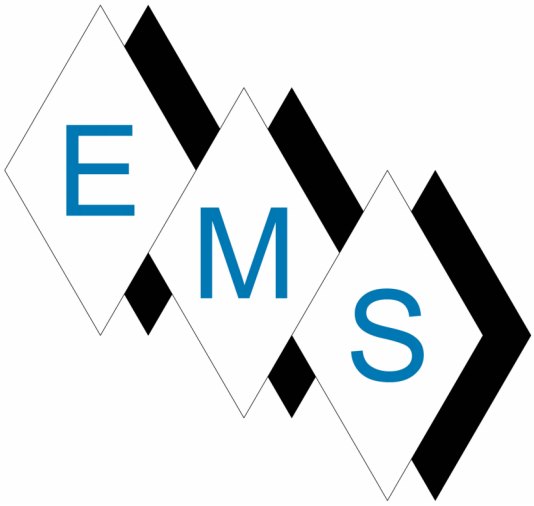
ST. GREGORY HVAC UPGRADES

O&M DOCUMENTS
Job 5321



Eastern Mechanical Services, Inc.
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Danbury, CT 06810
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Notes

Equipment Bill Of Material

Quantities

Qty	Model	Description	Tag
9	PAC-YT53CRAU-J	Simple MA controller	CTR1-New Class 1-1,CTR1-Corridor 1,CTR1-New Class 2-1,CTR1-Bath 1,CTR1-Bath 2,CTR1-Office 1,CTR1-Office 2,CTR1-Corridor 2,CTR1-Stairwell
1	PZ-62DR-EA	Lossnay	
1	PUHY-EP168TNU-A	R410A Y Series Outdoor Unit	OutdoorUnit 1
8	PMFY-P12NBMU-ER5	Ceiling Cassette (One-Way) Indoor Unit	New Class 1-1,New Class 1-2,New Class 1-3,New Class 1-4,New Class 2-1,New Class 2-2,New Class 2-3,New Class 2-4
3	PKFY-P06NLMU-E.TH	Wall -Mounted Indoor Unit	New Corridor,Bath 1,Bath 2
4	PMFY-P08NBMU-ER5	Ceiling Cassette (One-Way) Indoor Unit	Corridor 1,Office 1,Office 2,Corridor 2
1	PKFY-P08NLMU-E.TH	Wall -Mounted Indoor Unit	Stairwell
9	CMY-Y102LS-G2	Branch Joint	Joint 1,Joint 2,Joint 3,Joint 4,Joint 6,Joint 7,Joint 8,Joint 9,Joint 10
6	CMY-Y102SS-G2	Branch Joint	Joint 11,Joint 11,Joint 12,Joint 13,Joint 14,Joint 14
1	LGH-F600RVX2-E	Lossnay	
1	AE-200A	System Remote Controller	CTR1
12	PMP-16BMUW	Decoration Panel	New Class 1-1,New Class 1-2,New Class 1-3,New Class 1-4,Corridor 1,New Class 2-1,New Class 2-2,Office 1,Office 2,Corridor 2,New Class 2-3,New Class 2-4

Refrigerant Piping Materials

Pipe Size (inch)	Total Length (feet)	Number of Bends
1/4	290	0
1/2	331	9
3/8	44.5	0
5/8	52.5	2
3/4	18	0
7/8	9	0
1-1/8	76	11

Written Specifications

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Part 1 - General

1.01 SYSTEM DESCRIPTION Y-SERIES (HEAT/COOL MODEL)

Per the equipment schedule, the variable capacity, heat pump air conditioning system basis of design is Mitsubishi Electric CITY MULTI VRF (Variable Refrigerant Flow) zoning system(s).

Acceptable alternative manufacturers, assuming compliance with these equipment specifications, are Daikin, Panasonic, and Hitachi. Contractor bidding an alternate manufacturer does so with full knowledge that that manufactures product may not be acceptable or approved and that contractor

is responsible for all specified items and intents of this document without further compensation.

1.02 SYSTEM DESCRIPTION LOSSNAY

The basis of design fresh air ventilation system(s) is the Mitsubishi Electric LOSSNAY total heat exchanger with outside air bypass damper and energy recovery ventilation.

The unit shall be equipped with data network control and be directly connectable to the communication control network serving other systems from this manufacturer.

1.03 QUALITY ASSURANCE

1. The units shall be listed by Electrical Testing Laboratories (ETL) and bear the ETL label.

2. All wiring shall be in accordance with the National Electrical Code (N.E.C.).

3. The units shall be manufactured in a facility registered to ISO 9001 and ISO14001 which is a set of standards applying to environmental protection set by the International Standard Organization (ISO).

4. All units must meet or exceed the 2010 Federal minimum efficiency requirements and the ASHRAE 90.1 efficiency requirements for VRF systems. Efficiency shall be published in accordance with the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Standard 1230.

5. System start-up supervision shall be a required service to be completed by the manufacturer or a duly authorized, competent representative that has been factory trained in system configuration and operation. The representative shall provide proof of manufacturer certification indicating successful completion within no more than two (2) years prior to system installation. This certification shall be included as part of the equipment and/or controls submittals.

1.04 DELIVERY, STORAGE AND HANDLING

1. Unit shall be stored and handled according to the manufacturer's recommendation.

Part 2 - Warranty

The CITY MULTI units shall be covered by the manufacturer's limited warranty for a period of one (1) year parts and seven (7) year compressor to the original owner from date of installation.

Installing contractor shall meet manufacturer requirements to obtain extended manufacturer's limited parts and compressor warranty for a period of ten (10) years to the original owner from date of installation. This warranty shall not include labor.

Manufacturer shall have a minimum of fifteen (15) years continuous experience providing VRF systems in the U.S. market.

All manufacturer technical and service manuals must be readily available for download by any local contractor should emergency service be required.

Registering and sign-in requirements which may delay emergency service reference are not allowed.

The CITY MULTI VRF system shall be installed by a contractor with extensive CITY MULTI install and service training. The mandatory contractor service and install training should be performed by the manufacturer.

Part 3 - Outdoor Units

3.01 Y-SERIES HIGH EFFICIENCY (HEAT PUMP), AIR-COOLED OUTDOOR UNITS

General:

1. The outdoor unit modules shall be air-cooled, direct expansion (DX), multi-zone units used specifically with VRF components described in this section and Part 5 (Controls). The outdoor unit modules shall be equipped with a single compressor which is inverter-driven and multiple circuit boards—all of which must be manufactured by the branded VRF manufacturer. Each outdoor unit module shall be completely factory assembled, piped and wired and run tested at the factory.

2. Outdoor unit systems may be comprised of multiple modules with differing capacity if a brand other than basis of design is proposed. All units requiring a factory supplied twinning kits shall be piped together in the field, without the need for equalizing line(s). If an alternate manufacturer is selected, any additional material, cost, and labor to install additional lines shall be incurred by the contractor. Contractor responsible for ensuring alternative brand compatibility in terms of availability, physical dimensions, weight, electrical requirements, etc.

3. Outdoor unit shall have a sound rating no higher than 68 dB(A) individually or 69.5 dB(A) twinned. Units shall have a sound rating no higher than 55 dB(A) individually or 55.5 dB(A) twinned while in night mode operation. Units shall have 5 levels sound adjustment via dip switch selectable fan speed settings. If an alternate manufacturer is selected, any additional material, cost, and labor to meet published sound levels shall be incurred by the contractor.

4. Refrigerant lines from the outdoor unit to the indoor units shall be insulated in accordance with the installation manual.

5. The outdoor unit shall have the capability of installing the main refrigerant piping through the bottom of the unit.

6. The outdoor unit shall have an accumulator with refrigerant level sensors and controls. Units shall actively control liquid level in the accumulator via Linear Expansion Valves (LEV) from the heat exchanger.

7. The outdoor unit shall have a high pressure safety switch, over-current protection, crankcase heater and DC bus protection.

8. VRF system shall meet performance requirements per schedule and be within piping limitations & acceptable ambient temperature ranges as described in respective manufacturers' published product catalogs. Non-published product capabilities or performance data are not acceptable.

9. The outdoor unit shall be capable of guaranteed operation in heating mode down to -25F ambient temperatures and cooling mode up to 126°F without additional restrictions on line length & vertical separation beyond those published in respective product catalogs. Models with capacity data for required temperature range published as "for reference only" are not considered capable of guaranteed operation and are not acceptable. If an alternate manufacturer is selected, any additional material, cost, and labor to meet ambient operating range and performance shall be incurred by the contractor.

10. The outdoor unit shall have a high efficiency oil separator plus additional logic controls to ensure adequate oil volume in the compressor is maintained. Oil return sequences must be enabled only during extended periods of reduced refrigerant flow to ensure no disruption to correct refrigerant flow to individual zones during peak loads. Systems which might engage oil return sequence based on hours of operation risk oil return during inopportune periods are not allowed. Systems which rely on sensors (which may fail) to engage oil return sequence are not allowed.

11. Unit must defrost all circuits simultaneously in order to resume full heating more quickly during extreme low ambient temperatures (below 23F). Partial defrost, also known as hot gas defrost which allows reduced heating output during defrost, is permissible only when ambient temperature is above 23F.

12. While in hot gas defrost the system shall slow the indoor unit fan speed down to maintain a high discharge air temperature, systems that keep fan running in same state shall not be allowed as they provide an uncomfortable draft to the indoor zone due to lower discharge air temperatures.

Unit Cabinet:

1. The casing(s) shall be fabricated of galvanized steel, bonderized and finished.
2. The outdoor unit shall be tested in compliance with ISO9277 such that no unusual rust shall develop after 960 hours of salt spray testing.
3. Panels on the outdoor unit shall be scratch free at system startup. If a scratch occurs the salt spray protection is compromised and the panel should be replaced immediately.

Fan:

1. Each outdoor unit module shall be furnished with direct drive, variable speed propeller type fan(s) only. Fans shall be factory set for operation at 0 in. WG external static pressure, but capable of normal operation with a maximum of 0.32 in. WG external static pressure via dipswitch.
2. All fan motors shall have inherent protection, have permanently lubricated bearings, and be completely variable speed.
3. All fans shall be provided with a raised guard to prevent contact with moving parts.

Refrigerant and Refrigerant Piping

1. R410A refrigerant shall be required for systems.
2. Polyolester (POE) oil—widely available and used in conventional domestic systems—shall be required. Prior to bidding, manufacturers using alternate oil types shall submit material safety data sheets (MSDS) and comparison of hygroscopic properties for alternate oil with list of local suppliers stocking alternate oil for approval at least two weeks prior to bidding.

3. Refrigerant piping shall be phosphorus deoxidized copper (copper and copper alloy seamless pipes) of sufficient radial thickness as defined by the VRF equipment manufacturer and installed in accordance with manufacturer recommendations.

4. All refrigerant piping must be insulated with ½" closed cell, CFC-free foam insulation with flame-Spread Index of less than 25 and a smoke-development Index of less than 50 as tested by ASTM E 84 and CAN / ULC S-102. R value of insulation must be at least 3.

5. Refrigerant line sizing shall be in accordance with manufacturer specifications.

Coil:

1. Outdoor Coil shall be constructed to provide equal airflow to all coil face surface are by means of a 4-sided coil.

1. Outdoor Coil shall be elevated at least 12" from the base on the unit to protect coil from freezing and snow build up in cold climates. Manufacturer's in which their coil extends to within a few inches from the bottom of their cabinet frame shall provide an additional 12" of height to their stand or support structure to provide equal protection from elements as Mitsubishi Electric basis of design. Any additional support costs, equipment fencing, and tie downs required to meet this additional height shall be responsibility of Mechanical Contractor to provide.

2. The outdoor heat exchanger shall be of zinc coated aluminum construction with turbulating flat tube construction. The coil fins shall have a factory applied corrosion resistant finish. Uncoated aluminum coils/fins are not allowed.

3. The coil shall be protected with an integral metal guard.

4. Refrigerant flow from the outdoor unit shall be controlled by means of an inverter driven compressor.

5. Unit shall have prewired plugs for optional panel heaters in order to prevent any residual ice buildup from defrost. Panel heaters are recommended for operating environments where the ambient temperature is expected to stay below -1F for 72 hours.

6. Condenser coil shall have active hot gas circuit direct from compressor discharge on lowest coil face area to shed defrost condensate away from coil and protect from Ice formation after returning to standard heat pump operation. While in Heat Pump operation this lower section of the Outdoor Evaporator coil shall continually run hot gas from the compressor discharge to protect the coil from ice buildup and coil rupture. Manufacturers who do not have an active hot gas circuit in the lower section of the Outdoor coil to protect coil from freezing shall not be allowed to bid on project in markets where the outdoor unit will see temperatures below freezing.

Compressor:

1. Each outdoor unit module shall be equipped with only inverter driven scroll hermetic compressors. Non inverter-driven compressors, which may cause inrush current (demand charges) and require larger generators for temporary power shall not be allowed.

2. Each compressor shall be equipped with a multi-port discharge mechanism to eliminate over compression at part load. Manufacturer's that rely on a single compressor discharge port and provide no means of eliminating over compression and energy waste at part load shall not be allowed.

3. Crankcase heat shall be provided via induction-type heater utilizing eddy currents from motor windings. Energy-wasting "belly-band" type crankcase heaters are not allowed. Manufacturers that utilize belly-band crankcase heaters will be considered as alternate only.

4. Compressor shall have an inverter to modulate capacity. The capacity for each compressor shall be variable with a minimum turndown not greater than 15%.

5. The compressor shall be equipped with an internal thermal overload.

6. Field-installed oil equalization lines between modules are not allowed. Prior to bidding, manufacturers requiring equalization must submit oil line sizing calculations specific to each system and module placement for this project.

7. Manufacturers that utilize a compressor sump oil sensor to equalize compressor oil volume within a single module shall not be allowed unless they actively shut down the system to protect from compressor failure.

Controls:

8. The unit shall be an integral part of the system & control network described in Part 5 (Controls) and react to heating/cooling demand as communicated from connected indoor e control circuit. Required field-installed control voltage transformers and/or signal boosters shall be provided by the manufacturer.

9. The outdoor unit shall have the capability of 4 levels of demand control for each refrigerant system based on external input.

Electrical:

1. The outdoor unit electrical power shall be 208/230 volts, 3-phase, 60 hertz or 460 volts, 3-phase, 60 hertz per equipment schedule.

2. The outdoor unit shall be controlled by integral microprocessors.

3. The control circuit between the indoor units and the outdoor unit shall be 24VDC completed using a 2-conductor, twisted pair shielded cable to provide total integration of the system.

4.

Part 4 - Indoor Units

4.01 WALL MOUNTED INDOOR UNIT

General:

1. The wall-mounted indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, and a test run switch. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.

Unit Cabinet:

1. All casings, regardless of model size, shall have the same white finish

2. Multi directional drain and refrigerant piping offering four (4) directions for refrigerant piping and two (2) directions for draining are required.

3. There shall be a separate back plate which secures the unit firmly to the wall.

Fan:

1. The indoor fan shall be statically and dynamically balanced to run on a single motor with permanently lubricated bearings.
2. A manual adjustable guide vane shall be provided with the ability to change the airflow from side to side (left to right).
3. A motorized air sweep louver shall provide an automatic change in airflow by directing the air up and down to provide uniform air distribution.

Filter:

1. Return air shall be filtered by means of an easily removable, washable filter.

Coil:

1. Basis of design indoor units include factory-installed LEV/EEV. Alternative brands which require field-installed, accessory LEV or EEV kits are permissible only with written Engineer and Architect approval for the location of kits being submitted two weeks prior to bid date. EEV kits mounted in cavities inside fire-rated interior walls shall be mounted inside three hour fire rated enclosures with access panels supplied by the manufacturer. Enclosure type and placement require prior approval.
2. The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. All tube joints shall be brazed with phos-copper or silver alloy.
3. The coils shall be pressure tested at the factory.

Electrical:

1. The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.
2. The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253 volts (230V/60Hz)

Controls:

1. The unit shall include an IR receiver for wireless remote control flexibility

2. Indoor unit shall compensate for the higher temperature sensed by the return air sensor compared to the temperature at level of the occupant when in HEAT mode. Disabling of compensation shall be possible for individual units to accommodate instances when compensation is not required.

3. Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8°F – 9.0°F adjustable deadband from set point.

4. Indoor unit shall include no less than four (4) digital inputs capable of being used for customizable control strategies.

5. Indoor unit shall include no less than three (3) digital outputs capable of being used for customizable control strategies.

4.02 1-WAY CEILING-RECESSED CASSETTE WITH GRILLE INDOOR UNIT

General:

1. The one-way cassette indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, an emergency operation function and a test run switch. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory. The unit shall be suitable for use in plenums in accordance with UL1995 ed 4.

Unit Cabinet:

1. The cabinet panel shall have provisions for a field installed filtered outside air intake.

2. Branch ducting shall be allowed from cabinet.

3. The one-way grille shall be fixed to bottom of cabinet allowing for one-way airflow.

Fan:

1. The indoor fan shall be an assembly with one line-flow fan direct driven by a single motor with permanently lubricated bearings.

2. The indoor fan shall consist of four (4) speeds, Low, Mid1, Mid2, and High.

Filter:

1. Return air shall be filtered by means of a long-life washable permanent filter.

Coil:

1. The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. All tube joints shall be brazed with phos-copper or silver alloy.
2. The coils shall be pressure tested at the factory.
3. The unit shall be provided with an integral condensate lift mechanism able to raise drain water 23 inches above the condensate pan.

Electrical:

1. The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.
2. The system shall be capable of satisfactory operation within voltage limits of 187-228 volts (208V/60Hz) or 207-253 volts (230V/60Hz).

Controls:

1. Indoor unit shall compensate for the higher temperature sensed by the return air sensor compared to the temperature at level of the occupant when in HEAT mode. Disabling of compensation shall be possible for individual units to accommodate instances when compensation is not required.
2. Control board shall include contacts for control of external heat source. External heat may be energized as second stage with 1.8°F – 9.0°F adjustable deadband from set point.
3. Indoor unit shall include no less than four (4) digital inputs capable of being used for customizable control strategies.
4. Indoor unit shall include no less than three (3) digital outputs capable of being used for customizable control strategies.

5. A factory-installed drain pan sensor shall provide protection against drain pan overflow by sensing a high condensate level in the drain pan. Should this occur the control shuts down the indoor unit before an overflow can occur. A thermistor error code will be produced should the sensor activate indicating a fault which must be resolved before the unit re-starts.

1. Control board shall include contacts for control of no less than two stages of external heat. The first stage of external heat may be energized when the space temperature is 2.7°F from set point for between 10-25 minutes (user adjustable). The second stage of external heat may be energized when the first stage has been active for no less than 5 minutes and the space temperature has not risen by more than 0.9°F.
2. Indoor unit shall include no less than four (4) digital inputs capable of being used for customizable control strategies.
3. Indoor unit shall include no less than three (3) digital outputs capable of being used for customizable control strategies.
4.
5.

Part 5 - Controls

5.01 OVERVIEW

The control system shall consist of a low voltage communication network and a web-based interface. The controls system shall gather data and generate web pages accessible through a conventional web browser on each PC

connected to the network. Operators shall be able to perform all normal operator functions through the web browser interface.

Furnish energy conservation features such as optimal start, request-based logic, and demand level adjustment of overall system capacity as specified in the sequence.

System shall be capable of email generation for remote alarm annunciation.

5.02 ELECTRICAL CHARACTERISTICS

General:

1. Controller power and communications shall be via a common non-polar communications bus and shall operate at 30VDC.

Wiring:

1. Control wiring shall be installed in a daisy chain configuration from indoor unit to indoor unit, to the BC controller (main and subs, if applicable) and to the outdoor unit. Control wiring to remote controllers shall be run from the indoor unit terminal block to the controller associated with that unit.

2. Control wiring for centralized controllers shall be installed in a daisy chain configuration from outdoor unit to outdoor unit, to the system controllers (centralized controllers and/or integrated web based interface), to the power supply.

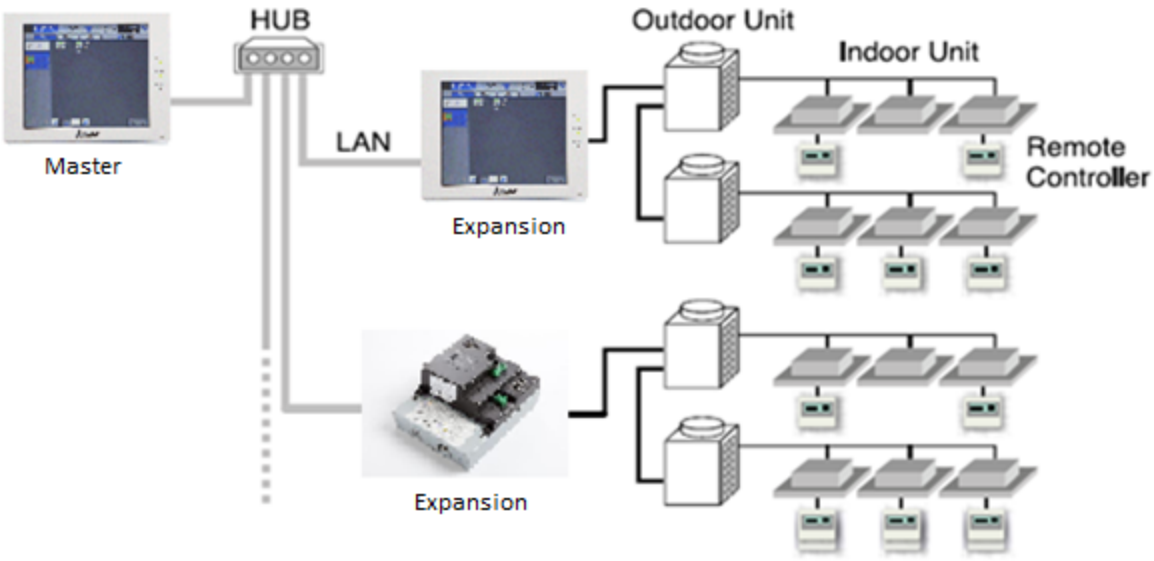
Wiring type:

1. Wiring shall be 2-conductor (16 AWG), twisted, stranded, shielded wire as defined by the Diamond System Builder output.

2. Network wiring shall be CAT-5 with RJ-45 connection.

5.03 CITY MULTI CONTROLS NETWORK

1. The CITY MULTI Controls Network (CMCN) consists of remote controllers, centralized controllers, and/or integrated web based interface communicating over a high-speed communication bus. The CITY MULTI Controls Network shall support operation monitoring, scheduling, occupancy, error email distribution, personal web browsers, tenant billing, online maintenance support, and integration with Building Management Systems (BMS) using either LonWorks® or BACnet® interfaces. The below figure illustrates a sample CMCN System Configuration.



CMCN System Configuration

5.04 CMCN: REMOTE CONTROLLERS

Simple MA Remote Controller:

1. The Backlit Simple MA Remote Controller shall be capable of controlling up to 16 indoor units (defined as 1 group).
2. The Backlit Simple MA Remote Controller shall only be used in same group with Wireless MA Remote Controllers or with other Backlit Simple MA Remote Controllers, with up to two remote controllers per group.

Simple MA Remote Controller			
Item	**Description**	**Operation**	**Display**
ON/OFF	Run and stop operation for a single group	Each Group	Each Group
Operation Mode	Switches between Cool/Drying/Auto/Fan/Heat/Setback. Operation modes vary depending on the air conditioner unit. Auto and Setback mode are available for the R2/WR2-Series only.	Each Group	Each Group
Temperature Setting	Sets the temperature from 40°F – 95°F depending on operation mode and indoor unit. Separate COOL and HEAT mode set points available depending on central controller and connected mechanical	Each Group	Each Group

	equipment.		
Fan Speed Setting	Available fan speed settings depending on indoor unit.	Each Group	Each Group
Air Flow Direction Setting	Air flow direction settings vary depending on the indoor unit model.	Each Group	Each Group
Permit / Prohibit Local Operation	Individually prohibit operation of each local remote control function (Start/Stop, Change operation mode, Set temperature, Reset filter). *1: Centrally Controlled is displayed on the remote controller for prohibited functions.	N/A	Each Group *1
Display Indoor Unit Intake Temp	Measures and displays the intake temperature of the indoor unit when the indoor unit is operating.	N/A	Each Group
Display Backlight	Pressing the button lights up a backlight. The light automatically turns off after a certain period of time. (The brightness settings can be selected from Bright, Dark, and Light off.)	N/A	Each Unit
Error	When an error is currently occurring on an air conditioner unit, the afflicted unit and the error code are displayed	N/A	Each Unit
Test Run	Operates air conditioner units in test run mode. *2 The display for test run mode will be the same as for normal start/stop (does not display “test run”).	Each Group	Each Group *2
Ventilation Equipment	Up to 16 indoor units can be connected to an interlocked system that has one LOSSNAY unit.	Each Group	N/A
Set Temperature Range Limit	Set temperature range limit for cooling, heating, or auto mode.	Each Group	Each Group

5.05 CENTRALIZED CONTROLLER (WEB-ENABLED)

Master Centralized Controller:

1. The Master Centralized Controller shall be capable of controlling a maximum of two hundred (200) indoor units across multiple CITY MULTI outdoor units with the use of three expansion controllers. The Master Centralized Controller shall be approximately 11-5/32” x 7-55/64” x 2-17/32” in size and shall be powered with an integrated 100-240 VAC power supply. The Master Centralized Controller shall support system configuration, daily/weekly scheduling, monitoring of operation status, night setback settings, free contact interlock configuration and malfunction monitoring. When being used alone without the expansion controllers, the Master Centralized Controller shall have five basic operation controls which can be applied to an individual indoor unit, a collection of indoor units (up to 50 indoor units), or all indoor units (collective batch operation). This basic set of operation controls for the Master Centralized Controller shall include on/off, operation mode selection (cool, heat, auto (R2/WR2-Series only), dry, setback (R2/WR2-Series only) and fan), temperature setting, fan speed setting, and airflow direction setting. Since the master provides centralized control it shall be able to enable or disable operation of local remote controllers. In terms of scheduling, the Master Centralized Controller shall allow the user to define both daily and weekly schedules (up to 24 scheduled events per day) with operations consisting of ON/OFF, mode selection, temperature setting, air flow (vane) direction, fan speed, and permit/prohibit of remote controllers.

Master Centralized Controller			
Item	**Description**	**Operation**	**Display**
ON/OFF	Run and stop operation.	Each Block, Group or Collective	Each Group or Collective
Operation Mode	Switches between Cool/Dry/Auto/Fan/Heat. (Group of Lossnay unit: automatic ventilation/vent-heat/interchange/normal ventilation) Operation modes vary depending on the air conditioner unit. Auto mode is available for the R2/WR2-Series only.	Each Block, Group or Collective	Each Group

Temperature Setting	Sets the temperature from 57°F – 87°F depending on operation mode and indoor unit.	Each Block, Group or Collective	Each Group
Fan Speed Setting	Available fan speed settings depending on indoor unit.	Each Block, Group or Collective	Each Group
Air Flow Direction Setting	Air flow direction settings vary depending on the indoor unit model. *1. Louver cannot be set.	*1 Each Block, Group or Collective	Each Group
Schedule Operation	Annual/weekly/today schedule can be set for each group of air conditioning units. Optimized start setting is also available. *1. The system follows either the current day, annual schedule, or weekly, which are in the descending order of overriding priority. Twenty-four events can scheduled per day, including ON/OFF, Mode, Temperature Setting, Air Direction, Fan Speed and Operation Prohibition. Five types of weekly schedule (seasonal) can be set. Settable items depend on the functions that a given air conditioning unit supports.	*2 Each Block, Group or Collective	Each Group
Optimized Start	Unit starts 5 - 60 minutes before the scheduled time based on the operation data history in order to reach the scheduled temperature at the scheduled time.	Each Block, Group or Collective	Each Block, Group or Collective
Night Setback Setting	The function helps keep the indoor temperature in the temperature range while the units are stopped and during the time this function is effective.	Each Group	Each Group
Permit / Prohibit Local Operation	Individually prohibit operation of each local remote control function (Start/Stop, Change operation mode, Set temperature, Reset filter). *3. Centrally Controlled is displayed on the remote controller for prohibited functions.	Each Block, Group or Collective	*3 Each Group

Room Temp	Displays the room temperature of the group. Space temperature displayed on the indoor unit icon on the touch screen interface.	N/A	Each Group
Error	When an error is currently occurring on an air conditioner unit, the afflicted unit and the error code are displayed *4. When an error occurs, the LED flashes. The operation monitor screen shows the abnormal unit by flashing it. The error monitor screen shows the abnormal unit address, error code and source of detection. The error log monitor screen shows the time and date, the abnormal unit address, error code and source of detection	N/A	*4 Each Unit or Collective
Outdoor Unit Status	Compressor capacity percentage and system pressure (high and low) pressure (excludes S-Series)	Each ODU	Each ODU
Connected Unit Information	MNET addresses of all connected systems	Each IDU, ODU and BC	Each IDU, ODU and BC
Ventilation Equipment	This interlocked system settings can be performed by the master system controller. When setting the interlocked system, use the ventilation switch the free plan LOSSNAY settings between “Hi”, “Low” and “Stop”. When setting a group of only free plan LOSSNAY units, you can switch between “Normal ventilation”, “Interchange ventilation” and “Automatic ventilation”.	Each Group	Each Group
Multiple Language	Other than English, the following languages can be selected: Spanish, French, Japanese, Dutch, Italian, Russian, Chinese, and Portuguese.	N/A	Collective
External Input / Output	By using accessory cables you can set and monitor the following. Input By level: “Batch start/stop”, “Batch emergency stop” By pulse: “batch start/stop”, “Enable/disable remote controller” Output: “start/stop”, “error/Normal” *5. Requires the external I/O cables (PAC-YG10HA-E) sold separately.	*5 Collective	*5 Collective

2. All Master Centralized Controllers shall be equipped with two RJ-45 Ethernet ports to support interconnection with a network PC via a closed/direct Local Area Network (LAN) or to a network switch for IP communication to up to three expansion controllers for display of up to two hundred (200) indoor units on the main master centralized controller interface.

3. The Master Centralized Controller shall be capable of performing initial settings via the high-resolution, backlit, color touch panel on the controller or via a PC browser using the initial settings.

4. Standard software functions shall be available so that the building manager can securely log into each master centralized controller via the PC's web browser to support operation monitoring, scheduling, error email, interlocking and online maintenance diagnostics. Additional optional software functions of personal browser for PCs and MACs and Energy shall be available but are not included. The Energy Apportionment function shall require a LIC-Charge software license

Expansion Controller:

1. The Expansion Controller shall serve as a standalone centralized controller or as an expansion module to the Master Centralized Controller for the purpose of adding up to 50 indoor units to either the main touch screen interface of the master centralized controller. Up to three (3) expansion controllers can be connected to the master via a local IP network (and their IP addresses assigned on the master) to the master to allow for up to two hundred (200) indoor units to be monitored and controlled from the master interface.

2. The expansion controllers have all of the same capabilities to monitor and control their associated indoor units as the features specified above. Even when connected to the master and configured to display their units on the main controller, the individual indoor units connected to the expansion can still be monitored and controlled from the interface of the expansion. The last command entered will take precedence, whether at the wall controller, the expansion or the master Centralized Controller.

Non Touch Screen, Networked Centralized Controller:

1. The Non Touch Screen, Networked Centralized Controller shall be capable of controlling a maximum of 50 indoor units across multiple CITY MULTI outdoor units. The controller shall be approximately 8-1/2”x10” in size and shall be powered by its internal power supply. The controller shall support system configuration, daily/weekly scheduling, monitoring of operation status, free contact interlock configuration and malfunction monitoring. The controller shall have five basic operation controls which can be applied to an individual indoor unit, a group of indoor units (up to 50 indoor units), or all indoor units (collective batch operation). This basic set of operation controls for the controller shall include on/off, operation mode selection (cool, heat, auto (R2/WR2-Series only), dry, temperature setting, fan speed setting, and airflow direction setting. Since the controller provides centralized control it shall be able to enable or disable operation of local remote controllers. In terms of scheduling, the controller shall allow the user to define both daily and weekly schedules with operations consisting of ON/OFF, mode selection, temperature setting, air flow (vane) direction, fan speed, and permit/prohibit of remote controllers.

Non Touch Screen, Networked Centralized Controller			
Item	**Description**	**Operation**	**Display**
ON/OFF	Run and stop operation.	Each Block, Group or Collective	Each Group or Collective
Operation Mode	Indoor unit modes: COOL/DRY/FAN/AUTO/HEAT. Lossnay unit modes: HEAT RECOVERY/BYPASS/AUTO Air to water (PWFY) modes: HEATING/HEATING ECO/HOT WATER/ANTI-FREEZE/COOLING *Operation modes vary depending on the unit model connected. ** Auto mode is available for the R2/WR2-Series only.	Each Block, Group or Collective	Each Group
Temperature Setting	Sets the temperature from 40°F – 95°F depending on operation mode and indoor unit model. Separate COOL and HEAT mode set points available depending on remote controller and connected mechanical equipment.	Each Block, Group or Collective	Each Group
Set Temperature Range Limit	The range of room temperature setting can be limited by the initial setting depending on the indoor unit connected.	Each Group	Each Group

Fan Speed Setting	Available fan speed settings depend on indoor unit model.	Each Block, Group or Collective	Each Group
Air Flow Direction Setting	*Air flow direction settings vary depending on the indoor unit model. *1. Louver cannot be set.	*1 Each Block, Group or Collective	Each Group
Schedule Operation	Annual/weekly/today schedule can be set for each group of air conditioning units. Optimized start setting is also available. *2. The system follows either the current day, annual schedule, or weekly, which are in the descending order of overriding priority. Twenty-four events can scheduled per day, including ON/OFF, Mode, Temperature Setting, Air Direction, Fan Speed and Operation Prohibition. Five types of weekly schedule (seasonal) can be set. Settable items depend on the functions that a given air conditioning unit supports.	*2 Each Block, Group or Collective	Each Group
Hold	Disables scheduled functions for indoor unit groups and their associated remote controller timers. *not available for general equipment	Each Block, Group or Collective	Each Group
Optimized Start	Unit starts 5 - 60 minutes before the scheduled time based on the operation data history in order to reach the scheduled temperature at the scheduled time.	Each Block, Group or Collective	Each Block, Group or Collective
Permit / Prohibit Local Operation	Individually prohibit operation of each local remote control function (Start/Stop, Change operation mode, Set temperature, Fan Speed, Air Direction and Reset filter). *3. Centrally Controlled is displayed on the remote controller for prohibited functions.	Each Block, Group or Collective	*3 Each Group
Room Temp	Displays the room temperature of the group.	N/A	Each Group
Room Humidity	Displays the percent relative humidity in the space as sensed by the Smart ME Remote Controller	N/A	Each Group

Occupancy Sensor	Displays the occupancy icon on the group icon in the condition list page when the room is occupied (blue) or vacant (gray). *The Smart ME Remote Controller Occupancy sensor is required.	N/A	Each Group
Brightness Sensor	Displays the brightness icon on the group icon in the condition list when the space is determined to be bright (yellow) or dark (gray). *The Smart ME Remote Controller Brightness sensor is required.	N/A	Each Group
Error	When an error is currently occurring on an air conditioner unit, the afflicted unit and the error code are displayed *4. When an error occurs, the LED flashes. The operation monitor screen shows the abnormal unit by flashing it. The error monitor screen shows the abnormal unit address, error code and source of detection. The error log monitor screen shows the time and date, the abnormal unit address, error code and source of detection	N/A	*4 Each Unit or Collective
Ventilation Equipment	This interlocked system settings can be performed by the master system controller. When setting the interlocked system, use the ventilation switch the free plan LOSSNAY settings between “Hi”, “Low” and “Stop”. When setting a group of only free plan LOSSNAY units, you can switch between “Normal ventilation”, “Interchange ventilation” and “Automatic ventilation”.	Each Group	Each Group
Multiple Language	Other than English, the following languages can be selected: Spanish, French, Japanese, German, Italian, Russian, Chinese, and Portuguese.	N/A	N/A
External Input / Output	By using accessory cables you can set and monitor the following. Input: By level: “Batch start/stop”, “Batch emergency stop”; By pulse: “batch start/stop”, “Enable/disable remote controller” Output: “start/stop”, “error/Normal” *5. Requires the external I/O cables (PAC-YG10HA-E) sold separately.	*5 Collective	*5 Collective
M-Net	The "M-NET" LED lights, when AC power supply is turned ON. The LED blinks while M-NET is communicating.	N/A	Each Group (LED)
Collective ON/OFF	All the units can be operated / stopped with a DIP switch.	Collective	N/A

Measurement	Displays the Temperature and Humidity inputs of the AI Board. Supports graph display and data export.	N/A	Each Unit
AHC Status	Displays the status of the of the inputs and outputs of each Advanced HVAC Controller (DC-A2IO)	N/A	Each Unit
Free Contact Status	Displays the input/output status of the Free Contacts on the indoor units	N/A	Each Unit
Free Contact Interlock Control	Operation of indoor groups, general equipment or free contact outputs based on group(s) conditions or free contact(s) input states.	Each Group, Output or Collective	N/A
Data Back-up (PC)	Initial setting data can be exported to a PC.	Collective	N/A

2. All Non Touch Screen, Networked Centralized Controller shall be equipped with two RJ-45 Ethernet port to support interconnection with a network PC and BACnet/IP communication via a closed/direct Local Area Network (LAN). The controller shall be capable of performing initial settings online via a PC using the controller's initial setting browser or online/offline with the Initial Setting Tool.

3. Standard software functions shall be available so that the building manager can securely log into each controller via the PC's web browser to support operation monitoring, scheduling, error email, interlocking and online maintenance diagnostics. Standard software functions shall not expire. Additional optional software functions of personal browser for PCs and MACs and Energy Allocation shall be available. The Energy Allocation function shall require Master Centralized Controller Energy Allocation Integrated System in conjunction with Non Touch Screen, Networked Centralized Controller.

5.06 GRAPHICAL USER INTERFACE

The Graphical User Interface (Integrated Centralized Control Web) shall require a field supplied PC or Tablet.

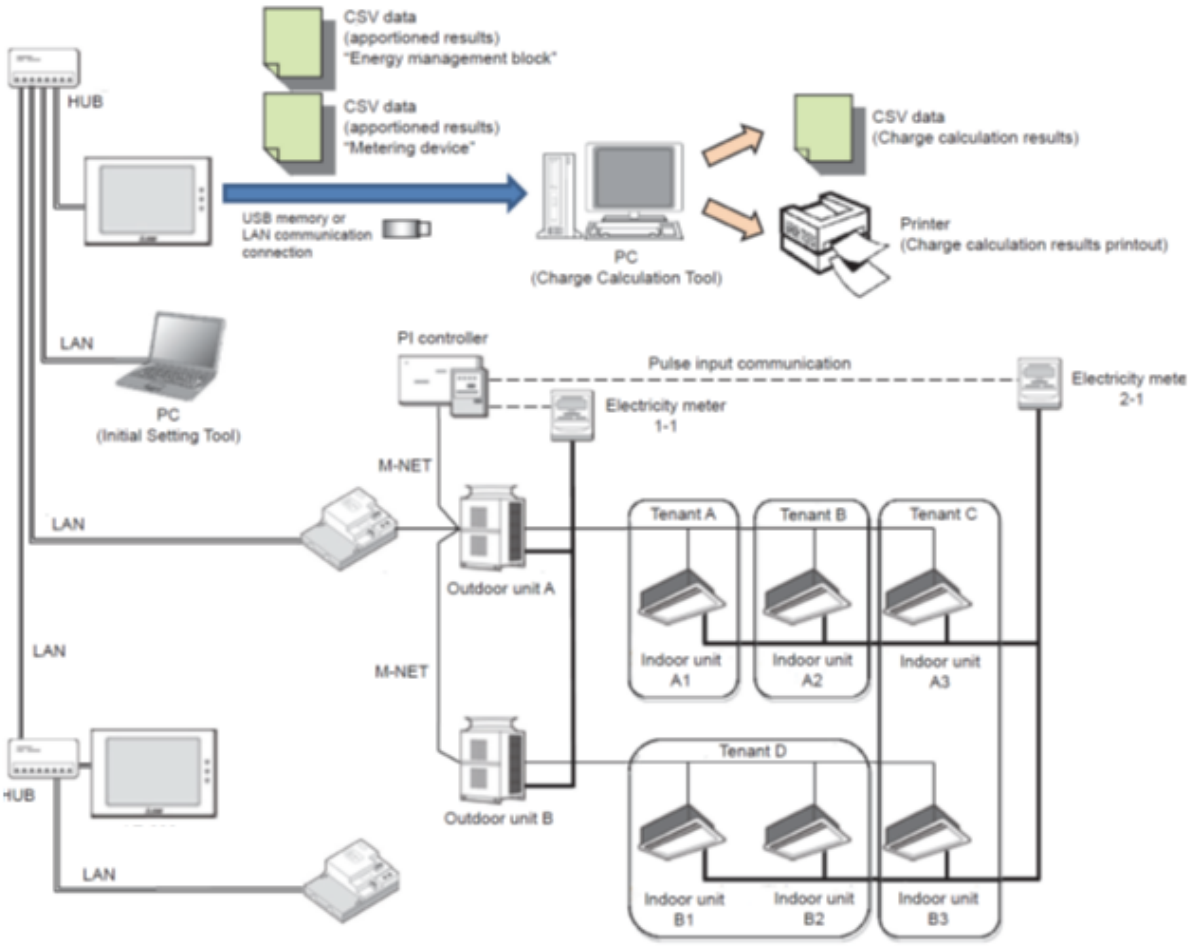
ICCW

1. The Integrated Centralized Control Web System (ICCW) interface shall enable the user to control multiple networked central controllers and shall provide additional functions such as energy apportionment from a single network PC configured with the Charge Calculation Tool. The ICCW shall be capable of controlling up to forty networked Centralized Controllers with a maximum of 2,000 indoor units across multiple CITY MULTI outdoor units. The ICCW shall be required if the user wants to simultaneously control more than 1 Centralized Controllers from a single PC or tablet using a single web browser session. Licensing per function, per Centralized Controller shall be required for the ICCW. Optional software features shall be available through the ICCW including energy apportionment and personalized web. These optional software features shall require the ICCW, advance purchase from the customer, and licensing from ICCW.

ICCW (Integrated System Software)	
Item	**Details**
ON/OFF	The units can turn ON and OFF for all floors or in a block, floor, or group of units.
Operation Modes	The operation mode can be switched between COOL, DRY, FAN, AUTO, and HEAT for all floors or in a block, floor, or group of units
Temperature Setting	Sets the temperature for a single group. Range of Temperature setting from 57°F – 87°F depending on operation mode and indoor unit model. Separate COOL and HEAT mode set points available depending on remote controller and connected mechanical equipment.
Fan Speed	The fan speed can be set to four stages for all floors or in a block, floor, or group of units
Air Direction	The air direction can be set in four vertical directions or to swing for all floors or in block, floor, or group of units. (The selectable air direction differs according to the model.)
Interlocked Unit ON/OFF LOSSNAY	If there is an interlocked unit (LOSSNAY), then the unit can be turned ON (strong/weak) or OFF for all floors or in a block, floor, or group of units. (Note that the ventilation mode cannot be selected for interlocked units.)
Local Operation Prohibit	The items for which operation with the local remote controller are to be prohibited can be selected for all floors or in a block, floor, or group of units. (The items that can be prohibited are ON/OFF, operation mode, set temperature and filter sign reset.)
Annual / Weekly Schedule	The annual/weekly schedule function can be used by registering the license. Two settings, such as seasonal settings for summer and winter, can be saved.
Power Rate Apportionment Charging	A watt-hour meter (WHM) with kWH pulse output is connected to calculate the air conditioning charges based on the amount each tenant’s air-conditioner has operated. Five charging rates can be applied per day. ***OPTIONAL ENERGY APPORTIONMENT SOFTWARE (LIC-CHARGE) and PI Controller (PAC-Y60MCA) REQUIRED
History	Up to 3,000 items for the error history and up to 10,000 items for operation history can be saved. Each history file can be output as a

	daily report or monthly report in CSV format. (The operation history consists only of the operations carried out with the ICCW and is limited to some limited operation items.)
Operation Time Monitor	The cumulative operation time of each indoor unit can be viewed or output as a CSV format file. (This function is valid only when the charging function license is registered.)
Filter Sign Display Mask	The filter sign display at the remote controllers can be disabled.
Set Temperature Limit	The set temperature lower limit can be set for cooling and the upper limit for heating. (ME remote controller required)

5.07 ENERGY APPOINTMENT METHOD FOR CITY MULTI CENTRALIZED CONTROLLERS



CMCN System Configuration

System Overview

1. For centralized systems serving multiple tenants for which one-to-one electricity metering is not possible, an apportioned electricity billing function that attributes just the electrical energy consumed by each individual tenant's air conditioner is required. The Energy Apportionment function takes the information on the electrical energy usage gathered from Watt Hour Meters (WHM) connected to dedicated breaker panels serving the system's outdoor units and synthesizes it with the information on the operating status of the indoor units that is collected by the CITY MULTI centralized controller(s).

Watt Hour Meters

1. Requirements:

- The Watt Hour Meters (WHMs) to be used to read the electrical energy consumption of the outdoor units must be capable of a pulse output, which would be configured based on the current rating of the units. The associated current transformers/ transducers (CTs) must also be sized based on the current rating of either the individual outdoor units or the dedicated air conditioning electrical panels they are to be reading. The proper quantity of meters for a particular sized system must be selected in order to ensure sufficient resolution and hysteresis in the unit pulse output of the meters so as to ascribe an acceptable level of accuracy to the apportionment of energy usage for each tenant's system. The system is designed to work with any WHM capable of a pulse output that meets ANSI C12.20 class 0.2% or 0.5% accuracy standards.

2. Connection:

- The WHMs are to be physically connected to the integrated pulse input module or an external Mitsubishi Electric PI Controller if such an input is not available or if there is a wiring length limitation or installation hardship. The cable type of the interconnecting wiring shall be according to the wiring specifications of the WHM manufacturer.

CITY MULTI Centralized Controller Requirements

1. Licensing:

- Each centralized controller to which units are assigned that require the energy apportionment function must have the “LIC-Charge“ software license purchased and properly unlocked in order to enable the operating status of the indoor units to be passed to the energy apportionment tool. The procedure for licensing the centralized controllers with this function and the necessary forms can be found on Mitsubishi Electric’s technical documentation repository, mylinkdrive.com. Purchase Order information for the licenses will be required at the time of submission of the licensing request forms.

2. Dedicated master centralized controller for apportionment (no MNET connection)

- A dedicated master centralized controller, for which the LIC-Charge license is purchased and the energy apportionment function enabled, must be provided in order to serve as the portal for exporting metering device and energy management data to a USB drive or to a PC via LAN connection. This means that by virtue of selecting this master centralized controller to serve this function, the MNET capability of this particular centralized controller will be disabled. All indoor units must be physically wired via MNET to other expansion centralized controllers, which must be physically wired via LAN with Static IP addresses and a network hub or switch to the master apportionment controller.

PC for collecting charge calculation results

- A networked PC, which does not necessarily have to be dedicated to the task of collecting energy apportionment data, can be provided and loaded with the Charge Calculation Tool software for exporting data necessary to generate billing documentation to be performed by a third party. The system requirements of the PC are as follows:

Item	Requirements
CPU	1 GHz or better (at least 2 GHz recommended)
Memory	2GB or more
Screen Resolution	1024 x 768 or better
OS	Windows 7, Windows 8.1 (32bit/64bit)
System requirements	The system should meet the minimum requirement for Windows 7 or Windows 8.1 • Net Framework 4.5 or later

Internal LAN port or LAN card	100 BASE-TX or better
Porting device	Mouse, etc.

1.

1. **Ventilation Options**

5.01 LOSSNAY ENERGY RECOVERY UNITS

General:

1. The ERV unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, control circuit board and blowers with motors, filters, and insulated foam air guides. The unit shall have factory installed inlet air thermistors, control board with functions for local, remote, and optional control modes.

Unit Cabinet:

1. The cabinet shall be fabricated of galvanized steel, and covered with polyurethane foam insulation as necessary with steel mounting points securely attached

Blowers:

1. The unit shall be furnished with direct drive centrifugal blowers running simultaneously supplying and extracting air at the same rate for balanced ventilation air flow.
2. The blower motors shall be a directly connected to the blower wheels and have permanently lubricated bearings.

Heat Exchanger

1. The enthalpic heat exchanger element shall be constructed of specially treated cellulous fiber membrane separated by corrugated layers to allow total heat (sensible and latent) energy recovery from the exhaust air to the supply air or from the supply air to the exhaust air as determined by design conditions.
2. Basis of design heat exchanger does not require condensate drain. Contractor responsible for all additional costs relating to alternate brands which may require condensate drain connection.

Bypass Damper

1. The ERV shall have an automatic supply side by-pass damper to allow inbound ventilation air to by-pass the heat exchanger element when factory-installed thermistors measure outside ambient temperature being at least 7 degrees cooler than air returned from interlocked indoor units running in cooling mode.
2. The mechanism for opening and closing the bypass damper shall be a 208V-230V synchronous electric motor through an actuator. The motor will drive a steel cable connected to a mechanical damper flap to allow fresh air to bypass the element.

Filter:

1. The ERV shall be equipped with factory installed, washable air filters located at each intake face (both supply and exhaust sides) of the heat exchanger element to clean the air and prevent clogging.

Electrical:

1. The units will require a 208-230Volt, 1 Phase, 60Hz power supply.

Control:

1. ERV shall be capable of interlocked control with other systems by manufacturer. Communication must include MODE of interlocked indoor unit to allow benefit of proper operation of bypass damper
2. ERV control board shall allow independent control by contact closure from third-party sensor-driven controllers, switches, or timers.

Performance:

1. The ERV units shall have the following nominal capacities:

Model Size (CFM)	Nominal Airflow	External Static Capacity (In. WG) at Nominal Airflow
300	300 CFM	0.46
470	470 CFM	0.60
600	600 CFM	0.66
1200	1200 CFM	0.59

2. The temperature recovery efficiency at extra low fan speed will be as follows:

Model Size (CFM)	Temperature Recovery	Enthalpic Recovery	
		Heating	Cooling
300	83%	81.5%	65%
470	84.5%	83%	72%
600	81%	80%	71%
1200	81%	80%	71%

3. RV performance must be certified to ARI Standard 1060
4. ERV operating sound level shall not exceed 41 dB(A) as measured 59 in. under center of unit at maximum fan speed.

Ductwork:

1. The two outdoor ducts must be covered with heat insulating material in order to prevent condensation from forming.
2. The two outdoor ducts must be tilted at a gradient (1/30 or more) down toward the outdoor area from Lossnay® unit.

Preheater (For Winter Design Temperature Less than 14°F):

1. A suitable pre-heater shall be supplied and installed to pre-heat and maintain the air entering the ERV to above 14°F; heater size shall be based on scheduled CFM and heating (winter) design condition.

Equipment Schedules

MITSUBISHI ELECTRIC TRANE HVAC US: CITY MULTI VRF OUTDOOR UNIT SCHEDULE

System Tag	Tag Reference	M-NET Address	Model Number	Modules	Nominal Cooling Capacity (BTU/h)	Nominal Heating Capacity (BTU/h)	Design Cooling Outdoor Temp DB (°F)	Design Heating Outdoor Temp WB (°F)	Corrected Cooling Total Capacity (BTU/h)	Corrected Heating Capacity (BTU/h)	Electrical-Per Module 208/230 or [460V]				Notes / Options
											Voltage / Phase	MCA 208/230 or [460V]	RFS	MOCP	
System 1	OutdoorUnit 1	51	PUHY-EP168TNU-A	P168	168,000	188,000	88.0	2.3	166,212.1	114,277.0	208/230V / 3-phase 3-wire	56/51	70/70	90/80	1, 2, 3, 4, 5

Notes & Options:

1 Nominal cooling capacities are based on indoor coil EAT of 80/67°F (DB/WB), outdoor of 95°F (DB)
2 Nominal heating capacities are based on indoor coil EAT of 70°F (DB), outdoor of 43°F (WB)
3 Efficiency values for EER, IEER, COP are based on AHRI 1230 test method for mixture of ducted & non-ducted indoor units.
4 For systems with multiple modules, refrigerant pipe dimensions indicate total system combined piping downstream of module twinning.
5 Added field charge listed is in addition to factory charge, this must be updated based upon final as-built piping layout.

MITSUBISHI ELECTRIC TRANE HVAC US: CITY MULTI VRF INDOOR UNIT SCHEDULE

System Tag	Room Name	Tag Reference	Model	Type	Nominal Cooling Capacity (BTU/h)	Nominal Heating Capacity (BTU/h)	Cooling Design Entering Temp DB/WB (°F) / [Water in temp]	Heating Design Entering Temp DB/WB (°F) / [Water in temp]	Corrected Capacity					Refrig Pipe Dim Liquid/Suction (inch)	Fan Speed Setting	Peak Fan Airflow (cfm) / [Design gpm G(US)/min]	Max Fan ESP Setting 208V/230V (IN WG)	Voltage / Phase	Electrical MCA/MFS	Notes / Options
									Cooling Diversity Full/Partial (See Note 5, 6)	Cooling Total Capacity (BTU/h)	Cooling Sensible Capacity (BTU/h)	Heating Diversity Full/Partial (See Note 5, 6)	Heating Capacity (BTU/h)							
System 1		New Class 1-1	PMFY-P12NBMU-ER5	Ceiling Cassette (One-Way)	12,000	13,500	79.8/68.0	66.6	FULL DEMAND	12,305.4	7,598.4	FULL DEMAND	9,075.3	1/4 / 1/2	HIGH	328		208/230V/1-phase	0.26/15	1, 2, 3, 4
System 1		New Class 1-2	PMFY-P12NBMU-ER5	Ceiling Cassette (One-Way)	12,000	13,500	79.8/68.0	66.6	FULL DEMAND	12,305.4	7,598.4	FULL DEMAND	9,075.3	1/4 / 1/2	HIGH	328		208/230V/1-phase	0.26/15	1, 2, 3, 4
System 1		New Class 1-3	PMFY-P12NBMU-ER5	Ceiling Cassette (One-Way)	12,000	13,500	79.8/68.0	66.6	FULL DEMAND	12,305.4	7,598.4	FULL DEMAND	9,075.3	1/4 / 1/2	HIGH	328		208/230V/1-phase	0.26/15	1, 2, 3, 4
System 1		New Corridor	PKFY-P06NLMU-E.TH	Wall -Mounted	6,000	6,700	80.0/67.0	70	FULL DEMAND	6,005.9	4,256.3	FULL DEMAND	4,302.8	1/4 / 1/2	HIGH	191		208/230V/1-phase	0.24/0.24/15	1, 2, 3, 4
System 1		New Class 1-4	PMFY-P12NBMU-ER5	Ceiling Cassette (One-Way)	12,000	13,500	80.0/67.0	70	FULL DEMAND	12,011.7	7,908.2	FULL DEMAND	8,669.8	1/4 / 1/2	HIGH	328		208/230V/1-phase	0.26/15	1, 2, 3, 4
System 1		Corridor 1	PMFY-P08NBMU-ER5	Ceiling Cassette (One-Way)	8,000	9,000	80.0/67.0	70	FULL DEMAND	8,007.8	6,218.8	FULL DEMAND	5,779.9	1/4 / 1/2	HIGH	328		208/230V/1-phase	0.25/15	1, 2, 3, 4
System 1		Bath 1	PKFY-P06NLMU-E.TH	Wall -Mounted	6,000	6,700	80.0/67.0	70	FULL DEMAND	6,005.9	4,256.3	FULL DEMAND	4,302.8	1/4 / 1/2	HIGH	191		208/230V/1-phase	0.24/0.24/15	1, 2, 3, 4
System 1		New Class 2-1	PMFY-P12NBMU-ER5	Ceiling Cassette (One-Way)	12,000	13,500	79.8/68.0	66.6	FULL DEMAND	12,305.4	7,598.4	FULL DEMAND	9,075.3	1/4 / 1/2	HIGH	328		208/230V/1-phase	0.26/15	1, 2, 3, 4
System 1		New Class 2-2	PMFY-P12NBMU-ER5	Ceiling Cassette (One-Way)	12,000	13,500	79.8/68.0	66.6	FULL DEMAND	12,305.4	7,598.4	FULL DEMAND	9,075.3	1/4 / 1/2	HIGH	328		208/230V/1-phase	0.26/15	1, 2, 3, 4
System 1		Bath 2	PKFY-P06NLMU-E.TH	Wall -Mounted	6,000	6,700	80.0/67.0	70	FULL DEMAND	6,005.9	4,256.3	FULL DEMAND	4,302.8	1/4 / 1/2	HIGH	191		208/230V/1-phase	0.24/0.24/15	1, 2, 3, 4
System 1		Office 1	PMFY-P08NBMU-ER5	Ceiling Cassette (One-Way)	8,000	9,000	79.9/67.5	68.3	FULL DEMAND	8,105.7	6,062.8	FULL DEMAND	5,915.9	1/4 / 1/2	HIGH	328		208/230V/1-phase	0.25/15	1, 2, 3, 4
System 1		Office 2	PMFY-P08NBMU-ER5	Ceiling Cassette (One-Way)	8,000	9,000	79.9/67.5	68.3	FULL DEMAND	8,105.7	6,062.8	FULL DEMAND	5,915.9	1/4 / 1/2	HIGH	328		208/230V/1-phase	0.25/15	1, 2, 3, 4
System 1		Corridor 2	PMFY-P08NBMU-ER5	Ceiling Cassette (One-Way)	8,000	9,000	80.0/67.0	70	FULL DEMAND	8,007.8	6,218.8	FULL DEMAND	5,779.9	1/4 / 1/2	HIGH	328		208/230V/1-phase	0.25/15	1, 2, 3, 4
System 1		Stairwell	PKFY-P08NLMU-E.TH	Wall -Mounted	8,000	9,000	80.0/67.0	70	FULL DEMAND	8,007.8	5,569.1	FULL DEMAND	5,779.9	1/4 / 1/2	HIGH	237		208/230V/1-phase	0.24/0.24/15	1, 2, 3, 4
System 1		New Class 2-3	PMFY-P12NBMU-ER5	Ceiling Cassette (One-Way)	12,000	13,500	79.8/68.0	66.6	FULL DEMAND	12,305.4	7,598.4	FULL DEMAND	9,075.3	1/4 / 1/2	HIGH	328		208/230V/1-phase	0.26/15	1, 2, 3, 4
System 1		New Class 2-4	PMFY-P12NBMU-ER5	Ceiling Cassette (One-Way)	12,000	13,500	79.8/68.0	66.6	FULL DEMAND	12,305.4	7,598.4	FULL DEMAND	9,075.3	1/4 / 1/2	HIGH	328		208/230V/1-phase	0.26/15	1, 2, 3, 4

Notes & Options:

1 Nominal cooling capacities are based on indoor coil EAT of 80/67°F (DB/WB), outdoor of 95°F (DB)
2 Nominal heating capacities are based on indoor coil EAT of 70°F (DB), outdoor of 43°F (WB)
3 See outdoor unit schedule for outdoor ambient conditions, connected capacity, and other factors associated with corrected capacities
4 See schematic piping/control diagram for indication of required indoor unit remote controllers, system controllers, and integration devices.
5 Full demand corrected capacity includes de-rate associated with indoor vs. outdoor connected capacity indicated on outdoor unit schedule for associated system.
Partial corrected capacity assumes sufficient diversity exists such that the connected capacity de-rate does not apply.
It is the designer's responsibility to ensure "Diamond System Builder" is set in the appropriate output capacity setting (full demand/partial demand) prior to generating this schedule.
6 It is recommended to always base heating corrected capacity on full demand.

LOSSNAY ENERGY RECOVERY VENTILATOR SCHEDULE

Lossnay Tag	Model Number	Interlocked or Stand Alone	Core Type	Nominal Airflow (cfm)	Max ESP (INWG)	Nominal Recovery Effectiveness (Extra High Fan Speed)			Voltage / Phase	MCA / MOCP	Notes / Options
						Temperature Recovery	Enthalpy Cooling	Enthalpy Heating			
Lossnay 0	LGH-F600RVX2-E	Stand-Alone	Fixed Permeable Cross Plate	600	0.86	67.0%	50.0%	64.0%	208-230V/1-phase	/15	1, 2, 3

Notes & Options:

1 Max external static pressure is at airflow listed with fan set on extra high speed.
2 See schematic piping/control diagram for indication of required lossnay local remote controller (stand alone operation) and M-NET connection points of associated systems.
3 Washable factory standard pre-filter on return and O/A intake side of cross plate core.

VENTILATION UNITS

Ventilation Unit Tag	Serving IUs	Zone Supply	Fan Speed Setting	Actual Supply Airflow (CFM)	Zone Airflow (CFM)	Indoor Unit Airflow (CFM)	Leaving Air Conditions			Served By Unit Tag	M-NET Address	Model	Type	Airflow (CFM)	Mixed Air Conditions		
							Dry Bulb Cooling (FDB)	Wet Bulb Cooling (FWB)	Dry Bulb Heating (FDB)						Dry Bulb Cooling (FDB)	Wet Bulb Cooling (FWB)	Dry Bulb Heating (FDB)
	Yes	Yes		600	200	400	79.3	73.8	47.7		1	PMFY-P12NBMU-ER5	Ceiling Cassette (One-Way)	50	79.8	68.0	66.6
											2	PMFY-P12NBMU-ER5	Ceiling Cassette (One-Way)	50	79.8	68.0	66.6
											3	PMFY-P12NBMU-ER5	Ceiling Cassette (One-Way)	50	79.8	68.0	66.6
											7	PMFY-P12NBMU-ER5	Ceiling Cassette (One-Way)	50	79.8	68.0	66.6
											9	PMFY-P12NBMU-ER5	Ceiling Cassette (One-Way)	50	79.8	68.0	66.6
											11	PMFY-P08NBMU-ER5	Ceiling Cassette (One-Way)	25	79.9	67.5	68.3
											12	PMFY-P08NBMU-ER5	Ceiling Cassette (One-Way)	25	79.9	67.5	68.3
											15	PMFY-P12NBMU-ER5	Ceiling Cassette (One-Way)	50	79.8	68.0	66.6
											16	PMFY-P12NBMU-ER5	Ceiling Cassette (One-Way)	50	79.8	68.0	66.6

Design View Piping Diagrams

Indoor Units:	16 / 1 to 42	
Capacity:	154 / 84 to 218	(91.7%)
* Connectable capacity is not actual capacity.		
Total Pipe Length:	428.5 / 3280.0	feet
Furthest Actual:	145.5 / 541.0	feet
Furthest Equiv.:	160.5 / 623.0	feet
After 1st Branch Actual:	110.5 / 295.0	feet
After 1st Branch Equiv.:	125.3 / 295.0	feet

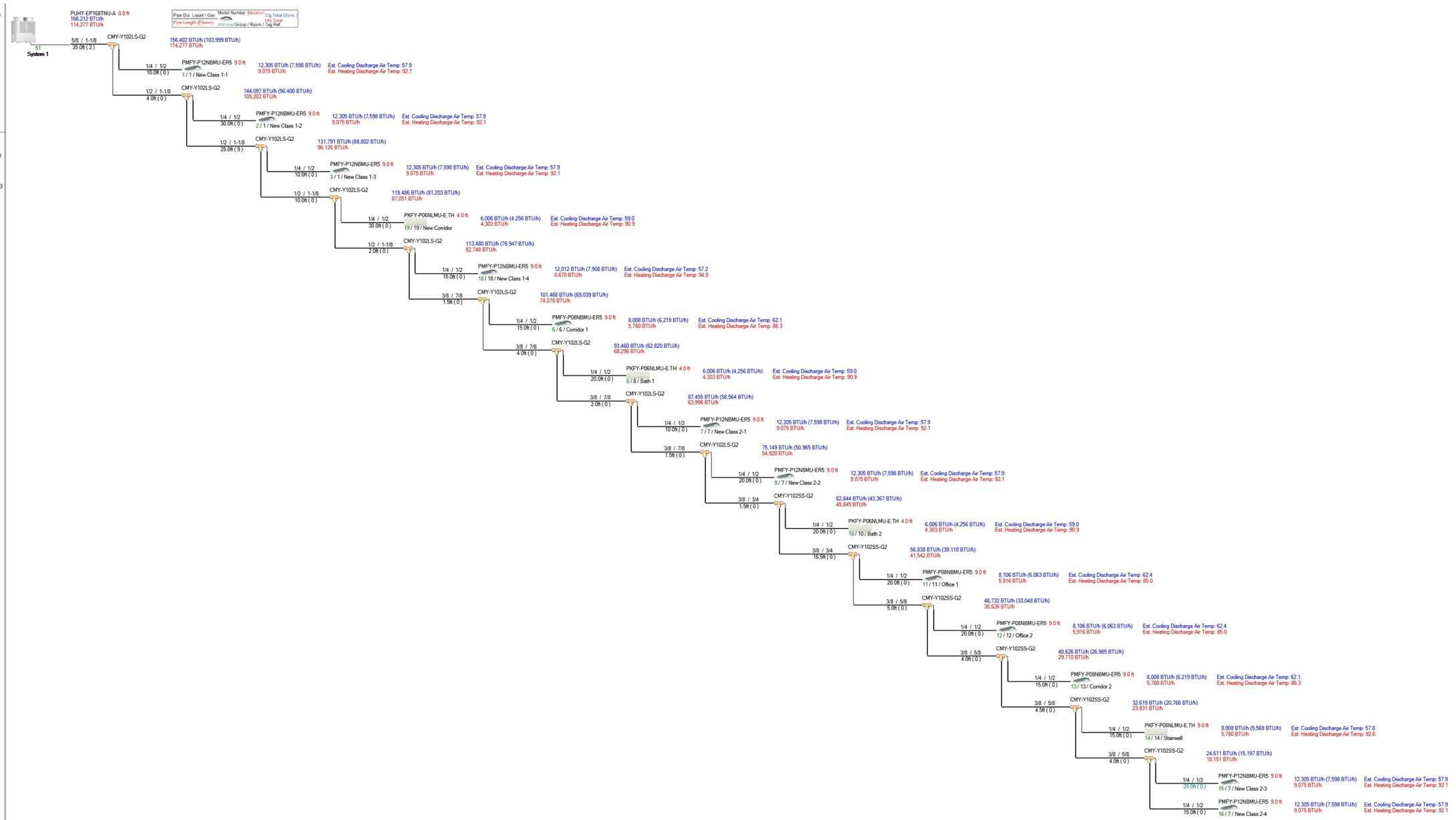
Correction Factors

Outdoor Unit Capacity:	1.00	1.00
Temperature:	1.03	0.66
Piping Length:	0.96	0.97
Defrosting:	-	0.95
User Derate:	1.00	1.00
Total Derate:	0.99	0.61
Additional Refrigerant:	23.04	lb
Total Refrigerant Amount:	46.85	lb

Conditions (°F)

Cooling
Indoor DB 80.0 Humidity 51.8% Indoor WB 67.0
Outdoor DB 88.0

Heating
Indoor DB 70.0
Outdoor DB 3.0 Humidity 78.5% Outdoor WB 2.3



AutoCAD Piping & Wiring Diagrams

CITY MULTI

SYSTEM SCHEMATIC DWG.

This drawing is schematic in nature. Final routing of piping & wiring shall be determined by the installing contractor and/or designer of record

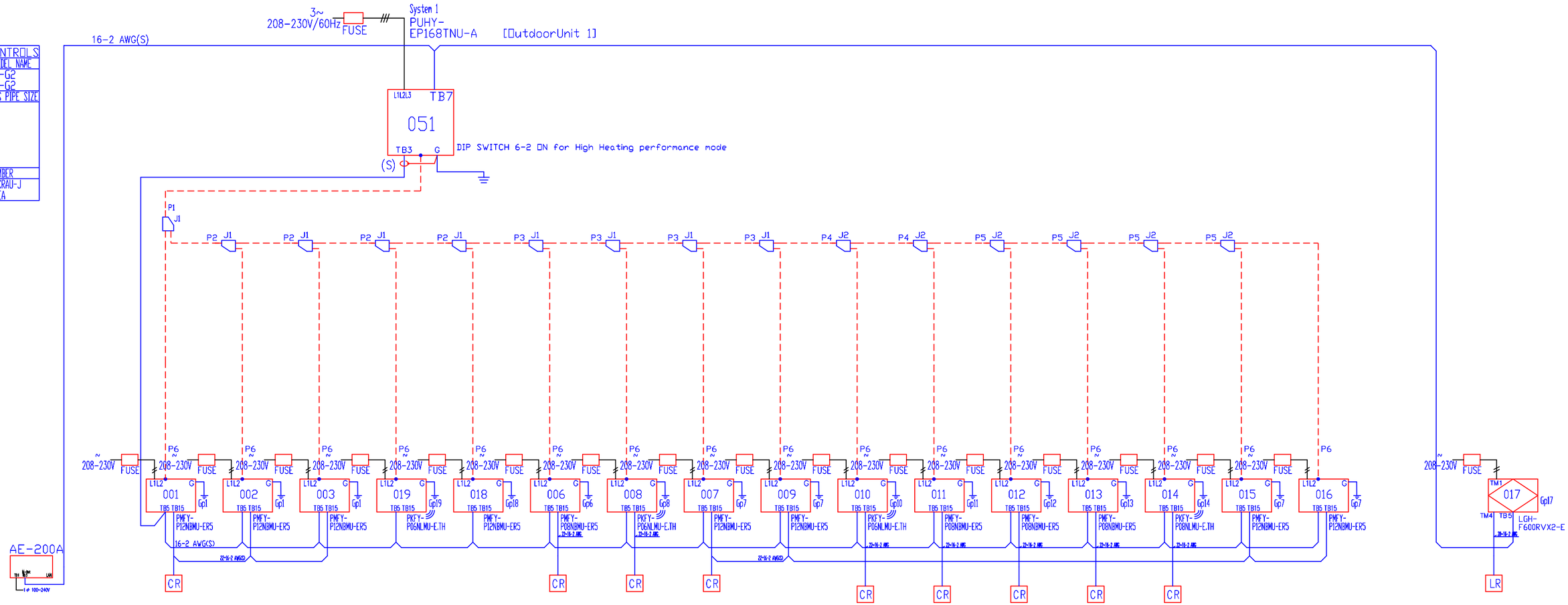
Additional refrigerant charge is needed depending on the size and length of extended piping. Please refer the amount of pre-charge and the formula of calculation which is mentioned on the data book.

1.25mm²(16 AWG) : 1.25mm²(16 AWG) or more. 0.75mm²(20 AWG) : between 0.5mm²(24 AWG) and 0.75mm²(20 AWG).

DIAGRAM SYMBOL LEGEND	
DISPLAY	DESCRIPTION
——//——	POWER WIRE
————	CONTROL WIRE
————	REF. PIPE

CONT.No | PAGE

PIPING AND CONTROLS	
SYMBOL	BRANCH PIPE MODEL NAME
J1	CMY-Y102LS-G2
J2	CMY-Y102SS-G2
SYMBOL	LIQUID PIPE/GAS PIPE SIZE
P1	5/8 / 1-1/8
P2	1/2 / 1-1/8
P3	3/8 / 7/8
P4	3/8 / 3/4
P5	3/8 / 5/8
P6	1/4 / 1/2
SYMBOL	MODEL NUMBER
CR	PAC-Y153CRAU-J
LR	PZ-62DR-EA



REMARKS

Originator: Steve Casey

Comments:

Diamond System Builder

sw: 4.5.4.7

dlb: 4.5.2.8

6/23/2023 2:40 PM

Submittal Documents

CITYMULTI® **14-TON PUHY-EP168TNU-A(-BS)** MITSUBISHI ELECTRIC HEATING & AIR CONDITIONING

Job Name:
System Reference: Date:

208/230V OUTDOOR VRF HEAT PUMP SYSTEM

UNIT OPTION

- ☐ Standard Model PUHY-EP168TNU-A
- ☐ Seacoast (BS) Model PUHY-EP168TNU-A-BS

ACCESSORIES

- ☐ Header Kit ..... for details see Pipe Accessories Submittal
- ☐ Joint Kit ..... for details see Pipe Accessories Submittal
- ☐ Low Ambient Kit ..... for details see Low Ambient Kit Submittal
- ☐ Panel Heater Kit ..... for details see Panel Heater Kit Submittal
- ☐ Snow/Hail Guards Kit ..... for details see Snow/Hail Guards Kit Submittal

Specifications			System
Unit Type			PUHY-EP168TNU-A(-BS)
Cooling Capacity (Nominal)		BTU/H	168,000
Heating Capacity (Nominal)		BTU/H	188,000
Guaranteed Operating Range	Cooling	°F [°C]	23~126 [-5.0~52.0]
	Heating	°F [°C]	-13~60 [-25.0~15.5]
Extended Operating Range	Heating	°F [°C]	-27.4~60 [-33.0~15.5]
External Dimensions (H x W x D)		In. [mm]	71-5/8 x 68-15/16 x 29-3/16 [1,818 x 1,750 x 740]
Net Weight		Lbs. [kg]	757 [343]
External Finish			Pre-coated galvanized steel sheet (+powder coating for -BS type) [MUNSELL 3Y 7.8/1.1 or similar]
Electrical Power Requirements	Voltage, Phase, Hertz, Power Tolerance		208/230V, 3-phase, 60 Hz, ±10%
Minimum Circuit Ampacity		A	56.0/51.0
Maximum Overcurrent Protection		A	90/80
Recommended Fuse Size		A	70/70
Recommended Minimum Wire Size		AWG [mm]	4/4 [21.2/21.2]
SCCR		kA	5
Refrigerant Piping Diameter	Liquid (High Pressure)	In. [mm]	5/8 [15.88] Brazed
	Gas (Low Pressure)	In. [mm]	1-1/8 [28.58] Brazed
Max. Total Refrigerant Line Length		Ft.	3,280
Max. Refrigerant Line Length (Between ODU & IDU)		Ft.	541
Max. Control Wiring Length		Ft.	1,640
Indoor Unit Connectable	Total Capacity		50.0~130.0% of outdoor unit capacity
	Model/Quantity		P04~P96/1.0~42.0
Sound Pressure Levels		dB(A)	60.0/61.5
Sound Power Levels		dB(A)	78.5/80.5
FAN[4]	Type x Quantity		Propeller fan x 2
	Fan Motor Output	kW	0.92+0.92
	Airflow Rate	CFM	10,600
	External Static Pressure	In. WG	Selectable; 0.00, 0.12, 0.24, 0.32, In. WG; factory set to 0 In. WG
Compressor Operating Range			15.0% to 100.0%
Compressor	Type x Quantity		Inverter scroll hermetic compressor x 1
Refrigerant	Type x Original Charge		R410A x 23 lbs + 12.0 oz [10.8 kg]
Protection Devices	High Pressure Protection		High pressure sensor, High pressure switch at 4.15 MPa (601 psi)
	Inverter Circuit (Comp./Fan)		Over-current protection
AHRI Ratings (Ducted/Non-ducted)	EER		11.7/12.4
	IEER		24.0/31.2
	COP		3.61/4.11

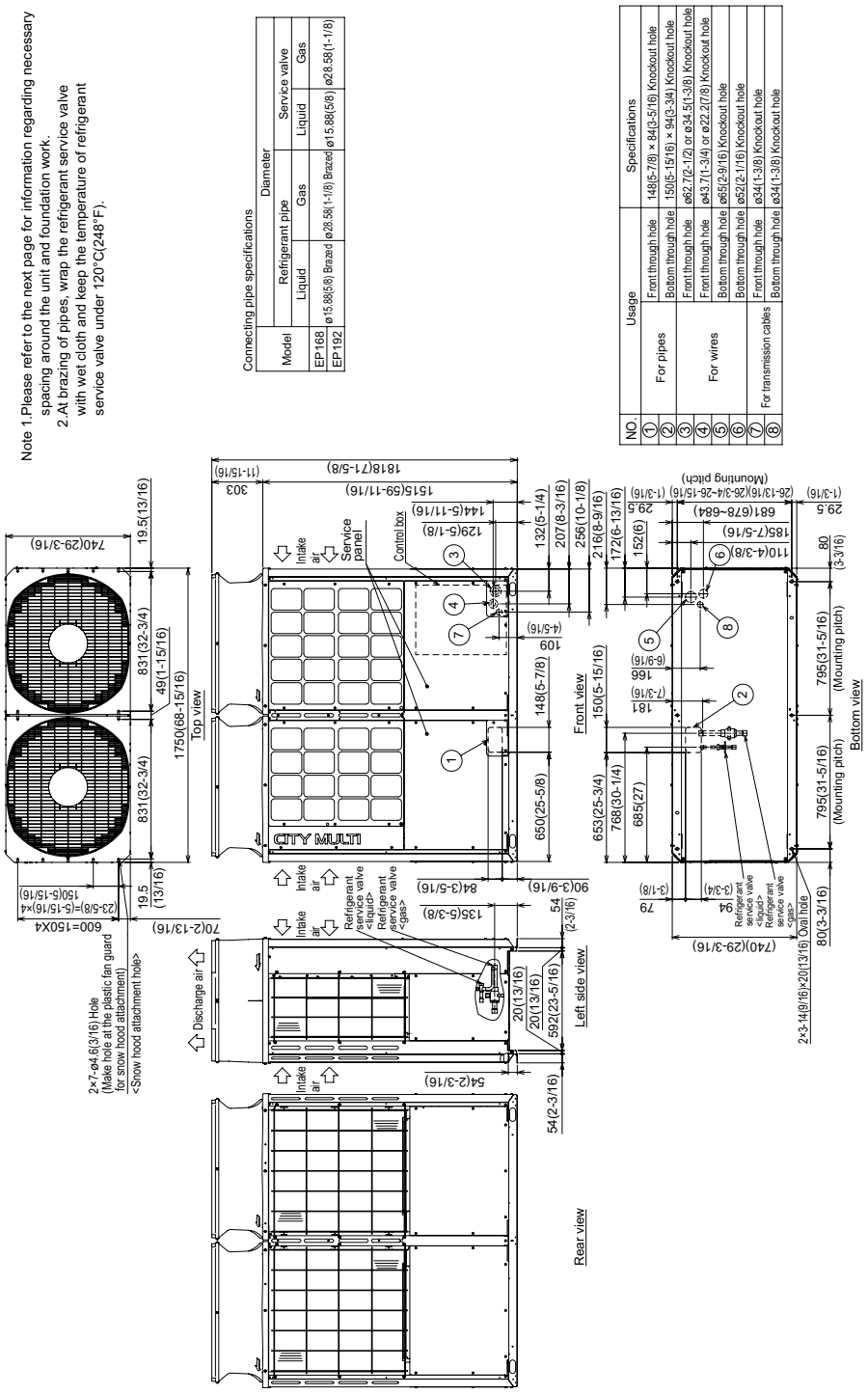
NOTES:
Nominal cooling conditions (Test conditions are based on AHRI 1230)
Indoor: 80°FD.B./67°FW.B. (26.7°CD.B./19.4°CW.B.), Outdoor: 95°FD.B. (35°CD.B.)
Nominal heating conditions (Test conditions are based on AHRI 1230)
Indoor: 70°FD.B. (21.1°CD.B.), Outdoor: 47°FD.B./43°FW.B. (8.3°CD.B./6.1°CW.B.)

