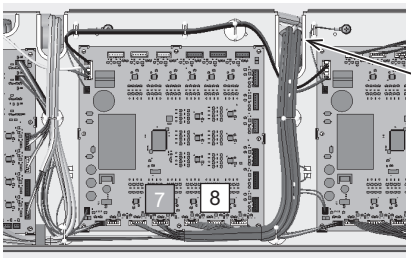
13-2-1. Main 4 to 8-branch BC controller LEV A/B/L coil (branches 1 to 6) replacement

Procedure	Illustration
(1) Remove Panel TR, Cover B, Panel BR, Panel TF, and Panel FU, and place the control box temporarily.	
Follow steps (1) to (4) in 13-1-1. Main 12-branch BC controller LEV A/B/L coil (branches 1 to 6) replacement to remove Panel TR, Cover B, Panel BR, Panel TF, and Panel FU, and then place the control box temporarily.	
Wiring route for LEV A, B, L coils	
	
(2) Remove the LEV A, B, L coils to be replaced.	
Remove the LEV A, B, L coils to be replaced all together.	
(3) Remove the cable ties and clips securing the wiring.	
1) Cut and remove the cable ties securing the wiring.	
2) Cut the cable tie securing the wiring and remove it from the cable clip.	
3) Cut the cable clips and remove the wiring. The wiring ASSY and the cable clips are bundled as a service part, so remove the cut cable clips from the sheet metal.	

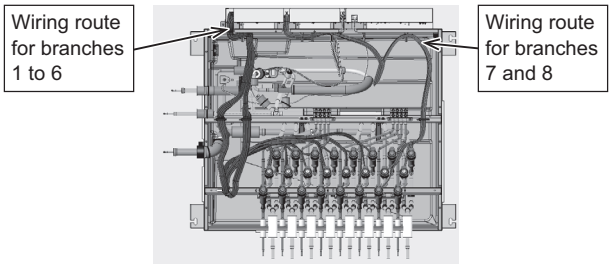
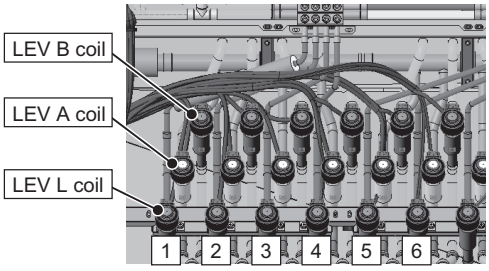
Procedure	Illustration
4) Cut and remove the cable ties securing the wiring.	
5) Remove the wiring from the cable clamp.	
(4) Replace the LEV A, B, L coils.	
1) Remove the wiring from the cable clips and replace the LEV A, B, L coils.	  Connecter locations
2) Follow the procedure in 13-1-1. Main 12-branch BC controller LEV A/B/L coil (branches 1 to 6) replacement to attach the supplied labels to the coils and replace the coils.	
(5) Reassemble the components.	
Reassemble the components in the reverse order.	

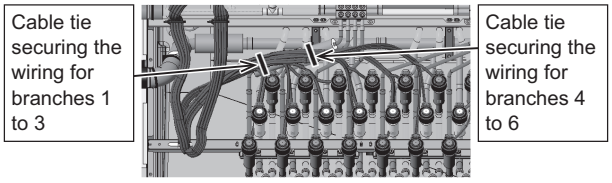
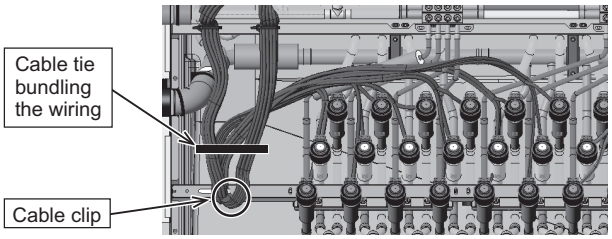
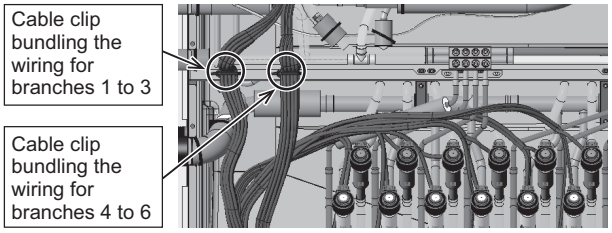
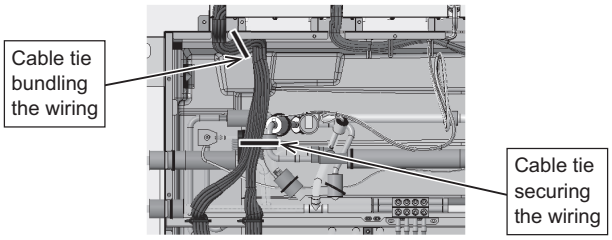
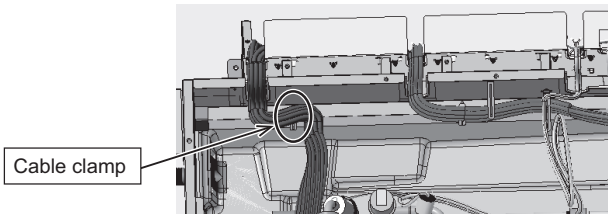
13-2-2. Main 8-branch BC controller LEV A/B/L coil (branches 7 and 8) replacement

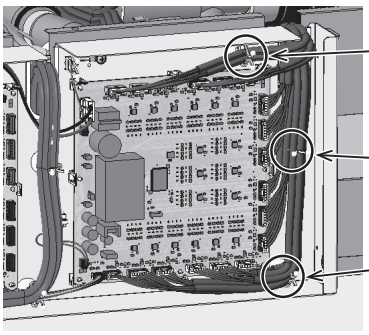
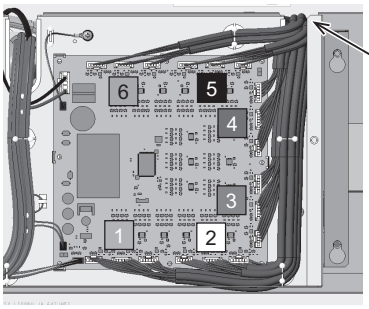
Procedure	Illustration
(1) Remove Panel TR, Cover B, Panel BR, Panel TF, and Panel FU, and place the control box temporarily.	
Follow steps (1) to (4) in 13-1-1. Main 12-branch BC controller LEV A/B/L coil (branches 1 to 6) replacement to remove Panel TR, Cover B, Panel BR, Panel TF, and Panel FU, and then place the control box temporarily.	
Wiring route for LEV A, B, L coils	
	
(2) Remove the LEV A, B, L coils to be replaced.	
Remove the LEV A, B, L coils to be replaced all together.	
(3) Remove the cable ties and clip securing the wiring.	
1) Cut the cable clip and remove the wiring. The wiring ASSY and the cable clips are bundled as a service part, so remove the cut cable clip from the sheet metal.	
2) Cut and remove the cable ties securing or bundling the wiring.	
3) Remove the wiring from the cable clamps.	

Procedure	Illustration
(4) Replace the LEV A, B, L coils.	
1) Remove the wiring from the cable clips and replace the LEV A, B, L coils.	  Connecter locations
2) Follow the procedure in 13-1-1. Main 12-branch BC controller LEV A/B/L coil (branches 1 to 6) replacement to attach the supplied labels to the coils and replace the coils.	
(5) Reassemble the components.	
Reassemble the components in the reverse order.	

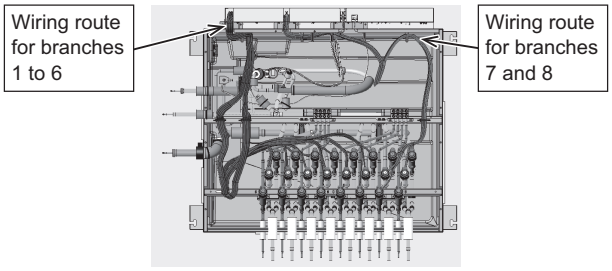
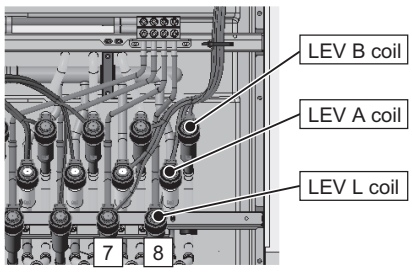
13-3-1. Sub 4 and 8-branch BC controller LEV A/B/L coil (branches 1 to 6) replacement

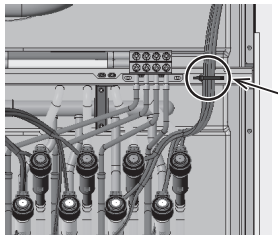
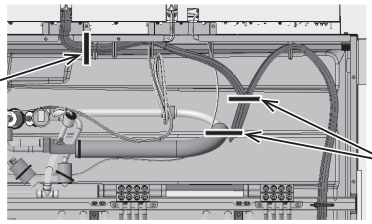
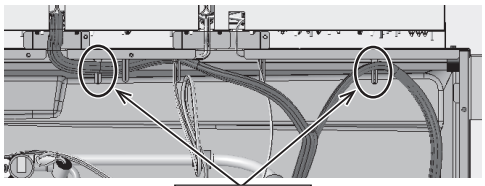
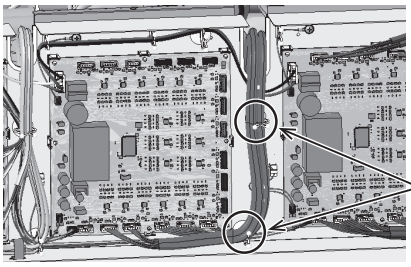
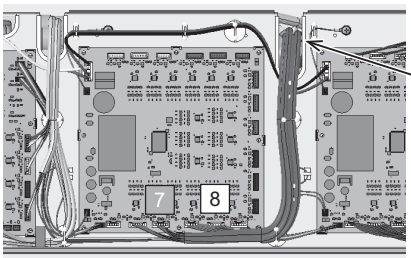
Procedure	Illustration
(1) Remove Panel TR, Cover B, Panel BR, Panel TF, and Panel FU, and place the control box temporarily.	
Follow steps (1) to (4) in 13-1-1. Main 12-branch BC controller LEV A/B/L coil (branches 1 to 6) replacement to remove Panel TR, Cover B, Panel BR, Panel TF, and Panel FU, and then place the control box temporarily.	
Wiring route for LEV A, B, L coils	
	
(2) Remove the LEV A, B, L coils to be replaced.	
Remove the LEV A, B, L coils to be replaced all together.	

Procedure	Illustration
(3) Remove the cable ties and clip securing the wiring.	
1) Cut and remove the cable ties securing the wiring.	
2) Cut the cable tie bundling the wiring and remove it from the cable clip.	
3) Cut the cable clips and remove the wiring. The wiring ASSY and the cable clips are bundled as a service part, so remove the cut cable clips from the sheet metal.	
4) Cut and remove the cable ties securing or bundling the wiring.	
5) Remove the wiring from the cable clamp.	

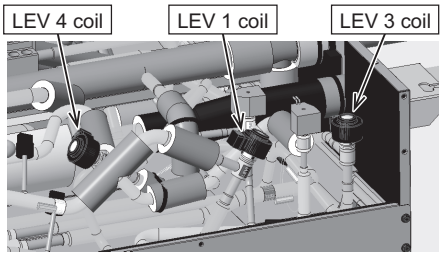
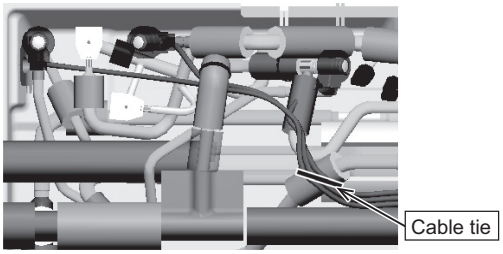
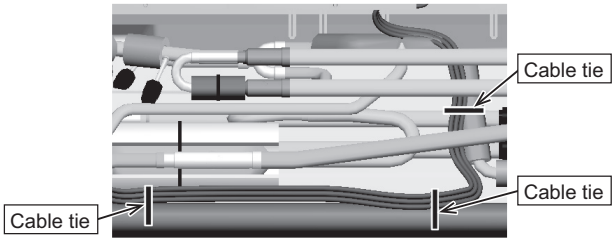
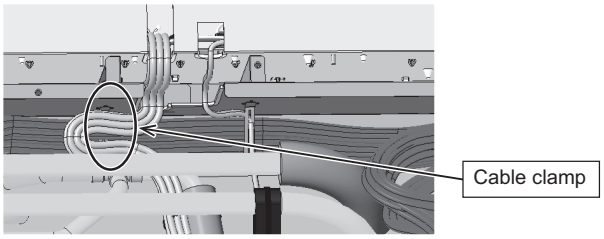
Procedure	Illustration
(4) Replace the LEV A, B, L coils.	
1) Remove the wiring from the cable clips and replace the LEV A, B, L coils.	  Connecter locations
2) Follow the procedure in 13-1-1. Main 12-branch BC controller LEV A/B/L coil (branches 1 to 6) replacement to attach the supplied labels to the coils and replace the coils.	
(5) Reassemble the components.	
Reassemble the components in the reverse order.	

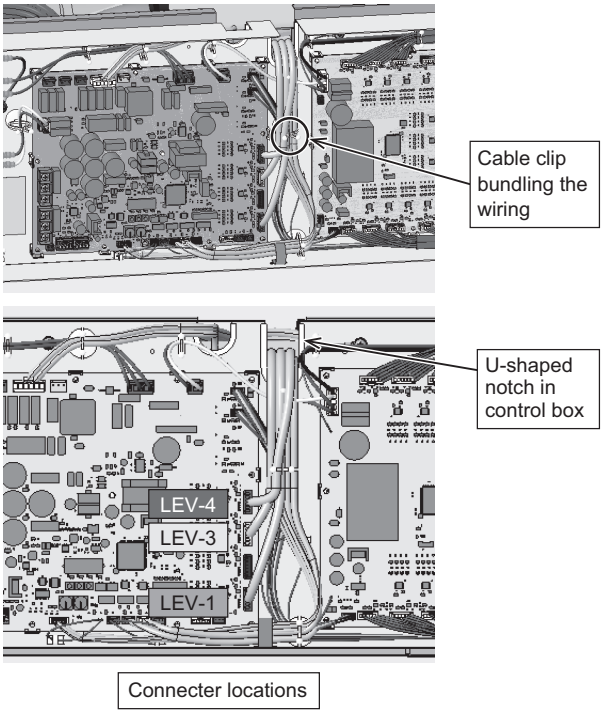
13-3-2. Sub 8-branch BC controller LEV A/B/L coil (branches 7 and 8) replacement

Procedure	Illustration
(1) Remove Panel TR, Cover B, Panel BR, Panel TF, and Panel FU, and place the control box temporarily.	
Follow steps (1) to (4) in 13-1-1. Main 12-branch BC controller LEV A/B/L coil (branches 1 to 6) replacement to remove Panel TR, Cover B, Panel BR, Panel TF, and Panel FU, and then place the control box temporarily.	
Wiring route for LEV A, B, L coils	
	
(2) Remove the LEV A, B, L coils to be replaced.	
Remove the LEV A, B, L coils to be replaced all together.	

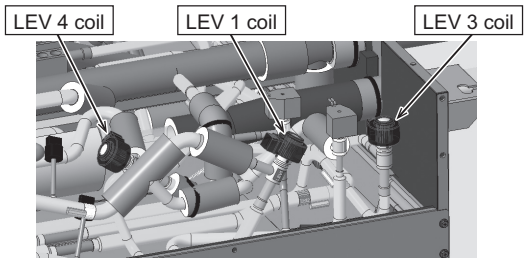
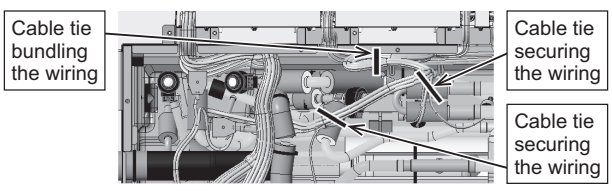
Procedure	Illustration
(3) Remove the cable ties and clip securing the wiring.	
1) Cut the cable clip and remove the wiring. The wiring ASSY and the cable clips are bundled as a service part, so remove the cut cable clip from the sheet metal.	 Cable clip bundling the wiring
2) Cut and remove the cable tie securing or bundling the wiring.	 Cable tie bundling the wiring Cable ties securing the wiring
3) Remove the wiring from the cable clamps.	 Cable clamps
(4) Replace the LEV A, B, L coils.	
1) Remove the wiring from the cable clips and replace the LEV A, B, L coils.	 Cable clips bundling the wiring  U-shaped notch in control box Connecter locations
2) Follow the procedure in 13-1-1. Main 12-branch BC controller LEV A/B/L coil (branches 1 to 6) replacement to attach the supplied labels to the coils and replace the coils.	
(5) Reassemble the components.	
Reassemble the components in the reverse order.	

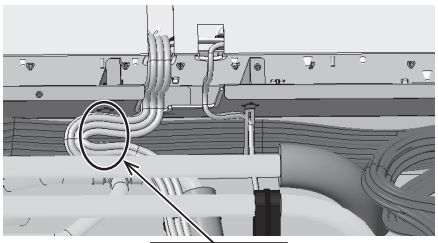
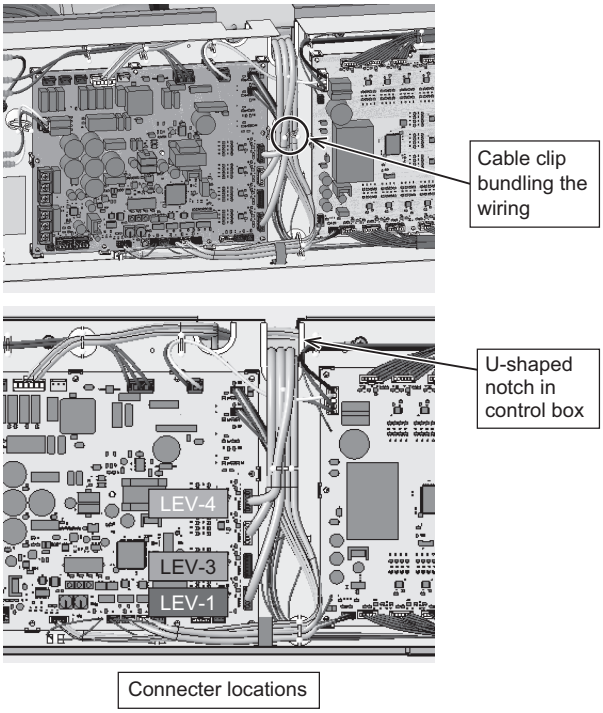
14-1. Main 12-branch BC controller LEV 1/3/4 coil replacement

Procedure	Illustration
(1) Remove Panel TR, Cover B, and Panel BR.	
Follow the procedure in 11. Panel BR replacement to remove Panel TR, Cover B, and Panel BR.	
(2) Temporarily place the control box.	
Follow step (2) in 13-1-1. Main 12-branch BC controller LEV A/B/L coil (branches 1 to 6) replacement to temporarily place the control box.	
(3) Remove the LEV 1/3/4 coils.	
Remove the LEV coils to be replaced.	
(4) Remove the cable ties and cable clamp securing the wiring.	
1) Cut and remove the cable ties securing the wiring.	
2) Cut and remove the cable ties securing the wiring.	
3) Remove the wiring from the cable clamp.	

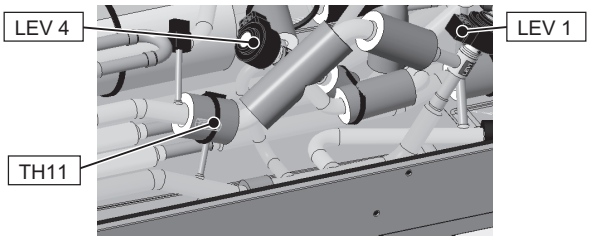
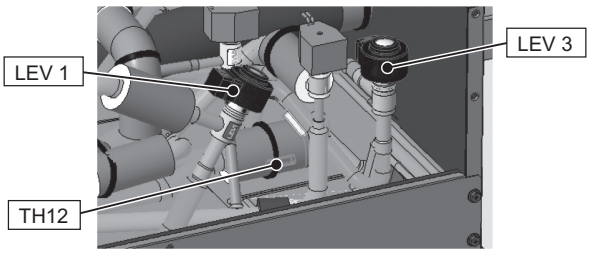
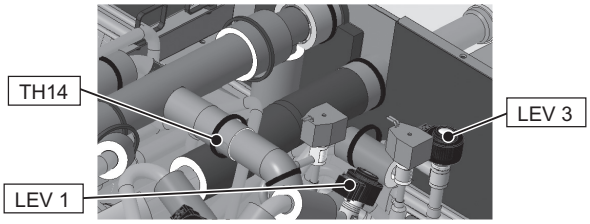
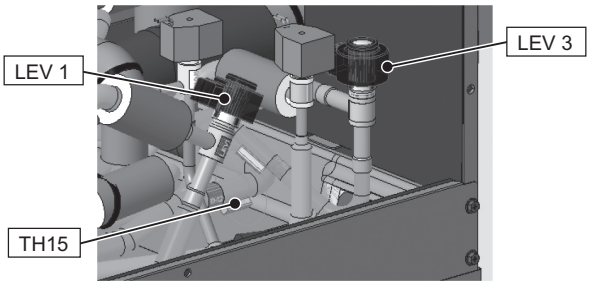
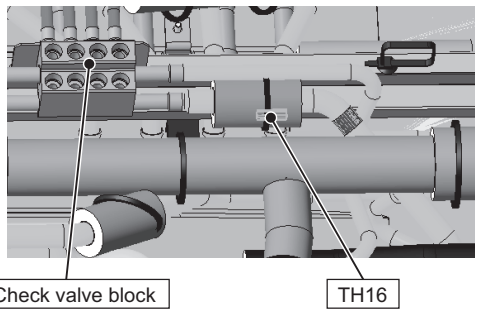
Procedure	Illustration
(5) Replace the LEV 1/3/4 coils.	
Remove the appropriate connectors to replace the LEV coils.	
(6) Reassemble the components.	
Reassemble the components in the reverse order.	

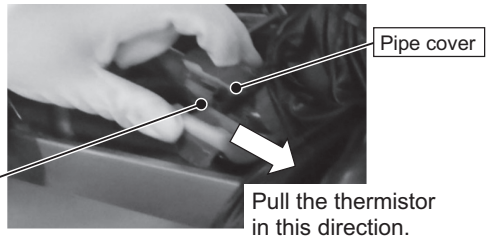
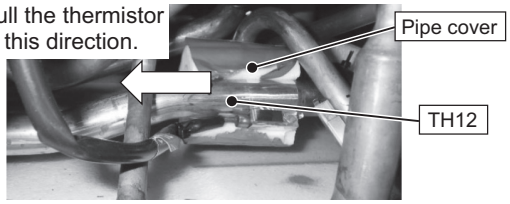
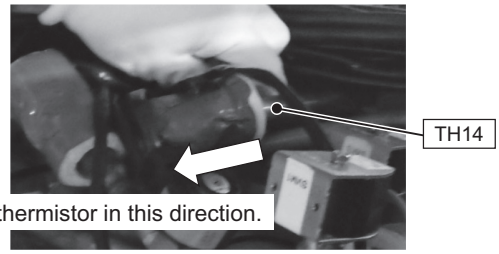
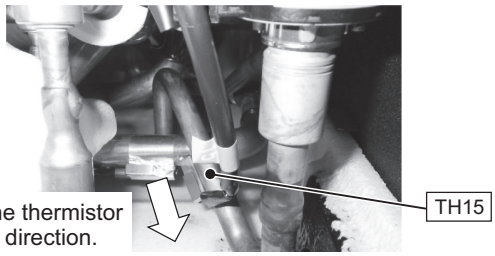
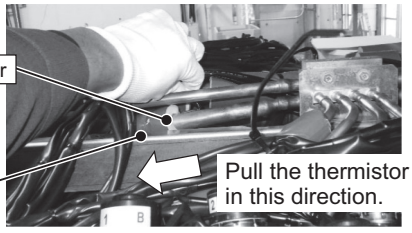
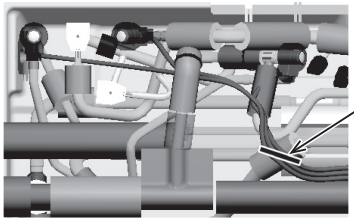
14-2. Main 4 to 8-branch BC controller LEV 1/3/4 coil replacement

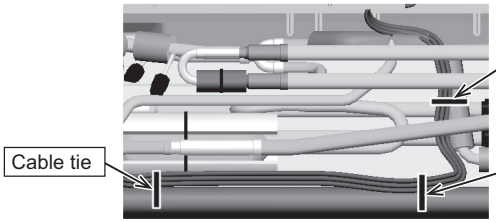
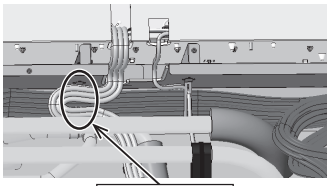
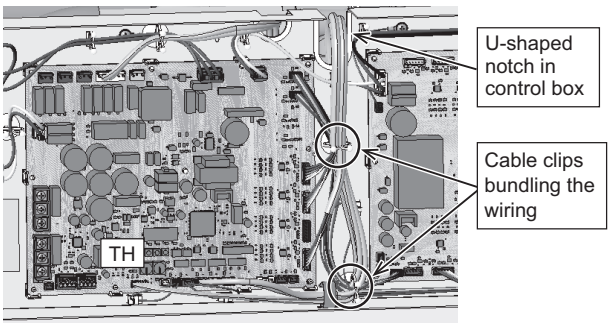
Procedure	Illustration
(1) Remove Panel TR, Cover B, and Panel BR.	
Follow the procedure in 11. Panel BR replacement to remove Panel TR, Cover B, and Panel BR.	
(2) Place the control box temporarily.	
Follow step (2) in 13-1-1. Main 12-branch BC controller LEV A/B/L coil (branches 1 to 6) replacement to temporarily place the control box.	
(3) Remove the LEV 1, 3, 4 coils.	
Remove the LEV coils to be replaced.	
(4) Remove the cable ties and cable clamp securing the wiring.	
1) Cut and remove the cable ties securing or bundling the wiring.	

Procedure	Illustration
2) Remove the wiring from the cable clamp.	
(5) Replace the LEV 1/3/4 coils.	
1) Remove the wiring from the cable clip and replace the LEV coils.	
(6) Reassemble the components.	
Reassemble the components in the reverse order.	