[1]Harsh weather environments may demand performance enhancing equipment. Ask your Mitsubishi Electric representative for more details about your region
[2]For details on extended cooling operation range down to -10° F DB, see Low Ambient Kit Submittal
[3]When applying product below -4°F, consult your design engineer for cold climate application best practices, including the use of a backup source for heating
[4]Unit will continue to operate in extended operating range, but capacity is not guaranteed

OUTDOOR UNIT: PUHY-EP168TNU-A(-BS) – DIMENSIONS

PUHY-EP168, 192TNU-A(-BS)

Unit: mm (in.)



NOTES:
SEACOAST PROTECTION
Anti-corrosion Protection: A coating treatment is applied to condenser coil for protection from air contaminants.
Standard: Salt Spray Test Method - no unusual rust development to 480 hours.
Sea Coast (BS): Salt Spray Test Method (JRA 9002) - no unusual rust development to 960 hours.

1340 Satellite Boulevard Suwanee, GA 30024
Toll Free: 800-433-4822 www.mehvac.com

FORM# PUHY-EP168TNU-A - 202204

Job Name:
System Reference: Date:

GENERAL FEATURES

- Dual set point functionality
- Lightweight and compact design
- Four-speed fan settings
- Built-in condensate lift mechanism
- Ventilation air intake supported

OPTIONS

□ CN24 Relay Kit.....CN24RELAY-KIT-CM3

* Cooling / Heating capacity indicated at the maximum value at operation under the following conditions:
Cooling | Indoor: 80° F (27° C) DB / 67° F (19° C) WB
Cooling | Outdoor: 95° F (35° C) DB
Heating | Indoor: 70° F (21° C) DB
Heating | Outdoor: 47° F (8° C) DB / 43° F (6° C) WB

SPECIFICATIONS

Capacity*
Cooling . . . . . .12,000 Btu/h
Heating . . . . . .13,500 Btu/h

Power
Power Source . . . . . .208 / 230V, 1 phase, 60Hz
Power Consumption
Cooling . . . . . 0.04 kW
Heating . . . . . 0.04 kW
Current
Cooling . . . . . 0.21 A
Heating . . . . . 0.21 A
Minimum Circuit Ampacity (MCA) . . . . . .0.26 A
Maximum Overcurrent Protection (MOCP) . . . . . .15 A

External Finish . . . . . .Grille: 6.4Y 8.9/0.4

Dimensions
Inches . . . . . .9-1/16" h x 31-31/32" w x 15-9/16" d
mm . . . . . .230 h x 812 w x 395 d
Grille
Inches . . . . . .1-3/16" h x 39-3/8" w x 18-17/32" d
mm . . . . . .30 h x 1000 w x 470 d

Net Weight
Unit . . . . . .31 lb / 14 kg
Grille . . . . . .7 lb / 3 kg

Coil Type . . . . . .Cross fin

Fan
Type x Quantity . . . . . .Line flow fan x 1
Airflow Rate (Low-Mid1-Mid2-High) . . 258 - 283 - 304 - 328 CFM
Motor Type . . . . . DC brushless motor

Air Filter . . . . . .PP honeycomb

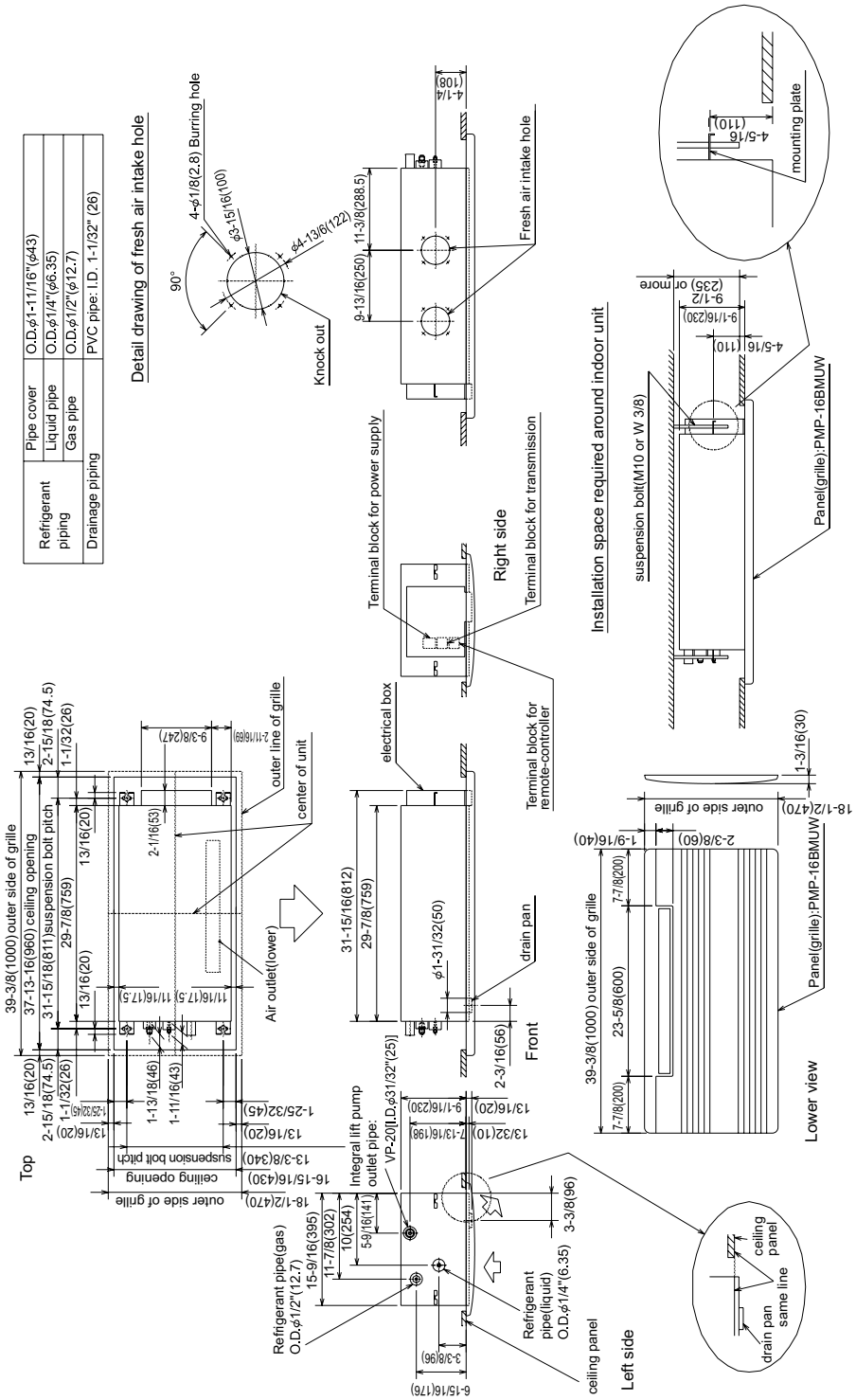
Refrigerant Pipe Dimensions
Liquid . . . . . .1/4" / 6.35 mm flare
Gas . . . . . .1/2" / 12.7 mm flare

Drainpipe Dimension . . . . . .O.D. 1" / 26 mm

Sound Level (Low-Mid1-Mid2-High) . . . . .32 - 34 - 36 - 37 dB (A)

Model: PMFY-P06NBMU-ER5 – DIMENSIONS

Unit : in(mm)



1340 Satellite Boulevard. Suwanee, GA 30024
Toll Free: 800-433-4822 www.mehvac.com

PKFY-P06NLMU-E
6,000 BTU/H WALL MOUNT

Job Name:

System Reference: Date:

GENERAL FEATURES

- Dual set point functionality
- Compact, lightweight, flat-white, flat-panel, modern design
- Quiet operation
- Multiple fan speed settings
- Easily removed intake grille filter for cleaning
- Back and right-side wiring take-out
- Wireless receiver on board

Specifications			System
Unit Type			PKFY-P06NLMU-E
Cooling capacity (Nominal)[1]		BTU/H	6,000
Heating capacity (Nominal)[1]		BTU/H	6,700
Power source		Voltage, Phase, Hertz	208/230V, 1-phase, 60 Hz
Power Consumption	Cooling	kW	0.02
	Heating	kW	0.01
Current	Cooling	A	0.2
	Heating	A	0.2
MCA		A	0.2
Maximum Overcurrent Protection (MOCP)		A	15
Recommended Fuse Size		A	15
External finish			Plastic, MUNSELL (0.7PB 9.2/0.4)
External Dimensions		In. [mm]	30-7/16 x 9-11/32 x 11-25/32 [733 x 237 x 299]
Net weight		Lbs [kg]	24.5 [11.1]
Heat exchanger			Cross fin (Aluminum fin and copper tube)
Fan	Type x quantity		Line flow fan x 1
	Airflow rate	CFM	141–155–173–191
	Motor type		DC Motor
	Motor Output	kW	.03
	Motor FLA	A	0.19
Sound pressure level (Measured in anechoic room)		dB(A)	22–26–29–31
Air filter			PP honeycomb
Refrigerant	Type		R410A
Diameter of refrigerant pipe (O.D.)	Liquid (High Pressure)	In. [mm]	1/4 [6.35] Flare
	Gas (Low Pressure)	In. [mm]	1/2 [12.70] Flare
Diameter of drain pipe		In. [mm]	I.D. 5/8 [16]

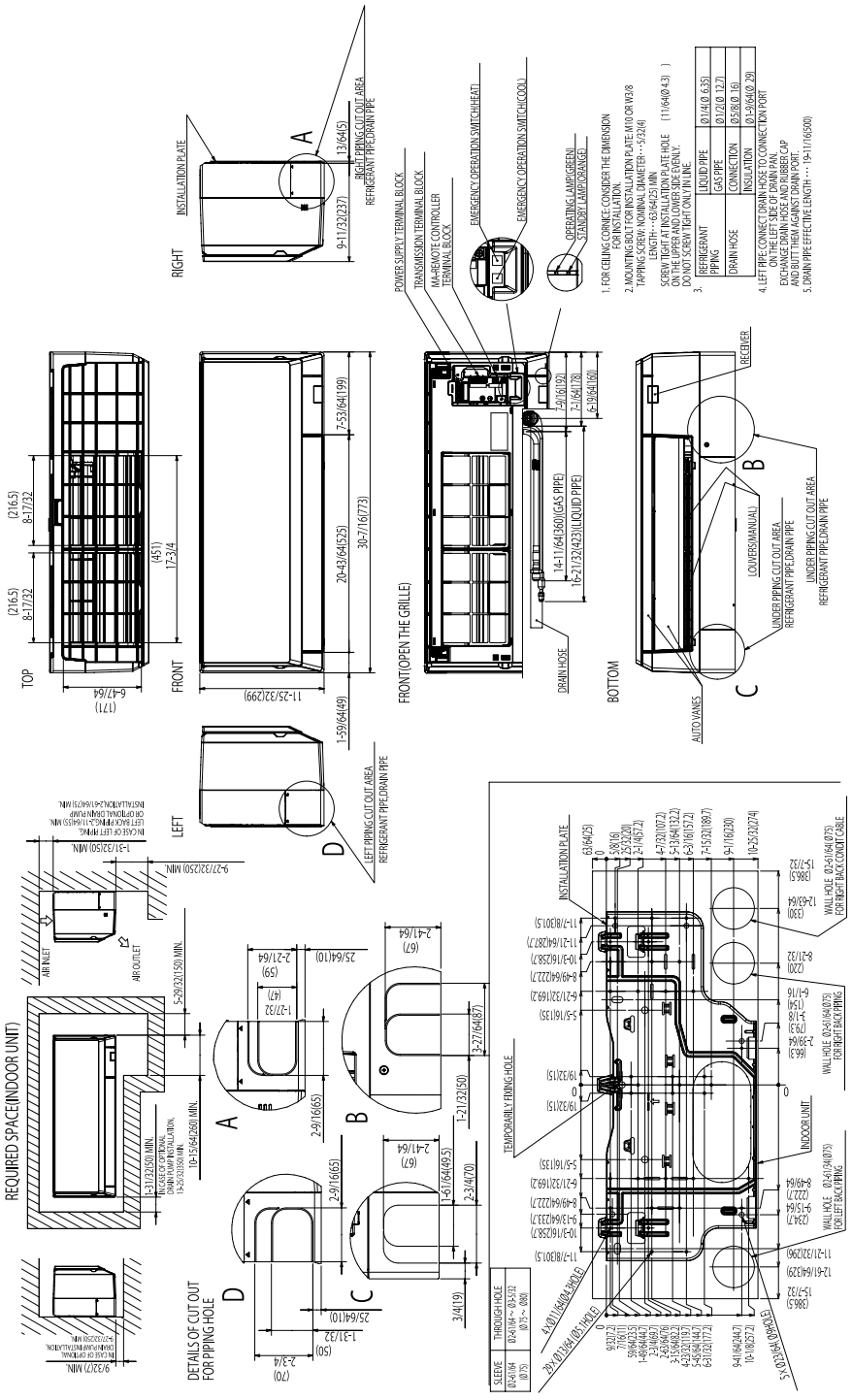
NOTES:
[1]Cooling / Heating capacity indicated at the maximum value at operation under the following conditions:
Cooling | Indoor: 80° F (26.7° C) DB / 67° F (19.4° C) WB; Outdoor 95° F (35° C) DB
Heating | Indoor: 70° F (21.1° C) DB; Outdoor 47° F (8.3° C) DB / 43° F (6.1° C) WB

INDOOR UNIT ACCESSORIES: PKFY-P06NLMU-E

Control Interface	3-Pin Connector	☐ PAC-715AD
	BACnet® and Modbus® Interface	☐ PAC-UKPRC001-CN-1
	CN24 Relay Kit	☐ CN24RELAY-KIT-CM3
	Connector and wire for Operation status/error using CN51	☐ PAC-725AD
	IT Extender	☐ PAC-WHS01IE-E
	kumo station® for kumo cloud®	☐ PAC-WHS01HC-E
	Thermostat Interface	☐ PAC-US444CN-1
	Thermostat Interface	☐ PAC-US445CN-1
	Wireless Interface for kumo cloud®	☐ PAC-USWHS002-WF-2
Remote Sensor	Flush Mount Remote Temperature Sensor	☐ PAC-USSEN002-FM-1
	Flush Mount Temperature Sensor	☐ PAC-USSEN001-FM-1
	Remote Temperature Sensor	☐ PAC-SE41TS-E
	Wireless temperature and humitity sensor for kumo cloud®	☐ PAC-USWHS003-TH-1
Terminal Signal Adapter	Terminal Signal Adapter	☐ PAC-IT51AD-E
	Terminal Signal Adapter	☐ PAC-IT52AD-E
Wired Remote Controller	Deluxe Wired MA Remote Controller†	☐ PAR-40MAAU
	Simple MA Remote Controller†	☐ PAC-YT53CRAU-J
	Touch MA Controller†	☐ PAR-CT01MAU-SB
Wireless Remote Controller	kumo touch™ RedLINK™ Wireless Controller	☐ MHK2
Condensate	Blue Diamond MultiTank — collection tank for use with multiple pumps	☐ C21-014
	Blue Diamond Sensor Extension Cable — 15 Ft.	☐ C13-103
	Drain Pan Level Sensor/Control	☐ SS610E
	Fascia Kit for MicroBlue Pump, mounts the MicroBlue and sensor directly beneath indoor unit	☐ T18-016
	Refco Condensate Pump (100-240 VAC) up to 120,000 BTU/H	☐ COMBI
	Refco Condensate Pump (100-240 VAC) up to 120,000 BTU/H	☐ GOBI-II
	Sauermann Condensate Pump	☐ SI30-230
Disconnect Switch	(30A/600V/UL) [fits 2” X 4” utility box] - Black	☐ TAZ-MS303
	(30A/600V/UL) [fits 2” X 4” utility box] - White	☐ TAZ-MS303W
Drain Hose	Flexible Mini-Split Drain Hose	☐ DRX-16

INDOOR UNIT DIMENSIONS: PKFY-P06NLMU-E

Unit: in(mm)



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Toll Free: 800-433-4822 www.mehvac.com

Model: PMFY-P08NBMU-ER5

MITSUBISHI ELECTRIC

Job Name:

System Reference: Date:

GENERAL FEATURES

- Dual set point functionality
- Lightweight and compact design
- Four-speed fan settings
- Built-in condensate lift mechanism
- Ventilation air intake supported

OPTIONS

□ CN24 Relay Kit.....CN24RELAY-KIT-CM3

* Cooling / Heating capacity indicated at the maximum value at operation under the following conditions:
Cooling | Indoor: 80° F (27° C) DB / 67° F (19° C) WB
Cooling | Outdoor: 95° F (35° C) DB
Heating | Indoor: 70° F (21° C) DB
Heating | Outdoor: 47° F (8° C) DB / 43° F (6° C) WB

SPECIFICATIONS

Capacity*
Cooling . . . . . .8,000 Btu/h
Heating . . . . . .9,000 Btu/h

Power
Power Source . . . . . .208 / 230V, 1 phase, 60Hz

Power Consumption
Cooling . . . . . 0.04 kW
Heating . . . . . 0.04 kW

Current
Cooling . . . . . 0.20 A
Heating . . . . . 0.20 A

Minimum Circuit Ampacity (MCA) . . . . . .0.25 A
Maximum Overcurrent Protection (MOCP) . . . . . .15 A

External Finish . . . . . Grille: 6.4Y 8.9/0.4

Dimensions
Inches . . . . . .9-1/16 h x 31-31/32 w x 15-9/16 d
mm . . . . . .230 h x 812 w x 395 d

Grille
Inches . . . . . .1-3/16" h x 39-3/8" w x 18-17/32" d
mm . . . . . .30 h x 1000 w x 470 d

Net Weight
Unit . . . . . .31 lb / 14 kg
Grille . . . . . .7 lb / 3 kg

Coil Type
. . . . . .Cross fin

Fan
Type x Quantity . . . . . .Line flow fan x 1
Airflow Rate (Low-Mid1-Mid2-High) . . .258-283-304-328 CFM
Motor Type . . . . . DC brushless motor

Air Filter
. . . . . .PP honeycomb

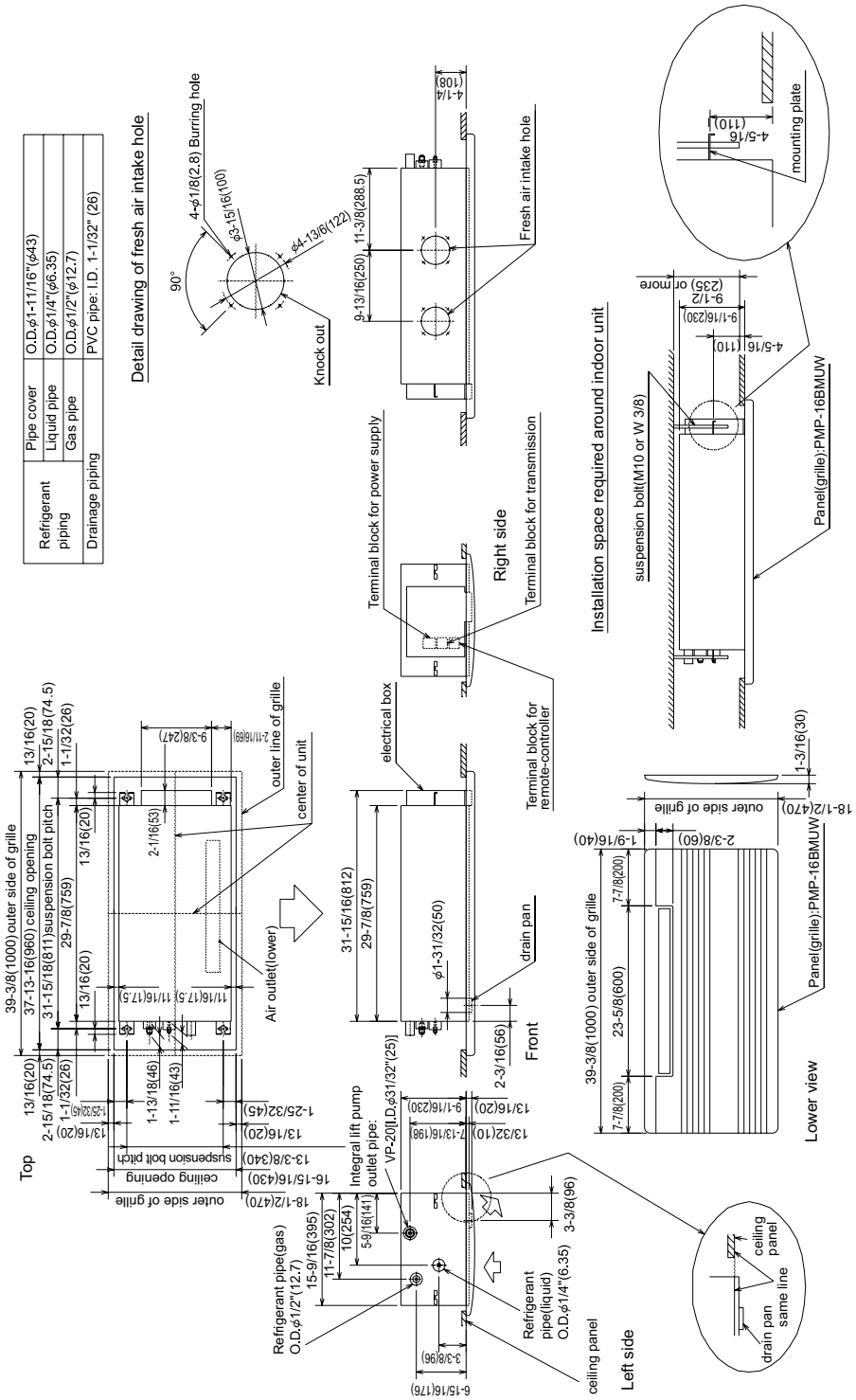
Refrigerant Pipe Dimensions
Liquid . . . . . .1/4" / 6.35 mm flare
Gas . . . . . .1/2" / 12.7 mm flare

Drainpipe Dimension . . . . . .O.D. 1" / 26 mm

Sound Level (Low-Mid1-Mid2-High) . . . . .32-34-36-37 dB (A)

Model: PMFY-P08NBMU-ER5 – DIMENSIONS

Unit : in(mm)



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CITYMULTI®

PKFY-P08NLMU-E
8,000 BTU/H WALL MOUNT

MITSUBISHI ELECTRIC
HEATING & AIR CONDITIONING

Job Name:

System Reference: Date:

GENERAL FEATURES

- Dual set point functionality
- Compact, lightweight, flat-white, flat-panel, modern design
- Quiet operation
- Multiple fan speed settings
- Easily removed intake grille filter for cleaning
- Back and right-side wiring take-out
- Wireless receiver on board

Specifications			System
Unit Type			PKFY-P08NLMU-E
Cooling capacity (Nominal)[1]		BTU/H	8,000
Heating capacity (Nominal)[1]		BTU/H	9,000
Power source		Voltage, Phase, Hertz	208/230V, 1-phase, 60 Hz
Power Consumption	Cooling	kW	0.03
	Heating	kW	0.02
Current	Cooling	A	0.3
	Heating	A	0.2
MCA		A	0.2
Maximum Overcurrent Protection (MOCP)		A	15
Recommended Fuse Size		A	15
External finish			Plastic, MUNSELL (0.7PB 9.2/0.4)
External Dimensions		In. [mm]	30-7/16 x 9-11/32 x 11-25/32 [733 x 237 x 299]
Net weight		Lbs [kg]	24.5 [11.1]
Heat exchanger			Cross fin (Aluminum fin and copper tube)
Fan	Type x quantity		Line flow fan x 1
	Airflow rate	CFM	141–162–191–237
	Motor type		DC Motor
	Motor Output	kW	.03
	Motor FLA	A	0.19
Sound pressure level (Measured in anechoic room)		dB(A)	22–27–31–35
Air filter			PP honeycomb
Refrigerant	Type		R410A
Diameter of refrigerant pipe (O.D.)	Liquid (High Pressure)	In. [mm]	1/4 [6.35] Flare
	Gas (Low Pressure)	In. [mm]	1/2 [12.70] Flare
Diameter of drain pipe		In. [mm]	I.D. 5/8 [16]

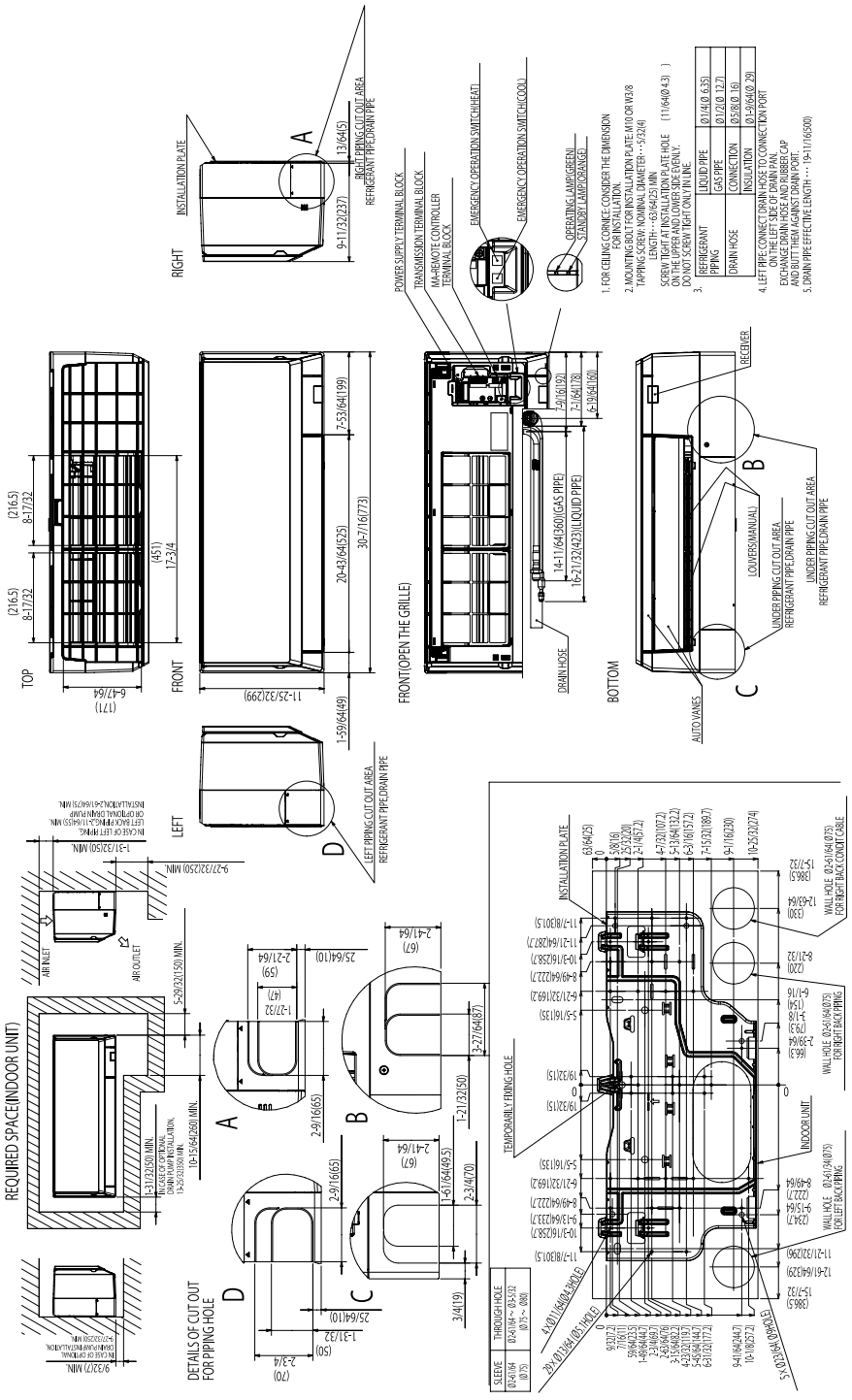
NOTES:
[1]Cooling / Heating capacity indicated at the maximum value at operation under the following conditions:
Cooling | Indoor: 80° F (26.7° C) DB / 67° F (19.4° C) WB; Outdoor 95° F (35° C) DB
Heating | Indoor: 70° F (21.1° C) DB; Outdoor 47° F (8.3° C) DB / 43° F (6.1° C) WB

INDOOR UNIT ACCESSORIES: PKFY-P08NLMU-E

Control Interface	3-Pin Connector	☐ PAC-715AD
	BACnet® and Modbus® Interface	☐ PAC-UKPRC001-CN-1
	CN24 Relay Kit	☐ CN24RELAY-KIT-CM3
	Connector and wire for Operation status/error using CN51	☐ PAC-725AD
	IT Extender	☐ PAC-WHS01IE-E
	kumo station® for kumo cloud®	☐ PAC-WHS01HC-E
	Thermostat Interface	☐ PAC-US444CN-1
	Thermostat Interface	☐ PAC-US445CN-1
	Wireless Interface for kumo cloud®	☐ PAC-USWHS002-WF-2
Remote Sensor	Flush Mount Remote Temperature Sensor	☐ PAC-USSEN002-FM-1
	Flush Mount Temperature Sensor	☐ PAC-USSEN001-FM-1
	Remote Temperature Sensor	☐ PAC-SE41TS-E
	Wireless temperature and humitity sensor for kumo cloud®	☐ PAC-USWHS003-TH-1
Terminal Signal Adapter	Terminal Signal Adapter	☐ PAC-IT51AD-E
	Terminal Signal Adapter	☐ PAC-IT52AD-E
Wired Remote Controller	Deluxe Wired MA Remote Controller†	☐ PAR-40MAAU
	Simple MA Remote Controller†	☐ PAC-YT53CRAU-J
	Touch MA Controller†	☐ PAR-CT01MAU-SB
Wireless Remote Controller	kumo touch™ RedLINK™ Wireless Controller	☐ MHK2
Condensate	Blue Diamond MultiTank — collection tank for use with multiple pumps	☐ C21-014
	Blue Diamond Sensor Extension Cable — 15 Ft.	☐ C13-103
	Drain Pan Level Sensor/Control	☐ SS610E
	Fascia Kit for MicroBlue Pump, mounts the MicroBlue and sensor directly beneath indoor unit	☐ T18-016
	Refco Condensate Pump (100-240 VAC) up to 120,000 BTU/H	☐ COMBI
	Refco Condensate Pump (100-240 VAC) up to 120,000 BTU/H	☐ GOBI-II
	Sauermann Condensate Pump	☐ SI30-230
Disconnect Switch	(30A/600V/UL) [fits 2” X 4” utility box] - Black	☐ TAZ-MS303
	(30A/600V/UL) [fits 2” X 4” utility box] - White	☐ TAZ-MS303W
Drain Hose	Flexible Mini-Split Drain Hose	☐ DRX-16

INDOOR UNIT DIMENSIONS: PKFY-P08NLMU-E

Unit: in(mm)

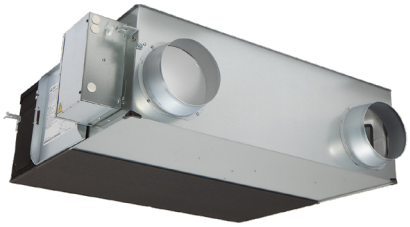


1340 Satellite Boulevard Suwanee, GA 30024
Toll Free: 800-433-4822 www.mehvac.com

LGH-F600RVX2-E
ENERGY RECOVERY VENTILATION

Job Name:

System Reference: Date:



GENERAL FEATURES

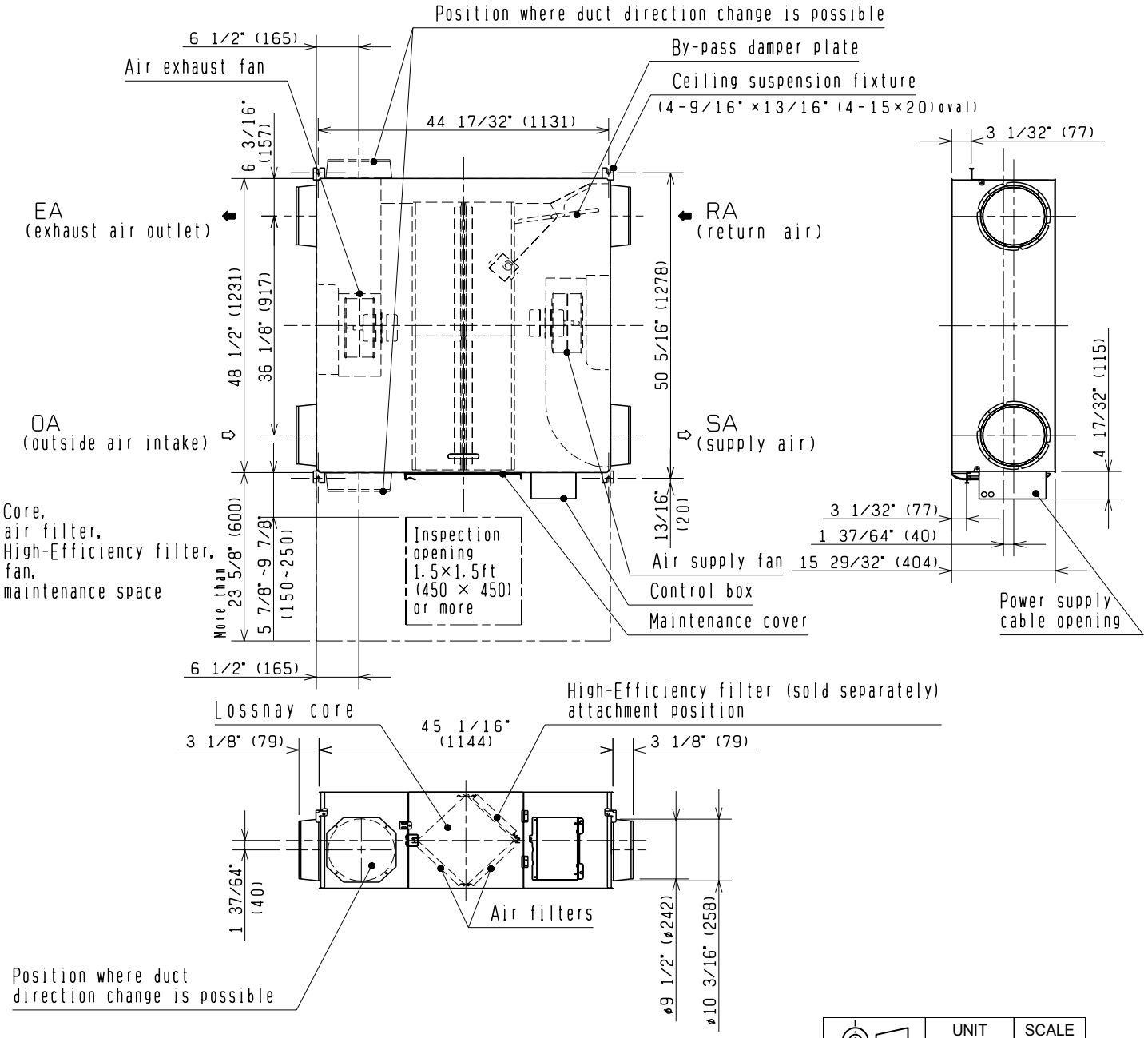
- Lossnay® cross-flow energy recovery core
- Minimal cross contamination between entering and leaving air streams
- Stand-alone remote controller (PZ-62DR-EA)
- M-NET Connectivity
- External input bypass damper control
- Stand alone or interlocks connects with all Mitsubishi Electric products
- Four fan speeds
- High efficiency DC Motor
- Standard MERV 7 non-woven fabric filter, washable fiber
- Optional high-efficiency MERV 14 and MERV 16 filters

Specifications			System
Unit Type			LGH-F600RVX2-E
Capacity		CFM [m³/h]	600 [1,019]
Power source		Voltage, Phase, Hertz	208/230V, 1-phase, 60 Hz
Power Consumption		kW	0.27 - 0.515
Current		A	0.047 - 0.12
Starting Current		A	6.1
MCA		A	5.2
Maximum Overcurrent Protection (MOCP)		A	15
Fan	Air Volume	CFM [m³/h]	150-300-450-600 [255-510-765-1,019]
	External Static pressure	in.WG	0.05–0.22–0.48–0.86
Exchange Efficiency	Temperature	%	81-76.5-73-67
	Enthalpy Cooling	%	71.0-64.5- 56.5- 50.0
	Enthalpy Heating	%	80.0-74.5-68.5-64.0
External Finish			Galvanized steel sheet
External Dimensions		In. [mm]	50-5/16 x 51-5/16 x 15-29/32 [1,278 x 1,302 x 404]
Net weight		Lbs [kg]	123 [56]
Energy Transfer Mechanism			Lossnay® Core
Heat Exchange Material			Partition, spacing plate-cellulose fiber membrane
Heat Exchange System			Air-to-air total heat (sensible heat + latent heat) exchange, no moving parts
Blower Type			9-5/8 In. diameter centrifugal fan
Motor Type			EC Motor
Entering Air Temperature Operation Range		°F [°C]	14 to 104 [-10 to 40]
Sound pressure level		dB(A)	20.0–27.0–35.0-41.0

ACCESSORIES: LGH-F600RVX2-E

Wired Remote Controller	Lossnay® ERV Remote Controller	☐ PZ-62DR-EA
Control Interface	Signal Output Terminal	☐ PZ-4GS-E
Duct Accessories	Duct Silencer	☐ PZ-250SS-E
Filter	MERV 14 Filter	☐ PZ-100RFP-E
	MERV 16 Filter	☐ PZ-100RFP2-E
	MERV 7 Filter (Included)	☐ PZ-100RF9-E
Remote Sensor	CO2 Sensor, Built-In	☐ PZ-70CSB-E
	CO2 Sensor, Wall Mount	☐ PZ-70CSW-E

DIMENSIONS: LGH-F600RVX2-E



	UNIT	SCALE
	inch(mm)	N.T.S

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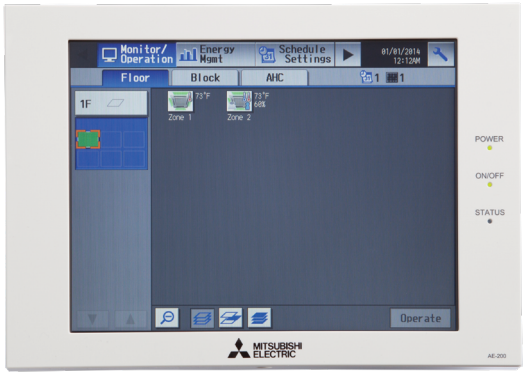
FORM# LGH-F600RVX2-E - 202304

Job Name:

System Reference: Date:



AE-200A

- AE-200A is the Master Controller
- Master Controller can operate and monitor up to 50 indoor units
- Expansion Controllers can expand an AE-200A to operate and monitor up to 50 additional indoor units through the touchscreen or web browser
- Network up to three AE-50A or EW-50A to one AE-200A to allow the AE-200A to manage up to 200 indoor units

OPTIONAL LICENSES

- LIC-BACnet Master: BACnet Function
  - Connected air conditioning units can be monitored and operated not only from the existing web browser or the AE-200/AE-50's LCD, but also from the building management system using the BACnet® communication protocol. See LIC-BACnet Data Sheet for more information.
- LIC-Charge Master: Energy Allocation
  - The apportioned electricity billing function is an electric energy
  - apportionment system that apportions electric energy using input from electricity meters with a pulse generator function. The respective amounts of electric energy can be apportioned based on the operating status and capacity of each tenant. See LIC-Charge Data Sheet for more information.
- LIC-PWeb Master: Online Personal Browser
  - Allows tenant managers and general users to control their respective zone conditions via a networked PC, tablet, or mobile phone with or without local remote controllers installed in the space. See LIC-PWeb Data Sheet for more information.

SPECIFICATIONS

- Supports dual set point functionality (connected equipment dependent)
- Displays:
  - CITY MULTI® compressor speed and hi/low pressure
  - AdvancedHVAC Controller (DC-A2IO) input/output status
  - Indoor unit free contact input/output status
  - Space temperature and humidity (from Smart ME or AI controller)
  - Error code (Can be emailed automatically to specified recipients)
  - Unoccupied setback up temperature range
- Functions
  - Hold function (temporarily disables schedules indoor unit model dependent)
  - Initial setting
  - Operation data back-up
- Permits or prohibits remote controller functions:
  - On/Off
  - Change Operation Mode
  - Change Set Point Temperature
  - Filter Status
  - Change Fan Speed
  - Change Air Direction
- External input/output signals can be used for batch operations such as Start/Stop and Emergency Stop (requires PAC-YG10HA)
- Pulse signal input can obtain watt-hour meter, billing data and energy management data based on the cumulative number of pulse signal pulse signals directly input from a metering device
- Temperature set point range limits can be set for local remote controllers
- User defined indoor unit functions:
  - On/Off
  - Monitoring and Operation
  - Operation mode:
    - Auto* (Dual or Single set point)
    - Heat
    - Fan
    - Drying
    - Setback*

      Note: *R2 Series only (connected equipment dependent)
  - Temperature Setting
  - Fan Speed
  - Airflow Direction
- • Monitoring and Control:
  - CITY MULTI® indoor units
  - M & P Series units (requires M-Net adapter)
  - Lossnay® units
  - PWFY hydronic heat pump units
  - DIDO controllers
  - CITY MULTI® DOAS
  - Interlock setting enables integration of general equipment inputs/outputs and indoor units
- Scheduling
  - Daily
  - Annually
  - Five pattern of weekly seasonal schedule
- Twenty four scheduled events per day, indoor unit model dependent:
  - ON/OFF
  - Mode
  - Temperature Setting
  - Vane Direction
  - Fan
  - Speed
  - Operation Prohibits
- Trend data:
  - Fan operation time
  - Thermo-on time
  - Set temperature
  - Room temperature
  - AI Controller temperature and humidity (requires PAC-YG63-MCA, 2 inputs total for each controller)
- Memory back up via USB (universal serial bus)
- Memory back up via LAN (local area network) port

AE-200A - SPECIFICATIONS, CONT.

TE-200A CENTRALIZED CONTROLLER

Item	Specifications		
Power Supply	**Rated input**		100–240 VAC ± 10%; 0.3–0.2 A 50/60 Hz Single-phase
	Fuse		250 VAC 6.3 A Time-Lag type (IEC 60127-2S.S.5)
M-NET power feeding capability			No specifications**Only an MN converter can be connected.
Ambient conditions	**Temperature**	**Operating Range**	0° C to +40° C (+32° F to +104° F)
		Non-operating Range	-20° C to +60° C (-4° F to +140° F)
	Humidity		30% to 90% RH (no condensation)
Weight			2.3 kg (5-5/64 lbs)
Dimensions (W x H x D)			11-5/32 × 7-55/64 × 2-17/32 in. (284 × 200 × 65 mm)
Installation conditions			Indoor only **To be used in a business office or similar environment

WEB BROWSER REQUIREMENTS

Item		Requirements
PC	**CPU**	1 GHz or faster (2 GHz or faster recommended)
	Memory	2 GB or more
	Screen Resolution	1024 x 768 or higher recommended
	OS/Java® execution environment	• Microsoft® Windows® 8.1 • Microsoft® Windows® 10 • Mac OS® X10.11 or later (Only CSV File Download Tool is not guaranteed to work.) * Java® execution environment (Oracle® Java or AdoptOpenJDK) is required. Verified to work properly on Oracle® Java8 (https://www.java.com/download/) and AdoptOpenJDK11 HotSpot (https://adoptopenjdk.net/). * The version of the Oracle® Java can be verified by clicking [Java] in the Control Panel. * Install the Java® execution environment that is appropriate for your Air Conditioner Control Tool. When using a 64-bit Air-conditioner Control Tool, install 64-bit Oracle® Java or AdoptOpenJDK
	Browser	• Microsoft® Internet Explorer® 11 • Microsoft® Edge® • Google Chrome™ Ver. 83 • Safari® 13
	Microsoft® Excel®	• Microsoft® Excel® 2010 or later

	Item	Requirements
Smartphone	**Safari® 12**	• iPhone 6s (Plus) (iOS 10.1.1 or later) • iPhone 7 (Plus) (iOS 10.1.1 or later) • iPhone SE (iOS 10.1.1 or later) • iPhone XR (iOS 12.1.1 or later)
	Google Chrome™ Ver. 83	• Galaxy SC-04J (Android™ 8.0.0) • HUAWEI P9 (Android™ 6.0 or later) • Xperia Z5 (Android™ 6.0 or later)
Tablet	**Safari® 13**	• iPad Air 2 (iOS 12.2.2 or later) • 9.7-inch iPad Pro (iOS 10.1.1 or later)
	Google Chrome™ Ver. 83	• MediaPad T2 7.0 Pro (Android™ 5.1.1)

Note: Registered trademarks

- Android is a registered trademark of Google LLC. in the U.S. and other countries.
- Apple is a trademark of Apple Inc., registered in the U.S. and other countries.
- Google is a registered trademark of Google LLC.
- Google Chrome is a registered trademark of Google LLC. in the U.S. and other countries.
- Edge is a trademark or registered trademark of Microsoft Corporation in the U.S. and other countries.
- Internet Explorer is a trademark or registered trademark of Microsoft Corporation in the U.S. and other countries.
- The official name of Internet Explorer is “Microsoft® Internet Explorer Internet browser”.
- iOS is a trademark or registered trademark of Cisco in the U.S. and other countries and is used under license.
- iPad is a trademark of Apple Inc., registered in the U.S. and other countries.
- Mac OS is a trademark of Apple Inc., registered in the U.S. and other countries.
- Microsoft Office Excel is a product name of Microsoft Corporation in the U.S.
- Windows is a trademark or registered trademark of Microsoft Corporation in the U.S. and other countries.
- The official name of Windows is “Microsoft® Windows® Operating System”.
- Safari is a trademark or registered trademark of Apple Inc. in the U.S.
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- Galaxy is a trademark or registered trademark of Samsun Co., Ltd.

Note: Company name or product name that is described in this manual may be a trademark or a registered trademark of each company

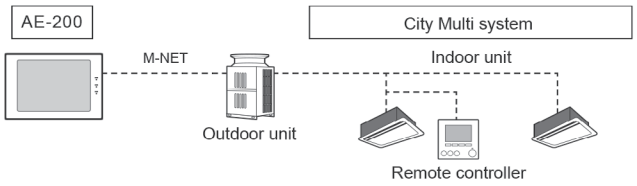
Specifications are subject to change without notice.

MODEL: AE-200A - SYSTEM CONFIGURATION

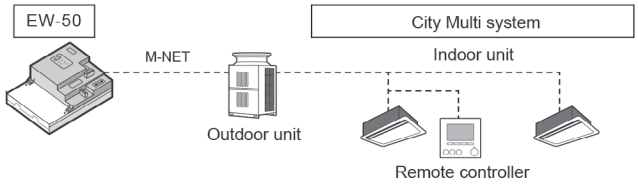
*AE-200A is indicated as AE-200
*AE-50A is indicated as AE-50

CONTROLLING 50 OR FEWER UNITS OF EQUIPMENT

1. AE-200



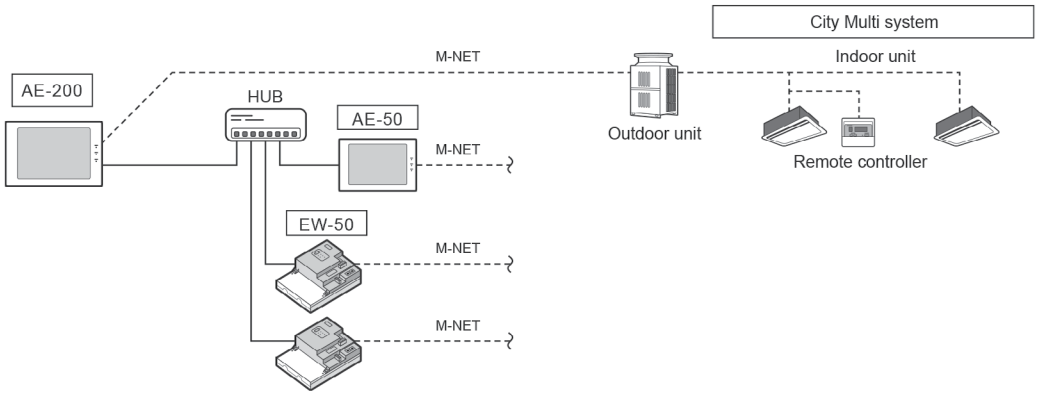
2. EW-50



CONTROLLING MORE THAN 50 UNITS OF EQUIPMENT (WITH CONNECTION TO AN AE-200 CONTROLLER)

Note

AE-200 is required when using AE-50



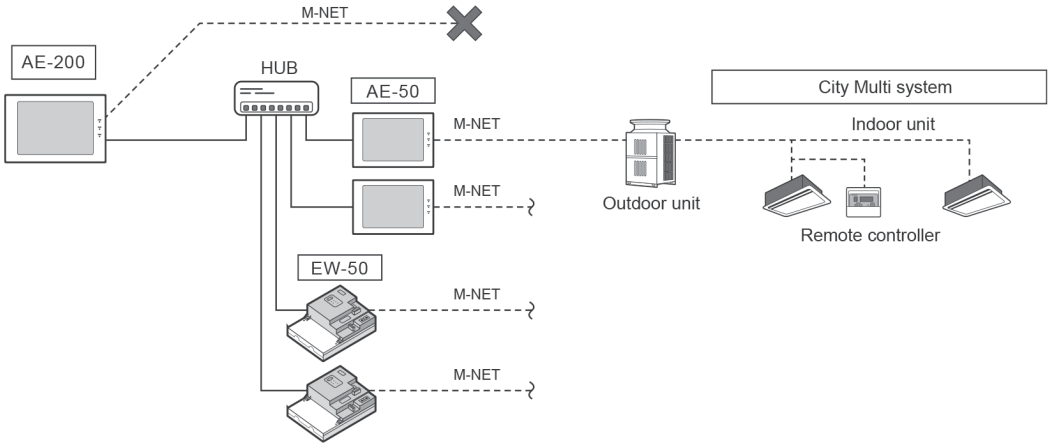
WHEN USING AN APPORTIONED ELECTRICITY BULLING FUNCTION

Notes

AE-200 is required to use a billing function.

AE-200 M-NET cannot be used when a billing function is used

“Charge” license is requited to use a billing function.

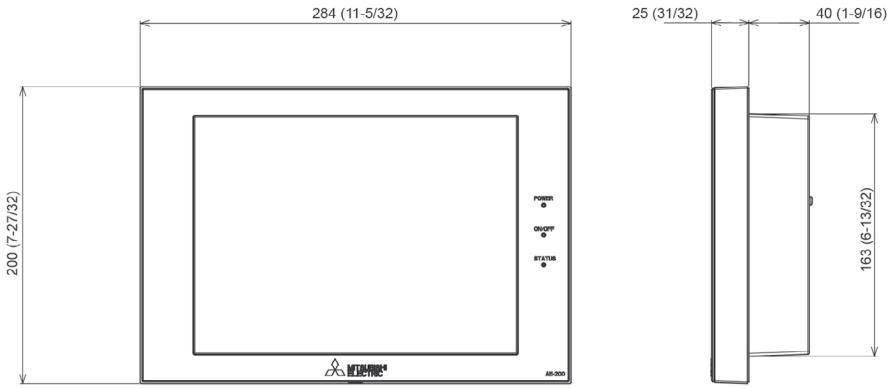


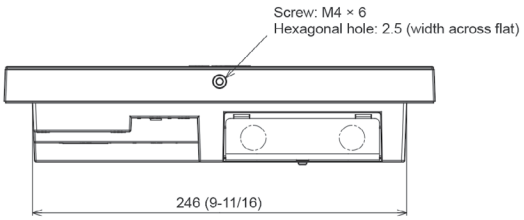
Specifications are subject to change without notice.

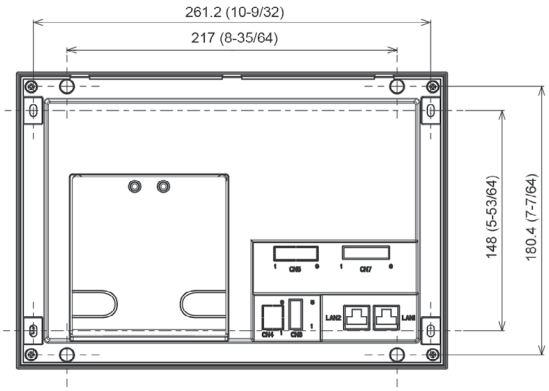
AE-200A - DIMENSIONS

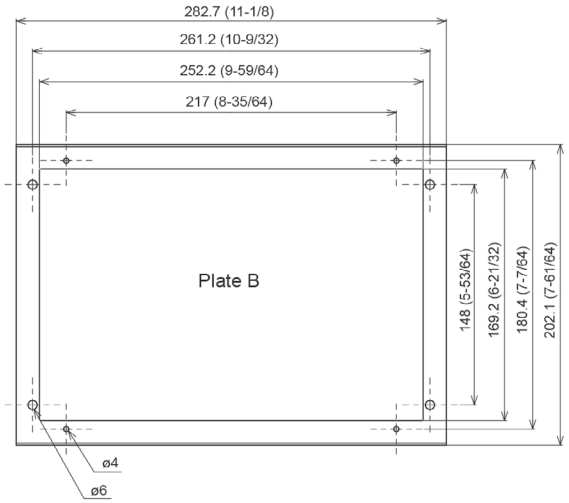
Unit: mm (inch)

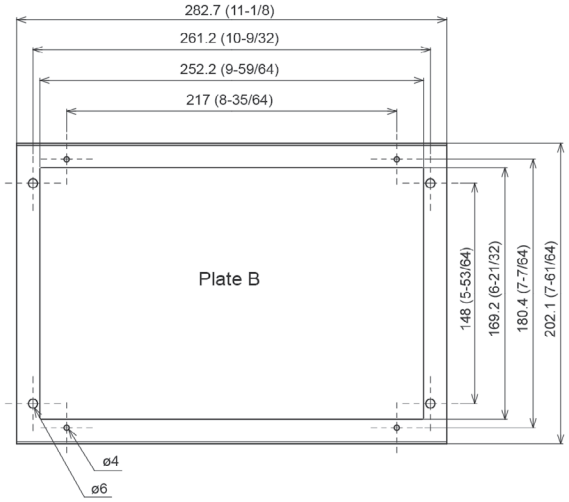
*AE-200A is indicated as AE-200
*AE-50A is indicated as AE-50











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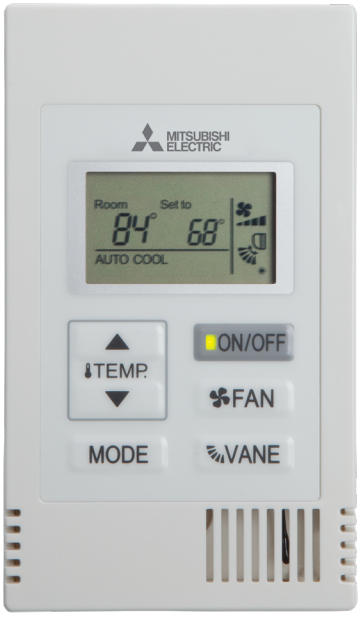
FORM# M_SUBMITTAL_AE-200A - 202104

Specifications are subject to change without notice.

MODEL: PAC-YT53CRAU-J

Job Name:
System Reference: Date:

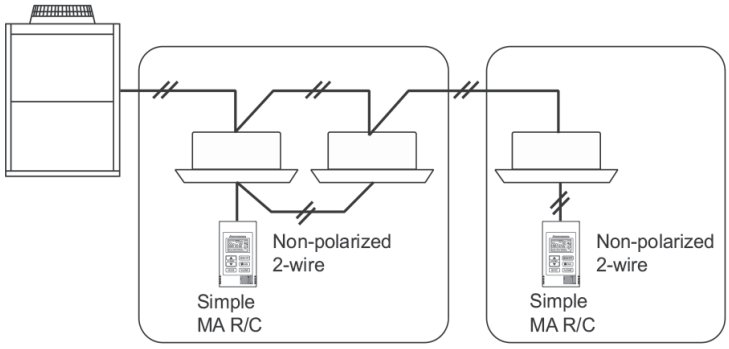


SIMPLE MA REMOTE CONTROLLER (PAC-YT53CRAU-J) SPECIFICATIONS

- Controls group operation for up to 16 indoor units in a single group
- Supports both Fahrenheit and Celsius
- User defined functions:
  - ON/OFF
  - Operation mode: AUTO (R2-Series only), COOL, HEAT, FAN, DRY, SETBACK, or ADD
  - Set temperature
  - Fan speed setting
  - Air flow direction
  - Set temperature range: depending on operation mode and indoor unit connected.
- Set temperature range limit: Simple MA allowable set temperature range can be reduced for cool and heat modes.
- LOSSNAY®: Simple MA for interlocked system can set high/low/Stop on LOSSNAY.
- Room temperature can be sensed either at the indoor unit (default) or at the remote controller.
- Diagnostics: Displays four-digit error code and error unit address.
- Grouping: Same group use only with other PAC-YT53CRAU-J Simple MA Controllers with up to two remote controllers per group.
- Addressing: No addressing required.
- Wiring: Uses two-wire, stranded, non-polar control wire for connecting TB15 connection terminal on the indoor unit.
- Requires crossover wiring for grouping across indoor units.
- Dimensions: 2-3/4 x 9/16 x 4-3/4" (70 x 14.5 x 120mm).

NOTE: A MAC-334IF-E may be needed in order to connect to the indoor unit. Please see the compatibility charts for more information.

SAMPLE SYSTEM

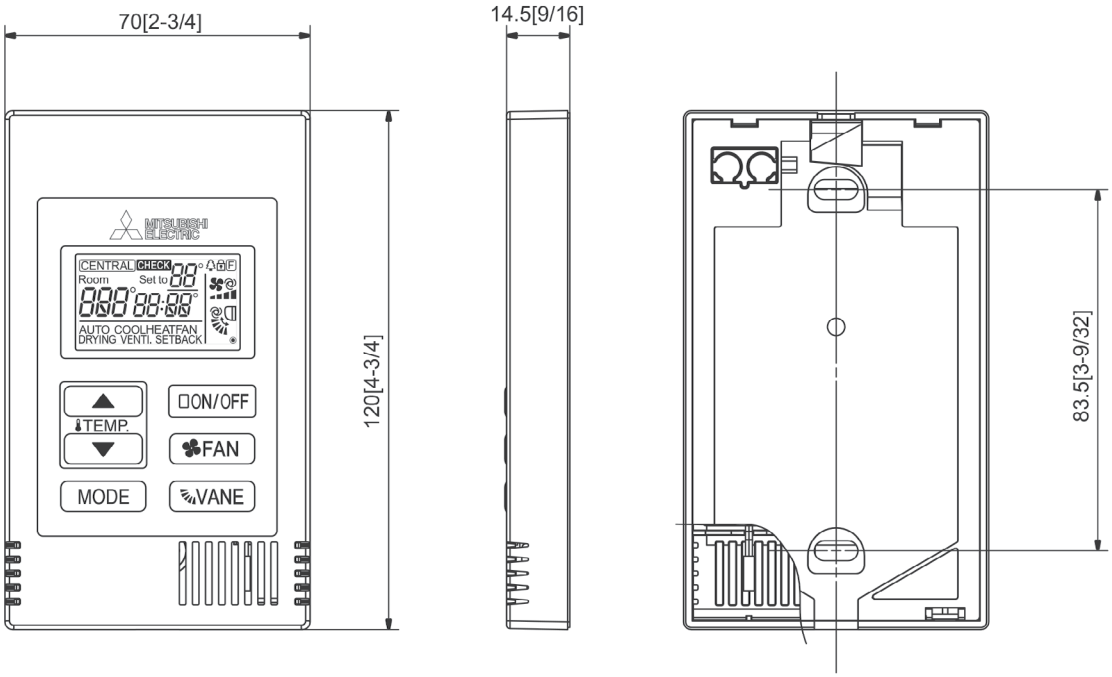


System example

NOTES:

DIMENSIONS: PAC-YT53CRAU-J

Unit:mm[in.]



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PZ-62DR-EA
LOSSNAY® ERV REMOTE CONTROLLER

Job Name:

System Reference: Date:

FUNCTIONS

Function (Communicating mode)	PZ-62DR-EA
Fan speed selection	4 fan speeds
Ventilation mode selection	Energy recovery/Bypass/Auto
Night-purge (time)	Any time selectable
Night-purge (fan speed)	Selectable from 4 fan speeds
Dip-switch setting and function setting from RC	Yes
Bypass temp. free setting	Yes
Heater-On temp. free setting	Yes
Fan power up after installation	Yes
0 - 10VDC external input	Yes
ON/OFF timer	Yes
Auto-Off timer	Yes
Weekly timer	Yes
Operation restrictions (ON/OFF, Ventilation mode, fan speed)	Yes
Operation restrictions (Fan speed skip setting)	Yes
Screen contrast adjustment	Yes
Language selection	Yes (11 languages)
Initializing remote controller	Yes
Filter cleaning sign	Yes
Lossnay core cleaning sign	Yes
Error indication	Yes
Error history	Yes
OA/RA/SA temp. display	Yes

SPECIFICATIONS

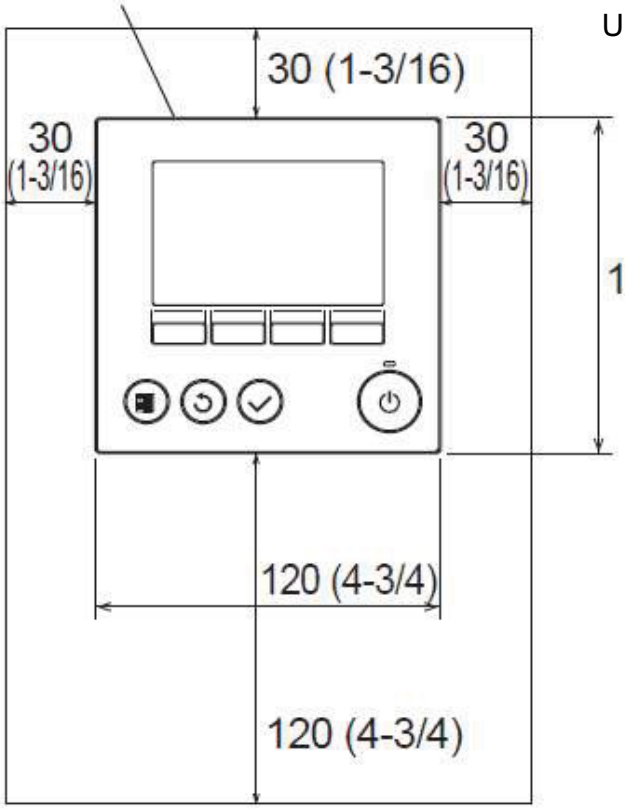
Power supply requirement	12V DC (Supplied from Lossnay unit)
Power consumption	0.3W
Transmission cable	Non polarized 2-wire (2 (AWG22) sheathed cable)
Total wiring length	219yd (200m) maximum
Number of controllable Lossnay units	15 Lossnay units maximum (Max 2 remote controllers installable)
Environmental condition	Temperature: 32 to 104°F (0 to 40°C) Humidity:30% to 90% relative humidity (no condensation)
Size	4.75 x 4.75 x 3/4 in (120 x 120 x 19 mm)
Weight	0.55lbs (0.25kg)
Color	Munsell 1.0Y9.2/0.2

- Compatible with Lossnay RVX2 series ERV
- Controls group operation for up to 15 ERV units and 2 RC's in a single group
- Not for use with Lossnay RX5 or RVX series ERV

DIMENSIONS: PZ-62DR-EA

External dimensions of remote controller

Unit: inch (mm)



unit: mm(in)

Minimum required space around the remote controller

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FORM# PZ-62DR-EA - 202201

Warranty Document

MITSUBISHI ELECTRIC TRANE HVAC US LLC

1340 Satellite Boulevard
Suwanee, GA 30024

LIMITED WARRANTY STATEMENT

Mitsubishi Electric CITY MULTI® Split Air-conditioner and Heat-pump Systems

Subject to the terms and conditions of this Limited Warranty Statement (the "Limited Warranty"), MITSUBISHI ELECTRIC TRANE HVAC US LLC ("METUS") warrants to the original purchaser of this CITY MULTI system (as used herein, "System" shall mean CITY MULTI outdoor and indoor components connected via refrigerant piping and electrical wiring) purchased on or after **May 1, 2019,** from a licensed HVAC contractor and installed by such contractor in the continental United States, Alaska and Hawaii, that:

A. **The parts are warranted to the original owner for a period of one (1) year from the date of installation by a licensed contractor.** If it should prove defective due to improper workmanship and/or material for a period of one (1) year from the date of installation, METUS will replace any defective part without charge for the part. Replacement parts are warranted for the remainder of the original 1-year warranty period. Parts used for replacement may be of like kind and quality and may be new or remanufactured. Defective parts must be made available to METUS in exchange for the replacement part and become the property of METUS.

B. **The compressor is warranted to the original owner for a period of seven (7) years from the date of installation by a licensed contractor.** If the compressor should prove defective due to improper workmanship and/or material for a period of seven (7) years from the date of installation, METUS will replace any defective compressor without charge for the compressor. Replacement compressors are warranted for the remainder of the original 7-year warranty period. Compressors used for replacement may be of like kind and quality and may be new or remanufactured. Defective compressors must be made available to METUS in exchange for the replacement compressor and become the property of METUS.

C. **Notwithstanding the foregoing, the parts and compressor will be warranted to the original owner for a period of ten (10) years from the date of installation if (1) the System is designed by a Diamond Designer using the Diamond System Builder™ (2) the installing contractor has successfully completed all METUS-approved CITY MULTI training courses, and (3) the contractor has timely submitted a completed and approved Diamond System Builder™ file per the METUS Extended Warranty Process.** If any parts and/or the compressor should prove defective due to improper workmanship and/or material for a period of ten (10) years from the date of installation, METUS will replace any defective parts or compressor without charge for the part or compressor. The replacement parts and/or compressor are warranted for the remainder of the original 10-year warranty period. Parts and/or compressors used for replacement may be of like kind and quality and may be new or remanufactured. Defective parts and/or compressors must be made available to METUS in exchange for the replacement parts and become the property of METUS.

D. **NO LABOR.** This Limited Warranty does NOT include labor or any other costs incurred for service, maintenance, repair, removing, replacing, installing, complying with local building and electric codes, shipping, handling or replacement of the System, compressors or any other parts. The owner is solely responsible for all labor and other costs of maintaining, installing, replacing, disconnecting or dismantling the System and any parts (such as filters) in connection with owner-required maintenance, including but not limited to cleaning and/or replacing air filters for each indoor unit of the System, and this Limited Warranty does not cover labor or other costs associated with such owner-required maintenance. Please consult the Operations Manual and other applicable technical documentation for air filter cleaning and other maintenance procedures.

E. **PROPER INSTALLATION; PROOF OF PURCHASE.** This Limited Warranty applies only to Systems that are installed by licensed HVAC contractors who have completed all METUS-required CITY MULTI training classes and who install the Systems in accordance with (i) all applicable building codes and permits; (ii) METUS installation and operation instructions; and (iii) good trade practices. METUS may require satisfactory proof of purchase, proper installation and start-up of the System as a condition to providing replacement parts or compressors under this Limited Warranty.

BEFORE REQUESTING SERVICE, please review the Operations Manual and technical documentation for your System to confirm the electric power supply and that user controls are properly adjusted for the System.

1) TO OBTAIN WARRANTY SERVICE:

a) Contact the licensed HVAC contractor who installed your System or another licensed HVAC contractor or servicer, or an authorized CITY MULTI distributor (whose name and address may be obtained on the METUS website at www.mehvac.com) within the applicable warranty time period.

b) Proof of the installation date is required when requesting warranty service. Present the sales receipt, building permit or other document which establishes the date of installation. In the absence of acceptable proof, this Limited Warranty shall be deemed to begin one hundred twenty (120) days after the date of manufacture stamped on the System.

c) This Limited Warranty applies only to Systems purchased on or after **May 1, 2019**, only while the System remains at the site of the original installation, and only to locations within the continental United States, Alaska and Hawaii.

d) All repairs under this Limited Warranty must be made by a licensed HVAC contractor or servicer.

1) THIS LIMITED WARRANTY DOES NOT COVER: property damages, malfunction or failure of the System, or personal injury caused by or resulting from: (a) accident, abuse, negligence or misuse; (b) operating the System in a corrosive or wet environment, including those containing chlorine, fluorine or any other hazardous or harmful chemicals or environmental factors, including sea- or salt-water; (c) installation, alteration, repair or service by anyone other than a licensed contractor or other than pursuant to the manufacturer's instructions; (d) improper matching of System components; (e) improper sizing of the System; (f) improper or deferred maintenance contrary to the manufacturer's instructions; (g) physical abuse to or misuse of the System (including failure to perform any maintenance as described in the Operation manual such as air filter cleaning, or any System damaged by excessive physical or electrical stress); (h) Systems that have had a serial number or any part thereof altered, defaced or removed; (i) System used in any manner contrary to the Operation Manual; (j) freight damage; or (k) events of force majeure or damage caused by other external factors such as lightning, power surges, fluctuations in or interruptions of electrical power, rodents, vermin, insects, or other animal- or pest-related issues.

2) THIS LIMITED WARRANTY ALSO EXCLUDES: (a) SERVICE CALLS WHERE NO DEFECT IN THE SYSTEM COVERED UNDER THIS WARRANTY IS FOUND: (b) System installation or set-ups; (c) Adjustments of user controls; (d) Systems purchased or installed outside the continental United States, Alaska and Hawaii; or (e) Systems purchased or installed prior to **May 1, 2018**. Consult the Operations Manual for information regarding user controls.

3) This Limited Warranty shall not be enlarged, extended or affected by, and no obligation or liability shall arise or grow out of, METUS providing, directly or indirectly, any technical advice, information and/or service to the original owner, contractor, distributor, or otherwise providing assistance in connection with the System.

4) EXCEPT AS OTHERWISE PROVIDED IN THIS LIMITED WARRANTY, METUS MAKES NO OTHER WARRANTIES OF ANY KIND WHATSOEVER REGARDING THE SYSTEM. METUS DISCLAIMS AND EXCLUDES ALL WARRANTIES NOT EXPRESSLY PROVIDED HEREIN AND ALL REMEDIES WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION OR OPERATION OF LAW, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT OF THIRD PARTY RIGHTS, AND OF FITNESS FOR ANY PARTICULAR PURPOSE. NO ONE IS AUTHORIZED TO CHANGE THIS LIMITED WARRANTY IN ANY RESPECT OR TO CREATE ANY OTHER OBLIGATION OR LIABILITY FOR METUS IN CONNECTION WITH THE SYSTEM. METUS DISCLAIMS ALL LIABILITY FOR THE ACTS, OMISSIONS AND CONDUCT OF ALL THIRD PARTIES (INCLUDING, WITHOUT LIMITATION, THE INSTALLING CONTRACTOR) IN CONNECTION WITH OR RELATED TO THE SYSTEM.

5) UNDER NO CIRCUMSTANCES SHALL METUS BE LIABLE FOR ANY INDIRECT, INCIDENTAL, SPECIAL, PUNITIVE OR CONSEQUENTIAL DAMAGES INCLUDING, WITHOUT LIMITATION, INFRINGEMENT OF THIRD PARTY RIGHTS, LOST GOODWILL, LOST REVENUES OR PROFITS, WORK STOPPAGE, SYSTEM FAILURE, IMPAIRMENT OF OTHER GOODS, COSTS OF REMOVAL AND REINSTALLATION OF THE SYSTEM, LOSS OF USE, INJURY TO PERSONS OR PROPERTY ARISING OUT OR RELATED TO THE SYSTEM WHETHER BASED ON BREACH OF WARRANTY, BREACH OF CONTRACT, TORT OR OTHERWISE, EVEN IF METUS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGE. IN NO EVENT SHALL METUS' LIABILITY EXCEED THE ACTUAL PURCHASE PRICE OF THE SYSTEM WITH RESPECT TO WHICH ANY CLAIM IS MADE.

6) **SOME STATES DO NOT ALLOW LIMITATIONS ON WARRANTIES OR EXCLUSIONS OR LIMITATION OF DAMAGES, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY.**

7) **DISPUTE RESOLUTION.** For any dispute with METUS, you agree to first contact us by phone (800-433-4822) or e-mail (CustomerCare@hvac.mea.com) or U.S. Mail at MITSUBISHI ELECTRIC TRANE HVAC US LLC ATTN: Customer Care, 1340 Satellite Blvd., Suwanee, GA 30024, and attempt to resolve the dispute with us informally by providing your name, address, and contact information and describing the nature of the dispute. In the unlikely event that METUS has not been able to resolve a dispute with you within 60 days of your original informal claim (or sooner if, in METUS' opinion, a dispute is not likely to be resolved within 60 days), we each agree to resolve any claim, dispute, or controversy arising out of or in connection with or relating to this Limited Warranty, or the breach or alleged breach thereof (collectively, "Claims"), by binding arbitration before an arbitrator from Judicial Mediation and Arbitration Services ("JAMS") located in Gwinnett County, Georgia. JAMS may be contacted at www.jamsadr.com and will require you to pay an initial filing fee set by JAMS (unless you successfully apply for a waiver of this fee from JAMS). All other JAMS costs associated with the arbitration will be borne by METUS. The arbitration will be conducted in Gwinnett County, Georgia, unless you request an in-person hearing where you live, or if you and METUS agree otherwise. If the arbitrator decides in your favor, the award may include your costs of arbitration, your reasonable attorneys' fees and your reasonable costs for any expert and other witnesses, and any judgment on the award rendered by the arbitrator may be entered in any court of competent jurisdiction. If the arbitrator makes an award in your favor greater than METUS's last written offer, METUS will pay you the greater of the award or $500, plus your reasonable attorney's fees, if any, and reimburse any reasonable expenses (including reasonable expert witness fees and costs) that are reasonably accrued for investigating, preparing, and pursuing your claim in arbitration, as determined by the arbitrator or as agreed to by you and METUS. Any judgment on the award rendered by the arbitrator may be entered in any court of competent jurisdiction. You may sue under state law in a small claims court of competent jurisdiction without first engaging in arbitration, but you must engage in arbitration before suing under the Federal Magnuson-Moss Act.

8) All claims must be brought in the parties' individual capacity, and not as a plaintiff or class member in any purported class or representative proceeding. This waiver applies to class arbitration unless such arbitration is necessary to effectuate the enforcement of the court class action waiver or in the event that class arbitration is expressly agreed to by METUS. You agree that you and METUS are each waiving the right to a trial by jury or to participate in a class action.

9) You may opt-out of the foregoing arbitration and class action/jury trial waiver provision of this Limited Warranty by notifying METUS in writing within 30 days of purchase. Such written notification must be sent to MITSUBISHI ELECTRIC TRANE HVAC US LLC ATTN: MEUS Legal Department, 5900-A Katella Avenue, Cypress, CA 90630, and must include (1) your name, (2) your address, (3) your warranted product's serial number, and (4) a clear statement indicating that you do not wish to resolve disputes through arbitration and demonstrating compliance with the 30-day time limit to opt-out.

10) **If any clause herein is found to be illegal or unenforceable, that clause will be severed from this Limited Warranty and the remainder of the Limited Warranty will be given full force and effect. As noted above, if a class action waiver of both court and arbitration class actions is found unenforceable, class arbitration will be expressly allowed under the Limited Warranty.**

11) **This Limited Warranty gives the original owner specific legal rights and the original owner may also have other rights that vary from state to state.**

12) **This Limited Warranty is valid only in the continental United States, Alaska and Hawaii, and it is not transferable.**

MITSUBISHI ELECTRIC

Changes for the Better

Air Conditioning Control System

2020

Service Handbook

Centralized Controller

Model name

AE-200A/AE-50A/EW-50A

AE-200E/AE-50E/EW-50E

Ver. 7.85

1. Safety precautions

► **Observe these precautions carefully to ensure safety.**

► **After reading this manual, pass the manual on to the end user to retain for future reference.**

► **The user should keep this manual for future reference and refer to it as necessary. This manual should be made available to those who repair or relocate the units. Make sure that the manual is passed on to any future air conditioning system user.**

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

1-1. General precautions

⚠ WARNING

Do not install the controller in areas where large amounts of oil, steam, organic solvents, or corrosive gases (such as ammonia, sulfuric compounds, or acids), or areas where acidic/alkaline solutions or special chemical sprays are used frequently. These substances may significantly reduce the performance and corrode the internal parts, resulting in electric shock, malfunction, smoke, or fire.

To reduce the risk of short circuits, current leakage, electric shock, malfunction, smoke, or fire, do not wash the controller with water or any other liquid.

To reduce the risk of electric shock, malfunction, smoke, or fire, do not touch the electrical parts, USB memory, or touch panel with wet fingers.

To reduce the risk of injury or electric shock, before spraying a chemical around the controller, stop the operation and cover the controller.

To reduce the risk of injury, keep children away while installing, inspecting, or repairing the controller.

If you notice any abnormality (e.g., burning smell), stop the operation, turn off the controller, and consult your dealer. Continuing the operation may result in electric shock, malfunction, or fire.

Properly install all required covers to keep moisture and dust out of the controller. Dust accumulation and the presence of water may result in electric shock, smoke, or fire.

⚠ CAUTION

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

To reduce the risk of electric shock or malfunction, do not touch the touch panel, switches, or buttons with a sharp object.

To avoid injury from broken glass, do not apply excessive force to the glass parts.

To reduce the risk of injury, electric shock, or malfunction, avoid contact with the sharp edges of certain parts.

Consult your dealer for the proper disposal of the controller. Improper disposal will pose a risk of environmental pollution.

1-2. Precautions for relocating or repairing the unit

⚠ WARNING

The controller must be repaired or moved only by qualified personnel. Do not disassemble or modify the controller. Improper installation or repair may result in injury, electric shock, or fire.

1-3. Additional precautions

CAUTION

To avoid discoloration, do not use benzene, thinner, or chemical rag to clean the controller. When the controller is heavily soiled, wipe the controller with a well-wrung cloth that has been soaked in water with mild detergent, and then wipe off with a dry cloth.

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

Contents

V. Troubleshooting

VI. Q & A

VII. Test run check lists for initial work and expansion work

VIII. Appendix

I. About this manual

I. About this manual

[1] About the information in this manual

This manual contains information regarding service work for the air conditioning control system centralized controller AE-200/AE-50/EW-50.
Please note that the information about functions contained in this manual is as of Ver. 7.85 and so information about any improvements made to functions after that is not included.

– Registered trademarks
- Windows is a registered trademark or trademark of Microsoft Corporation in the United States and/or other countries.
- Microsoft is a registered trademark or trademark of Microsoft Corporation in the United States and/or other countries.
- Oracle and Java are trademarks or registered trademarks of Oracle Inc. in the United States and/or other countries.
- Adobe Reader and Adobe Acrobat are registered trademarks of Adobe Systems Incorporated.
- Other product names contained in this document may be trademarks or registered trademarks of their respective companies.

– Terms used in this manual
- “Microsoft® Windows 8.1” is referred to as “Windows 8.1”, and “Microsoft® Windows 10” is referred to as “Windows 10”.
- “Centralized Controller AE-200A/AE-200E” is referred to as “AE-200”.
- “Centralized Controller AE-50A/AE-50E” is referred to as “AE-50”.
- “Centralized Controller EW-50A/EW-50E” is referred to as “EW-50”.
- “Advanced HVAC CONTROLLER” is referred to as “AHC”.
- “DIDO controller (PAC-YG66DCA)” is referred to as “DIDO controller”.
- “PI controller (PAC-YG60MCA)” is referred to as “PI controller”.
- “AI controller (PAC-YG63MCA)” is referred to as “AI controller”.
- “OA Processing unit (LOSSNAY with heater and humidifier)” is referred to as “OA Processing unit”.
- Energy management and peak-cut control can be performed without a PI controller by directly inputting the pulse signals of a meter to CN7 of the AE-200/AE-50/EW-50. In this manual, this method will be called pulse input (PI).
- “Booster unit” and “Water HEX unit” are referred to as “Air To Water (PWFY) unit”.
- “City Multi Y, HP, R2, WY, WR2, S” is referred to as “VRF”.
- “Hybrid City Multi” is referred to as “HVRF”.
- “Hydro branch controller (HBC)” and “Hydro unit” are referred to as “Pump unit”.
- “Hot Water Heat Pump unit” is referred to as “HWHP (CAHV, CRHV, QAHV) unit”.
- “e-Series chiller unit (EAHV, EACV)” is referred to as “Chiller unit”.
- “Chiller unit of MEHITS” is referred to as “MEHT-CH&HP unit.”
- Indoor units whose model names end with “-E-OA” are referred to as “outlet air temperature control unit.”

– About screen display
- The screens displayed in this manual may differ from those of the latest version.

– About terms
SSL: Stands for Secure Sockets Layer, which is a protocol for securely exchanging data via the Internet.
PLC: Stands for programmable logic controller, which performs the operation of a sequencer.
In the AE-200/AE-50/EW-50 system, there are a total of three types: PLC for Electric Amount Count (PAC-YG11CDA), PLC for Demand Input (PAC-YG41CDA), and PLC for General Equipment (PAC-YG21CDA) (TG-2000A is required).
Java®: A programming language that runs independent of a given computer architecture or platform.
OS: Stands for operating system. It is the basic software for running programs on a computer.

II. Be sure to read before performing service work

II. Be sure to read before performing service work

[1] Safety when performing service work

Be sure to carefully read "Safety Precautions" at the beginning of this manual and perform service work while paying attention to safety.

To ensure inspection and replacement work is performed safely, observe the following precautions when performing the work.

1. Turn off the breakers	Before replacing parts, be sure to turn off the breaker in the control panel and the main breaker outside the control panel to shut off the power supply to the AE-200/AE-50/EW-50.
2. Take electrical shock precautions	If inspection work must be performed while the equipment is energized, do not touch live parts and take sufficient precautions against electric shock.
3. Use appropriate tools	Use appropriate tools for inspection and replacement work. Using worn out tools may result in an accident due to inadequate tightening, contact failure, etc.
4. Ground	Be sure to ground the equipment. Furthermore, inspect the grounding state and perform the work again if the grounding is inadequate.
5. Clean	After performing the inspection and replacement work, clean the equipment and the area around the equipment and then notify the customer that the inspection and replacement work is complete.

[2] Equipment and materials required for service work

Prepare the following equipment and materials for the service work. (Note: Prepare the items that will be required for the particular site.)

<Tools>
- Screwdriver
- Hex key: Used to remove the front cover of the AE-200/AE-50.
  Width across flats: 2.5 mm (0.1 in)
  A hex key is included with the AE-200/AE-50.

<Measuring instruments>
- Tester: Used to check the wiring and voltage.
- Oscilloscope: Used to check the M-NET transmission waveform.

<Reference materials>
- Diagram of air conditioning control system at the site
- AE-200/AE-50 Installation Manual
- AE-200/AE-50 Instruction Book
- EW-50 Installation and Instructions Manual
- AE-200/AE-50 Instruction Book Detailed operations
- AE-200/AE-50/EW-50 Instruction Book Integrated Centralized Control Web
- AE-200/AE-50/EW-50 Instruction Book Initial Settings
- AE-200/AE-50/EW-50 Instruction Book Apportioned Electricity Billing Function
- AE-200/AE-50/EW-50 Instruction Book BACnet® function
- AE-200/AE-50/EW-50 Instruction Book BACnet® Setting Tool
- Instruction Manual and Installation Manual for each air conditioning unit, controller, and power supply unit
- Service Handbook (this manual)
- Air conditioning Unit Service Handbook
- Air conditioning Unit Service Parts Catalog

<Other items>
- License numbers: License numbers of AE-200/AE-50/EW-50 required for the functions to be used
  (Required when new installation, replacement, etc.)
- USB memory device: Used to back up the initial settings data.
  (Use a USB memory device specified in "III [11] (2) About USB memory devices.")
- PC: Used for various tools and Web display.
- LAN cable: 100BASE-TX compatible LAN cable (category 5 or better)
- User name and password settings: User name and password for AE-200 and Integrated Centralized Control Web (when changed from the default setting)

III. System restrictions and notes

III. System restrictions and notes

[1] System configuration restrictions

(1) Managed equipment

The devices that AE-200/AE-50/EW-50 can control are shown in the following table.

[Legend] ○: Use possible, ×: Use not possible

Model \ Function		Monitoring/ operation	Peak cut	Night mode
CITY MULTI	S series	○	○	○
	Y series*1	○	○	○
	HP series	○	○	○
	R2 series*1	○	○	○
	WY series	○	○	○
	WR2 series	○	○	○
	HVRF series	○	○	○
LOSSNAY		○	×	×
OA Processing unit		○	○	×
A-control unit (Mr. Slim)		○*2	○*3	×
AK-control unit (Mr. Slim)		○	○*3	×
K-control unit		×	×	×
Room air conditioner (RAC)		○*2	○*3	×
Air To Water (PWFY) Booster unit Air To Water (PWFY) HEX unit		○	×	○
DOAS (Dedicated Outside Air System)		○	○	×
Commercial PAC (PFAV)		○	○	×
Commercial PAC (PEV/PFV)		○	○	×
Computer room PAC (PFD)*4		○	×	×
AHC		○	×	×
HWHP (CAHV/CRHV)		○	×	×
HWHP (QAHV)		○*5	×	×
e-Series Chiller unit		○*6	×	×
General equipment (DIDO controller connection)		○	×	×
General equipment (indoor unit free contact connection)		○	×	×

*1 Also includes Replace Multi.

*2 A separate adapter is required.
A-control (Mr. Slim) model: M-NET connection adapter
Room air conditioner: M-NET control interface

*3 Only set temperature control or stop control can be performed for RAC and HAC.

*4 When the Computer room PAC is in maintenance mode, operation is not possible.

*5 The units with the software earlier than version 7.60 are connectable to AE-200, but not to AE-50/EW-50.

*6 The connectable EAHV or EACV chillers are P900 (30HP) models with the software version 7.53 or later and P1500(50HP)/P1800 (60HP) models with the software version 7.80 or later.

The table below shows the support status of the AE-200 apportioned electricity billing function for each model of units.

○: Supported [*1]
△: Not supported
(Direct meter readings are used for apportionment.)
×: Not supported

			Apportioned electricity billing function		Capacity save amount	Remarks
			Systems where electric energy is metered (with-metering-device method)	Systems where electric energy is entered manually (no-metering-device method)		
City Multi [*2]	Y series		○	○	○	
	HP series		○	○	○	
	R2 series		○	○	○	
	WY series		○	○	○	
	WR2 series		○	○	○	
	S series		○	○	○	
	HVRF series	WP type	○	○	×	Electric energy consumption of the outdoor units will be apportioned by the thermo-ON time, even if apportionment by capacity save amount is selected.
		W type	○	○	○	Electric energy consumption of the outdoor units can be apportioned by the capacity save amount.
		WL type	○	○	○	Electric energy consumption of the outdoor units can be apportioned by the capacity save amount. (An optional valve kit is required.)
Inverter of packaged air conditioner for equipment			○	○	○	Separately install an electricity meter for packaged air conditioner for equipment.
Packaged air conditioner for equipment			△	○	○	
Air conditioning unit with outlet air temperature control			○	○	○	
LOSSNAY			○	○	×	
OA Processing Unit			○	○	○	Power for humidifying is not taken into account.
A-control unit (Mr. Slim, PUMY) [*3*4]			○	○	○	Separately install an electricity meter for Mr. Slim air conditioner.
AK-control unit (Mr. Slim) [*3]			○	○	○	Apportioned in the same manner as to City Multi.
Room air conditioner (RAC)			△	×	×	
Air To Water Booster unit/Air To Water HEX unit			○	○	×	
HWHP (CAHV/CRHV/QAHV)			×	×	×	
Chiller unit			×	×	×	
MEHT-CH&HP unit			×	×	×	

○: Supported *1
△: Not supported
(Direct meter readings are used for apportionment.)
×: Not supported

	Apportioned electricity billing function		Capacity save amount	Remarks
	Systems where electric energy is metered (with-metering-device method)	Systems where electric energy is entered manually (no-metering-device method)		
General equipment via DIDO controller	△	×	×	
General equipment via indoor unit free contact	△	×	×	Cannot be monitored or operated with the AE-200/AE-50/EW-50.
K-control unit	×	×	×	Cannot be monitored or operated with the AE-200/AE-50/EW-50.

*1 Some types of this model of units do not support the apportioned electricity billing function.
*2 REPLACE Multi is included.
*3 Only when the following M-NET adapter is used, apportionment is possible by setting the apportioning mode for the outdoor unit electric energy to [Capacity save amount].
PAC-SJ95MA, 96MA, SF81MA, SF83MA, SJ19MA
When other model of M-NET adapter is used in the system, set the apportioning mode to [Thermo-ON time] or [FAN operation time].
*4 Select one of the “Power source of A-control unit” setting options from [Same power source (O/U - I/U)] and [Separated power source (O/U - I/U)].

Bar graph and line graph for energy management (*1)

[Legend] ○: Use possible, ×: Use not possible, —: No item

Model \ Graph display details		Bar graphs						Line graphs				
		Electric energy amount	Fan operation time	Thermostat on (total)	Thermostat on (cooling)	Thermostat on (heating)	Meter values	Outdoor air temperature	Set cooling temperature	Set heating temperature	Indoor temperature	Measured value
CITY MULTI	S series	○	○		○		Measurement values of PI controller can be displayed	Measurement values of AHC and AI controller can be displayed	○	○	○	Measurement values of AHC and AI controller can be displayed
	Y series	○	○		○				○	○	○	
	HP series	○	○		○				○	○	○	
	R2 series	○	○		○				○	○	○	
	WY series	○	○		○				○	○	○	
	WR2 series	○	○		○				○	○	○	
	HVRF series	○	○		○				○	○	○	
LOSSNAY		×	○		×				-	-	-	
OA Processing unit		○	○		○				○	○	○	
A-control unit (Mr. Slim)		○	○		○				○	○	○	
AK-control unit (Mr. Slim)		○	○		○				○	○	○	
K-control unit		×	×		×				×	×	×	
Room air conditioner (RAC)		○	○		○				○	○	○	
Air To Water (PWFY) Booster unit		○	○*2		○				○	○	○	
DOAS (Dedicated Outside Air System)		○	○		○				○	○	○	
Commercial PAC (PFAV)		○	○		○				○	○	○	
Commercial PAC (PEV/PFV)		○	○		○				○	○	○	
Computer room PAC (PFD)		○	○		○				○	○	○	
AHC		-	-		-				-	-	-	
HWHP (CAHV/CRHV)		-	-		-				-	-	-	
General equipment (DIDO controller connection)		×	×		×				-	-	-	
General equipment (indoor unit free contact connection)		×	×		×				-	-	-	

*1 Registration of the license is required for each AE-200/AE-50/EW-50.

*2 Becomes the cumulative operation time.

• The above functions are subject to change without notice for improvement.

(2) Number of connectible/controllable units in a system

1. Number of controllable units for AE-200/AE-50/EW-50

Item	Description	Managed equipment
Number of controllable indoor units	Max. 50*1	IC, LC, FU, AIC, RAC, PWFY, HWHP, AI controllers, PI controllers, DIDO controllers*2, AHC*3

[Code] IC: Indoor unit (OA Processing unit [without interlock control]), LC: Free-plan LOSSNAY, FU: OA Processing unit (with interlock control), AIC: Mr. Slim air conditioner, RAC: Room air conditioner, PWFY: Air To Water (PWFY), HWHP: HWHP (CAHV, CRHV)

*1 AE-50 cannot be operated individually.

*2 One contact is counted as one unit for a DIDO controller.

*3 Maximum number of connectible/controllable units in the case of AHC: Indoor units + AHC = 70 units.

2. Number of controllable units in an AE-200 + expansion controller (AE-50/EW-50) system

Item	Description	Managed equipment
Number of controllable indoor units	Max. 200 (When using three AE-50/EW-50)*1	IC, LC, FU, AIC, RAC, PWFY, HWHP, AI controllers, PI controllers, DIDO controllers*2, AHC*3

*1 When M-NET of AE-200 is not used or the apportioned electricity billing function of AE-200 is used, four AE-50/EW-50 units can be connected. (Max. 200 indoor units)

*2 One contact is counted as one unit for a DIDO controller.

*3 Maximum number of connectible/controllable units in the case of AHC: Indoor units + AHC = 70 units.

(3) When performing integrated centralized control with the integrated centralized control software TG-2000A.

Use Ver.6.60 or later of TG-2000A.

(4) Number of connectable units

The table below summarizes the number of connectable units in an M-NET system.

Unit type	Number of connectable units
Indoor units, PWFY, HWHP, LOSSNAY, OA Processing unit, DIDO controllers, PI controllers*1, and AI controllers per AE-200/AE-50/EW-50	Up to 50 units*2 (including the interlocked LOSSNAY units)
AHC per AE-200/AE-50/EW-50	Maximum of 70 indoor units for indoor units + AHC
Indoor units, PWFY, HWHP, e-Series Chiller unit, LOSSNAY, OA Processing unit, and DIDO controllers in one group	1–16 units*3*4 (Indoor units, PWFY, HWHP, LOSSNAY, OA Processing unit, and DIDO controllers cannot be used together in the same group.)
AHC in a group	1 unit (At least one indoor unit is required in the same group.)
Remote controllers in a group	0–2 units
System controllers in a group (AE-200/AE-50/EW-50 included)	0–5 units (Up to four remote and system controllers combined can be assigned to each group.)
LOSSNAY unit that can be interlocked with each indoor unit	1 unit
Indoor units that can be interlocked with each LOSSNAY unit	1–16 units

*1 15 PI controllers can be connected to each AE-200/AE-50/EW-50 and a maximum of 20 can be connected within an AE-200 system. A PI is counted as one unit.

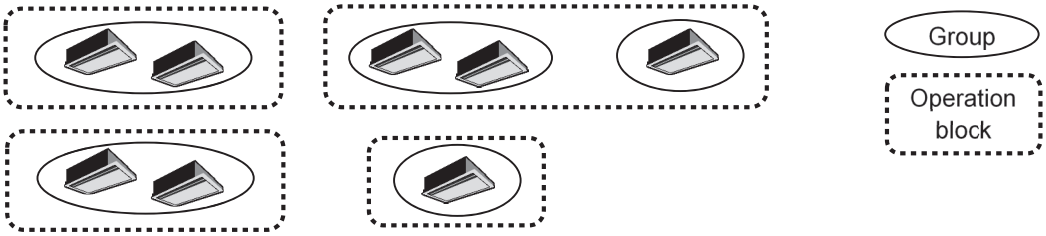
*2 By connecting AE-50/EW-50 controllers to an AE-200, up to 200 units can be controlled.

*3 The maximum number of controllable units for DIDO controllers differs depending on the number of channels used.

*4 One contact of a DIDO controller is calculated as one unit.

(5) Operation block setting restrictions

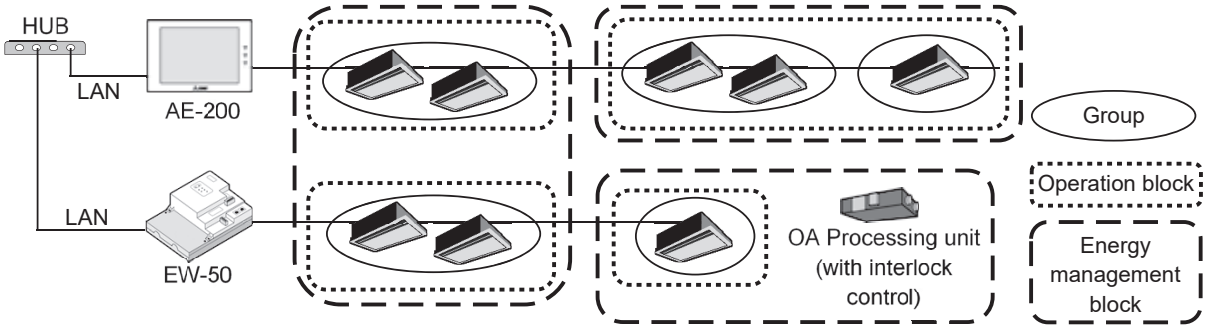
- An operation block is a collection of groups, and groups of different models (air conditioning units, LOSSNAY, general equipment, etc.) can even be set in the same operation block.



- An operation block that spans AE-200/AE-50/EW-50 systems cannot be set.
- The operation items differ so we recommend setting operation blocks separately for each of the indoor units, LOSSNAY units, and A-control models.
- When peak-cut control is used, blocks become the setting target unit so be sure to set the operation blocks.

(6) Energy management block setting restrictions

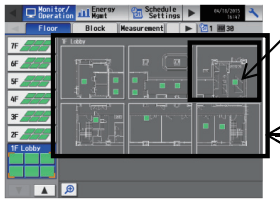
- An energy management block is a collection of operation blocks and OA Processing unit (with interlock control), and operation blocks of different models (air conditioning units, LOSSNAY, general equipment, etc.) can also be set in the same energy management block.



- An energy management block that spans multiple AE-50/EW-50 in an AE-200 system can be set, but an energy management block cannot span multiple AE-200 systems.
- When the apportioned electricity billing function is used, energy management blocks become the apportioning target unit so be sure to set the energy management blocks.

(7) Group setting restrictions

Restrictions also apply to group settings.

Item	Description	Remark
Number of remote controllers that can be connected	Up to two remote controllers in one group	MA remote controllers do not need to be registered and set on this equipment.*1
Number of indoor units that can be connected in one group	1 to 16	IC, AIC, FU, and LC cannot be connected to the same group. However, groups that span multiple AE-200/AE-50/EW-50 cannot be configured.*2
Number of SC and RC units that can be connected in one group	Up to four units in one group	
Number of groups per area Number of groups per floor	Up to 30 groups per area Up to 180 groups per floor	 [Area] Up to 30 groups can be placed [Floor] Up to 180 groups can be placed

*1 An ME remote controller and MA remote controller cannot be used together in the same group.

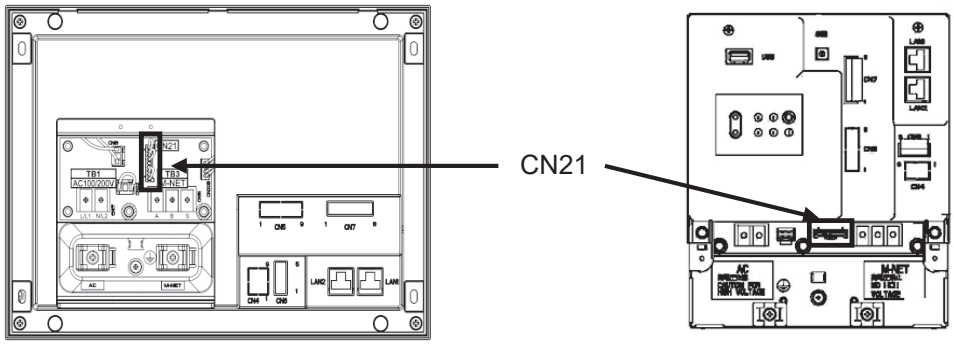
*2 If a group is made up of indoor units with different functions, only the function of the indoor unit with the lowest address in the group is operated and monitored.

[2] System connection

The following shows the equivalent power supply of the AE-200/AE-50/EW-50 and transmission line power supply unit and the equivalent power consumption and the equivalent number of units of the DIDO controller, PI controller, and AI controller.
Leave the power jumpers (CN41) of the outdoor units that are connected to M-NET centralized control transmission lines all connected to the CN41 in the same way as they were connected at the time of shipment.
If the equivalent power supply is insufficient because system remote controllers and other equipment are connected to the M-NET centralized control transmission lines, transmission line power supply units need to be added.
When connecting system remote controllers and other equipment to the M-NET centralized control transmission lines, make sure that the equivalent number of units total will be 40 or less.
If the equivalent number of units will exceed 40, add transmission line power supply units so that the equivalent number of units will be 40 or less.
To supply M-NET power from a transmission line power supply unit, disconnect the CN21 jumper from the AE-200/AE-50/EW-50.

Product	Model	The equivalent power supply	The equivalent power consumption	The equivalent number of units
Air Conditioning Control System Centralized Controller	AE-200	0.75	-	-
Air Conditioning Control System Centralized Controller (Expansion controller)	AE-50	0.75	-	-
Air Conditioning Control System Centralized Controller (Controller or Expansion Controller without LCD)	EW-50	1.5	-	-
Power Supply Unit for Transmission Line	PAC-SC51KUA	5	-	-
Power Supply Expansion Unit for Transmission Line	PAC-SF46EPA	25	-	-
System Remote Controller	AT-50B, TC-24B	-	1.5	5
	AT-50A, TC-24A	-	1.5	5
	PAC-SF44SRA	-	0.5	1
ON/OFF Remote Controller	PAC-YT40ANRA	-	1	1
ME Remote Controller	PAR-U02MEDA, PAR-U01MEDU	-	0.5	1
	PAR-F27MEA, PAR-F27MEA-US	-	0.25	1
AHC	PAC-IF01AHC-J	-	0.5	1
DIDO Controller	PAC-YG66DCA	-	0.25	1
PI Controller	PAC-YG60MCA	-	0.25	1
AI Controller	PAC-YG63MCA	-	0.25	1
MN Converter	CMS-MNG-E	-	2	1
	CMS-MNF	-	0.5	1
Simple ME Remote Controller	PAC-SE51CRA	-	0.25	1
Group Remote Controller	PAC-SC30GRA	-	0.5	1
Schedule Timer	PAC-YT34STA	-	0.5	1

NOTE:
- If you remove the service cover from the back of the unit, you will find the power jumper (CN21) of the AE-200/AE-50 in the place indicated in the figure below.
- If you remove the service cover from the front of the unit, you will find the power jumper (CN21) of the EW-50 in the place indicated in the figure below.



AE-200/AE-50 EW-50

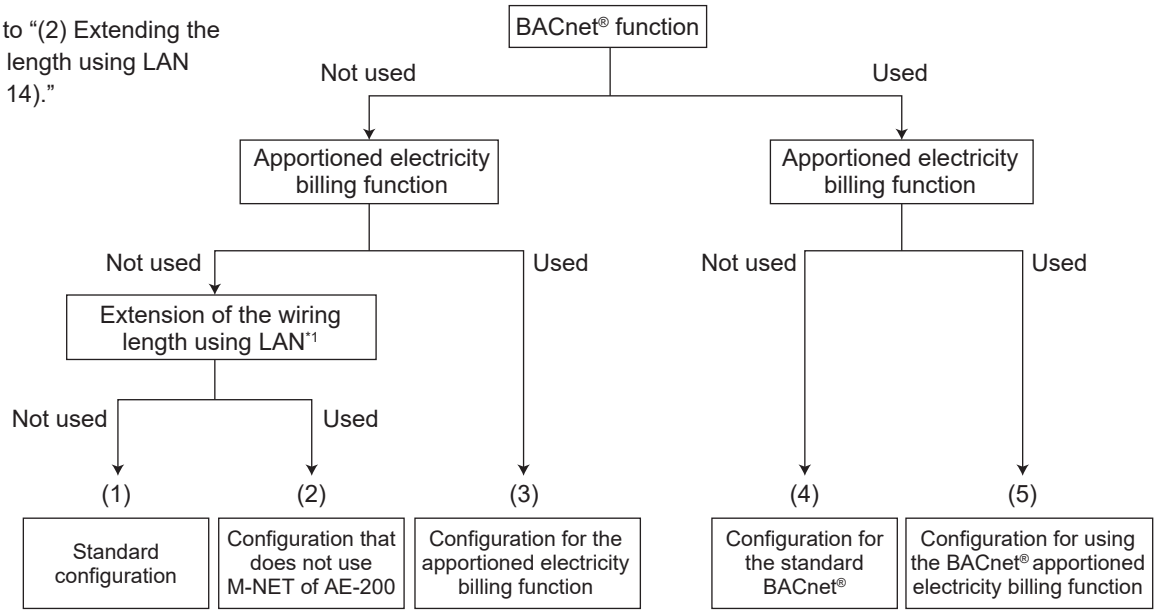
[3] AE-200 system configuration

1. Flowchart for selecting the system configuration

(1) Flowchart for selecting the system configuration

Up to 200 air conditioning units can be monitored and operated by connecting AE-200/AE-50/EW-50.

*1 Refer to "(2) Extending the wiring length using LAN (page 14)."

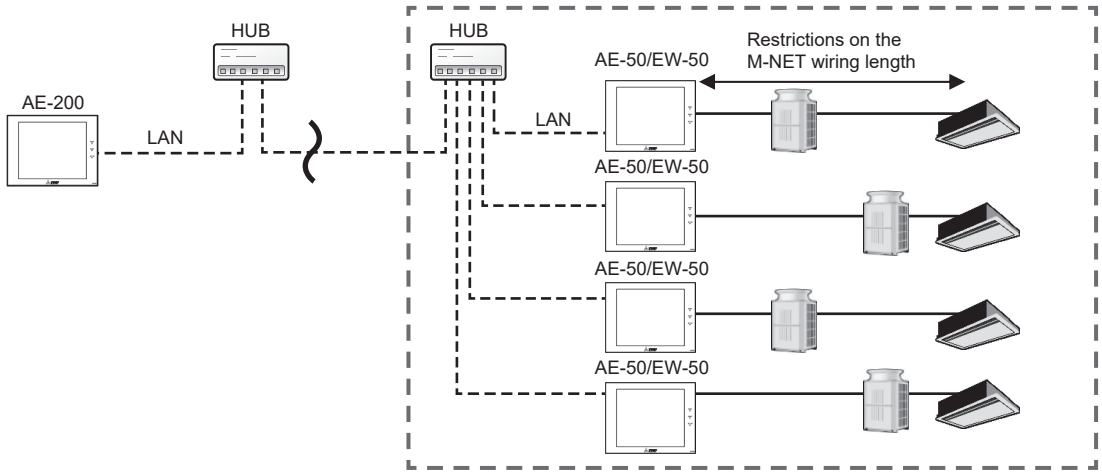


* The M-NET transmission line of AE-200 cannot be used when the apportioned electricity billing function is used. Use the M-NET transmission line of AE-50/EW-50.
* HWHP units or e-Series Chillers cannot be connected to the M-NET transmission line of AE-50/EW-50. Use the M-NET transmission line of AE-200.
* A-control Mr. Slim, room air conditioning units, residential air conditioning units, HWHP units, or e-Series Chillers cannot be connected to the indoor/outdoor transmission line. Use the transmission line for centralized control. (Refer to the catalog, delivery specifications, or other document for details of the connectable units.)
* The apportioned electricity billing function cannot be used for HWHP units or e-Series Chillers. When the apportioned electricity billing function is used on the air conditioning unit, install another AE-200 that does not use the apportioned electricity billing function, and connect the HWHP unit or e-Series Chiller to this AE-200. Configure an individual system for each of HWHP unit, e-Series Chiller, and other units.
* To use the apportioned electricity billing function or the BACnet® connection function, it is necessary to register the license (optional).
* ME remote controllers and MA remote controllers cannot be connected to HWHP units or e-Series Chillers. Use the dedicated remote controller.
* The BACnet® system must be configured in consideration of the building management system. For details, contact your dealer.

(2) Extending the wiring length using LAN

When the LAN connection is configured as shown in the figure below, AE-200 can be installed without restrictions on the M-NET wiring length.

When the units are connected as shown in the figure below, set the "AE-200M-NET" in the initial setting of AE-200 to "Do not use."
M-NET devices cannot be connected to AE-200. Up to four expansion controllers AE-50/EW-50 can be connected.



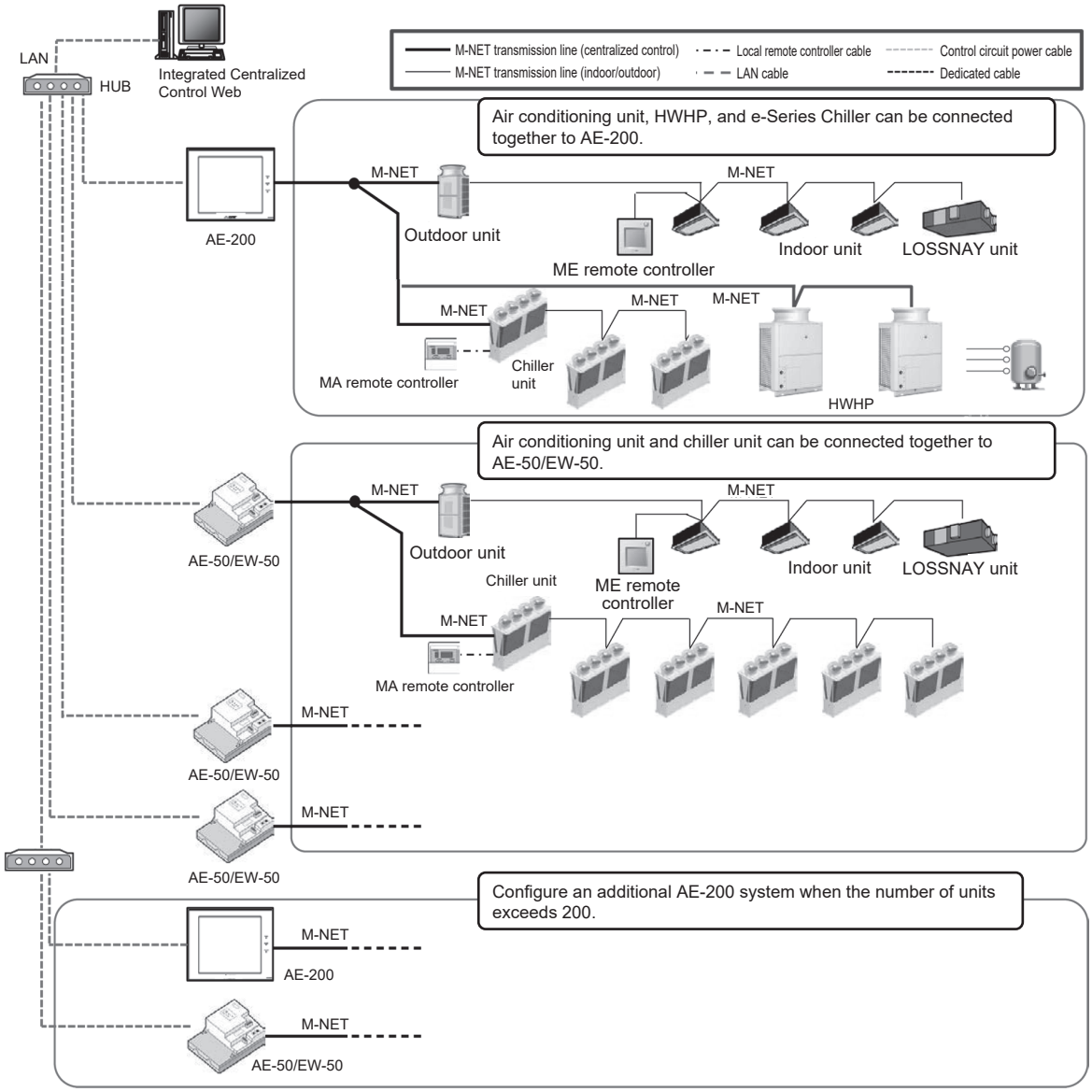
Connect the LAN cable to the LAN 1 port on AE-200/AE-50/EW-50.

When the LAN wiring length exceeds 100 m, a switching HUB is required. The LAN wiring length can be extended with no limitations. However, the transmission delay time between AE-200 and AE-50/EW-50 must be four seconds or shorter.

2. System configuration examples

(1) Standard configuration

When connected to AE-200 or the expansion controller AE-50/EW-50, air conditioning units, HWHP units, and e-Series Chillers can be monitored and operated collectively.
(Connect the LAN cable to the LAN 1 port on AE-200/AE-50/EW-50.)



<Number of connectable units>

- Up to 50 air conditioning units or HWHP units (calculated based on the number of indoor units) can be connected to AE-200. Up to 50 air conditioning units or chiller units (calculated based on the number of indoor units) can be connected to the expansion controller AE-50/EW-50.
- Up to 200 units (calculated based on the number of indoor units) can be connected to AE-200 when three expansion controllers AE-50/EW-50 are used. When Integrated Centralized Control Web is used, units in up to 40 M-NET systems (a maximum of 2,000 units calculated based on the number of indoor units) can be monitored and operated.

- Up to 50 air conditioning units in one M-NET system can be controlled. The number of units (other than air conditioning units) must be converted to the number of indoor units by using the formula below.

Chiller unit : When chiller units and other types of units are connected at the same time, one chiller unit is calculated as three indoor units.
Calculate the connectable number of other types of units by the following formula.
The connectable number of other types of units = 50 - (number of chiller units) × 3 (units)

Example) When one chiller unit is connected, the connectable number of other types of units is 47.
When two chiller units are connected, the connectable number of other types of units is 44.
When 16 chiller units are connected, the connectable number of other types of units is 2.
When 17 to 24 chiller units are connected, other types of units cannot be connected.

HWHP : When HWHP units and other types of units are connected at the same time, one HWHP unit is calculated as two indoor units.

Example) When one HWHP unit is connected, the connectable number of other types of units is 48 (calculated based on the number of indoor units).
When two HWHP units are connected, the connectable number of other types of units is 46 (calculated based on the number of indoor units).
When 24 HWHP units are connected, other types of units cannot be connected.

<Chiller unit>

- Chiller units can be connected to AE-200 or the expansion controller AE-50/EW-50.
  Chiller units cannot be connected to standalone EW-50.
- Up to 24 chiller units can be connected to one M-NET system (when no other types of units are connected).

<Integrated Centralized Control Web>

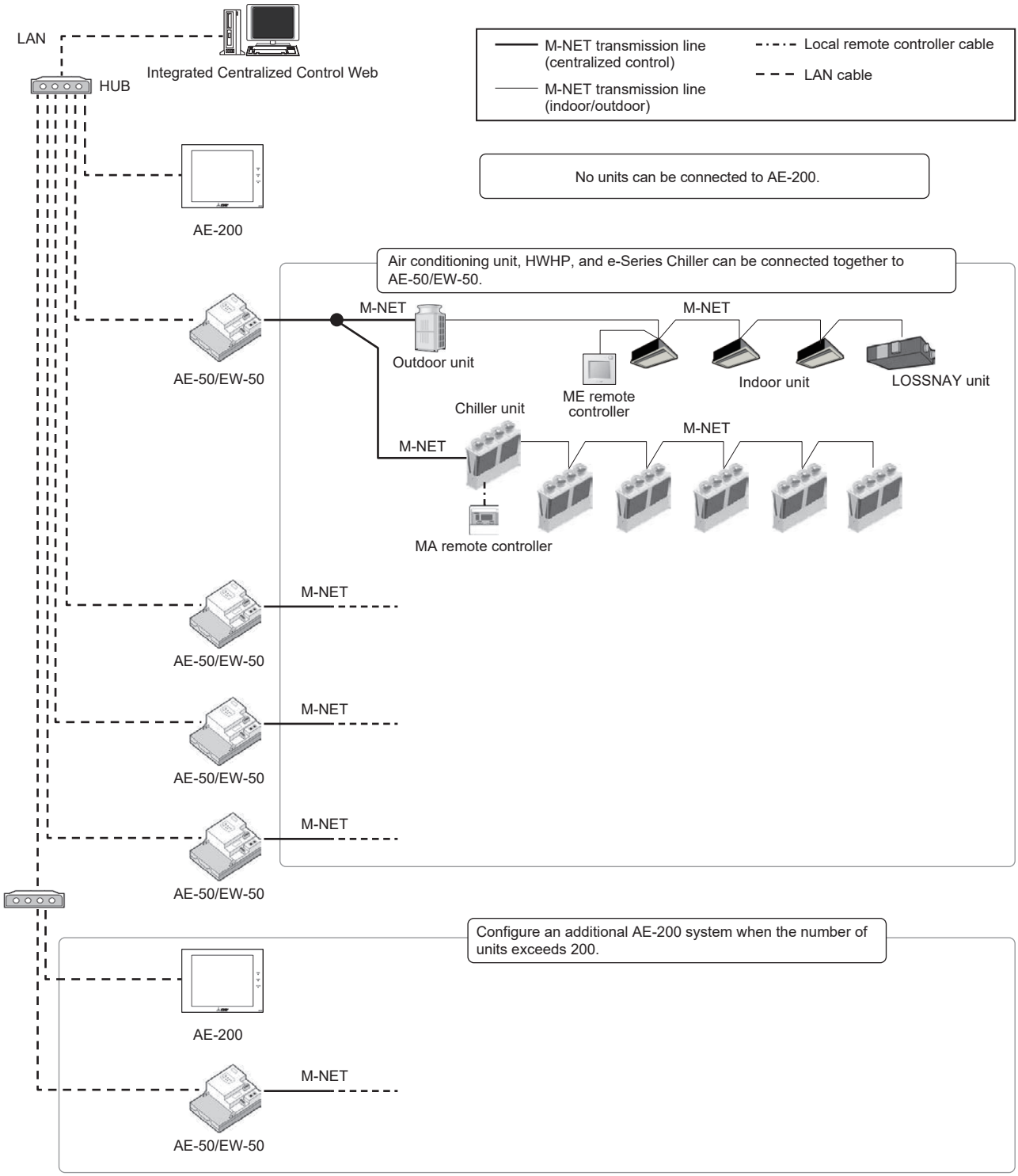
- To control multiple AE-200 systems or multiple EW-50 units (when no other types of units are connected) from one Integrated Centralized Control Web, it is necessary to register the Integrated Centralized Control Web license (optional).

<HWHP unit>

- Up to 24 HWHP units can be connected to one M-NET system (when no other types of units are connected).

(2) Installing AE-200 in a remote area via LAN

When the LAN connection is configured without using the M-NET transmission line of AE-200 as shown in the figure below, AE-200 can be installed without restrictions on the M-NET wiring length. Up to four expansion controllers AE-50/EW-50 can be connected. Refer to “[3] 1. (2) Extending the wiring length using LAN” for details.
(Connect the LAN cable to the LAN 1 port on AE-200/AE-50/EW-50.)



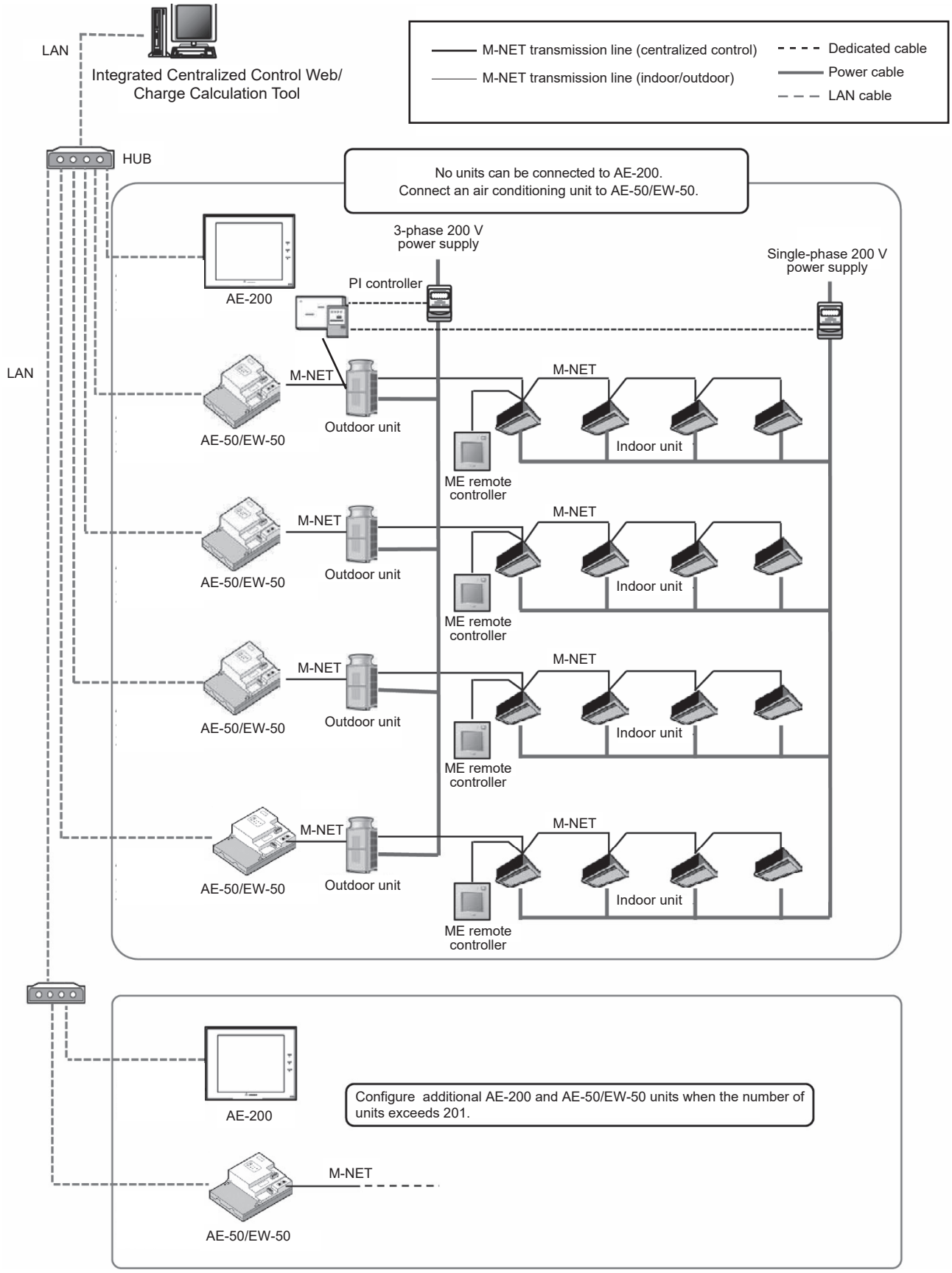
<Number of connectable units>
- Do not connect M-NET devices to AE-200. Up to 50 air conditioning units, HWHP units, and e-Series Chillers (calculated based on the number of indoor units) can be connected to the expansion controller AE-50/EW-50.
- Up to 200 units (calculated based on the number of indoor units) can be connected to AE-200 when four expansion controllers AE-50/EW-50 are used. When Integrated Centralized Control Web is used, units in up to 40 M-NET systems (a maximum of 2,000 units calculated based on the number of indoor units) can be monitored and operated.
- Up to 50 air conditioning units in one M-NET system can be controlled.

<Integrated Centralized Control Web>
- To control multiple AE-200 systems or multiple EW-50 units (when no other types of devices are connected) from one Integrated Centralized Control Web, the Integrated Centralized Control Web license is required.

<Restrictions applied when the M-NET transmission line of AE-200 is not used>
- Meter pulse input to AE-200(CN7) is not available.
- ON/OFF or emergency stop input to AE-200(CN5) is not available.
  Only the demand level input is available when referred to by other EW-50.

(3) Using the apportioned electricity billing function

The apportioned electricity billing function can be used in addition to monitoring and operation of up to 200 air conditioning units.
(Connect the LAN cable to the LAN 1 port on AE-200/AE-50/EW-50.)



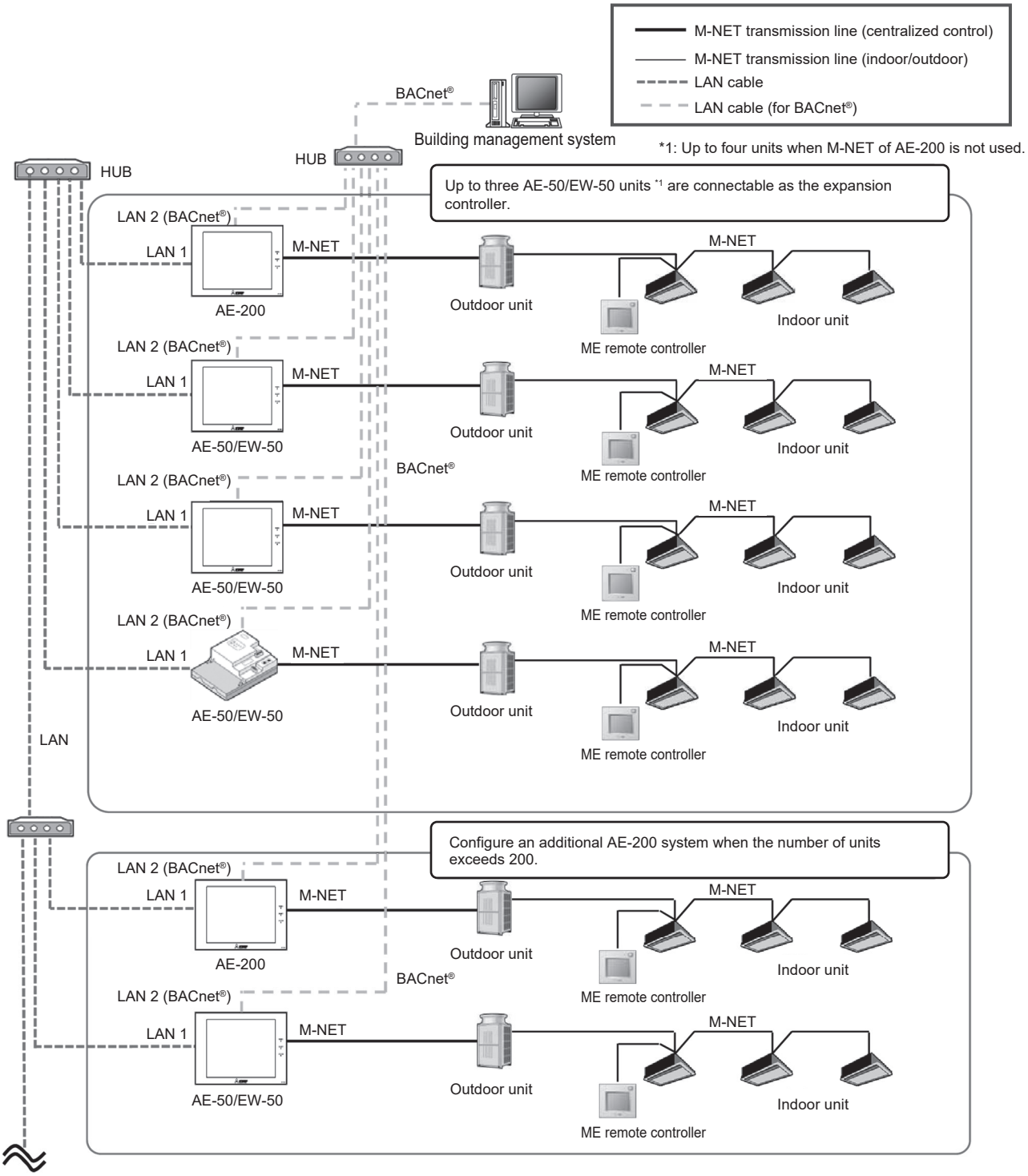
<Apportioned electricity billing function>

- The apportioned electricity billing function is not supported by HWHP units or e-Series Chillers.
- To use this function, register the apportioned electricity billing license (optional).
- AE-200 must be used. This function cannot be used in the system configured only by EW-50.
- No devices can be connected to the M-NET system of AE-200.
- Meter pulse input to AE-200 is not available. It is recommended to measure electricity with a PI controller. (When the built-in meter pulse input function of AE-50/EW-50 is used, the pulse input cannot be acquired during power outage or power off of AE-50/EW-50 or version update of the software. Due to this, the measured amount of electricity may be different from the actual amount.)
- The amount of electricity that is input from Electric Amount Count Software cannot be used in the apportioned electricity billing function.
- It is recommended to install a watt-hour meter to each outdoor unit to minimize the effects of difference in capacity, characteristics, or refrigerant pipe length of the model.
- The apportioned electricity billing function of AE-200 and that of TG-2000 cannot be used at the same time. When configuring the system, select AE-200 or TG-2000 on which the apportioned electricity billing function is used.
- This function can be used together with TG-2000 that does not perform the electricity billing function. Note that the software version of TG-2000 must be 6.61 or later.
- Sale of TG-2000 has been terminated.

(4) Standard configuration of BACnet®

The building management system manages each of AE-200/AE-50/EW-50 (up to 50 units each).
Connect the LAN cable for BACnet® only to AE-200/AE-50/EW-50 that includes the BACnet®-controlled unit.

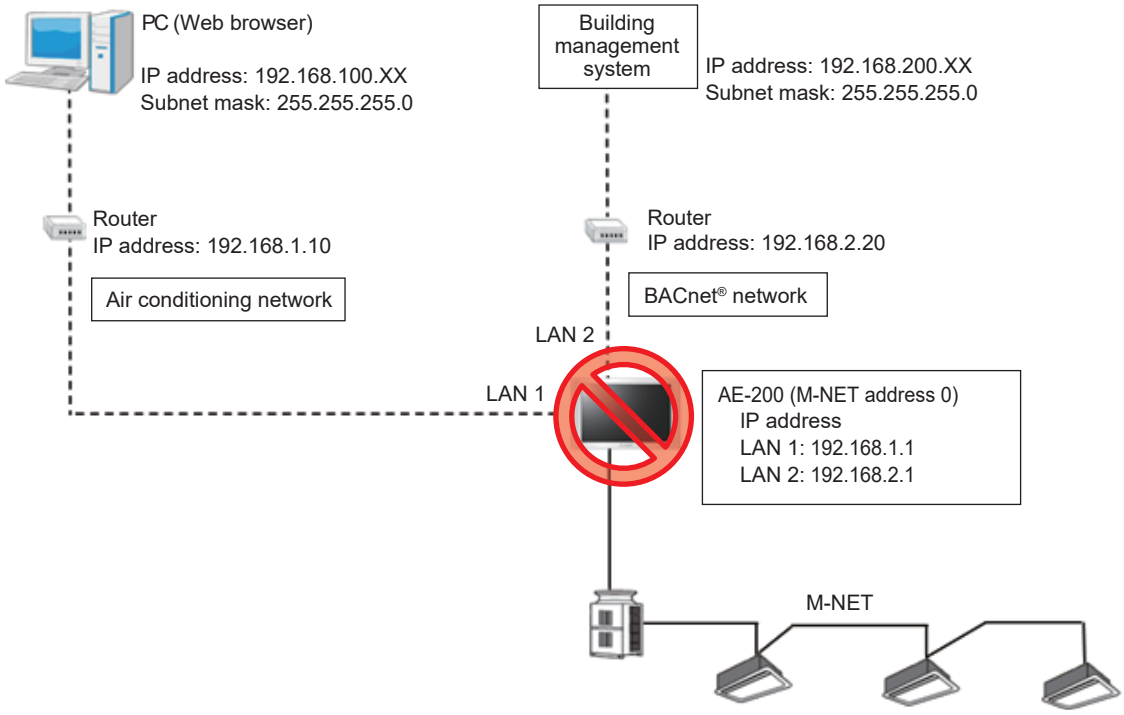
During the BACnet® communication, the communication load becomes heavier due to increased broadcast. Separately configure the LAN 1 system (air conditioning network) and the LAN 2 system (BACnet® network). Do not set the same IP address for LAN 1 and LAN 2 (BACnet® network).



<Connectable units>
- BACnet® is not supported by HWHP units or e-Series Chillers.

<Time synchronization>
- When the LAN cable for BACnet® is not connected to AE-200, set the [Time Master/Sub] setting of AE-200 to [Sub]. (The time setting of AE-200 is synchronized via AE-50/EW-50 that is connected via BACnet®.)

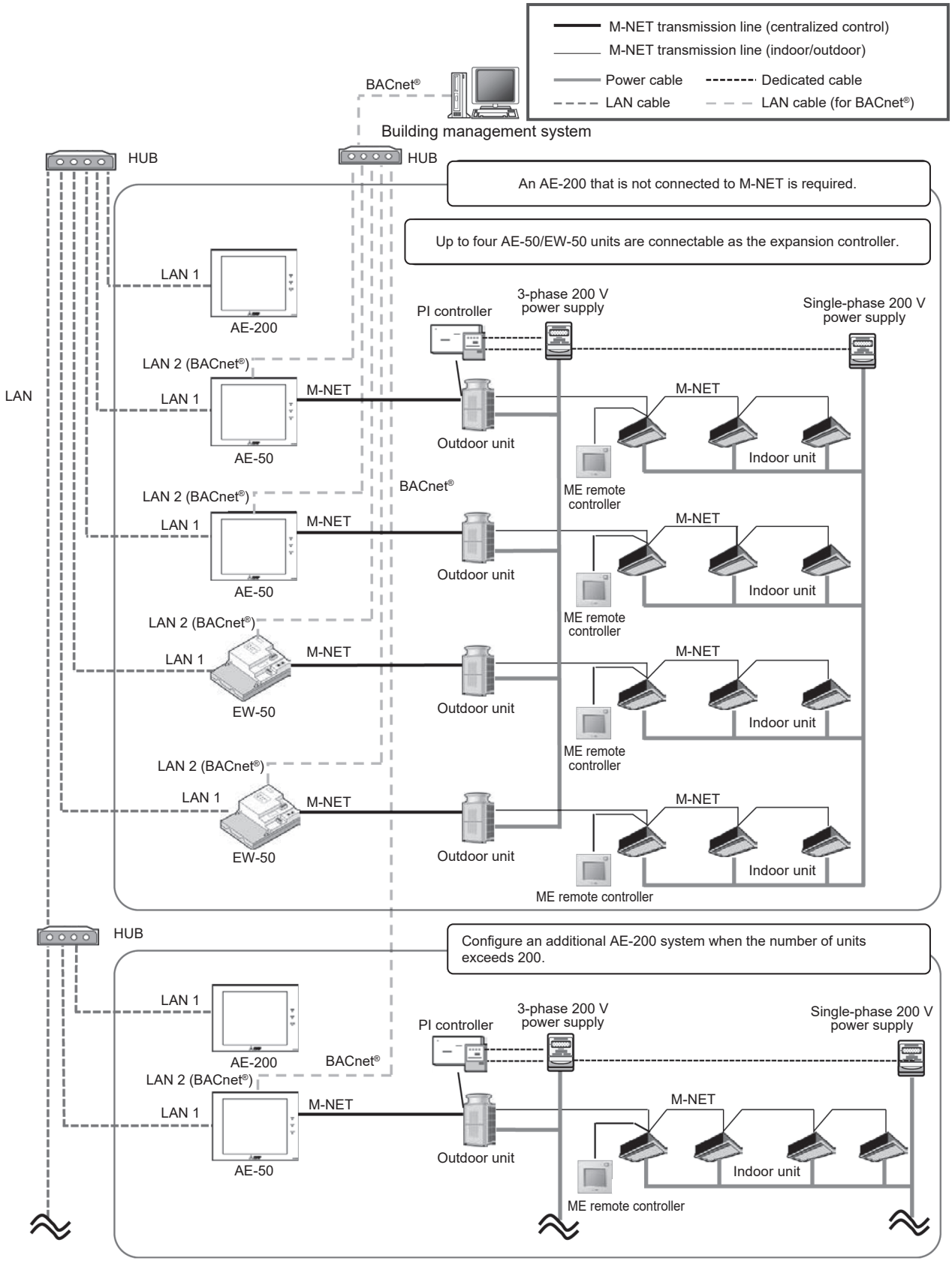
<When routers are connected to both LAN 1 and LAN 2>
Because AE-200 (or EW-50) has two LAN ports (LAN 1 and LAN 2), both of the air conditioning network and the BACnet® network can be connected. However, the network connection via router cannot be made for both LAN 1 (air conditioning network) and LAN 2 (BACnet® network) as shown in the figure below. (For details, contact your dealer.)



(5) Configuration when the apportioned electricity billing function is used in BACnet®

To use the apportioned electricity billing function in BACnet®, connect only AE-50/EW-50 to BACnet®.
Do not use BACnet® for connecting AE-200 that performs apportion.

During the BACnet® communication, the communication load becomes heavier due to increased broadcast. Separately configure the LAN 1 system (air conditioning network) and LAN 2 system (BACnet® network). Do not set the same IP address for LAN 1 and LAN 2 (BACnet® network).



<LAN connection and setting>
- AE-200/AE-50/EW-50 has two LAN ports (LAN 1 and LAN 2). LAN 2 is for BACnet®.
- Do not connect the LAN cables for LAN 1 and LAN 2 (BACnet® network) to the same HUB.
- Do not set the same IP address for LAN 1 and LAN 2 (BACnet® network).

<Time synchronization>
- To perform the time synchronization from the building management system, set the [Time Master/Sub] setting of AE-200 to [Sub].
  (The time setting of AE-200 will be synchronized via AE-50/EW-50 that is connected via BACnet®.)

<HWHP and e-Series Chiller>
- HWHP units or e-Series Chillers are not subjected to the BACnet® control.

<Apportioned amount of electricity>
- Amount of electricity is apportioned by groups (not by energy management blocks).
  To manage the apportioned amount of electricity by combining multiple groups into one tenant, use the control system.
  Use the control system also for calculating the charge.

(6) Connection to A-control Mr. Slim

A-control Mr. Slim can be connected to the M-NET transmission line in either of the following two ways. By making this connection, centralized control of A-control Mr. Slim from the system controller such as AE-200 becomes available.

■ Using the M-NET adapter

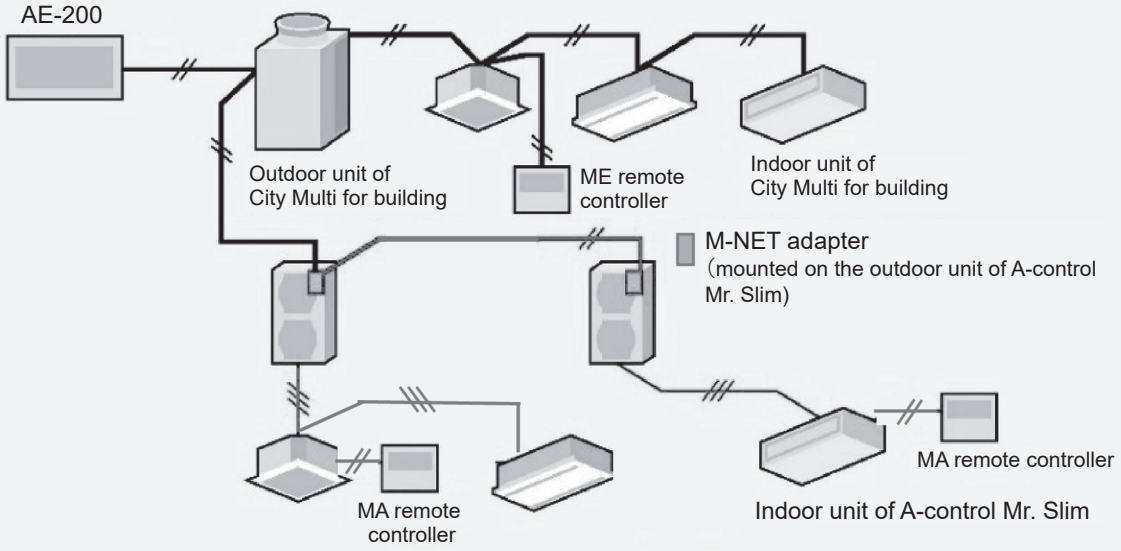
Attach the M-NET adapter to the outdoor unit to connect A-control Mr. Slim to the M-NET transmission line.
Note that the following restrictions will be applied.

1. The transmission line for M-NET centralized control must be used. The indoor/outdoor transmission line cannot be used.

2. The following functions of the system controller cannot be used.
   1) Prohibiting the operation of air flow direction, fan speed, or timer on the local remote controller
   2) Prohibiting the operation of the local remote controller when Air Conditioning Control System Adapter (PAC-YV03LMAP) is connected
      (Prohibiting the operation of ON/OFF, operation mode, temperature setting, or filter sign reset)
   3) Notification of the time setting to the local remote controller (supplied wireless remote controller and MA remote controller)

* Function 1) above is available when PAC-SJ98MA is used and all the outdoor units in the applicable group are A-control Mr. Slim hyper-heating models (MPUZ-HRMP·KA2 or later) released in May 2018 or later.
* The model name of the M-NET adapter varies with the model name of A-control Mr. Slim.
For details, refer to the technical manual of A-control Mr. Slim.

Connection example (when AE-200 is connected to the outdoor unit of A-control Mr. Slim via the transmission line for M-NET centralized control)



■ Using the M-NET interface

Attach the M-NET interface to the indoor unit to connect A-control Mr. Slim to the M-NET transmission line.
Note that the following restrictions will be applied.

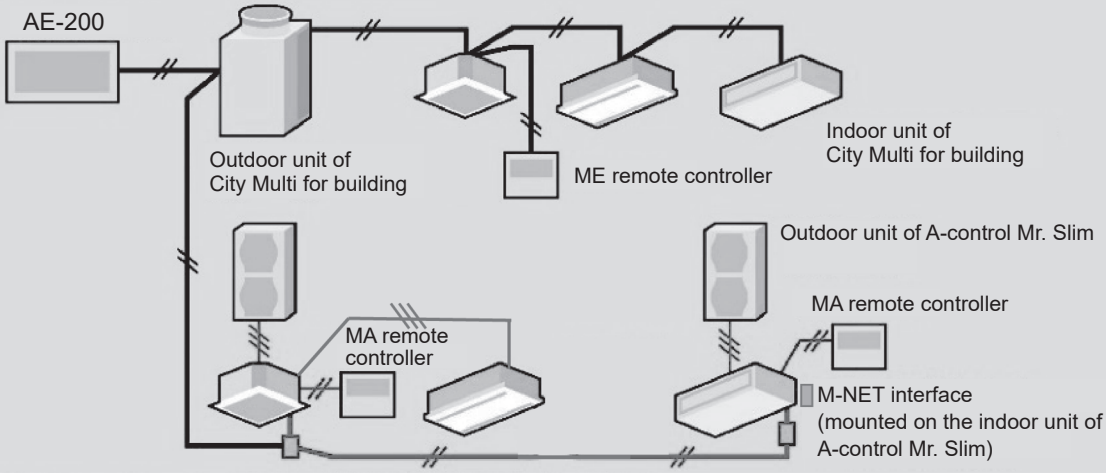
1. The transmission line for M-NET centralized control must be used. The indoor/outdoor transmission line cannot be used.

2. Connect the M-NET interface to any one of the indoor units in the twin, triple, or four configuration. Connect the M-NET interface to the indoor unit to which the MA remote controller is connected.
   * When the M-NET interface is connected to the indoor unit other than that connected to the MA remote controller or wireless receiver kit, the operation prohibition setting may not be applied correctly from the system controller to the local remote controller.

3. The following functions of the system controller cannot be used.
   1) Displaying or resetting the filter cleaning sign
   2) Prohibiting the operation of the filter sign reset of the local remote controller[*1]
   3) Prohibiting the operation of air flow direction, fan speed, or timer of the local remote controller
   4) Operation of the local remote controller cannot be prohibited when Air Conditioning Control System Adapter (PAC-YV03LMAP) is connected
      (Prohibiting the operation of ON/OFF, operation mode, temperature setting, or filter sign reset)
   5) Limiting the setting temperature range of the local remote controller (supplied wireless remote controller and MA remote controller)[*1]
   * ME remote controller is not applicable.
   6) Energy management function[*2]
   7) Capacity save function of the outdoor unit by using the energy save control or the energy saving peak cut control[*2]
   8) Apportioned electricity billing function[*1]
   *1 The apportioned electricity billing function is available when PAC-SK16MF is connected.
   *2 The apportioned electricity billing function is available when PAC-SK16MF is connected and AE-200 (Ver. 7.80) is used.

4. The following functions of the system controller are restricted.
   1) The cooling/heating temperature setting and the room temperature display are performed in 1°C unit.
   2) When the interlocked operation of the LOSSNAY unit is set, connect the LOSSNAY unit via M-NET.
      The ventilation mode of the LOSSNAY unit that is not connected via M-NET (the LOSSNAY unit directly interlocked with the indoor unit) cannot be changed.
   3) The remote monitoring operation must be performed by the remote control function of the M-NET interface, not by the remote control function of the indoor unit.
   4) Connect the MA remote controller to the indoor unit.

Connection example (when AE-200 is connected to the indoor unit of A-control Mr. Slim via the transmission line for M-NET centralized control)



[4] Restrictions and Notes on AC Power Supply Wiring

(1) Notes

1. Perform electrical work in accordance with the instructions in the installation manual.
2. To prevent electrical noise from the power supply wiring affecting the wiring for transmission (control), lay the power supply wiring at least 5 cm (2 in) apart if laying the wiring in parallel. (Do not insert them in the same conduit.)
3. Be sure to connect the ground wire for protection.
4. Select electrical wiring that meets the requirements in the following table.

Recommended power cable type	VCT, VVF, VVR, or its equivalent
Power cable size	0.75 to 2.00 mm² (ø1.0 to ø1.6 mm)

[5] Restrictions and Notes on Transmission Wiring

(1) Notes

1. Perform electrical work in accordance with the instructions in the installation manual.
2. To prevent the wiring for transmission (control) from being affected by electrical noise from the power supply wiring, lay the wiring for transmission (control) at least 5 cm (2 in) apart from the power supply wiring. (Do not insert them in the same conduit.)
3. Never connect a 100 V or 200 V power supply to the terminal block for the transmission wiring. In the event that a power supply is connected, the electrical components will burn out.
4. Use a 2-core shielded cable for the transmission wiring. Never use the same cable with multiple cores for wiring multiple systems because the transmission signals will become unable to be sent and received normally, resulting in erroneous operation.

(2) M-NET transmission line

The type and tolerance of wiring differ depending on the system configuration. Furthermore, if the transmission line is long and there is a noise source within the vicinity of a unit, move the noise source away from the unit to prevent noise interference.

Transmission line type*1	CPEVS ø1.2 to ø1.6 mm: PE insulated PVC jacketed shielded communication cable CVVS, MVVS 1.25 to 2 mm²: PVC insulated PVC jacketed shielded control cable
Maximum length for indoor/ outdoor transmission line	Max. 200 m (656 ft)
Farthest distance for M-NET transmission line (maximum length via an outdoor unit)	Max. 500 m (1640 ft) * The maximum wire length from the transmission line power supply unit installed for the centralized control transmission line to each outdoor unit and system controller is 200 m (656 ft).

(3) Remote controller line

		MA remote controller*1	M-NET remote controller*2	
Wiring type	Type	VCTF, VCTFK, CVV, CVS, VVR, VVF, VCT	10 m (32 ft) or less	If 10 m (32 ft) is exceeded
			Shielded wire CVVS,CPEVS,MVVS	
	Number of wires	2-core cable	2-core cable	
	Wire diameter	0.3 to 1.25 mm² *3*4 (0.75 to 1.25 mm²)*5	0.3 to 1.25 mm² *3*4 (0.75 to 1.25 mm²)*5	At least 1.25 mm²
Total length		Max. 200 m (656 ft)*6	Max. 10 m (32 ft)	The portion that exceeds 10 m (32 ft) must be included in the calculation for the maximum length of the indoor/outdoor transmission line.