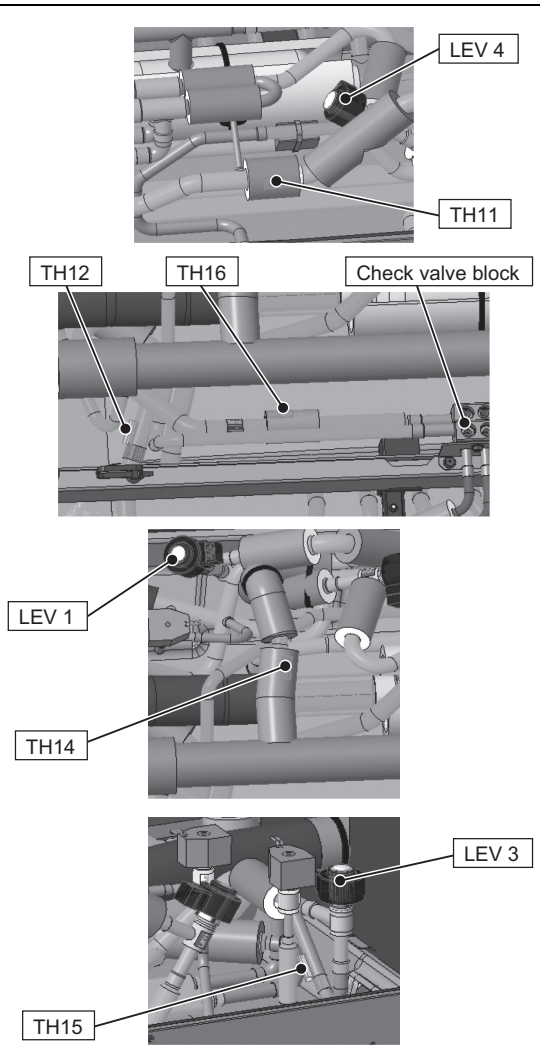
15-1. Main 12-branch BC controller thermistor replacement

Procedure	Illustration
(1) Remove Panel TR, Cover B, and Panel BR.	
Follow the procedure in 11. Panel BR replacement to remove Panel TR, Cover B, and Panel BR.	
(2) Place the control box temporarily.	
Follow step (2) in 13-1-1. Main 12-branch BC controller LEV A/B/L coil (branches 1 to 6) replacement to temporarily place the control box.	
Thermistor location	
	    

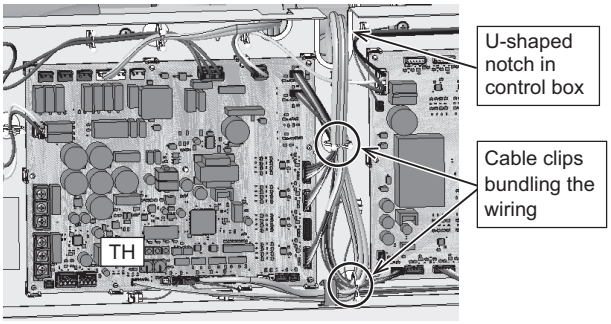
Procedure	Illustration
(3) Remove the thermistor.	
Cut the pipe cover and the attached cable tie, and then remove the thermistor.	TH11  TH12  TH14  TH15  TH16 
(4) Remove the cable ties and cable clamp securing the wiring.	
1) Cut and remove the cable tie securing the wiring.	

Procedure	Illustration
2) Cut and remove the cable ties securing the wiring.	
3) Remove the wiring from the cable clamp.	
(5) Replace the thermistor.	
Disconnect the wiring inside the control box and connect the new thermistor.	
(6) Reassemble the components.	
Reassemble the components in the reverse order.	

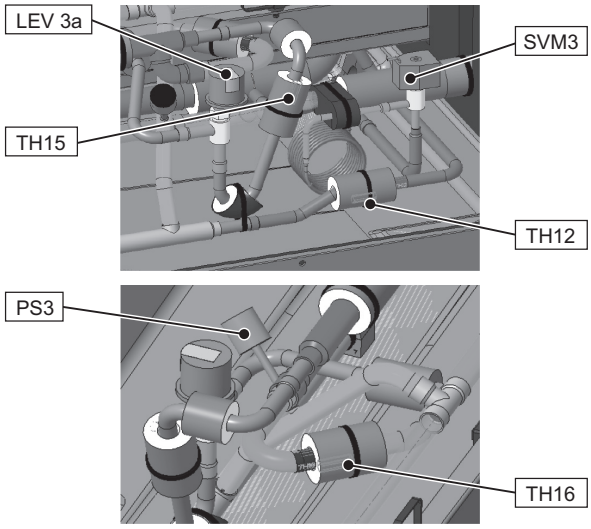
15-2. Main 4 to 8-branch BC controller thermistor replacement

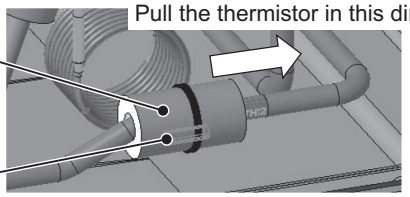
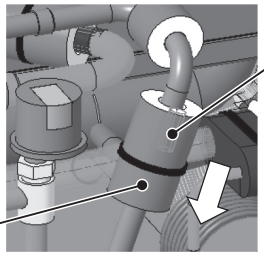
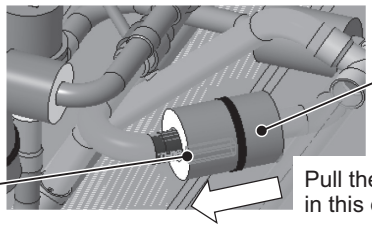
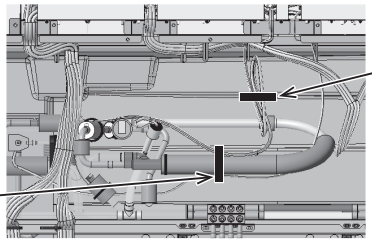
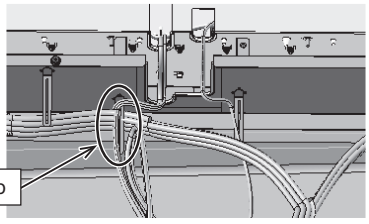
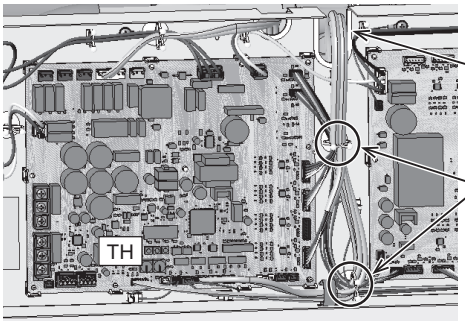
Procedure	Illustration
(1) Remove Panel TR, Cover B, and Panel BR.	
Follow the procedure in 11. Panel BR replacement to remove Panel TR, Cover B, and Panel BR.	
(2) Place the control box temporarily.	
Follow step (2) in 13-1-1. Main 12-branch BC controller LEV A/B/L coil (branches 1 to 6) replacement to temporarily place the control box.	
Thermistor location	
	

Procedure	Illustration
(3) Remove the thermistor.	
Cut the pipe cover and the attached cable tie, and then remove the thermistor.	TH11 Pull the thermistor in this direction. Pipe cover TH11 TH12, 16 TH12 Pull the thermistor in this direction. Pull the thermistor in this direction. Pipe cover TH16 TH14 TH14 Pull the thermistor in this direction. Pipe cover TH15 TH15 Pull the thermistor in this direction.
(4) Remove the cable ties and cable clamp securing the wiring.	
1) Cut and remove the cable ties securing or bundling the wiring.	Cable tie bundling the wiring Cable tie securing the wiring Cable ties securing the wiring
2) Remove the wiring from the cable clamp.	Cable clamp

Procedure	Illustration
(5) Replace the thermistor.	
Disconnect the wiring inside the control box and connect the new thermistor.	
(6) Reassemble the components.	
Reassemble the components in the reverse order.	

15-3. Sub BC controller thermistor replacement

Procedure	Illustration
(1) Remove Panel TR, Cover B, and Panel BR.	
Follow the procedure in 11. Panel BR replacement to remove Panel TR, Cover B, and Panel BR.	
(2) Place the control box temporarily.	
Follow step (2) in 13-1-1. Main 12-branch BC controller LEV A/B/L coil (branches 1 to 6) replacement to temporarily place the control box.	
Thermistor location	
	

Procedure	Illustration
(3) Remove the thermistor.	
Cut the pipe cover and the attached cable tie, and then remove the thermistor.	TH12 Pull the thermistor in this direction. Pipe cover TH12  TH15 TH15 Pipe cover Pull the thermistor in this direction.  TH16 Pipe cover TH16 Pull the thermistor in this direction. 
(4) Remove the cable ties and cable clamp securing the wiring.	
1) Cut and remove the cable ties securing or bundling the wiring.	Cable tie bundling the wiring Cable tie securing the wiring 
2) Remove the wiring from the cable clamp.	Cable clamp 
(5) Replace the thermistor.	
Disconnect the wiring inside the control box and connect the new thermistor.	U-shaped notch in control box Cable clips bundling the wiring TH 

Procedure	Illustration
(6) Reassemble the components.	
Reassemble the components in the reverse order.	

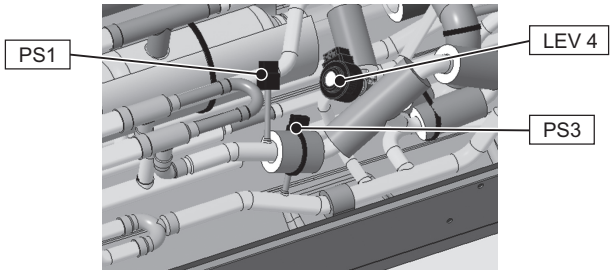
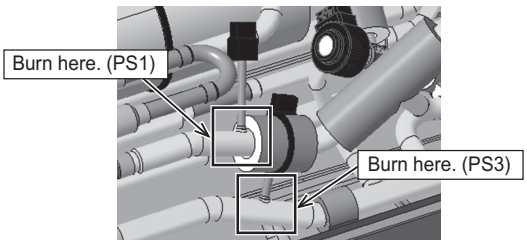
16-1. Main BC controller PS1 and PS3 replacement

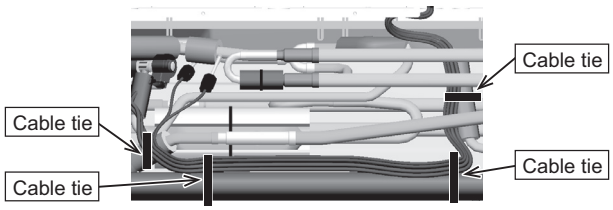
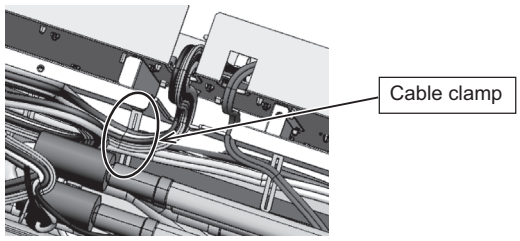
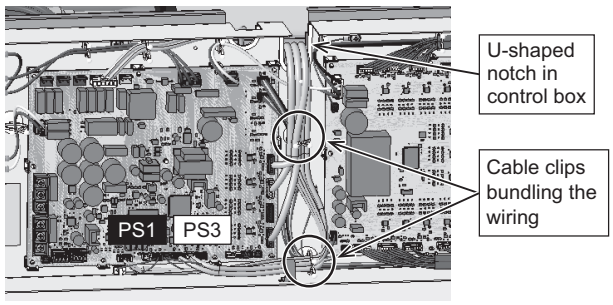
[WARNING]

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.

Cautions for replacing refrigerant circuit components

- Ensure a non-oxidizing brazing is performed.
- When heating the piping, wrap a wet towel around the refrigerant circuit parts except the pressure sensor to keep their temperature below 120°C [248° F]. Do not allow the temperature of the pressure sensor to rise above 80°C [176°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 drain pan, 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 drain pan is protected from spatter during brazing.

Procedure	Illustration
(1) Recover the refrigerant.	
(2) Lower the unit from the ceiling.	
Lower the unit from the ceiling for brazing work.	
(3) Remove Panel TR, Cover B, and Panel BR.	
Follow the procedure in 11. Panel BR replacement to remove Panel TR, Cover B, and Panel BR.	
PS1 and PS3 location	
	
(4) Remove the components around PS1 and PS3.	
Remove the pipe covers and wiring around PS1 and PS3.	
(5) Protect the functional components.	
Protect the functional components, insulation material, and drain pan around PS1 and PS3.	
(6) Remove PS1 and PS3.	
Remove PS1 and PS3.	

Procedure	Illustration
(7) Remove the cable ties securing the wiring.	
1) Cut and remove the cable ties securing the wiring. The cable path and cable tie location are the same as for LEV 1/3/4.	
2) Remove the wiring from the cable clamp.	
(8) Replace PS1 and PS3.	
Remove the relevant connectors and replace PS1 and PS3.	
(9) Reassemble the components.	
Reassemble the components in the reverse order.	

16-2. Sub BC controller PS3 replacement

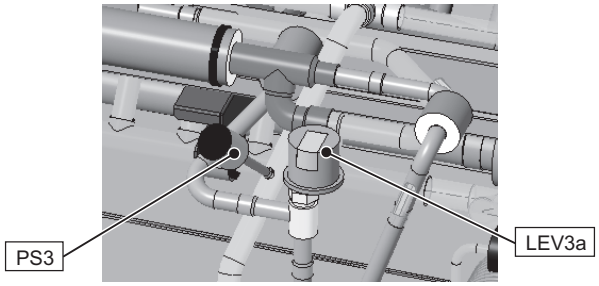
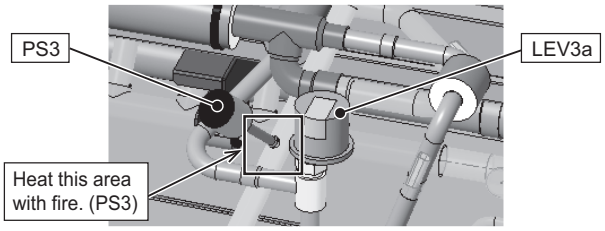
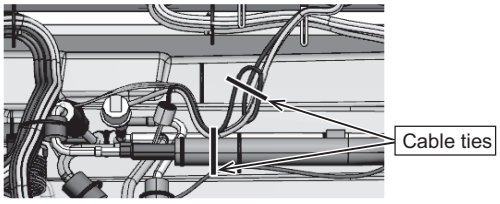
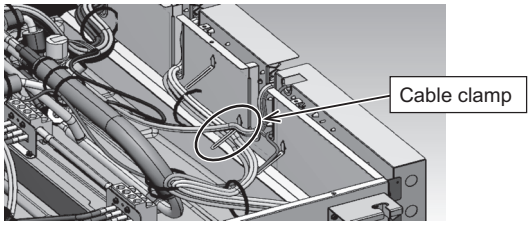
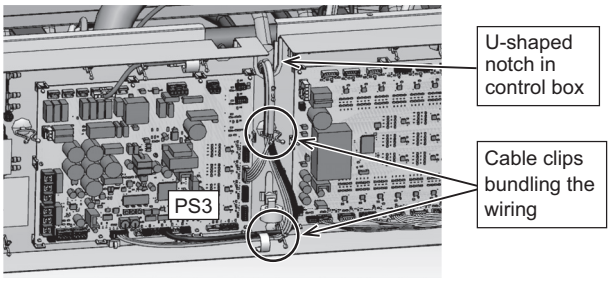
[WARNING]

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.

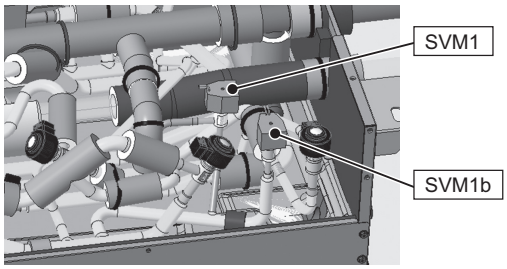
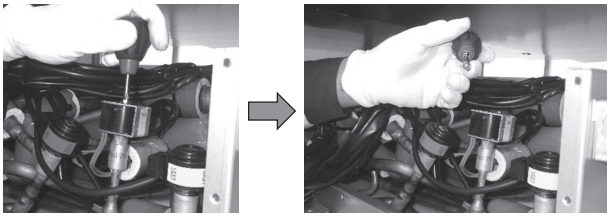
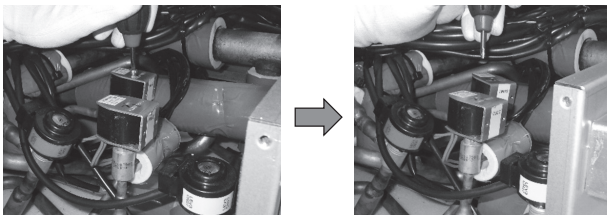
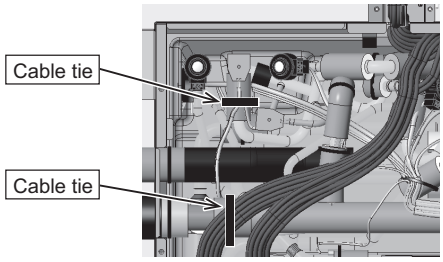
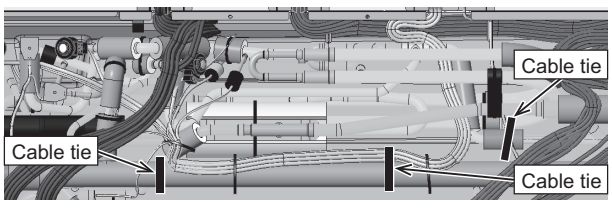
Cautions for replacing refrigerant circuit components

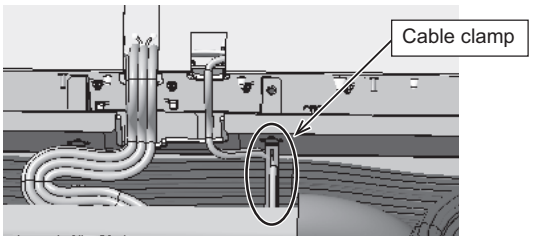
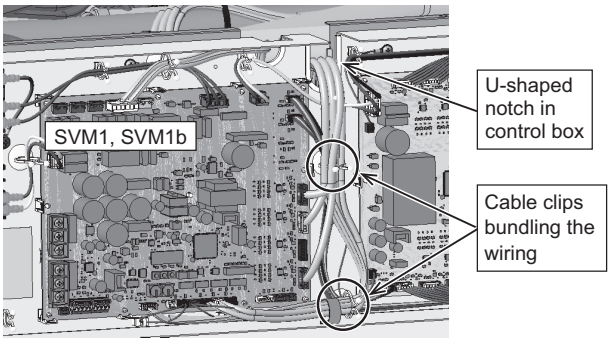
- Ensure a non-oxidizing brazing is performed.
- When heating the piping, wrap a wet towel around the refrigerant circuit parts except the pressure sensor to keep their temperature below 120°C [248° F]. Do not allow the temperature of the pressure sensor to rise above 80°C [176°F].
- After brazing, check 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 drain pan, 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 drain pan is protected from spatter during brazing.

Procedure	Illustration
(1) Recover the refrigerant.	
(2) Bring the unit down from the ceiling.	
Bring the unit down from the ceiling for brazing work.	
(3) Remove Panel TR, Cover B, and Panel BR.	
Follow the procedure in 11. Panel BR replacement to remove Panel TR, Cover B, and Panel BR.	

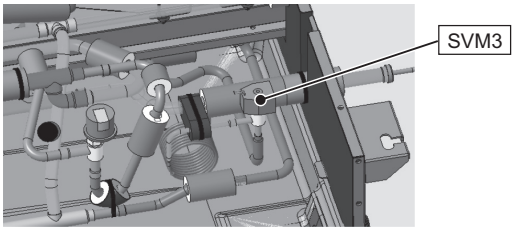
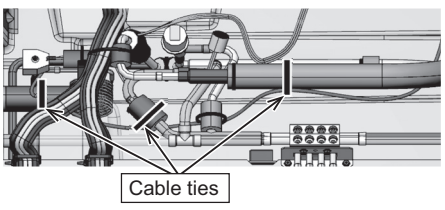
Procedure	Illustration
PS3 location	
	
(4) Remove the components around PS3.	
Remove the pipe cover and wiring around PS3.	
(5) Protect the functional components.	
Protect the functional components, insulation material, and drain pan around PS3.	
(6) Remove PS3.	
Remove PS3.	
(7) Remove the cable tie securing the wiring.	
1) Cut and remove the cable ties securing the wiring.	
2) Remove the wiring from the cable clamp.	
(8) Replace PS3.	
Remove the wiring from the cable clips and replace PS3.	
(9) Reassemble the components.	
Reassemble the components in the reverse order.	

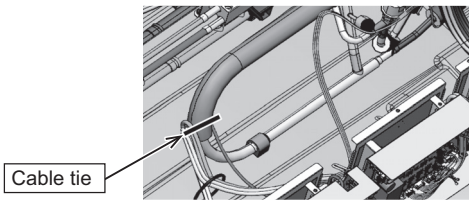
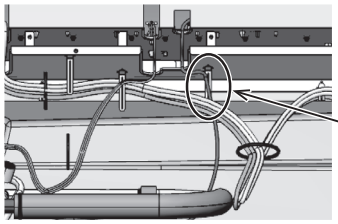
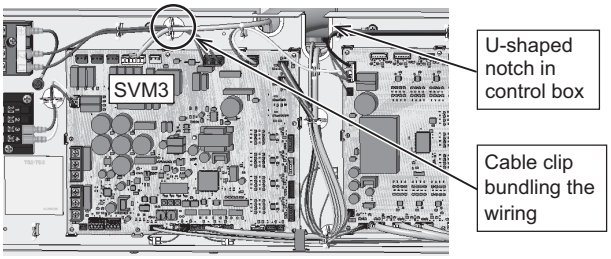
17-1. SVM1 and SVM1b coil replacement (only for main BC controller)

Procedure	Illustration
(1) Remove Panel TR, Cover B, and Panel BR.	
Follow the procedure in 11. Panel BR replacement to remove Panel TR, Cover B, and Panel BR.	
(2) Temporarily place the control box.	
Follow step (2) in 13-1-1. Main 12-branch BC controller LEV A/B/L coil (branches 1 to 6) replacement to temporarily place the control box.	
SVM1 and SVM1b coil location	
	
(3) Remove the SVM1 and SVM1b coils.	
Remove the screws to remove the coils.	Removing the screw (SVM1b)  Removing the screw (SVM1) 
(4) Remove the cable ties securing the wiring.	
1) Cut and remove the cable ties securing the wiring.	
2) Cut and remove the cable ties securing the wiring.	

Procedure	Illustration
3) Remove the wiring from the cable clamp.	
(5) Replace the SVM1 and SVM1b coils.	
Remove the relevant connectors and replace SVM1 and SVM1b.	
(6) Reassemble the components.	
Reassemble the components in the reverse order.	

17-2. SVM3 coil replacement (only for sub BC controller)

Procedure	Illustration
(1) Remove Panel TR, Cover B, and Panel BR.	
Follow the procedure in 11. Panel BR replacement to remove Panel TR, Cover B, and Panel BR.	
(2) Place the control box temporarily.	
Follow step (2) in 13-1-1. Main 12-branch BC controller LEV A/B/L coil (branches 1 to 6) replacement to temporarily place the control box.	
SVM3 coil location	
	
(3) Remove the SVM3 coil.	
Remove the screws to remove the coil.	
(4) Remove the cable ties securing the wiring.	
1) Cut and remove the cable ties securing the wiring.	

Procedure	Illustration
2) Cut and remove the cable tie securing the wiring.	
3) Remove the wiring from the cable clamp.	
(5) Replace SVM3.	
Remove the wiring from the cable clip and replace SVM3.	
(6) Reassemble the components.	
Reassemble the components in the reverse order.	

18-1. Main 12-branch BC controller LEV 1/3/4 valve replacement

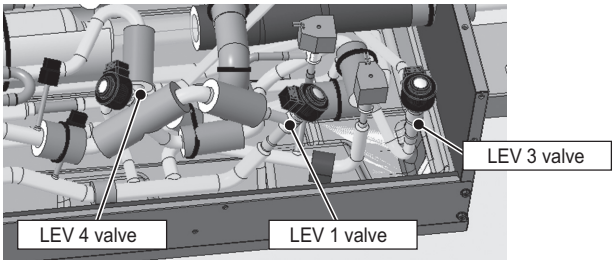
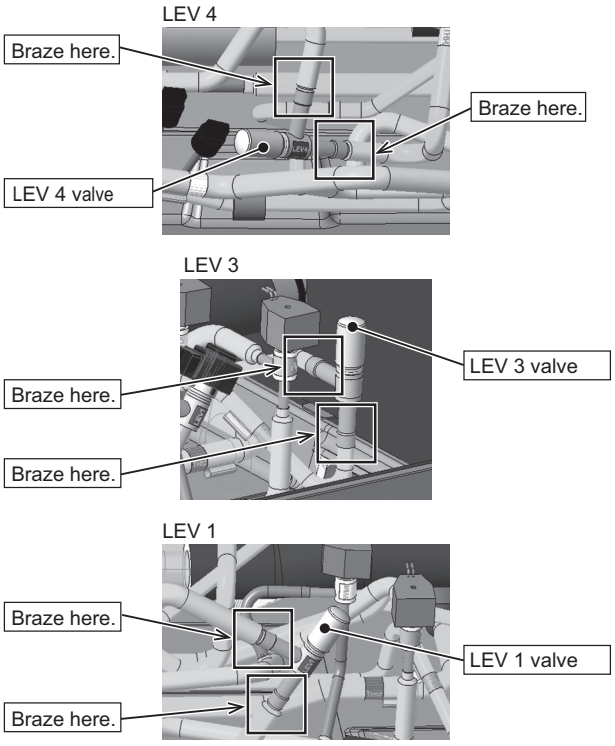
[WARNING]

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.

Cautions for replacing refrigerant circuit components

- Ensure a non-oxidizing brazing is performed.
- When heating the piping, wrap a wet towel around the refrigerant circuit parts except the pressure sensor to keep their temperature below 120°C [248° F]. Do not allow the temperature of the pressure sensor to rise above 80°C [176°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 drain pan, 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 drain pan is protected from spatter during brazing.

Procedure	Illustration
(1) Recover the refrigerant.	
(2) Lower the unit from the ceiling.	
Lower the unit from the ceiling for brazing work.	
(3) Remove Panel TR, Cover B, and Panel BR.	
Follow the procedure in 11. Panel BR replacement to remove Panel TR, Cover B, and Panel BR.	

Procedure	Illustration
LEV 1/3/4 valve location	
	
(4) Remove the components around the valves.	
Remove the pipe covers and wiring around the valves.	
(5) Protect the functional components.	
Protect the functional components, insulation material, and drain pan around the valve.	
(6) Replace the valves.	
Remove and replace the LEV 1/3/4 valves.	
(7) Reassemble the components.	
Reassemble the components in the reverse order.	

18-2. LEV 3a replacement (only for sub BC controller)

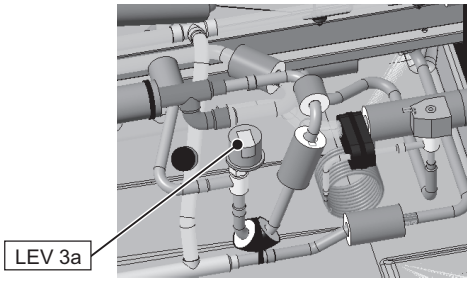
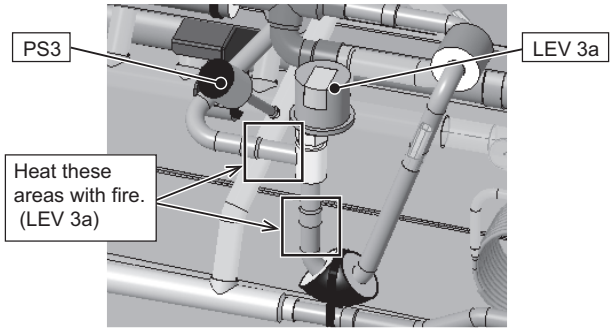
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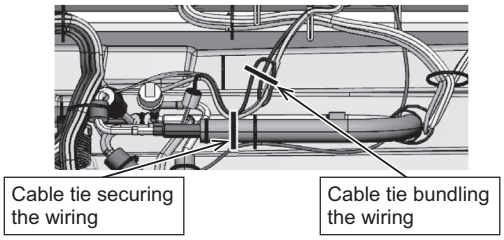
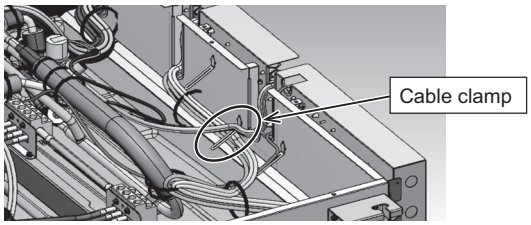
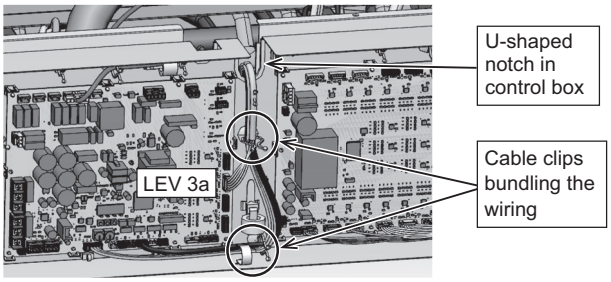
Refrigerant, when coming into direct contact with flame, can produce poisonous gases, so perform work in a well-ventilated place where the refrigerant does not stagnate.