*1 MA remote controllers include simple MA remote controllers and wireless remote controllers.
*2 M-NET remote controllers refer to ME remote controllers and LOSSNAY remote controllers.
*3 A wire diameter of up to 0.75 mm2 is recommended.
*4 When connecting an MA remote controller, use a 0.3 mm2 cable with a sheath for the wiring.
*5 When connecting to the terminal block of a simple MA remote controller, use wire with a diameter within the parentheses.
*6 Maximum 100 m (328 ft) when connecting a pair of remote controllers including an MA remote controller.

The following shows an example of a wiring diagram for the M-NET transmission line of CITY MULTI.
The example in the figure below shows the cable length limit of centralized control M-NET transmission line and indoor-outdoor M-NET transmission line for each system.

1. Farthest distance for M-NET transmission line (limited by attenuation of the signal waveform)
   - Make the distance between the transmission source and transmission destination of signals no more than 500 m (1640 ft).
     If this maximum distance is exceeded, communication will become impossible due to the attenuation of the waveform.
     a+c+d ≤ 500 m (1640 ft), a+c+e ≤ 500 m (1640 ft), a+b+f ≤ 500 m (1640 ft), c+d+b+f ≤ 500 m (1640 ft), c+e+b+f ≤ 500 m (1640 ft)

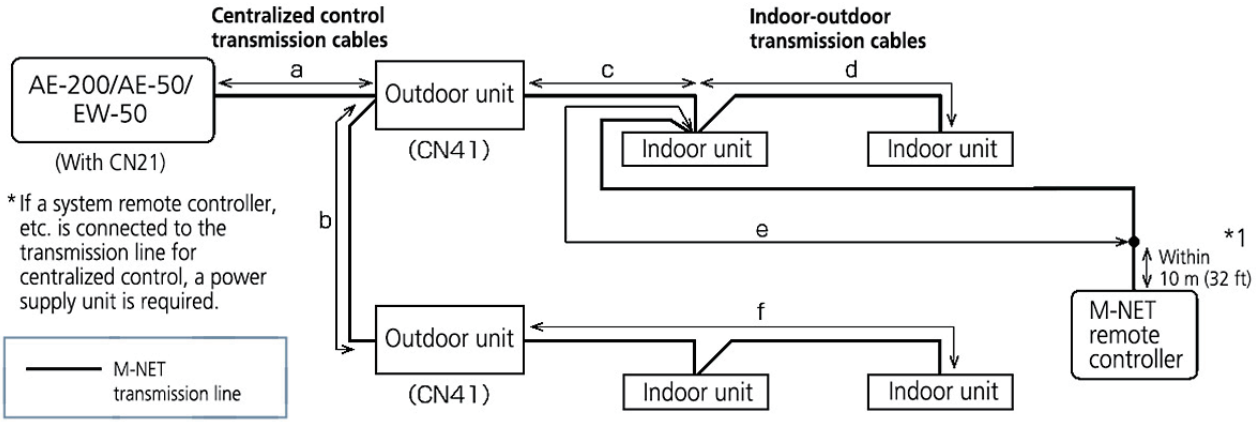
2. Maximum power supply distance for M-NET transmission line (limited by voltage drop)
   (1) Maximum total length of power feed for the centralized control transmission lines
   - Make the distance between the supply source and supply destination of power no more than 200 m (656 ft).
     If this maximum distance is exceeded, communication will become impossible due to the voltage drop.

     a+c+d ≤ 200 m (656 ft), a+c+e ≤ 200 m (656 ft), a+b+f ≤ 200 m (656 ft)

     * If a system remote controller, etc. is connected to the transmission line for centralized control, a power supply unit (PAC-SC51KUA) is required.
     * There are cases where the supply source and supply destination of M-NET power differ depending on the setting of the M-NET supply connector.

   (2) Maximum total length of power feed for the indoor-outdoor transmission lines
   - Make the distance from an outdoor unit to the supply destination no more than 200 m (656 ft).

     c+d ≤ 200 m (656 ft), c+e ≤ 200 m (656 ft)



Limitation of cable length of M-NET transmission line

*1 The wiring length of the M-NET remote controller must be 10 m (32 ft) or less. If 10 m (32 ft) is exceeded, the portion that exceeds 10 m (32 ft) must be included in the calculations for the maximum total wiring length of the M-NET transmission line (500 m (1640 ft)) and the maximum total power supply distance (200 m (656 ft)).

[6] M-NET address settings

The setting range for the address setting differs depending on the device.

(1) AE-200

Use “0” (factory setting) for the address of the AE-200.
Change it to a value within the range of 201 to 250 only if it duplicates the address of another controller (BM adapter, etc.).

	Address setting range	Setting method	When enabled
Unit address	0, 201–250	Any address within the address range on the left.	Always*1 (Network setting screen)

*1 The setting is applied after a restart. (A restart is performed automatically after the setting is changed.)
The setting can be checked from the network setting screen of the LCD screen or Initial setting tool.

(2) AE-50/EW-50

Use “0” (factory setting) for the address of the AE-50/EW-50.
Change it to a value within the range of 201 to 250 only if it duplicates the address of another controller (BM adapter, etc.).

	Address setting range	Setting method	When enabled
Unit address	0, 201–250	Any address within the address range on the left.	Always*1 (Network setting screen)

*1 The setting is applied after a restart. (A restart is performed automatically after the setting is changed.)
The setting can be checked from the network setting screen of the LCD screen or Initial setting tool.

(3) Various M-NET devices

Designate the address for each M-NET device. The addresses cannot be overlapped within the same M-NET system.

	Address setting method	M-NET address
Indoor unit	Assign the lowest address to the main indoor unit in the group, and assign sequential addresses to the rest of the indoor units in the same group.	1–50
Outdoor unit	Assign an address that equals the lowest indoor unit address in the same refrigerant system plus 50.	51–100
Auxiliary outdoor unit (BC controller etc.)	Assign an address that equals the address of the outdoor unit in the same refrigerant system plus 1.	52–100
Interlocked OA Processing unit/LOSSNAY	Assign an arbitrary but unused address to each of these units after assigning an address to all indoor units.	1–50
A-control Mr. Slim outdoor unit	Make the settings in the same way as with the indoor units. Requires PAC-SJ19MA-E/PAC-SJ83MA-E (sold separately).	1–50
Room air conditioner	Make the settings in the same way as with the indoor units. Requires MAC-333IF (sold separately).	1–50
AHC	Assign an address that equals the address of the main indoor unit with the lowest address in the group plus 200. If the address overlaps with the Sub system controller’s address, assign an arbitrary but unused address between 201 and 250 to the Advanced HVAC CONTROLLER.	201–250
Air To Water (PWFY) unit	Make the settings in the same way as with the indoor units.	1–50
HWHP (CAHV, CRHV) unit (Main Box)	Make the settings in the same way as with the indoor units.	1–50
HWHP (CAHV, CRHV) unit (Sub Box)	Assign addresses that equal the addresses of the main and sub units in the Main Box plus 50 to the units in the Sub Box.	51–100
HWHP (QAHV) unit	Make the settings in the same way as with the indoor units.	1–50
M-NET remote controller	Assign an address that equals the address of the main indoor unit with the lowest address in the group plus 100. Add 150 instead of 100 to set the address for a sub remote controller.	101–200
MA remote controller	Address setting is not required. Connection of two remote controllers requires the Main/Sub setting for each controller to be made.	-
Sub System controller	Assign an address that equals the group number of the smallest controlled group plus 200.	201–250
DIDO controller	Assign an arbitrary but unused address to the controller after completing the address setting for the units with an address between 1 and 50. The number of controllable units varies with the number of channels used.	1–50
PI controller	Assign an arbitrary but unused address to the controller after completing the address setting for the units with an address between 1 and 50.	1–50
AI controller	Assign an arbitrary but unused address to the controller after completing the address setting for the units with an address between 1 and 50.	1–50

* Some models cannot be controlled from the AE-200/AE-50/EW-50.
For details on the managed equipment, refer to “III [1] (1) Managed equipment.”

[7] Restrictions and notes on network wiring

NOTE:
When connecting the AE-200/AE-50/EW-50 to the Internet, be sure to use a VPN router or other security device to prevent unauthorized access.

(1) About LAN

We recommend using 100BASE-TX for the LAN.
Also, with regard to the category of LAN cables, use category 5 or better for reasons such as availability and connectivity with optical cables (100BASE-FX).
The main cable type is shown in the following table.

LAN standard	Cable specification	Maximum wiring length	Communication speed
100BASE-TX	Twisted pair cable (T)	100 m (328 ft)	100 Mbps

(2) About HUB

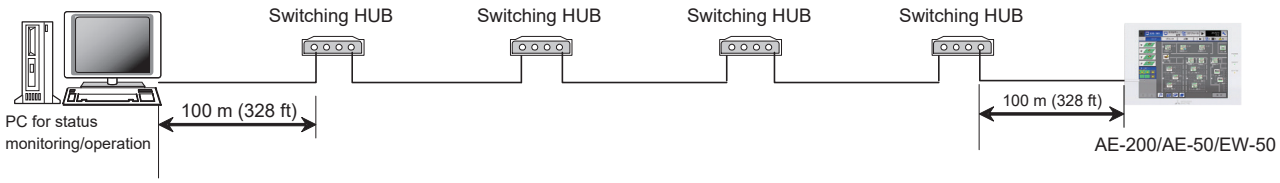
Use a switching HUB for the HUB.

(3) LAN cable length

The maximum cable length for 100BASE-TX when connecting to the AE-200/AE-50/EW50 is 100 m (328 ft).
Therefore, if the LAN cable length exceeds 100 m (328 ft), you can increase the distance between the PC for state monitoring and operation and the AE-200/AE-50/EW-50 by connecting via a switching HUB or other device.

NOTE:
For details on the switching HUB, refer the instruction manual supplied with the switching HUB.

There is no limit on the number of switching HUB connections, but if the load on the network becomes extremely high, delays will occur and connecting normally with the network may not be possible.
The recommended number of devices, including a HUB, gateway, router, or layer 3 switch, to connect between the AE-200/AE-50/EW-50 is four or less.
(The transmission delay time must be 4 seconds or less round trip. If the transmission delay time needs to be checked because, for example, five or more devices are connected, refer to “V [5] 2. About the check method using ping.”)
If a LAN communication error code appears, check the error as described in “V [5] LAN communication error check procedure.”



NOTE:
- Use commercially available LAN cables.

[8] Restrictions and notes on network wiring

Using AE-200 increases the number of connectable devices and enhances the functions by connecting the expansion controller AE-50/EW-50 or Integrated Centralized Control Web PC via LAN. In addition to the LAN connection, AE-200 supports the remote monitoring via Internet.

AE-200/AE-50/EW-50 has two LAN ports (LAN 1: Air conditioning network; LAN 2: BACnet® network).

(1) Connectable number of units via LAN

The following table lists the devices connectable to the LAN 1 port in the AE-200 system and the maximum number of connectable devices.

Connectable devices	The maximum number of units connectable to the LAN 1 port	
Integrated Centralized Control Web (administrative user)	Up to 50 devices such as PC, tablet PC, and smartphone can be connected to one AE-200 system at the same time.	The total number of devices that can be connected to one AE-200 system is 50.
Integrated Centralized Control Web (tenant administrative user)		
Integrated Centralized Control Web (user)		
Expansion controller AE-50/EW-50	Up to 3 for each AE-200 (Up to 4 for each AE-200 when M-NET of AE-200 is not used)	

(2) Recommended devices for LAN connection

The following table lists the recommended devices to be connected to the LAN 1 (air conditioning network) port and the LAN 2 (BACnet® network) port of AE-200/AE-50/EW-50.

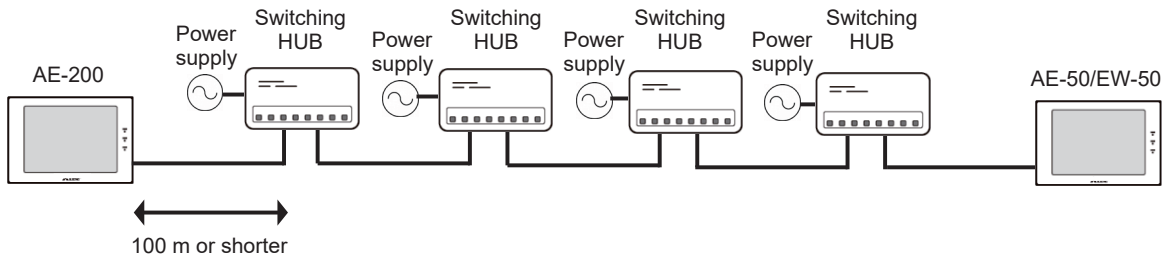
Device	Remarks
Hub: Used to connect AE-200/AE-50/EW-50 to PC.	
Switching HUB (for 100BASE-TX)	Select a switching hub according to the necessary number of ports.
LAN cable: Used for connection among hub, AE-200/AE-50/EW-50, and PC.	
LAN cable (100BASE-TX)	Use a cable of Ethernet category 5 or higher.
Wireless LAN router: Used when Integrated Centralized Control Web is used on the tablet PC or smartphone.	
Wireless LAN router	To install a wireless LAN router that also serves as hub, connect AE-200/AE-50/EW-50 to the wireless LAN router, and set the SSID of the wireless LAN router in the Wi-Fi setting to connect the tablet PC or smartphone.

* Select the devices for LAN 2 (BACnet® network) according to the devices and specifications required from the building management system.

(3) Wiring length of LAN cables

The maximum wiring length of the LAN cable (100BASE-TX) to be connected to AE-200/AE-50/EW-50 is 100 m (328 ft). If the wiring length of the LAN cable exceeds 100 m (328 ft), extend the distance between the centralized control PC and AE-200/AE-50/EW-50 using a switching HUB.

Although there are no restrictions on the number of connectable switching HUBs, if the network load becomes too high, the network may delay, resulting in a network connection failure.



* Set the round-trip transmission delay time to four seconds or shorter. For how to check the transmission delay time, refer to the installation manual of AE-200/AE-50/EW-50.

[9] IP address settings

We recommend using the IP addresses in the following table for the AE-200/AE-50/EW-50, TG-2000A, and other equipment when using a dedicated LAN.

Model	IP address range
AE-200/EW-50 unit *1	[192.168.1.1] to [192.168.1.40]
AE-50/EW-50 unit *1	[192.168.1.211] to [192.168.1.249]
PC for browser	[192.168.1.101] to [192.168.1.149]
PC for integrated centralized control software TG-2000A	[192.168.1.150]
PLC for Electric Amount Count (PAC-YG11CDA)	[192.168.1.151] to [192.168.1.170]
PLC for General Equipment (PAC-YG21CDA)	[192.168.1.171] to [192.168.1.190]
PLC for Demand Input (PAC-YG41CDA)	[192.168.1.191] to [192.168.1.194]
Router	[192.168.1.254]

*1 Set an address within the range of [192.168.1.1] to [192.168.1.40] when using EW-50 individually and within the range of [192.168.1.211] to [192.168.1.249] when using it as an expansion controller.

Unless otherwise specified, leave the subnet mask of the AE-200/AE-50/EW-50 set to the initial value of [255.255.255.0].

NOTE:
When connecting to an existing LAN, set the IP address and subnet mask specified by the LAN administrator.

The IP address range for various software of PLC differs depending on the model. We recommend using the IP address in the following table.

Software name	Model name	IP addresses
Electric Amount Count PLC Software	PAC-YG11CDA	[192.168.1.151] to [192.168.1.155]
General Control PLC Software	PAC-YG21CDA	[192.168.1.171] to [192.168.1.190]
Demand Input PLC Software	PAC-YG41CDA	[192.168.1.191] to [192.168.1.194]

[10] Switch Settings

(1) AE-200/AE-50/EW-50 Switch Settings

The power jumper (CN21) needs to be set (disconnected/connected) depending on the system configuration.
For details, refer to “III [2] System connection.”

(2) Main board of outdoor units

The following shows the DIP switches to use for a system with the AE-200/AE-50/EW-50 connected.
When connecting the AE-200/AE-50/EW-50, set the centralized control switch to ON.

Switches	Function	Operations according to switch setting		Switch setting timing
		OFF	ON	
SWU1, 2	Unit address setting	Set to 51 to 100 with the dial switch		Before power on
SW2–1 (SW 5–1 depending on the model)	Centralized control switch	Without connection to centralized controller	With connection to centralized controller	Before power on

Change the setting of the power jumper of the outdoor units in accordance with the system to be built.
For details, refer to the Installation Manual of Outdoor unit.

(3) Indoor Units

The following shows the switch settings to change to the free contact mode that can generally use external inputs and outputs of an indoor unit.
The free contact compatible models of indoor units are R410A compatible models and R407C compatible Ver.33 or later*1.
*1 The version can be verified in the indoor unit version display part in Maintenance Tool.

Function	Switch settings			Other functions		Remarks
Free contact	SW1–10	SW1–9	SW1–5	Power ON/OFF and power failure automatic recovery	Remote display switching	
Enabled	ON	ON	ON	Power failure auto recovery	Disabled	Differs from switch setting.
			OFF	Disabled		
Disabled	ON	OFF	ON	Power ON/OFF	Thermostat ON signal display	Depends on the original switch setting.
			OFF		Fan output display	
	OFF	ON	ON	Power failure auto recovery	Thermostat ON signal display	
			OFF		Fan output display	
		OFF	ON	Disabled	Thermostat ON signal display	
			OFF		Fan output display	

(Reference) For a model prior to the free contact compatible models, SW1-5 is remote display switching, SW1-9 is power failure auto recovery, and SW1-10 is power ON/OFF.

[11] Other points to note

(1) About using General equipment

- There may be cases when the general equipment cannot be monitored or operated due to, for example, a disconnection of the wiring between the general equipment or a failure of the DIDO controller or PLC. In such a case, Mitsubishi Electric will not be held liable in the event of any damages. We recommend providing a circuit that enables emergency remedial operation, etc. to be performed when a failure occurs.
- With the Ver.1 series of General Control PLC Software, the license number does not need to be registered to the AE-200/AE-50/EW-50.
- With the Ver.2 series of General Control PLC Software, General Control PLC Software License is not required to operate and monitor general equipment and use the schedule functions, but TG-2000A is required.
- To use interlock control, General Control PLC Software License is required for each AE-200/AE-50/EW-50.
- General Control PLC Software License is required even for interlock control within the PLC.
- A license number does not need to be registered to, for example, operate general equipment with a DIDO controller.

(2) About USB memory devices

- Select a USB memory device that meets the following conditions and verify operation several times before use.
  * Reading and writing with a memory device for which operation has not been verified may cause an unexpected operation.
    Therefore, verify operation of the memory device (during trial operation) before use.
    Do not use a USB memory device for which a data writing error has occurred.

  1. USB standard: Supports USB 2.0.
  2. Formatted with FAT32 or FAT (FAT16)
  3. Security function is not provided or not required to be set.
     (Depending on the security function, there may also be some USB devices for which use is possible.)
     In cases such as when data writing can still not be performed normally when a USB memory device has been replaced with another one after a data error occurs, restart the AE-200/AE-50/EW-50 (turn the power off and then back on) and then perform the check again with a USB memory device other than the one with which the error first occurred.

- Do not remove and insert a USB memory device during writing to a USB memory device.
  A USB memory device may not be recognized if it is removed and inserted within a short period of time.
  If that happens, the unit needs to be restarted (turn the power off and then back on).

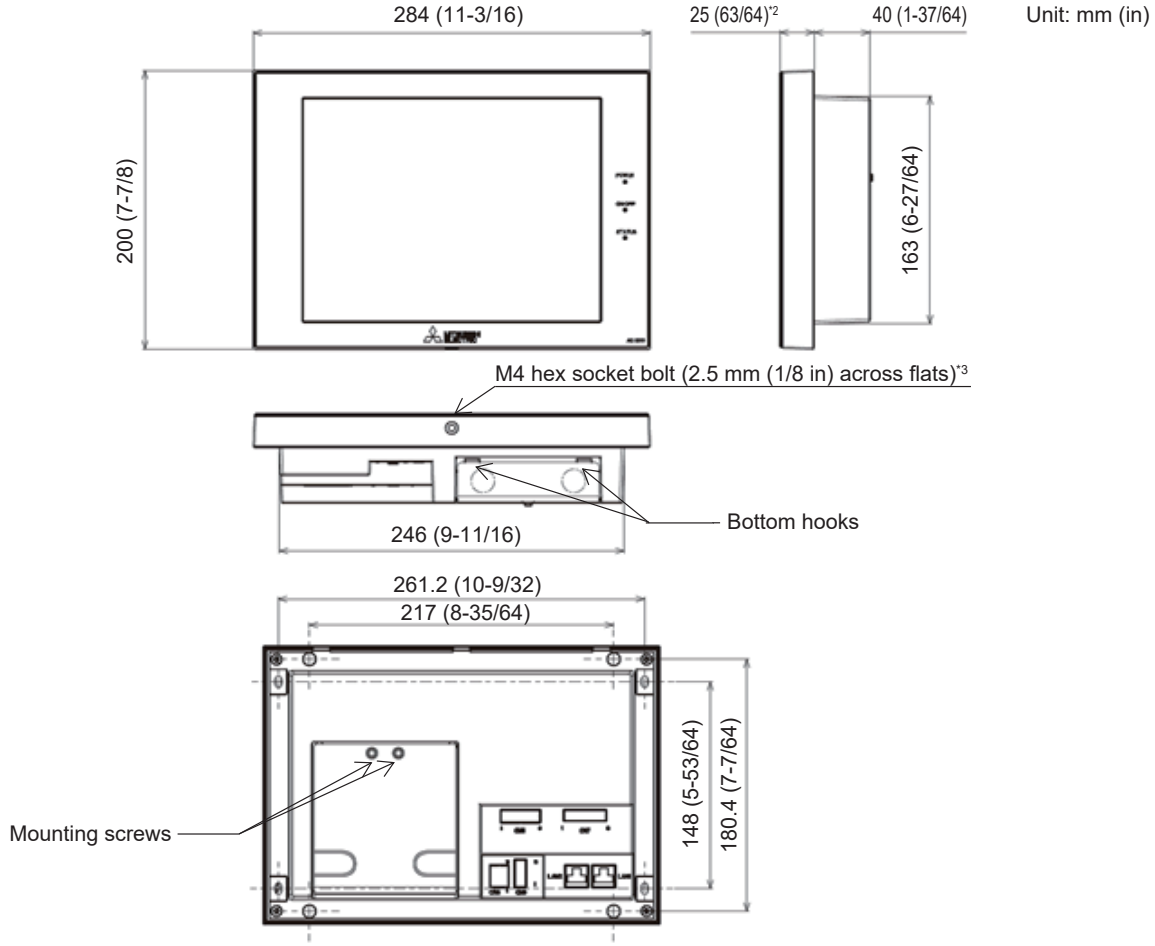
IV. Product specifications and functions

IV. Product specifications and functions

[1] Structure of AE-200/AE-50/EW-50

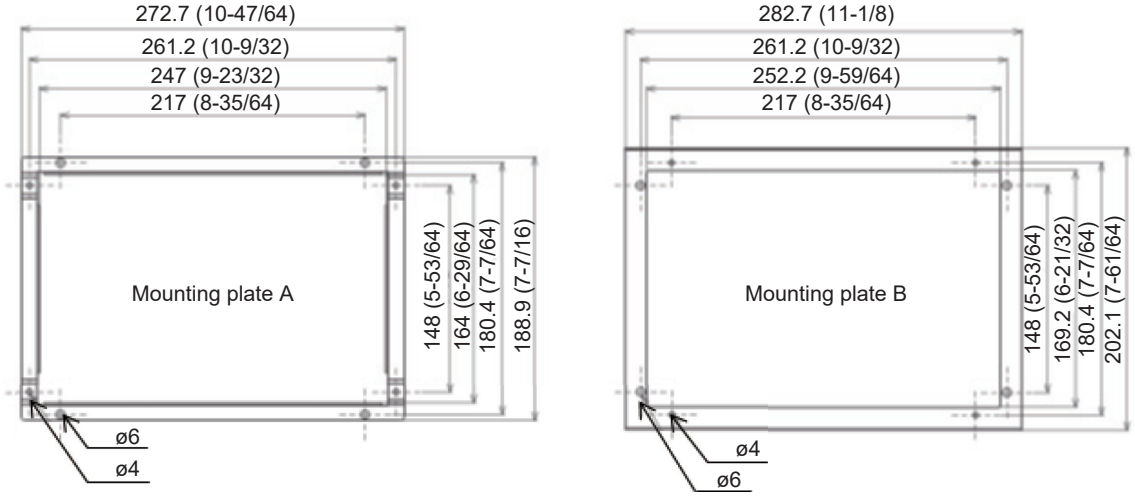
1. External dimensions

(1) AE-200/AE-50*1



*1 The dimensions of the AE-200 and AE-50 are the same.
*2 The protrusion when the unit is mounted to a wall or metal control box is 25.0 mm.
*3 A hex key for removing the hex socket bolt is supplied with the AE-200/AE-50 unit. For how to use it, refer to “IV [1] 4. How to remove and attach the cover.”

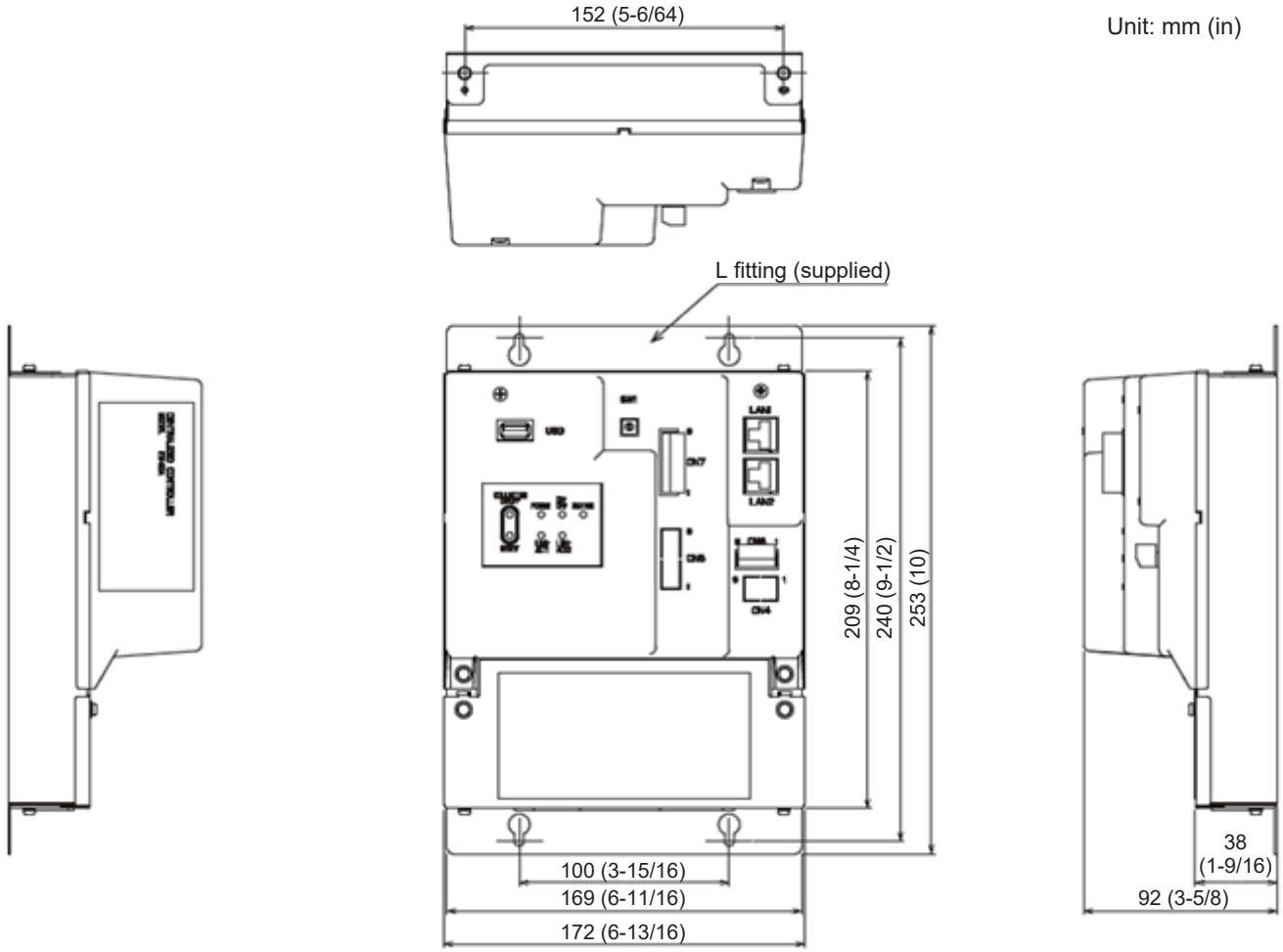
Mounting plate (supplied)
Used when mounting to a wall or metal control box.
For the mounting procedure, refer to “5-5-2. Wall-embedded installation (Method 1)” or “5-5-3. Wall-embedded installation with an electrical box (Method 2)” in the AE-200/AE-50 Installation Manual.



(2) EW-50

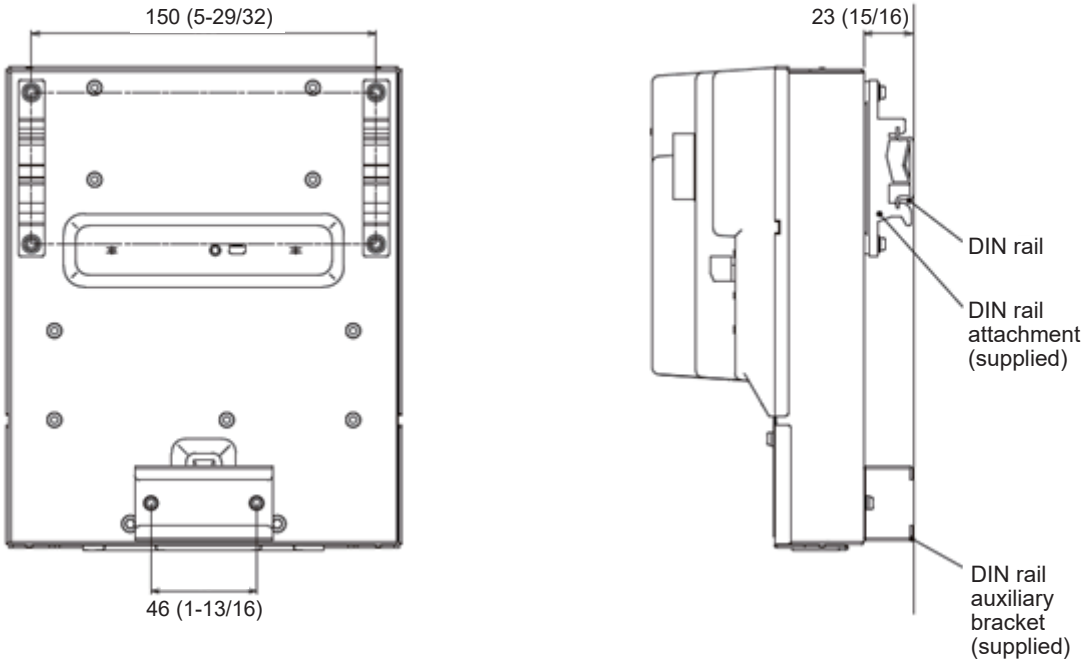
When attaching L-fittings

Unit: mm (in)



When mounting on DIN rails

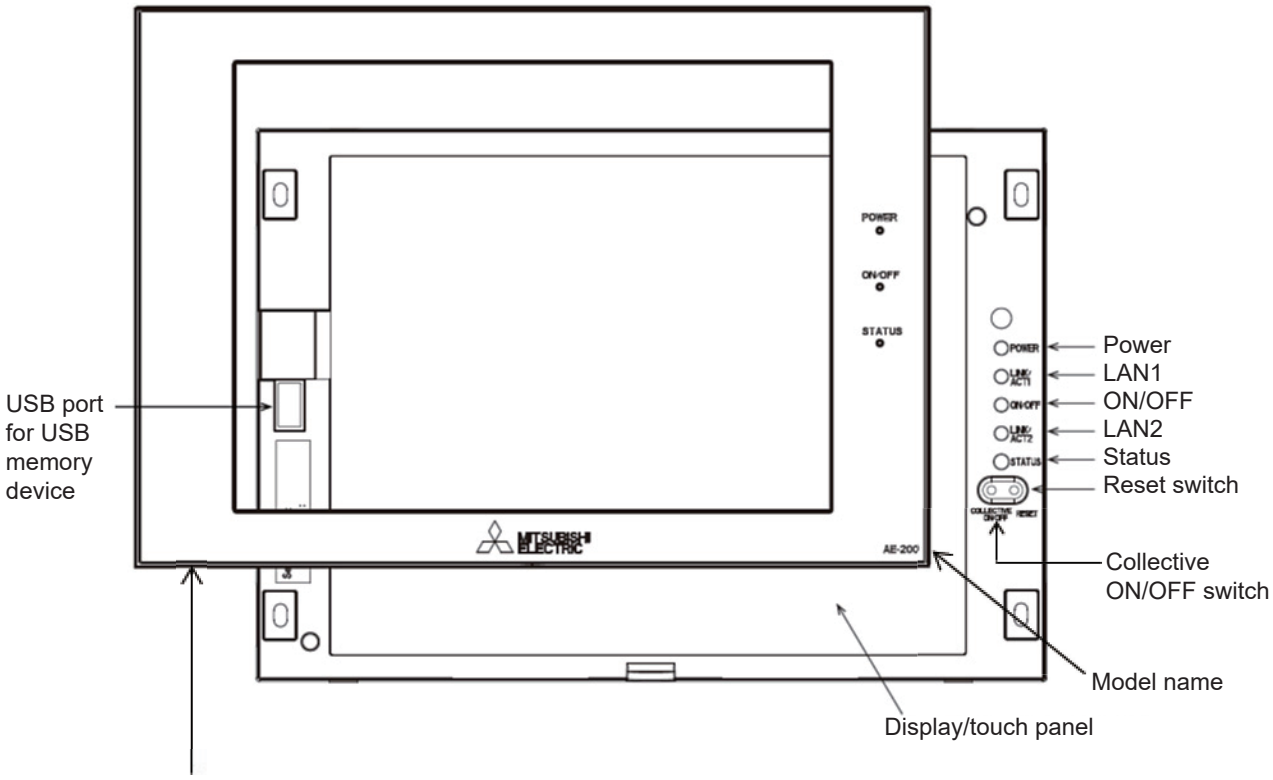
Unit: mm (in)



* For the installation method, refer to “5. Installation” in the EW-50 Installation and Instructions Manual.

2. Location of main parts

(1) Front of AE-200/AE-50

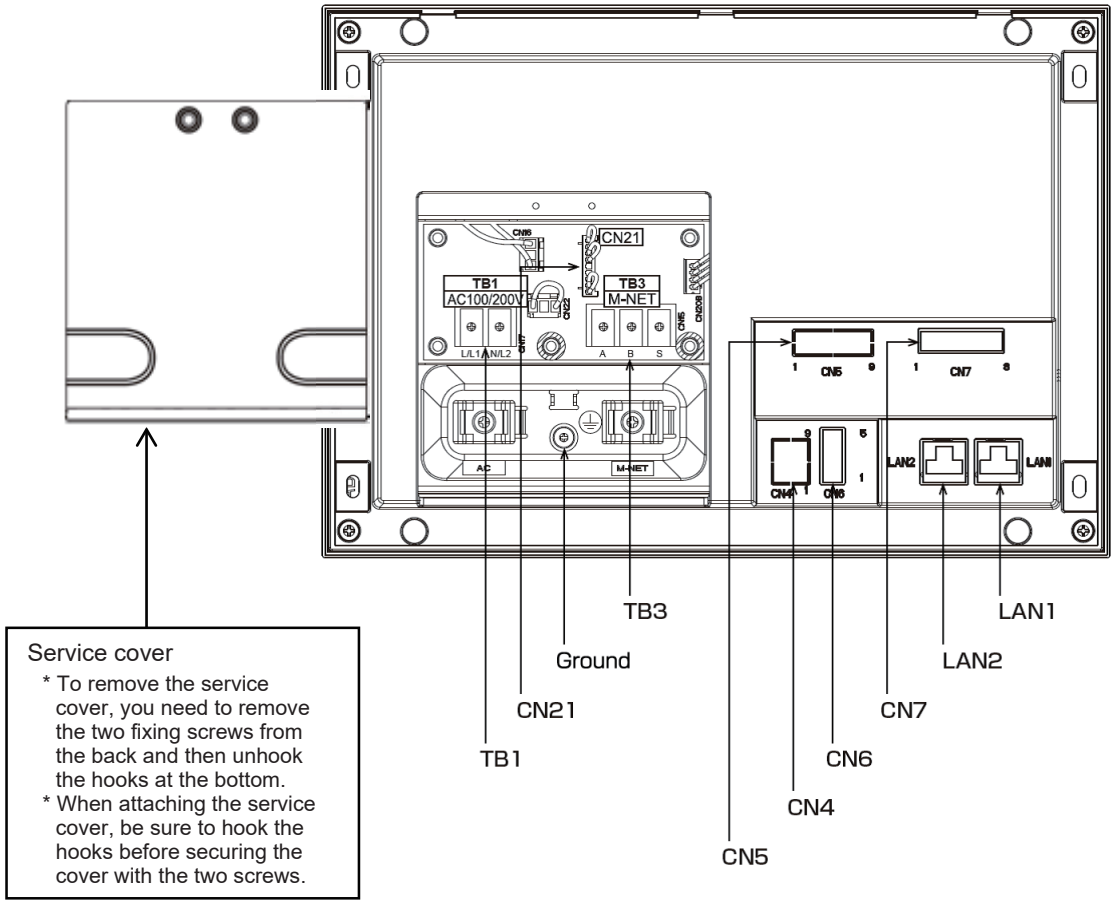


* In the case of the AE-50, the model name at the bottom right is "AE-50."
* To remove the decorative cover, you need to remove the hex socket bolt at the bottom.
* If the separately sold cover with a USB door (PAC-YE72CWL) is used, a USB memory device can be connected without removing the decorative cover.

LED		Description
Power	Lit in green	Power ON
	Unlit	Power OFF
LAN1	Blink in orange	Data transmission in progress (LAN1)
LAN2		Planned to be used with BACnet
ON/OFF	Lit in green	One or more air conditioning units are ON.
	Blink in green	One or more air conditioning units or other related equipment are in error.
	Unlit	All air conditioning units are OFF.
Status	Blink in orange	Error in SD card, or startup failed
	Blink in blue	Software update in progress
	Blink in pink	Software update failed

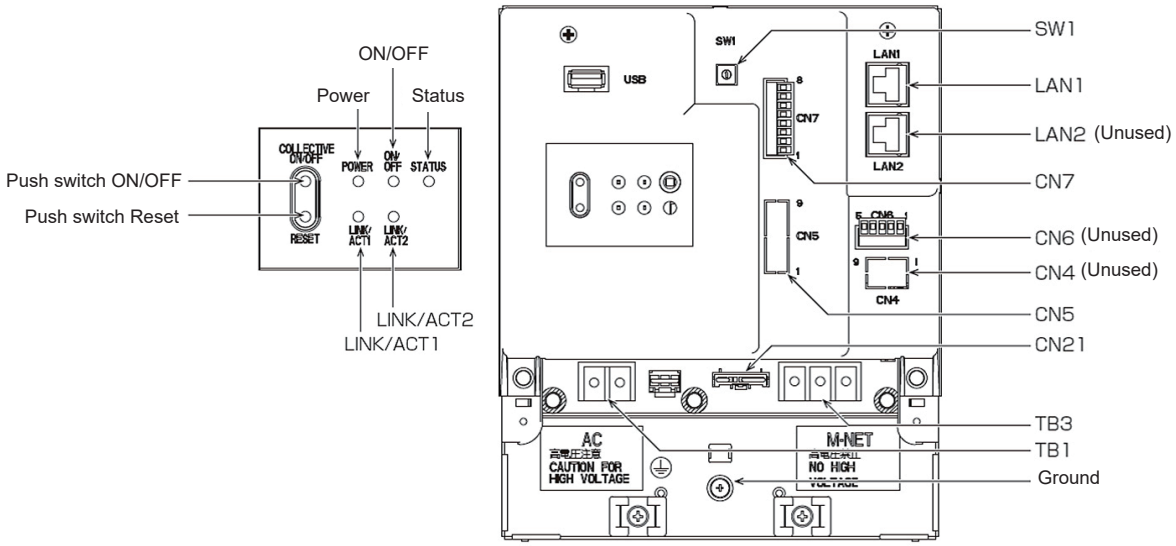
Item	Description
Reset switch	Used to reboot the AE-200/AE-50.
Collective ON/OFF switch	Collectively runs/stops air conditioning units that have their own M-NET connected. The operation becomes the collective stop operation if even one air conditioning unit is operating, and the collective run operation if they are all stopped.
USB port	Used when updating the software version, backing up the setting data, and acquiring billing data.

(2) Back of AE-200/AE-50



Item		Description
LAN1		Connect with other equipment over a LAN via a switching HUB.
LAN2		Planned to be used with BACnet
CN7	Pulse input	Connect the pulse detector of an electricity meter.
CN6	RS-422/485	Unused
CN4	RS-232C	Unused
CN5	External I/O	Cut out the knockout hole and then connect an external I/O adapter (PAC-YG10HA).
TB3	M-NET A, B, S (M3.5)	M-NET transmission line terminal block Connect with an outdoor unit using an M-NET transmission line. (A, B: Non-polarized, S: Shielded)
Ground	(M4)	Connect a ground wire for protection.
CN21	M-NET power jumper	Connect the power jumper to supply power to M-NET (default). If another system controller is connected to the same M-NET, disconnect the power jumper to supply power to the M-NET from the power supply unit.
TB1	AC power supply L/L1, N/L2 (M3.5)	Connect an AC power supply cable.

(3) Front of EW-50



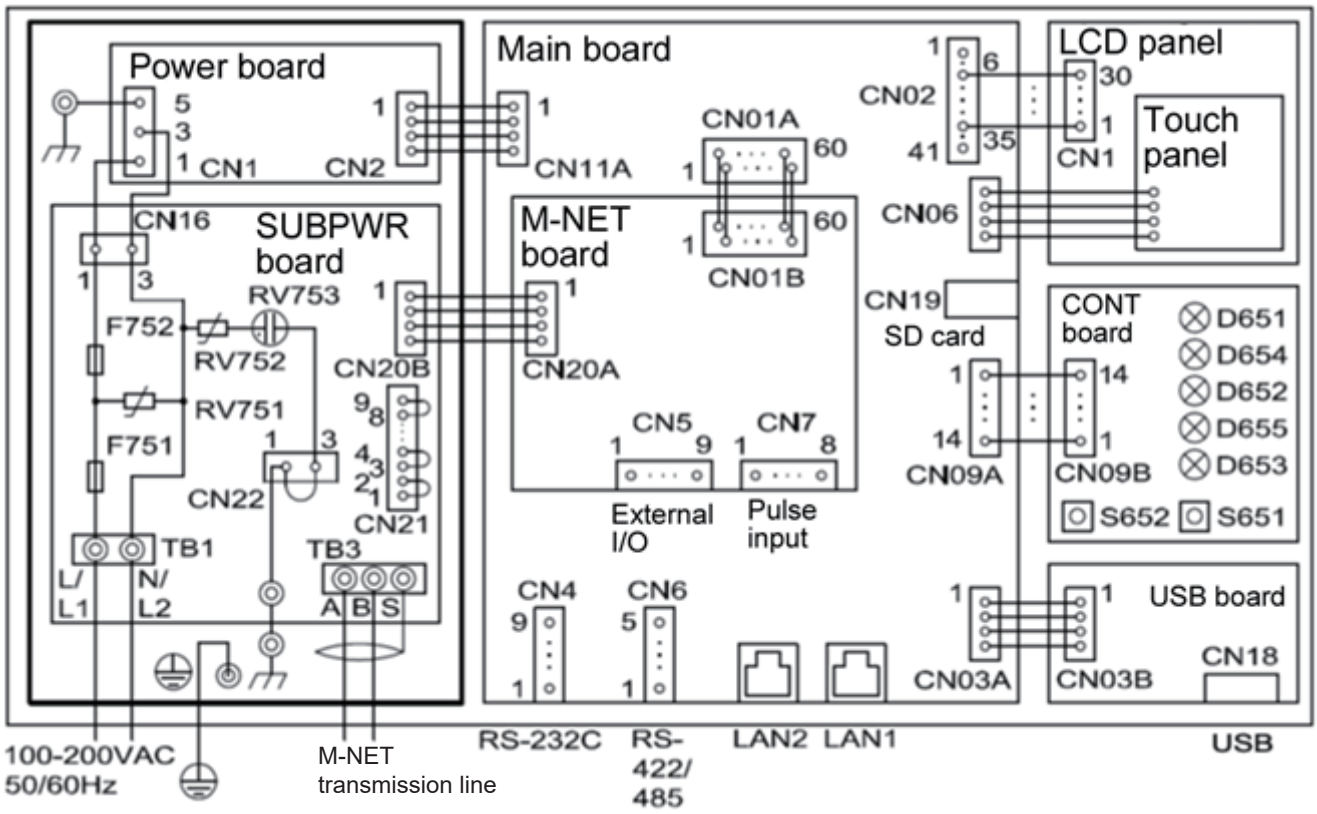
LED		Description
Power	Lit in green	Power ON
	Unlit	Power OFF
ON/OFF	Lit in green	One or more air conditioning units are ON.*1
	Blink in green	One or more air conditioning units or other related equipment are in error.
	Unlit	All air conditioning units are OFF.*1
Status	Blink in orange	Startup error
	Blink in blue	Software update in progress
	Blink in pink	Software update failed
LINK/ACT1	Blink in orange	Data transmission in progress (LAN1)
LINK/ACT2		Unused (planned to be used with BACnet)

*1 The statuses of other related equipment are not indicated.

Item		Description
Push switch	ON/OFF	Collectively runs/stops air conditioning units that have their own M-NET connected. The operation becomes the collective stop operation if even one air conditioning unit is operating, and the collective run operation if they are all stopped.
	Reset	Used to reboot the EW-50. (This will not affect the operation status of the air conditioning units.)
USB port		Unused
SW1	Simple address setting	IP addresses can be easily set with SW1.
LAN1	LAN connection	Connects to other units of equipment over the LAN via a HUB.
LAN2		Planned to be used with BACnet
CN7	PI	Connects to metering devices using the supplied connector.
CN6		Unused
CN4		Unused
CN5	External I/O	Connects to an external input/output adapter (PAC-YG10HA) by cutting out the knockout hole.
CN21	M-NET power jumper	Connects to the M-NET power jumper to supply power (default). If another system controller is connected to the same M-NET system and the equivalent power consumption is 6 or above, disconnect the M-NET power jumper to supply power from the separately-sold power supply unit.
TB3	M-NET A,B,S (M3.5)	M-NET transmission terminal block Connects to M-NET transmission lines from the outdoor unit. (A, B: Non-polarized, S: Shield)
TB1	Power source AC L/L1, L/L2 (M3.5)	Connects to the power cable.
Ground	(M4)	Connects to the protective ground wire.

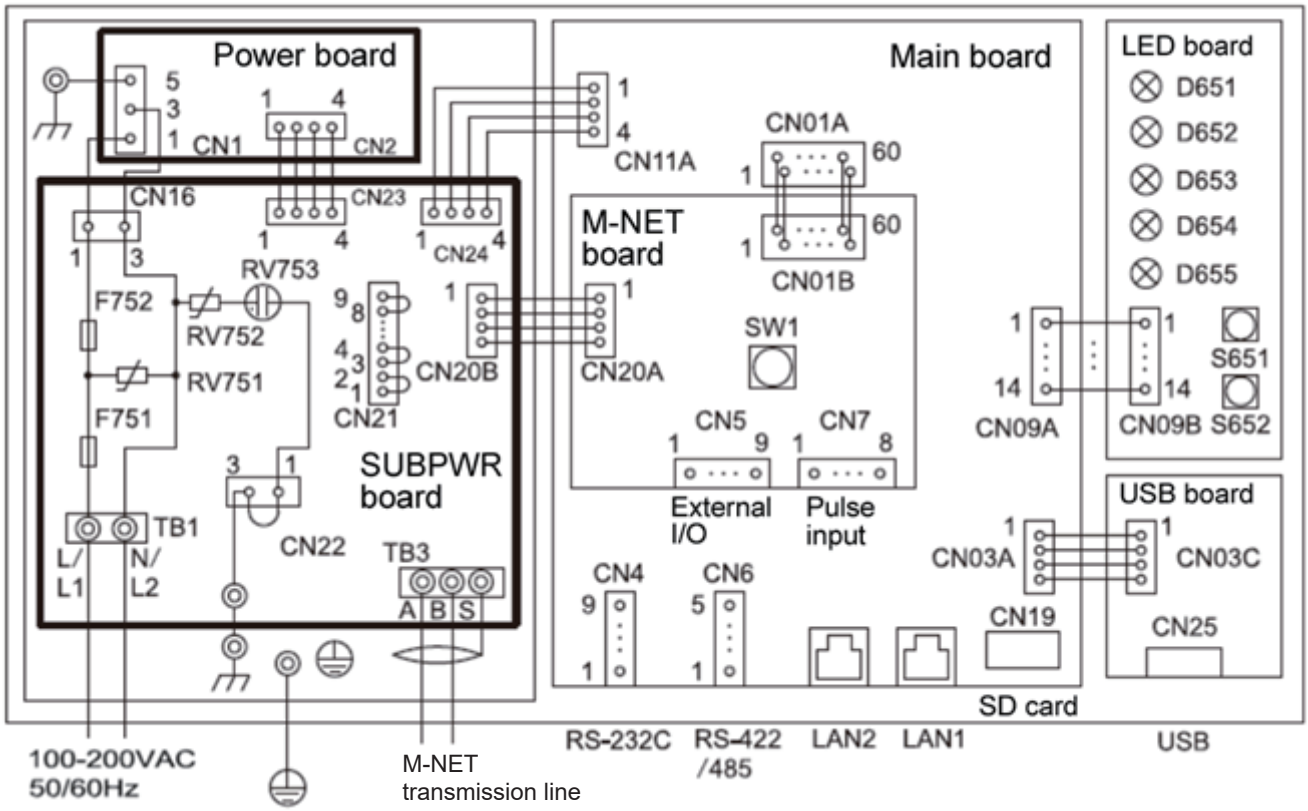
3. Electrical wiring diagram

(1) AE-200/AE-50



Board	Code	Name	Board	Code	Name
SUBPWR	TB1	Power terminal block	M-NET	CN5	Connector (external I/O)
	TB3	M-NET transmission terminal block		CN7	Connector (pulse input)
	CN21	Jumper (power supply selector)	CONT	D651	LED (POWER)
	F751	Fuse (250 VAC T6.3AH)		D652	LED (ON/OFF)
	F752	Fuse (250 VAC T2A)		D653	LED (STATUS)
MAIN	CN4	Connector (RS-232C)		D654	LED (LAN1 LINK/ACT)
	CN6	Connector (RS-422/485)		D655	LED (LAN2 LINK/ACT)
	CN19	Connector (SD card)		S651	Reset switch
	LAN1	Connector (LAN1)		S652	Collective ON/OFF switch
	LAN2	Connector (LAN2)	USB	CN18	Connector (USB)

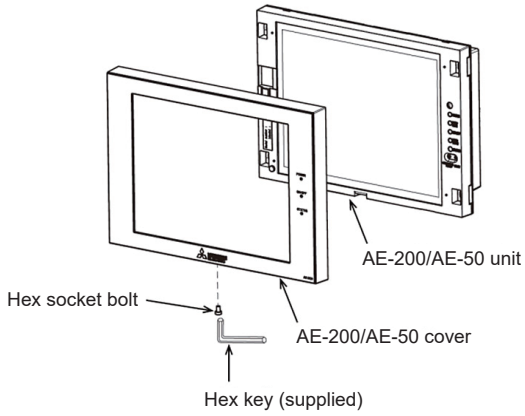
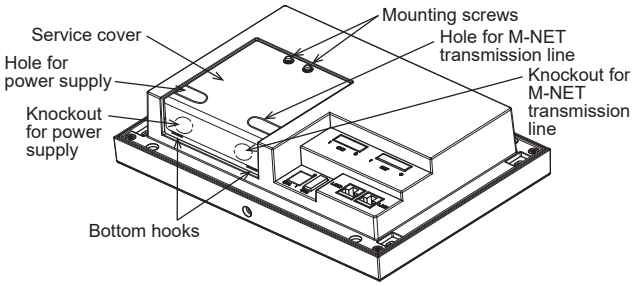
(2) EW-50

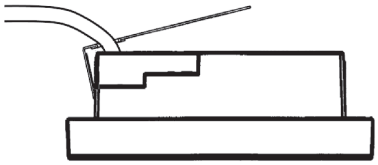
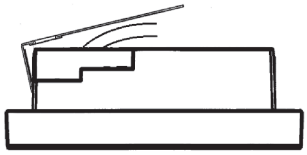
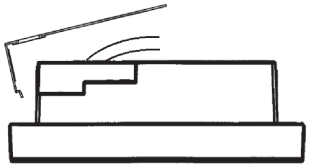


Board	Code	Name	Board	Code	Name
SUBPWR	TB1	Power terminal block	M-NET	CN5	Connector (external I/O)
	TB3	M-NET transmission terminal block		CN7	Connector (pulse input)
	CN21	Jumper (power supply selector)		SW1	Switch (IP address setting)
	F751	Fuse (250 VAC T6.3AH)	LED	D651	LED (POWER)
	F752	Fuse (250 VAC T2A)		D652	LED (ON/OFF)
	CN4	Connector (RS-232C)		D653	LED (STATUS)
MAIN	CN6	Connector (RS-422/485)		D654	LED (LAN1 LINK/ACT)
	CN19	Connector (SD card)		D655	LED (LAN2 LINK/ACT)
	LAN1	Connector (LAN1)		S651	Reset switch
	LAN2	Connector (LAN2)		S652	Collective ON/OFF switch
USB	CN25	Connector (USB)			

4. How to remove and attach the cover

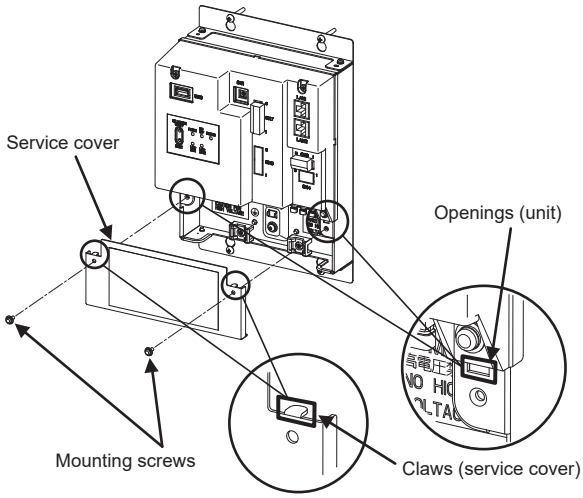
(1) AE-200/AE-50

<table>
<tr><th>Item</th><th>Work procedure</th><th>Illustrations</th></tr>
<tr><td>How to remove the decorative cover</td><td>Use the supplied hex key to remove the hex socket bolt from the bottom of the decorative cover.</td><td rowspan="2"> 
</td></tr>
<tr><td>How to attach the decorative cover</td><td>Attach the decorative cover to the AE-200/AE-50 unit and then use the supplied hex key to screw the hex socket bolt into the bottom of the decorative cover.</td></tr>
<tr><td>How to remove the service cover</td><td>[Wiring at the back]
Remove the two fixing screw, lift up the service cover, and remove the cables from the holes for wiring. Unhook the bottom hooks from the AE-200/AE-50 unit.
[Wiring at the bottom]
Remove the two fixing screws and unhook the bottom hooks from the AE-200/AE-50 unit.</td><td rowspan="2"> 

• How to remove the service cover
1. Remove the two fixing screws and lift up the cover. (Do the same for the wiring at the bottom)
 
2. Remove the cables from the holes for wiring. (Only for the wiring at the back)
 
3. Unhook the bottom hooks from the AE-200/AE-50 unit. (Do the same for the wiring at the bottom)
  </td></tr>
<tr><td>How to attach the service cover</td><td>[Wiring at the back]
Insert the bottom hooks of the service cover into the AE-200/AE-50 unit.
Close the cover so that the power supply cable and M-NET transmission line pass through the holes for the wiring of the service cover.
Secure the service cover with the two fixing screws.

[Wiring at the bottom]
Check that the power cable and M-NET transmission line are routed through the knockout holes and connected to the terminals.
Insert the bottom hooks of the service cover into the AE-200/AE-50 unit and then secure cover the two fixing screws.</td></tr>
</table>

(2) EW-50

Item	Work procedure	Illustrations
How to remove the service cover	Remove the two fixing screw and lift up the service cover.	
How to attach the service cover	Hook the claws at the top of the service cover onto the EW-50 unit and then secure the cover with the fixing screws. Note: When attaching the service cover, take care that the power supply cable and transmission line are not trapped between the EW-50 unit and service cover.	

[2] Product specifications of AE-200/AE-50/EW-50

1. Product specifications

(1) Product specifications

The following shows the product specifications of the AE-200/AE-50.

Item		Specifications
Power supply (for driving unit)	Rated input	100–240 VAC ± 10%; 50/60 Hz Single-phase
Power consumption		12 W
M-NET equivalent power supply		No specifications Only an MN converter can be connected.
Ambient conditions	Operating temperature range	0°C – +40°C (+32°F – +104°F)
	Storage temperature range	-20°C – +60°C (-4°F – +140°F)
	Humidity	30%–90% RH (Non-condensing)
Weight		2.3 kg (5-5/64 lbs)
Dimensions (W × H × D)		284 × 200 × 65 mm (11-5/32 × 7-55/64 × 2-17/32 in) * When installed, AE-200/AE-50 will protrude 25.0 mm (31/32 in) from the wall or the metal control box.
Installation environment		Indoor only • For an office environment, install inside a metal control box or similar environment.

• The above specifications are subject to change without notice for improvement.

The following shows the product specifications of the EW-50.

Item		Specifications
Power supply (for driving unit)	Rated input	100–240 VAC ± 10%; 50/60 Hz Single-phase
Power consumption		12 W
M-NET equivalent power supply		The equivalent power supply of 1.5
Ambient conditions	Operating temperature range	-10°C – +55°C (14°F – +131°F)
	Storage temperature range	-20°C – +60°C (-4°F – +140°F)
	Humidity	30%–90% RH (Non-condensing)
Weight		1.7 kg (4 lbs)
Dimensions (W × H × D)		172 × 209 × 92 mm (6-13/16 × 8-4/16 × 3-10/16 in) (172 × 253 × 92 mm (10 × 6-13/16 × 3-10/16 in) when using L-fittings)
Installation environment		Only in a metal control box indoors

• The above specifications are subject to change without notice for improvement.

(2) Default Settings

The following table lists the default settings of the AE-200/AE-50/EW-50.

Item		AE-200A/AE-50A/EW-50A	AE-200E/AE-50E/EW-50E
Common settings	Date and time settings	April 1, 2014	
	IP addresses	192.168.1.1	
	Subnet mask	255.255.255.0	
	Gateway address	Unset	
	M-NET address	0	
	Range of prohibited controllers	SC/RC	
	External input setting*1	Do not use	
	External output setting*1	ON/OFF and Error/Normal	
	Time master setting	Master	
	Schedule/Season setting	Enabled	
	Old model compatible mode	OFF	
	System expansion	Do not expand	
	AE-200 M-NET*1	Use	
	AE-200 apportioning*1	Do not use	
	Occupancy sensor display setting	Show occupancy mark	
	Brightness sensor display setting	Hide	
	Date format	dd/mm/yyyy	yyyy/dd/mm
	Time format	AM/PM	24-hour display
	Unit of temperature display	°F	°C
	Room temperature display	*2	
	Unit of pressure display	PSI	MPa
	Humidity display	Display	
	Maintenance user name	initial	
	Maintenance user password	init	
	Administrator user name	administrator	
	Administrator user password	admin	
Unit screen settings	Sound	Level 1	
	Brightness	100%	
	Test run	Do not use	
	Screen lock	Do not use	
	Administrator user restriction functions	Unit information Advanced settings Network settings Group settings (group configuration) Interlock LOSSNAY settings Block settings (block configuration) Floor layout (floor configuration) Energy management settings Peak cut (system configuration)	
Web browser settings	List screen group name display	ON	
	Filter sign display	ON	
	Administrator user restriction functions	Basic system Group settings (group configuration) Interlock LOSSNAY settings Block settings (block configuration) Peak cut (system configuration) Measurement settings	

*1 AE-200 only

*2 The settings differ between the LCD screen and the Web browser.

2. AE-200/AE-50/EW-50 unit functions and Web browser functions

The following table lists the AE-200/AE-50/EW-50 unit functions and Web browser functions.

(1) Normal operation functions

○: Function available

Item	Description	Unit	Integrated Centralized Control web
ON/OFF/Test run	The equipment can be turned on and off and operated per group, per block, or per floor, or collectively. When the test run mode is selected, the test run operation can be performed. (Unit screen only)	○	○
Operation mode	The operation mode can be switched between Cool, Dry, Heat, Fan, and Auto per group, per block, or per floor, or collectively.	○	○
Set temperature	The indoor temperature can be set per group, per block, or per floor, or collectively. (0.5°C (1°F) increments) Setting temperature range Cool/Dry: 19°C to 35°C (66°F to 95°F) (14°C to 30°C (57°F to 86°F) when mid temperature model connected) Heat: 4.5°C – 28°C (40°F – 82°F) Auto: 19°C to 28°C (66°F to 82°F) (17°C to 28°C (63°F to 82°F) when mid temperature model connected) Note: The settable temperature differs depending on the model. Note: The set temperature may be in 1°C (2°F) increments depending on the model. Note: The set temperature may be able to be registered for each of the cool and heat modes depending on the model.	○	○
Fan speed / Air flow (LOSSNAY)*1	The fan speed can be switched to any of four levels per group, per block, or per floor, or collectively. (There may be no levels, 2 levels, 3 levels, or 4 levels depending on the model, and auto operation is available for models with an auto function.) (In the case of LOSSNAY, the fan speed can be switched to Very Low, Low, High, and Auto. The air flow levels that can be selected differ depending on the model. However, there are the two levels of Low and High in the case of an interlocked LOSSNAY.)	○	○
Air flow direction setting	The air direction setting can be switched to any of five vertical air flow directions, auto, and swing per group, per block, or per floor, or collectively. (The air flow functions that can be selected differ depending on the model.) Operation with five air flow directions and auto is possible only for the models with those functions.	○	○
Ventilation mode (LOSSNAY)*1	The ventilation mode can be switched to any of Bypass, Heat Recovery, and Auto per group, per block, or per floor, or collectively.	○	○
ON/OFF of interlocked LOSSNAY*1	When there are interlocked LOSSNAY, they can be switched ON (high/low) or OFF per group or per block, or collectively.	○	○
Monitoring of energy use status*2	The electric energy consumption, outdoor temperature, operation time, and other information can be displayed and compared in bar graphs and line graphs. Note: A PI controller and electricity meter (pulse output type) need to be connected to display the electric energy consumption. The electric energy consumption cannot be displayed with a PLC for Electric Amount Count connection. An AI controller or AHC and a temperature sensor need to be connected for outdoor temperature display.	○	○
Ranking*2	The consumption and time can be displayed ranked in order of largest to smallest for electric energy consumption and fan operation time. Note: The ranking of electric energy consumption can only be displayed by block.	○	○

○: Function available

Item	Description	Unit	Integrated Centralized Control web
Target value settings*2	The target value for electric energy consumption can be set on an annual, monthly, or weekly basis and by block. The set value is displayed in the Energy Use Status screen and the Ranking screen.	○	○
Peak cut control status*2	The peak cut control level and electric energy can be displayed. Note: A license is required.	○	○
Air-conditioner, ventilator, and general equipment schedules	The weekly schedule, annual schedule, and today's schedule for the day-of-week pattern can be set for each group per group, per block, or per floor, or collectively. • Up to 24 events can be scheduled for each day, and the “ON/OFF,” “Operation Mode,” “Set Temperature,” “Air Direction,” “Fan Speed,” and “Prohibit Local Remote Controller Operation” settings can be set. (In the case of LOSSNAY, the “ON/OFF,” “Ventilation Mode,” and “Air Flow,” and “Prohibit Local Remote Controller Operation” settings can be set for schedule operation.) • There are five types of weekly schedule, and the season schedule settings can be set. • The schedule events of the weekly, yearly, or today’s schedule are executed on a set day, and the priority for execution from the highest level to lowest level is [Today] → [Yearly] → [Week 1] → ... → [Week 5]. • With the yearly schedule, the days of national holidays and summer holidays and other days that do not fit in the weekly schedule can be set on 50 days within the range up to 24 months in the future. Five operation patterns can be set for each group. • [Optimized Start] can be set so that the set temperature is reached at the set time. (Indoor units only) Note: The items that can be set differ depending on the model (function) of the air conditioner.	○	○
Enable/disable schedule	Schedules can be enabled or disabled per group, per block, or per floor, or collectively.	○	○
Prohibit local remote controller operation setting	The items for prohibiting operation from a local remote controller can be selected per group, per block, or per floor, or collectively. (The items that can be prohibited are ON/OFF, operation mode, set temperature, filter sign, fan speed, air direction, and timer.) Note: The items that can be prohibited differ depending on the model of the air conditioner, LOSSNAY, etc.	○	○
External input function settings*3	Emergency stop/normal, emergency stop recover/normal, ON/OFF, prohibit/permit local remote controller operation, and peak cut level settings be set for all managed air conditioners by inputting a wet contact signal (12 V DC or 24 V DC) from an external device. (The PAC-YG10HA external I/O adapter is required separately.) Note: An external I/O adapter needs to be connected to each AE-200, AE-50, and EW-50. (An emergency stop of the AE-50 system cannot be performed by an external input to the AE-200.)	○	○
External output function settings*4	The operation signal is output when one or more air conditioning units are in operation, and the error signal is output when one or more air conditioning units are in error (with the exception of the operation output signal of general equipment (DIDO controller connection), which is output when the equipment is in error). (The PAC-YG10HA external I/O adapter is required separately.) Note: In the case of external output of an error signal with the AE200, an error signal is output when an error occurs with any of the AE-200, AE-50, and EW-50. In the case of output of an error signal with the AE-50/EW-50, an error signal is output when an error occurs with each of the AE-50 and EW-50.	○	○

○: Function available

Item	Description	Unit	Integrated Centralized Control web
Filter sign reset	The filter sign display can be reset per group, per block, or per floor, or collectively.	○	○
Error reset	An error that is currently occurring can be reset.	○	○
Error history reset	The error history (unit errors and communication errors) can be reset.	○	○
ON/OFF display (Collective)	The ON/OFF LED of the AE-200/AE-50/EW-50 is on when one or more groups are operating and off when all groups are stopped (with the exception of general equipment (DIDO controller connection)).	○	
Energy management table*5	The apportioning results can be displayed using the AE-200 apportioned electricity billing function. Also, the apportioning results can be output to a USB memory device.	○	
Operation status per group	ON/OFF, operation mode, set temperature, fan speed, air direction, ventilation mode, interlocked LOSSNAY ON/OFF, schedule operation enabled/disabled, peak cut, and night purge can be displayed per group Note: The items that can be displayed differ depending on the models in the group.	○	○
Filter sign display	The filter sign can be displayed per group, per block, or per floor, or collectively.	○	○
Local remote controller operation prohibited display	The items for which operation with a local remote controller is prohibited for this unit or another system controller are displayed.	○	○
Display of errors occurring on air conditioning units	The address and error code are displayed for a unit with an error, and the address of the unit that detected the error is displayed.	○	○
Monitoring of error history of air conditioning units	Up to 512 errors that occurred in the past are stored. 128 for each AE-200/ AE-50/EW-50. (64 unit errors and 64 communication errors)	○	○
Error mail send history	The history of mail sent at the time of error occurrence and error recovery can be checked.		○
Monitoring of measurement status	The measurement values of the temperature sensor and humidity sensor of the AI controller and the measurement values of the electricity meter, water supply meter, etc. of the PI controller can be monitored.	○	○
Refrigerant system display	A list of refrigerant systems (connection information of outdoor units and indoor units) connected to the AE-200/AE-50/EW-50 can be displayed.	○	

(2) Initial setting functions

On version 7.7 and later, it is recommended to set the settings from the Initial Setting Tool and the Integrated Centralized Control Web.

○: Function available

Item	Supported versions	Description	LCD	Initial Setting Tool	Web Browser for Initial Settings	Integrated Centralized Control Web	TG-2000
Current date and time settings	7.1 or later	The current date and time can be set.	○		○	○	○
Individual license registration	7.1 or later	Purchased licenses can be registered.	○	○	○	○	
Batch license registration	7.6 or later	Licenses can be batch-registered using the license CSV file.		○			
Unit information (Basic system)	7.1 or later	• Common items for AE-200/AE-50 and the Web browser: Settings related to the unit name, ID number, date display format, time display format, temperature display format, pressure display unit, brightness sensor, occupancy sensor, room temperature display, and humidity sensor • Only for AE-200/AE-50: Settings related to the expansion, display language (other than Japanese [English, French, German, Spanish, Italian, Russian, Chinese, Portuguese, or Turkish]), LCD brightness, audio volume, test run, and screen lock • Only for the Web browser: Settings related to the group name display in the list window and the filter sign display Enter the URL for the language of your choice to change the display language.	○	○	○		
Network settings	7.1 or later	Sets the LAN settings of AE-200/AE-50/EW-50 (IP address, subnet mask, gateway, and communication error detection setting), M-NET address of AE-200/AE-50/EW-50, operation prohibition range of the local remote controller, and external input/external output. • Only the M-NET address of AE-200/AE-50/EW-50 and the external input/external output can be set with the Initial Setting Tool.	○	○	○		
Advanced settings	7.1 or later	Sets the master/sub of the time setting, turns ON/OFF the old model compatible mode, and enables/disables the schedule/season setting.	○	○	○		
Group settings	7.1 or later	Registers the indoor units, LOSSNAY units, general equipment, remote controllers, and sub system controllers to a group.	○	○	○		○
Block settings	7.1 or later	Registers the set groups to a block. • A group that spans over AE-200/AE-50/EW-50 systems cannot be registered to a block.	○	○	○		○
Energy management block (EM block) settings[*1]	7.3 or later	Registers the set blocks to an energy management block (EM block). • A block that spans over AE-200/AE-50/EW-50 systems can be registered.	○	○			
Interlock LOSSNAY settings	7.1 or later	Registers the indoor units to be interlocked with the LOSSNAY units.	○	○	○		○
Floor layout settings	7.1 or later	Sets the floor layout and the display position of the group icon. • Because of the difference in the file format of the floor plan, it is necessary to create and set the separate floor plan files for LCD and TG-2000.	○	○			○
	7.3 or later	• Setting with the Initial Setting Tool is required to display the floor layout on the Integrated Centralized Control Web.					

○: Function available

Item	Supported versions	Description	LCD	Initial Setting Tool	Web Browser for Initial Settings	Integrated Centralized Control Web	TG-2000
Error mail settings	7.1 or later	Makes the settings for the error mail notification function, such as the e-mail server and send addresses of the error mail. • Make the settings for each of AE-200/AE-50/EW-50.			○		
Energy-saving/ peak cut control settings*1 *2 *3*8	7.1 or later	Makes the settings for the energy-saving control/energy-saving peak cut control, such as the control system and the control method of indoor units and outdoor units.	○		○	○	○
Measurement settings	7.1 or later	Makes the settings for the temperature sensor and humidity sensor of the AI controller and for the watt-hour meter and water meter of the PI controller.	○	○	○		○
Temperature setting range settings*8	7.1 or later	Limits the temperature setting range of the local remote controller. • The temperature setting range that can be limited varies depending on the model. This setting is not available for A control Mr. Slim, room air conditioners, or residential air conditioners.			○	○	○
Energy management settings *9	7.1 or later	Makes the settings for the external temperature sensor unit, apportioning mode, and watt-hour meter used for apportioning.	○	○	○		
Night mode schedule settings*8	7.1 or later	Sets the time period during which the outdoor unit performs the night mode operation (low-noise operation). • This setting is not available for A control Mr. Slim, room air conditioners, or residential air conditioners.			○	○	○
Auto changeover settings*9	7.1 or later	Automatically changes the operation mode (cooling/heating) of all the indoor unit connected to one outdoor unit according to the change in the room temperature. Sets the outdoor unit that performs the auto changeover and the changeover mode (auto/representative group).		○	○		○
External temperature interlock control*8	7.1 or later	Selects the external temperature sensor unit and sets the control level for each group for using the external temperature interlock control function.	○		○	○	○
Night setback function*8	7.1 or later	Sets the control time period and the upper/lower limit temperature of each group for using the night setback function.	○		○	○	○
Interlocked control *4	7.1 or later	Performs the interlocked control among the units on which the interlocking conditions are set. • Up to 150 interlocking conditions can be registered for each of AE-200/AE-50/EW-50. • Up to 200 interlocking conditions can be registered for each of AE-200/AE-50/EW-50 using the software version 7.5 or later. The interlocked control setting that spans over multiple systems (AE-200/AE-50/EW-50) can be made.		○	○		
24-hour ventilation*2*8	7.1 or later	Enables or disables the 24-hour ventilation operation of LOSSNAY units/OA processing units.	○		○	○	○
Night purge*2*8	7.1 or later	Enables or disables the night purge and sets the day of the week, start time, end time, threshold outside temperature, indoor/outdoor temperature difference, and initial airflow volume for using the night purge function of LOSSNAY units/OA processing units.	○		○	○	○
Maintenance user	7.1 or later	Sets the maintenance user name and the password.	○		○		
Building manager (administrator user)	7.1 or later	Sets the building manager (administrator user) name, password, and available functions. • The available functions that can be set are different between LCD of AE-200/AE-50 and the Web browser.	○		○		
Monitor display settings	7.1 or later	Makes the settings related to the monitor display.				○	

○: Function available

Item	Supported versions	Description	LCD	Initial Setting Tool	Web Browser for Initial Settings	Integrated Centralized Control Web	TG-2000
User management	7.2 or later	Changes the user ID or password of the administrator user, and registers the tenant administrator user and general user.				○	
Data importing*8	7.1 or later	Loads the setting data.	○	○ *5	○	○	
Data backup*8	7.1 or later	Saves the setting data.	○	○ *5	○	○	
CSV output	7.1 or later	Saves the operation data (billing parameters and power consumption data) of up to 62 days (or up to four days when the operation data is acquired in 30-minute unit) to a USB memory device.* 6	○			○	
Energy management data output	7.1 or later	Outputs the energy management data. • The data of AE-200/AE-50/EW-50 needs to be output separately.	○			○	
Refrigerant charge check support	7.4 or later	Supports the check function of the refrigerant charge in the outdoor unit. Displays the change in the refrigerant amount from the initial measurement. • Up to 10 check results are saved for each unit.	○			○	
	7.6 or later	• Periodically checks the refrigerant charge using the scheduling function. • Check results for each outdoor unit can be output in the CSV file.					
Apportioned data*6 (comparison data)	7.2 or later	Resets the previous apportioned data (comparison data) of AE-200/AE-50/EW-50.	○				
Apportioned data*6 (carried-over)	7.2 or later	Clears the carried-over apportioned data of AE-200/AE-50/EW-50.	○				
Apportioned data*6 (restore)	7.2 or later	Restores the apportioning calculation results and the billing parameters of AE-200/AE-50/EW-50.	○				
Touch panel calibration	7.1 or later	Calibrates the touch positions on the touch panel of AE-200/AE-50.	○				
Software update	7.1 or later	Updates the software of AE-200/AE-50/EW-50. • There are two methods to update the software of AE-200/AE-50. One is to attach a USB memory device that contains the update file and use LCD. The other is to connect the PC to which the update file is saved via LAN, and use the Web browser. • To update the software of EW-50, connect EW-50 to the PC to which the update file is saved.	○				
Lock function	7.1 or later	Locks the touch panel operation of AE-200/AE-50. Touch panel operation is disabled unless the correct user name and password are entered.	○				
Touch panel cleaning	7.1 or later	Temporarily locks the touch panel operation of AE-200/AE-50 to clean LCD.	○				
Time management*7	7.1 or later	Sets the time of the applicable controllers and units once a day. (This function can be used only on the controllers and units that support the time synchronization function.)	○				

• The items shown above may not work as described depending on the units connected or the combination of units.

*1 LCD can be used to make the settings when the software version 7.30 or later is used. The Web Browser for Initial Settings can be used when the software version 7.23 or later is used.

*2 Some settings may not be available depending on the model.

*3 The energy-saving control/energy-saving peak cut control license is required. If the license has not been registered, settings can be made, but the control will not be performed.

*4 The interlocked control license is required. If the license has not been registered, settings can be made, but the control will not be performed. When the software version 7.5 or later is used, use the Initial Setting Tool.

*5 Only the settings that can be set with the Initial Setting Tool

*6 Registration of the apportioned electricity billing license is required. If the license has not been registered, settings can be made, but the control will not be performed.
*7 When the AE-200 system is used together with the building management system such as BACnet®, the time synchronization function can be used in either of the two systems.
*8 The Integrated Centralized Control Web can be used when the software version 7.70 or later is used.
*9 The Initial Setting Tool can be used when the software version 7.70 or later and the Initial Setting Tool version 1.61 or later are used.

NOTE:

- To prohibit the local remote controller operation from other system controller, set the operation prohibition range to “RC only” in the network settings of AE-200/AE-50.
  Because AE-200/AE-50 is the most significant controller, no other system controllers can prohibit the operations of AE-200/AE-50.
- The functions of LOSSNAY unit group that can be prohibited are ON/OFF and the filter sign reset operation.
- To use the apportioned electricity billing function, it is required to make the settings in the Charge Calculation Tool and the Initial Setting Tool that supports the settings for the apportioned electricity billing function. For details, refer to “Instruction Book (Apportioned Electricity Billing Function).”

3. Chiller unit

(1) Normal operation functions

○: Function available

Item	Supported versions	Description	LCD		Integrated Centralized Control Web	
			Status display	Setting/Operation	Status display	Setting/Operation
ON/OFF	7.5 or later	Operates ON/OFF of each system. Displays ON/OFF status of each simultaneously operated group.	○	○	○	○
Operation mode	7.5 or later	Changes the operation mode (cooling/heating) of each system. Displays the operation mode (cooling/heating) status of each simultaneously operated group.	○	○	○	○
Fan mode	7.5 or later	Changes the fan mode (always/snow) of each system. Displays the fan mode (always/snow) status of each simultaneously operated group.	○	○	○	○
Set water temperature	7.5 or later	Sets the water temperature of each system. Setting range: Cooling: 5˚ to 30˚C Heating: 35˚ to 55˚C Displays the set water temperature of each simultaneously operated group.	○	○	○	○
Water temperature and outside temperature	7.5 or later	Displays the representative temperature (inlet water temperature and outlet water temperature) status of each system.*1 Displays the unit temperature (inlet water temperature, outlet water temperature, and outside temperature) status of each simultaneously operated group.	○		○	
Schedule	7.5 or later	Sets up to 24 events per day in the schedule (weekly, yearly, today) for each system. ON/OFF, operation mode, and temperature setting • Up to five weekly schedules can be set, and the season schedule can be set based on the weekly schedules. • An exception schedule can be set for days to which the weekly schedule cannot be applied such as national holidays and summer holidays (for up to 50 days in the next 24 months). Five operation patterns can be set for each system. • If the weekly, yearly, and today's schedules are set on the same day, the priority will be given as follows. [Today] (highest priority) → [Yearly] → [Week 1] → ... → [Week 5] (lowest priority)	○	○	○	○
Enabling/disabling the schedule	7.5 or later	Enables or disables the schedule setting for each system.	○	○	○	○

*1 Available when the representative water temperature sensor (optional) is connected to the chiller unit. When the representative water temperature sensor is not connected, the average value of the inlet water temperature and the outlet water temperature of the units in the system is displayed.

(2) Initial setting functions

○: Function available

Item	Supported versions	Description	LCD	Initial Setting Tool	Web Browser for Initial Settings	Integrated Centralized Control Web
Current date and time settings	7.5 or later	Sets the current date and time.	○		○	○
License registration	7.5 or later	Registers the purchased license (chiller unit connection license).	○	○	○	○
Unit information	7.5 or later	Sets the basic settings of the unit (such as expansion setting of AE-50/EW50 and display format).	○	○	○	
Network settings	7.5 or later	Sets the network settings of AE-200 and the IP address of the connection destination when AE-50/EW-50 is expanded.	○	○	○	
Group settings	7.5 or later	Registers chiller units to a group.	○	○		

* Items in the initial settings are supported by the software version 7.1 or later, and those for the chiller unit are supported by the software version 7.5 or later.

4. HWHP

(1) Normal operation functions

○: Function available

Item	Supported versions	Description	LCD	Integrated Centralized Control Web
ON/OFF	7.5 or later	Starts or stops the operation of each system.	○	○
Operation mode	7.5 or later	Changes the operation mode of each system. For details of the operation mode, refer to AE-200 MELANS Centralized Controller Technical Manual.	○	○
Mode settings	7.5 or later	Displays the operation mode setting of each system. For how to set the operation mode, refer to AE-200 MELANS Centralized Controller Technical Manual.	○	○
Set temperature	7.5 or later	Sets the temperature for each system.	○	○
Fan mode	7.5 or later	Changes the fan mode (always/snow) of each system.	○	○
Prohibition of remote controller operation	7.5 or later	Prohibits or allows the remote controller operation (ON/OFF) for each system.	○	○
Error indication during occurrence	7.5 or later	Displays the address of the unit with an error, error code, and error details.	○	○
Error reset	7.5 or later	Resets the errors occurred in each system.	○	○
Error history	7.5 or later	Displays the unit errors and communication errors that are currently occurring or that have occurred in the past.	○	○
Clearing the error history	7.5 or later	Clears the error history.	○	○
Weekly schedule setting	7.5 or later	• Sets up to 24 events per day for each system. • In addition to the weekly schedule, five types of the season schedule can be set.	○	○
Yearly schedule setting	7.5 or later	• An exception schedule can be set for days to which the weekly schedule cannot be applied such as national holidays and summer holidays (for up to 50 days in the next 24 months). Five operation patterns can be set for each system. • Sets up to 24 events per day for each system.	○	○
Today's schedule setting	7.5 or later	Today's schedule applies only to the day without changing the weekly or yearly schedule.	○	○
Enabling/disabling the schedule	7.5 or later	Enables or disables the schedule setting of each system. The season schedule will be enabled or disabled on an AE-200 basis.	○	○

(2) Initial setting functions

○: Function available

Item	Supported versions	Description	LCD	Integrated Centralized Control Web
Current date and time settings	7.5 or later	The current date and time can be set.	○	○
Unit information	7.5 or later	Sets the basic settings of the unit (such as the volume adjustment and display format).	○	
Network settings	7.5 or later	Makes the network-related settings.	○	
HWHP settings*1	7.5 or later	Registers the HWHP system, and makes the detailed settings.	○	
Maintenance user	7.5 or later	Sets the "maintenance user name" and the "password."	○	
Building manager	7.5 or later	Sets the "user name of the building manager," "password," and "available functions."	○	
Data backup	7.5 or later	Saves the setting data to a USB memory device.	○	
Data importing	7.5 or later	Loads the setting data from the USB memory device.	○	
Touch panel calibration	7.5 or later	Calibrates the touch positions on the touch panel.	○	
Update	7.5 or later	Updates the software.	○	

*1 This function can be set only by the LCD of AE-200.

NOTE:

- When the settings are made using the LCD, Initial Setting Tool, and Integrated Centralized Control Web, the functions that can be set differ depending on the setting tool used. For details, refer to “AE-200/AE-50/EW-50 Instruction Book (Initial Settings).”

5. BACnet ® function list

(1) List of functions that can be operated or monitored from BACnet ®

The following table lists the functions that can be operated or monitored from BACnet ® when AE-200/AE-50/EW-50 is connected via BACnet ®.

○: Function available

Item	Description	Indoor unit	OA Processing unit (IC)	Interlocked OA Processing unit (FU)	Non-interlocked LOSSNAY unit	Chiller unit	Status monitoring	Setting/Operation
ON/OFF	Starts or stops the operation of each group. Monitors the operation status of each group.	○	○		○		○	○
Operation mode	Changes the operation mode (cooling, heating, fan, auto, or dry) of each group. Monitors the operation mode (cooling, heating, fan, auto, or dry) of each group.	○	○				○	○
Fan speed	Changes the fan speed (low, high, middle 2, middle 1, or auto) of each group. Monitors the fan speed (low, high, middle 2, middle 1, or auto) of each group.	○	○		○		○	○
Air flow direction	Changes the air flow direction (horizontal, downblow 60%, downblow 80%, downblow 100%, or swing) of each group. Monitors the air flow direction (horizontal, downblow 60%, downblow 80%, downblow 100%, or swing) of each group.	○					○	○
Indoor temperature	Monitors the current indoor temperature of each group. Reads out the past log.	○	○				○	
Set temperature	Sets the temperature or reads out the setting value of each group. (0.5°C (1°F) increments) Some of the four set temperatures (indoor temperature, cooling temperature, heating temperature, or auto 1 temperature) are used depending on the support status and the setting of Dual Auto Mode.	○	○				○	○
Filter sign	Monitors the filter sign of each group.	○	○		○		○	
Filter sign reset	Resets the filter sign of each group.	○	○		○			○
Prohibition of remote controller operation[*7]	Allows or prohibits the local remote control operation for each group. Monitors the allowance/prohibition status of the local remote controller operation for each group. (The operations that can be prohibited are ON/OFF, operation mode, temperature, and filter sign reset.)	○	○		○		○	○
Emergency stop[*6]	Stops the operation or prohibits the remote control operation (ON/OFF) collectively or on a group basis.	○	○		○			○
Ventilation mode	Operates the ventilation mode (heat exchange, normal, or auto) of each group. Monitors the ventilation mode (heat exchange, normal, or auto) of each group.		○		○		○	○
Night purge	Monitors the night purge status (OFF or ON) of each group.		○		○		○	
Thermo ON/OFF	Monitors the Thermo ON/OFF status of each group.	○	○				○	
Communication status	Monitors whether the M-NET communication of each group is being performed normally. A notification is issued when the status changes.	○	○		○		○	
Alarm signal	Monitors whether the air conditioning units in each group are operated normally. A notification including a four-digit error code is issued when the status changes.	○	○		○		○	

○: Function available

Item	Description	Indoor unit	OA Processing unit (IC)	Interlocked OA Processing unit (FU)	Non-interlocked LOSSNAY unit	Chiller unit	Status monitoring	Setting/Operation
Error code	Monitors the error code of each group (four digits aggregated into nine types). A notification is issued when the status changes.	○	○		○		○	
System alarm signal	Monitors the system error status. A notification including a four-digit error code is issued when the status changes.						○	
Apportioned electricity billing function*1*2	Monitors the current value of the watt-hour meter connected to the weighing pulse input of the PI controller/AE-50/EW-50. Reads out the past log.						○	○
	When a watt-hour meter is connected, monitors the current value of the electric energy (of the outdoor unit and the indoor unit) that is apportioned to groups or interlocking units (*5) by the apportioned electricity billing function of AE-200. Reads out the past log. When a watt-hour meter is not connected, monitors the current value of the apportionment parameters (of the outdoor unit) that are apportioned to groups by the apportioned electricity billing function of AE-200. Reads out the past log.	○	○	○	○		○	○

*1 To use this function, register the apportioned electricity billing license. The charge information cannot be read out from BACnet®.

*2 A watt-hour meter is required.

*3 Excluding the emergency stop, fire recovery command, and power recovery command.

*4 Excluding ON/OFF, emergency stop, fire recovery command, and power recovery command.

*5 Interlocking units means the OA processing units that are set to the energy management block.

*6 When the ceiling-embedded microcomputer-type industrial LOSSNAY unit with humidifier, the ceiling-embedded standard-type industrial LOSSNAY unit with humidifier (when the free plan adapter for ventilation equipment is connected), or the standalone industrial humidifying unit (manufactured in or before September 2016) is stopped due to the stop signal triggered by the fire control from BACnet® or the emergency stop (individual) command from BACnet®, the fan may continue rotation for a set amount of time even after the unit is stopped due to the humidifying element dry function, freeze-up protection for feed-water solenoid valve, 24-hour ventilation operation, or night purge operation.

*7 When the AE-200 system is used together with the building management system such as BACnet®, the “operation prohibition of the local remote controller” and the “time synchronization” can be set in either of the two systems.

(2) Initial setting functions

○: Function available

Item	Description	LCD	Web Browser for Initial Settings	Initial Setting Tool	Integrated Centralized Control Web
LAN 2 (BACnet®)	Sets the IP address (IPv4) of LAN 2 (BACnet®). * To set the IPv6 address, use the BACnet® Setting Tool.	○	○	○	
License registration	Registers the BACnet®connection license.	○	○	○	○

* To set the initial settings of BACnet® other than the above, use the BACnet® setting tool.

[3] System requirements

System requirements for online monitoring

■Initial Setting Tool, Web Browser for Initial Settings, CSV Download Tool

Item	Requirement
CPU	1 GHz or faster (2 GHz or faster recommended)
RAM	1GB
Screen resolution	1024 x 768 or higher (1366 x 768 or higher recommended)
OS	Windows 8.1 (64-bit), Windows 10 (64-bit)
System requirements (Requirement for the Initial Setting Tool)	.NET Framework 4.5.2 or later Microsoft® Excel 2010/2013/2016/2019 (when using a trial run check sheet)
Browser (Required to use the Web Browser for Initial Settings and the CSV Download Tool) On versions 7.70 and later, the functions of the Web Browser for Initial Settings are available for use by the Initial Setting Tool and by the Integrated Centralized Control Web.	Microsoft® Internet Explorer 11.0 * Java execution environment must be met. (Verified to work on Oracle® Java plug-in version 1.8.0_241) * Install the Oracle® Java plug-in that is supported by the operating system. When using 64-bit Internet Explorer, install a 64-bit Java plug-in. * The version of the Oracle® Java plug-in can be found by clicking **[Java]** in the Control Panel.
On-board LAN port or LAN card	100BASE-TX or higher
Pointing device such as a mouse	

■Integrated Centralized Control Web

Item		Requirement
PC	CPU	1 GHz or faster (2 GHz or faster recommended)
	RAM	2 GB minimum
	Screen resolution	1024 x 768 or higher (1920 x 1080 or higher recommended)
	OS	• Microsoft® Windows® 10, Windows® 8.1 • Mac OS® X10.11
	Browser	• Microsoft® Internet Explorer® 11 • Microsoft® Edge® 44 (Ver. 7.8 and later) • Google Chrome™ Ver. 78 • Safari® 12
	Microsoft® Excel®	Microsoft® Excel® 2010 or later

	Browser	Model
Smartphone	Safari® 10	• iPhone6s (Plus) (iOS 10.1.1) • iPhone7 (Plus) (iOS 10.1.1) • iPhoneSE (iOS 10.1.1)
	Google Chrome™ Ver. 56	• Galaxy S7 Edge (Android™ 6.0.1) • Xperia Z5, X Performance (Android™ 6.0.1)
Tablet	Safari® 10	• iPad Air2 (iOS 10.1.1) • iPad Pro 9.7-inch (iOS 10.1.1)
	Google Chrome™ Ver. 56	• Xperia Z4 TAB (Android™ 5.0.2)

NOTE:

- Android is a registered trademark of Google LLC. in the United States and other countries.
- Apple is a trademark of Apple Inc. registered in the United States and other countries.
- Google is a registered trademark of Google LLC.
- Google Chrome is a registered trademark of Google LLC. in the United States and other countries.
- Edge is a registered trademark or trademark of Microsoft Corporation in the United States and other countries.
- Internet Explorer is a registered trademark or trademark of Microsoft Corporation in the United States and other countries.
- The official name of Internet Explorer is Microsoft® Internet Explorer Internet browser.
- iOS is a trademark or registered trademark of Cisco in the United States and other countries and is used under license.
- iPad is a trademark of Apple Inc. registered in the United States and other countries.

- Mac OS is a trademark of Apple Inc. registered in the United States and other countries.
- Microsoft Office Excel is a product name of Microsoft Corporation in the United States.
- Windows is a registered trademark or trademark of Microsoft Corporation in the United States and other countries.
- The official name of Windows is Microsoft® Windows® Operating System.
- Safari is a trademark or registered trademark of Apple Inc. in the United States.
- Nexus is a registered trademark of Google LLC. in the United States and other countries.
- Xperia is a trademark or registered trademark of Sony Corporation.
- Galaxy is a trademark or registered trademark of Samsung CO., Ltd.

Company names and product names in this manual may be trademarks or registered trademarks of their respective companies.

■System requirements for the Charge Calculation Tool and Initial Setting Tool

Item	Requirement
CPU	1 GHz or faster (2 GHz or faster recommended)
RAM	2GB minimum
Screen resolution	1024 x 768 or higher
OS	Windows 8.1 (64-bit), Windows 10 (64-bit)
System requirements	The minimum requirements for Windows 7 SP1, Windows 8.1, or Windows 10 must be met. • .NET Framework 4.5.2 or later Microsoft® Excel 2010/2013/2016/2019 (when using a trial run check sheet or the verification function)
On-board LAN port or LAN card	100BASE-TX or higher
Pointing device such as a mouse	
USB	Minimum 1 port

*Version requirements
The version of the tools that are supported depends on the AE-200, AE-50, and EW-50 versions.

AE-200/AE-50/EW-50 version	Initial Setting Tool version	.NET Framework
Ver. 7.2-7.85	Ver. 1.8	Ver. 4.5.2 or later
Ver. 7.2-7.8	Ver. 1.7	Ver. 4.5.2 or later
Ver. 7.2-7.7	Ver. 1.6	Ver. 4.5.2 or later
Ver. 7.2-7.68	Ver. 1.5	Ver. 4.5.2 or later
Ver. 7.2-7.62	Ver. 1.4	Ver. 4.5.2 or later
Ver. 7.2-7.5	Ver. 1.3	Ver. 4.5.2 or later
Ver. 7.2-7.4	Ver. 1.2	Ver. 4.5.2 or later
Ver. 7.2-7.3	Ver. 1.1	Ver. 4.5.2 or later
Ver. 7.2	Ver. 1.0	Ver. 4.5 or later
Ver. 7.1	Cannot be used.	–

AE-200 version	Charge Calculation Tool version	.NET Framework version
Ver. 7.2* or later	Ver.1.20	Ver. 4.5 or later

NOTE:

- Make sure to unify the versions of AE-200/AE-50/EW-50. If the versions are different, a “7905” error will be detected and the controllers cannot be operated.
- Refer to the AE-200/AE-50/EW-50 Installation Manual or the Instruction Book –Initial Settings– for how to check the AE-200/AE-50/EW-50 versions and how to update the software.
- Initial Setting Tool is upper compatible as shown in the table above. However, when the settings data is sent from the latest version’s Initial Setting Tool to the older version’s centralized controller, some settings cannot be configured on the centralized controller.

■ System requirements for BACnet® Setting Tool
The BACnet® Setting Tool operates on a PC.
The BACnet® Setting Tool requires a PC that meets the following system requirements.

Item	Detail	Remarks
CPU	1 GHz or faster	
RAM	1 GB more	
Free hard disk space	100 MB or more	C drive
Screen resolution	1024 x 768 or higher	
LAN	1 port (100BASE-TX)	
OS	Microsoft® Windows® 8.1 64-bit Microsoft® Windows® 10 64-bit	
EXCEL®	Microsoft® Excel® 2010, 2013, and 2016	For use with the interlock setting information integration file
System requirements	Microsoft® .NET Framework 4.5.2 or later	
Other requirements	Pointing device such as mouse Internet connection (Required to install .NET Framework)	

*BACnet® Setting Tool version
Indicates the combination of AE-200 version and BACnet® Setting Tool version.
BACnet® Setting Tool cannot be used with an unsupported version of AE-200.
Use the BACnet® Setting Tool that is compatible with the AE-200 version.

No.	AE-200 version	BACnet® Setting Tool version
1	Ver. 7.3*–7.4*	3.0.*.*
2	Ver. 7.50–7.70	3.1.*.*
3	Ver. 7.71 or later	3.2.*.*

■ System requirements for the Update Tool
Refer to the Instructions Book (Update Tool) of AE-200, AE-50, or EW-50.

[4] Various Functions

1. Functions and licenses

(1) License overview

By registering the AE-200/AE-50/EW-50 license, the extension will become available.
The following types of license are available. Registration of the license requires the AE-200/AE-50/EW-50's serial number.

License name	Control overview
License for Integrated Web control	Air conditioning and refrigeration equipment can be operated and monitored from a personal computer, tablet, or smartphone connected to a LAN. (Licensing is not required for a standalone AE-200 system.)
BACnet® connection license	Air conditioning and refrigeration equipment can be operated and monitored by using the BACnet® communication protocols.
Apportioned billing support license	The amount of power used by the air conditioning unit can be proportionally divided according to the operation status and capacity of each tenant (indoor unit).
Peak-cut control license	Runs an energy-save operation at a maximum of four levels to reduce the maximum energy demand.
Energy-save control license	Performs energy-saving operation for indoor units (temperature control, fan control, stop control) or outdoor units (capacity save).
Interlock control license	Interlocked operation can be performed with equipment other than air conditioning units. It is effective in linking security systems in tenant buildings and other buildings, and in preventing forgetting to turn off air conditioning units.
Personal Web	A general user's browser can be used.
Maintenance tool	Connectable from the Maintenance Tool via the LAN
Energy management license pack	This is a package license for enabling the apportioned billing, energy-save control, energy-save peak-cut control, outdoor unit power measuring function, and energy monitoring functions.
General control PLC	Enable the general purpose PLC software.
Outdoor unit operation status monitoring	Enables the use of the outdoor unit operation status monitoring screen.
Super user	The dedicated URLs are enabled and the skip function on the log-in screen is enabled.

* BACnet® is a registered trademark of the American Society of Heating, Refrigeration and Air Conditioning (ASHRAE).

NOTE:

- Note that the contract power may be exceeded when the maximum energy demand is suppressed.

(2) List of functions and licenses

[Legend] ○: License required

Function		Supplementary explanation	Licenses								
			License not required	Apportioned electricity billing	Personal Web	Maintenance tool	Energy management license pack	General control PLC	Interlock control	Outdoor unit operation status monitoring	Super user
Web browser			○								
Personal browser					○						
Error mail notification			○								
Integrated management (TG-2000A)			○								
Yearly/weekly schedule			○								
TG-2000A Electric energy charge (electric energy manual entry method)		Method that does not use an electricity meter. TG-2000A is required.		○							
TG-2000A Electric energy charge (electric energy metering-device method)		Method to charge for electric energy used by air conditioner. TG-2000A is required.		○							
TG-2000A Meter charge (electric energy metering-device method)		Function to charge for outlet and other general electric power, gas, water, etc. TG-2000A is required.		○							
AE-200 Electric energy charge (electric energy manual entry method)		Method that does not use an electricity meter.		○							
AE-200 Electric energy charge (electric energy metering-device method)		Method to charge for electric energy used by air conditioner.		○							
AE-200 Meter charge (electric energy metering-device method)		Function to charge for outlet and other general electric power, gas, water, etc.		○							
Operation and monitoring of general equipment	DIDO controller method		○								
	Free contact method	TG-2000A is required.	○								
	PLC method	TG-2000A is required.	○								
Interlocked control of general equipment	DIDO controller method	When using interlocked control of the AE-200/AE-50/EW-50							○		
	Free contact method	When using interlocked control of the AE-200/AE-50/EW-50							○		
	PLC method (between PLC equipment)	TG-2000A is required.	○								
	PLC method (between air conditioning units and PLC equipment)	TG-2000A is required.						○			
Night mode			○								
External temperature interlock control			○								
Night setback function			○								
Set temperature range limit setting			○								
Temperature and humidity measurement			○								
Upper and lower limit warning mail			○								
Energy management function							○				
Peak cut control (other system method)							○				
Peak cut control (electric energy amount monitoring method)		A PI controller is required.					○				
Peak cut control (Peak cut level contact input)		Method to directly input the peak cut level from the demand controller to the external input of the AE-200/AE-50/EW-50.									
Peak cut control (PLC method)		Demand Input PLC Software is required.					○				
Outdoor unit operation status monitoring										○	
Super user											○
Maintenance tool						○					

- Registration of the license is required for each AE-200/AE-50/EW-50.
- The above functions are subject to change without notice for improvement.

NOTE:

- Energy saving and peak-cut functions
  - When using the peak cut function, please understand that Mitsubishi Electric cannot compensate for any damages in the event of electricity consumption exceeding the electricity values of the contract as a result of a control operation setting mistake, failure of an AE-200/AE-50/EW-50, PLC, PI controller, E-Energy, or demand controller, or other problem.
  - The peak cut control units are the blocks of indoor units and the outdoor units in the AE-200/AE-50/EW-50 unit.
  - For the peak cut control for the electricity meter which is performed using the counting function of a PI controller or PLC, the electricity meter to be monitored by the AE-200/AE-50/EW-50 must be one only, and it can be set for each AE-200/AE-50/EW-50.
    Peak cut control cannot be used with air conditioning units to be controlled by one AE-200/AE-50/EW-50 in a system with two or more electricity meters connected. Furthermore, use version 1.01 or later of the Electric Amount Count Software when using a PLC.
  - Peak-cut control using demand control devices (Demand level contact input method)
    This method directly inputs a demand signal to the AE-200/AE-50/EW-50 via an external input adapter (PAC-YG10HA-E).
    A PLC is not required for this method. The demand level monitoring and control commands can be issued from up to three AE-200/AE-50/EW-50 in addition to the connected AE-200/AE-50/EW-50.
  - The peak-cut control using the demand control devices (PLC) method sends a demand level signal from the demand controller to the AE-200/AE-50/EW-50 via a PLC. The PLC software (PAC-YG41/42/43/91/92/93ATM) is required.
    Up to 10 AE-200/AE-50/EW-50 units can be set. If the number of AE-200/AE-50/EW-50 exceeds 10, install multiple PLC.
  - Up to 10 AE-200/AE-50/EW-50 units can be controlled by the E-Energy to control the peak-cut operation. For details, refer to Instruction Book of the E-Energy.
  - Using a PI controller enables demand control from up to three AE-200/AE-50/EW-50 in addition to the connected AE-200/AE-50/EW-50.

- Temperature range setting function

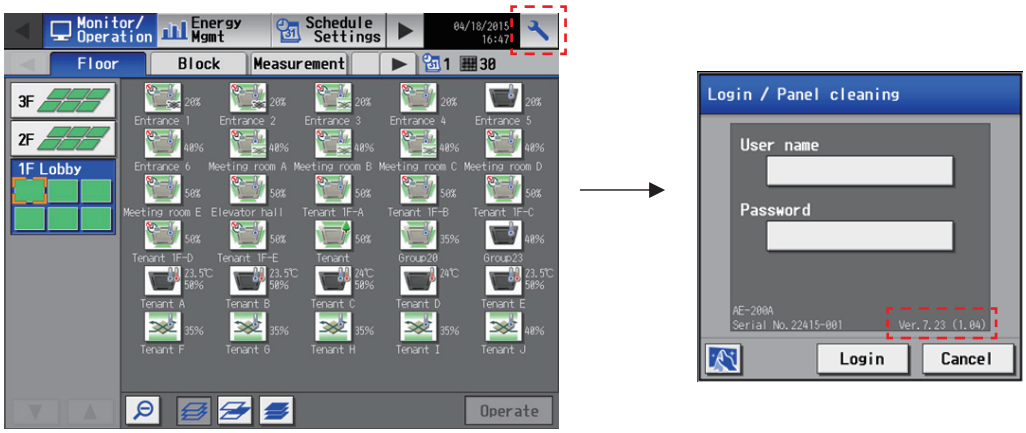
Remote controller type	Cooling		Heating		Auto mode	
	Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit
ME Remote Controller (PAR-F27MEA)	○	×	×	○	×	
ME Remote Controller (PAR-U01MEDU, PAR-U02MEDA)	○	○	○	○	○	
MA smooth remote controller (PAR-2*MA)	○	○	○	○	○	
MA smart controller (PAR-3*MA, 40MAA)	○	○	○	○	○	
MA compact remote controller (PAC-YT52-53CRA)	○	○	○	○	○	
MA compact remote controller (PAC-SF01CRA)	○	○	○	○	○	

  - Setting operations can also be performed with other than the above target remote control, but are not limited.
  - The functions of the MA Smooth Remote Control, MA Smart Remote Control, MA Deluxe Remote Control, and MA Compact Remote Control may not be available depending on the indoor unit model.
  - The temperature setting range can only be set on the remote controllers listed above and the Web browser.
  - This function cannot be used with the A-control models (Mr. Slim), room air conditioners, or residential air conditioners.

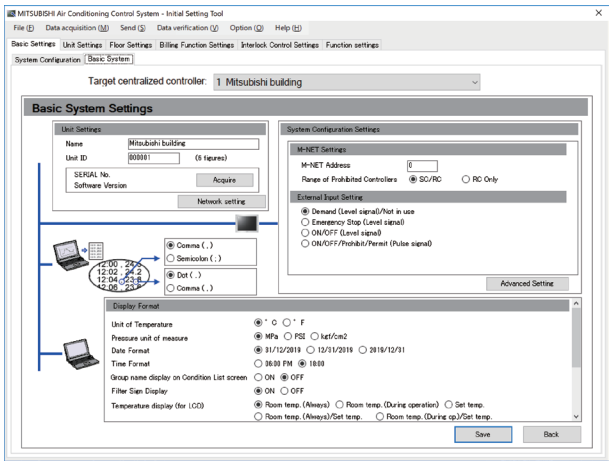
[5] How to check the version of AE-200/AE-50/EW-50

Check the version of AE-200/AE-50/EW-50 in one of the following ways.

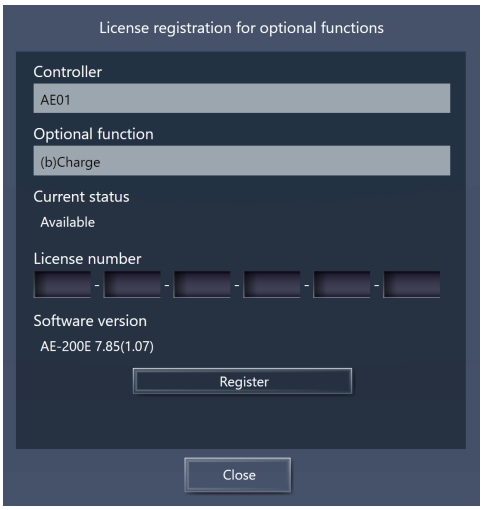
Method 1: While the Monitor/Operation screen is displayed on the AE-200/AE-50 unit, press the button at the top right of the screen to display the Login screen. The version is displayed at the bottom right of the login screen.



Method 2: The software version is displayed on the Registration of Optional Functions screen for the AE-200/AE-50/EW-50 in the Web browser.



Method 3: Click “Settings”> “Initial settings” > “License registration” on the Integrated Centralized Control Web to see the software version on the license registration screen of the optional functions license registration.



[6] AE-200/AE-50/EW-50 update procedure

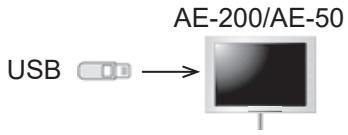
Conduct a trial run in the presence of the client.

1. Software update

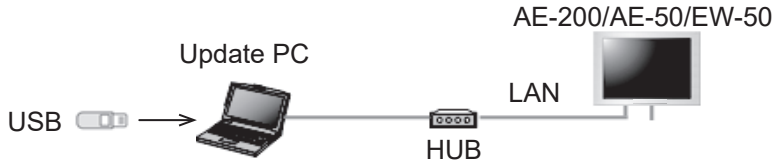
Updating the software for the AE-200 and the AE-50 The software versions must be compatible with each other. Have the update files ready to update the software. Consult your dealer (installer) for how to obtain update files.

The software for the AE-200 and AE-50 can be updated in two ways:
(1) Update using a USB memory device and (2) Update using a Web browser

(1) Update procedure using a USB memory device



(2) Update procedure using a Web browser



NOTE:

(An approval of your clients should be obtained as necessary.)

- Communication with the air conditioning units is not possible during the update of the AE-200/AE-50/EW-50 so the air conditioning units that are operating may detect a communication error and display the error on the local remote controllers. The air conditioning units will continue operation even if that happens, so operation with the local remote controllers will be possible. (However, please note that systems without local remote controllers or Mr. Slim models may detect a communication error and come to an abnormal stop.)
- Up to 60 minutes worth of energy management and charging data will not be recorded during software update.
- When using the pulse input function of the AE-50/EW-50, pulses input during software update will not be counted.
- Software cannot be downgraded.
- A “6920” error may occur while the AE-50/EW-50 is updated. When the error is detected, refer to “5-1-5. Network” in the Initial Settings version of the Instruction Book of the AE-200/AE-50/EW-50, and set the settings for detecting the communication error for the IP address of the AE-200 not currently connected to the main body of the AE-200 to “Do not detect.”

IMPORTANT:

- Be sure to use the compatible versions of AE-200 and the expansion controller. Mismatched versions will result in a “7905” error.
- When updating, also update the Initial Setting Tool.
- Write down the operation status of the air conditioning units immediately before updating the software. After the software update is completed, check the operation status of the air conditioning units, and if air conditioning units that were operating are stopped, manually operate them as necessary.
- Various control functions, such as schedule control, billing data processing, peak-cut control, and energy management function, will not be available during the update.
  Check the settings of these functions beforehand, and perform updates when the effects of stopping the functions will be minimum.
- When the following functions are used, do not update the AE-200, AE-50, or EW-50 during the hours shown in the table below.

Functions used	No update hours
Apportioned billing function (Uses the Charge Calculation Tool)	5:00 AM to 5:10 AM
Apportioned billing function (Uses the TG-2000)	4:05 AM to 4:35 AM
Automatic output of error history (daily) (Uses the TG-2000)	0:05 AM to 0:15 AM
Energy saving daily report (energy-save/peak cut control) (Uses the TG-2000)	2:00 AM to 2:10 AM
Uses the PI controller	0:00 AM to 0:05 AM
Measurement trend monitoring (Uses the PI controller and the AI controller) (Uses the TG-2000)	1:05 AM to 1:15 AM
Low-temperature equipment schedule function	10:00 PM to 10:10 PM

(1) Directly reading the update file in a USB memory device

1) Preparation

Store the update file (AExx_FW####_****.dat)*1 in the root folder of a USB memory device.

*1 “xx”: “200” (AE-200) or “50” (AE-50); “####”: software version

2) Update procedures

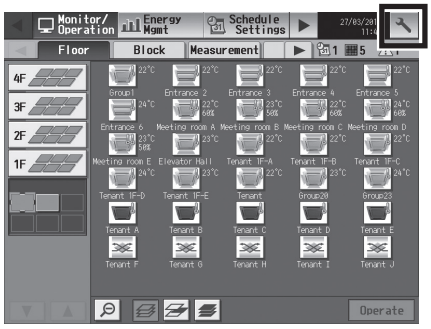
Note:The software cannot be downgraded to an earlier version.

(1) Remove the controller cover, and insert a USB memory device in which the update file is stored to the USB port.

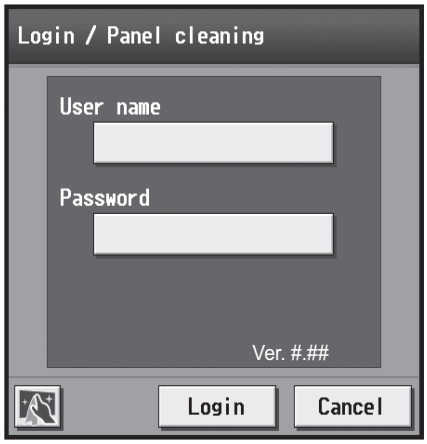
Note:Do not remove the USB memory device while the software is being updated.

Note:The USB memory device may not be recognized if you insert and remove it within a short time. If this happens, reset the AE-200/AE-50.

(2) Touch [ ] to display the login window.



(3) Enter the maintenance user name and the password in the login window, and touch [Login]. (Default user name: initial, Default password: init)



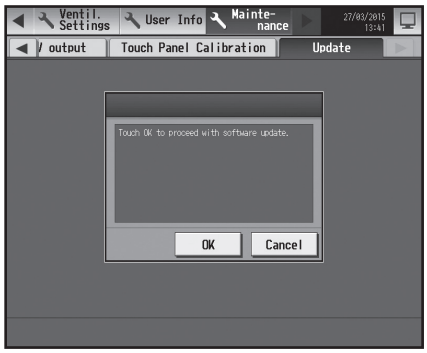
(4) Touch [Maintenance] in the menu bar, and then touch [Update]. Touch [Software Update] to read the update file.

(5) Touch [OK]. A software update process starts.

Note:It takes about four minutes to complete the update.

Note:The Status LED will blink in blue while the software is being updated. (Refer to section 2. “Location of main parts” for details about the LEDs.)

Note:Do not turn off the power to the AE-200/AE-50 while the software is being updated.



(6) The AE-200/AE-50 will reboot after the update is complete. Disconnect the USB memory device.

(7) Touch [ ] to display the login window.
Check that the version on the login window is the same as the version of the update file (AExx_FW####_****.dat).
* If the name of the update file contains ####, “Ver. #.##” should be displayed on the login window as shown at right.

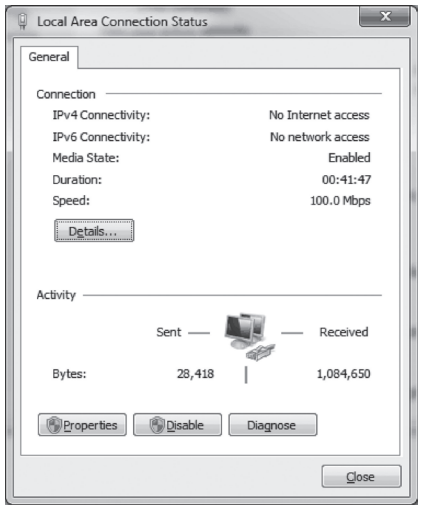
(8) When using the Integrated Centralized Control Web or Web Browser for Initial Settings, clear the history data of the browser and delete Java temporary files. Refer to the Instruction Book (Initial Settings) for the procedures.

(2) Using a Web browser

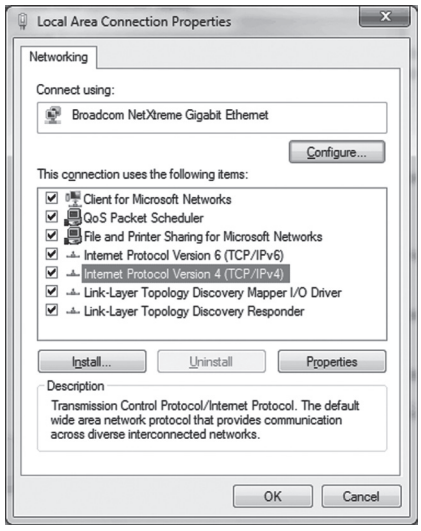
1) Preparation

Follow the instructions below to change the IP address of the PC that is used for software update.
Note: When the system is connected to the existing LAN, ask the system administrator for permission before changing the IP address settings and updating the software.

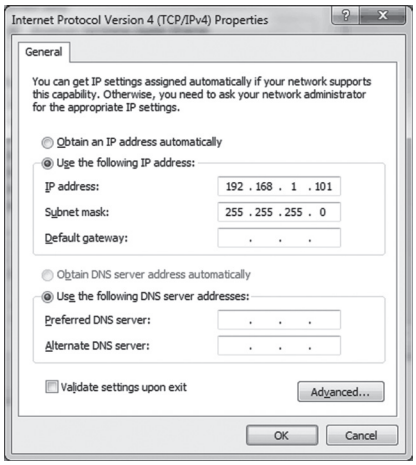
(1) Click [Control Panel] in the Start menu, and click [Network and Sharing Center]>[Local Area Connection].
In the [Local Area Connection Status] window, click [Properties].



(2) Click [Internet Protocol Version 4 (TCP/IPv4)] to select it, and click [Properties].



(3) In the [Internet Protocol Version 4 (TCP/IPv4) Properties] window, check the radio button next to [Use the following IP address].
Enter [192.168.1.*] in the [IP address] field. (The number indicated with an asterisk must be different from the IP address of the AE-200/AE-50 to be updated.)
Leave [255.255.255.0] in the [Subnet mask] field as it is.
Note: If the IP address of the AE-200/AE-50 is [192.168.1.1], set the same 1st, 2nd, and 3rd numbers and different 4th number, such as [192.168.1.2].
Note: Default IP address of AE-200/AE-50 is [192.168.1.1].
Note: When performing an update on a PC that is already connected to the existing LAN, [255.255.255.0] may not appear in the [Subnet mask] field. When [255.255.0.0] appears, enter the same 1st and 2nd numbers (192.168) and different 3rd or 4th number of the IP address of the AE-200/AE-50 in the [IP address] field.



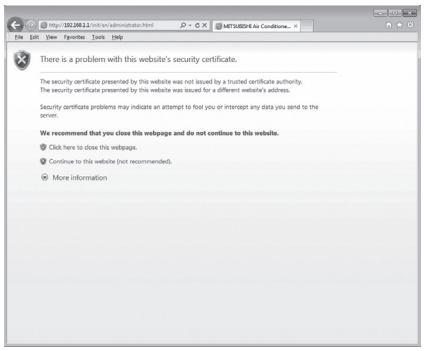
2) Update procedures

(1) Make sure that the PC that has been set in section 1) above and the AE-200/AE-50 to be updated are connected with a LAN cable.

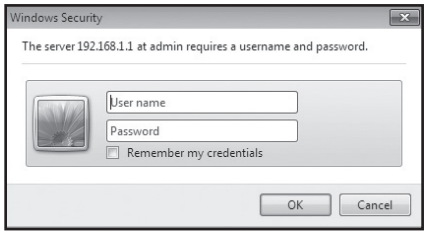
(2) Turn on the power to the AE-200/AE-50, and insert a USB memory device in which the update file is stored to the PC.

(3) Enter the web page address in the address field of the Web browser as follows:
https://[IP address of each AE-200/AE-50]/swupdate/Update.html
Press the [Enter] key.
Note: If the IP address of the AE-200/AE-50 is [192.168.1.1], the web page address is [https://192.168.1.1/swupdate/Update.html].

(4) If the security certificate is invalid, a security certificate error page (as shown at right) will appear.
Click [Continue to this website (not recommended)].



(5) Enter the maintenance user name and the password in the login screen, and click [OK]. (Default user name: initial, Default password: init)

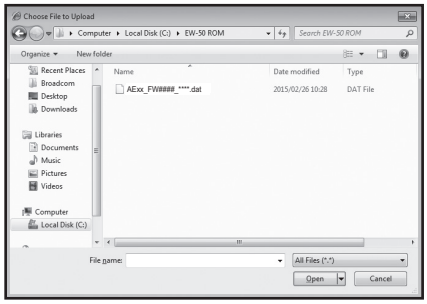


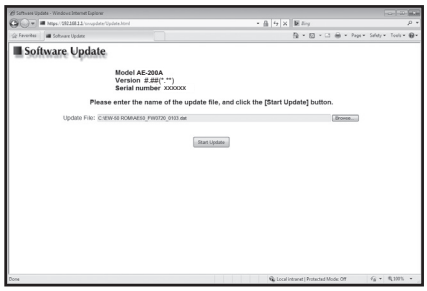
(6) A software update screen will appear.

(7) Click the [Browse...] button and select the update file (AExx_ FW####_****.dat) stored in the USB memory device, and click [Start Update].

Note: The software cannot be downgraded to an earlier version.

Note: "####" indicates the software version.



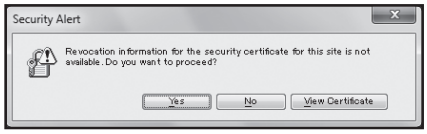


(8) A software update process starts.

Note: It takes about ten minutes to complete the update.

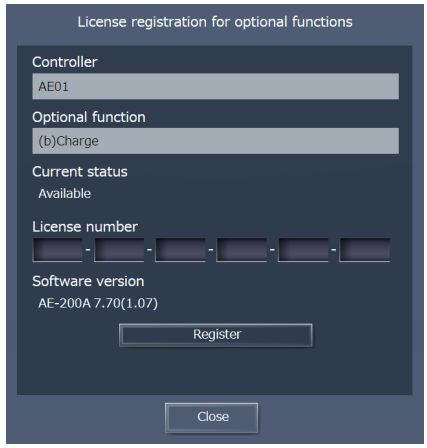
Note: Do not disconnect the LAN cable or turn off the power to the AE-200/AE-50 while the software is being updated.

A Security Alert window may appear. When it appears, click [Yes] to proceed.



(9) The AE-200/AE-50 will reboot after the update is complete. Check that the version that will appear on the screen is the same as the version of the update file. Also check that the version displayed on the "License registration for optional functions" screen on the Integrated Centralized Control Web is also the same.

Note: "#.##" indicates the software version.



(10) When using the Integrated Centralized Control Web, clear the history data of the browser. Refer to the Instruction Book (Initial Settings) for the procedures.

If the software update did not properly complete, update the software again. If the problem persists, the AE-200/AE-50 may be damaged. Consult your dealer.

2. Software information

Detailed information about the open source software of the AE-200/AE-50/EW-50 can be checked by accessing the following address:

https://[IP address of each AE-200, AE-50, or EW-50]/license/

* Accessible only if logged in as a maintenance user.

V. Troubleshooting

V. Troubleshooting

[1] Before performing failure diagnosis

If the AE-200/AE-50/EW-50 is not operating normally, first check the following items.
(The following items are for the maximum system configuration. Just check the items for the applicable equipment.)

No.	Item	Yes	No
1	Are the AE-200/AE-50/EW-50, PC, PLC, HUB, power supply unit, and other equipment and air conditioning units powered on?		
2	Is a power cable or transmission line disconnected?		
3	Is 100 to 240 VAC applied on the AC power cable of the AE-200/AE-50/EW-50?		
4	Is 17 to 32 VDC applied on the M-NET transmission line?		
5	Have the initial settings been configured for the AE-200/AE-50/EW-50 and each equipment?		
6	Are the correct date and time set on the AE-200/AE-50/EW-50?		
7	Is the required license number registered for each AE-200/AE-50/EW-50?		
8	Is a LAN cable disconnected? (Are the LAN cables compliant with the relevant standards?)		
9	Is the IP address of each equipment set?		
10	Is a terminal screws loose or a connector not inserted properly?		

If you answered “No” for any of the above items, remove the cause for that item.
If there is no problem, refer to the following sections.

[2] Error code list

1. List of error codes for errors detected by the AE-200/AE-50/EW-50

The following shows the error codes of errors detected by the AE-200/AE-50/EW-50.

Error code	Error description	Unit where error occurred				
		Outdoor unit	Indoor unit	Remote controller	AE-200 AE-50 EW-50	Remarks
0092	Version combination error				○	AE-200 only
0093	System configuration change warning				○	AE-200 only
0094	“Charge” license not registered				○	AE-200 only
0095	Warning - possibility of damaged metering device				○	AE-200 only
0097	Apportioned calculation data collection error				○	AE-200 only
6204	External memory read/write error				○	
6600	Communication error - Address duplicate	○	○	○	○	
6601	Communication error - Polarity unsettled				○	
6602	Communication error - Transmission processor hardware error				○	
6603	Communication error - Transmission line busy				○	
6606	Communication error - Transmission processor communication error				○	
6607	Communication error - No ACK return	○	○	○		
6608	Communication error - No return of response frame	○	○	○		
6920	Communication error - No response				○	
7106	System abnormality - Attribute setting error				○	
7109	System abnormality - Connection setting error				○	
7905	Version error				○	

For details on the error codes, refer to “V [3] Troubleshooting and solutions depending on the equipment.”

[Supplementary explanation] Error codes 0092 to 0095 and 0097 are for error occurrences of the AE-200 and are stored in the error history.
Error codes 6607 and 6608 are detected only by the AE-200/AE-50/EW-50 and are for error occurrences of the AE-200/AE-50/EW-50 and are stored in the error history.

[3] Troubleshooting and solutions depending on the equipment

1. How to determine the cause and resolve trouble based on the detected error display of the AE-200/ AE-50/EW-50

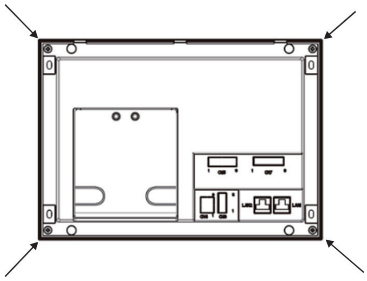
The following shows the details, causes, and solutions for the error codes of errors detected at the detection source by the AE-200/AE-50/EW-50.
First confirm that there is no mistake for each setting.
* The detection address displayed on the error monitor and in the error history is the address of the controller that detected the error.

Error code	Description and method of detection	Cause	Check procedure and remedy
0092	Version combination error Error detected when the versions of the AE-200/ AE-50/EW-50 are not a compatible combination for the apportioned electricity billing function.	1) The apportioned electricity billing function of the AE-200 has been enabled but the AE-50/EW-50 is a version that is not supported (version earlier than 7.23) by the apportioned electricity billing function.	The apportioned electricity billing function of the AE-200 does not operate while this error code is displayed. Update the AE-50/EW-50 to Ver.7.23 or later. Note: The equipment recovers from the error and then data collection resumes after a maximum of 30 minutes elapse. For how to update the software, refer to "IV [6] AE-200/AE-50/EW-50 update procedure."
0093	System configuration change warning Error detected when the apportioned data is not restored when the AE-200/AE-50/EW-50 is replaced while the apportioned electricity billing function of the AE-200 is enabled.	1) The AE-200 and AE-50/ EW-50 back up each other's data with the apportioned electricity billing function of the AE-200, but the backup data no longer matches after the AE-200/AE-50/EW-50 was replaced.	To prevent a loss of backup data, the apportioned electricity billing function of the AE-200 does not operate while this error code is displayed. Perform an apportioned data restore for the new AE-200/AE-50/ EW-50. Note: The equipment recovers from the error and then data collection resumes after a maximum of 30 minutes elapse. For how to restore apportioned data, refer to AE-200 Instruction Book (Apportioned Electricity Billing Function).
0094	"Charge" license not registered Error detected when a license is not registered to any of the AE-200/AE-50/ EW-50 while the apportioned electricity billing function is enabled for an AE-200 without an apportioned electricity billing function license.	1) With the apportioned electricity billing function of the AE-200, the "Charge" license needs to be registered to all the AE-50/ EW-50 under the control of the AE-200, but there is equipment to which it is not registered.	The apportioned electricity billing function of the AE-200 does not operate while this error code is displayed. Register the "Charge" license to all the AE-50/EW-50 under the control of the AE-200.

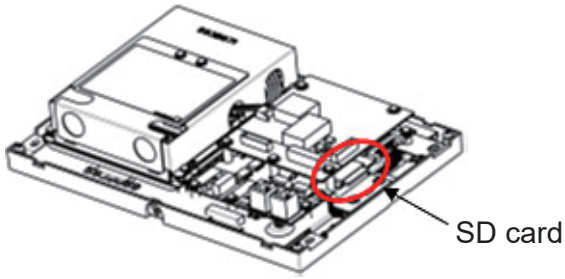
Error code	Description and method of detection	Cause	Check procedure and remedy
0095	Warning - possibility of damaged metering device Error detected when the state of the measurement value of the meter not counting up continues for at least three days even though the operation amount of the air conditioning units is being counted up while the apportioned electricity billing function of the AE-200 is enabled.	1) There is a wiring connection failure between the electricity meter and PI controller. (When a PI controller is used) 2) There is a wiring connection failure between the electricity meter and the built-in PI of the AE-50/EW-50. (When meter pulse input (PI) of the AE-50/EW-50 is used) 3) There is an error with communication between the PI controller and AE-50/EW-50. 4) An electricity meter with pulse output of 10 kWh/pulse or higher is being used. 5) The carried-over data was not cleared after the time period of the unit price was deleted.	Causes 1 to 3) Check the wiring connections to ensure there is no connection mistake or broken/disconnected wire. Cause 4) If an electricity meter with a large pulse output such as 10 kWh/pulse is used, three days or longer may be required to add one pulse depending on the operating conditions of the air conditioning units. If changing the pulse output of the electricity meter is possible, change it to a value such as 1 kWh/pulse. Cause 5) Perform the carried-over data clearing process for the deleted unit price. For how to clear the carried-over data, refer to AE-200 Instruction Book (Apportioned Electricity Billing Function). Note: The equipment recovers from the error and then data collection resumes after a maximum of 30 minutes elapse.
0097	Apportioned calculation data collection error Error detected when an error with communication between the AE-200 and AE-50/EW-50 continues for at least three days while the apportioned electricity billing function of the AE-200 is enabled. * When the communication error is less than three days and the apportioned electricity billing function of the AE-200 is disabled, the error will be 6920.	1) LAN contact failure 2) The power of the HUB is not on. 3) The IP address has not been set. 4) Is the length of the LAN cable 100 m (328 ft) or less? 5) Is the transmission delay time 4 seconds or less round trip?	Cause 1) Check that the LAN cables between the AE-200/AE-50/EW-50 and HUB are connected. Cause 2) Check that the power of the HUB is on. Cause 3) Check the IP address of the AE-200/AE-50/EW-50. Cause 4) Use LAN cables that are 100 m (328 ft) or less. Cause 5) Check the communication state by pinging. For the ping check method, refer to "V [5] 2. About the check method using ping." If the ping is timed out, check the following. • Are LAN cables of category 5 or better being used? • Is there not connections to four or more layers using a gateway, router, etc.?
6204	External memory read/write error Error detected when writing or reading to/from the internal SD card of the AE-200/AE-50/EW-50 could not be performed properly.	1) An error occurred because the reading or writing from/to the internal SD card could not be performed due to an unexpected erroneous operation of the AE-200/AE-50/EW-50 on which the error occurred. 2) The internal SD card has come out of the slot. 3) The AE-200/AE-50/EW-50 has malfunctioned (circuit failure, etc.).	Shut down the AC power of the AE-200/AE-50/EW-50 and then turn it back on and check the STATUS LED. a) If it is blinking in orange, shut down the AC power of the AE-200/AE-50/EW-50 and then remove the back cover. Reinsert the SD card, attach the back cover, and then turn on the AC power again. → If the LED is still blinking in orange, the AE-200/AE-50/EW-50 has failed. Replace the AE-200/AE-50/EW-50. Note: A commercially available SD card cannot be used. b) If the LED is not blinking in orange but the 6204 error is not resolved, the AE-200/AE-50/EW-50 has failed. Replace the AE-200/AE-50/EW-50.

Error code	Description and method of detection	Cause	Check procedure and remedy

When AE-200/AE-50
Remove the four screws in the positions indicated in the figure below, and remove the back cover.



When you remove the back cover, you will be able to see the SD card.



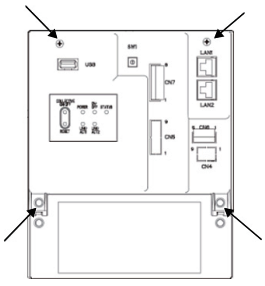
Note: When attaching the back cover to the AE-200/AE-50 unit, be sure to follow the procedure below.

1. **Check that the SD card is inserted properly.**
2. **Place the back cover on the unit cover so that the right edge (SD card side) of the back cover is aligned.**
3. **Move the placed back cover to the left so that it fits to the AE-200/AE-50 unit.**
4. **Press the top of the back cover to insert the back cover below the claws at the top of the AE-200/AE-50 unit.**
5. **Tighten the screws in four places on the back cover.**

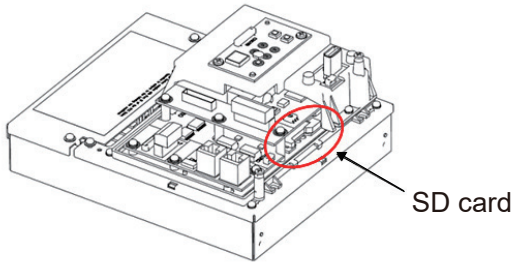
*** When attaching the cover, be very careful not to trap a wire or the SD card.**

When EW-50

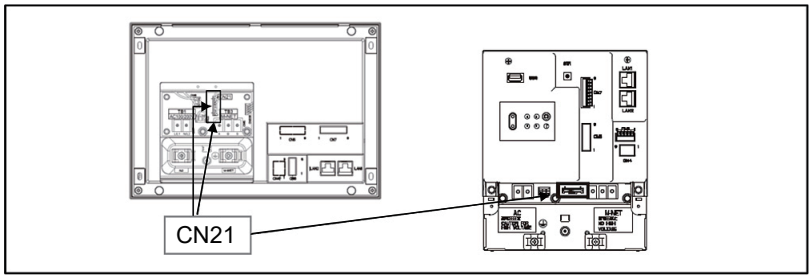
Remove the four screws in the positions indicated in the figure below, and remove the back cover.

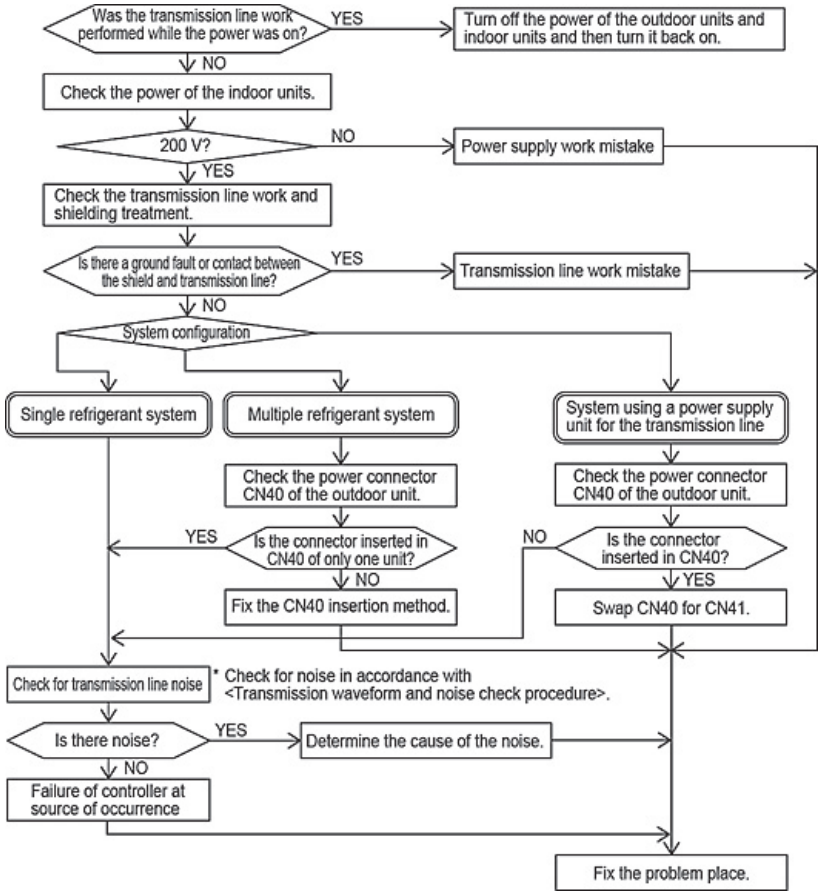


When you remove the back cover, you will be able to see the SD card.



Error code	Description and method of detection	Cause	Check procedure and remedy
6600	Communication error - Address duplicate Error detected when units with the same address are transmitting.	1) There are two more units with the same address among the AE-200/AE-50/ EW-50, outdoor units, indoor units, LOSSNAY, M-NET remote controllers, and other units. 2) Two or more AE-200/AE-50/ EW-50 with the same address set are installed in the same transmission line system. <Example> The part in ( ) indicates the detection source. 000-6600(000) There are two or more controllers with the address "000". 3) The transmitted data changed due to noise during transmission. 4) While AE-200 M-NET is set to [Do not use], the power jumper (CN21) of the AE-200 was removed.	Causes 1) and 2) Find the unit that has the same address as the unit where the error occurred. If the same address could be verified, check whether there are any mistakes with the wiring and whether there are any mistakes with the addresses in the system, and fix any mistakes you find. Turn off the power of the air conditioning units, controllers, and other equipment at the same time, leave it off for at least 5 minutes, and then turn it back on. Cause 3) Check the transmission waveform and noise on the transmission line. For the check procedure, refer to "V [4] M-NET transmission waveform and noise check procedure." Cause 4) Check the connection of the power jumper of the AE-200. Be sure to connect the power jumper even when AE-200 M-NET is set to [Do not use].

Error code	Description and method of detection	Cause	Check procedure and remedy
6601	Communication error - Polarity unsettled 1. Error detected when the transmission processor which is an M-NET communication component cannot verify the + and - voltage polarity of the M-NET transmission line.	1) There is no voltage between the M-NET transmission line connected to the AE-200/ AE-50/EW-50. 2) The M-NET transmission line connected to the AE-200/ AE-50/EW-50 is shorted. 3) The M-NET power supply is duplex feeding and has a different polarity connection.	Causes 1) and 2) Check whether there is a voltage to the M-NET transmission line of the AE-200/ AE-50/EW-50 and fix any wiring work mistakes. In the case of a system for which power is supplied from the AE-200/AE-50/EW-50 to the MN converter, check that the M-NET power jumper (CN21) is connected.  Cause 3) Check whether power is being supplied to the M-NET transmission line from multiple equipment, and fix the power supply configuration if it is incorrect.
	2. Detected invalid signal due to a transmission waveform error or noise on the M-NET transmission line.	4) Contact failure of the transmission line of an outdoor unit or indoor unit. 5) Attenuation of the transmission voltage/signal because the allowable range for the transmission line wiring has been exceeded. • Farthest end: Exceeds 200 m (656 ft) • Remote controller line: Exceeds 10 m (32 ft) However, there is no problem if the portion where the remote controller line exceeds 10 m (32 ft) is 1.25 mm². 6) Attenuation of the transmission voltage/ signal because mismatch of transmission line types Wire diameter: Less than 1.25 mm² 7) The M-NET power supply is duplex feeding and has a same polarity connection. 8) Failure of control board in the outdoor unit	Causes 4) to 8) → If you find the cause, fix the problem. → If you cannot find the cause, check the transmission waveform and noise on the transmission line. Perform the check procedure in accordance with "V [4] M-NET transmission waveform and noise check procedure" and <Transmission waveform and noise check procedure> in the Service Handbook of the air conditioning unit. The part causing the error may be a different line than the one where the error was detected so check all wiring in the same system.
	3. Polarity not set error	9) Defective AHC ADAPTER	Check the voltage and short circuit. Replace the product.

<table>
<tr><th>Error code</th><th>Description and method of detection</th><th>Cause</th><th>Check procedure and remedy</th></tr>
<tr><td>6602</td><td>Communication error - Transmission processor hardware error
The transmission processor intended to send "0" but "1" is output on the transmission line.</td><td colspan="2">Cause 1) When work was performed or the polarity was changed for the transmission line of either an indoor unit or outdoor unit while the power was left on, the waveform changed and an error was detected when the transmission data collided.
Cause 2) When a 100 V power supply was connected to the indoor unit.
Cause 3) Ground fault of the transmission line.
Cause 4) When a power supply unit for the transmission line is not used in a system with the AE-200/AE-50/EW-50 connected, the power jumper is inserted in CN40 on multiple outdoor units.
Cause 5) When a power supply unit for the transmission line is used in a system with the AE-200/AE-50/EW-50 connected, the power jumper is inserted in CN40 on one of the outdoor units.
Cause 6) Failure of the controller on which the error occurred.
Cause 7) When the transmitted data changed due to noise during transmission.
 

Cause 8) Defective AHC ADAPTER
Refer to the CITY MULTI (Outdoor Unit) Service Handbook.</td></tr>
<tr><td>6603</td><td>Communication error - Transmission line busy
1. Collision over error. Error when the state of data not being able to be transmitted continues for a period of 4 to 10 minutes due to a transmission collision.
2. Error when the state of data not being output to the transmission line continues for a period of 4 to 10 minutes due to, for example, noise.</td><td>1) The transmission processor is in the state of being unable to transmit due to a voltage of a short period such as noise continuing to be generated and causing an interference on the transmission line.
2) Failure of controller on which error occurred.
3) Defective AHC ADAPTER</td><td>Check the transmission waveform and noise on the transmission line. Perform the check in accordance with <Transmission waveform and noise check procedure>.
→ If there is no noise, the controller at the source of occurrence has failed. If the AE-200/AE-50/EW-50 has failed, replace the AE-200/AE-50/EW-50.
→ If there is noise, refer to "V [4] M-NET transmission waveform and noise check procedure."
Refer to the CITY MULTI (Outdoor Unit) Service Handbook.</td></tr>
</table>

Error code	Description and method of detection	Cause	Check procedure and remedy
6604	M-NET communication error - No ACK return Error detected by AHC ADAPTER when the other party fails to return the ACK signal after a command transmission on M-NET.	1) Incorrect initial settings 2) The address of the other party on the M-NET transmission line changed during transmission. 3) Defective M-NET transmission line 4) Transmission line or connector disconnected at the address of the other party in M-NET communications. 5) Other party in M-NET communications is effective 6) For communications about multiple refrigerants, the transmission line or connector is disconnected from the terminal block for centralized control (TB7). 7) For communications about multiple refrigerants, power is cut to an outdoor unit. 8) For communications about multiple refrigerants, the power connector (CN40) was not inserted in an outdoor unit. 9) For communications about multiple refrigerants, two or more power connectors (CN40) were inserted for centralized control. 10) For communications about multiple refrigerants, an outdoor unit power supply system is defective. 11) Transmitted data changed due to noise on the M-NET transmission line.	An AHC ADAPTER No ACK return error was displayed on the remote controller or centralized controller. Follow the procedure below to determine the address of the unit that caused the AHC ADAPTER error. (1) Use the centralized controller or Maintenance Tool to check for abnormalities in the I/O data held in Mitsubishi air conditioners set by the initial settings. (No value is displayed when data is abnormal.) → If an abnormality exists, check for problems in the unit at the address where the corresponding data is held and for problems in the M-NET transmission line connected to the unit or in the unit itself. (For communications about multiple refrigerants, also investigate intermediate outdoor units.) (2) Check for incorrect remote controller or centralized controller settings that do not correspond to (1) above. → If incorrect settings are discovered at steps (1) or (2), use Maintenance Tool to repeat the initial settings. If the cause does not correspond to steps (1) or (2), check for noise in the M-NET transmission line.
6605	M-NET communication error - No return of response frame Error indicating that the ACK signal was returned to acknowledge receipt but no response was returned when a communication command was sent over M-NET.	1) Transmission line work was performed while power is supplied to M-NET. 2) Transmitted data changed due to noise on the M-NET transmission line. 3) Transmission line voltage/ signal attenuation as M-Net transmission line exceeded its permitted length range. Remote end: 200 m max. 4) Transmission line voltage/ signal attenuation due to mismatch in M-Net transmission line types. Cable cross-sectional area: 1.25 mm² min.	Cut the power supply from the unit (outdoor unit or power supply unit) that supplies power to AHC ADAPTER, or reset the error from the remote controller or centralized controller. → If the same error recurs, see causes 3) and 4). → If causes 3) and 4) do not apply, check the transmission waveform and noise in the transmission line. For details about the check procedures, refer to the CITY MULTI (Outdoor Unit) Service Handbook.

Error code	Description and method of detection	Cause	Check procedure and remedy
6606	Communication error - Transmission processor communication error Failure with communication between the device processor on the board and the transmission processor.	1) Error that occurs when data was not transmitted normally due to an unexpected erroneous operation of the controller on which the error occurred. 2) Failure of the controller on which the error occurred. 3) Error due to abnormal data transmission due to a chance malfunction of the AHC ADAPTER. 4) Defective AHC ADAPTER	Causes 1) and 2) Shut off the AC power of the AE-200/AE-50/EW-50 and then turn it back on. → If the same error occurs again, the controller on which error occurred has failed. If the AE-200/AE-50/EW-50 has failed, replace the AE-200/AE-50/EW-50. Causes 3) and 4) Cut the power supply from the unit (outdoor unit or power supply unit) that supplies power to AHC ADAPTER, or reset the error from the remote controller or centralized controller. → If the same error recurs, AHC ADAPTER is defective.
6607	Communication error - No ACK return Error detected by the controller on the transmission side when there is no reply (ACK signal) from the other party after transmission. * If recovery from the error is not possible with this check method and solution, refer to the service manual of the air conditioning unit.	Occurrence source address: Outdoor unit 1) The transmission line of the centralized control terminal block (TB7) of the outdoor unit is disconnected or shorted. 2) Power of the outdoor unit is shut off. 3) The electric system of the outdoor unit has failed. 4) When the address of the outdoor unit changes or is changed part way through or when the error occurred after normal operation was performed once, there are the following causes. • System abnormality - Total capacity error (7100) • System abnormality - Capacity code error (7101) • System abnormality - Connecting unit number excess (7102) • System abnormality - Address setting over 254 (7105)	a) Check causes 1) to 4). Fix the problem if you find the cause, and proceed to b) if you do not find the cause. b) Shut off the power of the AE-200/AE-50/EW-50 and then turn it back on. Fix the problem if you find the cause, and proceed to c) if you do not find the cause. c) Check whether or not an error has occurred by checking the remote controller or the LED for failure diagnosis on the outdoor unit. When there is an error → Fix the failed part in accordance with the details on the error code.
		Occurrence source address: Indoor unit a) Error for only some indoor units. 1) When the address of the indoor unit changes or is changed part way through. 2) The transmission line of the indoor unit is defective or disconnected. 3) The connector (CN2M) of the indoor unit is disconnected. 4) The indoor unit controller has failed.	Turn off the power of the outdoor units and indoor units at the same time, leave it off for at least 5 minutes, and then turn it back on. Shut off the power of the AE-200/AE-50/EW-50 and then turn it back on. The equipment recovers normally if an unexpected error occurred. If it does not recover normally, check causes 1) to 4).

Error code	Description and method of detection	Cause	Check procedure and remedy
		b) All indoor units in one refrigerant system are in error 5) Outdoor unit detects the error. • System abnormality - Total capacity error (7100) • System abnormality - Capacity code error (7101) • System abnormality - Connecting unit number excess (7102) • System abnormality - Address setting over 254 (7105) 6) The transmission line of the centralized control terminal block (TB7) of the outdoor unit is disconnected or shorted. 7) Power of the outdoor unit is shut off. 8) The electric system of the outdoor unit has failed. 9) The address switch of the outdoor unit is mistakenly set to 000 (00).	a) Check the failure diagnosis LED on the outdoor unit. → When an error is occurring, perform a check in accordance with the details on the error code. → When an error is not occurring, proceed to b) b) Check the details of causes 6) to 9).
		c) All indoor units are in error 10) When a power supply unit for the transmission line is used, the power jumper (CN40) is inserted for supplying power to the centralized control transmission line of the outdoor unit. 11) When outdoor units are used, the power jumper (CN40) is inserted for supplying power to the centralized control transmission line of multiple outdoor units. 12) The transmission line power supply unit is disconnected or the power is shut off. 13) The AE-200/AE-50/EW-50 has failed.	Check the voltage of the centralized control transmission line. (Voltage between A and B of TB3 in the case of the AE-200/AE-50/EW-50) • When 17 V or higher → Check causes 5) to 11) • When less than 17 V → Check cause 12)
		Occurrence source address: Remote controller Occurrence source address: System remote controller * Same as when the occurrence source is an indoor unit (Read that section and replace the term "indoor unit" with "remote controller" or "system remote controller")	
	Communication error - No ACK return Error detected by the controller on the transmission side when there is no reply (ACK signal) from the other party after transmission.	Address that should not exist An address that does not exist is set in the group registration, interlock LOSSNAY settings, or measurement settings of the AE-200/AE-50/EW-50.	Check whether the address that does not exist in the system configuration is set in the group registration, interlock LOSSNAY settings, or measurement settings. If it is set, delete it.

Error code	Description and method of detection	Cause	Check procedure and remedy
6608	Communication error - No return of response frame When transmission was performed, there was an acknowledgment (ACK) to notify that the transmission was received from the other party but the response command was not returned. The transmission side detects an error 10 consecutive times at 3-second intervals.	1) When work was performed or the polarity was changed for the transmission line while the power was left on, the waveform changed and an error was detected when the transmission data collided. 2) Transmission fails repeatedly because of, for example, noise. 3) Attenuation of the transmission line voltage/ signal because the allowable range for the transmission line wiring has been exceeded. • Farthest end: 200 m (656 ft) or less • Remote controller line: 10 m (32 ft) or less 4) Attenuation of the transmission voltage/ signal because mismatch of transmission line types. • Wire diameter: 1.25 mm² or more 5) The set temperature range limit is set in a system with a remote controller that does not support the set temperature range limit connected.	a) When occurs during test run Turn off the power of the outdoor units, indoor units, and LOSSNAY at the same time, leave it off for at least 5 minutes, and then turn it back on. → If the equipment recovers from the error normally, the error was detected because transmission work was performed while the power was on. → If the error occurs again, proceed to b). b) Check causes 3) and 4). → If you find the cause, fix the problem. → If you do not find the cause, proceed to c). c) Check the transmission waveform and noise on the transmission line. Perform the check in accordance with <Transmission waveform and noise check procedure>. If 6608 is occurring, it is very likely to be due to noise. d) If the cause is not any of 1) to 4), check the system operating status and configuration. → If you find the cause, reset the remote controller.
6920	Communication error - No return of response frame	1) LAN contact failure. 2) The power of the HUB is not on. 3) The IP address has not been set. 4) Is the length of the LAN cable 100 m (328 ft) or less? 5) Is the transmission delay time 4 seconds or less round trip?	Cause 1) Check that the LAN cables between the AE-200/AE-50/EW-50 and HUB are connected. Cause 2) Check that the power of the HUB is on. Cause 3) Check the IP address of the AE-200/AE-50/EW-50. Cause 5) Check the communication state by pinging. For the ping check method, refer to "V [5] 2. About the check method using ping." If the ping is timed out, check the following. • Are LAN cables of category 5 or better being used? • Is there not connections to four or more layers using a gateway, router, etc.?
7106	System abnormality - Attribute setting error	1) An address with a different attribute (air conditioning unit or other unit) is set for the group for which devices such as PI controller, chiller, and HWHP (QAHV) are set. 2) The unit address set for the interlock source in the interlock LOSSNAY settings is not a LOSSNAY. 3) The attribute (IC/FU) setting of the OA Processing unit is not correct.	Cause 1) Adjust the group configuration so that all addresses have the same attribute such as PI controller, chiller, and HWHP (QAHV). Cause 2) Change the address set for the interlock source in the interlock LOSSNAY settings to the correct address. Alternatively, delete it. Cause 3) Switch the attribute with the dip switch. For details, refer to the installation manual for OA Processing unit.