Cautions for replacing refrigerant circuit components

- Ensure a non-oxidizing brazing is performed.
- When heating the piping, wrap a wet towel around the refrigerant circuit parts except the pressure sensor to keep their temperature below 120°C [248° F]. Do not allow the temperature of the pressure sensor to rise above 80°C [176°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 drain pan, 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 drain pan is protected from spatter during brazing.

Procedure	Illustration
(1) Recover the refrigerant.	
(2) Bring the unit down from the ceiling.	
Bring the unit down from the ceiling for brazing work.	
(3) Remove Panel TR, Cover B, and Panel BR.	
Follow the procedure in 11. Panel BR replacement to remove Panel TR, Cover B, and Panel BR.	
LEV 3a location	
	
(4) Remove the components around LEV 3a.	
Remove the pipe covers and wiring around LEV 3a.	
(5) Protect the functional components.	
Protect the functional components, insulation material, and drain pan around LEV 3a.	
(6) Remove LEV 3a.	
Remove LEV 3a.	

Procedure	Illustration
(7) Remove the cable ties securing the wiring.	
1) Cut and remove the cable ties securing or bundling the wiring.	
2) Remove the wiring from the cable clamp.	
(8) Replace LEV 3a.	
Remove the wiring from the cable clips and replace LEV 3a.	
(9) Reassemble the components.	
Reassemble the components in the reverse order.	

19-1. Main 12-branch BC controller LEV A/B valve replacement

[WARNING]

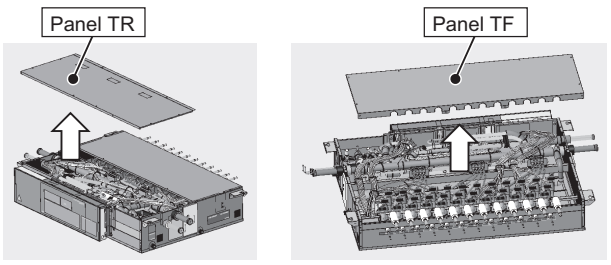
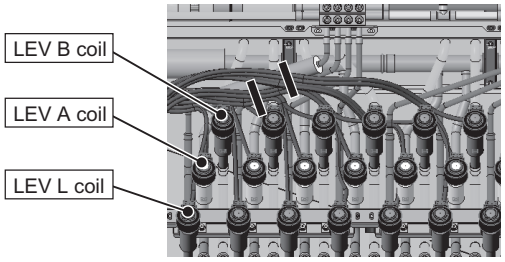
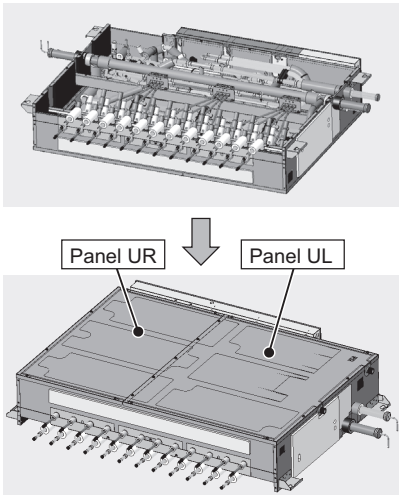
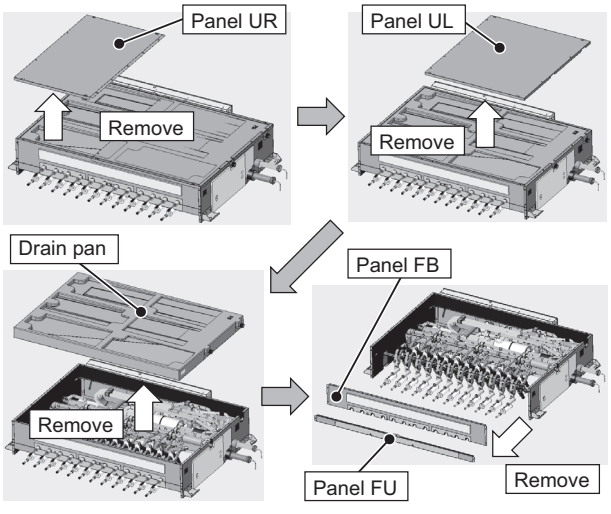
Refrigerant, when coming into direct contact with flame, can produce poisonous gases, so perform work in a well-ventilated place where the refrigerant does not stagnate.

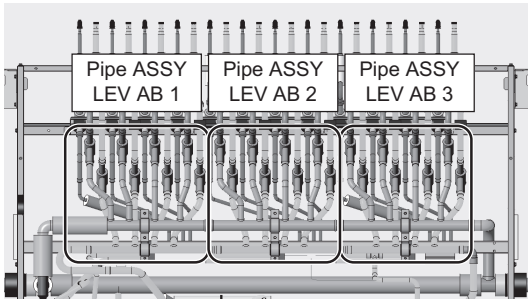
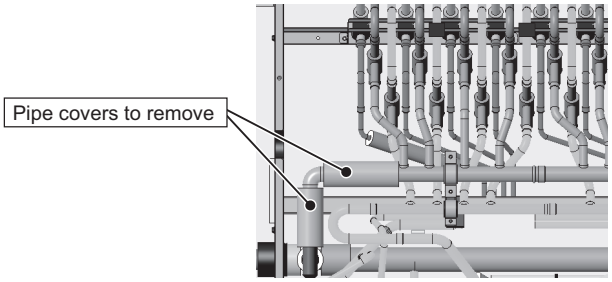
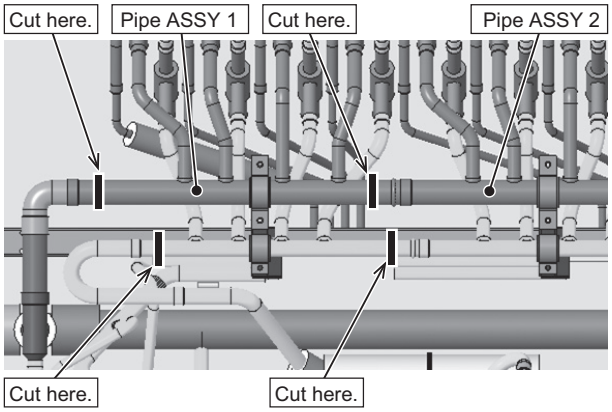
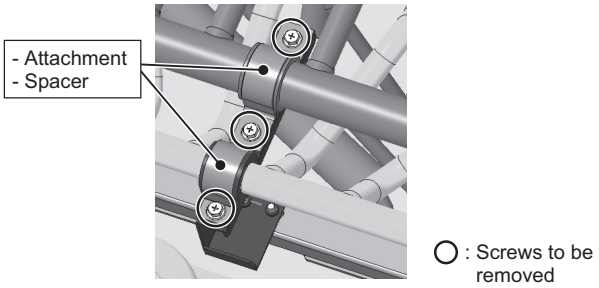
Cautions for replacing refrigerant circuit components

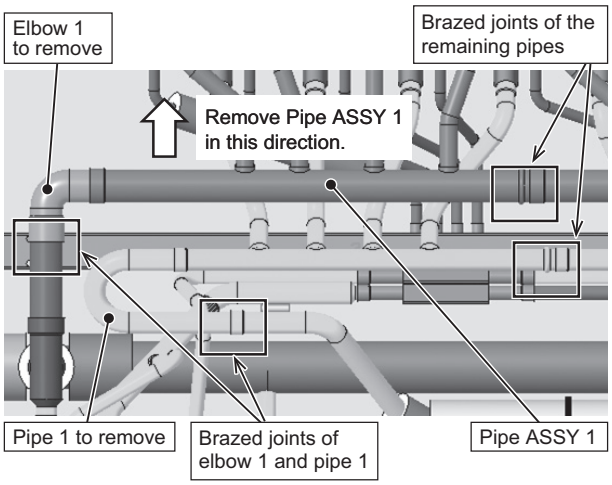
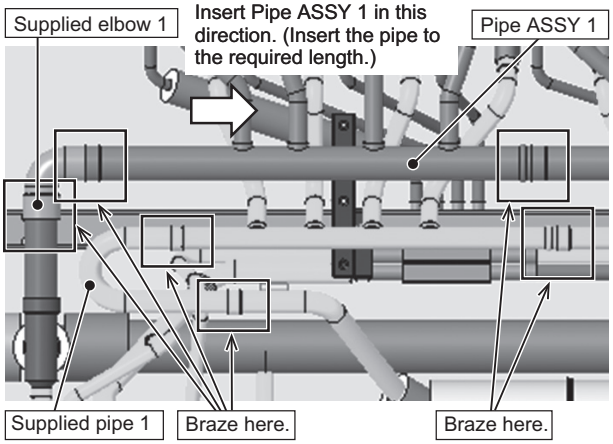
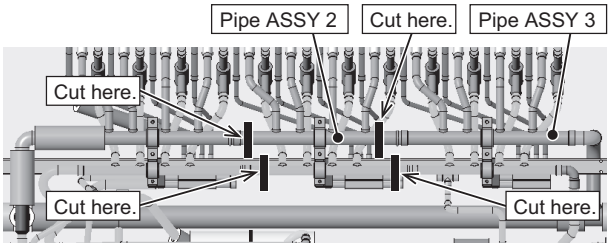
- Ensure a non-oxidizing brazing is performed.
- When heating the piping, wrap a wet towel around the refrigerant circuit components to keep their temperature below 120°C [248°F].
- After brazing, check the area around the brazing joint for any leaks before performing vacuum drying.
- Beware of the flame direction during brazing, as it may burn the wiring or sheet metal parts inside the unit. To protect the drain pan, 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.

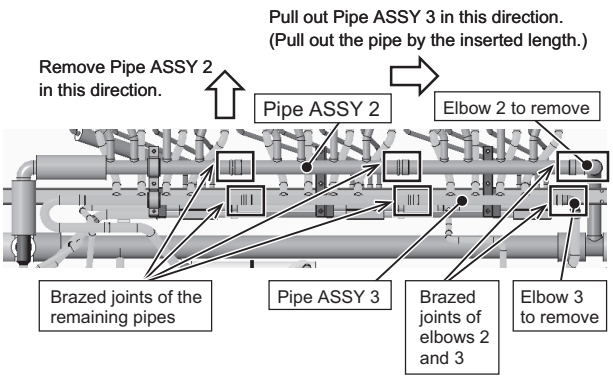
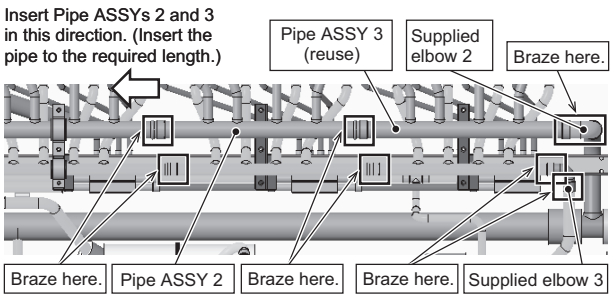
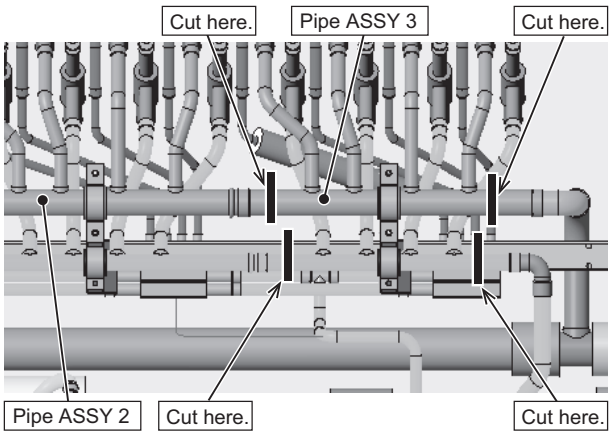
  Recommended felt: TRUSCO NAKAYAMA Spatter Felt 50CF-11 (5t × 1 m × 1 m)
  Flame retardant testing method for spark droplets from welding and gas cutting on fabric sheets in construction works (JIS A 1323) Type A approved
- Ensure the drain pan is protected from spatter during brazing.

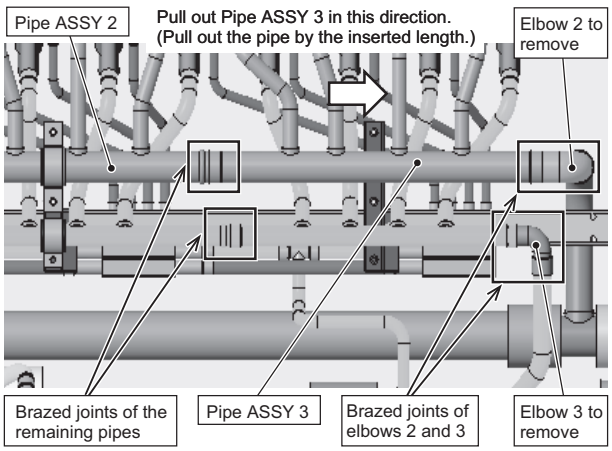
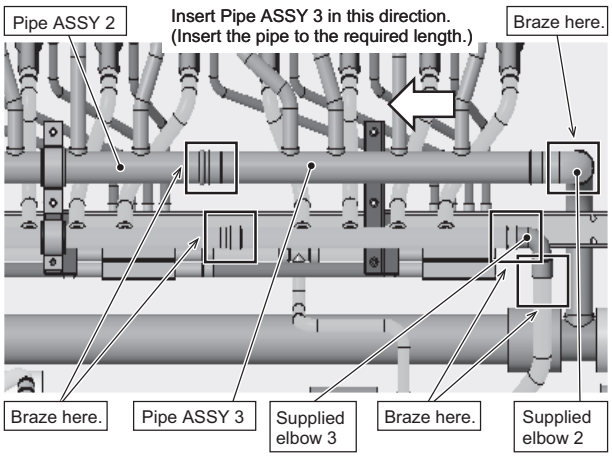
No.	Procedure	Illustration
1	Recover the refrigerant.	
2	Bring the unit down from the ceiling for brazing work.	

No.	Procedure	Illustration
3	Remove Panel TR, and then Panel TF.	
4	Remove the LEV A, B, and L coils from the Pipe ASSY that needs to be replaced, and set them aside in a location where they are not exposed to fire during brazing.	
5	Turn the unit upside down so that Panel UR and Panel UL face up.	
6	Remove Panel UR, Panel UL, the drain pan, Panel FB, and Panel FU in that order.	

No.	Procedure	Illustration
Locations of the Pipe ASSYs on the main BC controller (12 branches)		
No. 7: To replace Pipe ASSY LEV AB 1 on the main BC controller (12 branches), follow the steps below.		
7-(1)	Remove the pipe covers.	
7-(2)	Remove the insulation material and cables around Pipe ASSY 1 to prevent them from being exposed to fire during brazing.	
7-(3)	Cut the pipes using a pipe cutter.	
7-(4)	Remove the attachment and spacer that secure Pipe ASSY 1.	

No.	Procedure	Illustration
7-(5)	Remove Pipe ASSY 1, as well as elbow 1, pipe 1, and the remaining pipes from the brazed joints.	
7-(6)	Replace the old elbow 1 and pipe 1 with elbow 1 and pipe 1 that are supplied with Pipe ASSY 1. **Note** ♦Be sure to use brazing to connect the pipes.	
7-(7)	The replacement of Pipe ASSY LEV AB 1 is completed here. Install the removed parts in reverse order.	
No. 8: To replace Pipe ASSY LEV AB 2 on the main BC controller, follow the steps below.		
8-(1)	Remove the insulation material and cables around Pipe ASSY 2 to prevent them from being exposed to fire during brazing.	
8-(2)	Cut the pipes using a pipe cutter.	
8-(3)	Remove the attachments and spacers that secure Pipe ASSYs 2 and 3, referring to step No. 7-(4) on previous page.	

No.	Procedure	Illustration
8-(4)	Remove Pipe ASSY 2, as well as Pipe ASSY 3, elbows 2 and 3, and the remaining pipes from the brazed joints.	
8-(5)	Reuse the removed Pipe ASSY 3, and replace the old elbows 2 and 3 with elbow 2 and elbow 3 that are supplied with Pipe ASSY 2. **Note** ♦Be sure to use brazing to connect the pipes. ♦Dispose of pipe 2 and pipe 3 as they will not be used.	
8-(6)	The replacement of Pipe ASSY LEV AB 2 is completed here. Install the removed parts in reverse order.	
No. 9: To replace Pipe ASSY LEV AB 3 on the main BC controller (12 branches), follow the steps below.		
9-(1)	Remove the insulation material and cables around Pipe ASSY 3 to prevent them from being exposed to fire during brazing.	
9-(2)	Cut the pipes using a pipe cutter.	
9-(3)	Remove the attachment and spacer that secure Pipe ASSY 3, referring to step No. 7-(4) in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	

No.	Procedure	Illustration
9-(4)	Remove Pipe ASSY 3, as well as elbows 2 and 3, and the remaining pipes from the brazed joints.	
9-(5)	Replace the old elbow 2 and elbow 3 with elbow 2 and elbow 3 that are supplied with Pipe ASSY 3. **Note** ♦Be sure to use brazing to connect the pipes.	
9-(6)	The replacement of Pipe ASSY LEV AB 3 is completed here. Install the removed parts in reverse order.	

19-2. Main 8-branch BC controller LEV A/B valve replacement

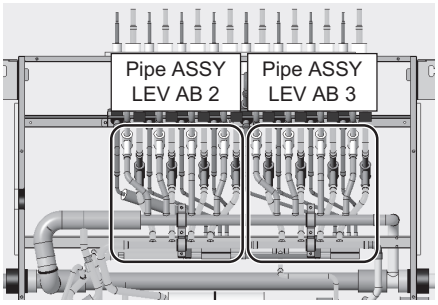
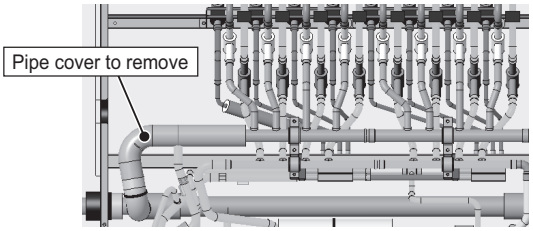
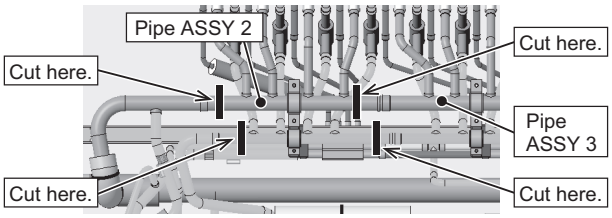
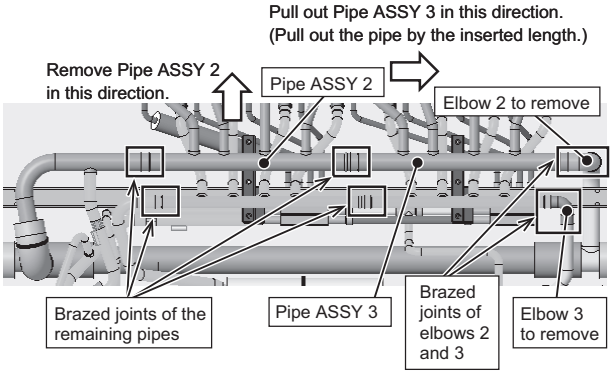
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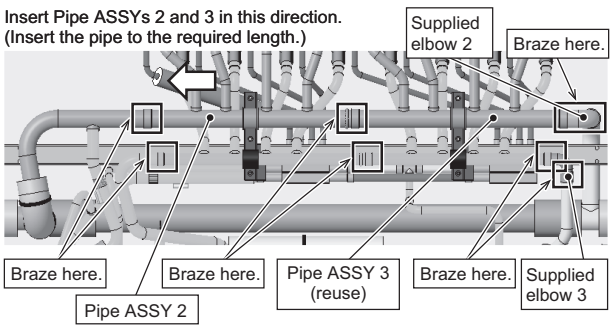
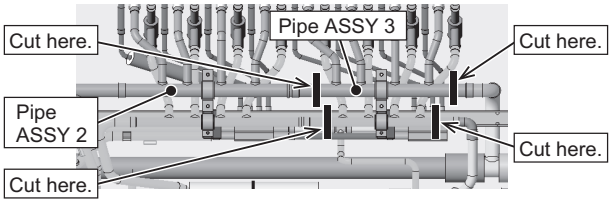
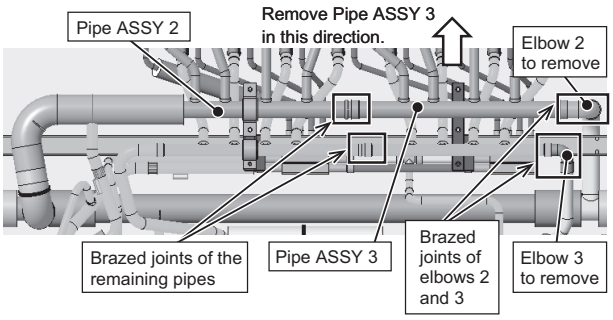
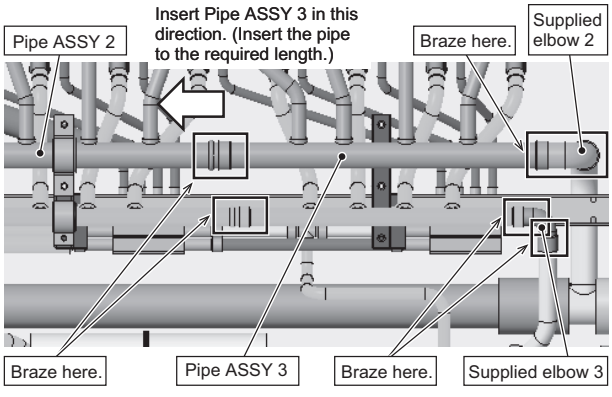
Refrigerant, when coming into direct contact with flame, can produce poisonous gases, so perform work in a well-ventilated place where the refrigerant does not stagnate.

Cautions for replacing refrigerant circuit components

- ♦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 drain pan, 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 drain pan is protected from spatter during brazing.

No.	Procedure	Illustration
1	Recover the refrigerant.	
2	Bring the unit down from the ceiling for brazing work.	
3	Remove Panel TR and Panel TF, referring to step No. 3 in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
4	Remove the LEV A, B, and L coils from the Pipe ASSY that needs to be replaced, referring to step No. 4 in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	

No.	Procedure	Illustration
5	Turn the unit upside down, referring to step No. 5 in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
6	Remove Panel UR, Panel UL, the drain pan, Panel FB, and Panel FU, referring to step No. 6 in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
Locations of the Pipe ASSYs on the main BC controller (8 branches)		
No. 7: To replace Pipe ASSY LEV AB 2 on the main BC controller (8 branches), follow the steps below.		
7-(1)	Remove the pipe cover.	
7-(2)	Remove the insulation material and cables around Pipe ASSY 2 to prevent them from being exposed to fire during brazing.	
7-(3)	Cut the pipes using a pipe cutter.	
7-(4)	Remove the attachments and spacers that secure Pipe ASSYs 2 and 3, referring to step No. 7-(4) in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
7-(5)	Remove Pipe ASSY 2, as well as Pipe ASSY 3, elbows 2 and 3, and the remaining pipes from the brazed joints.	

No.	Procedure	Illustration
7-(6)	Reuse the removed Pipe ASSY 3, and replace the old elbows 2 and 3 with elbow 2 and elbow 3 that are supplied with Pipe ASSY 2. **Note** ♦Be sure to use brazing to connect the pipes. ♦Dispose of pipe 2 and pipe 3 as they will not be used.	
7-(7)	The replacement of Pipe ASSY LEV AB 2 is completed here. Install the removed parts in reverse order.	
	No. 8: To replace Pipe ASSY LEV AB 3 on the main BC controller (8 branches), follow the steps below.	
8-(1)	Remove the insulation material and cables around Pipe ASSY 3 to prevent them from being exposed to fire during brazing.	
8-(2)	Cut the pipes using a pipe cutter.	
8-(3)	Remove the attachment and spacer that secure Pipe ASSY 3, referring to step No. 7-(4) in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
8-(4)	Remove Pipe ASSY 3, as well as elbows 2 and 3, and the remaining pipes from the brazed joints.	
8-(5)	Replace the old elbow 2 and elbow 3 with elbow 2 and elbow 3 that are supplied with Pipe ASSY 3. **Note** ♦Be sure to use brazing to connect the pipes.	
8-(6)	The replacement of Pipe ASSY LEV AB 3 is completed here. Install the removed parts in reverse order.	

19-3. Main 6-branch BC controller LEV A/B valve replacement

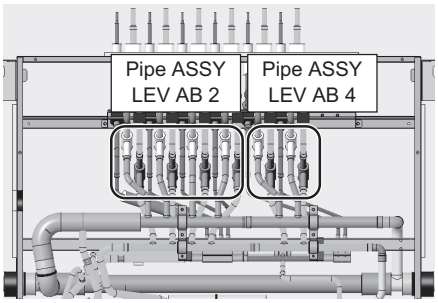
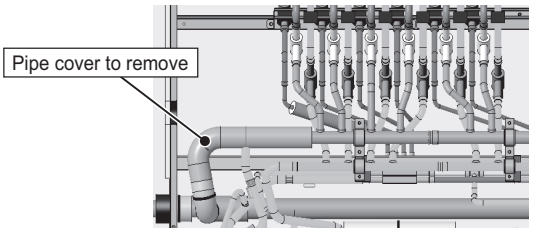
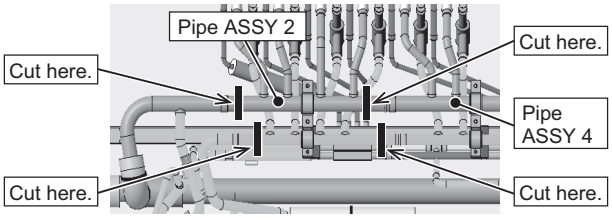
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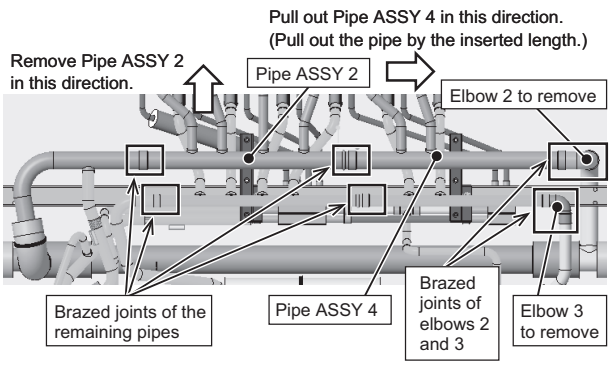
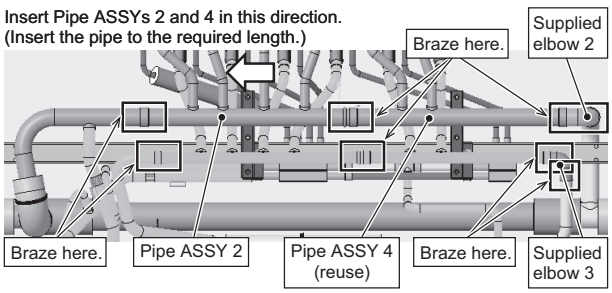
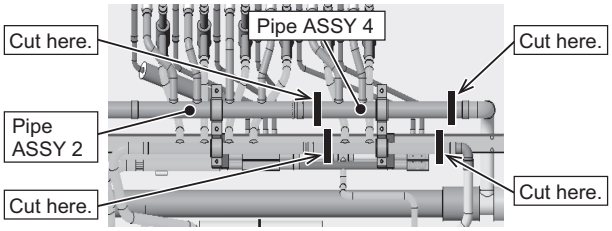
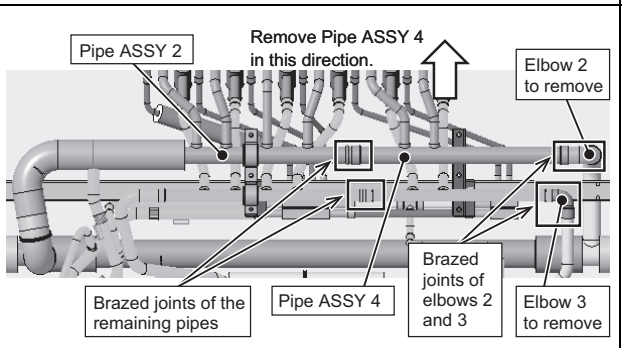
Refrigerant, when coming into direct contact with flame, can produce poisonous gases, so perform work in a well-ventilated place where the refrigerant does not stagnate.