Error code	Description and method of detection	Cause	Check procedure and remedy
7109		Occurrence source address: Chiller 1) The group settings on AE-200 and the configuration and settings on the chiller do not match.	Check the address registration of the group settings and the device configuration of the air-cooled chiller. If the address registration and the device configuration are different, review the address registration or the device configuration of the chiller.
		Occurrence source address: HWHP(QAHV) 1) The description of HW Supply on the AE-200 Initial Settings screen and the configuration and settings for HWHP do not match.	Check the address registration of HW Supply and the device configuration of HWHP (QAHV). If the address registration and the device configuration are different, review the address registration.
7130	System abnormality - Different unit model error ALPHA2 program version mismatch error	1) The ALPHA2 program was created and run without using the base program supplied with AHC ADAPTER. 2) Version data has been overwritten in the base program supplied with AHC ADAPTER. 3) The ALPHA2 base program used did not correspond to the AHC ADAPTER version.	Causes 1) and 2) Confirm that the ALPHA2 internal program uses the base program supplied with AHC ADAPTER. Check that the program version number matches the base program version number. => If not, recreate the ALPHA2 program from scratch using the base program supplied with AHC ADAPTER. Cause 3) (N/A as of April 2013)
7905	Version error	1) The software versions of AE-200 and AE-50/EW-50 do not match. 2) PAC-YG50ECA is connected.	Cause 1) Update AE-200/AE-50/EW-50. For the update procedures, refer to "IV [6] AE-200/AE-50/EW-50 update procedure." Cause 2) Disconnect PAC-YG50ECA from the system. If an expansion controller is required, use AE-50/EW-50.

NOTE: When the error code is for a detection source other than AE-200/AE-50/EW-50, refer to the service handbook or each air conditioning unit and perform the checks and take the corresponding measures.

2. Error judgment based on the STATUS LED display of the AE-200/AE-50/EW-50

The AE-200/AE-50/EW-50 indicates its internal status with the STATUS LED.
The following table shows the LED lighting states, operating status, check methods, and solutions.

STATUS LED (Lighting color and state)		Operation status	Cause	Check procedure and remedy
Off	Normal	The equipment is operating normally.	-	-
Blinking in blue	Normal	The software of the AE-200/AE-50/EW-50 unit is being updated.	-	The LED will turn off after the update completes. Please wait until the process completes.
Blinking in pink	Error	The software update of the AE-200/AE-50/EW-50 unit failed.	When updating the software using a USB memory device 1) An error occurred because the update process could not be performed normally due an unexpected erroneous operation. 2) The update file is incorrect. 3) The USB memory device is not inserted properly. 4) The USB memory device is not compatible with the AE-200/AE-50/EW-50. 5) The USB memory device is damaged. 6) The USB memory device was removed and then reinserted within a short period of time. 7) The AE-200/AE-50/EW-50 has failed.	1) Perform the update again. 2) Check the file. Has the software for the AE-200, AE-50, and EW-50 been mixed up? 3) Check that the USB memory device is inserted properly. 4) Refer to "III [11] (2) About USB memory devices." 5) Connect the USB memory device to a PC or other device and check that the data inside it can be read correctly. 6) Reset the power of the AE-200, AE-50, and EW-50 and then perform the update again. 7) If the update fails after resetting the power, the product is likely to have failed so replace it.
			When updating via the Web 1) An error occurred because the update process could not be performed normally due an unexpected erroneous operation. 2) The update file is incorrect. 3) The AE-200/AE-50/EW-50 has failed.	1) Check that the LAN cable is connected properly and then perform the update again. 2) Check the file. Has the software for the AE-200, AE-50, and EW-50 been mixed up? 3) If the update fails after resetting the power, the product is likely to have failed so replace it.

STATUS LED (Lighting color and state)		Operation status	Cause	Check procedure and remedy
Blinking in orange	Error	The LED blinks in orange after the power is turned on and then a unit reset is performed 30 minutes after the power was turned on.	Reading from the SD card failed. 1) An error occurred because the reading or writing from/ to the internal SD card could not be performed due to an unexpected erroneous operation. 2) The internal SD card has come out of the slot. 3) The AE-200/AE-50/EW-50 has failed. (Memory circuit failure, etc.)	The LED is blinking in orange and the [6204] error is also detected. Check causes 1) and 2). Check how to perform the procedure to resolve the problem of error code [6204] in "V [3] 1" and then resolve the problem. → If the LED is still blinking in orange after taking the measure, the AE-200/AE-50/EW-50 has malfunctioned. Replace the AE-200/ AE-50/EW-50.
		The unit does not start up. (A reset is not performed.)	Startup error 1) A normal startup was not possible due to an unexpected erroneous operation of the controller on which the error occurred. 2) The AE-200/AE-50/EW-50 has failed.	1) Shut down the power of the AE-200/AE-50/EW-50 and then turn it back on. → If the unit still does not start up after taking the measure, the AE-200/ AE-50/EW-50 has malfunctioned. Replace the AE-200/AE-50/ EW-50.

3. Troubleshooting depending on the trouble symptoms of the AE-200/AE-50/EW-50 and trouble examples

(1) When AE-200/AE-50/EW-50 unit functions

	Symptom	Cause	Check procedure and remedy
1	The LCD remains off and no operation is possible.	1) AC power is not being supplied. 2) The AE-200/AE-50 has failed. (Internal power supply failure, etc.)	Cause 1) Check the voltage of the AC power supply terminal block of the AE-200/AE-50. a) When 0 V → Check whether the circuit breaker connected to the AC power supply is ON. b) When 100 to 240 VAC → Proceed to cause 2) Cause 2) Shut off the AC power of the AE-200/AE-50 and then turn it back on. → If the same error occurs again, the AE-200/AE-50 has failed. Replace the AE-200/AE-50.
2	The LCD screen turns on and off every few seconds and normal startup is not possible.	1) A software update of the AE-200/AE-50 did not end normally. 2) The AE-200/AE-50 has failed. (Internal connector contact failure, etc.)	Cause 1) Check the STATUS LED. → If it is blinking in pink, perform the software update again. Refer to "VIII [1] How to Use Wireshark for AE-200 BACnet®." Cause 2) If the cause is not cause 1) above, shut off the power and then turn it back on. If the same symptoms occur, the AE-200/AE-50 has failed. Replace the AE-200/AE-50.
3	The LCD screen becomes red and a restart is performed repeatedly.	The AE-200/AE-50 has failed. (SDRAM failure, etc.)	The AE-200/AE-50 has failed. Replace the AE-200/AE-50.
4	Prohibiting operation with the local remote controller does not work.	The M-NET remote controller is not registered to the group of the AE-200/AE-50/EW-50.	Check whether the M-NET remote controller is registered to the group on the AE-200/AE-50/EW-50, and if it is not, perform group registration for the M-NET remote controller.
5	The time is significantly different from the set time.	1) Incorrect setting from upper level equipment. 2) Incorrect setting from BACnet®. 3) The AE-200/AE-50/EW-50 has failed.	Cause 1) Check the upper level equipment (TG-2000A, etc.) to see whether there is equipment for which the time is wrong. [Supplementary explanation] If the cause is not incorrect setting from upper level equipment, disconnect from the LAN and leave the equipment for one hour without a connection to the LAN and then check. Cause 2) Check that the time on the upper level equipment connected via BACnet® is correct. → If the time is significantly slow (10 seconds or more per hour), the AE-200/AE-50/EW-50 has failed. Replace the AE-200/AE-50/EW-50.
6	Error output of the external output always continues to be ON even though an error has not been detected.	1) The power supply of the external circuit is connected with the polarity reversed. 2) AC power is applied to the external input. 3) The AE-200/AE-50/EW-50 has failed.	Cause 1) Check the polarity of the connection of the external power supply of the external circuit. If it is reversed, fix the polarity. If output is not normal even after changing the polarity, replace the AE-200/AE-50/EW-50. Cause 2) and 3) Replace the AE-200/AE-50/EW-50.

	Symptom	Cause	Check procedure and remedy
7	The unit icon remains in the starting up state and does not change.	A communication error is occurring.	The startup process will complete approximately five minutes after the power is turned on. After that, check the error code and remove the cause of the communication error. For the error codes detected by the centralized controller, refer to "V [3] 1. How to determine the cause and resolve trouble based on the detected error display of the AE-200/AE-50/EW-50."
8	The initial settings data cannot be output to a USB memory device.	1) The USB memory device is not inserted properly. 2) There is no free space in the USB memory device. 3) The USB memory device is not supported by the AE-200/AE-50. 4) The USB memory device is damaged. 5) The USB memory device was removed and then reinserted within a short period of time. 6) The AE-200/AE-50 has failed.	Check causes 1) to 5). Take the measure corresponding to the cause. Cause 1) Check that the USB memory device is inserted properly. Cause 2) Check that there is free space on the USB memory device and free up space if necessary. (Minimum of 64 MB) Cause 3) Refer to "III [11] (2) About USB memory devices." Cause 4) Try using another USB memory device. Cause 5) Restart the AE-200/AE-50 (power OFF → ON). If the cause of the problem was none of causes 1) to 5), the AE-200/AE-50 has failed. Replace the AE-200/AE-50.
9	The charge parameters cannot be output to a USB memory device.	1) The USB memory device is not inserted properly. 2) There is no free space in the USB memory device. 3) The USB memory device is not supported by the AE-200/AE-50. 4) The USB memory device is damaged. 5) The USB memory device was removed and then reinserted within a short period of time. 6) The “Charge” license is not registered. 7) The AE-200/AE-50 has failed.	Check causes 1) to 6). Take the measure corresponding to the cause. For causes 1) to 5), check causes 1) to 5) for the item above. Cause 6) Check whether the apportioned electricity billing license is valid, and if it is invalid, register a license. If the cause of the problem was none of causes 1) to 6), replace the AE-200/AE-50.
10	The date and time of the AE-200/AE-50/EW-50 are a date and time in the past.	1) The date and time were not set after installation. 2) If the power of the AE-200/AE-50/EW-50 is turned off after the power has been off for at least one week, the date and time will not have been retained. 3) An AE-200/AE-50/EW-50 was added to the system but its time was not set.	Cause 1) Set the current date and time on the date and time setting screen. Cause 2) When the power remains off for about one week, the date is returned to April 1, 2014. (Supplementary explanation) The billing results will be affected in a system with a billing function, so set the current date and time on the date and time setting screen. If there is a TG-2000A, set the date and time on the TG-2000A. Cause 3) The date at the initial startup becomes April 1, 2014. Set the current date and time on the date and time setting screen.

Symptom		Cause	Check procedure and remedy
11	A place that differs from the touched position responds.	1) You are not pressing firmly enough. 2) There is an offset due to the viewing angle. 3) The AE-200/AE-50 has failed. (Touch panel input circuit failure, etc.)	Causes 1) and 2) If a place that differs from the touched position responds, perform touch panel position adjustment on the calibration screen. (Supplementary explanation) The calibration screen can be opened from [Initial Settings] → [Maintenance] → [Touch Panel Calibration]. → If touch panel position adjustment is not successful, the AE-200/AE-50 has failed. Replace the AE-200/AE-50.
12	A floor plan cannot be read.	1) The USB memory device is not inserted properly. 2) A USB memory device that is supported by the AE-200/AE-50 is not being used. 3) The name of a file you are attempting to read is incorrect. 4) There are no files in the correct location in the USB memory device. 5) The created gif files contain extension data (XMP, etc.). 6) The file size is not correct. 7) The USB memory device is damaged. 8) The USB memory device was removed and then reinserted within a short period of time. 9) The AE-200/AE-50 has failed.	Check causes 1) to 8). Take the measure corresponding to the cause. Cause 1) Check that the USB memory device is inserted properly. Cause 2) Refer to "III [11] (2) About USB memory devices." Cause 3) Set a correct file name as described in the Instruction Book. E.g.: floor_01.gif If [Hide extensions for known file types] is set in the folder settings of the PC on which the file was created, check the file name in the properties. Cause 4) Place the files in the root directory of the USB memory device. Cause 5) When creating gif files, set extension data to not be included and then create the files. Cause 6) Create a file in gif format that is fixed to 1890 dots wide by 900 dots high for each floor. Cause 7) Try using another USB memory device. Cause 8) Restart the AE-200/AE-50 (power OFF → ON). If the cause of the problem was none of causes 1) to 8), the AE-200/AE-50 has failed. Replace the AE-200/AE-50.

	Symptom	Cause	Check procedure and remedy
13	The display of the read floor plan is strange in terms of size, colors, etc.	1) The size of the prepared images is incorrect. 2) The colors used in the prepared images are other than the specified ones. 3) Free software was used to create the gif images.	Cause 1) If the prepared images are enlarged or displayed tilted, the image sizes may be different than the designated 1890 dots wide by 900 dots high. Check that the prepared images are the correct size. Cause 2) If the colors become different from those of the prepared images, check whether the images have been created using the colors specified in the instruction manual. Also, transparent gifs and animation gifs cannot be used. Cause 3) If free software is used to create the images, the format may differ from the standard gif format. If normal display is not possible, we recommend using the following software to create images. [Recommended software] Photoshop CS* (* is the version) Photoshop Elements * (* is the version)
14	Logged in to the initial setting screen but the setting buttons are in the pressed state and operation is not possible.	You are logged in as the administrator user so you do not have setting privileges.	Log in by entering the login name and password of the maintenance user.
15	The initial settings data cannot be read from a USB memory device.	1) The USB memory device is not inserted properly. 2) The SetupData folder does not exist in the USB memory device. Or the folder is incorrect. 3) A USB memory device that is supported by the AE-200/ AE-50/EW-50 is not being used. 4) The USB memory device is damaged. 5) The USB memory device was removed and then reinserted within a short period of time. 6) The AE-200/AE-50/EW-50 has failed.	Check causes 1) to 5). Take the measure corresponding to the cause. Cause 1) Check that the USB memory device is inserted properly. Cause 2) Check that the name of the folder containing the initial settings data is correctly set to SetupData (including uppercase and lowercase). Cause 3) Refer to "III [11] (2) About USB memory devices." Cause 4) Try using another USB memory device. Cause 5) Restart the AE-200/AE-50/ EW-50 (power OFF → ON). If the cause of the problem was none of causes 1) to 5), the AE-200/AE-50/EW-50 has failed. Replace the AE-200/AE-50/EW-50.
16	The displayed set temperature differs from the set temperature.	1) External temperature interlock control is set. 2) Peak cut control is being performed. 3) A schedule is set. 4) Interlock control is set.	Cause 1) If external interlock control is set, the set temperature is changed automatically according to the outdoor temperature. Check the external interlock control settings. Cause 2) If peak cut control is being performed, the temperature may change. Check the peak cut control settings. Cause 3) Check whether or not changing of the set temperature is registered in the schedule settings. Cause 4) Check whether or not changing of the set temperature is set in the interlock control.

Symptom		Cause	Check procedure and remedy
17	Air conditioning units start operating on their own even though they are supposed to be stopped.	The setback function is set.	If the setback function is set to [Use], air conditioning units start performing the cooling or heating operation automatically when a set condition is met while the air conditioning units are stopped.
18	LOSSNAY units start operating on their own even though they are supposed to be stopped.	Night purge is set on the LOSSNAY units.	If the night purge setting is set on the LOSSNAY units, the operation to take in outside air is performed automatically according to the settings that are set on the LOSSNAY units.
19	A schedule does not operate.	1) Incorrect settings are set. 2) The period settings of the schedule are incorrect. 3) The [OK] button was pressed while the display area in today's schedule was still blank. 4) The current time is not correct. 5) The "Schedule" on the operation screen is set to **[Disabled]**. 6) A schedule is duplicated with the settings for a schedule with higher priority such as the yearly schedule. 7) The "Schedule/Season setting" in the advanced settings is set to **[Disabled]**.	Open the today's schedule screen of the group to be operated and check the set schedule is displayed. If it is not displayed, check causes 1) to 3) below. Cause 1) The schedule settings are retained for each group so check whether or not the schedule settings of the group you wish to operate are incorrect. Cause 2) One of the weekly schedules operates in accordance with the set period so check whether or not there is a mistake in the period settings of the season settings screen. Cause 3) If the [OK] button is pressed while the display in the today's schedule settings screen is left blank, the schedule is handled as having been set not to operate. If the settings of causes 1) and 2) are set correctly and a blank area is displayed when the today's schedule settings screen is opened, the cause is highly likely to be cause 3). Set the schedule to be operated again from the today's schedule settings screen. Cause 4) Check the current time. Cause 5) Change the setting to **[Enabled]**. Cause 6) The order of priority for schedules from highest to lowest is today's schedule, yearly schedule, weekly schedule 1, ..., weekly schedule 5. Cause 7) Set the "Schedule/Season setting" in the advanced settings to **[Enabled]**. For details, refer to "AE-200/AE-50/EW-50 Instruction Book (Initial Settings)."

	Symptom	Cause	Check procedure and remedy
20	Error mail is not sent.	1) Incorrect settings are set. 2) Communication is cut off. 3) The mail is blocked by the mail server. 4) The mail is blocked by the incoming mail server.	Check causes 1) to 3) below. Cause 1) Check the mail address setting and SMTP server settings. For the setting procedures, refer to "7-1-1. E-Mail" in AE-200/AE-50/EW-50 Instruction Book (Initial Settings). Cause 2) Check the following items. • Is the power of the HUB turned on? • Is the HUB broken? • Is the LAN cable disconnected? • Is the LAN cable 100 m (328 ft) or less? • Is a straight LAN cable of category 5 or better being used? Cause 3) Port 25 (SMTP) (factory default setting) is used for sending mail of the AE-200/AE-50/EW-50. Mail sent using port number 25 may be blocked by the mail server for security enhancement purposes. If it is blocked, sending will not be possible so consult with the information system administrator. Cause 4) The security settings required by the incoming mail server are not supported by AE-200. Normal operation was confirmed using Yahoo Mail in July 2019. After checking causes 1) to 4), check whether or not error mail is sent. Method: Register an unconnected indoor unit or local remote controller in the group registration screen of the AE-200/AE-50/EW-50 in order to generate an error and then check whether or not error mail is sent.
21	A buzzer sounds (continuous beeping sound) and the screen is not displayed after turning on the power of the unit.	The AE-200/AE-50 has failed. (Internal power supply failure, etc.)	The AE-200/AE-50 has failed. Replace the AE-200/AE-50.

	Symptom	Cause	Check procedure and remedy
22	The set temperature is not reflected when the operation mode and set temperature are changed at the same time. Or the set temperature is not reflected when the operation mode and set temperature are changed at the same time in the schedule settings.	1) One of the following local remote controllers is connected to the air conditioning unit. • ME remote controller (model before PAR-U02MEDA and PAR-U01MEDU) • MA remote controller (model before PAR-31MAA(E)) • MA remote controller (model before PAR-21MAA) 2) The air conditioning unit is set to one of the following. • The set temperature is 18°C (64°F) or less in the "Heat" operation mode. • The set temperature is 29°C (84°F) or more in the "Cool" or "Dry" operation mode. 3) The operation mode and set temperature change at the same time. * The operation mode changes from "Heat" to "Cool" or "Dry," or from "Cool" or "Dry" to "Heat." * The set temperature is set to an arbitrary temperature.	This symptom is likely when causes 1) to 3) are all met and multiple air conditioning units are operated at the same time from the centralized controller or system remote controller. Perform the check using the method described below. Cause 1) Confirm the model name printed on the local remote controller or from the supplied instruction manual. Cause 2) Display the operation screen and check the settings. Cause 3) Check the settings before the change and settings after the change in the operation screen. If this symptom occurred, the problem can be prevented by taking the following measure. If the operation mode is "Heat" for cause 2), change the setting for the set temperature to 19°C (66°F) or more, and if it is "Cool," change the setting for the set temperature to 28°C (82°F) or less. If schedule settings are used and the symptom occurred, the problem can be prevented by taking the following measure. If the operation mode is "Heat," set the schedule setting for the set temperature to 19°C (66°F) or more, and if it is "Cool," set the schedule setting for the set temperature to 28°C (82°F) or less before the time you wish to set in the schedule (five minutes before is recommended). Example: When wish to set to heating 26°C (79°F) at 8:00. 7:55 Cooling 28°C (82°F) (schedule setting) ↓ 8:00 Heating 26°C (79°F) (schedule setting)

Symptom		Cause	Check procedure and remedy
23	The temperature does not return to the original set temperature when control ends for setback control.	1) One of the following local remote controllers is connected to the air conditioning unit. • ME remote controller (model before PAR-U02MEDA and PAR-U01MEDU) • MA remote controller (model before PAR-31MAA(E)) • MA remote controller (model before PAR-21MAA) 2) The setting is one of the following before setback control is executed. • The lower limit temperature is 18°C (64°F) or less in the "Cool," "Dry," or "Auto" operation mode. • The upper limit temperature is 29°C (84°F) or more in the "Heat" or "Auto" operation mode. 3) Setback control starts in one of the following states. • Heating control that exceeds the lower limit temperature is started in the "Cool," "Dry," or "Auto" operation mode. • Cooling control that exceeds the upper limit temperature is started in the "Auto" or "Heating" operation mode.	This symptom is likely when causes 1) to 3) are all met and setback controlled is used, perform the check using the method described below. Cause 1) Confirm the model name printed on the local remote controller or the model number from the supplied instruction manual. Cause 2) Display the operation screen and check the settings. Furthermore, check the upper limit temperature and lower limit temperature from the initial settings screen. If this symptom occurred, the problem can be prevented by taking the following measure. In the winter season, set the operation mode to "Heat" before setback control is executed. In the summer season, set the operation mode to "Cool" or "Dry" before setback control is executed.
24	The set temperatures of all connected devices are 24°C (75°F).	1) The old model compatible mode setting was changed from disabled to enabled.	Cause 1) When the old model compatible mode is enabled, the set temperature for each mode changes to the temperature common to all modes. As a result, the symptom described on the left occurs. Set the temperature again when using the old model compatible mode.
25	The temperature settings for schedules disappeared.	1) The old model compatible mode setting was changed from disabled to enabled, and enabled to disabled.	Cause 1) When the old model compatible mode is enabled, the set temperature for each mode changes to the temperature common to all modes. As a result, the symptom described on the left occurs. Set the schedule settings again when using the old model compatible mode.
26	A tree icon appears.	1) Demand control is operating. 2) High sensible heat control is operating. 3) Contact demand of the outdoor unit is operating. 4) Contact demand of the indoor unit is operating. 5) Energy-saving control is performed with a local remote controller. 6) ET control is operating.	Causes 1) to 5) This icon appears when the energy-saving control is operated. Check the settings for each operation. Cause 6) This icon appears when the ET control is operated. This icon is standard on units with versions 7.40 and later. To hide the display, change the setting to [Disabled].

	Symptom	Cause	Check procedure and remedy
27	Screen lock is set to [Use], but the screen does not lock even when it is not operated for three minutes.	1) This symptom occurs when both conditions (a) and (b) listed below are met. (a) The software version of AE-200/AE-50 is Ver. 7.40 through Ver. 7.46. (b) Data was copied to a USB memory device using [Maintenance]→[Backup] on the Initial Settings screen of the LCD; or a CSV file was output to a USB memory device using [Maintenance]→[CSV output] on the Initial Settings screen of the LCD.	Cause 1) If the occurrence conditions are met, update the software to Ver. 7.51 or later, which supports this symptom.
28	Selecting the built-in PI controller on the Energy Use Status screen of the LCD does not show the selected item. When the Display Range setting is changed from [Group] to [Address] with the display being blank, AE-200 or AE-50 restarts.	1) This symptom occurs when all of the conditions from (a) to (c) listed below are met. (a) The software version is 7.60. (b) The built-in PI controller on AE-200 or AE-50 is used for measurements. (c) Electric energy consumption of the built-in PI controller is monitored on the Energy Use Status screen of the LCD.	Cause 1) If the occurrence conditions are met, update the software to Ver. 7.62 or later, which supports this symptom.
29	The ON/OFF signal output for the schedule control function of DIDO controller (PAC-YG66DC (1)) becomes reversed. * This symptom also occurs when schedule settings are made from Integrated Centralized Control Web or TG-2000, as well as from the LCD.	1) This symptom occurs when both conditions (a) and (b) listed below are met. (a) The software version is 7.60. (b) The schedule control function of DIDO controller (PAC-YG66DC(1)) is used.	Cause 1) If the occurrence conditions are met, update the software to Ver. 7.62 or later, which supports this symptom.

(2) When Web browser for AE-200/AE-50/EW-50

Symptom		Cause	Check procedure and remedy
1	Display by the Web browser is not possible.	LAN communication error.	Enter the following in the command prompt on the PC, press the [Enter] key, and check the response. **Ping** [IP address of AE-200/AE-50/EW-50] E.g.: ping 192.168.1.1 (IP address of PC: 192.168.1.101) If communication was successful, the reply is as follows. **Reply from 192.168.1.1: bytes=32 time=1 ms TTL=64** If the LAN cable is not connected or the IP address setting is incorrect, the reply is as follows. **Request timed out.** If the subnet mask, gateway, or other network setting is incorrect, the reply is as follows. **Reply from 192.168.1.250: Destination host unreachable.**
		The LAN cable connector is disconnected or the connection is incorrect.	Insert the connector of the LAN cable properly into the LAN port at the back of the AE-200/AE-50/EW-50. Furthermore, old types of HUBs have two port types, one for a terminal connection and one for a HUB connection, so check whether or not the LAN cables of the AE-200/AE-50/EW-50 and PC for the browser are connected to ports for terminal connections.
		The IP address and subnet mask settings are incorrect.	Unless other specified, set the IP address as follows. AE-200: **192.168.1.1 to 192.168.1.40** AE-50: **192.168.1.211 to 192.168.1.249** EW-50 (standalone): **192.168.1.1 to 192.168.1.40** EW-50 (expansion controller): **192.168.1.211 to 192.168.1.249** PC for browser: **192.168.1.101 to 192.168.1.149** PC for integrated centralized control software TG-2000A: **192.168.1.150** Set the subnet mask to **255.255.255.0**.
		The gateway address setting is incorrect.	If a router is connected to the network, the gateway address needs to be set on the AE-200/AE-50/EW-50. Set the IP address of the router to which the AE-200/AE-50/EW-50 will be connected as the gateway address.
		LAN communication equipment (HUB or router) has failed. LAN cable disconnected or contact failure.	If a connection error reply is returned for the ping command even after checking the various settings above, the cause is probably a failure of the LAN communication equipment (HUB or router) or a defect of the LAN cable itself. Replace the HUB or other communication equipment or the LAN cable and then perform a connection check.

Symptom		Cause	Check procedure and remedy
1	Display by the Web browser is not possible.	Other than the login page is registered in Favorites of Internet Explorer.	Register the login page to Favorites from the login screen.
		Display by the Web browser is not possible because the cache file is damaged.	Clear the cache (temporary files) of Internet Explorer and Java Plug-in. • Procedure for Internet Explorer 8 * (1) Select [Internet Options] from the [Tools] menu in the browser. (2) Select [Delete] under [Browser history] on the General tab. (3) Select the [Temporary Internet Files] check box in the Delete Browsing History window and then click the [OK] button. (It is alright to clear the check boxes for the other items.) • Procedure for the Java Plug-in (1) Click [Start] - [Control Panel]. (2) When [Control Panel] appears, click [Java]. (3) When [Java Control Panel] appears, click the [Settings] button under [Temporary Internet Files]. (4) When [Temporary Files Settings] appears, click the [Delete Files] button. (5) When [Delete Files and Applications] appears, click the [OK] button while the check boxes for all of the items are selected. (6) Click the [OK] button in [Temporary Files Settings]. (7) Click the [OK] button in [Java Control Panel]. (8) Close [Control Panel]. * The setting procedure differs depending on the Internet Explorer version.
		A Web browser setting is incorrect.	If a Web browser setting is incorrect, the Web screen of the AE-200/AE-50/EW-50 may not be able to be displayed at all even if a response to the ping command could be received normally. If the Web screen is not displayed at all, check the following setting.
		The AE-200/AE-50/EW-50 is not registered as an exception in the proxy server settings.	In the case of a PC with Internet access that is installed in an internal LAN or the like, a proxy server may be set. If a proxy server is set, enter the IP address of the AE-200/AE-50/EW-50 in the exception field to enable a connection that is not via the proxy server.
2	A residual image remains when the screen is scrolled with the scroll bar.	Browser drawing process.	When this symptom occurs, refresh the screen (click the Refresh button in the Web browser, navigate to another screen, etc.) to resolve the problem. Furthermore, the problem may be resolved by clicking [Internet Options] in the [Tools] menu of Internet Explorer, selecting the [Advanced] tab, and then clearing the [Use smooth scrolling] check box of [Browsing]. Also, the problem may be resolved by updating the browser to the latest version.

	Symptom	Cause	Check procedure and remedy
3	The controls of the Web browser are grayed out and display is not possible or extremely slow.	Web browser and Java versions are different.	The Web browser with which AE-200/AE-50/EW-50 Web can be used is Internet Explorer version 8.0 or later. If the browser used is earlier than version 8.0, problems may occur, such as not being able to display the Web screen at all or not being able to select numerical values. Furthermore, if the version of Java VM (Java Virtual Machine) used as a plug-in of the browser is old or a VM that can be used is not installed, the screen may be displayed normally but the controls of the Web screen will remain grayed out.
		Version of the Web browser (Internet Explorer) is earlier than 8.0	Update the version of Internet Explorer to 8.0 or later.
		Web browser other than Internet Explorer is used.	Use Internet Explorer version 8.0 to 11.0.
		The Oracle Java Plug-in is not enabled (or is not installed).	If the Oracle Java Plug-in is enabled, a picture of a coffee cup is displayed at the top left when the controls of the Web screen are grayed out. Click [Internet Options] in the [Tools] menu of Internet Explorer, select the [Advanced] tab, and then select the [Use ... for <applet>] check box of [Java (Sun)]. If the Oracle Java VM is not installed, it can be downloaded from the Oracle website. Download and install it.
		Version of the Oracle Java Plug-in is earlier than 1.7.0_51.	Update the version of the Oracle Java Plug-in to 1.7.0_51 or later. (You can check the version by clicking [Java] in the control panel and clicking the [About...] button on the [General] (or [Basic]) tab.)
		Internet Explorer and Oracle Java Plug-in mismatch.	Install the 32-bit version of the Oracle Java Plug-in when using the 32-bit version of Internet Explorer, and the 64-bit version of the Oracle Java Plug-in when using the 64-bit version of Internet Explorer.
4	Display by the Web browser is not possible using the HTTPS (SSL) protocol.	LAN communication error.	Check the same items as "LAN communication error" and "A Web browser setting is incorrect" of "Display by the Web browser is not possible."
		Web browser and Java VM versions are different.	Check the same items as "Web browser and Java VM versions are different" of "The controls of the Web browser are grayed out and display is not possible or extremely slow."
		A Web browser setting is incorrect.	If a setting of the Web browser has been set incorrectly or not been set, display by the Web browser is not possible using the HTTPS (SSL) protocol. → Set the settings as described in "2-3. Java settings" of AE-200/AE-50/EW-50 Instruction Book (Web Browser for System Maintenance Engineer).
		Combination of OS, Internet Explorer, and Oracle Java Plug-in.	There are cases where display by the Web browser is not possible because of the combination of the OS, Internet Explorer, and Java Plug-in versions. → If the problem is not resolved even after implementing the check methods and solutions for the three causes above, change the version of one of the OS, Internet Explorer, and Java Plug-in or use the Web browser with the HTTP protocol. → If the version of the Oracle Java Plug-in is between Java 7 and Java 7 update 5, a connection with the HTTPS protocol is not possible, so update the version to Java 7 update 6 or later.
5	Sometimes the entire icon for an error or filter sign that is occurring blinks.	Refresh the display screen.	The problem may be resolved by replacing the display, updating the driver software, changing the refresh rate of the display, etc.

<table>
<tr><th colspan="2">Symptom</th><th>Cause</th><th>Check procedure and remedy</th></tr>
<tr><td>6</td><td>A message such as "Application blocked by Java Security," "If you see this you don't have a Java-enabled Web browser. Here's a picture of what you are missing." or "Error. Click to find out more." appears and the login screen is not displayed.</td><td>When caused by Java
1) Java content in the browser is not enabled.
2) The site is not registered in the Java exception site list.
3) Display by the Web browser is not possible because the cache file is damaged.

When caused by Internet Explorer
4) Display by the Web browser is not possible because the cache file is damaged.
5) Java Version 8 or earlier has been updated to Java Version 9 or later, or Java Version 9 or later has been installed on a PC with Web function for the centralized controller used, and the version of AE-200 is old.</td><td>1) Enable Java content.
1. Click [Control Panel] → [Java] to open [Java Control Panel].
2. Click the [Security] tab.
3. If the [Enable Java content in the browser] check box is not selected, select the check box.
4. After you finish configuring the setting, close any open Internet Explorer windows and then access the Web page again to confirm that a connection is possible.
2) Register the site in the Java exception site list.
1. Click [Control Panel] → [Java] to open [Java Control Panel].
2. Click the [Security] tab.
3. Click [Edit Site List] of Exception Site List.
4. Click [Add] of Exception Site List.
5. Enter "http://[IP address of AE-200/AE-50/EW-50]."
Example: When the IP address is 192.168.1.1
http://192.168.1.1
Enter the Web address of the AE-200/AE-50/EW-50 and then click [Add].
The user needs to enter HTTP or HTTPS separately.
6. When the Security Warning pop-up screen appears, click [Continue].
If other AE-200/AE-50/EW-50 are connected, enter the other Web addresses in the Location field.
7. When input for all of the AE-200/AE-50/EW-50 is complete, click the [OK] button to close the screen.
8. After you finish configuring the setting, close any open Internet Explorer windows and then access the Web page again to confirm that a connection is possible. (Clear the cache of Internet Explorer and the cache of Java before connecting. For the procedure, refer to "Display by the Web browser is not possible because the cache file is damaged" of No. 1.)
3) Clear the cache of Java. For the procedure, refer to "Display by the Web browser is not possible because the cache file is damaged" of No. 1.
4) Clear the cache of Internet Explorer. For the procedure, refer to "Display by the Web browser is not possible because the cache file is damaged" of No. 1. For details, refer to the Technical information PWE1302C.
If the problem is not resolved even after carrying out the above, reset the settings of Internet Explorer.
1. Select [Internet Options] from the [Tools] menu in the browser.
2. Click [Reset] on the [Advanced] tab. The following settings are reset. Make a note beforehand if necessary.
• Disable toolbars and add-ons
• Advanced options
• Default web browser settings
• Tabbed browsing settings
• Privacy settings
• Pop-up settings
• Security settings
5) Uninstall Java Versions 9 and later, and install the latest version of Java Version 8.
The latest version as of August 2019 is Java 1.8.0.221 (8u221).
You can check the release status at the following URL:
URL: https://www.java.com/ja/download/
<table><tr><th>Version of AE-200/AE-50/EW-50 (* is an arbitrary number.)</th><th>Java version to be installed</th></tr><tr><td>7.6*</td><td>1.8.0_121(8u121)</td></tr><tr><td>7.5*</td><td>1.8.0_101(8u101)</td></tr><tr><td>7.4*</td><td>1.8.0_91(8u91)</td></tr><tr><td>7.3*</td><td>1.8.0_60(8u60)</td></tr><tr><td>7.2*</td><td>1.8.0_25(8u25)</td></tr><tr><td>7.1*</td><td>1.7.0_51(7u51)</td></tr></table></td></tr>
</table>

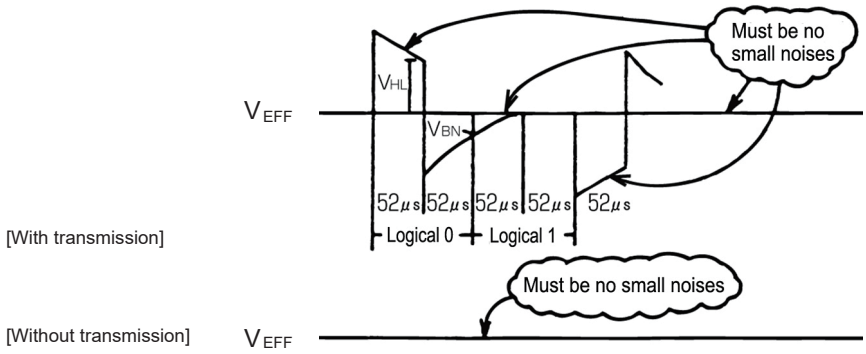
[4] M-NET transmission waveform and noise check procedure

The AE-200/AE-50/EW-50 performs control while signals are exchanged between AE-200/AE-50/EW-50, outdoor units, indoor units, and remote controllers (M-NET remote controllers) through M-NET. The interference of noise or the like on the transmission line will cause normal transmission to no longer be possible and erroneous operation.

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

Cause	Malfunction	Error code	Error description
Interference of noise on the transmission line	The signal is transformed and is mistaken as a signal from a different address.	6600	Communication error - Address duplicate
	The sent waveform is transformed to a different signal due to noise.	6602	Communication error - Transmission processor hardware error
	The sent waveform is transformed due to noise and the other party cannot receive the signal normally leading to no acknowledgment (ACK).	6607	Communication error - No ACK return
	The state of being unable to send continues due to small noise interference.	6603	Communication error - Transmission line busy
	Sending is successful but the acknowledgment (ACK) or the response is not returned normally due to noise.	6607 6608	Communication error - No ACK return/No return of response frame

(2) Waveform check procedure



Waveform check procedure

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

1) There must be no small waveform (noise) in the transmission signal.
   (Small noise of approximately 1 V caused by the operation of a DC-DC converter or inverter may be noticeable but such noise should not be a problem when the unit and transmission line shield are grounded.)
2) The voltage level of each portion of the transmission signal must be as follows.

Logic	Transmission line effective voltage level	Transmission line signal voltage level
0	17 V ≤ V_{EFF} ≤ 32 V	VHL = 2.5 V or higher
1		VBN = 1.3 V or lower

[Supplementary explanation] Oscilloscope settings

- Band with 300 MHz or higher
- V/div: 2 V/div AC coupling
- T/div: 20 to 100 μsec/div

(3) Check and solution

If noise is confirmed in the waveform or any of the errors of the error codes in (1) occur, perform the following checks.

	Error description	Action
Wiring method check	1. Are the transmission line and power cable (100—240VAC) routed together?	Lay the power cable as far away as possible. When laying the cables over a long distance, provide a space of at least 5 cm between them. In particular, do not insert them in the same conduit.
	2. Is the transmission line bundled together with the transmission line of another system?	Lay the transmission line so that it is separate from other transmission lines. When it is bundled with another transmission line, there is the risk of erroneous operation.
	3. Is the specified cable being used for the transmission line?	Use the specified transmission line. Transmission line type: CVVS/CPEVS/MVVS shielded cable (for M-NET remote controller) Transmission line diameter: At least 1.25 mm² (Remote controller wire: 0.5 to 1.25 mm²)
	4. When the transmission line is daisy-chained on the indoor unit terminals, is the shield daisy-chained too?	The two wires of the transmission line are daisy-chained. The shield must also be daisy-chained in the same way as the transmission lines. If the shield is not daisy-chained, its effect on reducing noise will be small.
	5. Is the transmission line grounded with the earth?	Prevent parts from being grounded with the earth.
	6. Is the transmission line connected to the junction terminals properly?	If bare wires are twisted together, connect the wires properly by, for example, crimping them together.
Grounding method check	1. When the transmission line is daisy-chained, is the shield daisy-chained too?	Ground one point of the shield at a unit that supplies power. If no grounding is provided, the noise on the transmission line cannot escape so there is the risk that the transmission signal will be transformed.
	2. Check the treatment method of the shield of the transmission line (for centralized control).	The transmission line for centralized control is less susceptible to noise interference if it is grounded from one outdoor unit in the case of group operation between units with different refrigerant or from the system controller in the case of using a system controller. However, 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, and the environment of the installation site, so check that the transmission line work for centralized control has been performed as follows. a) When not grounded • Group operation between units with different refrigerant Grounded at one outdoor unit (power supply unit) • Using system controller Grounded at a power supply unit (including a system controller with a built-in power supply) b) When an error occurs even though grounded at one point Ground the shield at all outdoor units and power supply units (including system controllers with a built in power supply)

If the peak value is low, if a 66xx error occurs, or if the remote controller remains in the initial screen display state

Error description	Action
1. The distance to the farthest end of transmission line exceeds 200 m (656 ft).	Check that the distance from the outdoor unit or power supply unit to the indoor unit and to the remote controller at the farthest end is 200 m (656 ft) or less.
2. The types of transmission lines differ.	Use the specified transmission line. Transmission line type: CVVS/CPEVS/MVVS shielded cable Transmission line diameter: At least 1.25 mm² (remote controller wire: 0.5 to 1.25 mm²)
3. Outdoor unit board failure	Replace the outdoor unit control board or transmission power supply board.
4. Indoor unit or remote controller failure	Replace the indoor unit control board or remote controller.
5. The MA remote controller is connected to the M-NET transmission line.	Connect the MA remote controller to the MA remote controller terminal block (TB15) on the indoor unit control board.

NOTE: For details on the restrictions on wiring length, refer to "III [5] Restrictions and Notes on Transmission Wiring."

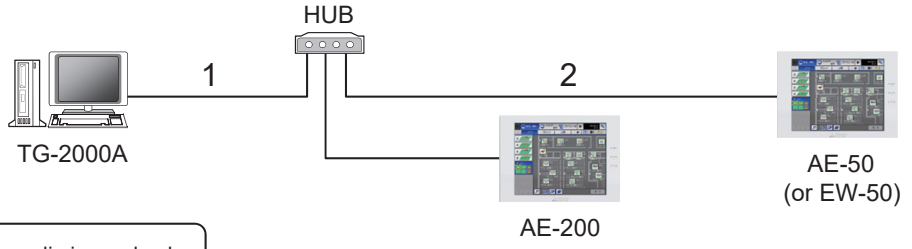
[5] LAN communication error check procedure

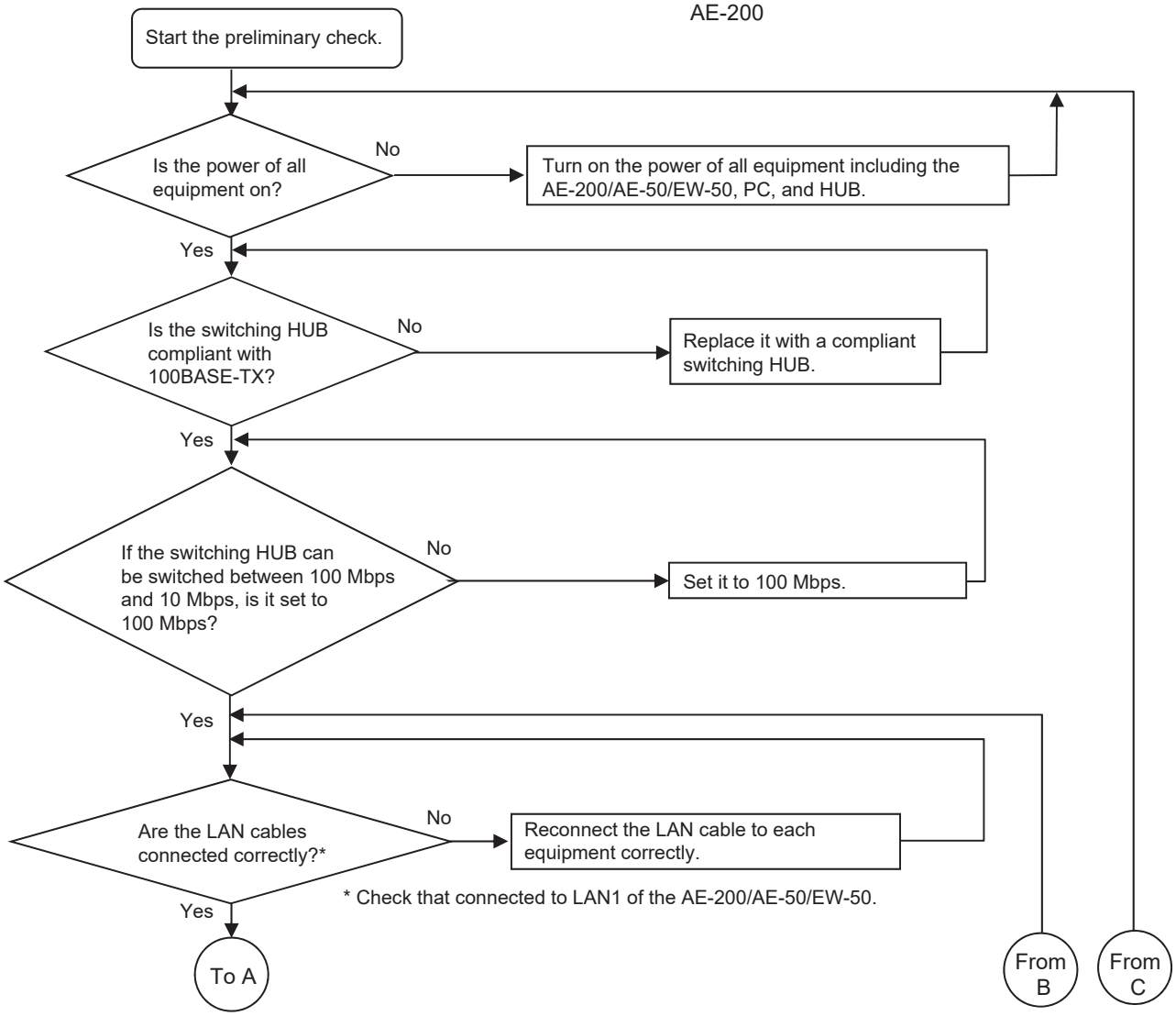
This section describes how to check and resolve trouble when the equipment does not operate normally and there are symptoms related to a LAN communication error such as when an error code for a LAN communication error is displayed and Web browser display is not possible.

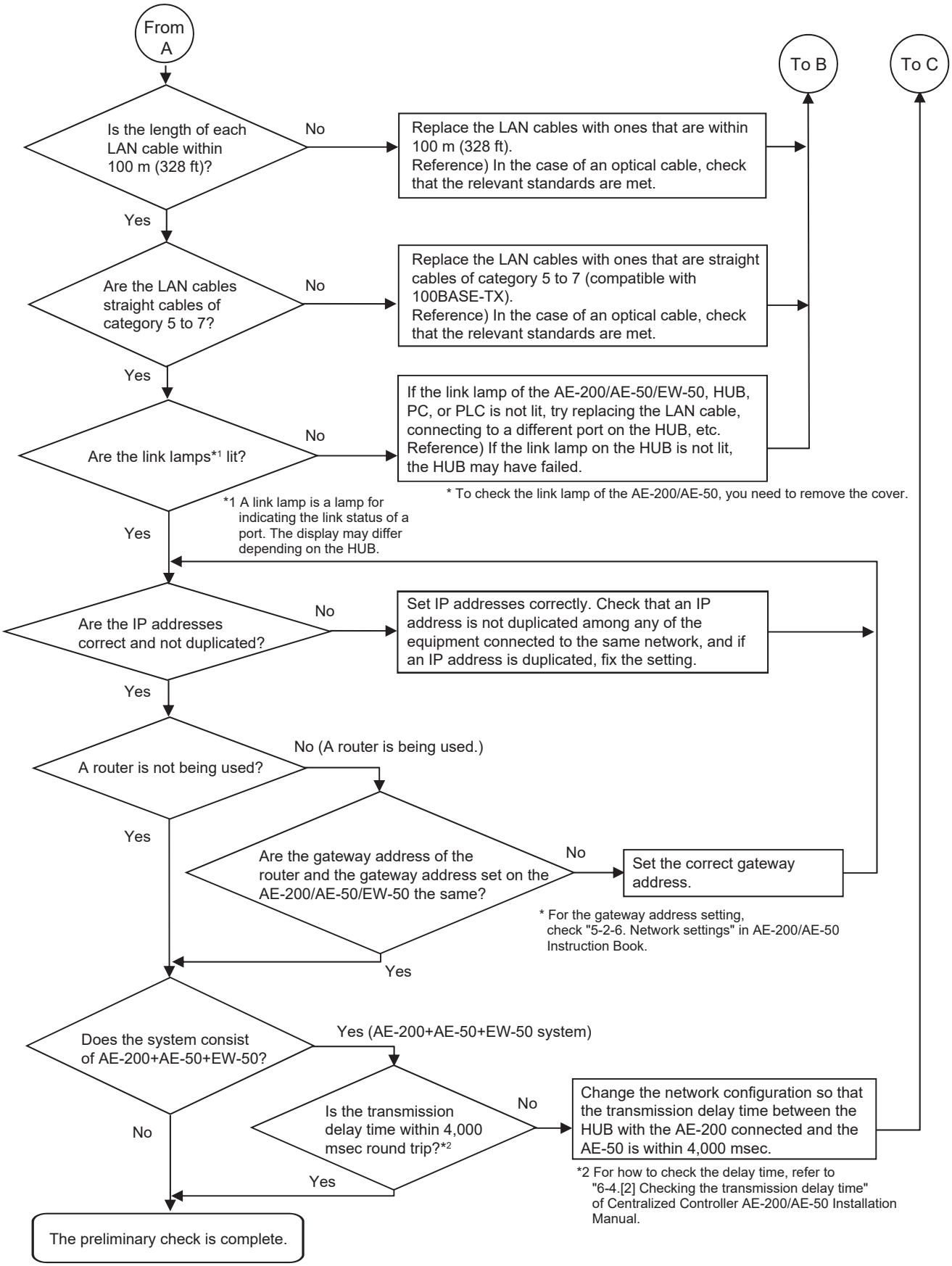
[About the required equipment]
The following lists the equipment required for the check when there are symptoms related to a LAN communication error.
PC
LAN cable…Several straight cables (category 5 to 6e)
Switching HUB…100BASE-TX

1. About the preliminary check items

If the equipment is not operating normally and there are symptoms related to LAN communication, first recheck the following items.
1. TG-2000A: 0003 or 6920 is displayed
   * When TG-2000A is connected
2. AE-200/AE-50/EW-50: 6920 or 0097 (when using billing function) is displayed







<u>If you answered “No” for any of the above items, first remove the cause of that item and then check if the symptoms persist.</u>

However, try your best to not turn on and off the power of the target devices (AE-200/AE-50/EW-50, PC of TG-2000A, and PLC) many times.

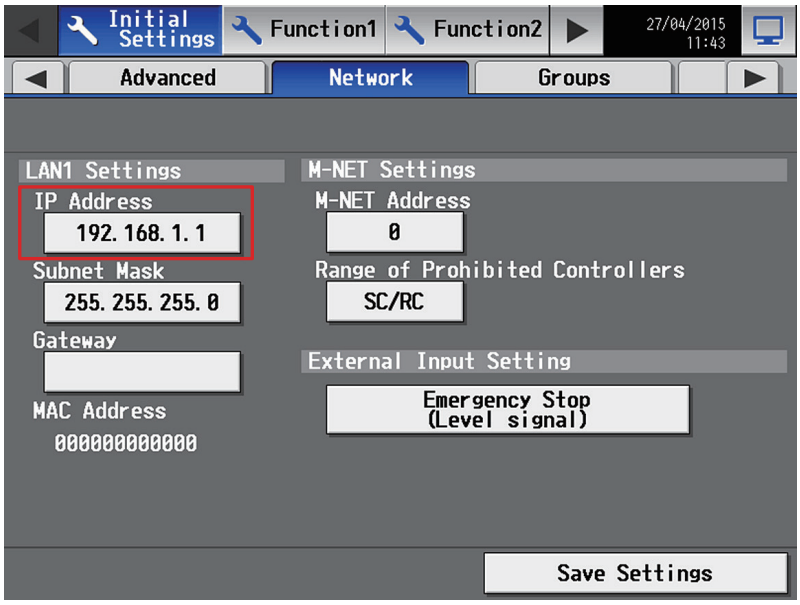
If the symptoms still persist, refer to “V [1] Before performing failure diagnosis” and then perform the checks.

[How to check the IP address of the AE-200/AE-50/EW-50]

Check the IP address setting of each equipment to confirm that there is not a duplicate IP address set for equipment connected to the same network.

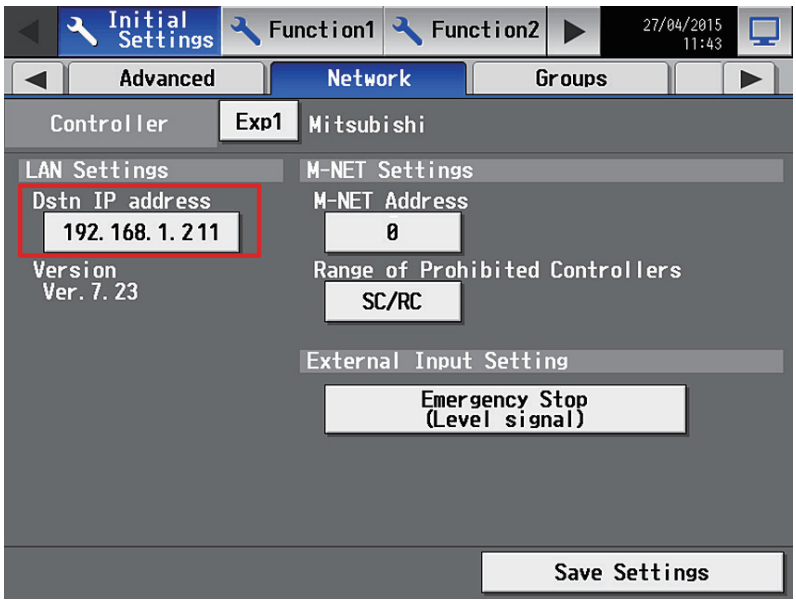
(1) How to check IP address of the AE-200/AE-50 unit

The IP address of the AE-200/AE-50 can be checked in [Initial Settings] - [Network] screen.



(2) How to check the IP address of the AE-50/EW-50 on the LCD screen of the AE-200

The IP address of the AE-50/EW-50 can be checked by selecting the equipment to display (“Controller”) in [Initial Settings] - [Network] screen.



* If the IP address of an individual EW-50 is unknown, set the IP address again with SW1 on the EW-50 main unit.

2. About the check method using ping

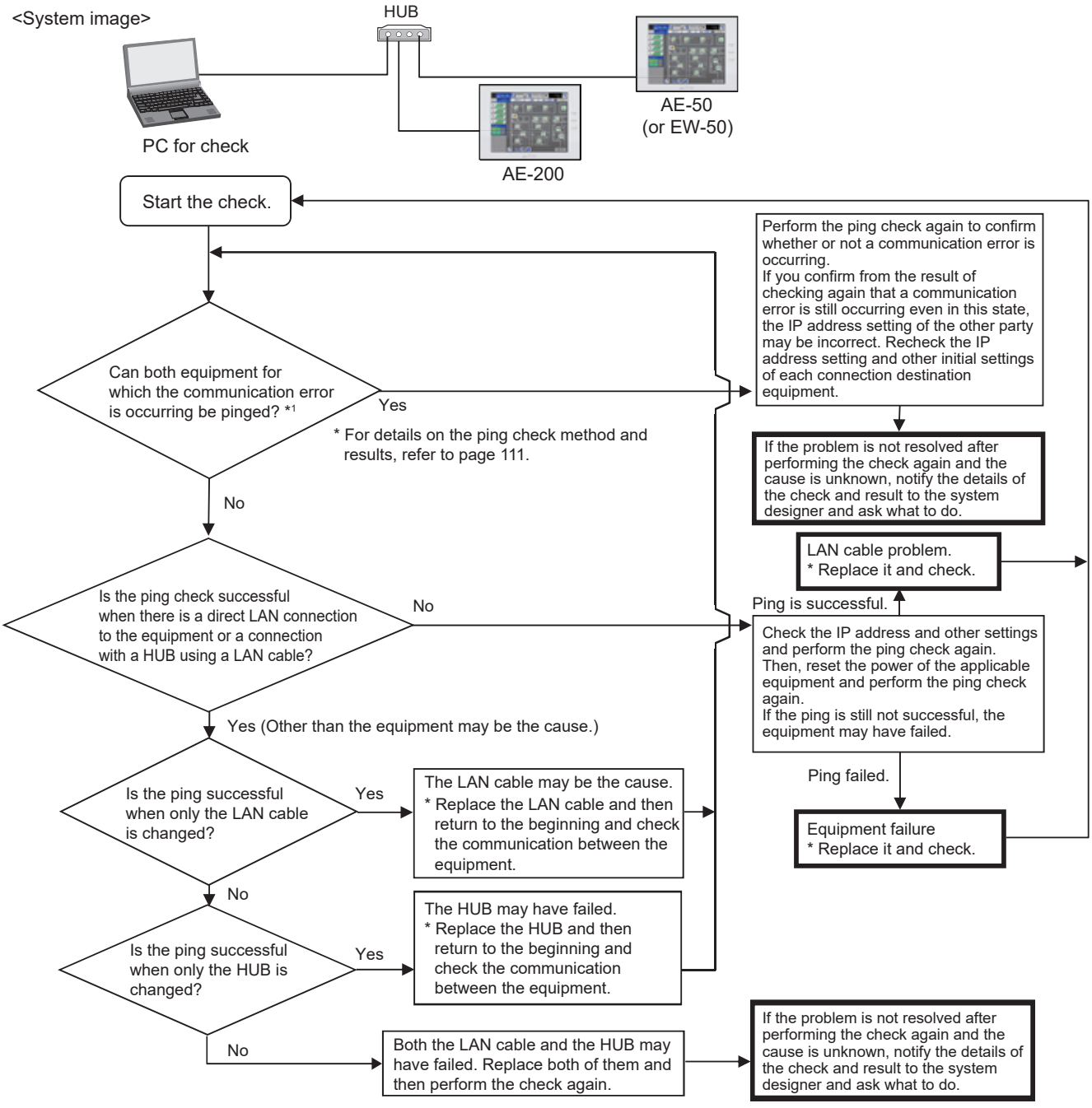
(1) Notes

<u>This section contains notes on performing a check. Read them before you perform a check.</u>

1) Be sure to obtain the permission of the network administrator to connect a PC to the network for the check and also check that the IP address is one that it is alright to use.
2) Set the IP address of the PC for the check to one that is suitable for the network. (When a router or other equipment is used, also set the gateway address.)
   Set an IP address that will not duplicate the IP address of any of the other equipment on the network.
3) If you cannot use the PC that you brought with you, ask the network administrator if there is a PC that you can borrow.
   * In the case of a system that uses TG-2000A, the PC of the TG-2000A can be used.

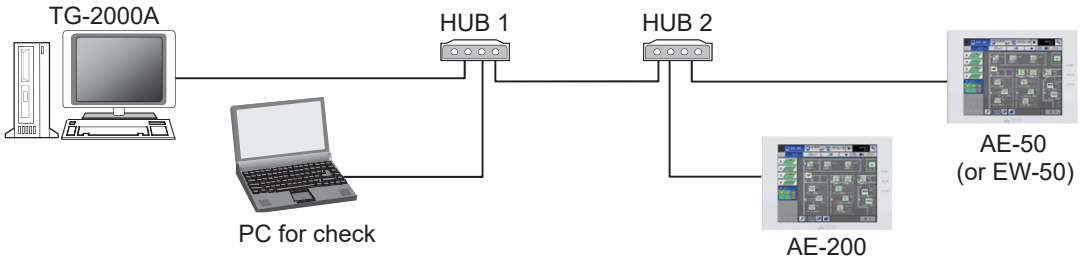
(2) About the check item using ping

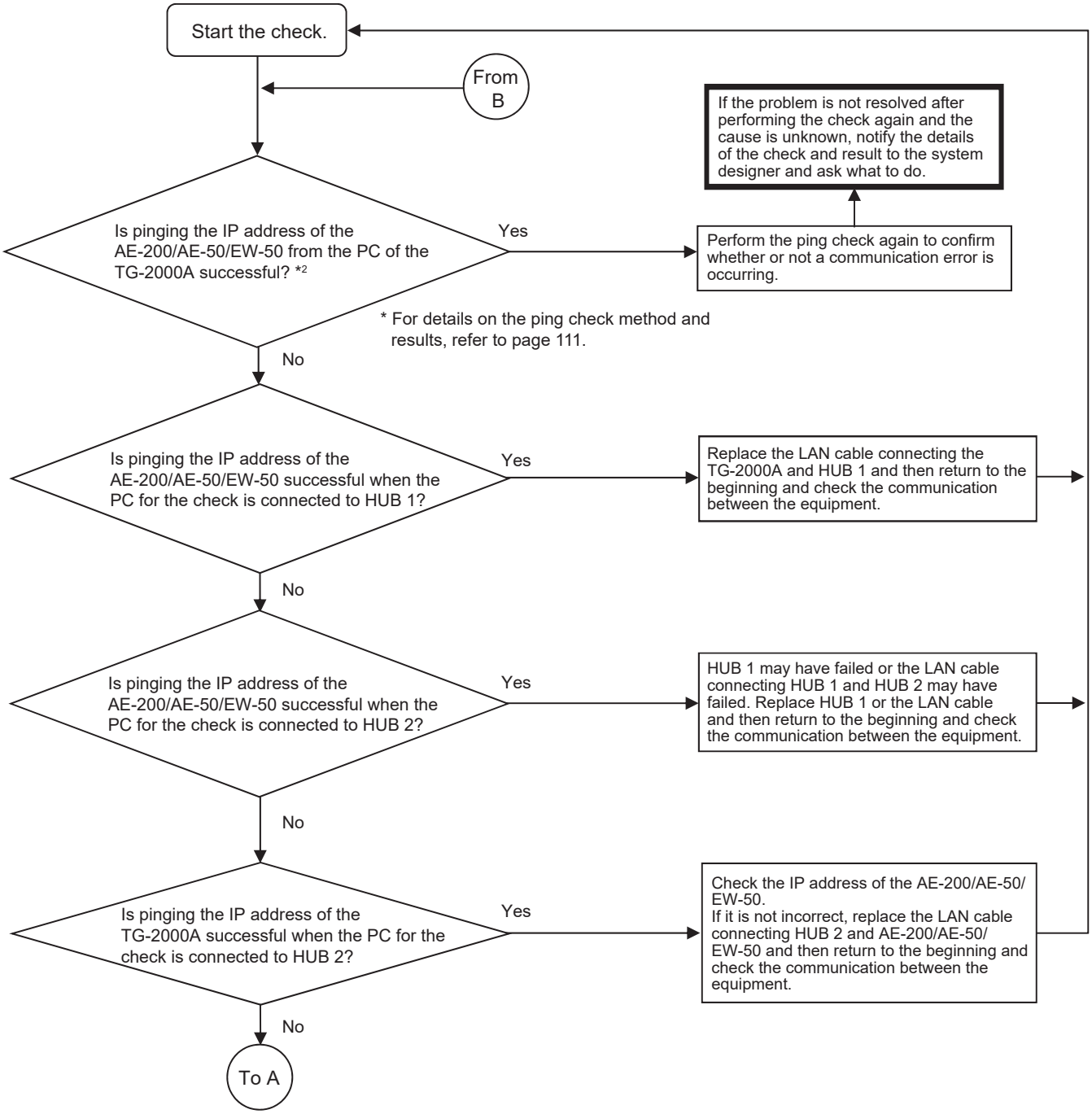
Use a PC to check the communication status of equipment for which a communication error is occurring between equipment.

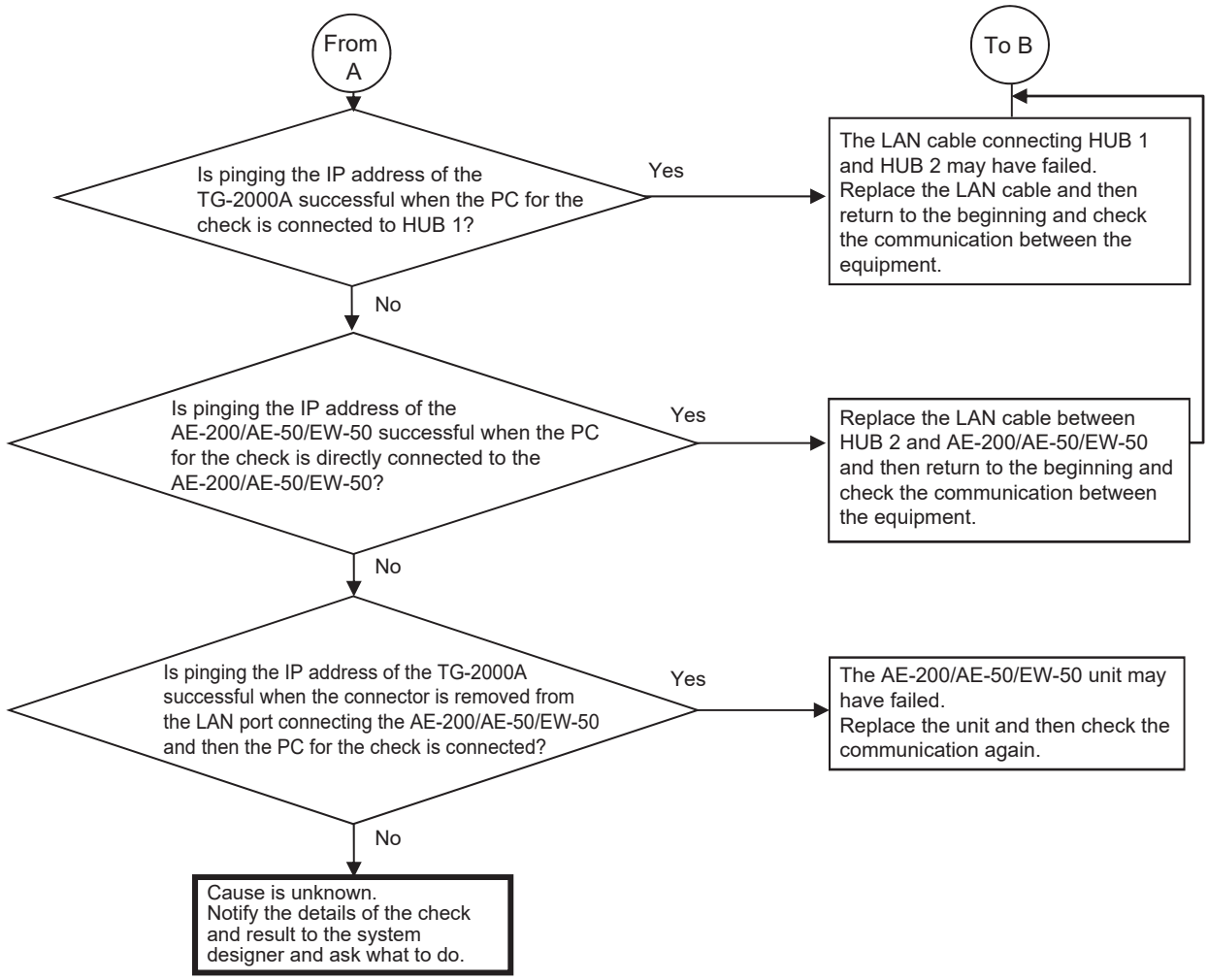


(3) When 0003 or 6920 error on the TG-2000A in the check item using ping

Use a PC to check the communication status of equipment for which a communication error is occurring between equipment.






From A
Is pinging the IP address of the TG-2000A successful when the PC for the check is connected to HUB 1?
Yes
The LAN cable connecting HUB 1 and HUB 2 may have failed. Replace the LAN cable and then return to the beginning and check the communication between the equipment.
No
Is pinging the IP address of the AE-200/AE-50/EW-50 successful when the PC for the check is directly connected to the AE-200/AE-50/EW-50?
Yes
Replace the LAN cable between HUB 2 and AE-200/AE-50/EW-50 and then return to the beginning and check the communication between the equipment.
No
Is pinging the IP address of the TG-2000A successful when the connector is removed from the LAN port connecting the AE-200/AE-50/EW-50 and then the PC for the check is connected?
Yes
The AE-200/AE-50/EW-50 unit may have failed. Replace the unit and then check the communication again.
No
Cause is unknown. Notify the details of the check and result to the system designer and ask what to do.
To B

[Ping check method]
Ping the AE-200, AE-50, EW-50, etc. from the command prompt of a PC.

How to display the command prompt
In Windows 7
Display the Start menu of Windows.
Select [Command Prompt].

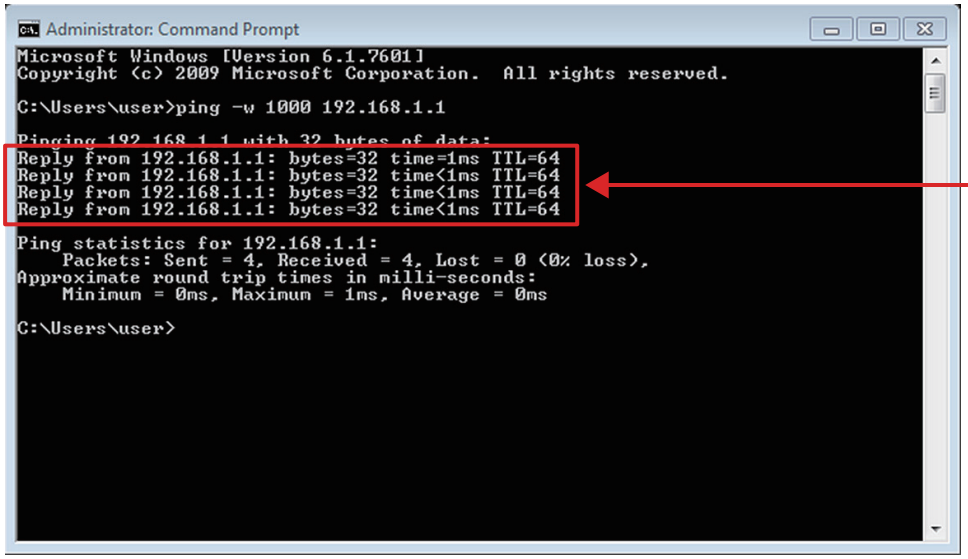
Run the following in the command prompt.

ping␣-t␣[IP address of AE-200, AE-50, etc.]
Single-byte space (1 character)

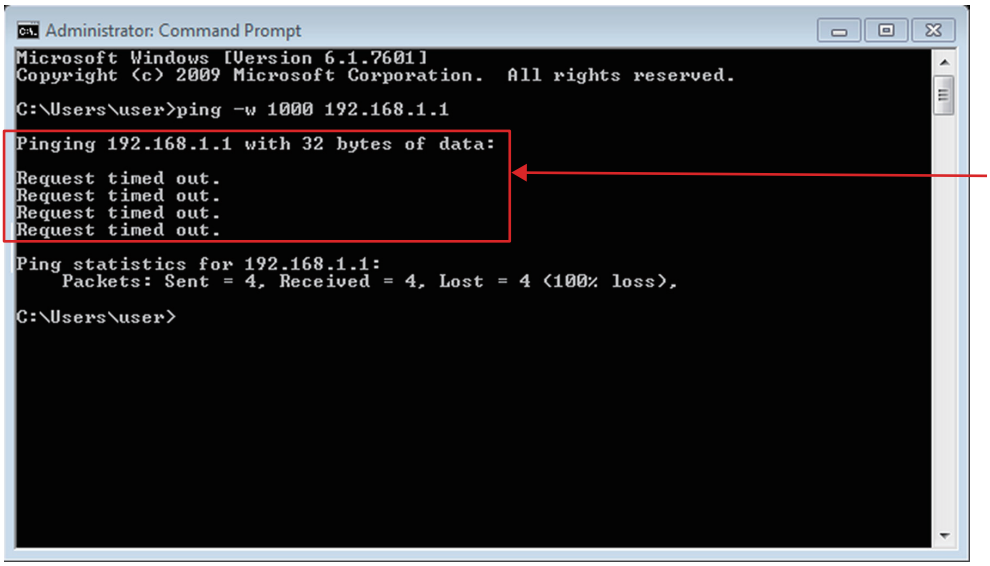
[Example] ping -t 192.168.1.1

Check that the connection was successful from the message displayed when the command was run.
To quit ping, press the Ctrl and C keys on the keyboard at the same time.

<Result when could be pinged (example when successful)>



<Result when could not be pinged (example when failed)>



[How to check when a LAN communication error occurs in a system connected via a router (how to isolate the cause)]

When LAN communication is not performed properly (pinging is not successful*1) in a system connected using a router, you can isolate the cause as follows.

*1 Check whether pinging the AE-200/AE-50/EW-50 from a PC is successful when there is a connection via a router in advance.

Step	Method	Supplement
1	Prepare a PC that is connected to the same network. Use a PC in the same network with no connection via the router.	If there is no PC connected to the network, identify an IP address that it is alright to use and then connect a PC with that IP address set.
2	Ping the AE-200/AE-50/EW-50 or other target equipment from the PC. Run the following in the command prompt. ping␣-t␣[IP address of target equipment] Single-byte space (1 character) [Example] ping -t 192.168.1.1 → When pinging is successful: There may be a problem with the gateway setting of the target equipment or the router settings. Consult with the equipment administrator. For the gateway address setting, check “8-2-6. Network settings” in AE-200/AE-50 Instruction Book. For the router settings, check the Instruction Book of the router. → When pinging failed: There may be a problem with the IP address setting of the target equipment. Check the setting. If the problem still cannot be resolved, there is likely to be a problem with the network of the router. Consult with the system administrator.	* For the operating procedure, refer to [Ping check method] on the previous page.

[How to check that an IP address is not duplicated]

If it is not possible to check the IP addresses of all equipment, there is the following method using a PC to check with the command prompt.

(Supplement) If all connected equipment in a system in an existing network cannot be checked, you can compare the MAC addresses of the equipment of only the air conditioning control system to check if an IP address is duplicated.

Step	Method	Supplement
1	Prepare a PC that is connected to the network.	If there is no PC connected to the network, identify an IP address that it is alright to use and then connect a PC with that IP address set.
2	Ping the IP address of the AE-200/AE-50/EW-50 from the PC while the AE-200/AE-50/EW-50 is disconnected from the LAN. If there is a response, there is equipment with the same IP address as the AE-200/AE-50/EW-50. Consult with the network administrator.	

[6] Peak cut troubleshooting

The following shows troubleshooting for the peak cut function.

* Before carrying out troubleshooting, check whether or not the peak cut settings have been configured.

	Item	Yes	No
1	Are the block settings configured?		
2	Are the peak cut settings configured?		
3	Is the license registered to each AE-200/AE-50/EW-50?		

→ If “No” was answered for any of the above, the cause is likely to be that item. First remove that cause.