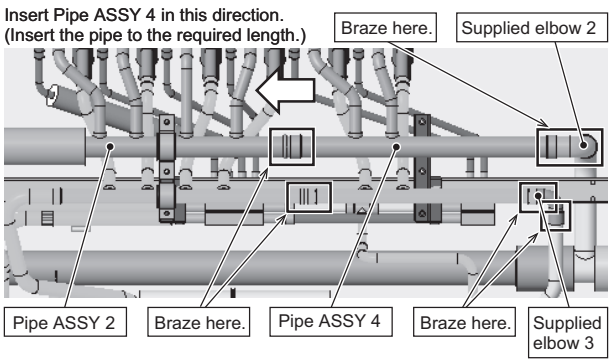
Cautions for replacing refrigerant circuit components

- 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 drain pan, 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 drain pan is protected from spatter during brazing.

No.	Procedure	Illustration
1	Recover the refrigerant.	
2	Bring the unit down from the ceiling for brazing work.	
3	Remove Panel TR and Panel TF, referring to step No. 3 in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
4	Remove the LEV A, B, and L coils from the Pipe ASSY that needs to be replaced, referring to step No. 4 in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
5	Turn the unit upside down, referring to step No. 5 in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
6	Remove Panel UR, Panel UL, the drain pan, Panel FB, and Panel FU, referring to step No. 6 in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
Locations of the Pipe ASSYs on the main BC controller (6 branches)		
No. 7: To replace Pipe ASSY LEV AB 2 on the main BC controller (6 branches), follow the steps below.		
7-(1)	Remove the pipe cover.	
7-(2)	Remove the insulation material and cables around Pipe ASSY 2 to prevent them from being exposed to fire during brazing.	
7-(3)	Cut the pipes using a pipe cutter.	

No.	Procedure	Illustration
7-(4)	Remove the attachments and spacers that secure Pipe ASSYs 2 and 4, referring to step No. 7-(4) in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
7-(5)	Remove Pipe ASSY 2, as well as Pipe ASSY 4, elbows 2 and 3, and the remaining pipes from the brazed joints.	
7-(6)	Reuse the removed Pipe ASSY 4, and replace the old elbows 2 and 3 with elbow 2 and elbow 3 that are supplied with Pipe ASSY 2. **Note** ♦Be sure to use brazing to connect the pipes. ♦Dispose of pipe 2 and pipe 3 as they will not be used.	
7-(7)	The replacement of Pipe ASSY LEV AB 2 is completed here. Install the removed parts in reverse order.	
	No. 8: To replace Pipe ASSY LEV AB 4 on the main BC controller (6 branches), follow the steps below.	
8-(1)	Remove the insulation material and cables around Pipe ASSY 4 to prevent them from being exposed to fire during brazing.	
8-(2)	Cut the pipes using a pipe cutter.	
8-(3)	Remove the attachment and spacer that secure Pipe ASSY 4, referring to step No. 7-(4) in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
8-(4)	Remove Pipe ASSY 4, as well as elbows 2 and 3, and the remaining pipes from the brazed joints.	

No.	Procedure	Illustration
8-(5)	Replace the old elbow 2 and elbow 3 with elbow 2 and elbow 3 that are supplied with Pipe ASSY 4. Note ♦Be sure to use brazing to connect the pipes.	
8-(6)	The replacement of Pipe ASSY LEV AB 4 is completed here. Install the removed parts in reverse order.	

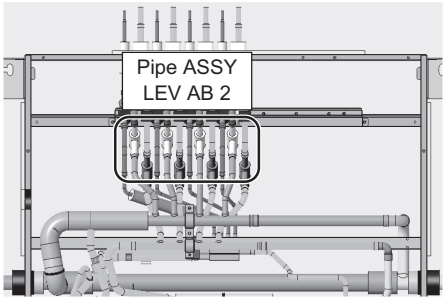
19-4. Main 4-branch BC controller LEV A/B valve replacement

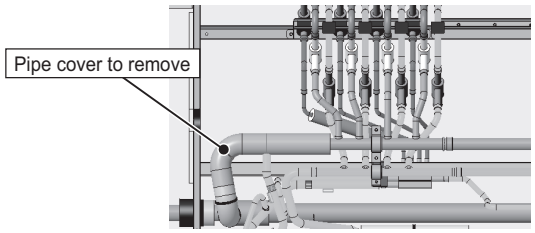
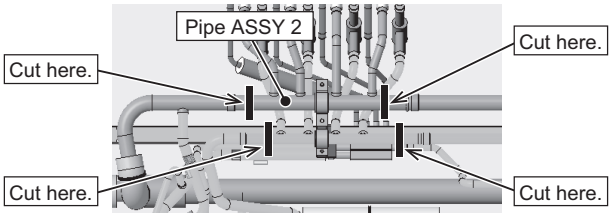
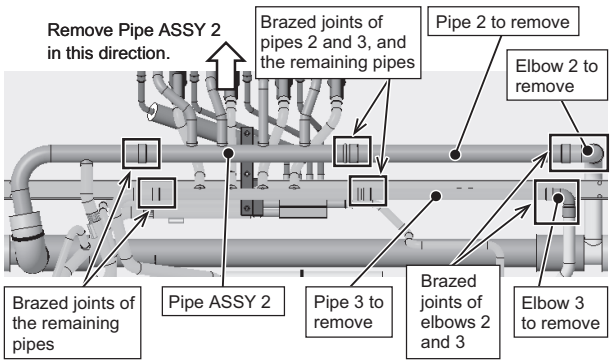
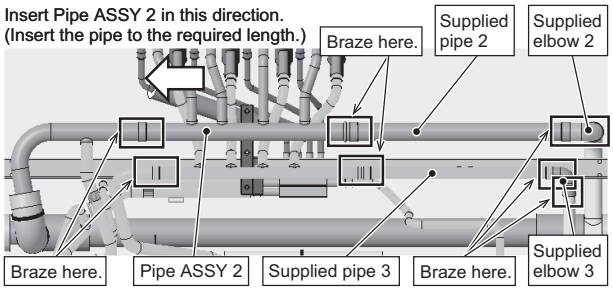
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Refrigerant, when coming into direct contact with flame, can produce poisonous gases, so perform work in a well-ventilated place where the refrigerant does not stagnate.

Cautions for replacing refrigerant circuit components

- ♦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 drain pan, 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 drain pan is protected from spatter during brazing.

No.	Procedure	Illustration
1	Recover the refrigerant.	
2	Bring the unit down from the ceiling for brazing work.	
3	Remove Panel TR and Panel TF, referring to step No. 3 in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
4	Remove the LEV A, B, and L coils from the Pipe ASSY that needs to be replaced, referring to step No. 4 in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
5	Turn the unit upside down, referring to step No. 5 in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
6	Remove Panel UR, Panel UL, the drain pan, Panel FB, and Panel FU, referring to step No. 6 in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
Locations of the Pipe ASSYs on the main BC controller (4 branches)		

No.	Procedure	Illustration
7	Remove the pipe cover.	
8	Remove the insulation material and cables around Pipe ASSY 2 to prevent them from being exposed to fire during brazing.	
9	Cut the pipes using a pipe cutter.	
10	Remove the attachment and spacer that secure Pipe ASSY 2, referring to step No. 7-(4) in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
11	Remove Pipe ASSY 2, as well as pipes 2 and 3, elbows 2 and 3, and the remaining pipes from the brazed joints.	
12	Replace the old pipe 2, pipe 3, elbow 2, and elbow 3 with pipe 2, pipe 3, elbow 2, and elbow 3 that are supplied with Pipe ASSY 2. **Note** ♦Be sure to use brazing to connect the pipes.	
13	The replacement of Pipe ASSY LEV AB 2 is completed here. Install the removed parts in reverse order.	

19-5. Sub 8-branch BC controller LEV A/B valve replacement

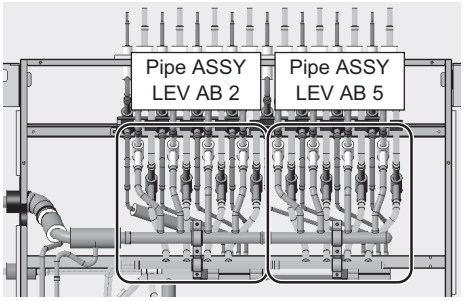
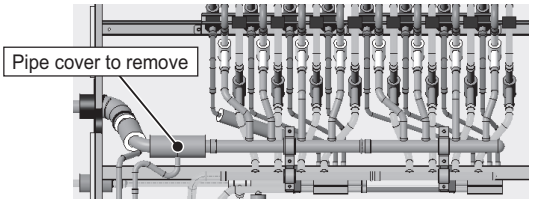
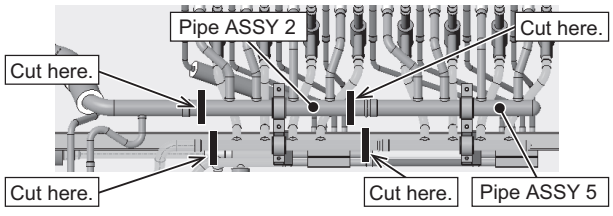
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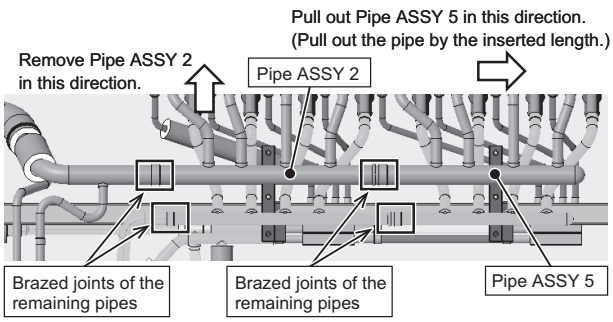
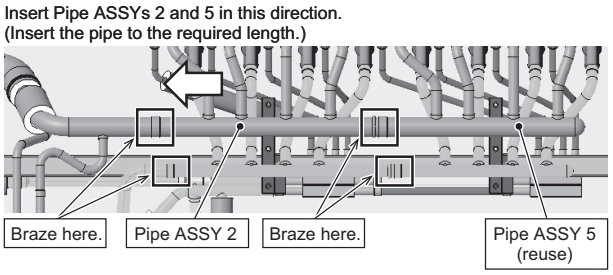
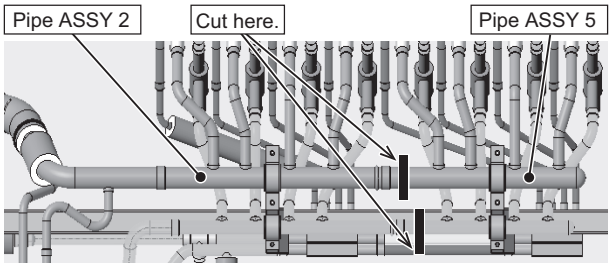
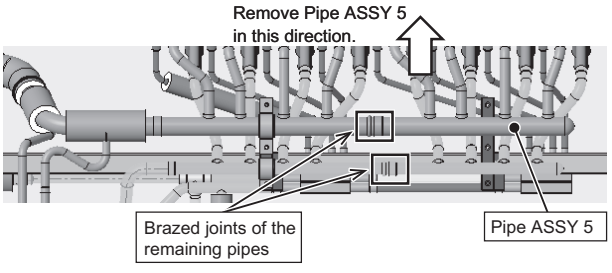
Refrigerant, when coming into direct contact with flame, can produce poisonous gases, so perform work in a well-ventilated place where the refrigerant does not stagnate.

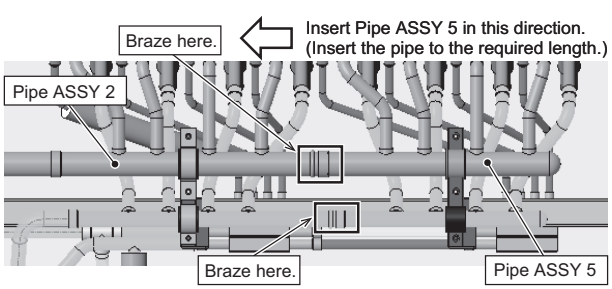
Cautions for replacing refrigerant circuit components

- 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 drain pan, 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 drain pan is protected from spatter during brazing.

No.	Procedure	Illustration
1	Recover the refrigerant.	
2	Bring the unit down from the ceiling for brazing work.	
3	Remove Panel TR and Panel TF, referring to step No. 3 in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
4	Remove the LEV A, B, and L coils from the Pipe ASSY that needs to be replaced, referring to step No. 4 in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
5	Turn the unit upside down, referring to step No. 5 in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
6	Remove Panel UR, Panel UL, the drain pan, Panel FB, and Panel FU, referring to step No. 6 in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
Locations of the Pipe ASSYs on the main BC controller (8 branches)		
No. 7: To replace Pipe ASSY LEV AB 2 on the sub BC controller (8 branches), follow the steps below.		
7-(1)	Remove the pipe cover.	
7-(2)	Remove the insulation material and cables around Pipe ASSY 2 to prevent them from being exposed to fire during brazing.	
7-(3)	Cut the pipes using a pipe cutter.	
7-(4)	Remove the attachments and spacers that secure Pipe ASSYs 2 and 5, referring to step No. 7-(4) in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	

No.	Procedure	Illustration
7-(5)	Remove Pipe ASSY 2, as well as Pipe ASSY 5, and the remaining pipes from the brazed joints.	
7-(6)	Reuse the removed Pipe ASSY 5, and replace the old Pipe ASSY 2 with Pipe ASSY 2. **Note** ♦Be sure to use brazing to connect the pipes. ♦Dispose of pipe 2, pipe 3, elbow 2, and elbow 3 as they will not be used.	
7-(7)	The replacement of Pipe ASSY LEV AB 2 is completed here. Install the removed parts in reverse order.	
No. 8: To replace Pipe ASSY LEV AB 5 on the sub BC controller (8 branches), follow the steps below.		
8-(1)	Remove the insulation material and cables around Pipe ASSY 5 to prevent them from being exposed to fire during brazing.	
8-(2)	Cut the pipes using a pipe cutter.	
8-(3)	Remove the attachment and spacer that secure Pipe ASSY 5, referring to step No. 7-(4) in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
8-(4)	Remove Pipe ASSY 5 and the remaining pipes from the brazed joints.	

No.	Procedure	Illustration
8-(5)	Replace the old Pipe ASSY 5 with Pipe ASSY 5. Note ♦Be sure to use brazing to connect the pipes.	
8-(6)	The replacement of Pipe ASSY LEV AB 5 is completed here. Install the removed parts in reverse order.	

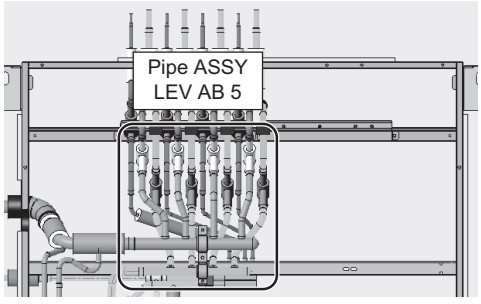
19-6. Sub 4-branch BC controller LEV A/B valve replacement

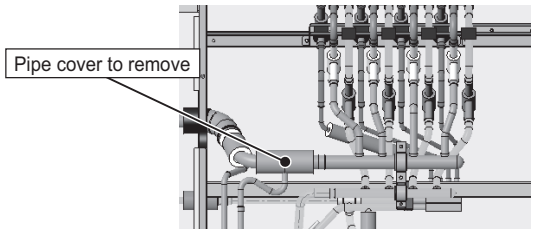
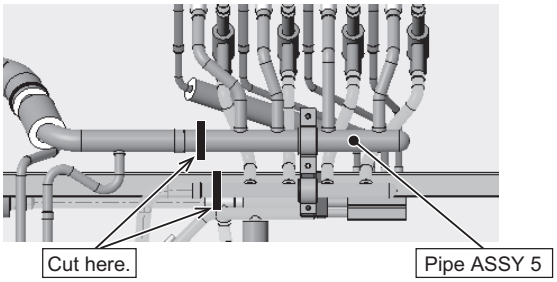
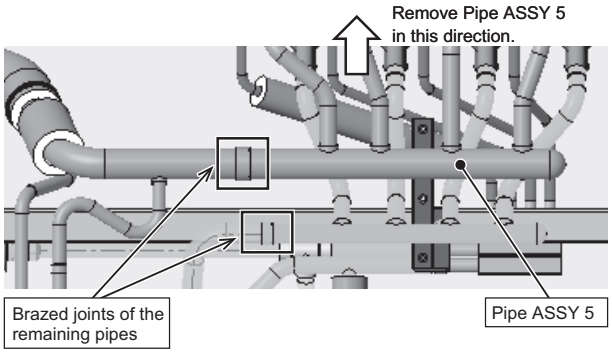
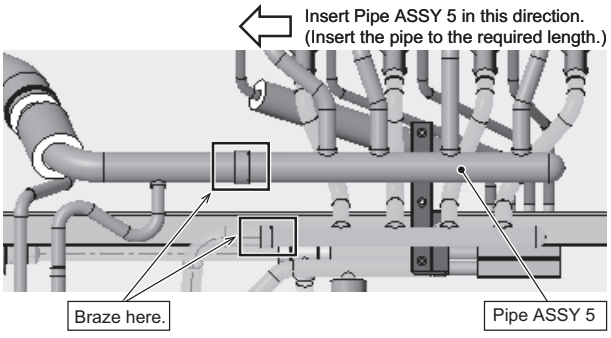
[WARNING]

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.

Cautions for replacing refrigerant circuit components

- ♦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 drain pan, 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 drain pan is protected from spatter during brazing.

No.	Procedure	Illustration
1	Recover the refrigerant.	
2	Bring the unit down from the ceiling for brazing work.	
3	Remove Panel TR and Panel TF, referring to step No. 3 in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
4	Remove the LEV A, B, and L coils from the Pipe ASSY that needs to be replaced, referring to step No. 4 in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
5	Turn the unit upside down, referring to step No. 5 in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
6	Remove Panel UR, Panel UL, the drain pan, Panel FB, and Panel FU, referring to step No. 6 in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
Locations of the Pipe ASSYs on the main BC controller (4 branches)		

No.	Procedure	Illustration
7	Remove the pipe cover.	
8	Remove the insulation material and cables around Pipe ASSY 5 to prevent them from being exposed to fire during brazing.	
9	Cut the pipes using a pipe cutter.	
10	Remove the attachment and spacer that secure Pipe ASSY 5, referring to step No. 7-(4) in 19-1. Main 12-branch BC controller LEV A/B valve replacement.	
11	Remove Pipe ASSY 5 and the remaining pipes from the brazed joints.	
12	Replace the old Pipe ASSY 5 with Pipe ASSY 5. **Note** ♦Be sure to use brazing to connect the pipes.	
13	The replacement of Pipe ASSY LEV AB 5 is completed here. Install the removed parts in reverse order.	

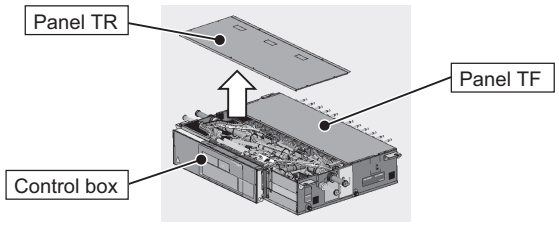
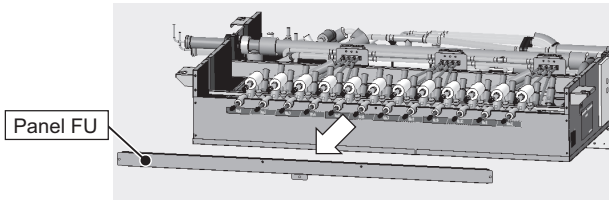
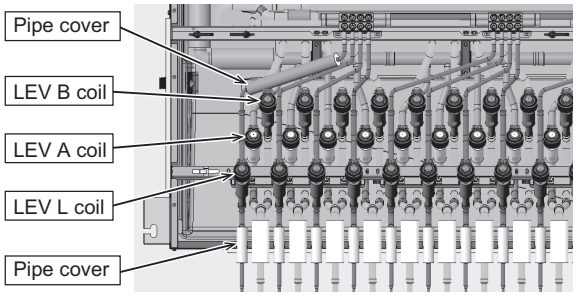
20. LEV L valve replacement

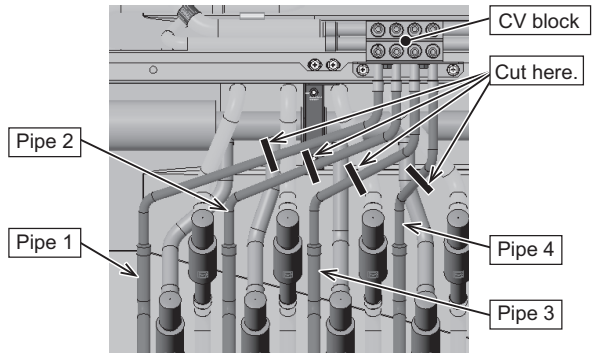
[WARNING]

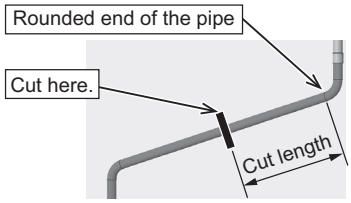
Refrigerant, when coming into direct contact with flame, can produce poisonous gases, so perform work in a well-ventilated place where the refrigerant does not stagnate.

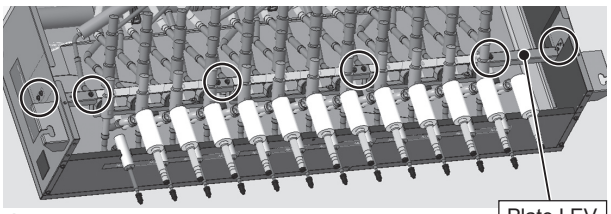
Cautions for replacing refrigerant circuit components.

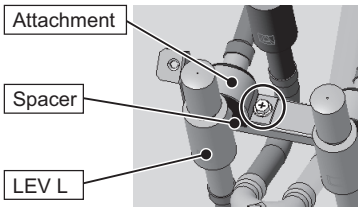
- Ensure a non-oxidizing brazing is performed.
- When heating the piping, wrap a wet towel around the refrigerant circuit components to keep their temperature below 120°C [248°F].
- After brazing, check the area around the brazing joint for any leaks before performing vacuum drying.
- Beware of the flame direction during brazing, as it may burn the wiring or sheet metal parts inside the unit. To protect the drain pan, 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 drain pan is protected from spatter during brazing.

No.	Procedure	Illustration
1	Recover the refrigerant.	
2	Bring the unit down from the ceiling for brazing work.	
3	Remove Panel TR, and then Panel TF.	
4	Remove Panel FU.	
5	(1) Remove all the LEV L coils. (2) Remove LEV A/B coils around LEV L that needs to be replaced. (3) Remove the pipe cover of LEV L that needs to be replaced.	

<table>
<tr><th>No.</th><th>Procedure</th><th>Illustration</th></tr>
<tr><td>6</td><td>Cut the pipe of the LEV L that needs to be replaced at the location shown in Table 1 using a pipe cutter.
Note
♦Remove burrs from the cut section of the pipe.</td><td>



<table>
<tr><th>Item</th><th>Cut length
mm (in.)</th></tr>
<tr><td>Pipe 1</td><td>100 (3-15/16)</td></tr>
<tr><td>Pipe 2</td><td>80 (3-3/16)</td></tr>
<tr><td>Pipe 3</td><td>50 (2)</td></tr>
<tr><td>Pipe 4</td><td>40 (1-5/8)</td></tr>
</table>
Table 1. Pipe cut length</td></tr>
<tr><td>7</td><td>Remove the Plate LEV.</td><td>

○ : Screws to be removed</td></tr>
<tr><td>8</td><td>Remove the attachment and spacer that are securing LEV L, and then remove LEV L.</td><td>

○ : Screw to be removed

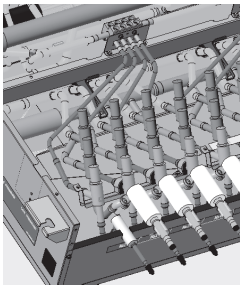
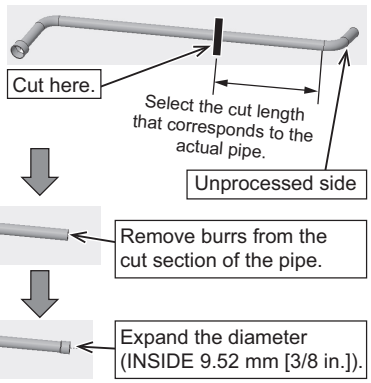
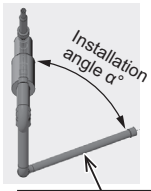
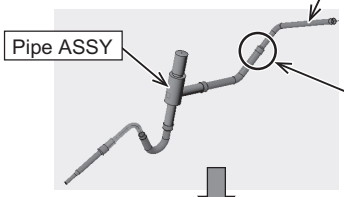
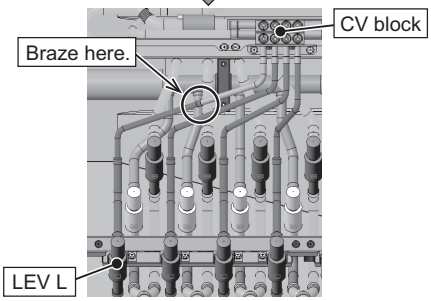

Remove LEV L.
</td></tr>
<tr><td>9</td><td>(1) Select the pipe to be replaced from Table 2.
(2) Cut the end of the selected pipe on the unprocessed side, and then expand its diameter (INSIDE 9.52 mm [3/8 in.]). (See Fig. 1.)
Refer to Table 1 and select the cut length that corresponds to the actual pipe.
Note
♦Consider the margin needed for inserting the pipe when cutting.
♦Remove burrs from the cut section of the pipe.
♦Dispose of the pipes that are not selected as they will not be used.</td><td><table>
<tr><th>Branch No.</th><th>Supplied pipe</th></tr>
<tr><td>1, 5, 9</td><td>Pipe 1</td></tr>
<tr><td>2, 6, 10</td><td>Pipe 2</td></tr>
<tr><td>3, 7, 11</td><td>Pipe 3</td></tr>
<tr><td>4, 8, 12</td><td>Pipe 4</td></tr>
</table>
Table 2. Pipe selection


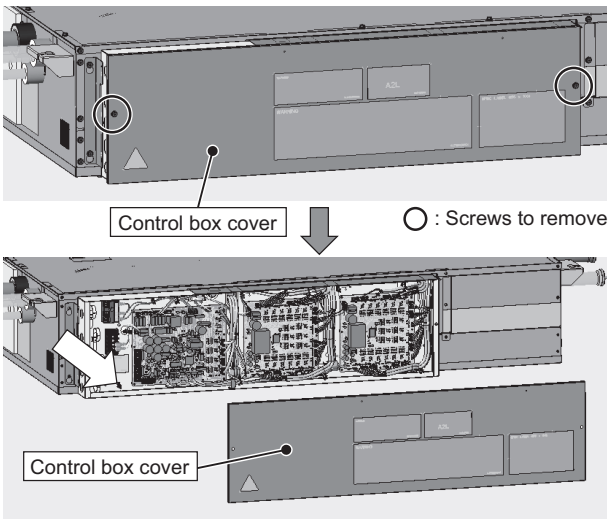
Fig. 1. Pipe processing procedure
Shown above is the procedure for processing Pipe 1.
This procedure applies to other pipes.</td></tr>
</table>

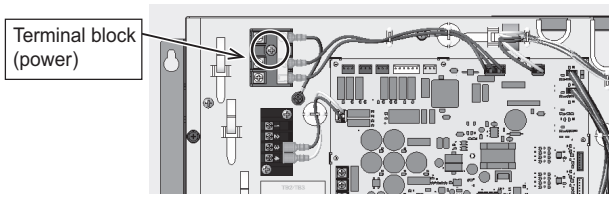
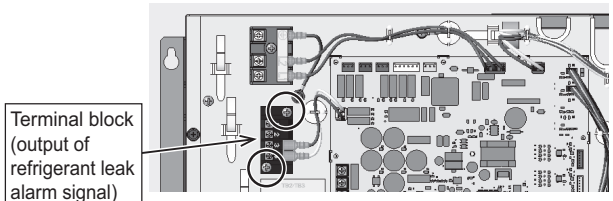
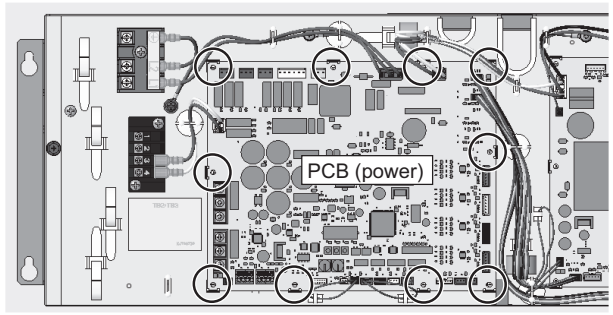
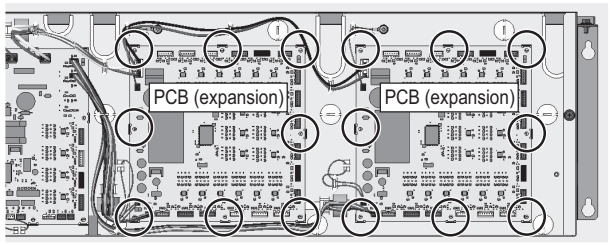
No.	Procedure	Illustration
10	Braze the Pipe ASSY and the pipe processed in No. 9 above, and then braze them to the unit. Refer to Table 3 for the installation angles of the pipes connected to the Pipe ASSY. **Note** •Be sure to use brazing to connect the pipes. •Before brazing to the unit, protect the insulation material, pipe covers, cables, and other components from burning.	 Table 3. Pipe installation angle Pipe processed in No. 9 Pipe processed in No. 9   Shown above is the procedure for brazing Pipe 1 (Item No. S-3). This procedure applies to other pipes (Item Nos. S-4 to S-6).

Pipe to connect	Installation angle α°
Pipe 1 (Item No. S-3)	70°
Pipe 2 (Item No. S-4)	60°
Pipe 3 (Item No. S-5)	45°
Pipe 4 (Item No. S-6)	20°

*The replacement of LEV L is completed here.
Reverse the order above to reinstall the removed components to their original positions.

21. Terminal block and board replacement

Procedure	Illustration
(1) Remove the control box cover.	
Remove the two screws to remove the control box cover.	

Procedure	Illustration
(2) Replace the terminal block (power).	
Remove the screw to replace the terminal block (power).	 ◯ : Screws to remove
(3) Replace the terminal block (output of refrigerant leak alarm signal).	
Remove the two screws to replace the terminal block (output of refrigerant leak alarm signal).	 ◯ : Screws to remove
(4) Replace the PCB (main).	
Remove the 10 clips to replace the PCB (main).	 ◯ : Clips to remove
(5) Replace the PCB (expansion).	
Remove the eight clips to replace the PCB (expansion).	 ◯ : Clips to remove
(6) Reassemble the components.	
Reassemble the components in the reverse order.	

[12] Troubleshooting Using the Heat source Unit LED Error Display

If the LED error display appear as follows while all the slide switches of SW4 are set to OFF, and SW6-10 is set to OFF, check the items under the applicable item numbers below.

1. Error code appears on the LED display.

Refer to VIII [2] Responding to Error Display on the Remote Controller.

2. LED is blank.

Take the following troubleshooting steps.

(1) If the voltage between pins 1 and 3 of CNDC on the control board is outside the range between 220 VDC and 380 VDC, refer to VIII [4] -7- (2) Troubleshooting Problems with Heat Source 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 the transmission line power supply 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 display appears as noted in "X [1] 2. LED display at Initial setting" while the transmission cables to TB3 and TB7 are disconnected, failure with the transmission cable or the connected equipment is suspected.

IX USB Function

[1] Service Overview 365
[2] Operation Data Collection and Storage Functions (Heat source unit) 369
[3] Software Rewrite Function on the USB (Heat source unit, BC Controller) 373
[4] Maintenance LED Display and Troubleshooting 375

[1] Service Overview

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 (heat source unit)

Operation information from indoor units, heat source units, and other equipment and devices in the system are collected and-stored in the flash memory in the control board of the heat source unit (OC).
The data can be transferred and stored in a USB memory stick.

- Operation data in the multiple-heat source-unit system will be saved on the OC unit.
- Attempting to collect the operation data from the OS unit will result in an error.

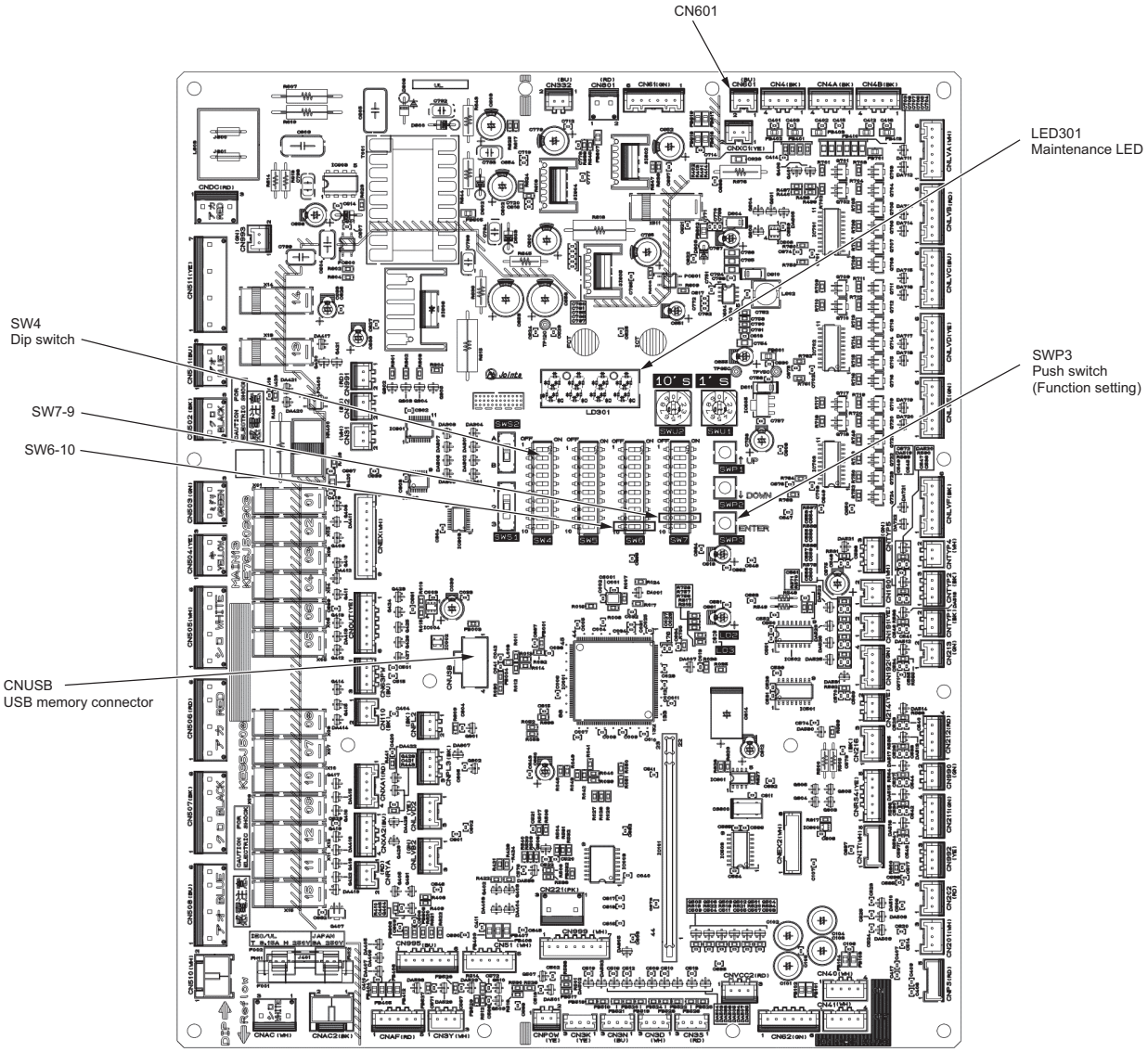
(2) Software rewrite function (heat source unit, BC controller)

The software on heat source units can be rewritten using a USB memory stick.

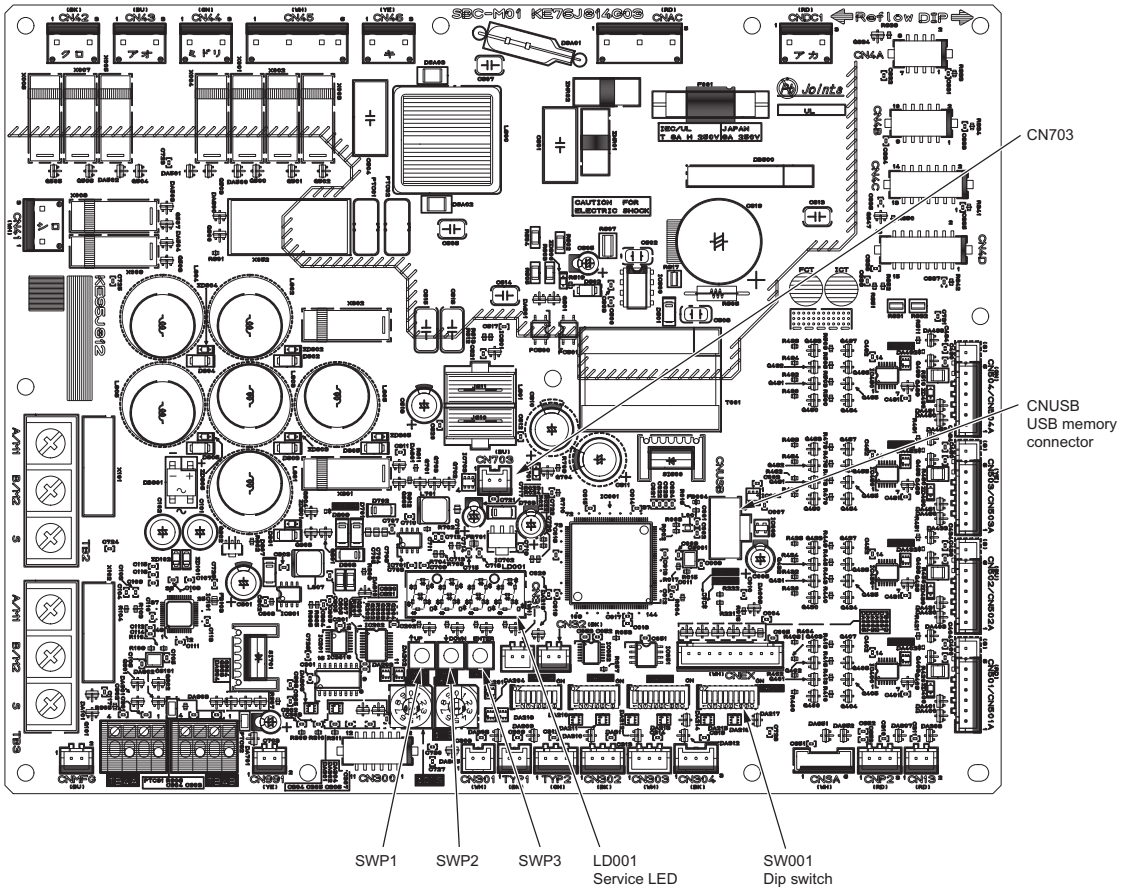
For detailed information about each function, refer to Section [[2] Operation Data Collection and Storage Functions (Heat source unit)] and Section [[3] Software Rewrite Function on the USB (Heat source unit, BC Controller)].
For information regarding the maintenance LED display content and regarding troubleshooting, refer to Section [[4] Maintenance LED Display and Troubleshooting].

2. System Structure

(1) Control board on the heat source unit



(2) Control board on the BC controller



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 energy-saving mode
  A battery charger not compatible with the energy-saving 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.

[2] Operation Data Collection and Storage Functions (Heat source unit)

Operation data of the units collected on the heat source 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 [IX [2] 2. Storing Data on a USB Memory Stick] for information on storing data on a USB memory stick.
See Section [IX [2] 3. Collecting Operation Data] for information on the collection of operation data.

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 [IX [1] 3. Necessary Materials].

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

- 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 heat source 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 heat source 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 heat source unit turned off

<Starting up the unit in the data storage mode>

- Turn off the main power to the heat source 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 LD301. If "USB" does not appear, refer to Section (1) 1) in [IX [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 LD301.
- [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 heat source unit back on.
- If the data collection process needs to be started, check the operation data collection status by following the procedures explained in [IX [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 heat source 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 LD301.



- 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 LD301.
- [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 LD301.
- Restart the indoor and heat source 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 [IX [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.”

3. Collecting Operation Data

This function is used to collect the operation data of the heat source 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 (LD3 OFF)	ON (LD3 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 heat source unit is energized.
Also use Section [VI [1] Functions and Factory Settings of the Dipswitches] as a reference.

The procedure for making the operation data settings is shown below.

(1) Operation procedure

1) Status Confirmation

a) 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 (LD301).
* For details, refer to Section [IX [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 [IX [4] 2. Troubleshooting]

2) Setting Start and End of data collection

a) Set the switches on the control board by following the table shown above.
Switch setting: SW6-10: ON
SW4: 817

b) Press SWP3 (ENTER).With each switch operation, the setting can be alternately switched ON and OFF.

c) 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.

a) 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

b) 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

a) 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) a).

4. Precautions

For dealing with display on the maintenance LED and other problems, refer to Section [[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 [IX [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 [IX [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-C400A/TW-C50A or the Maintenance Tool, the function to collect heat source unit (OC) data with a USB memory stick will not be available for use.

[3] Software Rewrite Function on the USB (Heat source unit, BC Controller)

The USB memory stick may be used to rewrite the software of the heat source unit or the BC controller in the same way as using a ROM writer.

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.

2. Rewriting Software

The procedure is shown below.

(1) Operation procedure

1) Starting software rewrite mode

[Heat source unit]

a) Shut down the power for the heat source unit. Make sure the power for the heat source unit control board is off.
   This is done by confirming LD2 is off.
b) Turn on switches SW7-9 of the heat source unit control board.
c) 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.
d) Connect the portable battery charger to the heat source unit control board (CN601).
   The power of the heat source unit control board will turn on.
e) Make sure the display “Pro” is shown on the maintenance LED (LD301).
   This shows that Software Rewrite Mode has been started.

[BC controller]

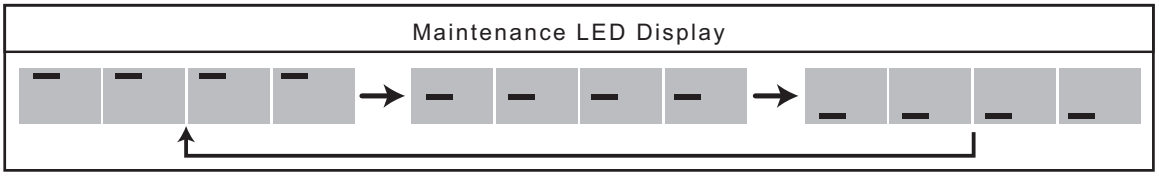
a) Shut down the power for the heat source unit and the BC controller. Make sure the power for the BC controller control board is off by checking that the maintenance LED (LD001) does not light up when pressing SWP1.
b) Turn on switches SW001-10 of the BC controller control board.
c) Insert the USB memory stick into the USB port (CNUSB) on the BC controller control board.
d) Connect the portable battery charger to the BC controller control board (CN703).
   The power of the BC controller control board will turn on.
e) Make sure the display “Pro” is shown on the maintenance LED (LD001).
   This shows that Software Rewrite Mode has been started.



2) Performing software rewriting

[Heat source unit, BC controller]

a) 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.



b) 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

[Heat source unit]

a) Disconnect the portable battery charger from the heat source unit control board (CN601). The control board will be turned off.
b) Remove the USB memory stick from the USB port (CNUSB) on the control board.
c) Turn off the switches SW7-9 on the control board.
d) Turn on the heat source unit, and check that the versions of the heat source 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.

[BC controller]

a) Disconnect the portable battery charger from the BC controller control board (CN703). The BC controller control board will be turned off.
b) Remove the USB memory stick from the USB port (CNUSB) on the BC controller control board.
c) Turn off the switches SW001-10 of the BC controller control board.
d) Turn on the BC controller, and check that the versions of the BC controller 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.

3. Precautions

For dealing with the displays shown on the maintenance LED and other problems, refer to Section [[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) - b) or forget to turn off the switch in step 3) - c). [[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) - c). [[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 [[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.

[4] Maintenance LED Display and Troubleshooting

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 [IX [4] 2. Troubleshooting].

(1) Storing data on a USB memory stick (heat source unit)

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 [IX [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 [IX [4] 2. Troubleshooting](1) 3).
				“Er02” The storage process was stopped due to failure of the USB memory stick during processing. See Section [IX [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 [IX [4] 2. Troubleshooting](1) 5).

(2) Collecting operation data (heat source unit)

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 [IX [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 [IX [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 [IX [4] 2. Troubleshooting](2) 3).

- Collect data from both OC and OS from multiple-heat source 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 (heat source unit, BC controller)

No.	Switch	Meaning	Maintenance LED Display	Description
10	[Heat source unit] SW7-9: ON [BC controller] SW001-10: ON	Rewrite Mode activated		“PRO” Software rewrite mode is active. Software rewrite is enabled. See Section [IX [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 [IX [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 [IX [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 [IX [4] 2. Troubleshooting](3) 6).
				“Er11” Software rewrite has not been completed due to failure in writing new software. See Section [IX [4] 2. Troubleshooting](3) 6).

2. Troubleshooting

Troubleshooting of USB functions are shown below.
The displays on the maintenance LED described in Section [IX [4] 1. Maintenance LED Display Content List] may also be used as a reference.

(1) Storing on a USB memory stick (heat source unit)

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 [IX [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 [IX [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 [IX [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 [IX [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 [IX [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 [IX [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 [IX [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 heat source 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 [IX [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 (heat source unit)

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 heat source 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 heat source 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 [IX [2] 3. Collecting Operation Data].

(3) Rewriting software (heat source unit, BC controller)

1) Maintenance LED does not display "Pro."

(Meaning or Cause)

The system is not started in Software Rewrite Mode.
Switches SW7-9 (heat source unit) and SW001-10 (BC controller) on the control board may not be in the ON position, or the portable charger may not be charged sufficiently.
The power-supply units (heat source unit/transmission booster) may not be turned off.

(Solution)

Make sure switches SW7-9 are ON using Section [IX [3] 2. Rewriting Software] as a reference.
Restart using a fully charged portable charger or a different charger.
Check that the power-supply units (heat source 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 [IX [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 (heat source unit) and SW001-10 (BC controller) 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, 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 [IX [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 [IX [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 [IX [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 [IX [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 [IX [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.

X LED Monitor Display on the Heat source Unit Board

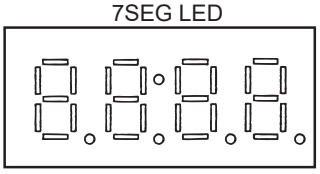
[1] How to Read the LED on the Service Monitor 385

[1] How to Read the LED on the Service Monitor

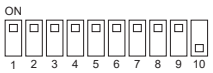
1. How to read the LED

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.

7SEG LED



SW4



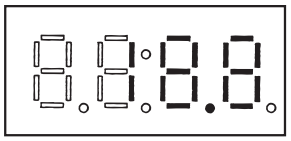
- SW4-10 is represented as "0" in the table.
- In the example above, 1 through 9 are set to ON, and 10 is set to OFF.

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

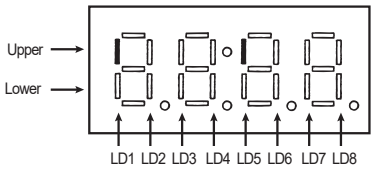
Example: When the pressure data sensor reads 18.8kg/cm^2 (Item No. 58)

- 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

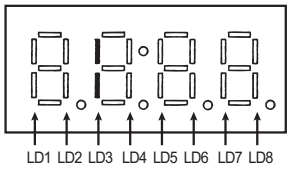


2) Flag display

Example: When 21S4a, SV1a are ON. (Item No. 3)

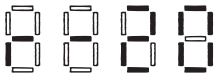


Example: 3-minutes restart mode (Item No. 14)



2. LED display at initial setting

From power on until the completion of initial settings, the following information will be displayed on the monitor screen. (Displays No. 1 through No. 4 in order repeatedly.)

No	Item	Display	Remarks
1	Software version		[0103] : Version 1.03
2	Refrigerant type		[32] : R32
3	Model and capacity		[r-20] : Cooling/Heating 20 HP For the first few minutes after power on, the capacity of each heat source 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 /Ton**

HP capacity is the capacity of heat source unit that is shown on LED display at initial setting.
Please refer to the following table to convert from HP capacity to Model name/Ton.

HP	Model	Ton
8	P072	6.0
10	P096	8.0
12	P120	10.0
16	P144	12.0
18	P168	14.0
20	P192	16.0
22	P216	18.0

HP	Model	Ton
24	P240	20.0
30	P288	24.0
32	P312	26.0
34	P336	28.0

3. Time data storage function

The heat source 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 heat source 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

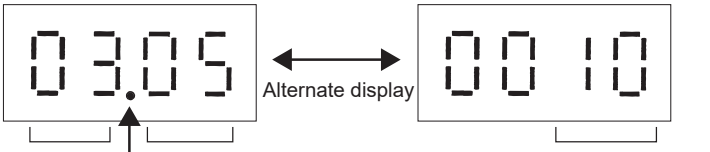
Example: 12 past 9



* 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



Alternate display of year and month, and date

* 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



Day count

* Appears between the year and the month, and nothing appears when the date is displayed.

LED monitor display

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		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		SV1a				A	A	
			Bottom											
4	0010000000	Relay output display 3	Top							SV9	Supply power	A	A	
			Bottom											
5	1010000000	Relay output display 4	Top	Optional 200 V output		CH21						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)		Cooling-heating changeover (Cooling)	Cooling-heating changeover (Heating)				A	A	
12	0011000000	External signal (Open input contact point)								Pump interlock (Contact: open)	Low-noise mode (Quiet priority)	A	A	
14	0111000000	Heat source unit operation status		BC operation signal		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								A	A	
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											

*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	
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		
37	1010010000	BC operation mode		Cooling-only ON	Cooling-only OFF	Heating-only ON	Heating-only OFF	Mixed-mode ON	Mixed-mode OFF	Fan	Stop	B		
39	1110010000	Heat source unit Operation mode		Permissible stop	Standby	Cooling	Cooling-main	Heating	Heating-main			A	A	
42	0101010000	Heat source unit control mode		Stop	Thermo OFF	Abnormal stop	Scheduled con-trol	Initial start up		Oil balance	Low frequency oil recovery	A	A	
43	1101010000				Refrigerant re-covery							A	A	
45	1011010000	TH4		-99.9 to 999.9								A	A	The unit is [°C]
47	1111010000	TH7		-99.9 to 999.9								A	A	
50	0100110000	TH5		-99.9 to 999.9								A	A	
51	1100110000	TH8		-99.9 to 999.9								A	A	
53	1010110000	THINV		-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	
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	

*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	
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	
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 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	
100	0010011000	LEV7	0000 to 9999								A	A	
102	0110011000	LEVINV	0000 to 9999								A	A	
105	1001011000	LEV4	0000 to 9999								A	A	
108	0011011000	COMP operating current (DC)	00.0 to 999.9								A	A	Peak value[A]
111	1111011000	COMP bus voltage	00.0 to 999.9								A	A	The unit is [V]
114	0100111000	ALh	0: -, 1: Low, 2: Mid, 3: High								A	A	
115	1100111000	LEV8	0000 to 9999								A	A	
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		Control box temperature rise			A	A	Stays lit for 90 seconds after the completion of backup control
123	1101111000	COMP number of start-stop events Upper 4 digits	0000 to 9999								A	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]

*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	
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	

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Data before error

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	Heat source unit operation status		BC operation signal		3-minutes restart mode	Compressor in operation	Preliminary error	Error	3-minutes restart after instantaneous power failure	Preliminary low pressure error	A	A	
202	0101001100	OC/OS identification		OC/OS								A	A	
203	1101001100	BC operation mode		Cooling-only ON	Cooling-only OFF	Heating-only ON	Heating-only OFF	Mixed-mode ON	Mixed-mode OFF	Fan	Stop	A	A	
205	1011001100	Heat source unit Operation mode		Permissible stop	Standby	Cooling	Cooling-main	Heating	Heating-main			A	A	
208	0000101100	Heat source unit control mode		Stop	Thermo OFF	Abnormal stop	Scheduled control	Initial start up		Oil balance	Low frequency oil recovery	A	A	
209	1000101100	Heat source unit control mode			Refrigerant recovery							A	A	
211	1100101100	Relay output display 1		Comp in operation				72C		OC	Always lit	A	A	
212	0010101100	Relay output display 2	Top	21S4a		CH11		SV1a				A	A	
			Bottom											
213	1010101100	Relay output display 3	Top							SV9	Supply power	A	A	
			Bottom											
214	0110101100	Relay output display 4	Top	Optional 200 V output		CH21						A	A	
			Bottom											
216	0001101100	TH4		-99.9 to 999.9								A	A	The unit is [°C]
218	0101101100	TH7		-99.9 to 999.9								A	A	
221	1011101100	TH5		-99.9 to 999.9								A	A	
222	0111101100	TH8		-99.9 to 999.9								A	A	The unit is [°C]
224	0000011100	THINV		-99.9 to 999.9								A	A	The unit is [°C]
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	0101011100	TH15		-99.9 to 999.9								A	A	The unit is [°C]
238	0111011100	ALh		0: -, 1: Low, 2: Mid, 3: High								A	A	
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	
262	0110000010	COMP output frequency		0000 to 9999								A	A	
264	0001000010	All AK (OC+OS)		0000 to 9999								B		

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Data before error

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	
271	1111000010	LEV7	0000 to 9999								A	A	
273	1000100010	LEVINV	0000 to 9999								A	A	
276	0010100010	LEV4	0000 to 9999								A	A	
279	1110100010	COMP operating current (DC)	00.0 to 999.9								A	A	Peak value[A]
282	0101100010	COMP bus voltage	00.0 to 999.9								A	A	The unit is [V]
287	1111100010	LEV8	0000 to 9999								A	A	
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]
301	1011010010	Power supply unit	OC/OS ↔ Address								B		

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Current data

No.	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	
302	0111010010	Start-up unit	OC/OS ↔ Address								B		

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Setting data

No.	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		
515	1100000001	BC/BS/TU 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	

*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	
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										

*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	
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										

*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	
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										

*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	
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	
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.