(1) Troubleshooting based on trouble examples

	Symptom	Cause	Check procedure and remedy
1	The peak cut control status does not match on the actual equipment and the AE-200/AE-50/EW-50 (Web browser) or TG-2000A screen. (Display timing offset)	There is a difference in the monitor timing.	- (Normal) → An offset occurs due to the monitor timing.
2	It is hot as cooling has no effect due to peak cut.	1) Control is always at the highest level because the set peak cut power value is low.	Check how low the peak cut level is set (*1) and if it is low, do the following. Cause 1) Consider whether the peak cut level can be changed. *1 The level can be checked in the [Energy Mgmt] - [Peakcut] screen on the AE-200 LCD.
3	Peak cut control is not being performed normally.	1) The license is not registered to the AE-200/AE-50/EW-50. 2) The power of the AE-200/AE-50/EW-50, PI controller, PLC is shut down. 3) The M-NET transmission line or a LAN cable is broken or disconnected. 4) The operation block is not set. 5) The control settings of peak cut control are not set or the settings are incorrect. 6) There is a pulse setting mistake (in the case of a PI controller). The pulse unit is set on the PI controller even though it is connected with the AE-200/AE-50/EW-50 or TG-2000A.	Check causes 1) to 7). Take the measure corresponding to the cause. Cause 1) Register the energy management license pack to the AE-200/AE-50/EW-50. Cause 2) Check the power supply system. Cause 3) Check the connections of the M-NET transmission line and LAN cables. Cause 4) Set the operation block and configure the peak cut control settings. Cause 5) Check and fix the settings. Cause 6) Check that the [kWh/pulse] setting on the electricity meter and PI controller is correct. When the PI controller is connected with the AE-200/AE-50/EW-50 or TG-2000A, dip switch SW02 of the PI controller needs to be set to the SC setting (factory default setting). If there is setting mistake, fix it.
4	After recovering from the 30-minute stop control of energy-saving/peak cut control, the fan does not operate for a maximum of 30 minutes even when the indoor unit, LOSSNAY, and outside air processing unit are operating.	1) This symptom occurs when all of the conditions from (a) to (c) listed below are met. (a) The software version of AE-200/AE-50/EW-50 is Ver. 7.45. (b) The Energy-saving/peak cut license is registered. (c) The 30-minute stop of peak cut control is used.	Cause 1) If the occurrence conditions are met, update the software to Ver. 7.46 or later, which supports this symptom.

[7] Energy management troubleshooting

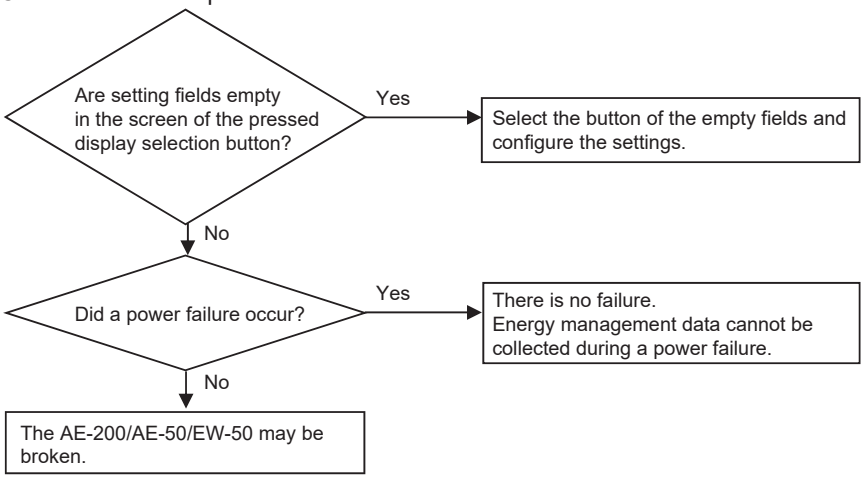
The following shows troubleshooting for energy management

* Before carrying out troubleshooting, check whether or not the energy management settings have been configured.

	Item	Yes	No
1	Are the external temperature sensor settings configured?		
2	Is apportioning mode of the indoor unit set?		
3	Are the settings of the apportioning source electricity meter of the indoor unit configured?		

* For the setting procedures, refer to the Instruction Book (Initial Settings).

→ If “No” was answered for any of the above, the cause is likely to be that item. First remove that cause.

<table>
<tr><th colspan="2">Symptom</th><th>Cause</th><th>Check procedure and remedy</th></tr>
<tr><td>1</td><td>Bar graphs and line graphs are not displayed.</td><td colspan="2">1) There are required items for display that is not set.
2) There was a power failure so management data does not exist for that period.
3) The data is damaged.</td></tr>
<tr><td colspan="4">Check method and process
 
</td></tr>
<tr><td>2</td><td>The target values are not displayed.</td><td>1) The display unit is other than "Block."
2) The target values are not set.
3) The settings of the apportioning source electricity meter of the indoor unit are not configured.</td><td>Check causes 1) to 3). Take the measure corresponding to the cause.
Cause 1) Touch [Display switching] to change the display unit to [Block].
Cause 2) Go to the [Energy Mgmt] - [Target value] screen and set the target values. For details, refer to Instruction Book.
Cause 3) Select the electricity meter in [Indoor unit electricity meter] of the Energy Management Settings screen of Initial Setting Tool.</td></tr>
<tr><td>3</td><td>[OK] cannot be pressed after setting the target values.</td><td>The total of the percentages is not 100%.</td><td>Adjust the percentages based on the red indication at the bottom of the setting screen.</td></tr>
</table>

[8] Troubleshooting for apportioned electricity billing function

The following shows troubleshooting for the apportioned electricity billing function.

* Before performing the troubleshooting, read “[1] Before performing failure diagnosis” and “[3] Troubleshooting and solutions depending on the equipment” in Chapter V.
  Also, check whether the initial settings related to billing have been configured from the Initial Setting Tool.

Item			Yes	No
1	Initial Setting Tool	Are the refrigerant system settings configured?		
2		Are the operation block and energy management block settings configured?		
3		Are the billing settings configured?		
4	Charge Calculation Tool	Are the advanced settings configured?		

→ If you answered "No" to any of the above, the item may be the cause of the failure.

Check the setting items below to see if there is any error. If there is an error, correct it.

[Legend] ○: Applicable, -: Not applicable

Check item			Check required/not required		Check result	
			Electric energy metering-device (meter) method	Electric energy manual entry (no meter) method	Good	NG
1	Initial Setting Tool (Unit settings)	Refrigerant system settings	○	○		
2		Operation block settings	○	○		
3		Energy management block settings	○	○		
4		PI controller settings	○	-		
5	Initial Setting Tool (Billing settings)	Billing settings	○	○		
6		Outdoor unit settings (standby power)	○	-		
7		Indoor unit settings (Cooling capacity, FAN power consumption, standby power)	○	○		
8		Measurement settings (unit to be connected to the meter)	○	-		
9		Charge settings	○	○		
10	Charge Calculation Tool (Advanced settings)	Charge calculation advanced settings	○	○		

(1) Troubleshooting based on trouble examples

	Symptom	Cause	Check procedure and remedy
1	The charge calculation results show that the total output values of the energy management block do not match the total values of the electricity meter.	If the difference is small: 1) Normal If the difference is large: 2) Check the causes of Symptom 4.	The values for electric energy are rounded off to two decimal places, and the digits after the decimal point are rounded down from the values for the charge. This may result in a mismatch between the total values of the block and electricity meter.
2	The charge calculation results show that the values of the electricity meter and the actual electricity meter do not match.	If the difference is small: 1) Normal If the difference is large: 2) Setting error of pulse unit	Cause 1) An error occurs because the value is rounded off to two decimal places. A difference from the actual electricity meter also occurs due to the pulse input timing. Cause 2) Check that the pulse unit [kWh/pulse] settings on the electricity meter are correct. If there is a setting error, correct it.
3	The charge calculation results show that the value of the electricity meter is "0."	1) Setting error of the pulse value in the PI controller settings. 2) Setting error of the Dip switch on the PI controller	Cause 1) Correct the settings. Cause 2) Turn on the Dip switch SW01 on the PI controller. * Charges cannot be apportioned correctly if there is an error in these settings. When changing or adding a meter, be sure to configure the settings before use.
4	The amounts of charge for some energy management blocks are large.	1) Setting error of the refrigerant system 2) Setting error of the energy management block 3) Setting error of the cooling capacity/FAN consumption power in the indoor unit settings 4) Setting error of the connection unit in the measurement settings 5) Setting error of the charge time period 6) Setting error of the unit price (yen/kWh)	Check causes 1) to 6). Correct the error and resolve the problem according to the causes shown in the analysis results. Causes 1) to 5) After correcting the settings and performing remedial apportionment, recalculate the amounts using the Charge Calculation Tool. Cause 6) Make corrections and perform recalculation using the Charge Calculation Tool.
5	The charge calculation results for all blocks are 0 yen or the display is blank.	1) Setting error of the refrigerant system 2) Setting error of the energy management block 3) Setting error of the cooling capacity/FAN consumption power in the indoor unit settings 4) Setting error of the charge time period 5) Setting error of the unit price (yen/kWh) 6) The license for the apportioned electricity billing function is not registered to the expansion controller.	Check causes 1) to 6). Correct the error and resolve the problem according to the causes shown in the analysis results. Causes 1) to 4) After correcting the settings and performing remedial apportionment, recalculate the amounts using the Charge Calculation Tool. Cause 5) Make corrections and perform recalculation using the Charge Calculation Tool. Cause 6) Register the license to the expansion controller.

	Symptom	Cause	Check procedure and remedy
6	The charge calculation results for some blocks are 0 yen.	1) Setting error of the refrigerant system 2) Setting error of the energy management block 3) Setting error of the cooling capacity/FAN consumption power in the indoor unit settings	Check causes 1) to 3). Correct the error and resolve the problem according to the causes shown in the analysis results. Causes 1) to 3) After correcting the settings and performing remedial apportionment, recalculate the change using the Charge Calculation Tool.
7	The display of charge calculation results for some AE-200 is blank.	1) The date and time on AE-200 are incorrect.	Check the cause and resolve the problem. Cause 1) Configure the time settings. Charges cannot be apportioned correctly if the date and time are incorrect. * When changing or adding AE-200, be sure to configure the time settings before use.
8	The same time period was calculated, but the results differ from the previous charge calculation results.	1) The unit price ($/kWh etc.) was changed. 2) The energy management block was changed. 3) The apportioned data was edited. 4) The amount carried over became an effective apportioned value by performing remedial apportionment.	Check causes 1) to 4). * In the case of cause 4), any amount carried over to the next settlement period is carried over to the next day and onward. Take a measure suitable for the purpose of calculating the same time period and the billing status. → If the charge has already been settled and billed, sum up the difference on the next day of the settlement-of-accounts day using the Editing Apportioned Data function.
9	Misalignment of printed characters or garbled characters occur.	1) Printer driver is incompatible.	Cause 1) Check the printer driver on the OS. Also, check whether printing can be performed with other applications.
10	By inputting pseudo pulses into the electricity meter during the test run, charges including the pseudo pulses were billed by the tenant.	1) The input of pseudo pulses during the test run was not reported.	* We recommend that you perform a test run using signals such as pseudo pulse with the consent of the owner.
11	Billing results are wrong after making a time change in a period that spans two days.	1) The time was changed to one that spans two days.	* If the apportioned electricity billing function is used, keep the changes of time to a minimum. In particular, do not make time changes in a period that spans two days.
12	The Automatic Output setting of the Charge Calculation Tool is set to [Yes], but the automatic output is not being performed.	1) The following items were enabled in the PC settings (power option): • System standby • System in hibernation 2) Charge Calculation Tool was activated. 3) A LAN communication error occurred between the system and AE-200.	Cause 1) Change the settings for "System standby," "System in hibernation," and "Turn off hard disk power" to [No] to enable continuous operation. Cause 2) Close the Charge Calculation Tool before the automatic output time. Cause 3) Check the LAN connection between PC and AE-200 and reconnect them. * Manually calculate the charges for the time periods for which automatic output was not performed.
13	The time period output by the automatic output of the Charge Calculation Tool is wrong.	1) The time on PC is incorrect.	Cause 1) Correct the time on PC. * Manually calculate the charges for the time periods for which automatic output was not performed.

Symptom		Cause	Check procedure and remedy
14	When the built-in measurement pulse input of AE-50/EW-50 is used, the billing apportionment results do not match the difference from the actual electricity meter.	1) The power of AE-50/EW-50 was shut off due to a power failure. 2) AE-50/EW-50 was updated.	Check the cause and resolve the problem. Causes 1) and 2) Distribute the electric energy during the power failure/update to each connected unit using the Editing Apportioned Data function. This should be done, however, after obtaining consent from the owner.
15	The apportioned charge for a certain day is "0" due to a total power failure.	The power failure lasted all day.	No action is required since the charge is carried over to the next day.
16	Data is defined as Status-2 (with carry-over) even though electric energy is apportioned daily in the daily charge calculation results.	Normal	* With AE-200, the electricity is apportioned every 30 minutes. This causes a carry-over to easily occur during the time period in which an air conditioning unit is stopped, such as nighttime. This is not a problem as the charge will be apportioned at the next apportionment time.
17	Electricity apportionment is not calculated correctly.	1) This symptom occurs when all of the conditions from (a) to (c) listed below are met. (a) AT-50A(B) and TC-24A(B) are used as a sub controller. (b) The time on AT-50A(B) and TC-24A(B) set based on the time of the host controller are behind by more than two minutes. (c) The time alarm settings on AT-50A(B) and TC-24A(B) are set to [Use].	Cause 1) Change the time alarm settings on AT-50A(B) and TC-24A(B) to [Do not use].

(2) Assumed cases and restoration method

The air conditioning charge obtained by the apportioned electricity billing function is calculated based on the operation amount data of the indoor unit. If data cannot be collected for some reason, irregular processing is performed. Corrections of apportioned data or remedial apportionment may be required, depending on the contents of this irregular processing. The table below shows assumed cases.

Table: Assumed cases and recovery method (for electric energy metering-device (meter connected) method)

Assumed case	Charge calculation result	Billing data status	Data restoration required or not required/method
PC failure (HDD failure)	(Non-displayable)	Charge calculation result data is destroyed.	Data restoration is not required.*1
Communication error between AE-200 and expansion controller	Carry-over	Data is carried over and apportioned at the recovery time. (Data for several hours is collectively apportioned.)	Data restoration is not required.*2
AE-200 unit failure	(Non-displayable)	Data is not apportioned. (Period: Error day–Recovery day)	Restore apportioned data (AE-200)*2
Expansion controller failure	Carry-over	Data is apportioned, but is incorrect. (Period: Error day–Recovery day)	Restore apportioned data (AE-50/EW-50) + Edit apportioned data
Meter failure	Normal	Data is not apportioned. (Period: Error day–Recovery day)	Edit apportioned data
PI controller failure	Carry-over	Data is not apportioned. (Period: Error day–Recovery day)	Clear comparison data + Edit apportioned data
Carried-over unused unit price	Carry-over	Unused unit price remains carried over. (Period: When settings are changed–Recovery day)	Clear comparison data
Setting error	Black characters (normal)	Data is apportioned based on the set information.	Remedial apportionment

*1 We recommend that you back up the charge calculation results periodically against a failure.

*2 If a carry-over for a long period of time that extends over the multiple settlement-of-accounts days occurs, we recommend that you correct the data on the Editing Apportioned Data screen. However, it is unnecessary to perform this procedure when there is an agreement with the tenant that allows the charge to be collected as the next day's portion, even if carry-over settlement occurs.

Table: Assumed cases and recovery method (for electric energy manual entry (meter not connected) method)

Assumed case	Charge calculation result	Billing data status	Data restoration required or not required/method
PC failure (HDD failure)	(Non-displayable)	Charge calculation result data is destroyed.	Data restoration is not required.*1
Communication error between AE-200 and expansion controller	Carry-over	Data is carried over and apportioned at the recovery time. (Data for several hours is collectively apportioned.)	Data restoration is not required.*2
AE-200 unit failure	(Non-displayable)	Data is not apportioned. (Period: Error day–Recovery day)	Restore apportioned data (AE-200)*2
Expansion controller failure	Carry-over	Data is apportioned, but is incorrect. (Period: Error day–Recovery day)	Restore apportioned data (AE-50/EW-50) + Edit apportioned data
Carried-over unused unit price	Carry-over	Unused unit price remains carried over. (Period: When settings are changed–Recovery day)	Clear comparison data
Setting error	Normal	Data is apportioned based on the set information.	Remedial apportionment

*1 We recommend that you back up the charge calculation results periodically against a failure.

*2 If a carry-over for a long period of time that extends over the multiple settlement-of-accounts days occurs, we recommend that you correct the data on the Editing Apportioned Data screen. However, it is unnecessary to perform this procedure when there is an agreement with the tenant that allows the charge to be collected as the next day's portion, even if carry-over settlement occurs.

NOTE:

- If there are two or more assumed cases, make overall judgment.
- When carry-over of apportionment spans the settlement-of-accounts day, the carried-over portion is added to the next month. If you want to separate this month's portion and the next month's portion, divide the apportionment parameter of carried-over and collected charge on the Editing Apportioned Data screen by the number of days in this month and the next month.

The following describes the outline of the restoration method.

	Overview	Application
Restore apportioned data (AE-200)	Restore the data of AE-200 apportioned before the failure from the expansion controller.	Use this method when AE-200 fails.
Restore apportioned data (AE-50/EW-50)	Restore the data of the expansion controller apportioned before the failure from AE-200.	Use this method when the expansion controller fails.
Clear comparison data	Reset the carried-over data of the unused unit price.	Use this method when a unit price in use is changed to unused.
Edit apportioned data	Change the apportioned electric energy/ apportionment parameter data you want to correct by indoor units for each day. After all changes are completed, recalculate the air conditioning charge using the Charge Calculation Tool.	Use this method to correct or change the calculated apportionment parameter or apportioned electric energy.
Remedial apportionment	The apportioned electric energy for the remedial period is calculated by recalculating the apportionment from operation amount, electric energy, and other factors of the expansion controller. Then, the air conditioning charge is calculated together with the charge for the normal period.	Use this method for reapportionment for the carry-over period.

NOTE:

- To restore apportioned data and clear comparison data, refer to the Instruction Book (Apportioned Electricity Billing Function).

(3) Restoration procedure (Before performing the restoration procedure, update the software of AE-200/AE-50/ EW-50 to version 7.85 or later.)

1) Editing apportioned data

If AE-50/EW-50 fails, the operation time of an air conditioning unit or measurement value of the meter cannot be measured until AE-50/EW-50 is replaced. Therefore, apportionment calculation cannot be performed for the period during which AE-50/EW-50 is broken.

This chapter describes the method of correcting apportioned data for the period during which AE-50/EW-50 is broken, after replacing AE-50/EW-50.

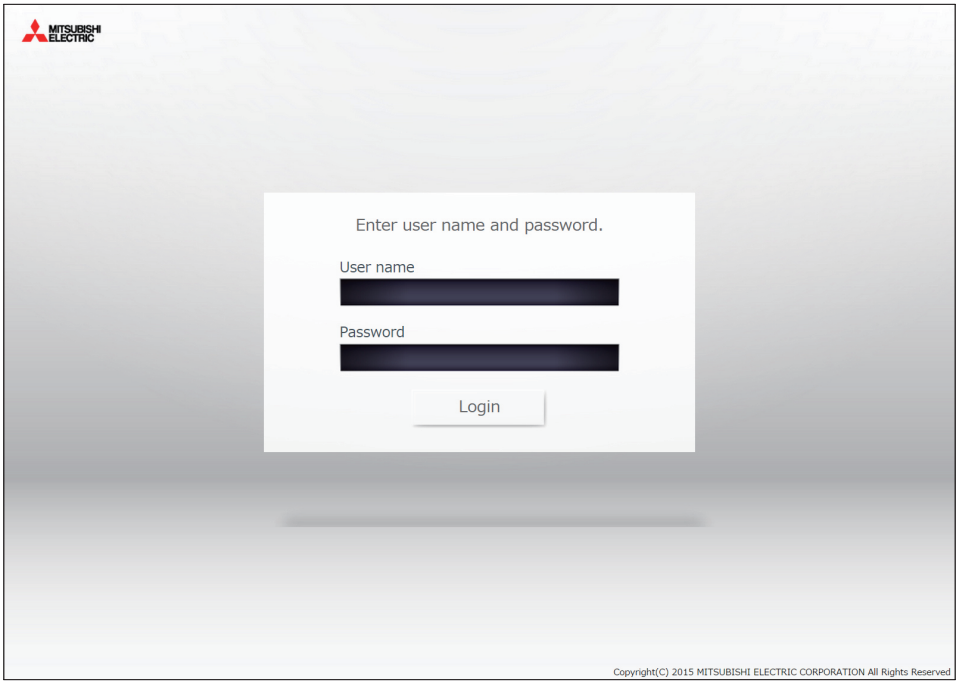
NOTE:

- If AE-200 fails, you can correct apportioned data automatically by using the Remedial Apportionment function. For the remedial apportionment method, refer to “2) Remedial apportionment.”

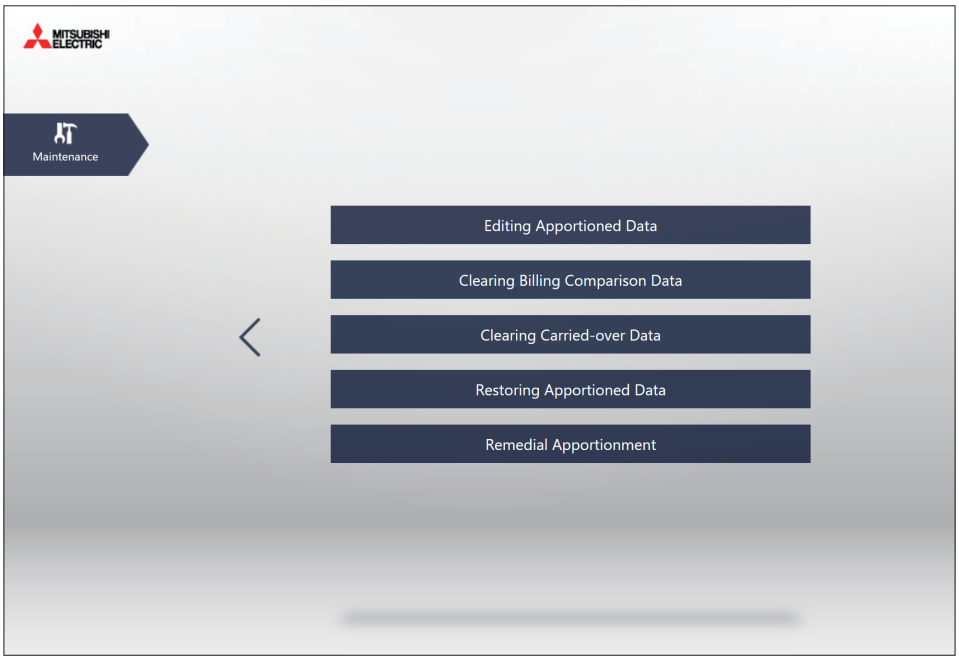
IMPORTANT:

- The Editing Apportioned Data function is performed to correct the apportionment calculation results for each day used in the Charge Calculation Tool.
- Please note that the electric energy displayed on the Energy Use Status screen or Ranking screen, or the electric energy displayed in the energy management table cannot be corrected.
- Corrections can be made on data from 62 days ago to the previous day. Data earlier than 62 days ago cannot be corrected.
- Do not perform remedial apportionment for the period for which corrections of apportioned data have been made. Doing so will change the data back to one before the correction was made.

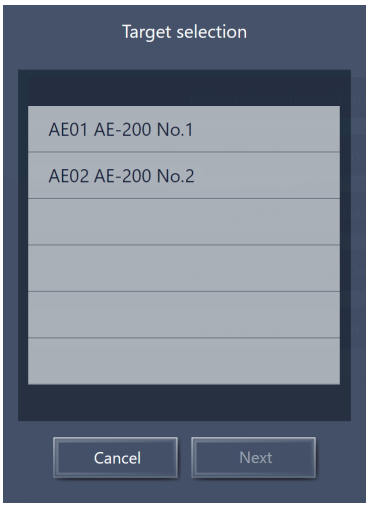
1. Replace AE-50/EW-50 that has failed.
   For the replacement method of AE-50/EW-50, refer to the Instruction Book (Apportioned Electricity Billing Function).
2. Log in to the Maintenance screen of the Integrated Centralized Control Web.
   URL: http://[IP address of AE-200]/control/index.html
   User name: maintenance
   Password: mainte



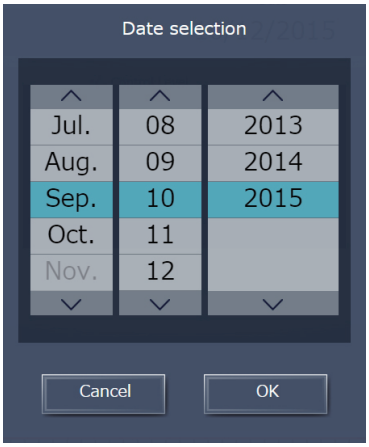
3. Click **[Editing Apportioned Data]** on the Maintenance screen of the Integrated Centralized Control Web.



4. Click the AE-200 to which the replaced AE-50/EW-50 belong, and then click **[Next]**.

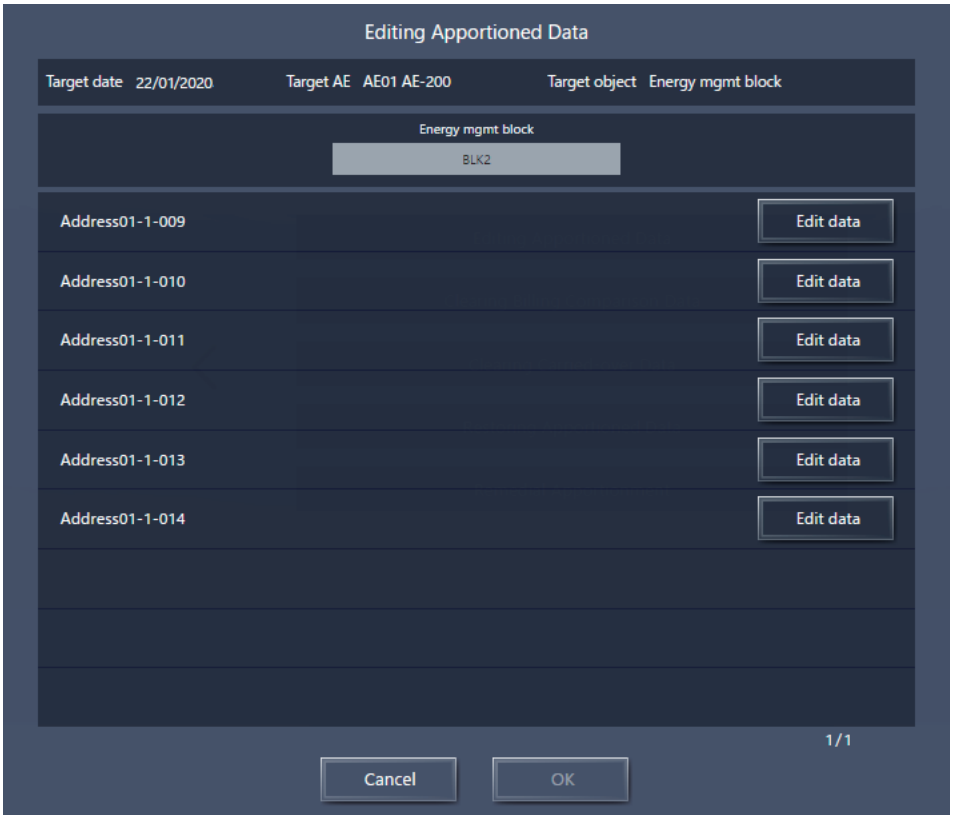


5. Click the date you want to correct, and then click **[Next]**.
   Corrections can be made on data within the range from 62 days ago to the previous day.



6. Click **[Energy mgmt block]**, and then click **[Next]**.

7. Click the energy management block you want to correct. Then, from the address list, click the **[Edit data]** button of the unit to be corrected.



8. Correct the apportioned electric energy by unit price.
Correction examples are shown below.

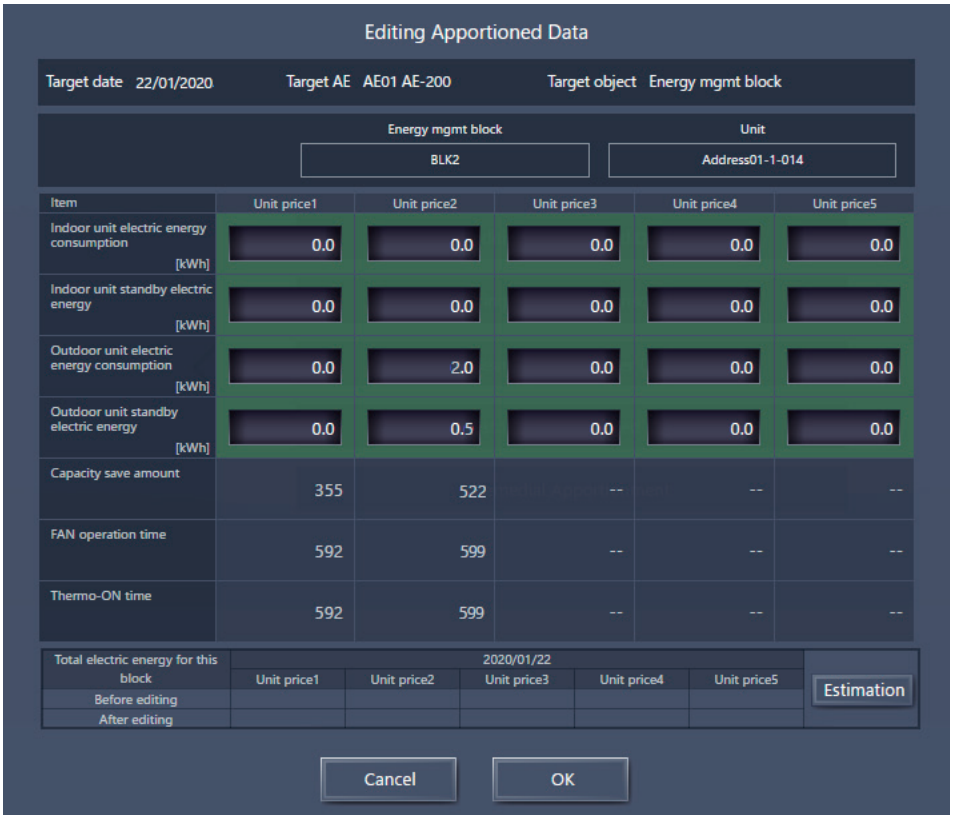
Example 1: Correction using the average value of one week before failure

→Calculate the average value of the apportioned electric energy for one week before failure, multiply the value by the number of days of the failure period, and input it as the apportioned electric energy for the day prior to the recovery day.

If a failure occurred on a day that overlaps the monthly settlement-of-accounts day, input the apportioned electric energy for the number of days before and after the settlement day within the failure period, on the day prior to the settlement day and the day prior to the recovery day, respectively.

Example 2: Correction using the normal period only

→With this method, the electric energy is not billed during the failure period. Input "0" for the apportioned electric energy for the number of days of the failure period.



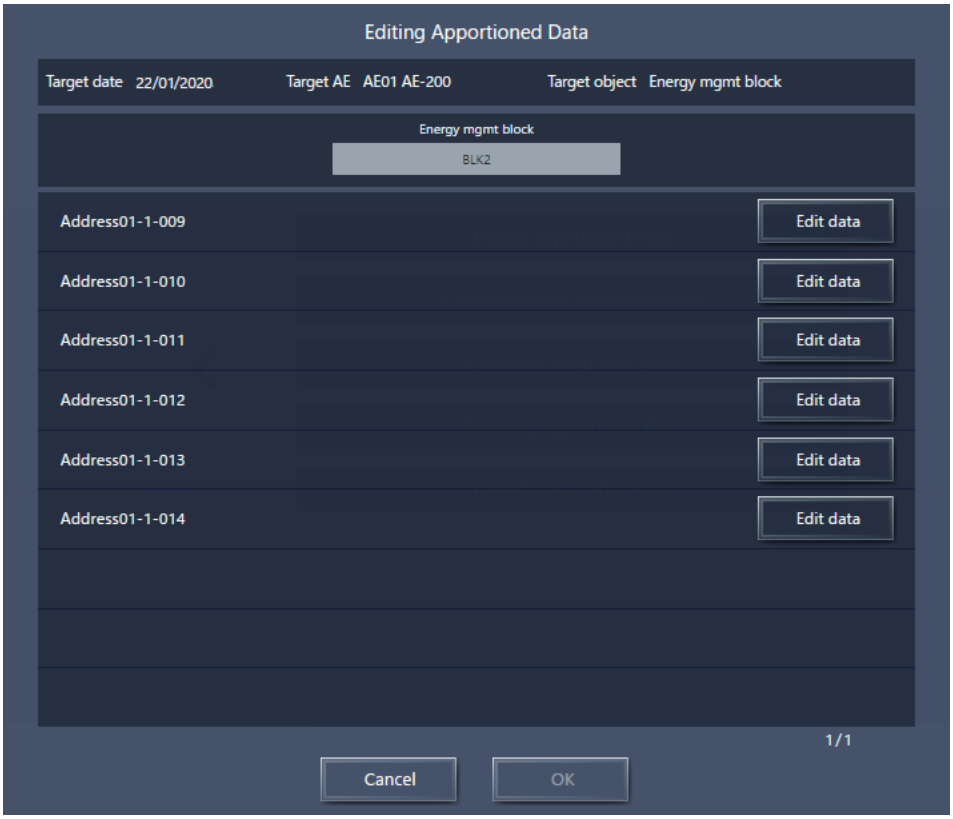
NOTE:

- Correctable items vary according to the apportionment mode settings on the Initial Setting Tool.

9. Select the **[OK]** button.

10. Perform Steps 8 and 9 for every unit that needs to be corrected.

11. On the Editing Apportioned Data screen, click the **[OK]** button to complete the correction settings.



NOTE:

- If you close the browser without clicking the **[OK]** button on the Editing Apportioned Data screen, the correction result will not be saved.

12. Calculate the charge using the Charge Calculation Tool, and check that the correction results are reflected.

2) Remedial apportionment

Apportionment calculation is not performed during the failure period of AE-200.
This chapter describes the method of recalculating apportionment (performing remedial apportionment) for the failure period after replacing AE-200.

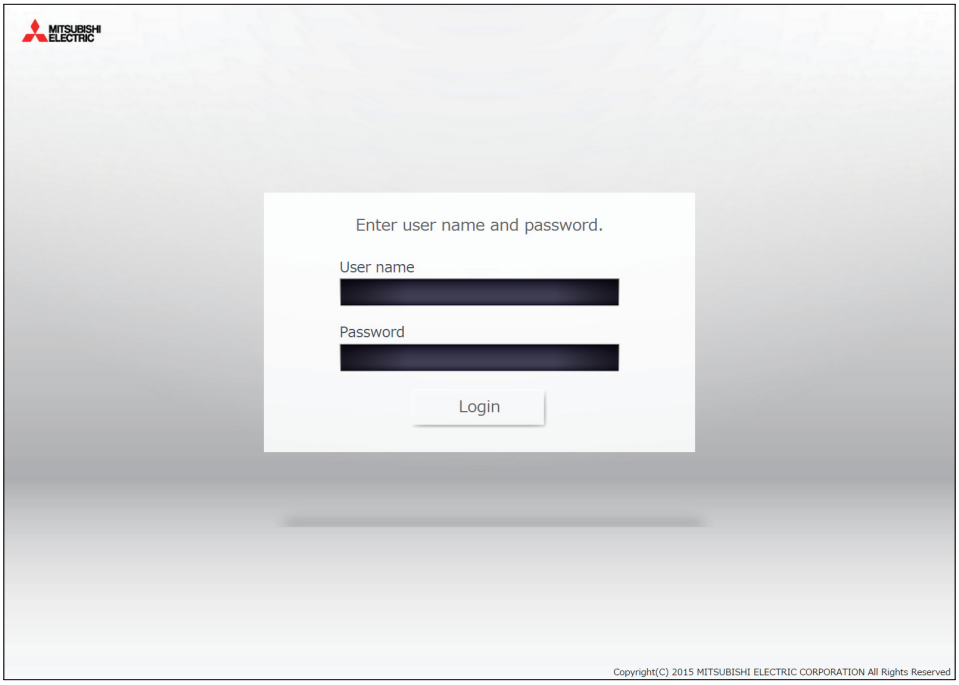
NOTE:

- Remedial apportionment is not performed when AE-50/EW-50 has failed. To make a correction, use the Editing Apportioned Data function.
  For the method of correcting apportioned data, refer to “1) Editing apportioned data.”
- This procedure can be used to recalculate daily apportionment for the period of a communication error even when a long-term communication error between AE-200 and AE-50/EW-50 has occurred. In this case, start the procedure from Step 2 after recovering from the communication error.

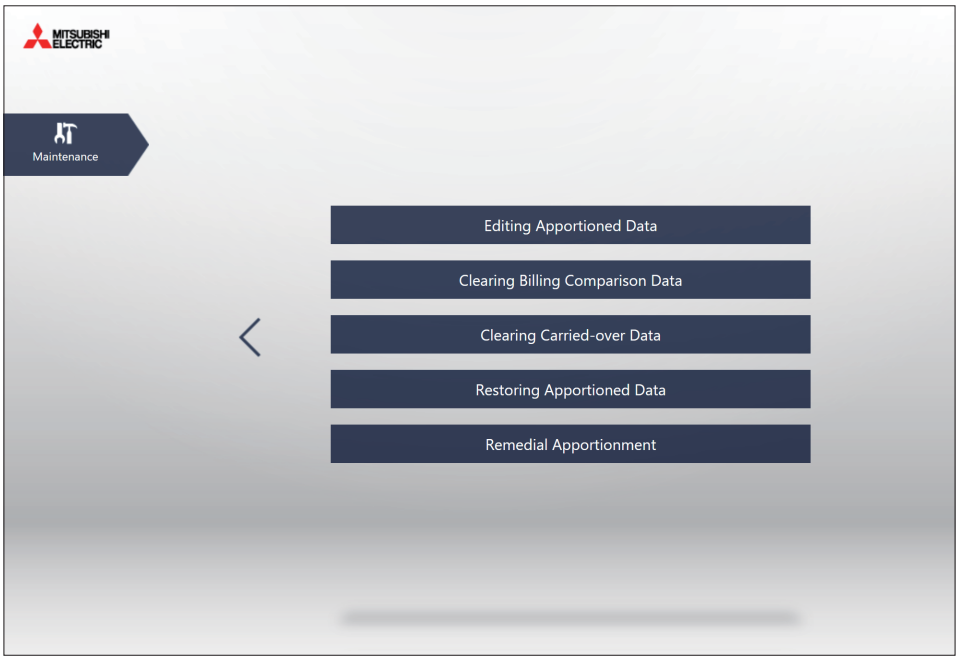
IMPORTANT:

- The Remedial Apportionment function is performed to correct the apportionment calculation results for each day used in the Charge Calculation Tool.
  Please note that the electric energy displayed on the Energy Use Status screen or Ranking screen, or the electric energy displayed in the energy management table cannot be corrected.
- While regular apportionment is performed by using data for 30 minutes, remedial apportionment is performed using data for one day. Therefore, the calculation results differ between the regular apportionment and remedial apportionment. (30-minute data cannot be retained for a long period of time. Instead, apportionment is performed using data for one day.)
  Perform remedial apportionment only for the period when data has errors.
- Remedial apportionment can be performed on data from 61 days ago to the previous day. Data for the current date and the date earlier than 61 days ago cannot be remedied.
- Do not perform remedial apportionment for the period for which corrections of apportioned data have been made. Doing so will change the data back to one before the correction was made.

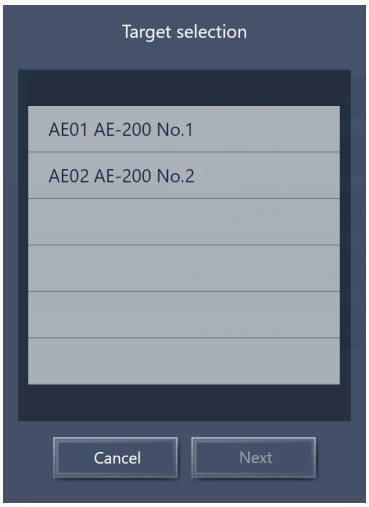
1. Replace AE-200 that has failed.
   For the replacement method of AE-200, refer to the Instruction Book (Apportioned Electricity Billing Function).
2. Log in to the Maintenance screen of the Integrated Centralized Control Web.
   URL: http://[IP address of AE-200]/control/index.html
   User name: maintenance
   Password: mainte



3. Click **[Remedial Apportionment]** on the Maintenance screen of the Integrated Centralized Control Web.



4. Click the replaced AE-200, and then click **[Next]**.



5. To start remedial apportionment, set the period of remedial apportionment, and then click **[OK]**.
Set the period from the day prior to the day AE-200 failed to the previous day.

NOTE:

- Remedial apportionment can be performed on data from 61 days ago to the previous day.
- Remedial apportionment may take several to dozens of minutes.

6. Calculate the charge using the Charge Calculation Tool, and check that the remedial apportionment results are reflected.

(4) Data collection method for troubleshooting of apportioned electricity billing function

Data collection may be required to investigate problems that occur with the apportioned electricity billing function.

■ Data required for investigation

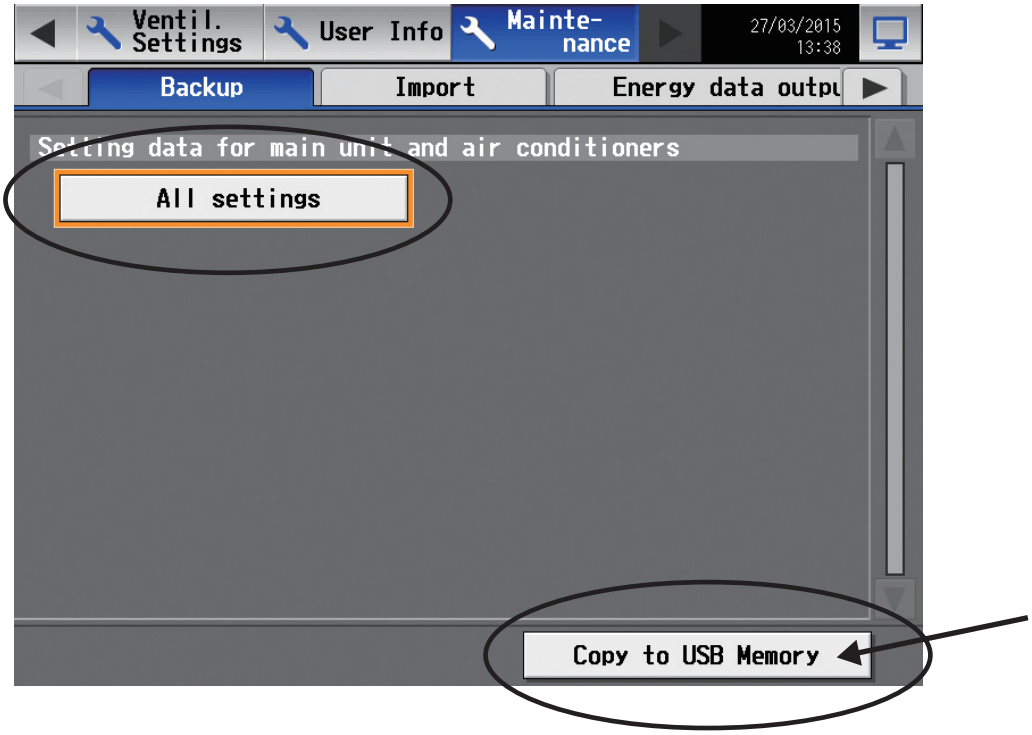
1) AE-200 Setting data
2) Billing parameter
3) Billing apportionment results data
4) AE-200 Setting data of Initial Setting Tool
5) Initial Setting Tool log
6) Charge Calculation Tool log
7) Serial numbers of all AE-200 , AE-50, and EW-50 in the system

■ Data collection method

1) AE-200 Setting data

i) Insert the USB memory device into AE-200.

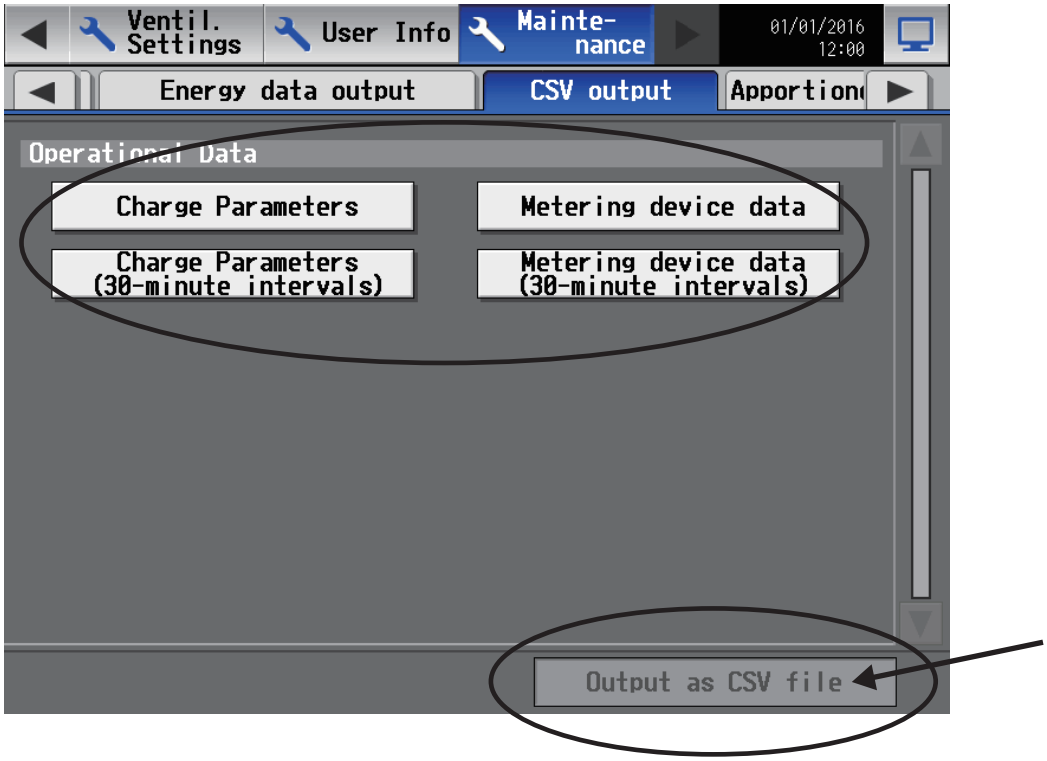
ii) Go to [Maintenance]→[Backup] on the Initial Settings screen of AE-200 LCD, and select [All settings]. Then, press [Copy to USB Memory] to output data to the USB memory device.



2) Billing parameter

i) Insert the USB memory device into AE-200.

ii) Go to [Maintenance]→[CSV output] on the Initial Settings screen of AE-200 LCD, and select [Charge Parameters], [Metering device data], [Charge Parameters (30-minute intervals)], and [Metering device data (30-minute intervals)]. Then, press [Output as CSV file] to output data to the USB memory device.

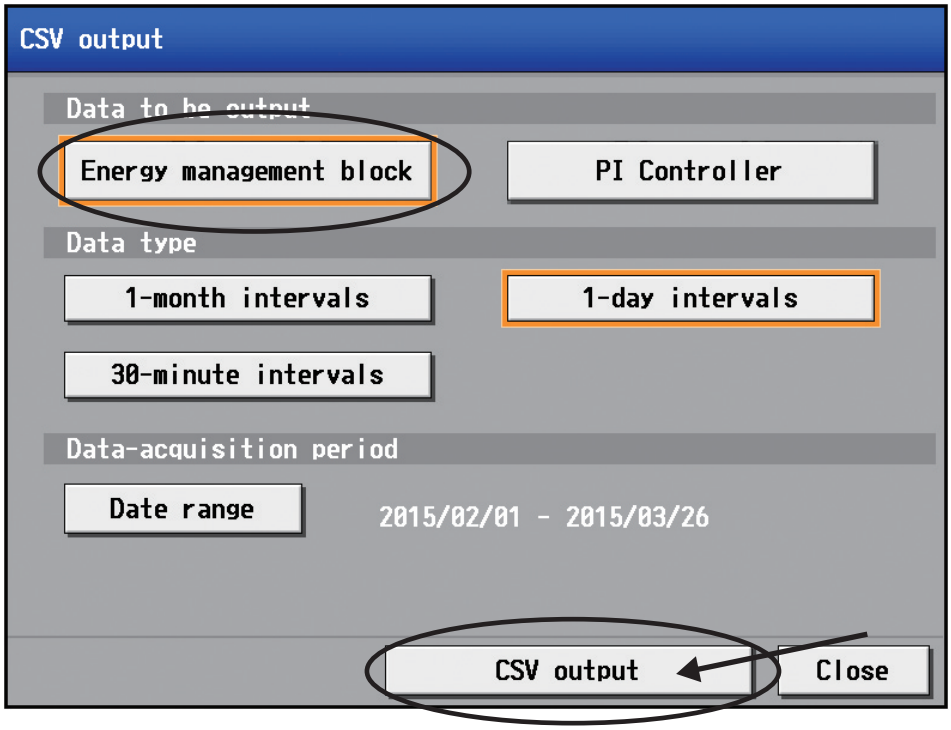


3) Billing apportionment results data

i) Insert the USB memory device into AE-200.

ii) Go to [Energy Management]→[Energy management list] on the AE-200 LCD screen, and then press [CSV output].

iii) Select [Energy management block], and then select [30-minute intervals]. Then, press [CSV output] to output data to the USB memory device. Data for one month and one day can also be output to the USB memory device by selecting [1-month intervals] and [1-day intervals]. (Period setting is not required.)



[9] Troubleshooting (BACnet® function)

The following shows troubleshooting for the BACnet® function.

(1) Troubleshooting based on trouble examples

	Category	Symptom	Cause	Check method and remedy
1	Building management system (communication)	AE-200 does not respond to the building management system. AE-200 cannot be found from the building management system.	LAN2 (BACnet®) is disconnected or a wire is broken.	• Check that there is no abnormality with any of the connector connections on the path from the LAN2 (BACnet®) to the building management system. • If there is a LINK/ACT lamp on the hub connecting the LAN2 (BACnet®), check that it is lit. • Replace the LAN cables with ones that are working properly.
2			The IP address of the LAN2 (BACnet®) of AE-200 or building management system is incorrect.	Check the following, and change the setting if there is a problem. • Send pings to the IP addresses of the building management system and LAN2 (BACnet®) of AE-200 from Command Prompt on a PC for performing checks, and confirm that packets arrive. • Execute “Acquire settings” from BACnet® Setting Tool and then check the BACnet® setting information.
3			The IP address of the LAN2 (BACnet®) of AE-200 duplicates that of other equipment.	• Send a ping from Command Prompt on a PC for performing checks while the LAN2 (BACnet®) of AE-200 is disconnected, and confirm that there is no response. If there is a response, change the IP address of the equipment with the duplicate IP address or the IP address of the AE-200. • Execute "Acquire settings" from BACnet® Setting Tool, and then check whether the network addresses of LAN 1 and LAN 2 (BACnet®) of AE-200 are the same. If they are the same, change the network address of LAN 1 or LAN 2 (BACnet®).
4			The AE-200 BACnet® connection mode is not "Online".	Check that "Current Mode" on the Mode Setting screen of BACnet® Setting Tool is "Online". If it is not "Online", set it to "Online". (Note that the mode will be "Offline" after "Send settings" is executed from BACnet® Setting Tool.)
5			• The request from the building management system was not sent. • The response was not sent from the AE-200.	Connect a network analyzer (e.g., Wireshark), capture packets, and confirm that the expected request and response are made over BACnet®. If the request is not made, recheck the settings of the building management system. If the response is not made, recheck the settings of the AE-200. For the packet capture procedure, refer to “VIII [1] How to Use Wireshark for AE-200 BACnet®”.
6			The object or property that the building management system requests does not exist.	• Execute “Acquire settings” from BACnet® Setting Tool and then check that the object the building management system requests is included in the BACnet® setting information. If the object the building management system requests is not included, recheck the settings of the AE-200. • For the procedure to check the BACnet® object or property state of the AE-200 while the BACnet® connection mode is online, refer to “VIII [2] BACnet® Object Check Procedure Using InneaBACnetExplorer”.

Category		Symptom	Cause	Check method and remedy
7		The response from the AE-200 is slow or some of the response is missing.	There is a possibility that the request interval from the building management system via BACnet® communication exceeds the response performance of the AE-200.	Set a request frequency of 5 properties or less per second by checking with the system integrator of BACnet® about either increasing the interval for state collection or reducing the number of properties target for collection on the building management system side.
8			The communication speed of LAN2 (BACnet®) has decreased.	• Check whether or not network equipment (LAN cable, hub, router, etc.) with a communication speed of less than 100 Mbps is connected to the LAN2 (BACnet®), and if such equipment is connected, replace it with high-speed equipment or disconnect it. • Check whether or not equipment that performs communication other than BACnet® is connected to the LAN2 (BACnet®), and if such equipment is connected, disconnect it.
9		The response from the AE-200 is slow or communication becomes unstable. The COL lamp of the hub connecting the AE-200 lights very frequently.	There is a possibility of the state of inconsistencies occurring in Ethernet Auto Negotiation.	Check whether or not any equipment that communicates with the AE-200 has Auto Negotiation disabled. If it is disabled, enable it. (The AE-200 supports Auto Negotiation.)
10		Even though COV notification is used, it takes time to be reflected in the building management system.	The COV notification process ID is not set to an appropriate value.	Set the COV notification process ID to an appropriate value (usually 0, but check with the administrator because it is dependent on the building management system).
11		The state indication on the building management system does not change. (Operation from the building management system is possible.) The AE-200 has detected error code 6600.	The M-NET address is duplicated with that of another system controller connected to the same M-NET as the AE-200.	Change the M-NET address of the AE-200 so that it is not duplicated and then restart the AE-200.
12		BACnet® communication became no longer possible when a new air conditioning unit or PI controller was registered on the AE-200.	When the equipment configuration is changed, the BACnet® connection mode may become "Offline".	If there is also a change to the BACnet® settings, set the settings again with BACnet® Setting Tool. Then, change BACnet® connection mode to "Online" from the Mode Setting screen of BACnet® Setting Tool.

	Category	Symptom	Cause	Check method and remedy
13	Building management system (error display)	When an air conditioning unit is set to run, an alarm is displayed by the building management system.	The building management system may determine there to be an alarm and display the alarm because the "InAlarm" bit of the "Status_Flags" property is ON, or the "Event_State" property is "Offnormal", or the "Notify Type" parameter of event notification is "Alarm".	When the event notification of "On Off State" (BI_01xx02) is used, set "NotifyType" of event notification of "On Off State" (BI_01xx02) not to "Alarm" but to "Event" from BACnet® Setting Tool. Disable (clear the check box for using) event notification of "On Off State" (BI_01xx02). If the process of determining this to be an alarm on the building management system side can be canceled, have it canceled.
14		When the on/off operation is performed from the AE-200 or a remote controller, an error is detected on the building management system side. When the on/off operation is performed from the building management system, an error is not detected.	A mismatch of the "On Off Setup" object (BO_01xx01) and "On Off State" object (BI_01xx02) is occurring.	This is not a malfunction. Configure the settings so that an error due to a mismatch of both object states is not detected on the building management system side.
15	BACnet® Setting Tool	The settings cannot be configured from BACnet® Setting Tool. (The "Response Timeout" message appears.)	• LAN1 of the AE-200 is not set correctly. • The PC for setting is not set correctly.	Configure the settings so that Web Browser for Initial Settings or Initial Setting Tool can connect referring to the AE-200/AE-50/EW-50 Instruction Book (Initial Settings).
16			The network addresses of LAN1 of the AE-200 and the PC for setting do not match.	Set the correct IP address and subnet mask referring to the AE-200/AE-50/ EW-50 Instruction Book (Initial Settings).
17			The AE-200 is restarting.	If the AE-200 is restarting, wait a while (maximum of about 10 minutes) and then connect.
18			The IP address (LAN1) of the AE-200 unit and the setting destination IP address (LAN1) of BACnet® Setting Tool do not match.	Set IP address of both so that they match. The setting destination IP address of BACnet® Setting Tool can be checked from [AE-200/AE-50/EW-50] - [Property] on the menu bar. If the IP address (LAN1) of the AE-200 unit is unknown, refer to "When forgetting the IP address of LAN1" below.
19		Even if the BACnet® connection mode is set to "Online" on the Mode Setting screen of BACnet® Setting Tool, the mode does not change to "Online".	The "BACnet connection" license has not been registered.	Register the "BACnet connection" license referring to the AE-200/AE-50/EW-50 Instruction Book (Initial Settings).
20			"Send settings" has not been executed even once with BACnet® Setting Tool or the settings sent with "Send settings" included inconsistencies.	Do not change the settings on the AE-200 LCD, etc. during the period from executing "Acquire settings" with BACnet® Setting Tool to executing "Send settings" after configuring the BACnet® information settings. If a setting was changed during the process, execute "Acquire settings" again.
21			A metering device has been registered in "Measurement" but the accumulator (PI controller Electric Energy 1–4 or Pulse Input Electric Energy 1–4) supporting the metering device has not been enabled.	When a metering device will be used, select the check box even if the corresponding object will not be used.

Category		Symptom	Cause	Check method and remedy
22			The notification destinations of the "Recipient_List" properties of the Notification Class object exceeds 5 devices.	For the notification destinations of the "Recipient_List" properties, the notification destination addresses registered with BACnet® Setting Tool and those registered from the building management system are managed separately, so make sure the total of both does not exceed 5 devices.
23	Integrated Centralized Control Web browser	A message saying, "Centrally Controlled" appears on the Integrated Centralized Control Web browser even after changing the "Prohibit remote controller operation" settings from [Prohibit] to [Permit] from the building management system.	The software version of AE-200/AE-50/EW-50 is earlier than Ver. 7.45.	Update the software version of AE-200/AE-50/EW-50 to Ver. 7.46 or later. Also, ensure that the software versions of all AE-200/AE-50/EW-50 are the same. For the procedure for updating AE-200/AE-50/EW-50, refer to "Software Update" in AE-200/AE-50/EW-50 Instruction Book (Initial Settings).
24	IP address	When forgetting the IP address of LAN1.	-	Check it on the LCD of the AE-200/AE-50. If you have forgotten the LAN1 IP address of EW-50, set it again with SW1 on the unit referring to the Installation and Instructions Manual for EW-50.
25		When forgetting the IP address of LAN2 (BACnet®).	-	Check it by executing "Acquire data" with Initial Setting Tool, executing "Acquire settings" with BACnet® Setting Tool, or using Initial Setting Tool from LAN1 with the AE-200/AE-50/EW-50. It can also be checked on the LCD of the AE-200/AE-50.

[10] Troubleshooting for chiller unit connection function

Symptom		Cause	Check procedure and remedy
1	The monitoring screen of chiller unit does not appear.	1) Chiller unit is not registered to the group. 2) Chiller unit is in a state of communication error.	Cause 1) Register the chiller unit to the group from the Initial Settings screen. Cause 2) Check the error code and remove the cause of the communication error. For the error codes, refer to “V [3] 1. How to determine the cause and resolve trouble based on the detected error display of the AE-200/AE-50/EW-50.”
2	The operation mode was changed, but the unit returns to the mode before the change after a while.	1) The operation mode was changed without setting the unit to a stopped state. 2) The Main Unit setting of the chiller unit (Command Input Source setting) is set to a unit other than "System Controller."	Cause 1) When changing operation modes, first [Stop] the unit, and then change the operation mode to [Cool]/[Heat]. Next, after at least one minute has passed, make sure that the operation mode has been changed on the monitoring screen, and then perform the operation by clicking [Operation]. Cause 2) Set the Main Unit of the chiller unit (Command Input Source setting) to "System Controller." For the setting method, refer to the technical materials for the unit.
3	The operation, set water temperature, or fan mode was changed, but the unit returns to the mode before the change after a while.	The Main Unit setting of the chiller unit (Command Input Source setting) is set to a unit other than "System Controller."	Set the Main Unit of the chiller unit (Command Input Source setting) to "System Controller." For the setting method, refer to the technical materials for the unit.
4	The units are not aligned by system for display on the monitoring screen.	On the Initial Settings screen, the smallest group number is not assigned as the group number of the system representative group.	When performing group registration, assign the smallest group number in the system to the system representative group.

[11] Troubleshooting for HWHP (QAHV)

	Symptom	Cause	Check procedure and remedy
1	The monitoring screen of the HWHP unit does not appear.	1) The HWHP unit is not registered.	Cause 1) Register the HWHP unit from the Initial Settings screen.
2	It takes a long time for the amount of hot water in tank to reach the target value, or it does not reach the target value.	1) The effective temperature of hot water in tank is higher than the boiling temperature set in the schedule. 2) An error was detected on the unit.	Cause 1) An error occurs when the effective temperature of hot water in tank is set on the Initial Settings screen after configuring the schedule settings. Set the effective temperature of hot water in tank lower than the boiling temperature in the schedule. Cause 2) Check the error code. For details on the error codes, refer to the technical materials for the unit.
3	It takes a long time for the water temperature to reach the set temperature, or it does not reach the set temperature.	1) The boiling temperature is lower than the temperature set in the schedule. 2) An error was detected on the unit.	Cause 1) An error occurs when the boiling temperature is set on the Initial Settings screen after configuring the schedule settings. Set the boiling temperature higher than the set temperature in the schedule. Cause 2) Check the error code. For details on the error codes, refer to the technical materials for the unit.
4	The schedule settings on the HWHP unit do not operate.	1) Incorrect schedule settings are configured. 2) The time on AE-200 or the time on the unit is different from the current time. 3) A schedule is duplicated with the settings for a schedule with higher priority such as the yearly schedule.	Cause 1) The schedule settings are retained for each system. Check whether the schedule settings for the system you want to operate are correct. Cause 2) Check the time settings on AE-200 or the unit. Cause 3) The order of priority for schedules from higher to lower is yearly schedule and weekly schedule.

Symptom		Cause	Check procedure and remedy
5	The schedule settings on the HWHP unit do not operate.	1) Incorrect schedule settings are configured. 2) The period settings for schedules are incorrect. 3) The [OK] button was pressed while the display area in today's schedule was still blank. 4) The time on AE-200 or the time on the unit is different from the current time. 5) The "Schedule" on the operation screen is set to [Disabled]. 6) A schedule is duplicated with the settings for a schedule with higher priority such as the yearly schedule. 7) The "Schedule/Season setting" in the advanced settings is set to [Disabled]. 8) On the weekly schedule settings screen, the period settings are set to [Disabled].	Check causes 1) to 3). Take the measure corresponding to the cause. For causes 1) and 2), check causes 1) and 2) described for symptom 6. Cause 3) The order of priority for schedules from highest to lowest is today's schedule, yearly schedule, weekly schedule 1, ... weekly schedule 5. Cause 4) One of the weekly schedules operates according to the set period. Check the period settings on the season settings screen to see if there is any error. Cause 5) If the [OK] button is pressed while the display on today's schedule settings screen is left blank, the schedule is handled as having been set not to operate. Set the schedule to be operated again from today's schedule settings screen. Cause 6) Change the setting to [Enabled]. Cause 7) Set the "Schedule/Season setting" in the advanced settings to [Enabled]. For details, refer to "AE-200/AE-50/EW-50 Instruction Book (Initial Settings)." Cause 8) The season settings for the weekly schedule are the same as those for air conditioning unit and other units. Enable the season settings that have been set to [Disabled]. Ensure that the schedule settings for weekly schedule 5 cover the entire period and are set to [Enabled]. For details, refer to "AE-200 Instruction Book (Initial Settings)."

	Symptom	Cause	Check procedure and remedy
6	A message saying, "System is not connected to the HWHP unit properly, or advanced settings are not complete. Check the settings or connection with the HWHP unit and complete the detail settings." appears.	1) A device other than HWHP unit is connected to the address set on the HW Supply screen of AE-200. 2) The description of HW Supply of AE-200 and the configuration and settings for the HWHP unit do not match. 3) The board digital settings for the HWHP unit are incorrect. 4) The advanced settings for HW Supply are not complete.	Check causes 1) to 4). Take the measure corresponding to the cause. Cause 1) Check the connected device and reconfigure the settings on the HW Supply screen. Cause 2) Check the address registration of HW Supply and the device configuration of the HWHP unit. If the address registration and the device configuration are different, review the address registration. Cause 3) After setting the set value to 2 for item code 107 in the board digital settings on the HWHP unit, perform one of the following operations with AE-200. (a) With AE-200, delete the address settings and save the settings, and then reset the address. (b) Restart AE-200. For details on digital settings for the unit, refer to "QAHV Installation Manual." If the problem persists after implementing the check methods and solutions for causes 1) to 3), check cause 4) and resolve the problem. Cause 4) Open the advanced settings screen of the HWHP unit system displayed in [HWHP unit system name] and complete the settings. Press the [OK] button, and then [Save Settings] on the settings screen of the HWHP unit. For details on the settings for AE-200, refer to "AE-200 Instructions Book (Initial Settings)."
7	Trend data related to time and integration are not output with the correct values.	1) This symptom occurs when all of the conditions from (a) to (c) listed below are met. (a) AT-50A(B) and TC-24A(B) are used as a sub controller. (b) The time on AT-50A(B) and TC-24A(B) set based on the time of the host controller are behind by more than two minutes. (c) The time alarm settings on AT-50A(B) and TC-24A(B) are set to [Use].	Cause 1) Change the time alarm settings on AT-50A(B) and TC-24A(B) to [Do not use].
8	The execution of a schedule is delayed.	1) This symptom occurs when all of the conditions from (a) to (c) listed below are met. (a) AT-50A(B) and TC-24A(B) are used as a sub controller. (b) The time on AT-50A(B) and TC-24A(B) set based on the time of the host controller are behind. (c) The time alarm settings on AT-50A(B) and TC-24A(B) are set to [Use].	Cause 1) Change the time alarm settings on AT-50A(B) and TC-24A(B) to [Do not use].

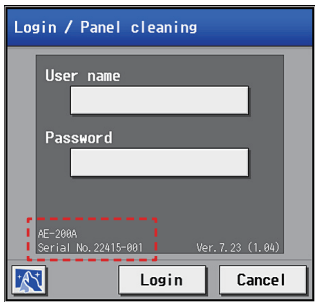
Symptom		Cause	Check procedure and remedy
9	The yearly schedule is not executed.	1) This symptom occurs when all of the conditions from (a) to (c) listed below are met. (a) AT-50A(B) and TC-24A(B) are used as a sub controller. (b) The time on AT-50A(B) and TC-24A(B) set based on the time of the host controller are behind by more than one week. (c) The time alarm settings on AT-50A(B) and TC-24A(B) are set to [Use].	Cause 1) Change the time alarm settings on AT-50A(B) and TC-24A(B) to [Do not use].

VI. Q & A

VI. Q & A

[1] About the entire system

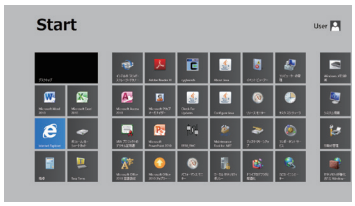
No.	Question	Answer
1	Is the centralized control of another company's air conditioning units possible?	The ON/OFF operation and error status of another company's air conditioning units can be managed from AE-200/AE-50/EW-50 by using a DIDO controller and connecting to contact points.
2	What methods are available to perform remote monitoring?	There is a method of connecting via a VPN router*1 using an Internet connection*2. If you use an Internet connection, it is necessary to sign a contract with a separate Internet provider and obtain a global IP address (or use dynamic DNS) to identify the VPN router from the Internet. With regard to error mail notification, mail can be sent to a mobile phone, PC, or other devices capable of receiving email*3 by signing a contract with a separate provider. *1 Be sure to install a VPN router or other equipment to ensure security. *2 This method cannot be used if there is a router or proxy server that does not support VPN pass-through in the communication path (please note that in most cases, connection to a VPN router in a remote location cannot be made from an internal LAN). *3 SMS is not supported.
3	Can two AE-200 be connected to the same M-NET line?	No.
4	When does the unit LCD backlight turn off?	The backlight turns off when three minutes have elapsed without any operation input. There are no settings that allow the backlight to remain lit by reason of product life. However, the backlight remains lit when an error occurs.
5	Is it possible to connect with the PLC of Electric Amount Count Software or Demand Input PLC Software?	Yes. However, only peak cut control can be used. As for the apportioned electricity billing function of AE-200, only connection with the PI controller is possible.
6	Is it possible to select the error codes to be notified of by error mail?	You can select the notification target error codes in the error code notification settings.
7	Is 50 the maximum number of air conditioning units that can be controlled by AE-200/AE-50/EW-50?	The maximum number of units that can be controlled by a single AE-200/AE-50/EW-50 is 50. A maximum of 200 units can be controlled when AE-200 and AE-50/EW-50 are used together. For details on the number of each device that can be controlled, refer to the Instruction Book.
8	Can the status of an AI controller and PI controller be displayed on the unit? (Is display on the LCD supported?)	The current value can be displayed in a list. Graphs can be displayed on the Energy Use Status screen.
9	Can the operation of AE-200/AE-50 itself be locked?	The operation of AE-200/AE-50 can be locked on the login screen by enabling the screen lock function on the [Initial Settings] screen → [Unit Information] screen. If the screen lock function is enabled, the lock also activates automatically when no operation is performed for a set period of time (three minutes). * However, the screen lock does not activate automatically when an error occurs.
10	Up to how many floors can be set?	A maximum of 10 floors can be set.
11	How many groups can be placed on one floor?	30 groups can be placed on one area of a floor. A maximum of 180 groups can be placed on a floor with the floor layout split into six.
12	If the set schedules from week 1 to week 5 are duplicated, which schedule operates?	The schedule of week 1 takes priority and will be executed. The priority order for schedules is as follows (the priority order is from left to right): Today's schedule > Yearly schedule > Week 1 > Week 2 > Week 3 > Week 4 > Week 5
13	Is group registration required for an ME remote controller?	Yes, group registration is required. (Group registration is required for an ME remote controller and system remote controller. However, group registration is not required for an MA remote controller.)

No.	Question	Answer
14	Is it possible to select whether to show or hide the indoor (inlet) temperature?	You can select from [Show always], [Show during operation], or [Hide]. The indoor (inlet) temperature will be displayed on the upper right of the group icon always if [Show always] is selected, and only during operation if [Show during operation] is selected.
15	Is there a way to hide the inlet temperature display of AE-200/AE-50 when operation is stopped?	Set the room temperature display to [Show during operation] in [Unit Information] on the [Initial Settings] screen of AE-200/AE-50. If [Show during operation] is selected, the indoor (inlet) temperature will not be displayed when operation is stopped.
16	Can the set temperature be displayed on the layout screen?	The set temperature display can be switched between [Show] and [Hide], and will be displayed when set to [Show]. The set temperature will be displayed on the lower right of the group icon if the indoor (inlet) temperature is displayed at the same time, and on the upper right of the group icon if displayed alone.
17	About how long does it take for AE-200/ AE-50/EW-50 to start after the power is turned on?	The time required varies according to conditions such as system configuration and communication interruption. As a standard, you can expect it to take approximately five minutes.
18	What is the initial license status of AE-200/AE-50/EW-50?	All items of the licenses are in a disabled state at the time of shipment. Purchase the required licenses from the dealer and register them to AE-200/ AE-50/EW-50. (License is not required for the schedule function.)
19	Where can I find the serial number of the AE-200/AE-50/EW-50?	It is printed on a label attached to the left side of the packaging box. Example: "Serial Number: 12664-567" You can also check the serial number on the login screen of AE-200/AE-50 LCD or on the Web browser license registration screen. 
20	Is there a way to check the power supply status or the status of air conditioning units when the backlight of AE-200/AE-50 turns off?	Yes, there is. The POWER LED turns on when power is supplied to AE-200/ AE-50. To indicate the status of air conditioning units, the ON/OFF LED turns on when one or more air conditioning units are operating; the LED blinks when an error occurs with one or more connected devices; and it turns off when all air conditioning units are stopped.
21	Is there a way to erase all group registrations in one go?	No, there is not. (This function is not provided so that we can prevent all registrations from being erased by accident.)
22	Can a floor plan for TG-2000 be used as a floor plan for AE-200/AE-50?	No, it cannot be used. Floor plans for AE-200/AE-50 and TG-2000 differ in size and format. Prepare them separately.
23	Is there anything I can do if I have forgotten the building manager login password?	Contact the dealer or distributor and inform them of the serial number of AE-200/AE-50/EW-50. You will be given a password that allows you to log in. Log in and then change the password.
24	Is it possible to set the range for the set temperature on a Mr. Slim model from AE-200/AE-50/EW-50 via an M-NET adapter?	The unit operates within the limit of temperature range when PAC-SJ**MA is connected although the settings are not displayed on the local remote controller. The temperature range cannot be set when an M-NET adapter other than PAC-SJ**MA is connected. To set the temperature range on an MA remote controller, use the MA remote controller itself. As for the ME remote controller, you can set it from AE-200/AE-50/EW-50 as there is no connection via an M-NET adapter.
25	Can the set temperature range be set on a system remote controller such as PAC-SF44SRA from AE-200/AE-50/ EW-50?	No, it cannot be set on a system remote controller such as PAC-SF44SRA. It can only be set on local remote controllers (ME and MA). (This setting may not be possible for some models of ME remote controller. For details, refer to "NOTE:" in "IV [4] 1. (2)")

No.	Question	Answer
26	Are the specified models of USB memory devices the only models that can be used?	For AE-200/AE-50, the USB memory devices specified in the Instruction Book are used to check the operation. However, if these models are not available, select a USB memory device that meets the following conditions and check the operation several times before use. * Reading and writing with a memory device whose operation has not been checked may cause an unexpected operation. Therefore, check the operation of the memory device (during test run) before use. Do not use a USB memory device in which a data writing error has occurred. 1) USB standard: Must be USB 2.0 compliant. 2) Format: Must be formatted in FAT32 or FAT (FAT16). 3) Must have no security function. 4) Provided with the security function, but does not perform any security processing by using a PC. (Note that you may not be able to use some USB memory devices. Check the operation before use.) In the case where data cannot be written properly even though a USB memory device has been replaced with another one after a data writing error occurred, restart AE-200/AE-50 (turn the power off, and then back on) and recheck all USB memory devices other than the one in which an error first occurred.
27	Is an apportioned electricity billing license required to output the billing parameters in CSV format?	Yes, it is required. Data output is not possible if the license is not registered. Perform data output from the AE-200 screen or from AE-50/EW-50.
28	The error codes of Mr. Slim are two digits. How will they be displayed when it is connected to AE-200/AE-50/EW-50?	The descriptions of errors for the models that can be connected to AE-200/AE-50/EW-50 (Mr. Slim, RAC/HAC) are displayed by the error codes (four digits) of AE-200/AE-50/EW-50.
29	Can the power supply expansion unit (PAC-SF46EP) also be used without the power supply unit (PAC-SC51KUA)?	Yes, it can.
30	If AE-200/AE-50/EW-50 fails after setting the prohibit local remote controller operation from AE-200/AE-50/EW-50, can the prohibit local remote controller operation setting be canceled?	When communication from AE-200/AE-50/EW-50 stops, the prohibit setting is canceled after approximately 15 minutes.
31	If AE-200/AE-50/EW-50 shuts down due to incidents such as a power failure, will the air conditioning units stop also?	If a local remote controller or system controller is connected, operation will continue. If not, operation will stop after a maximum of 13 minutes.
32	I have forgotten the IP address of AE-200/AE-50/EW-50. How can I find out what it is?	• AE-200/AE-50 You can check the address on the [Initial Settings] - [Network] screen on the LCD. • EW-50 Expansion controller: You can check the address by specifying the [Device to display] on the [Initial Settings] - [Network] screen on the LCD. Standalone: There is no way to check. It can be set again by using the rotary switch (SW1) of the unit. For the setting procedure, refer to “Quick IP address (LAN1) setting” in the EW-50 Installation and Instructions Manual.
33	I have forgotten the login name or password for AE-200/AE-50/EW-50. How can I find out what it is?	There is no way to find out. Contact your dealer.
34	Is there a good way to arrange air conditioning units linearly in the floor layout?	They can be easily arranged by displaying grids and changing travel widths on the floor layout screen.
35	Should all the software versions of AE-200/AE-50/EW-50 on the same site (system) be the same?	Ensure that the software versions 7.31 or later for all AE-200/AE-50/EW-50 on one site (system) are the same. Although not required, we recommend that you update the version to the latest version when using the same version within a site.