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.

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	
881	1000111011	INV board Reset counter	0 to 254								A	A	The unit is [time]
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.

Current data

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	
1152	0000000100	Relay output display BC (Main)	SVM1	SVM2	SVM1b	SVM2b	21S4a				B		The 21S4a value will be displayed only when a WCB is connected to the system.
1153	1000000100	LEV output display BC (Main)	LEV-A1	LEV-A2	LEV-A3	LEV-A4	LEV-A5	LEV-A6	LEV-A7	LEV-A8	B		
			LEV-B1	LEV-B2	LEV-B3	LEV-B4	LEV-B5	LEV-B6	LEV-B7	LEV-B8			
1154	0100000100		LEV-L1	LEV-L2	LEV-L3	LEV-L4	LEV-L5	LEV-L6	LEV-L7	LEV-L8	B		
			LEV-A9	LEV-A10	LEV-A11	LEV-A12	LEV-A13	LEV-A14	LEV-A15	LEV-A16			
1155	1100000100		LEV-B9	LEV-B10	LEV-B11	LEV-B12	LEV-B13	LEV-B14	LEV-B15	LEV-B16	B		
			LEV-L9	LEV-L10	LEV-L11	LEV-L12	LEV-L13	LEV-L14	LEV-L15	LEV-L16			
1158	0110000100	Relay output display BC (Sub1)	SVM3								B		
1159	1110000100		LEV-A1	LEV-A2	LEV-A3	LEV-A4	LEV-A5	LEV-A6	LEV-A7	LEV-A8	B		
			LEV-B1	LEV-B2	LEV-B3	LEV-B4	LEV-B5	LEV-B6	LEV-B7	LEV-B8			
1160	0001000100		LEV-L1	LEV-L2	LEV-L3	LEV-L4	LEV-L5	LEV-L6	LEV-L7	LEV-L8	B		
			LEV-A9	LEV-A10	LEV-A11	LEV-A12	LEV-A13	LEV-A14	LEV-A15	LEV-A16			
1161	1001000100		LEV-B9	LEV-B10	LEV-B11	LEV-B12	LEV-B13	LEV-B14	LEV-B15	LEV-B16	B		
			LEV-L9	LEV-L10	LEV-L11	LEV-L12	LEV-L13	LEV-L14	LEV-L15	LEV-L16			
1163	1101000100	Relay output display BC (Sub2)	SVM3								B		
1164	0011000100		LEV-A1	LEV-A2	LEV-A3	LEV-A4	LEV-A5	LEV-A6	LEV-A7	LEV-A8	B		
			LEV-B1	LEV-B2	LEV-B3	LEV-B4	LEV-B5	LEV-B6	LEV-B7	LEV-B8			
1165	1011000100		LEV-L1	LEV-L2	LEV-L3	LEV-L4	LEV-L5	LEV-L6	LEV-L7	LEV-L8	B		
			LEV-A9	LEV-A10	LEV-A11	LEV-A12	LEV-A13	LEV-A14	LEV-A15	LEV-A16			
1166	0111000100		LEV-B9	LEV-B10	LEV-B11	LEV-B12	LEV-B13	LEV-B14	LEV-B15	LEV-B16	B		
			LEV-L9	LEV-L10	LEV-L11	LEV-L12	LEV-L13	LEV-L14	LEV-L15	LEV-L16			
1168	0000100100	Relay output display BC (Sub3)	SVM3								B		
1169	1000100100		LEV-A1	LEV-A2	LEV-A3	LEV-A4	LEV-A5	LEV-A6	LEV-A7	LEV-A8	B		
			LEV-B1	LEV-B2	LEV-B3	LEV-B4	LEV-B5	LEV-B6	LEV-B7	LEV-B8			
1170	0100100100		LEV-L1	LEV-L2	LEV-L3	LEV-L4	LEV-L5	LEV-L6	LEV-L7	LEV-L8	B		
			LEV-A9	LEV-A10	LEV-A11	LEV-A12	LEV-A13	LEV-A14	LEV-A15	LEV-A16			
1171	1100100100		LEV-B9	LEV-B10	LEV-B11	LEV-B12	LEV-B13	LEV-B14	LEV-B15	LEV-B16	B		
			LEV-L9	LEV-L10	LEV-L11	LEV-L12	LEV-L13	LEV-L14	LEV-L15	LEV-L16			
1173	1010100100	Relay output display BC (Sub4)	SVM3								B		
1174	0110100100		LEV-A1	LEV-A2	LEV-A3	LEV-A4	LEV-A5	LEV-A6	LEV-A7	LEV-A8	B		
			LEV-B1	LEV-B2	LEV-B3	LEV-B4	LEV-B5	LEV-B6	LEV-B7	LEV-B8			
1175	1110100100		LEV-L1	LEV-L2	LEV-L3	LEV-L4	LEV-L5	LEV-L6	LEV-L7	LEV-L8	B		
			LEV-A9	LEV-A10	LEV-A11	LEV-A12	LEV-A13	LEV-A14	LEV-A15	LEV-A16			
1176	0001100100		LEV-B9	LEV-B10	LEV-B11	LEV-B12	LEV-B13	LEV-B14	LEV-B15	LEV-B16	B		
			LEV-L9	LEV-L10	LEV-L11	LEV-L12	LEV-L13	LEV-L14	LEV-L15	LEV-L16			
1178	0101100100	Relay output display BC (Sub5)	SVM3								B		

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Current data

No.	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	
1179	1101100100		LEV-A1	LEV-A2	LEV-A3	LEV-A4	LEV-A5	LEV-A6	LEV-A7	LEV-A8	B		
			LEV-B1	LEV-B2	LEV-B3	LEV-B4	LEV-B5	LEV-B6	LEV-B7	LEV-B8			
1180	0011100100		LEV-L1	LEV-L2	LEV-L3	LEV-L4	LEV-L5	LEV-L6	LEV-L7	LEV-L8	B		
			LEV-A9	LEV-A10	LEV-A11	LEV-A12	LEV-A13	LEV-A14	LEV-A15	LEV-A16			
1181	1011100100		LEV-B9	LEV-B10	LEV-B11	LEV-B12	LEV-B13	LEV-B14	LEV-B15	LEV-B16	B		
			LEV-L9	LEV-L10	LEV-L11	LEV-L12	LEV-L13	LEV-L14	LEV-L15	LEV-L16			
1183	1111100100	Relay output display BC (Sub6)	SVM3								B		
1184	0000010100		LEV-A1	LEV-A2	LEV-A3	LEV-A4	LEV-A5	LEV-A6	LEV-A7	LEV-A8	B		
			LEV-B1	LEV-B2	LEV-B3	LEV-B4	LEV-B5	LEV-B6	LEV-B7	LEV-B8			
1185	1000010100		LEV-L1	LEV-L2	LEV-L3	LEV-L4	LEV-L5	LEV-L6	LEV-L7	LEV-L8	B		
			LEV-A9	LEV-A10	LEV-A11	LEV-A12	LEV-A13	LEV-A14	LEV-A15	LEV-A16			
1186	0100010100		LEV-B9	LEV-B10	LEV-B11	LEV-B12	LEV-B13	LEV-B14	LEV-B15	LEV-B16	B		
			LEV-L9	LEV-L10	LEV-L11	LEV-L12	LEV-L13	LEV-L14	LEV-L15	LEV-L16			
1188	0010010100	Relay output display BC (Sub7)	SVM3								B		
1189	1010010100		LEV-A1	LEV-A2	LEV-A3	LEV-A4	LEV-A5	LEV-A6	LEV-A7	LEV-A8	B		
			LEV-B1	LEV-B2	LEV-B3	LEV-B4	LEV-B5	LEV-B6	LEV-B7	LEV-B8			
1190	0110010100		LEV-L1	LEV-L2	LEV-L3	LEV-L4	LEV-L5	LEV-L6	LEV-L7	LEV-L8	B		
			LEV-A9	LEV-A10	LEV-A11	LEV-A12	LEV-A13	LEV-A14	LEV-A15	LEV-A16			
1191	1110010100		LEV-B9	LEV-B10	LEV-B11	LEV-B12	LEV-B13	LEV-B14	LEV-B15	LEV-B16	B		
			LEV-L9	LEV-L10	LEV-L11	LEV-L12	LEV-L13	LEV-L14	LEV-L15	LEV-L16			
1193	1001010100	Relay output display BC (Sub8)	SVM3								B		
1194	0101010100		LEV-A1	LEV-A2	LEV-A3	LEV-A4	LEV-A5	LEV-A6	LEV-A7	LEV-A8	B		
			LEV-B1	LEV-B2	LEV-B3	LEV-B4	LEV-B5	LEV-B6	LEV-B7	LEV-B8			
1195	1101010100		LEV-L1	LEV-L2	LEV-L3	LEV-L4	LEV-L5	LEV-L6	LEV-L7	LEV-L8	B		
			LEV-A9	LEV-A10	LEV-A11	LEV-A12	LEV-A13	LEV-A14	LEV-A15	LEV-A16			
1196	0011010100		LEV-B9	LEV-B10	LEV-B11	LEV-B12	LEV-B13	LEV-B14	LEV-B15	LEV-B16	B		
			LEV-L9	LEV-L10	LEV-L11	LEV-L12	LEV-L13	LEV-L14	LEV-L15	LEV-L16			
1198	0111010100	Relay output display BC (Sub9)	SVM3								B		
1199	1111010100		LEV-A1	LEV-A2	LEV-A3	LEV-A4	LEV-A5	LEV-A6	LEV-A7	LEV-A8	B		
			LEV-B1	LEV-B2	LEV-B3	LEV-B4	LEV-B5	LEV-B6	LEV-B7	LEV-B8			
1200	0000110100		LEV-L1	LEV-L2	LEV-L3	LEV-L4	LEV-L5	LEV-L6	LEV-L7	LEV-L8	B		
			LEV-A9	LEV-A10	LEV-A11	LEV-A12	LEV-A13	LEV-A14	LEV-A15	LEV-A16			
1201	1000110100		LEV-B9	LEV-B10	LEV-B11	LEV-B12	LEV-B13	LEV-B14	LEV-B15	LEV-B16	B		
			LEV-L9	LEV-L10	LEV-L11	LEV-L12	LEV-L13	LEV-L14	LEV-L15	LEV-L16			
1203	1100110100	Relay output display BC (Sub10)	SVM3								B		
1204	0010110100		LEV-A1	LEV-A2	LEV-A3	LEV-A4	LEV-A5	LEV-A6	LEV-A7	LEV-A8	B		
			LEV-B1	LEV-B2	LEV-B3	LEV-B4	LEV-B5	LEV-B6	LEV-B7	LEV-B8			

*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:ON, SW6-10:OFF)	Item	Display								Unit (A, B)*1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
1205	1010110100		LEV-L1	LEV-L2	LEV-L3	LEV-L4	LEV-L5	LEV-L6	LEV-L7	LEV-L8	B		
			LEV-A9	LEV-A10	LEV-A11	LEV-A12	LEV-A13	LEV-A14	LEV-A15	LEV-A16			
1206	0110110100		LEV-B9	LEV-B10	LEV-B11	LEV-B12	LEV-B13	LEV-B14	LEV-B15	LEV-B16	B		
			LEV-L9	LEV-L10	LEV-L11	LEV-L12	LEV-L13	LEV-L14	LEV-L15	LEV-L16			
1208	0001110100	Relay output display BC (Sub11)	SVM3								B		
1209	1001110100		LEV-A1	LEV-A2	LEV-A3	LEV-A4	LEV-A5	LEV-A6	LEV-A7	LEV-A8	B		
			LEV-B1	LEV-B2	LEV-B3	LEV-B4	LEV-B5	LEV-B6	LEV-B7	LEV-B8			
1210	0101110100		LEV-L1	LEV-L2	LEV-L3	LEV-L4	LEV-L5	LEV-L6	LEV-L7	LEV-L8	B		
			LEV-A9	LEV-A10	LEV-A11	LEV-A12	LEV-A13	LEV-A14	LEV-A15	LEV-A16			
1211	1101110100		LEV-B9	LEV-B10	LEV-B11	LEV-B12	LEV-B13	LEV-B14	LEV-B15	LEV-B16	B		
			LEV-L9	LEV-L10	LEV-L11	LEV-L12	LEV-L13	LEV-L14	LEV-L15	LEV-L16			
1213	1011110100	BC (Main) TH11									B		
1214	0111110100	BC (Main) TH12	-99.9 to 999.9								B		
1215	1111110100	BC (Main) TH14	-99.9 to 999.9								B		
1216	0000001100	BC (Main) TH15	-99.9 to 999.9								B		
1217	1000001100	BC (Main) TH16	-99.9 to 999.9								B		
1218	0100001100	BC (Main) PS1	-99.9 to 999.9								B		
1219	1100001100	BC (Main) PS3	-99.9 to 999.9								B		
1220	0010001100	BC (Main) SC11 (WCB SC14)	-99.9 to 999.9								B		The SC14 value will be displayed when a WCB is connected to the system.
1221	1010001100	BC (Main) SH12	-99.9 to 999.9								B		
1222	0110001100	BC (Main) SC6	-99.9 to 999.9								B		
1223	1110001100	BC (Main) LEV1	0000 to 9999								B		
1224	0001001100	BC (Main) LEV3	0000 to 9999								B		LEV1 opening
1225	1001001100	BC (Main) LEV4	0000 to 9999								B		LEV2 opening
1231	1111001100	BC (Sub1) TH12	-99.9 to 999.9								B		
1232	0000101100	BC (Sub1) TH15	-99.9 to 999.9								B		
1233	1000101100	BC (Sub1) TH16	-99.9 to 999.9								B		
1234	0100101100	BC (Sub1) PS3	-99.9 to 999.9								B		
1235	1100101100	BC (Sub1) PS3	-99.9 to 999.9								B		
1237	1010101100	BC (Sub1) LEV3a	0000 to 9999								B		
1239	1110101100	BC (Sub2) TH12	-99.9 to 999.9								B		
1240	0001101100	BC (Sub2) TH15	-99.9 to 999.9								B		
1241	1001101100	BC (Sub2) TH16	-99.9 to 999.9								B		
1242	0101101100	BC (Sub2) PS3	-99.9 to 999.9								B		
1245	1011101100	BC (Sub2) LEV3a	0000 to 9999								B		
1247	1111101100	BC (Sub3) TH12	-99.9 to 999.9								B		
1248	0000011100	BC (Sub3) TH15	-99.9 to 999.9								B		
1249	1000011100	BC (Sub3) TH16	-99.9 to 999.9								B		
1250	0100011100	BC (Sub3) PS3	-99.9 to 999.9								B		
1253	1010011100	BC (Sub3) LEV3a	0000 to 9999								B		
1255	1110011100	BC (Sub4) TH12	-99.9 to 999.9								B		

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Current data

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	
1256	0001011100	BC (Sub4) TH15	-99.9 to 999.9								B		
1257	1001011100	BC (Sub4) TH16	-99.9 to 999.9								B		
1258	0101011100	BC (Sub4) PS3	-99.9 to 999.9								B		
1261	1011011100	BC (Sub4) LEV3a	0000 to 9999								B		
1263	1111011100	BC (Sub5) TH12	-99.9 to 999.9								B		
1264	0000111100	BC (Sub5) TH15	-99.9 to 999.9								B		
1265	1000111100	BC (Sub5) TH16	-99.9 to 999.9								B		
1266	0100111100	BC (Sub5) PS3	-99.9 to 999.9								B		
1269	1010111100	BC (Sub5) LEV3a	0000 to 9999								B		
1271	1110111100	BC (Sub6) TH12	-99.9 to 999.9								B		
1272	0001111100	BC (Sub6) TH15	-99.9 to 999.9								B		
1273	1001111100	BC (Sub6) TH16	-99.9 to 999.9								B		
1274	0101111100	BC (Sub6) PS3	-99.9 to 999.9								B		
1277	1011111100	BC (Sub6) LEV3a	0000 to 9999								B		
1279	1111111100	BC (Sub7) TH12	-99.9 to 999.9								B		
1280	0000000010	BC (Sub7) TH15	-99.9 to 999.9								B		
1281	1000000010	BC (Sub7) TH16	-99.9 to 999.9								B		
1282	0100000010	BC (Sub7) PS3	-99.9 to 999.9								B		
1285	1010000010	BC (Sub7) LEV3a	0000 to 9999								B		
1287	1110000010	BC (Sub8) TH12	-99.9 to 999.9								B		
1288	0001000010	BC (Sub8) TH15	-99.9 to 999.9								B		
1289	1001000010	BC (Sub8) TH16	-99.9 to 999.9								B		
1290	0101000010	BC (Sub8) PS3	-99.9 to 999.9								B		
1293	1011000010	BC (Sub8) LEV3a	0000 to 9999								B		
1295	1111000010	BC (Sub9) TH12	-99.9 to 999.9								B		
1296	0000100010	BC (Sub9) TH15	-99.9 to 999.9								B		
1297	1000100010	BC (Sub9) TH16	-99.9 to 999.9								B		
1298	0100100010	BC (Sub9) PS3	-99.9 to 999.9								B		
1301	1010100010	BC (Sub9) LEV3a	0000 to 9999								B		
1303	1110100010	BC (Sub10) TH12	-99.9 to 999.9								B		
1304	0001100010	BC (Sub10) TH15	-99.9 to 999.9								B		
1305	1001100010	BC (Sub10) TH16	-99.9 to 999.9								B		
1306	0101100010	BC (Sub10) PS3	-99.9 to 999.9								B		
1309	1011100010	BC (Sub10) LEV3a	0000 to 9999								B		
1311	1111100010	BC (Sub11) TH12	-99.9 to 999.9								B		
1312	0000010010	BC (Sub11) TH15	-99.9 to 999.9								B		
1313	1000010010	BC (Sub11) TH16	-99.9 to 999.9								B		
1314	0100010010	BC (Sub11) PS3	-99.9 to 999.9								B		
1317	1010010010	BC (Sub11) LEV3a	0000 to 9999								B		

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Data before error

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	
1550	0111000001	BC (Main) TH11	-99.9 to 999.9								B		
1551	1111000001	BC (Main) TH12	-99.9 to 999.9								B		
1552	0000100001	BC (Main) TH15	-99.9 to 999.9								B		
1553	1000100001	BC (Main) TH16	-99.9 to 999.9								B		
1554	0100100001	BC (Main) PS1	-99.9 to 999.9								B		
1555	1100100001	BC (Main) PS3	-99.9 to 999.9								B		
1556	0010100001	BC (Main) TH14	-99.9 to 999.9								B		
1560	0001100001	BC (Main) LEV1	0000 to 9999								B		LEV1 opening
1562	0101100001	BC (Main) LEV3	0000 to 9999								B		LEV3 opening
1563	1101100001	BC (Main) LEV4	0000 to 9999								B		LEV4 opening
1567	1111100001	BC (Sub1) TH12	-99.9 to 999.9								B		
1568	0000010001	BC (Sub1) TH15	-99.9 to 999.9								B		
1569	1000010001	BC (Sub1) TH16	-99.9 to 999.9								B		
1570	0100010001	BC (Sub1) PS1	-99.9 to 999.9								B		
1571	1100010001	BC (Sub1) PS3	-99.9 to 999.9								B		
1572	0010010001	BC (Sub1) LEV3a	0000 to 9999								B		
1575	1110010001	BC (Sub2) TH12	-99.9 to 999.9								B		
1576	0001010001	BC (Sub2) TH15	-99.9 to 999.9								B		
1577	1001010001	BC (Sub2) TH16	-99.9 to 999.9								B		
1578	0101010001	BC (Sub2) PS1	-99.9 to 999.9								B		
1579	1101010001	BC (Sub2) PS3	-99.9 to 999.9								B		
1580	0011010001	BC (Sub2) LEV3a	0000 to 9999								B		
1583	1111010001	BC (Sub3) TH12	-99.9 to 999.9								B		
1584	0000110001	BC (Sub3) TH15	-99.9 to 999.9								B		
1585	1000110001	BC (Sub3) TH16	-99.9 to 999.9								B		
1586	0100110001	BC (Sub3) PS1	-99.9 to 999.9								B		
1587	1100110001	BC (Sub3) PS3	-99.9 to 999.9								B		
1588	0010110001	BC (Sub3) LEV3a	0000 to 9999								B		
1591	1110110001	BC (Sub4) TH12	-99.9 to 999.9								B		
1592	0001110001	BC (Sub4) TH15	-99.9 to 999.9								B		
1593	1001110001	BC (Sub4) TH16	-99.9 to 999.9								B		
1594	0101110001	BC (Sub4) PS1	-99.9 to 999.9								B		
1595	1101110001	BC (Sub4) PS3	-99.9 to 999.9								B		
1596	0011110001	BC (Sub4) LEV3a	0000 to 9999								B		
1599	1111110001	BC (Sub5) TH12	-99.9 to 999.9								B		
1600	0000001001	BC (Sub5) TH15	-99.9 to 999.9								B		
1601	1000001001	BC (Sub5) TH16	-99.9 to 999.9								B		
1602	0100001001	BC (Sub5) PS1	-99.9 to 999.9								B		
1603	1100001001	BC (Sub5) PS3	-99.9 to 999.9								B		
1604	0010001001	BC (Sub5) LEV3a	0000 to 9999								B		
1607	1110001001	BC (Sub6) TH12	-99.9 to 999.9								B		
1608	0001001001	BC (Sub6) TH15	-99.9 to 999.9								B		

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Data before error

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	
1609	1001001001	BC (Sub6) TH16	-99.9 to 999.9								B		
1610	0101001001	BC (Sub6) PS1	-99.9 to 999.9								B		
1611	1101001001	BC (Sub6) PS3	-99.9 to 999.9								B		
1612	0011001001	BC (Sub6) LEV3a	0000 to 9999								B		
1615	1111001001	BC (Sub7) TH12	-99.9 to 999.9								B		
1616	0000101001	BC (Sub7) TH15	-99.9 to 999.9								B		
1617	1000101001	BC (Sub7) TH16	-99.9 to 999.9								B		
1618	0100101001	BC (Sub7) PS1	-99.9 to 999.9								B		
1619	1100101001	BC (Sub7) PS3	-99.9 to 999.9								B		
1620	0010101001	BC (Sub7) LEV3a	0000 to 9999								B		
1623	1110101001	BC (Sub8) TH12	-99.9 to 999.9								B		
1624	0001101001	BC (Sub8) TH15	-99.9 to 999.9								B		
1625	1001101001	BC (Sub8) TH16	-99.9 to 999.9								B		
1626	0101101001	BC (Sub8) PS1	-99.9 to 999.9								B		
1627	1101101001	BC (Sub8) PS3	-99.9 to 999.9								B		
1628	0011101001	BC (Sub8) LEV3a	0000 to 9999								B		
1631	1111101001	BC (Sub9) TH12	-99.9 to 999.9								B		
1632	0000011001	BC (Sub9) TH15	-99.9 to 999.9								B		
1633	1000011001	BC (Sub9) TH16	-99.9 to 999.9								B		
1634	0100011001	BC (Sub9) PS1	-99.9 to 999.9								B		
1635	1100011001	BC (Sub9) PS3	-99.9 to 999.9								B		
1636	0010011001	BC (Sub9) LEV3a	0000 to 9999								B		
1639	1110011001	BC (Sub10) TH12	-99.9 to 999.9								B		
1640	0001011001	BC (Sub10) TH15	-99.9 to 999.9								B		
1641	1001011001	BC (Sub10) TH16	-99.9 to 999.9								B		
1642	0101011001	BC (Sub10) PS1	-99.9 to 999.9								B		
1643	1101011001	BC (Sub10) PS3	-99.9 to 999.9								B		
1644	0011011001	BC (Sub10) LEV3a	0000 to 9999								B		
1647	1111011001	BC (Sub11) TH12	-99.9 to 999.9								B		
1648	0000111001	BC (Sub11) TH15	-99.9 to 999.9								B		
1649	1000111001	BC (Sub11) TH16	-99.9 to 999.9								B		
1650	0100111001	BC (Sub11) PS1	-99.9 to 999.9								B		
1651	1100111001	BC (Sub11) PS3	-99.9 to 999.9								B		
1652	0010111001	BC (Sub11) LEV3a	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	
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.

XI Safety for Leak

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[2] Refrigerant Emission Reduction 418
[3] Safety for Servicing 419
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[6] Precautions for Servicing 431
[7] Actions to Take When Refrigerant Leaks 435
[8] Other Services 440
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[10] Other Precautions 445

[1] Introduction

This chapter is for the following models that use R32 refrigerant.
*For the latest applicable models, check with local distributors.

Heat source unit

Category	Model
WR2 series	TQRYP_3AMM0AN
	TQRYP_4AMM0AN

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

[2] Refrigerant Emission Reduction

Dispose of recovered refrigerant according to local regulations such as the Code of Federal Regulations.

[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 carry a mobile gas leak detector while in operation, operate local exhaust systems, or take 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.

[4] Installation Requirements for R32 Refrigerant

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

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

- BC controller (TCMBM***MA11MM/TCMBS***MB11MM) *For WR2-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.

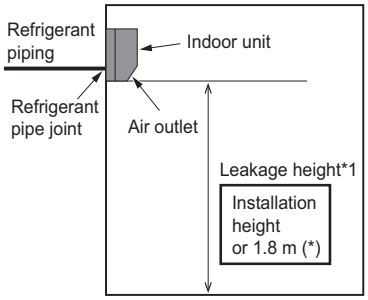
Note
Check the following when selecting or installing safety devices.
- The M-NET remote controller (ME remote controller) cannot be connected to R32 air c
- Reassess the safety measures if you change the room layout.
- Check whether each indoor unit is used in large space or with a safety device.

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.

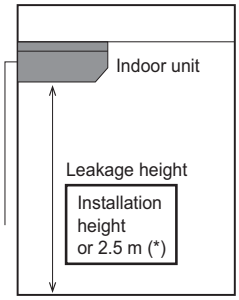
*Ensure that the leakage height is 1.8 m or higher from the floor before installation. (For the installation height requirements for each indoor unit model, refer to the Installation Manual.)

*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.

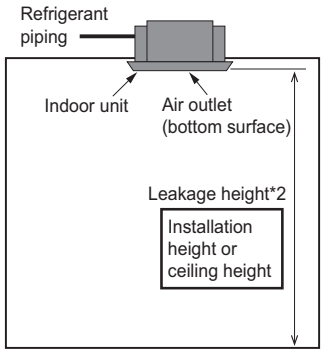
(1) Leakage height for wall-mounted indoor unit



(2) Leakage height for ceiling suspended indoor unit



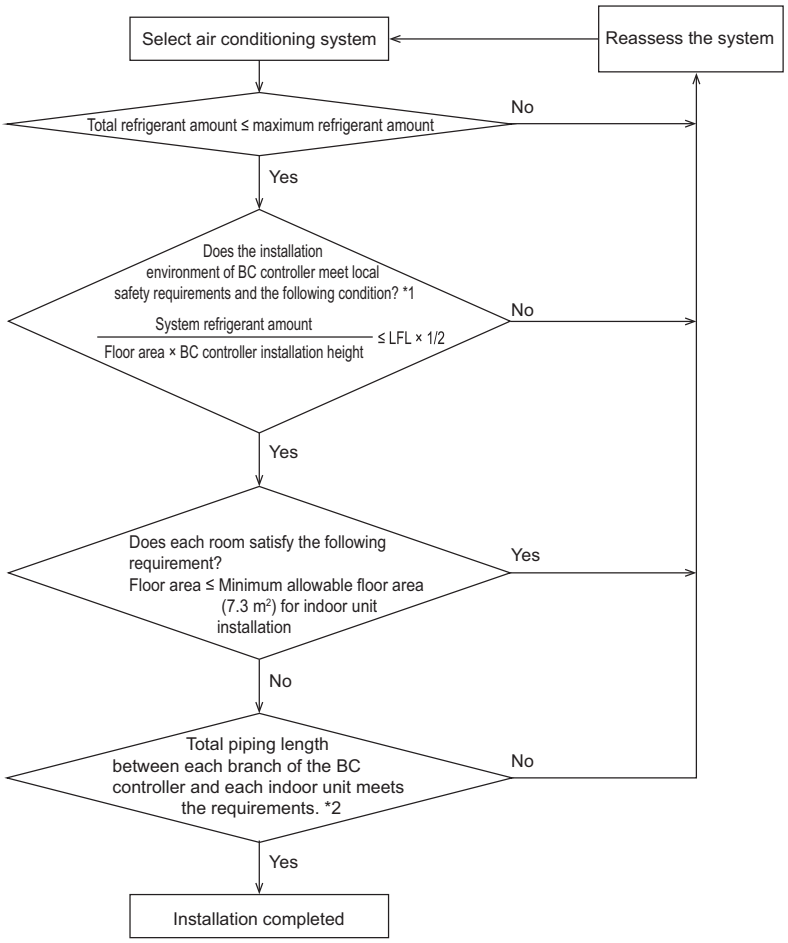
(3) Leakage height for ceiling cassette indoor unit



*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.

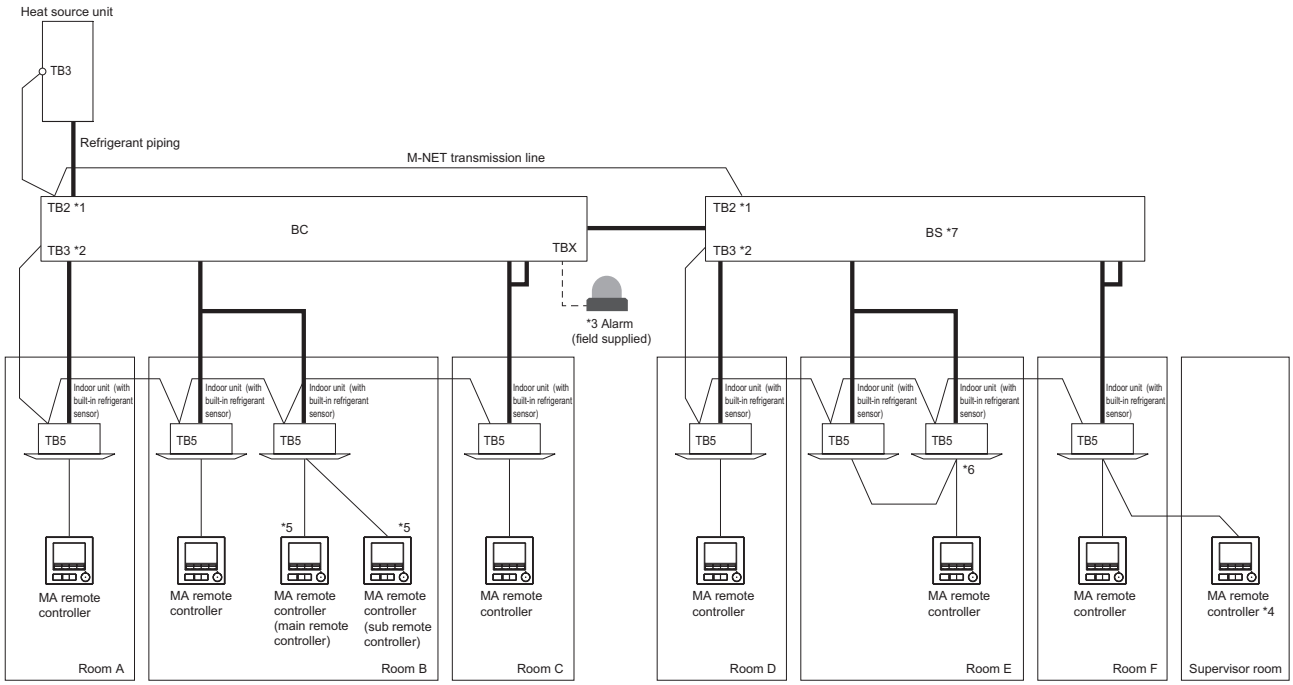
*2 The installation height or the ceiling height, whichever is lower, is considered as the leakage height.

■City Multi WR2-Series
<Safety measure selection flow>



*1 For details, refer to XI **[4] 4. (1) "[1] BC controller installation requirements"**.
*2 For details, refer to XI **[4] 4. (1) "[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 XI **[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.)

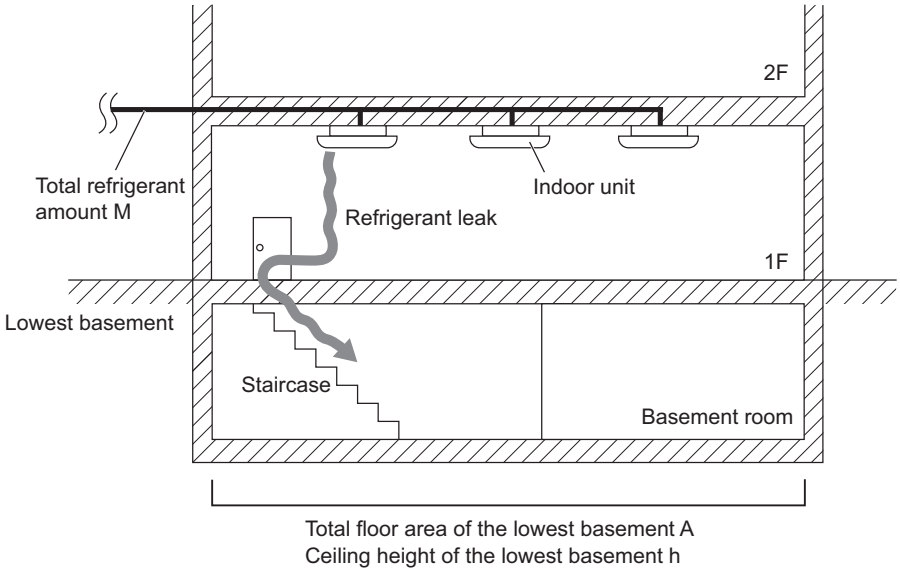
*1 Connect a heat source unit or another BC controller to TB2 of the BC controller.
*2 Connect an indoor unit controlled by the BC controller to TB3 of the same BC controller.
*3 A field-supplied building-wide alarm can be installed in case an indoor unit detects a refrigerant leak. For the setup, refer 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 XI **[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 XI **[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.

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.

4. Precautions for shut off device (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 BC controller, and length of branch piping.

(1) Shut off device for WR2-series (BC controller)

[1] BC controller installation requirements

Check that the difference of elevation between indoor and heat source 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.

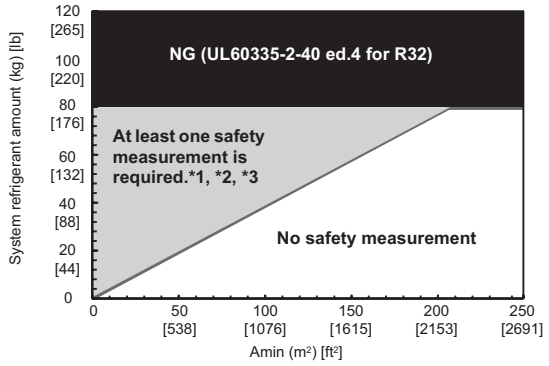
Amin = mc/(0.5 × 0.306 × Hr) …Equation 1
mc: Refrigerant charge in the system
Hr: Height from the floor to the BC controller

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.

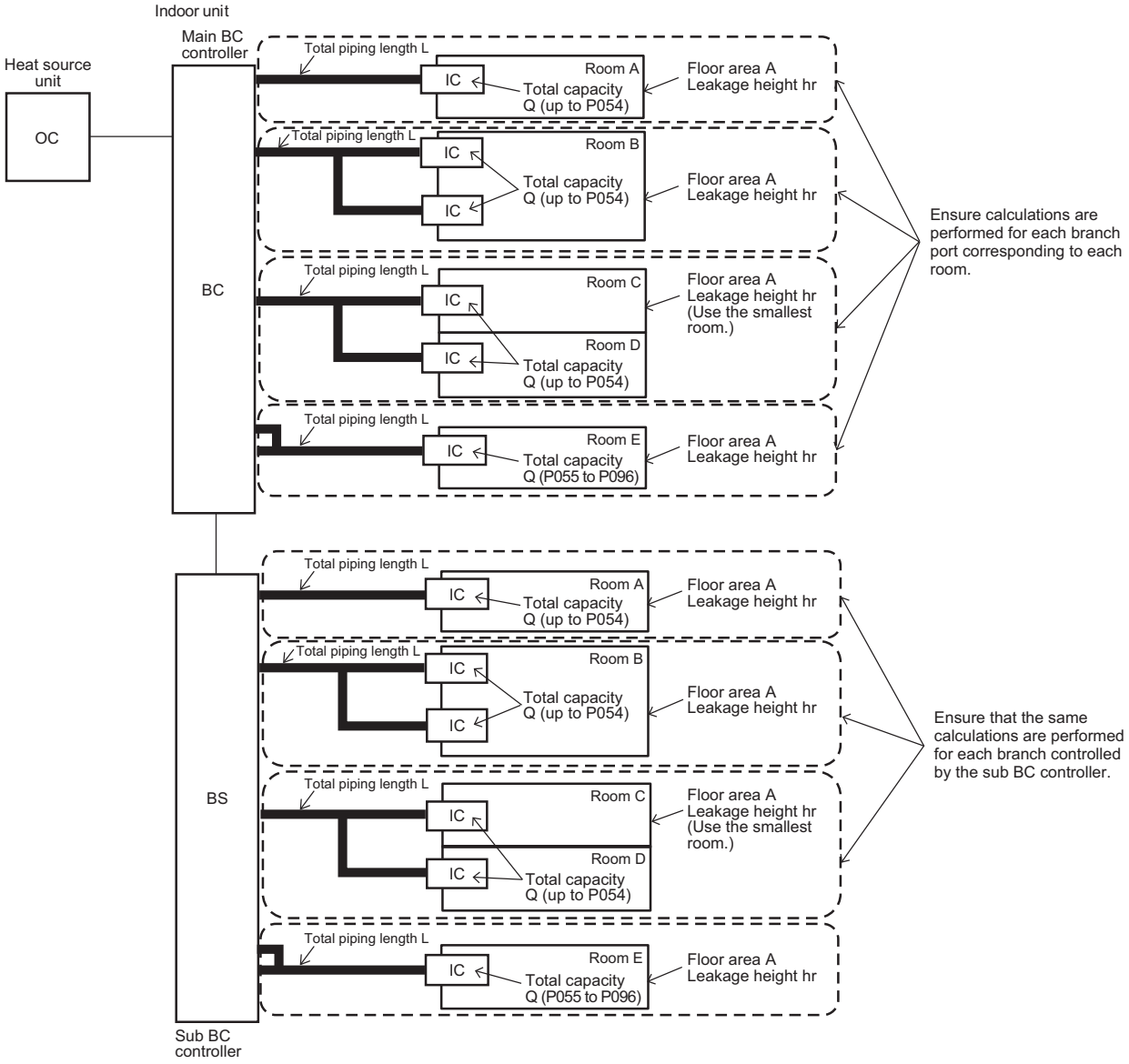
[2] Branch piping length requirements for indoor units controlled by BC controller with a built-in shut off valve

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 heat source 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)

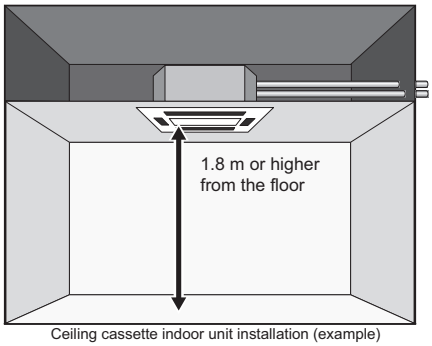
* When using indoor units with P055 to P096 capacity, connect them to two branch ports.

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.

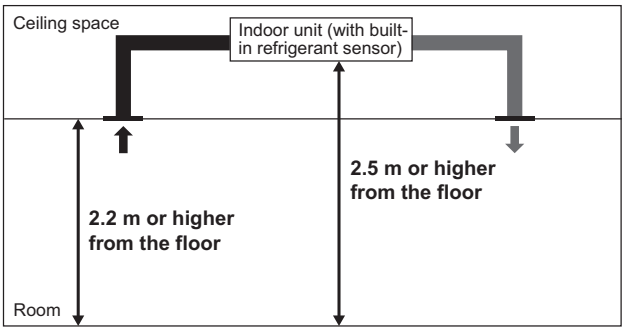
  For details, refer to the Installation Manual for the indoor unit.



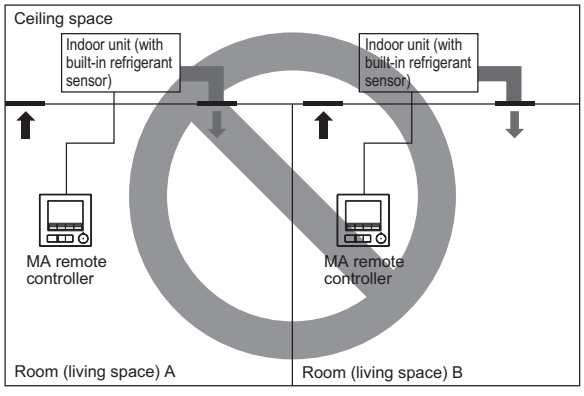
Ceiling cassette indoor unit installation (example)

■Duct installation requirements for ceiling concealed model

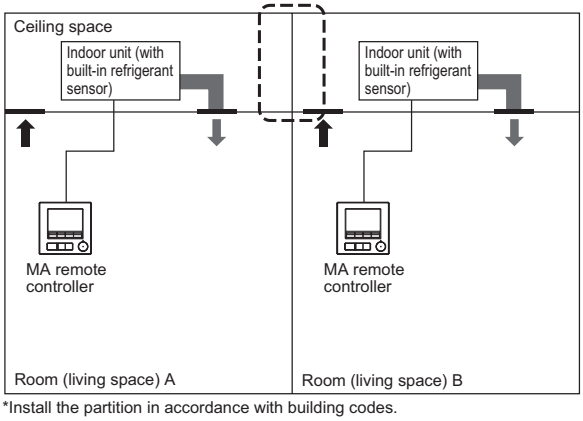
- Install the indoor unit at a height of 2.5 m or higher.
- Ensure the ceiling height (duct opening) is 2.2 m or higher.



- If two different rooms share the same space above the ceiling from which the indoor unit draws air, install a partition above the ceiling.

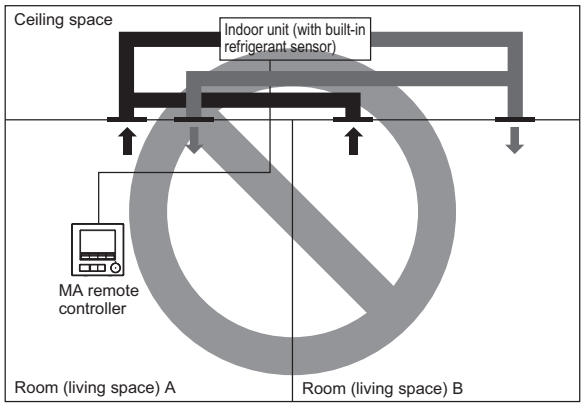


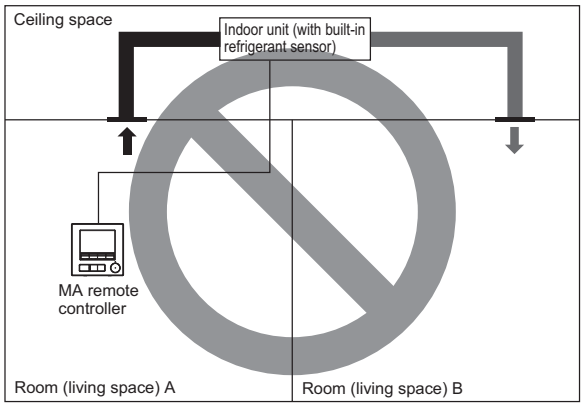
Partition the ceiling space into two for Rooms A and B.



*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 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.

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.

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.

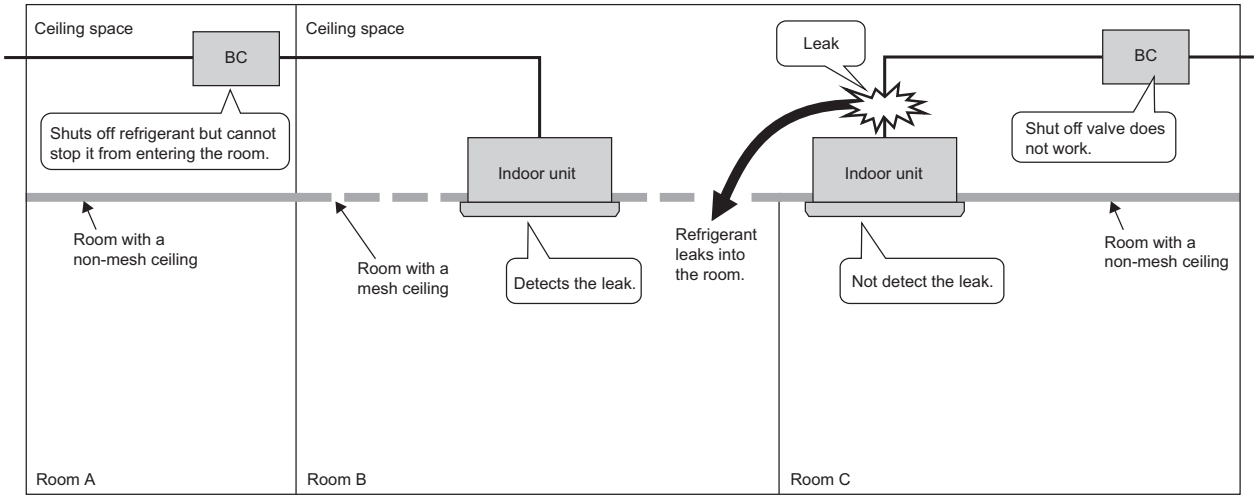
*2 Grouping connections across rooms are not allowed.

*3 The supervisor remote controller cannot be connected to grouped indoor units.

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.



8. Restrictions on installation environment of heat source units

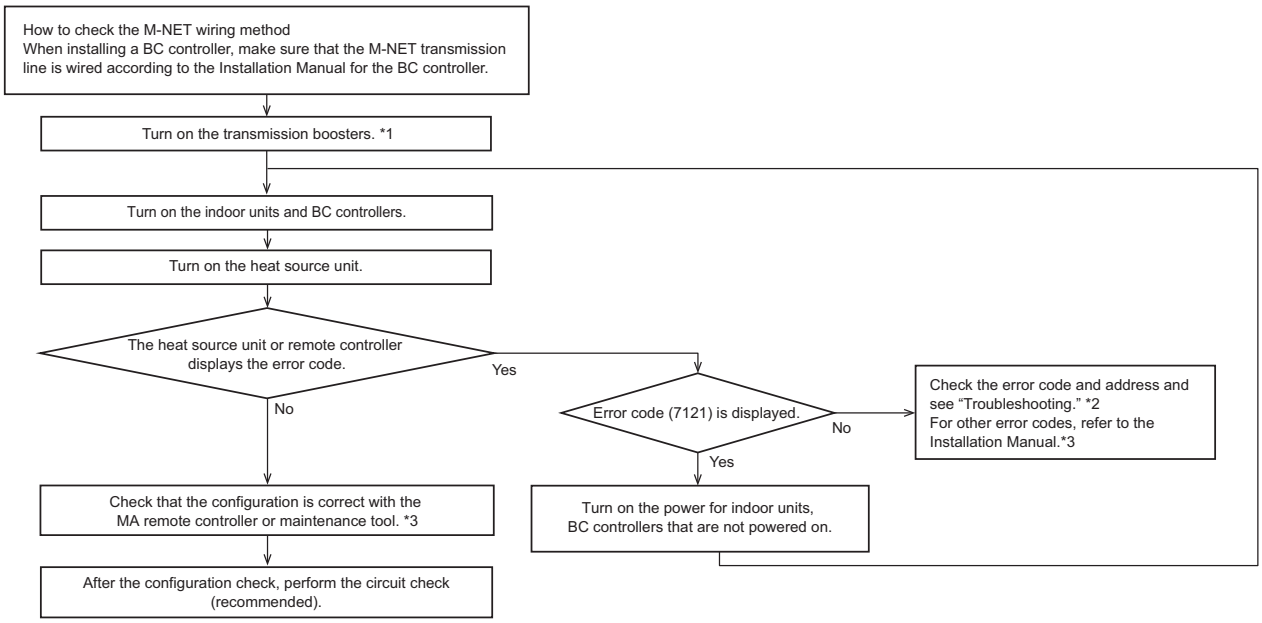
For installation restrictions regarding heat source units, refer to "General Precautions." The restrictions provided in "General Precautions" are based on UL60335-2-40. If any other applicable safety requirements are specified by building codes or other regulations, take appropriate measures considering those requirements.

[5] Precautions for Test Run

[Note]

- Turn on the heat source units **after turning on the indoor units, 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 (heat source units, indoor units, 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 XI [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. [XI [9] Troubleshooting]
*3 For details, refer to the specified page. [XI [9] 2. Checking and Changing the System Configuration]

[6] Precautions for Servicing

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. [I [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.

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.

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.

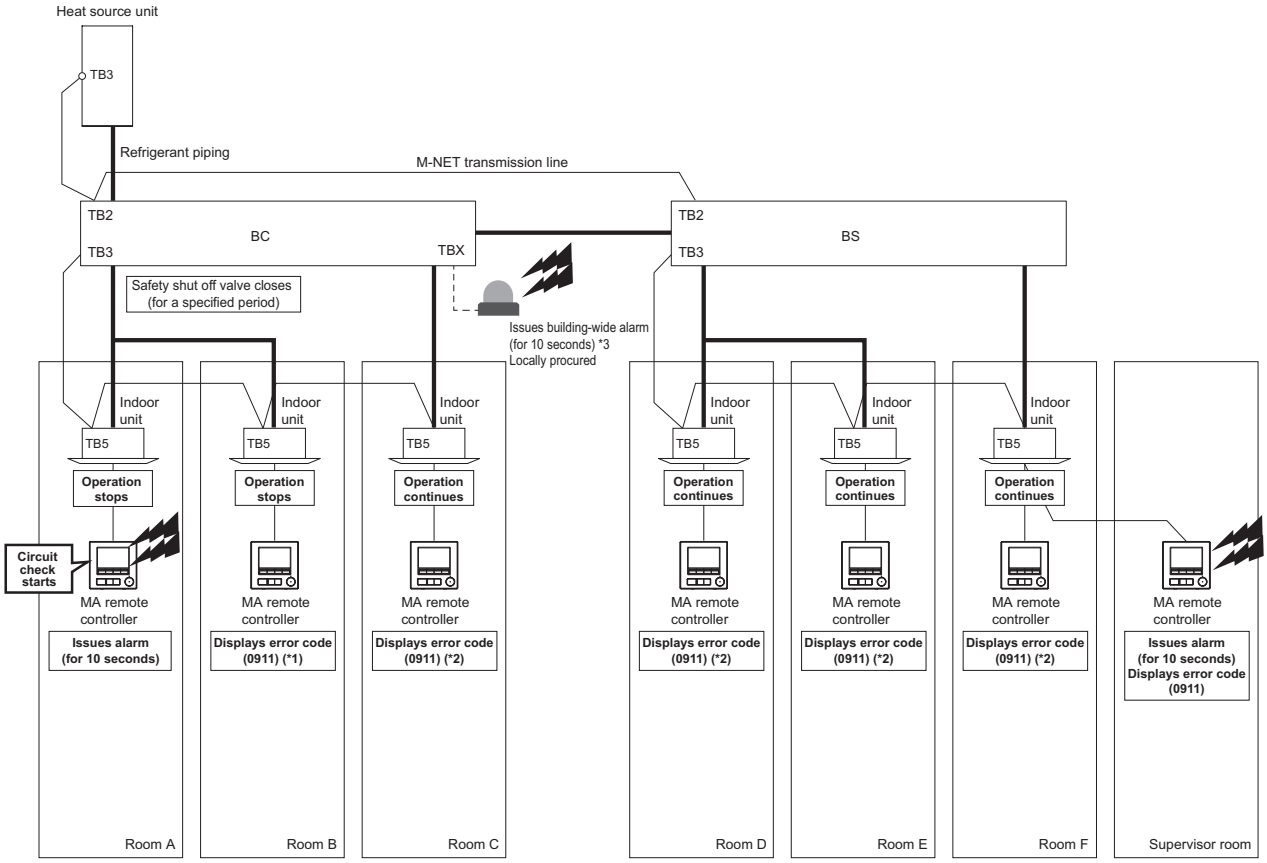
- Whether the alarm is activated with the leak detection signal
- Whether the shut off valve is activated when the refrigerant leaks

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 WR2 series]



*1 While the indoor unit is stopped, the error code (0911) may not be displayed depending on the check start timing.

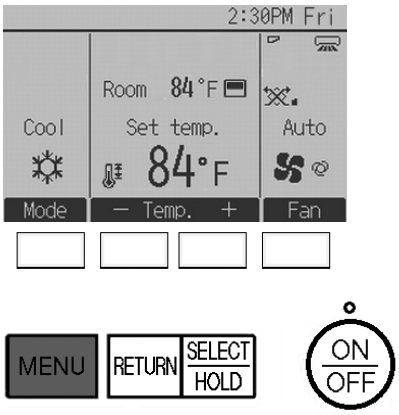
*2 While the indoor unit is in operation, the error code (0911) is displayed at the upper left of the remote controller screen. While the indoor unit is stopped, the error code (0911) is not displayed.

*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.

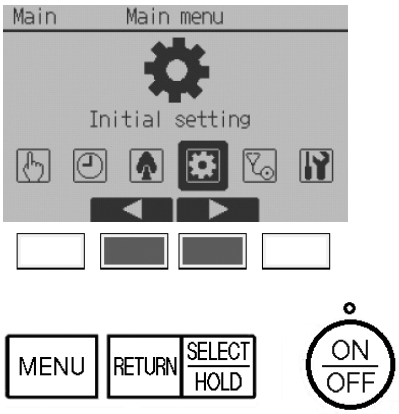
(1) When the circuit check is performed from the MA remote controller (TAR-43MAAUB)

[Procedure]

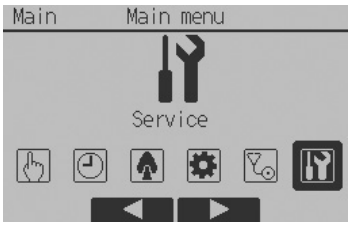
1) Press the **MENU** button on the main screen.
The main menu screen appears.



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.



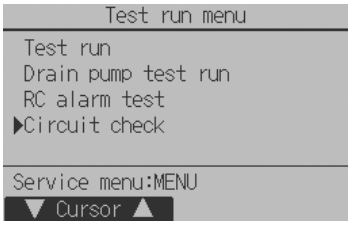
3) Select the service menu icon with the cursor and press the **SELECT/HOLD** button.
Each menu item is displayed.



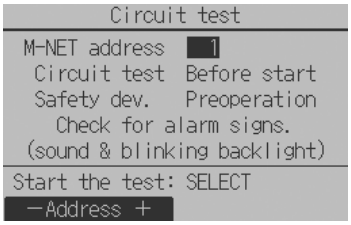
4) Select “Test run” with the cursor and press the **SELECT/HOLD** button.



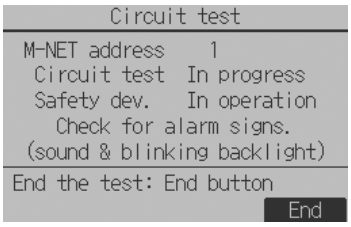
5) Select “Circuit check” with the cursor and press the **SELECT/HOLD** button.



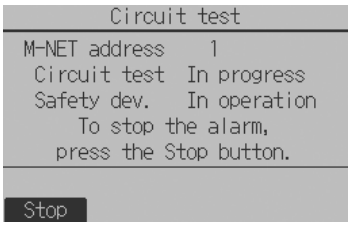
6) Check the circuit check start screen and press the **SELECT/HOLD** button.
The circuit check starts.



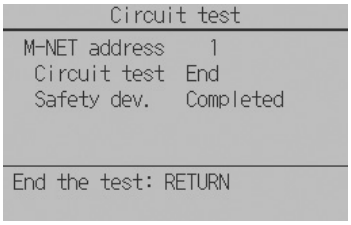
♦The MA remote controller will issue an alarm and sound, and the operation lamp and backlight will blink. (For approximately 10 seconds)
* The operation duration of the safety shut off valve differs according to the system. (Approximately 10 seconds to 2 minutes)
* If the supervisor remote controller 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. [XI [9] Troubleshooting]
♦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.

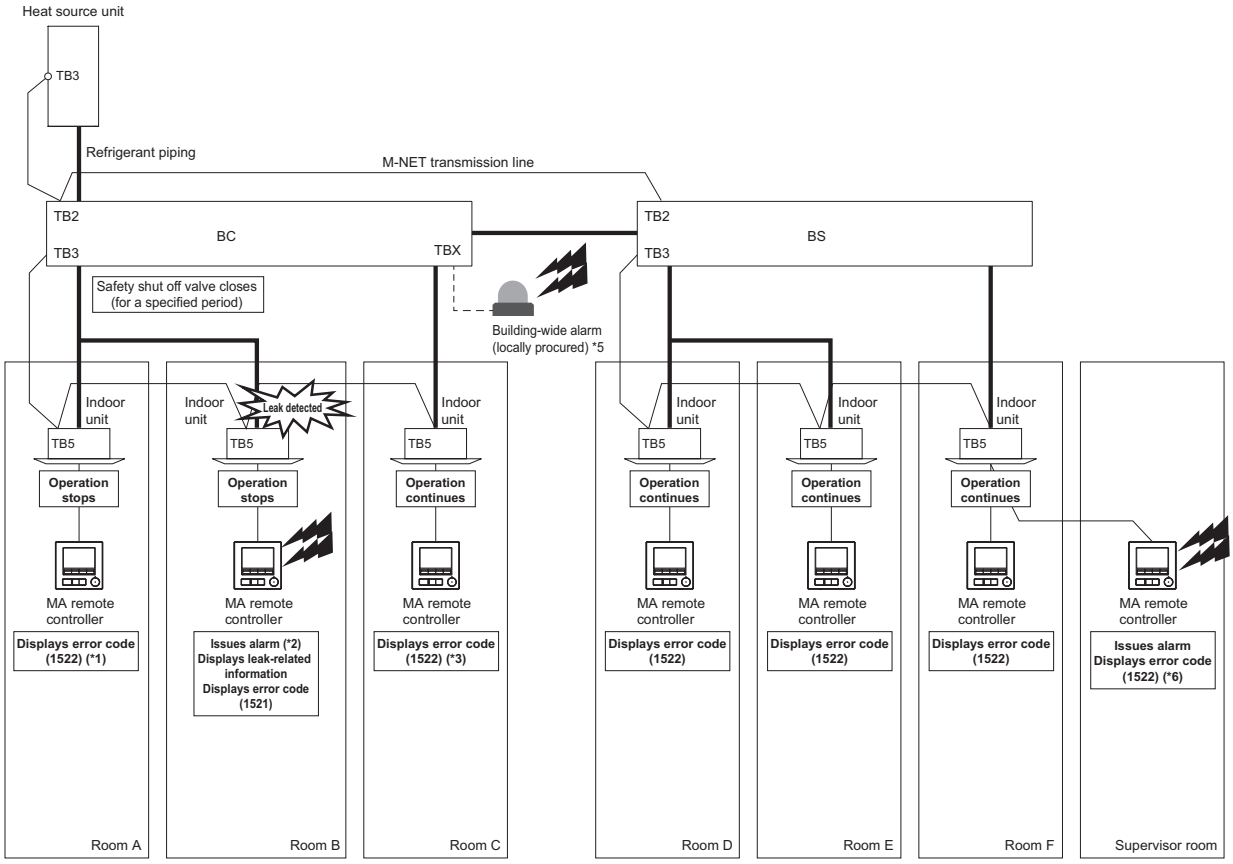
[7] Actions to Take When Refrigerant Leaks

[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.

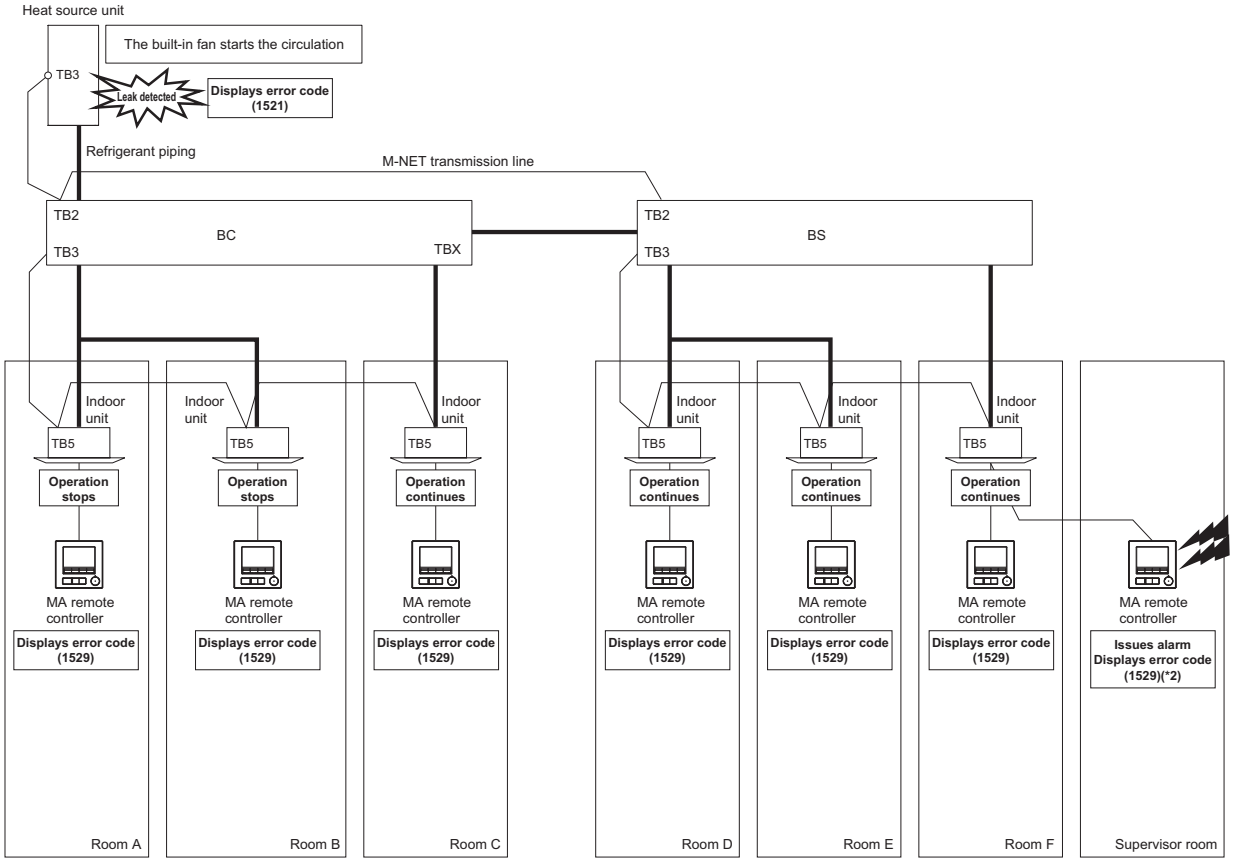
The following diagrams show the systems when refrigerant leaks.

[For indoor unit]



*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.

[For heat source unit]



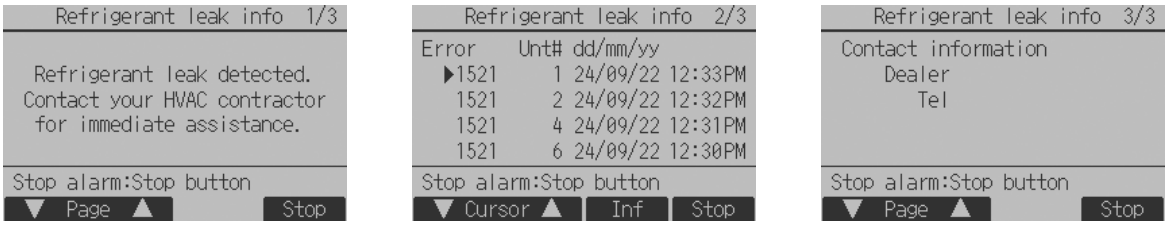
*1 While the indoor unit is in operation, the error code (1529) is displayed at the upper left of the remote controller screen. While the indoor unit is stopped, the error code (1529) is not displayed.

*2 Since the error codes (1521/1522/1524/5558) are prioritized, the error code (1529) may not be displayed.

1. In Case of the Alarm in a Room

If the MA remote controller is used

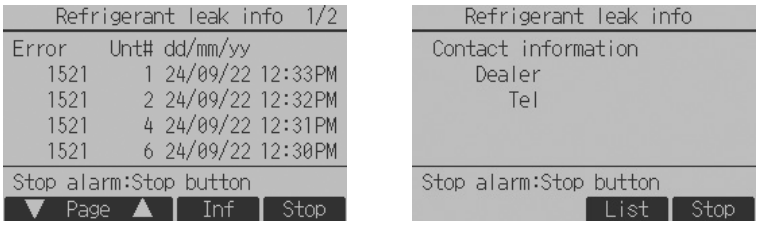
- The remote controller of the detected indoor unit sounds an alarm, the operation lamp and backlight blink, and the following screen appears.



- 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 XI [7] 3. Flowchart for Refrigerant Leak.

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.

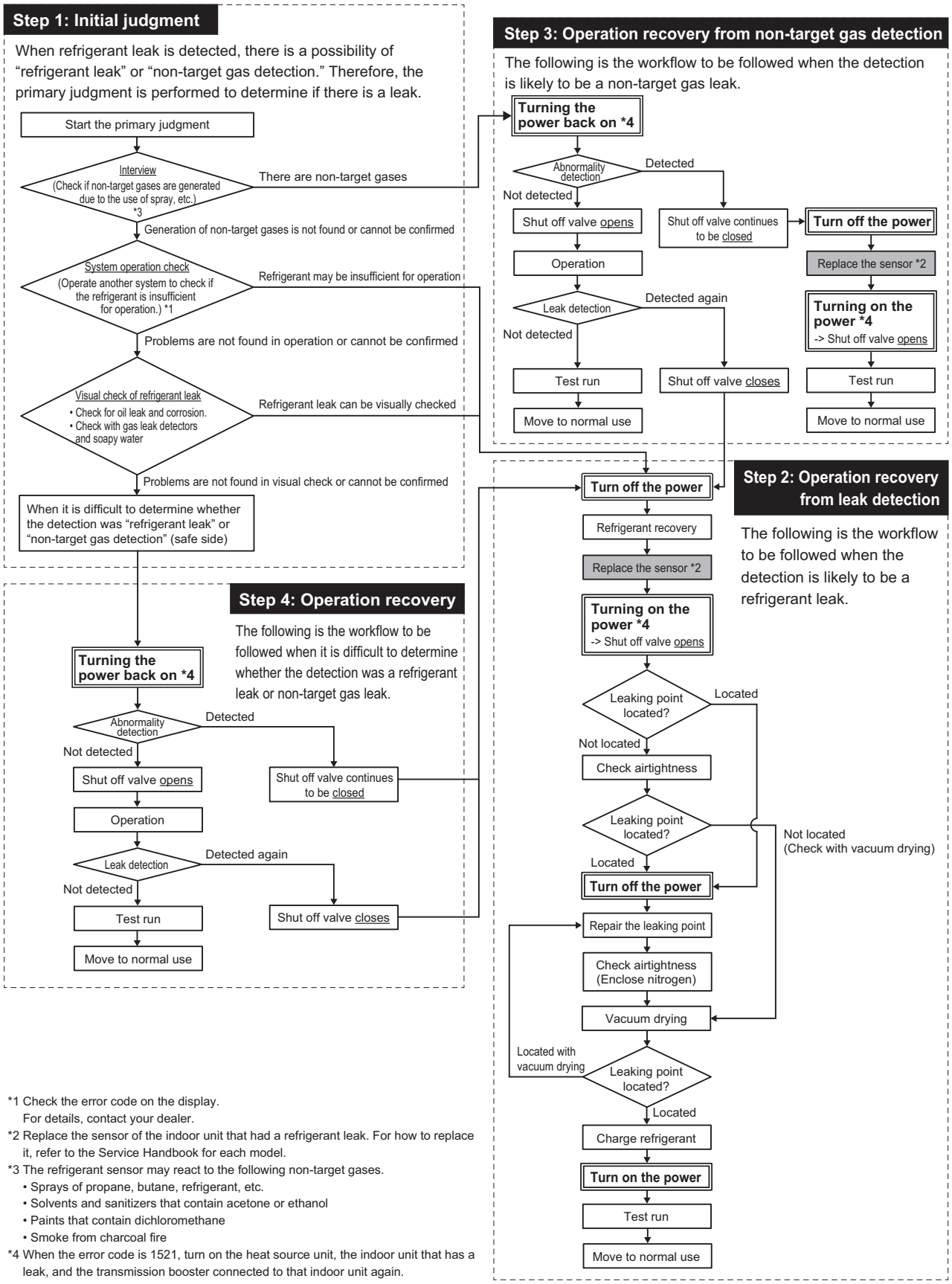


- Check the detected indoor unit and ventilate the room sufficiently by opening the windows and doors or other means.
- Follow the on-screen instructions to stop the alarm.
  * This stops the alarm but does not cancel the error.
- Check the refrigerant leak according to XI [7] 3. Flowchart for Refrigerant Leak.

3. Flowchart for Refrigerant Leak

(1) In case of indoor units

[For WR2 series]



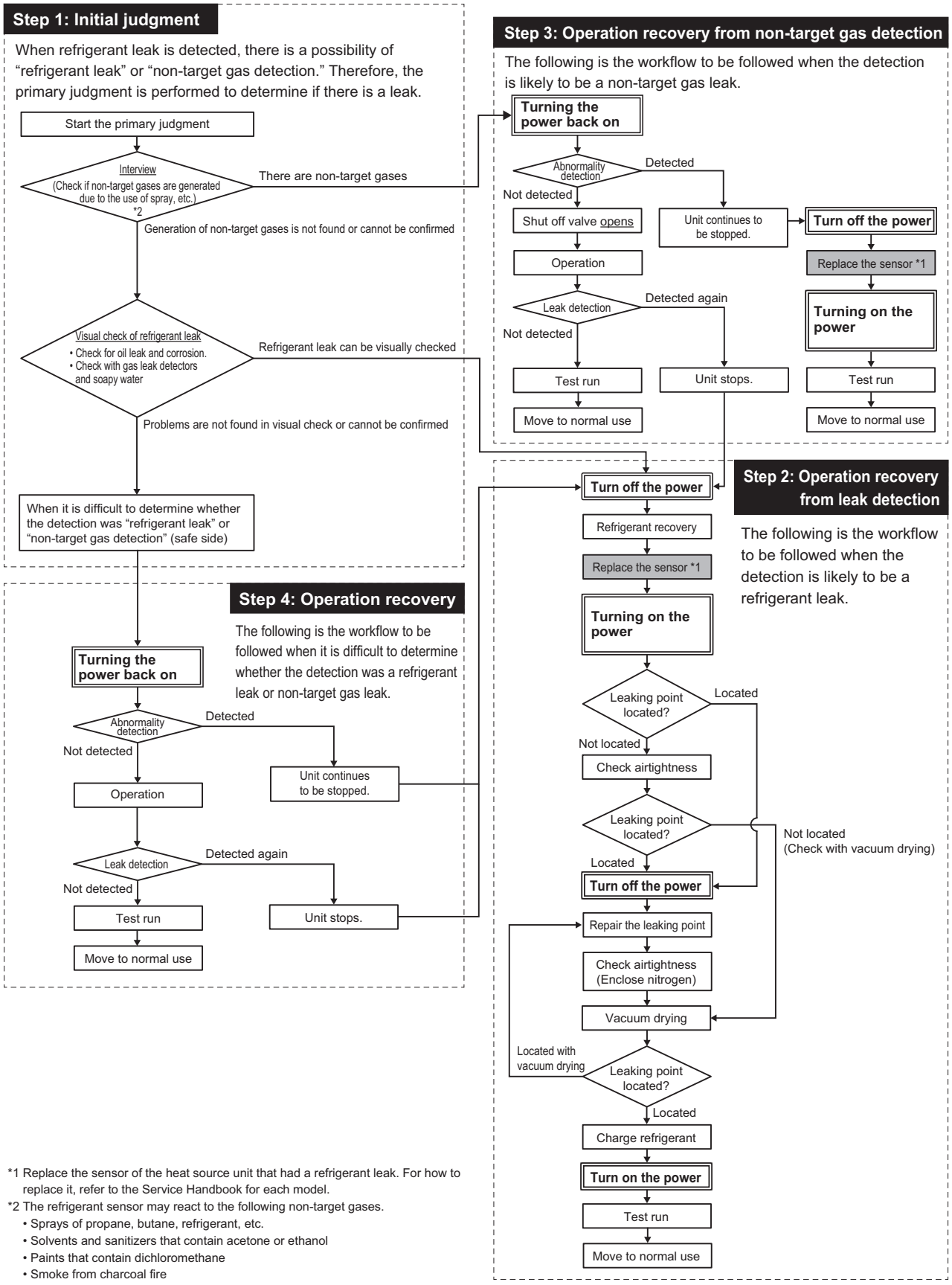
*1 Check the error code on the display.
For details, contact your dealer.

*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 heat source unit, the indoor unit that has a leak, and the transmission booster connected to that indoor unit again.

(2) In case of heat source units



*1 Replace the sensor of the heat source unit that had a refrigerant leak. For how to replace it, refer to the Service Handbook for each model.

*2 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

[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 heat source unit refrigerant sensors	This page below
(4)	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 [XI [7] 3. Flowchart for Refrigerant Leak].

(3) Replacement of heat source unit refrigerant sensors

[Procedure]

1) Turn off the target heat source unit.
2) Replace the refrigerant sensor.
3) Turn on the heat source unit.
   * For details of the replacement procedure, refer to VIII [9] Refrigerant Sensor Replacement Instructions.
   * In case of refrigerant leak, proceed with the replacement work according to [XI [7] 3. Flowchart for Refrigerant Leak].

(4) 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.

[9] Troubleshooting

[Memo]

The system power refers to the power to all units in the same refrigerant circuit system (heat source units, indoor units, BC controllers, and transmission boosters).

1. Troubleshooting List

Item	Symptom	Remedy
When the first power-on was performed in an incorrect order		
When the heat source unit was tuned on before the indoor units and BC controllers were turned on	The seven-segment LED display of the heat source 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 BC controllers, turn on the heat source 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 turn on the heat source unit/BC controllers.)
When the power to the heat source unit was shut off	The remote controller displays the error code (6607).	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 connection configuration, including partitioning, was changed		
When the number of indoor units was changed	-	For details, refer to the specified page. [XI [9] 2. Checking and Changing the System Configuration]
When the M-NET wiring connections were changed without changing the numbers of indoor units	-	
When an air tightness test and vacuum drying are required (When the shut off valve needs to be opened) When the power to the 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 heat source unit, shut off the power to the BC controller and indoor unit. [When the power is off] Turn on the BC controller and the indoor unit connected to that BC controller. * The product is shipped with the safety shut off valves of the 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. XI [7] Actions to Take When Refrigerant Leaks
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. XI [10] Other Precautions

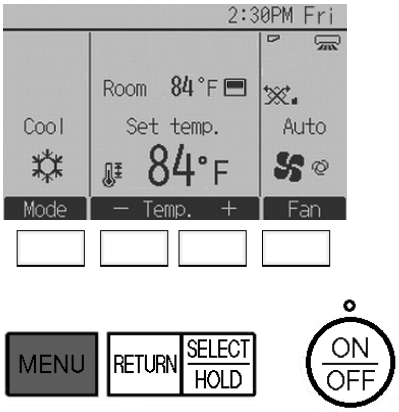
2. Checking and Changing the System Configuration

(1) Checking the system configuration

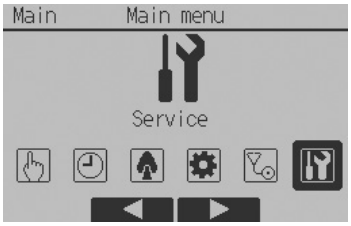
The system configuration can be checked by operating the MA remote controller (TAR-43MAAUB or later) after the interlock inspection.
Check it in the following procedure.

[Procedure]

1) Press the **MENU** button on the main screen.
The main menu screen appears.



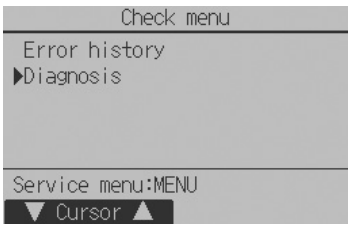
2) Select the service menu icon with the cursor and press the **SELECT/HOLD** button.
Each menu item is displayed.



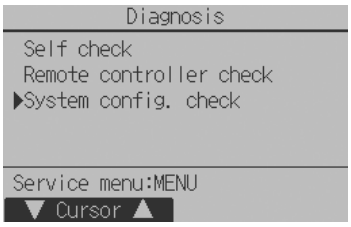
3) Select “Check” with the cursor and press the **SELECT/HOLD** button.
The check menu is displayed.



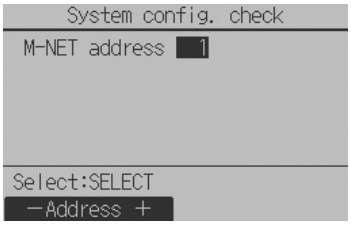
4) Select “Diagnosis” with the cursor and press the **SELECT/HOLD** button.
The diagnosis menu is displayed.



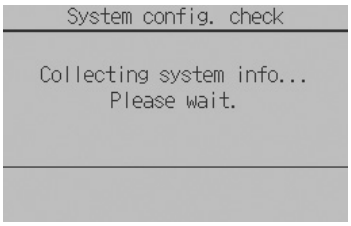
5) Select “System config. check” with the cursor and press the **SELECT/HOLD** button.



6) Check the system configuration check screen and press the **SELECT/HOLD** button.
Check the indoor unit address.

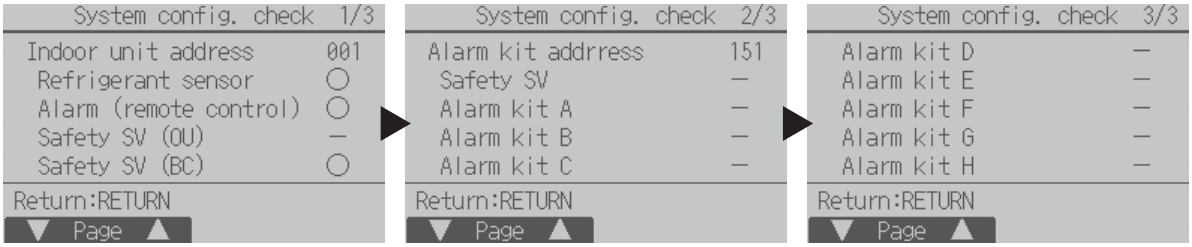


7) The system configuration information collection starts.

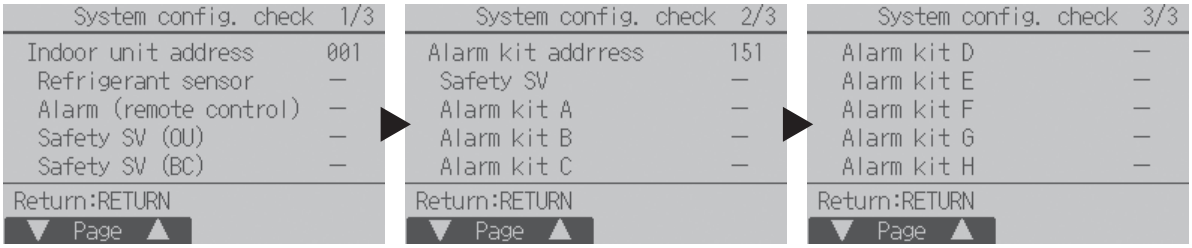


8) When the information collection ends, the following system configuration check screens are displayed.
Note that the screens to be displayed differ according to the system configuration.
"○" represents the enabled status and "–" represents the disabled status.

[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.

(2) Changing the system configuration

[Memo]

The system power refers to the power to all units in the same refrigerant circuit system (heat source units, indoor units, 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.

Item	Procedure
When the unit is removed * Before shutting off the system power, recover the refrigerant. For details, refer to the specified page. XI [10] Other Precautions	■ 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 heat source unit last.
When a unit is added * Before shutting off the system power, recover the refrigerant. For details, refer to the specified page. XI [10] Other Precautions	For WR2 series ■ 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 heat source unit last.

[10] Other Precautions

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 heat source unit first, and then turn off the power to the BC controller and the power to the indoor units. When turning on the power, start the BC controller and indoor units first, and then start the heat source unit. (If the BC controller 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.)

2. Precautions That Must Be Taken for Maintenance

Device managers must make sure that the environment of installed safety measures is maintained.

Strictly follow XI [3] Safety for Servicing when performing maintenance work.

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 heat source 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 heat source unit. If you must use fire, ensure there is no residual refrigerant in the circuit.
- Strictly follow XI [3] Safety for Servicing when removing and discarding units.

Service Handbook

Model

TQRYP072, 096, 120, 144, 168, 192, 216, 2403(4)AMM0AN

TQRYP144, 168, 192, 216, 240, 288, 312, 3363(4)BMM0AN

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