[2] About Web browsers

(1) Web Browser for Initial Settings, Web Browser for System Maintenance Engineer

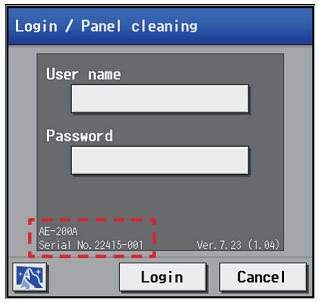
No.	Question	Answer
1	In Internet Explorer 8 and 9, an error message saying, "A malfunctioning or malicious add-on has caused Internet Explorer to close this webpage." appears and the web page closes.	Start Internet Explorer, and then select [Tools] → [Internet options] from the toolbar. Select the [Advanced] tab in Internet Options to open the Advanced screen. Clear the [Enable memory protection to help mitigate online attacks] check box of the Security items, and then click [OK]. Close all Internet Explorer screens that are opened, and then open Internet Explorer again, and check that the Web browser function of AE-200/AE-50 can be used (a web page is displayed).
2	Can Internet Explorer (IE) on the Start screen of Windows 8.1 be used?	No, it cannot be used. Use Internet Explorer (IE) on the desktop screen. If IE has been started from the Start screen, first close IE, and then switch to the desktop screen and start IE again. For how to switch screens, refer to the Instruction Book for Windows 8.1.  Start screen  Desktop screen

(2) Integrated Control Browser

No.	Question	Answer
1	I have forgotten the login name or password. How can I find out what it is?	You can change the login name and password by logging in as the maintenance user.
2	Can AE-200/AE-50/EW-50 be integrated between sites and monitored/operated from the Web browser screen?	Yes, they can be integrated and monitored/operated by using a dedicated VPN router that can connect sites.

[3] About the AE-200/AE-50/EW-50 Centralized Controller

No.	Question	Answer
1	Can two AE-200 be connected to the same M-NET line?	Yes, but there are restrictions.
2	When does the unit LCD backlight turn off?	The backlight turns off when three minutes elapse without any operation input. There are no settings that allow the backlight to remain lit by reason of product life. However, the backlight will remain lit if an error is occurring.
3	Is it possible to connect with the PLC of Electric Amount Count Software or Demand Input PLC Software?	Yes. However, only peak cut control can be used. With regard to the AE-200 apportioned electricity billing function, only a PI controller connection is possible.
4	Is it possible to select the error codes I wish to be notified of by error mail?	You can select the notification target error codes in the error code notification settings.
5	Is the maximum number of units that can be controlled 50?	The maximum number of units that can be controlled in the case of M-NET of the AE-200/AE-50/EW-50 is 50. A maximum of 200 units can be controlled when AE-200 and AE-50/EW-50 are used together.
6	Can the status of an AI controller and PI controller be displayed on the unit? (Is display on the LCD supported?)	Only the AE-200/AE-50 can display the status. However, graphs cannot be displayed. A centralized control PC (Web browser) is required to display graphs.
7	Can the operation of the AE-200/AE-50 itself be locked?	Enabling the screen lock function in [Initial Settings] → [Unit Information] screen locks the screen with a login screen. Furthermore, when the screen lock function is enabled, the lock is automatically activated if no operation is performed for a set time (three minutes). * However, the screen lock is not activated automatically while an error is occurring.
8	Up to how many floors can be set?	A maximum of up to 10 floors can be set.
9	How many groups can be placed on one floor?	30 group can be placed on one area of a floor. A maximum of 180 groups can be placed on a floor with the floor layout split into six.
10	If a schedule setting day of week 1 to week 5 is duplicated, which schedule operates?	The schedule of week 1 has priority and is executed. The priority order for schedules is as follows (the priority order is from left to right). Today's schedule > Annual schedule > Week 1 > Week 2 > Week 3 > Week 4 > Week 5
11	Is group registration required for an ME remote controller?	Yes, group registration is required. (Group registration is required for an ME remote controller and a system remote controller. However, group registration is not required for an MA remote controller.)
12	Is it possible to select whether to show or hide the indoor (inlet) temperature.	You can select any of [Show], [Hide], and [Show during operation]. The indoor (inlet) temperature is displayed at the top right of the group icon always if [Show] is selected and only during operation if [Show during operation] is selected.
13	About how long is required to start up after the power of the AE-200/AE-50/EW-50 is turned on?	The time required differs depending on the system configuration, communication interruptions, and other conditions. As a guide, you can expect it to take approximately 5 minutes.
14	What is the initial license status of the AE-200/AE-50/EW-50?	All items of the licenses are in a disabled state at the time of shipment. Purchase the required licenses from the dealer and then perform license registration on the AE-200/AE-50/EW-50. (The schedule function does not require a license.)

No.	Question	Answer
15	Where can I find the serial number of the AE-200/AE-50/EW-50?	It is on a sticker affixed to the left side of the packaging box. Example: "Serial Number: 12664-067." Furthermore, you can also check the serial number on the login screen of the LCD screen of the AE-200/AE-50 unit or on the Web browser license registration screen. 
16	Is there a way to check whether the unit is powered on or the air conditioning unit status when the backlight of the AE-200/AE-50 is off?	Yes, there is. The POWER LED turns on when power is supplied to the AE-200/AE-50 and the ON/OFF LED turns on (when one or more air conditioning units are operating), blinks (when an error is occurring with one more air conditioning units), or turns off (when all air conditioning units are stopped) to indicate the air conditioning unit status.
17	Is there a way to erase all group registrations in one go?	No, there is not. (This function is not provided as we wish to prevent all registrations being erased by accident.)
18	Can a floor plan of the AE-200/ AE-50 be used as a floor plan of the TG-2000A?	No, it cannot be used. Prepare them separately because the floor plans of the AE-200/AE-50 and TG-2000A differ in size and format.
19	Is there anything I can do if I have forgotten the building manager login password?	Contact the dealer or distributor and inform them of the serial number of the AE-200/AE-50/EW-50. You will be given a password that allows you to log in. Log in and then change the password.
20	Is it possible to set the set temperature range limit on a Mr. Slim model from the AE-200/AE-50/EW-50 via an M-NET adapter?	The set temperature range limit cannot be set via an M-NET adapter. For the settings of an MA remote controller, set them on the actual MA remote controller. For the settings of a ME remote controller, there is no connection via an M-NET adapter.
21	Are the USB memory devices that can be used only those specified?	For AE-200/AE-50, select a USB memory device that meets the following conditions and verify operation several times before use. * Reading and writing with a memory device for which operation has not been verified may cause an unexpected operation. Therefore, verify operation of the memory device (during trial operation) before use. Do not use a USB memory device for which a data writing error has occurred. 1. USB standard: Must be USB 2.0 compliant 2. Format: Must be formatted in FAT32 or FAT (FAT16). 3. Must have no security function or be able to be used without the security function. (Depending on the security function, there may also be some USB devices for which use is possible.) In cases such as when data writing can still not be performed normally when a USB memory device has been replaced with another one after a data error occurs, restart the AE-200/AE-50 (turn the power off and then back on) and then perform the check again with a USB memory device other than the one with which the error first occurred.
22	Can the set temperature range limit be set on the system remote controller from the AE-200/AE-50/EW-50?	No, it cannot be set on the system remote controller. It can be set only on local remote controllers (ME and MA). (Depending on the model of ME remote controller, setting may not be possible.)
23	Is an apportioned electricity billing license required to output the billing parameters in CSV format?	Yes, it is required. Data output is not possible if the license is not registered. Output to each centralized controller from the AE-200.
24	Can a Mr. Slim air conditioner and LOSSNAY be interlock controlled with the settings of the AE-200/AE-50/ EW-50?	Yes, they can be interlock controlled. Furthermore, there is also the method of interlocking by directly connecting the Mr. Slim (an MA remote controller is required) to the LOSSNAY with a LOSSNAY interlock cable.

No.	Question	Answer
25	The error codes of Mr. Slim are two digits. How will they be displayed when the Mr. Slim is connected to the AE-200/ AE-50/EW-50?	The models (Mr. Slim and RAC/HAC) that can be connected to the AE-200/AE-50/EW-50 are those for which errors can be indicated by the error codes (four digits) of the AE-200/AE-50/EW-50.
26	Is there a way to hide the inlet temperature display of the AE-200/AE-50 when operation is stopped?	Set room temperature display to [Show during operation] in the [Unit Information] of [Initial Settings] on the AE-200/AE-50 unit. If [Show during operation] is selected, the indoor (inlet) temperature is not displayed when operation is stopped.
27	Can the power supply expansion unit (PAC-SF46EPA) also be used without the power supply unit (PAC-SC51KUA)?	Yes, it can.
28	If the AE-200/AE-50/EW-50 fails after setting the prohibit local remote controller operation setting from the AE-200/AE-50/EW-50, can the prohibit local remote controller operation setting be disabled?	When communication from the AE-200/AE-50/EW-50 stops, the prohibit setting is disabled after approximately 15 minutes.
29	If the power of the AE-200/AE-50/ EW-50 is shut off due to, for example, a power failure, do the air conditioning units also stop?	If there is a local remote controller, operation continues. If there is not, operation stops after a maximum of 13 minutes.
30	I have forgotten the IP address of the AE-200/AE-50/EW-50. How can I find out what it is?	AE-200/AE-50 It can be checked in [Initial Settings] - [Network] screen on the LCD screen. EW-50 (Expansion controller) It can be checked by specifying the equipment to display in [Initial Settings] - [Network] screen on the LCD screen. (Standalone) There is no way to check. It can be set again by using the rotary switch (SW1) of the unit. For the setting procedure, refer to “7-2. Quick IP address (LAN1) setting” in the EW-50 Installation and Instructions Manual.
31	I have forgotten the login name or password for AE-200/AE-50/EW-50. How can I find out what it is?	There is no way to find out. Contact your dealer.
32	Is there a good way to arrange air conditioning units linearly in the floor layout?	They can be easily arranged by displaying grids and changing travel widths on the floor layout screen.

[4] About energy-saving/peak cut control

No.	Question	Answer
1	What is the concept of energy-saving/ peak cut control?	The concept of energy-saving/peak cut control is to control the operation of the air conditioning units to save energy by switching to each group in the operation block in order. (Some air conditioning units may not have functions to support this control.) • Change the set temperature • Switch to fan operation (or forced Thermo-OFF operation) • Stop • Outdoor unit capacity save Energy-saving control always performs control regardless of the electric energy consumption. On the other hand, peak cut control always monitors electric energy consumption and performs control when the predicted value of average electric energy within the demand time limit (30-minute period) has exceeded the preset level. In addition, the energy-saving (peak cut) control license corresponds to both energy-saving control and peak cut control.
2	Does control always begin from the same group in the rotation of energy-saving/ peak cut control?	Both energy-saving control and peak cut control are implemented in intervals of 0 to 29 minutes and 30 to 59 minutes, so control does not always begin from the same indoor unit group and the same outdoor unit (from the lowest address). However, when reduction of electricity consumption is requested by the power company, demand signals are issued in intervals of 30 minutes and 60 minutes. Therefore, control always begins from the same indoor unit group and the same outdoor unit (from the lowest address).
3	Is energy saving also possible for another company's air conditioning units, lighting, and other equipment?	No. Mitsubishi Electric's air conditioning units (products incorporating M-NET) are the only equipment for which the AE-200/AE-50/EW-50 system can perform energy-saving control.
4	Is energy-saving/peak cut control possible for low-temperature equipment?	Energy-saving control is not possible, but peak cut control is.
5	Is energy-saving/peak cut control possible for a DIDO controller?	A DIDO controller does not support energy-saving/peak cut control.
6	What is the control unit for energy-saving/ peak cut control?	The control of indoor units is performed for the unit of a group in the operation block. The control of outdoor units is performed for the unit of an outdoor unit.
7	If both the outdoor unit capacity save settings and the advanced power save settings of energy-saving/peak cut control are configured, what will the capacity save amount be?	The settings with larger save amount will be implemented.
8	If the capacity save amount of an outdoor unit is set to 80%, will electric energy consumption be reduced to 80%?	The 80% figure for saving is with respect to the maximum frequency of the compressor. Therefore, the electric energy amount will not be reduced to 80%.
9	If the outdoor unit capacity save settings are set to 90% or the advanced power save settings are set to "low" for energy-saving/peak cut control, which settings will have larger capacity save amount?	These cannot be compared since the methods of capacity save are different from each other. However, the advanced power save settings have greater energy-saving effects because capacity save is always performed in these settings.
10	Is capacity save of outdoor units supported for all room air conditioners, A control Mr. Slim, and City Multi?	It is not supported for room air conditioners. Support is possible for the inverter outdoor unit of City Multi (with connection to the outdoor unit only). As for the inverter outdoor unit of Mr. Slim, support for capacity save of outdoor unit is provided in energy-saving/peak cut control, but the advanced power save is not supported. It is not supported for City Multi S. Do not set this on thermal energy storage models.
11	Is it possible to implement only energy-saving control even when E-Energy or PI controller is not connected?	It is possible if an energy-saving license is registered. Use level 0 for the settings.
12	Is it possible to connect an electricity meter to the PI controller and then perform control according to the demand level within the range of multiple AE-200/ AE-50/EW-50 units?	Yes, it is. Demand control using a PI controller can perform control within the range of up to four AE-200/AE-50/EW-50 units.

No.	Question	Answer
13	Can the set temperature be changed using the ME remote controller or MA remote controller while controlling set temperature ±2°C (±4°F) with demand control?	Yes, the set temperature can be changed. However, if the set temperature is changed during peak cut control, ±2°C (±4°F) control will be performed again for the new temperature. Also, the set temperature will be the new set temperature after peak cut ends. Example: 1) Peak cut control (+2°C (+4°F)) starts with cooling at 26°C (79°F). → Set temperature is 28°C (82°F). 2) Changed to 24°C (75°F) with the remote controller. → Set temperature is 26°C (79°F). 3) Peak cut ends. → Set temperature is 24°C (75°F).
14	Why is capacity save using energy-saving/peak cut control not possible for thermal energy storage models and City Multi S?	The thermal energy storage models prohibit capacity save to ensure the creation of ice or hot water. As for City Multi S, this is because even though it is an inverter model, the unit does not support the capacity save settings.
15	Is it possible to connect a demand controller to an external input of AE-200 and then perform peak cut control for an AE-50 system?	Yes, it is. Set the settings as described in the following procedure. 1) Select [Other AE] in [System Settings] of [Function1] - [Peak Cut Settings] on the AE-50 Web Browser for Initial Settings. 2) The IP address input field appears. Enter the IP address of AE-200 that has been connected to the external input. Note: A delay of up to one minute in starting peak cut control occurs with AE-200/AE-50 that has selected [Other AE].
16	How many days of peak cut control history data are retained?	With versions 7.30 or later, data for 400 days are retained. With versions 7.24 or earlier, data for three days are retained.

[5] About the apportioned electricity billing function

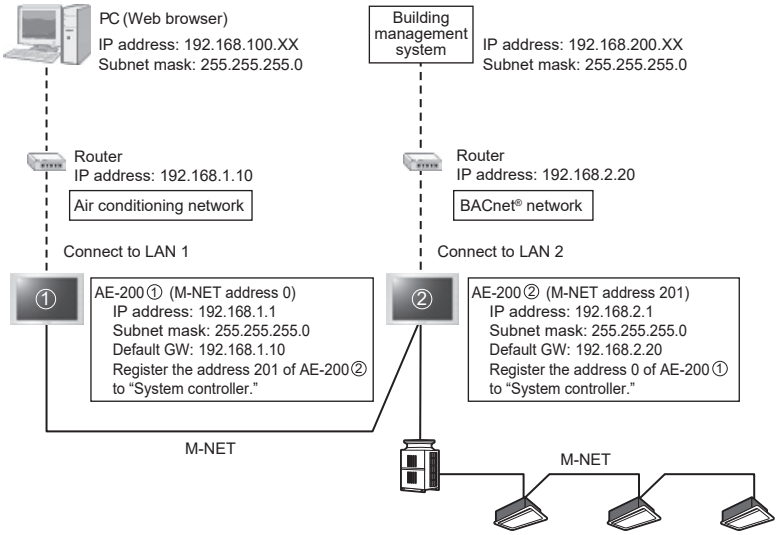
No.	Question	Answer
1	Can the apportioned electricity billing function for TG-2000 and AE-200 be used together?	No. Use the apportioned electricity billing function for either one of the models.
2	Can the apportioned electricity billing function be used by a single EW-50?	No. Prepare at least one unit each of AE-200 and expansion controller.
3	Is the license for the apportioned electricity billing function required for an expansion controller that does not support apportionment?	Yes, it is required. Register the license to all AE-200 and expansion controllers.

[6] About interlock control

No.	Question	Answer
1	Interlock control could not be initialized after performing an update. Where can I do the initial settings?	The procedure for initial settings varies between versions. • Ver. 7.1 to Ver. 7.4 : Perform the initial settings from the Initial Settings Browser or Interlock Settings Tool. • Ver. 7.5 or later : Perform the initial settings from the Initial Settings Tool.
2	Is interlock control over multiple expansion controllers possible?	It is possible if the versions are 7.5 or later. If the AE-200 or expansion controllers that you use are earlier than Ver. 7.5, update them to Ver. 7.5 or later, and then set the interlock control on AE-200.
3	Is interlock control over multiple AE-200 possible?	No.
4	If a communication error occurs between AE-200 and expansion controller, will the interlock control operate over multiple AE-200?	It will not operate if there is a communication error. Interlock control will be executed only when communication between AE-200 and expansion controller is available and the interlock conditions are met.

[7] About BACnet® connection

<table>
<tr><th>No.</th><th>Question</th><th>Answer</th></tr>
<tr><td>1</td><td>Can I connect LAN 2 (BACnet®) to an existing LAN that uses protocols other than BACnet®?</td><td>Do not connect it because communication protocols other than BACnet® affect the performance of BACnet®.</td></tr>
<tr><td>2</td><td>What values should be used for the IP addresses and device instance number (device No.) for LAN 2 (BACnet®)?</td><td>Check with the system integrator or network administrator.</td></tr>
<tr><td>3</td><td>Can integration data of electric energy be monitored from BACnet®?</td><td>Yes.
The integration data of electric energy is available with the apportioned electricity billing function (apportioned electricity billing function license and initial settings for apportioned electricity billing function are required).
This cannot be used together with the apportioned electricity billing function for TG-2000.</td></tr>
<tr><td>4</td><td>Can the current electric energy be monitored from BACnet®?</td><td>No.
The electric energy that can be monitored from BACnet® with the apportioned electricity billing function (apportioned electricity billing function license and initial settings for apportioned electricity billing function are required) is data from 15 to 45 minutes prior to the current time because of the update timing.</td></tr>
<tr><td>5</td><td>Is there a function that can set schedules from BACnet®?</td><td>Yes, there is.
The schedule control for ON/OFF operation of air conditioning units and LOSSNAY units managed by AE-200/AE-50/EW-50 can be used from the building management system using BACnet®.
(This is an independent function different from the schedule function that can monitor/operate from the LCD of AE-200/AE-50/EW-50 or Integrated Centralized Control Web browser.)</td></tr>
<tr><td>6</td><td>Are the initial settings for BACnet® required?</td><td>Yes, it is required.
Perform the initial settings for BACnet® using BACnet® Setting Tool after performing initial settings for other than BACnet® on the unit LCD of AE-200/AE-50, Web Browser for Initial Settings, and the Initial Setting Tool. For details, refer to “7. Checking installation operations and performing trial run” in the AE-200/AE-50/EW-50 Instruction Book (BACnet® function).</td></tr>
<tr><td>7</td><td>Is a license required for BACnet® connection?</td><td>A BACnet® connection license is required for BACnet® connection for all AE-200/AE-50/EW-50.</td></tr>
<tr><td>8</td><td>Which devices can be operated or monitored from BACnet®?</td><td>Refer to "III [1] System configuration restrictions."</td></tr>
<tr><td>9</td><td>Can the prohibit local remote controller operation be set from both building management system (BACnet®) and AE-200/AE-50/EW-50?</td><td>Yes, it can.
It can be set from both, but check with the administrator to make sure that it does not cause any problem with the operation of the building management system before performing the setting.</td></tr>
<tr><td>10</td><td>Can the prohibit local remote controller operation be set from both building management system (BACnet®) and a system controller other than AE-200/AE-50/EW-50 such as a system remote controller?</td><td>Set the prohibit local remote controller operation from either of these two.
When setting the prohibit local remote controller operation from a system controller other than AE-200/AE-50/EW-50, set the operation prohibition range to "RC only" from the LCD of AE-200/AE-50, Web Browser for Initial Settings, and Initial Setting Tool.</td></tr>
<tr><td>11</td><td>Can notification of errors occurred with all M-NET devices be sent via BACnet®?</td><td>Notification of communication errors between AE-200/AE-50/EW-50 and ME remote controller/system controller will not be sent.
Notification of errors and communication errors of outdoor units and BC controller will be sent when all groups of the indoor units connected with refrigerant piping are in error or communication error. (Notification of errors will not be sent by unit.)
Notification of device errors in ME remote controller and system controller will not be sent.</td></tr>
<tr><td>12</td><td>What is the correspondence between the error codes displayed in the building management system and the error codes of M-NET?</td><td>The correspondence is as follows:
<table>
<tr><th>Error code value (Building management system)</th><th>M-NET error code range</th></tr>
<tr><td>1</td><td>Normal</td></tr>
<tr><td>2</td><td>0000–0999, 6000–6499, 6750–6779</td></tr>
<tr><td>3</td><td>1000 - 1999</td></tr>
<tr><td>4</td><td>2000 - 2999</td></tr>
<tr><td>5</td><td>3000 - 3999</td></tr>
<tr><td>6</td><td>4000 - 4999</td></tr>
<tr><td>7</td><td>5000 - 5999</td></tr>
<tr><td>8</td><td>6500–6749, 6780–6999</td></tr>
<tr><td>9</td><td>7000 - 7999</td></tr>
</table></td></tr>
</table>

No.	Question	Answer
13	Is it possible to identify the address of the occurrence source of the error from BACnet®?	A group can be identified from BACnet®, but an address cannot be identified. Identify the address of the occurrence source of the error from the LCD of AE-200/AE-50 or Integrated Centralized Control Web browser.
14	Which data related to BACnet® are stored in non-volatile memory (retained also after power-off)?	Refer to “5-8. BACnet® information and storage timing/cycle in nonvolatile memory within the AE-200/AE-50/EW-50” in the AE-200/AE-50/EW-50 Instruction Book (BACnet® function).
15	Can the network addresses of LAN 1 and LAN 2 (BACnet®) be the same?	Use different values for the network addresses. For example, if the subnet mask is 255.255.255.0 and LAN 1 needs to be set to 192.168.200.***, change the 1st to 3rd octet of LAN 2 (BACnet®) to value other than 192.168.200 so that the network address of LAN 1 is not duplicated with LAN 2 (BACnet®).
16	Can different default gateways be set on LAN 1 and LAN 2 (BACnet®)?	No. The same settings of default gateway apply to both LAN 1 and LAN 2 (BACnet®). If it is necessary for LAN 1 and LAN 2 (BACnet®) to be connected to different gateways, follow the procedure below. Connect two units of AE-200 (or EW-50) for LAN 1 and LAN 2, and register the network settings including the gateway address to each AE-200 (or EW-50) as shown below. However, there are restrictions.  <Restrictions> • Low-temperature equipment cannot be connected in this configuration. • Apportioned electricity billing function cannot be used in this configuration. • Register two units of AE-200 (or EW-50) as a sub system controller for each other. • Configure the same group settings on two units of AE-200 (or EW-50). • Use only one of ① or ② for schedule control function and interlock control function on AE-200. • Use only one of ① or ② for the external input on AE-200 (or EW-50). • When performing time synchronization from the building management system (time server on BACnet® device), set the time master/sub settings for AE-200 (or EW-50) to [Master] and [Sub] for ② (BACnet® side) and ① (Web browser side), respectively. If time synchronization is not performed from the building management system, set ① (Web browser side) to [Master]. • Register BACnet® license for AE-200 (or EW-50) on ② (BACnet® side) only. Perform BACnet® function settings on ② (BACnet® side) only.

[8] About chiller unit connection

No	Question	Answer
1	Can a chiller unit be connected to AE-50 or EW-50?	It can be connected to AE-50 or EW-50 used as an expansion controller. (Upper level AE-200 is required.)
2	Can the fan mode be operated during operation?	No. It can only be operated when the unit is stopped.
3	Can simultaneously operated groups be operated?	No. Operation is performed by system representative groups. (For cooling/heating mixed operation, refer to the technical manual for the unit.)
4	Does the icon for a simultaneously operated group change when the system representative group is operating and the operation of simultaneously operated group is stopped?	Yes. The operation status of simultaneously operated group is determined by observing the operation status of its representative unit. Therefore, it changes according to the status.
5	Is power save schedule function on the remote controller (PAR-W31MAA) supported?	Power save schedule function is not supported by AE-200/AE-50/EW-50.

[9] About HWHP

No	Question	Answer
1	Can a HWHP be connected to AE-50 or EW-50?	No.
2	Can multiple units be operated?	No. HWHP can only be operated by system by system.
3	Is learning level included in the yearly schedule setting?	No, it is not. Learning level is included only in the weekly schedule setting.
4	Can heat retention temperature be set on the schedule settings screen?	The heat retention function is not supported.
5	Is HWHP data or HWHP trend data supported?	These data are not supported.
6	Is power save schedule function on the remote controller (PAR-W32MA) supported?	Power save schedule function is not supported by AE-200.

VII. Test run check lists for initial work and expansion work

VII. Test run check lists for initial work and expansion work

[1] Setting check list

Configure the settings for the functions you wish to operate and then perform the following checks.
For the setting procedures, refer to “Instruction Book” for the unit or “Instruction Book (Web Browser for Initial Settings).”

○: Settable

Setting items			Unit	Integrated Centralized Control web	Initial Setting Tool	Charge Calculation Tool	Check
User settings			○	○			
Initial settings	Date and time settings		○	○			
	Network settings		○	○			
	Group settings		○	○	○		
	Interlock LOSSNAY settings		○	○	○		
	Block settings		○	○	○		
	Advanced settings		○	○	○		
Monitor display settings	Floor plan creation						
	Floor layout settings		○				
Schedule settings (yearly/weekly/today)			○	○			
Function settings	External temperature interlock control settings		○	○			
	Night setback function settings screen		○	○			
	System changeover settings			○			
	PI controller and AI controller settings		○	○	○		
	Measurement settings		○	○	○		
	Mail settings			○			
	Energy management settings			○			
	Set temperature range limit			○			
	Night mode schedule settings			○			
Options *1	General control PLC settings		○	○			
	Peak cut settings			○			
	Interlock control settings			○			
	Billing settings	Refrigerant system settings			○		
		Energy management block settings			○		
		Indoor unit settings			○		
		Outdoor unit settings			○		
		Measurement settings			○		
		Charge settings			○		
		Metering device connected/not connected				○	
		Calculation of standby electric energy charge				○	
		Currency unit				○	
		Display order of charge calculation result				○	
		Merger of energy management blocks with same name				○	
		Decimal point character and separator character settings for CSV file				○	
		Unit price settings				○	
		Print settings				○	
		CSV output settings				○	
		Closing data calculation				○	
		Charge calculation IP address setting				○	

*1 Registration of the license is required for each AE-200/AE-50/EW-50.
For the required licenses, refer to “IV [4] 1. Functions and licenses.”

[2] Test run check list

Before performing a test run

Be sure to complete the test run on the air conditioning units before performing the test run check of the AE-200/AE-50/EW-50.

1. Test run check sheet

About the test run check sheet

After configuring the settings in “Setting check list” on the previous page, check the items in (1) to (3) below in accordance with the test procedure of the test run check list on the next page.

(1) Startup check

- After the settings of the initial screen are finished, switch to the management screen.
- Check that the screen displayed during startup is displayed.
- The startup time differs depending on the number of air conditioning units connected but the startup should complete after about 5 minutes.
- Check the display of each floor and confirm that an error is not occurring.
- If an error has occurred, check the error history in the history screen and remove the cause of the error.

(2) ON/OFF operation from the AE-200/AE-50/EW-50

- Operate the air conditioning units from the AE-200/AE-50/EW-50.
- Confirm that the air conditioning units are operating by checking the display on the local remote controllers.
- Perform operation of the air conditioning units in the order of group, block, floor, and entire building.
- If different air conditioning units and general equipment were operated by performing operation from the AE-200/AE-50/EW-50, check the following settings.
  → Group settings (Refer to “5-1-6. Groups” in AE-200/AE-50 Instruction Book or AE-200/AE-50/EW-50 Instruction Book (Initial Settings).)
  → Block settings (Refer to “5-1-9. Blocks” in AE-200/AE-50 Instruction Book or AE-200/AE-50/EW-50 Instruction Book (Initial Settings).)
  → Floor layout settings (Refer to “5-1-11. Floor layout” in AE-200/AE-50 Instruction Book.)

(3) Local remote controller ON/OFF

* Do not perform this check when there are no local remote controllers connected.

- Operate the air conditioning units from the local remote controllers.
- Check that the air conditioning units operate on the AE-200/AE-50 unit. Perform the check with the Web browser in the case of the EW-50.
- Check with the display of the AE-200/AE-50 set to the floor screen, block screen, and entire building screen. Perform the check with the Web browser in the case of the EW-50.

To make the check sheets easy to read, fill in the information for just one installation floor or one AE-200/AE-50/EW-50 unit on each check sheet.

NOTE:
- Save a backup of the setting data of the AE-200/AE-50 after the test run.
  For the backup procedure, refer to “6-1. Backing up settings data” in “AE-200/AE-50 Instruction Book.”
  For the backup procedure for the EW-50, refer to “Instruction Book (Initial Settings).”

Test run check sheet No. [ ]
AE-200/AE-50/EW-50 IP address of No. [ ] [ ]

Date		Check	

Name of managed equipment								Test run procedure and check results		
Floor	Unit address	Unit model	Group address	Group name	Remote controller address	Block No.	Block name	Startup check error display	Group unit of ON/OFF operation performed by AE-200/AE-50/EW-50	
									Local remote controller display	Air conditioning unit status

* In the case of general equipment, read general equipment instead of air conditioning units and check the necessary functions.

[3] Peak cut settings check list

1. About the peak cut settings check list

Perform the check using the following settings check list when setting peak cut (each level).

Block No.	Block Name	Group No.	Indoor unit control details
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
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30			
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50			

Temperature difference disables level 0 *2: Whether or not performed [ ] [ ] °C ([ ] [ ] °F)

*1 Do not set this on PUMY.

*2 If the temperature difference between the inlet temperature and set temperature is greater than the set value, peak cut control (level 0) is not performed.

Date		Check	

Building name: [ ]

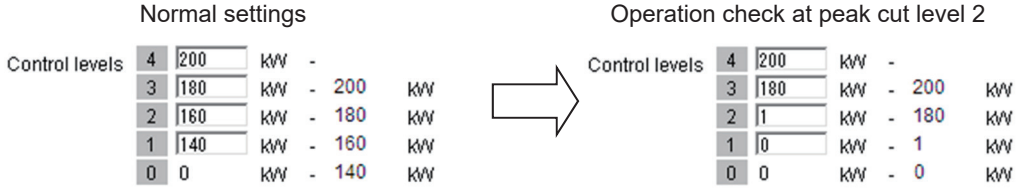
Setting level: [ ] AE-200/AE-50/EW-50 IP address [ ]

Indoor unit control time	Outdoor unit address	Name	Outdoor unit control details *1	Outdoor unit control time

2. About the peak cut operation check

Perform peak cut control and check whether or not the air conditioning units are operating or set as specified below for each control level.
Change the target electricity values in [Function1] - [Peak cut control] in Administrator Web and then perform control at each peak cut level.

[Example] When checking the operation at peak cut level 2



To check the capacity save amount of outdoor units, use Maintenance Tool.
Note: After performing the operation check, return the settings to the original settings.

[4] Apportioned electricity billing test run check list

When using the apportioned electricity billing function, be sure to perform the billing test run.
To perform the billing test run using the AE-200, output the test run check sheet with Initial Setting Tool and then perform the check.
For details, refer to “7. Billing function trial run” in AE-200/AE-50/EW-50 Instruction Book (Apportioned Electricity Billing Function).
When using the apportioned electricity billing function with the TG-2000A, refer to Operation Manual (Site adjustment).

[5] Work procedure and check for system expansion work

This section describes the work procedure for adding air conditioning units, general equipment, etc.

1. Preparation

(1) When air conditioning units are added, the power needs to be shut off, so peak cut control will not be performed during that time.
Furthermore, billing using the AE-200 and TG-2000A is also not possible.
Make sure that the owner understands the above.

(2) When adding equipment with the equivalent power consumption such as an indoor unit, PI controller, or ME remote controller, check that the equivalent power supply is sufficient.

2. Notes about expansion

When expanding the air conditioning system, please observe the following.

(1) Make sure that the owner understands that peak cut control will not be performed while the power of the PI controller, PLC, and E-Energy is shut off.

(2) Before performing the expansion work and after performing the expansion work, save a backup of the data of the AE-200/AE-50/EW-50.

3. Work procedure

When expanding the air conditioning system, carry out the work as described in the following procedure.
The steps distinguish between the “monitor/operation” and “general equipment monitor/operation” functions. Carry out all steps corresponding to the functions being used. Some steps include adding a PLC. Carry out these steps according to the actual expansion requirements at the site.

[Legend] ○: Applicable, –: Not applicable

Step	Description	Check
1	Stop all air conditioning units (and general equipment). Note: Check "Preparation" on the previous page beforehand.	
2	Back up the data of the AE-200/AE-50/EW-50.	
3	When adding a PLC, carry out the setup work, wiring connection work, and other work.	
	When adding a DIDO controller, PI controller, or AI controller, carry out the setup work, wiring connection work, and other work.	
4	Start up the PLC by turning on the power.	
	Start up the PI controller or DIDO controller by turning on the power.	
5	Start up the AE-200/AE-50/EW-50 and then configure the settings as necessary for the added air conditioning units using “VII [1] Setting check list.” Note: The time setting needs to be set for AE-200/AE-50/EW-50. Note: When adding AE-50/EW-50/EW-50 and using optional functions, register the licenses. For the required licenses, refer to “IV [4] 1. Functions and licenses.”	
6	Be sure to set the time in [Time setting].	
7	Switch to the Monitor /Operation screen from the Initial Settings screen with the button at the top right of the screen.	
8	Turn on the power of the air conditioning units.	
9	After startup of the air conditioning units finishes, restart the AE-200/AE-50/EW-50.	
10	Operate all air conditioners and check that the operation can be monitored. When using general equipment, check that the equipment can be correctly monitored and operated.	
11	When a PI controller and AI controller have been added, check that the values of the thermometer, hygrometer, and electricity meter match the values in [Monitor/Operation] - [Measurement]. Note: The electricity meter value on the Measurement screen is the integrated value. Check whether the values match for each additional equipment for a set time in accordance with the following table.	
12	When performing peak cut control, check whether control is performed for each peak cut level. Refer to “VII [3] 2. About the peak cut operation check.”	

NOTE: • We recommend also checking the settings other than those added or changed.

Form for recording meter values

Meter	PI controller No.	Name	Installation location	Pre-operation value	Post-operation value	Difference	Judgment
Meter 1 (Reading)							
(Monitor value)							
Meter 2 (Reading)							
(Monitor value)							
Meter 3 (Reading)							
(Monitor value)							
Meter 4 (Reading)							
(Monitor value)							
Meter 5 (Reading)							
(Monitor value)							
Meter 6 (Reading)							
(Monitor value)							

VIII. Appendix

VIII. Appendix

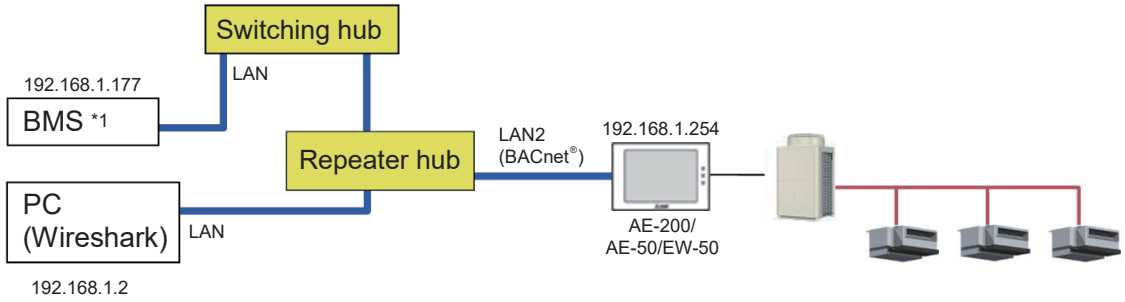
[1] How to Use Wireshark for AE-200 BACnet®

Wireshark can capture BACnet® communication between the building management system and AE-200/AE-50/EW-50.
Download Wireshark: http://www.wireshark.org/download.html

1. Repeater hub

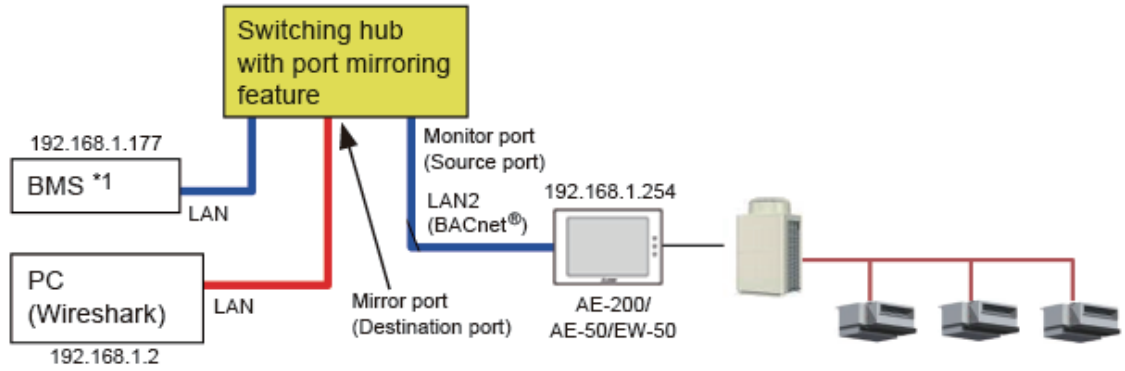
- It is required to use a repeater hub, or switching hub that features port mirroring ("Port Mirroring" setting is required to duplicate the communication data to other port) to intercept the communication between AE-200/AE-50/EW-50 and the building management system.
  Normal commercially available hubs are all switching hubs, but capturing the required packets is not possible because the packets sent to the AE-200/AE-50/EW-50 address or building management system address do not arrive at the PC for packet capture.
- Do not install Wireshark on the same PC as the building management system.

Connection example for repeater hub



*1 BMS: Building Management System

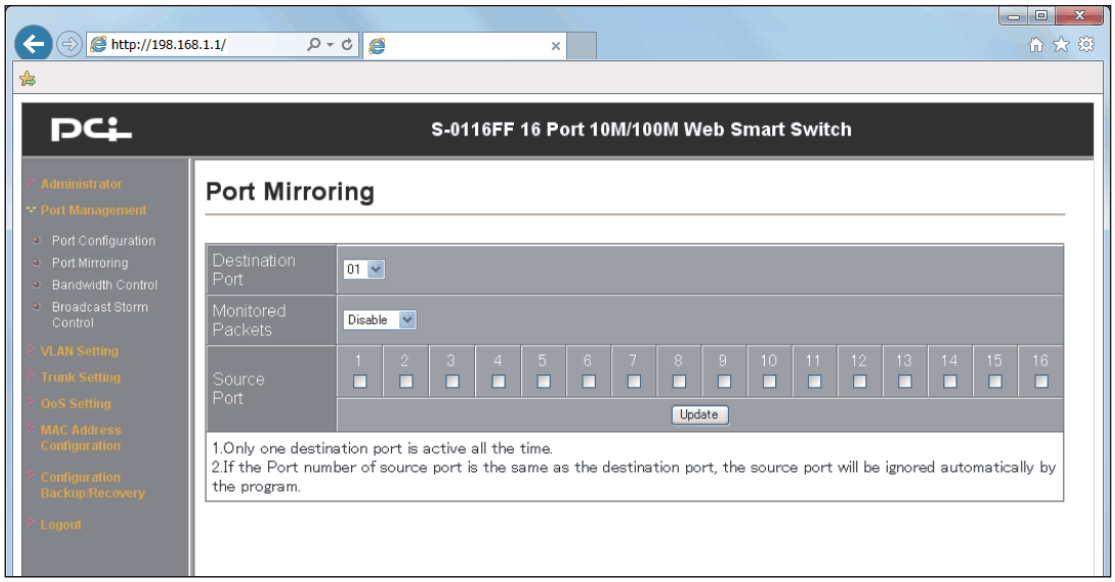
Connection example for switching hub with port mirroring feature



*1 BMS: Building Management System

2. Port Mirroring

When using a switching hub that features port mirroring, configure the “Port Mirroring” setting. The setting example for Planex communication’s switching hub is shown below.

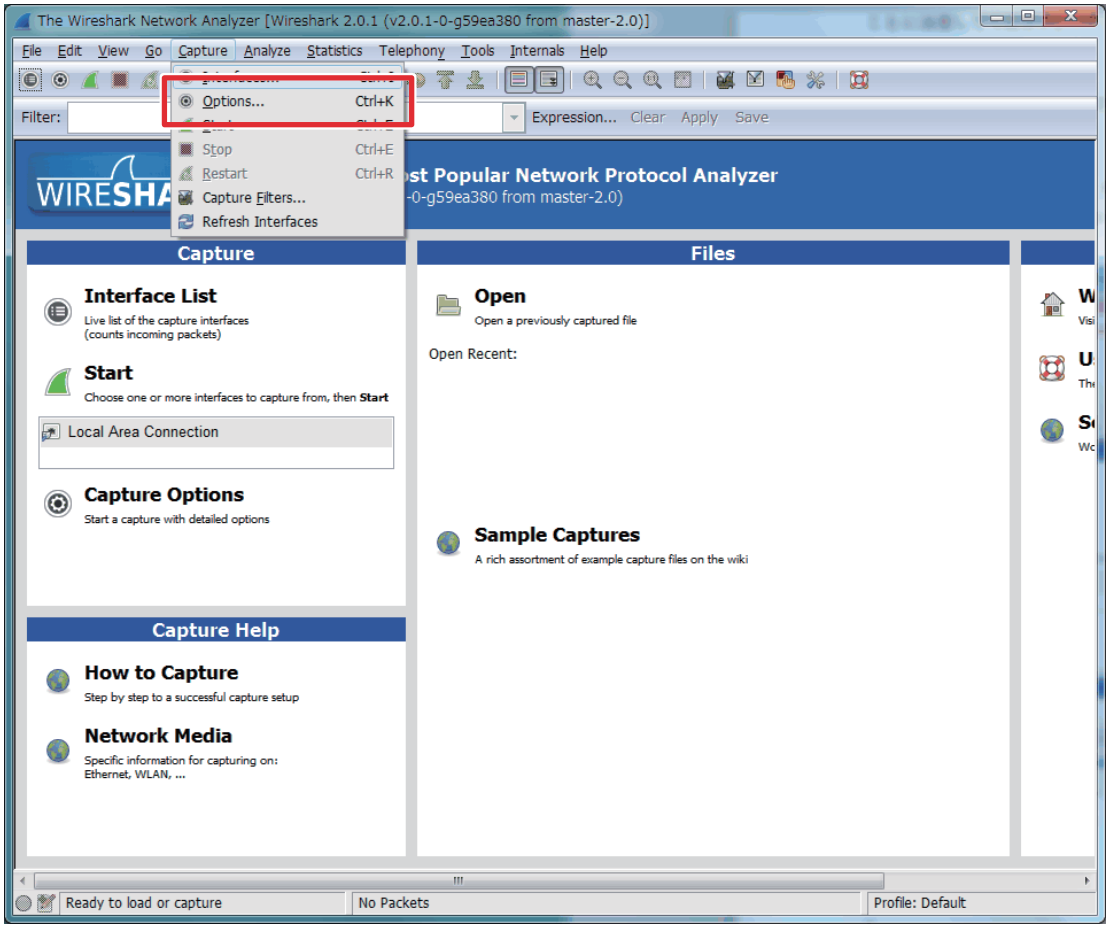


Configure the “Destination Port” setting for connecting the PC (Wireshark), and the “Source Port” setting for the monitoring target port. Multiple source ports can be selected.
If “Tx & Rx” is selected for “Monitored Packets”, both sending and receiving packets can be captured.

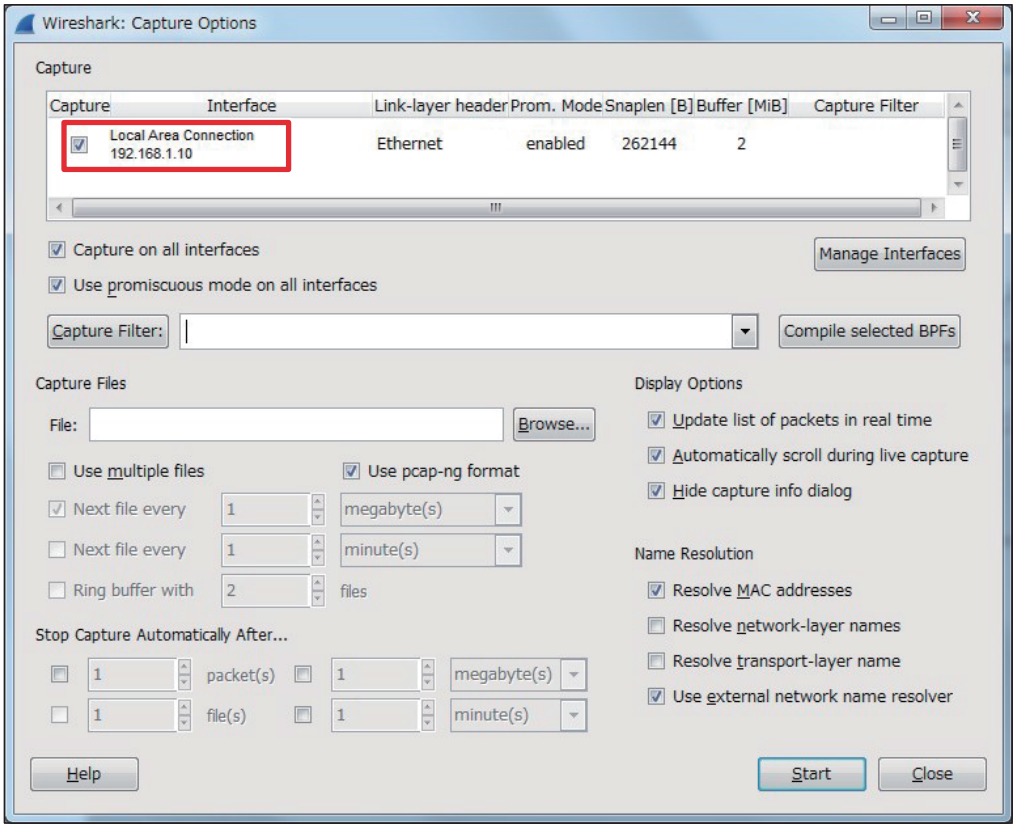
3. Wireshark Start

The images in this document may differ from the actual screens depending on the version of Wireshark used.

(1) Menu: Capture -> Options

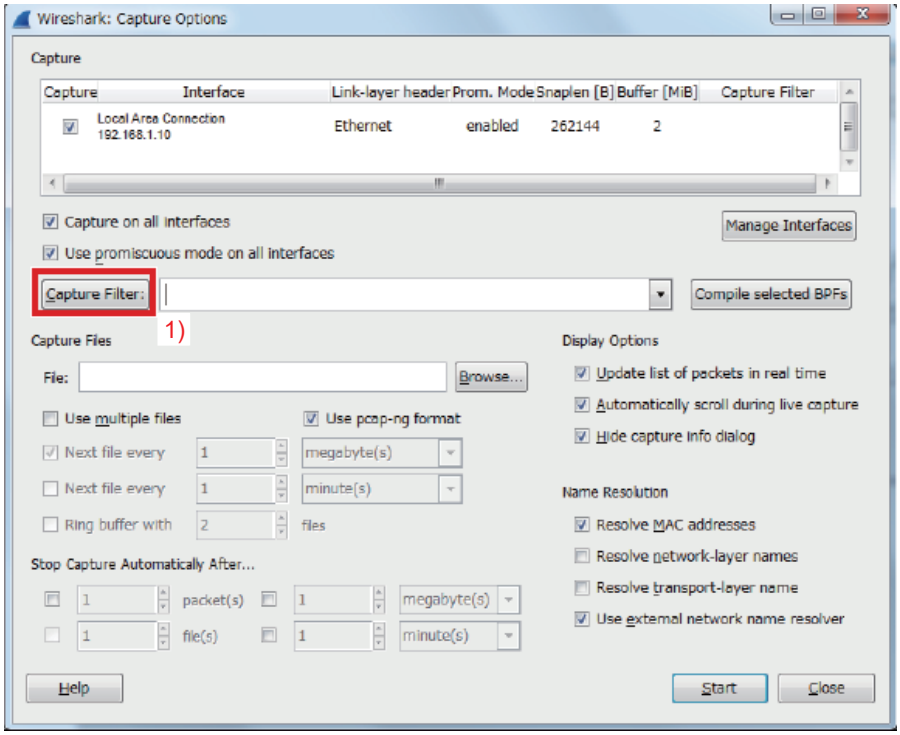


(2) Select the network interface and confirm the IP address.

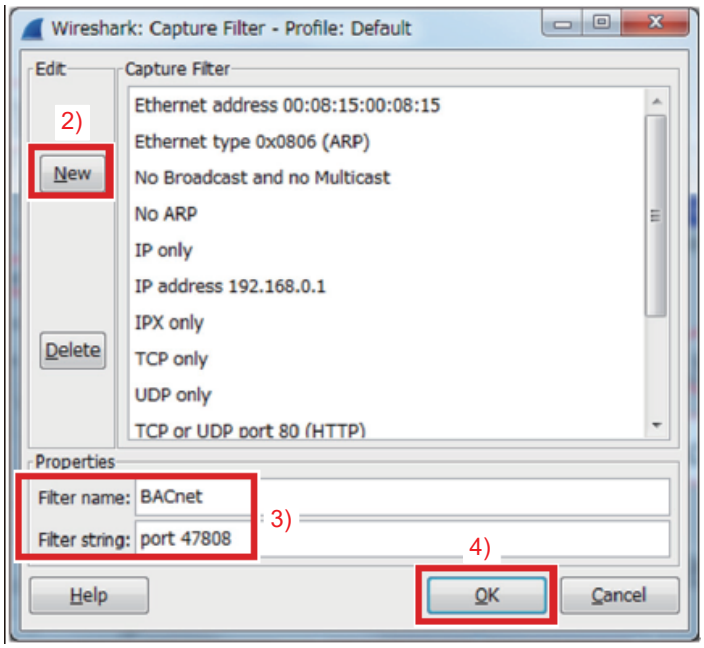


(3) “Capture Filter” setting (for limiting the recording data size)

1) Click “Capture Filter”.

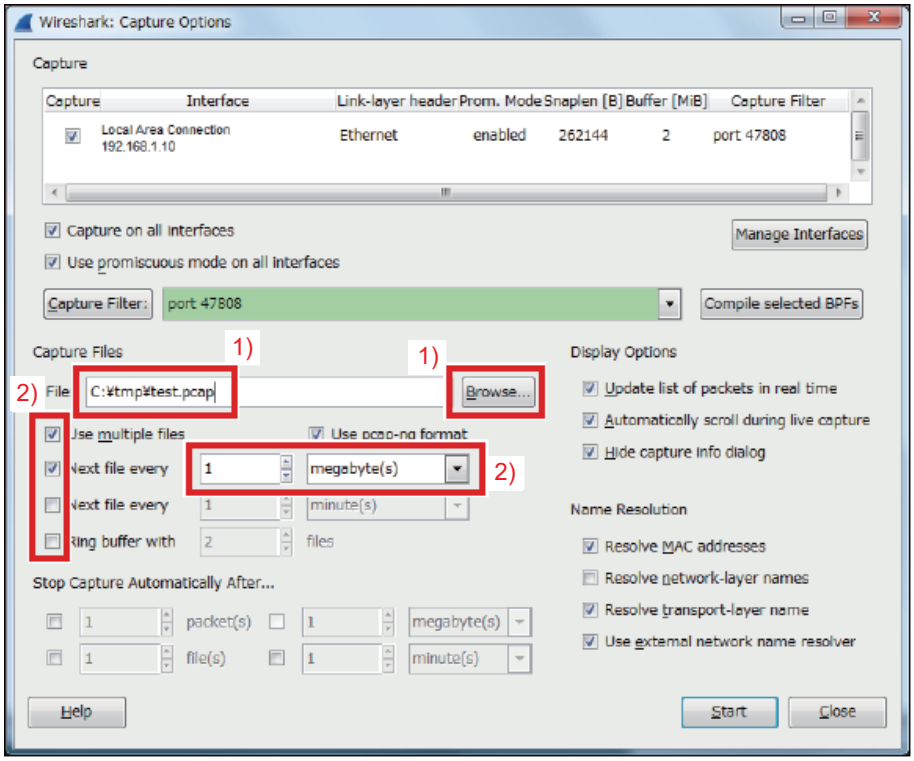


2) Click “New”.
3) Input: “BACnet”
“port 47808”
* “p” is lowercase.
4) Click “OK”.

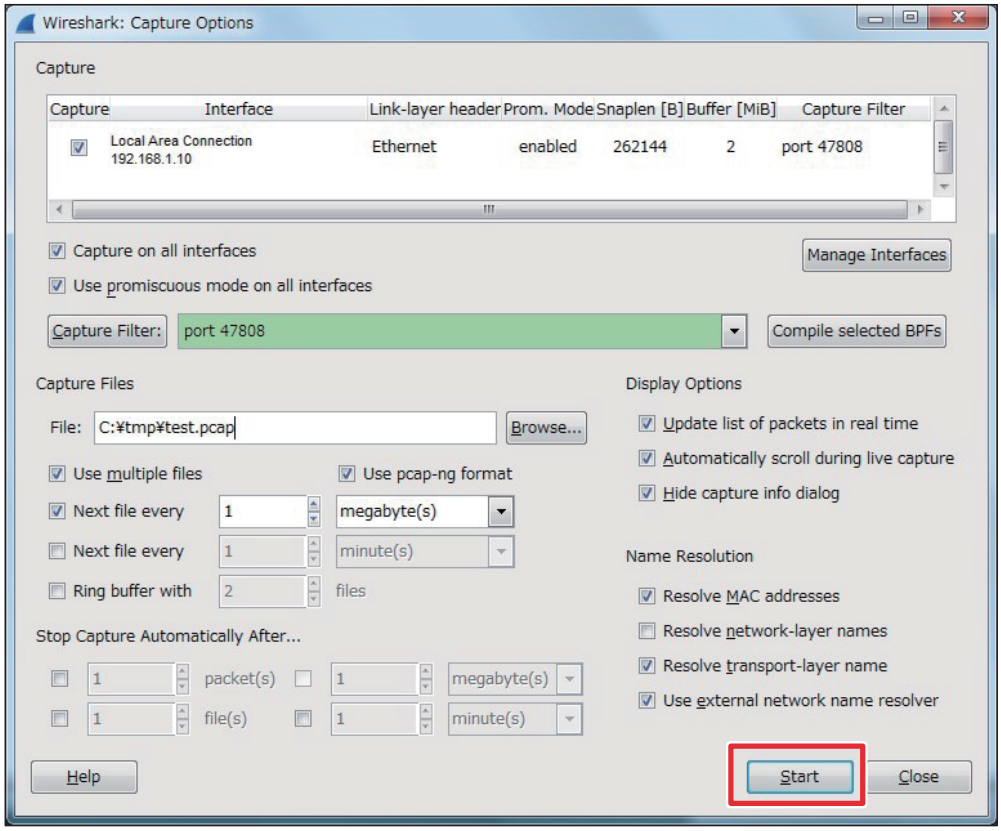


(4) “Capture Files” setting

1) Click “Browse...”.
Select the folder and input the file name. Adding “.pcap” is recommended. Example)
C:¥tmp¥test.pcap
2) Selecting “1 megabyte” is recommended.

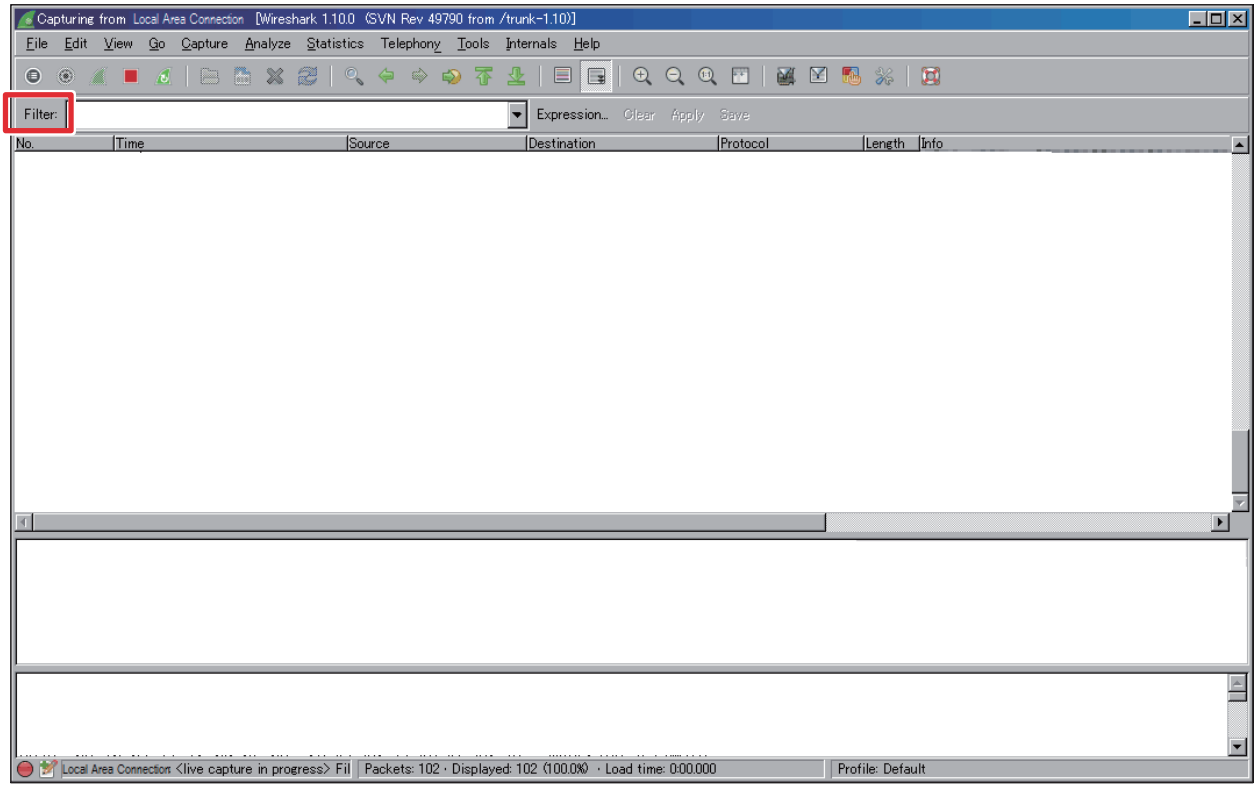


(5) Click “Start”.



4. “Filter” on monitoring screen

“Filter” on monitoring screen is for just limiting the display. (It does not affect to the recording data.)

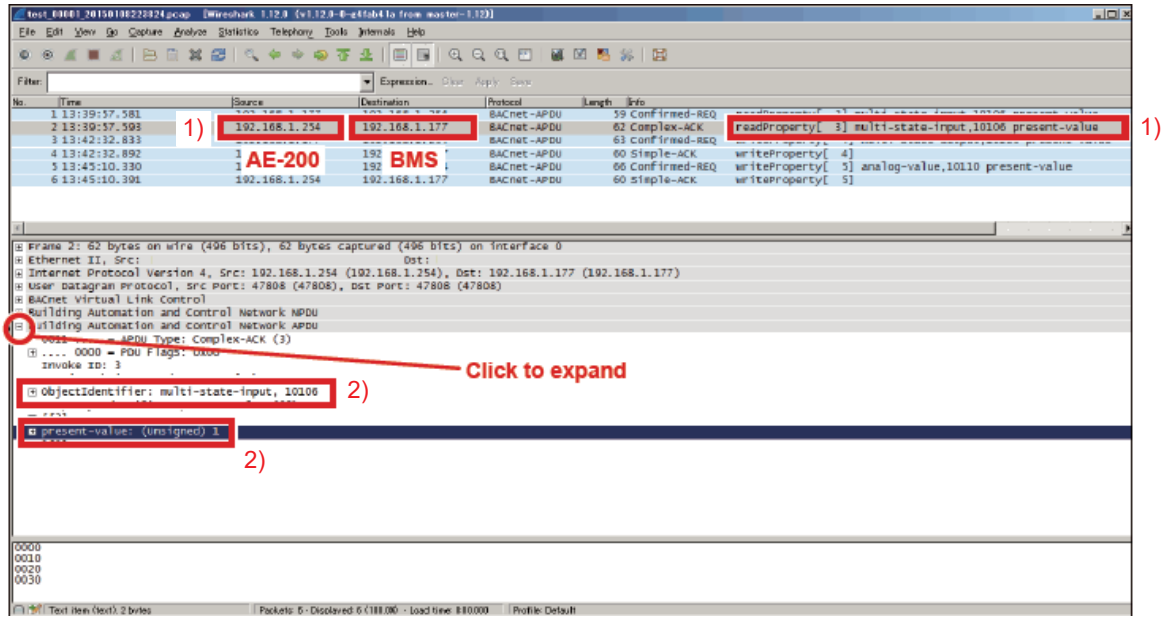


Filter examples

- Show only fixed device
  ip.addr == 192.168.1.1
- Show only fixed direction of communication
  ip.src == 192.168.1.1 and ip.dst == 192.168.1.2
- Show both direction of communication
  ip.src == 192.168.1.1 or ip.dst == 192.168.1.1
- Show only BACnet packet
  bvlc
- Show only the packet for a specific BACnet® instance number
  bacapp.instance_number == 010106
- Show only the packet for a specific BACnet® object type
  bacapp.objectType == 0
  (For object type values, refer to section “Objects” in the AE-200/AE-50/EW-50 Instruction Book (BACnet® function).)

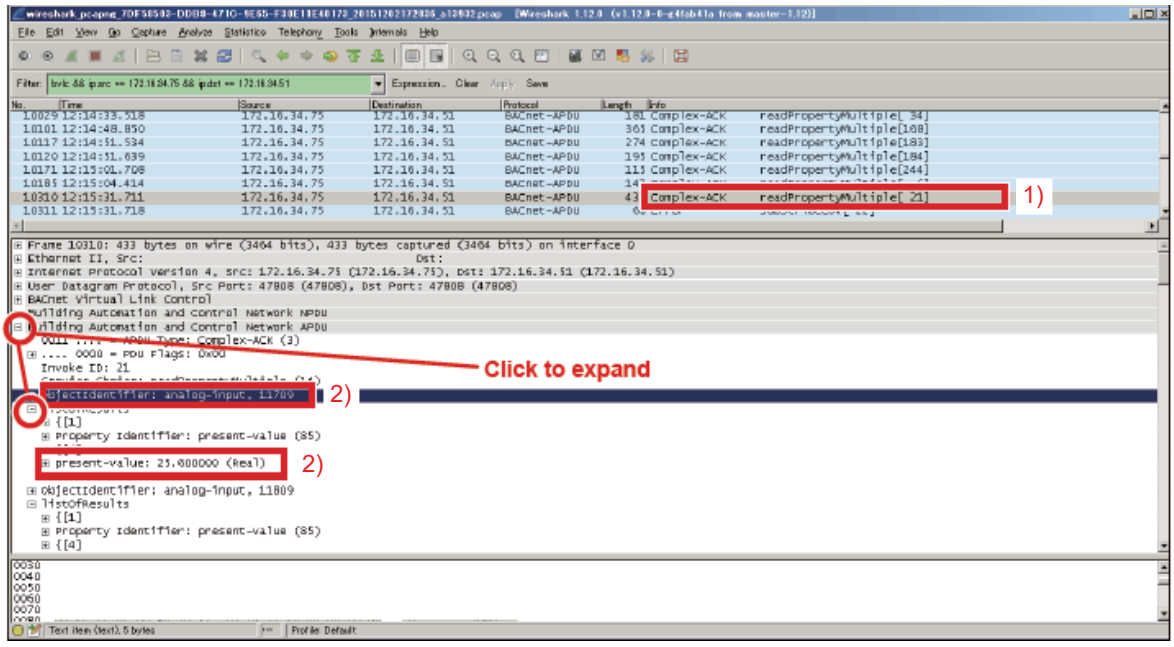
5. Examples

Example (1): When the “Operational Mode State” object is read out by the “ReadProperty” service



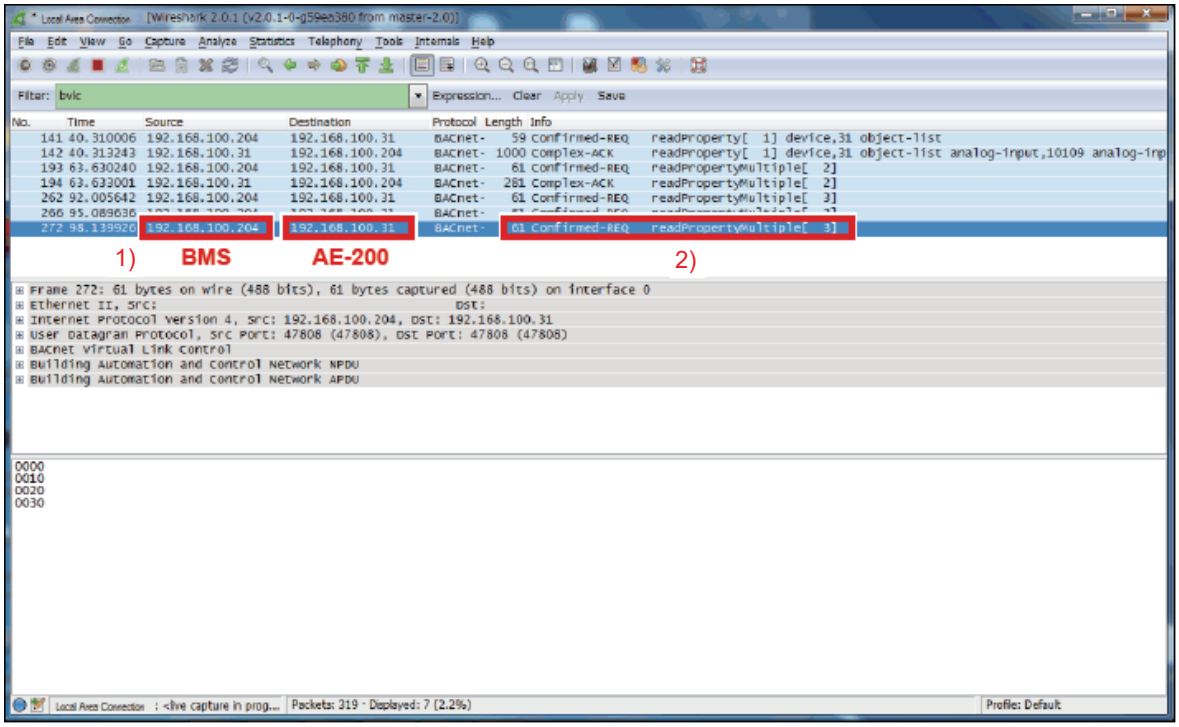
1) Confirm the response from AE-200 (192.168.1.254) to BMS (192.168.1.177).
Operation mode state (01xx06) of Group No.1:
Present value is 1 (= Cooling).
(For the BACnet® objects supported by AE-200 and the meanings of their instance numbers and present values, refer to section “Instance number for basic functions” in the AE-200/AE-50/EW-50 Instruction Book (BACnet® function).)

Example (2): When the “Room Temp” object is read out by the “ReadPropertyMultiple” service



1) Confirm the response from AE-200 to BMS.
2) Room Temp (01xx09) of Group No.17:
Present value is 25.6.
(For the BACnet® objects supported by AE-200 and the meanings of their instance numbers and present values, refer to section “Instance number for basic functions” in the AE-200/AE-50/EW-50 Instruction Book (BACnet® function).)

BACnet® display example (when no response from AE-200)



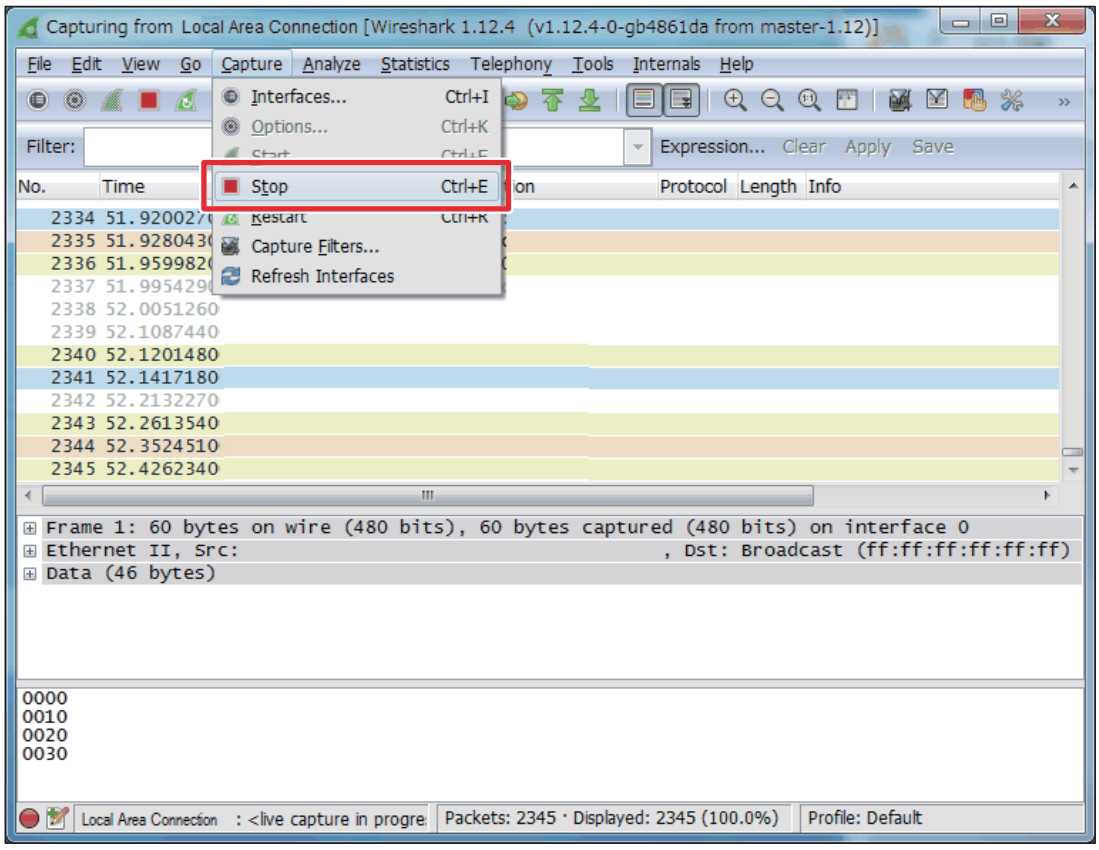
1) You can determine that the communication is from the BMS (192.168.100.204) to the AE-200 (192.168.100.31).

2) You can determine that this is a “ReadPropertyMultiple” service request.
(For BACnet® service that AE-200 supports, refer to section “Services for each object “ in the AE-200/AE-50/EW-50 Instruction Book (BACnet® function))

Since there are no response packets that have the same Invoke ID (value in the square bracket after the service name) as for the service request after the “ReadPropertyMultiple” service request indicated by 1) and 2), you can determine that a request was made from the BMS (Confirmed-REQ) but that there was no response from the AE-200 (Complex-ACK).

6. Wireshark Stop

(1) Menu: Capture -> Stop



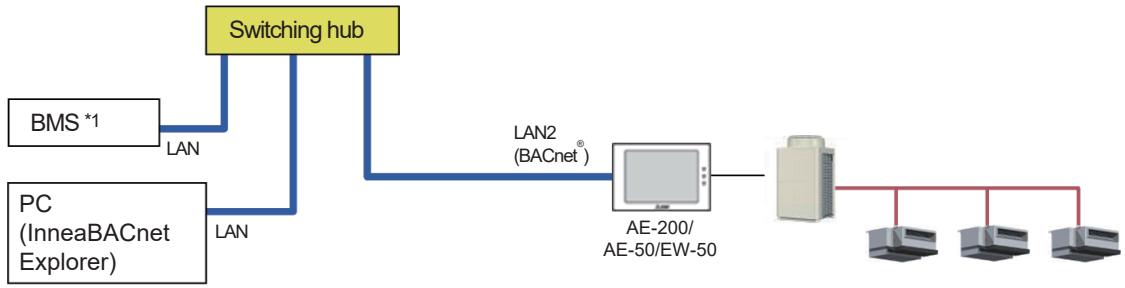
(2) Save the captured result.
Menu: File -> Save As

[2] BACnet® Object Check Procedure Using InneaBACnetExplorer

As an example of BACnet® analysis tool, the operation method of InneaBACnetExplorer is explained below.
The contents of the BACnet® object can be viewed using InneaBACnetExplorer.
Note) The free edition of this software does not support writing properties or viewing the trend log buffer.

1. Connecting the device

Download InneaBACnetExplorer (free) from Inneasoft (http://www.inneasoft.com/index.php/en/support/download) and then install it.
Connect the target BACnet® communication device to the wired LAN port of the PC with InneaBACnetExplorer installed.



*1 BMS: Building Management System

2. Starting InneaBACnetExplorer

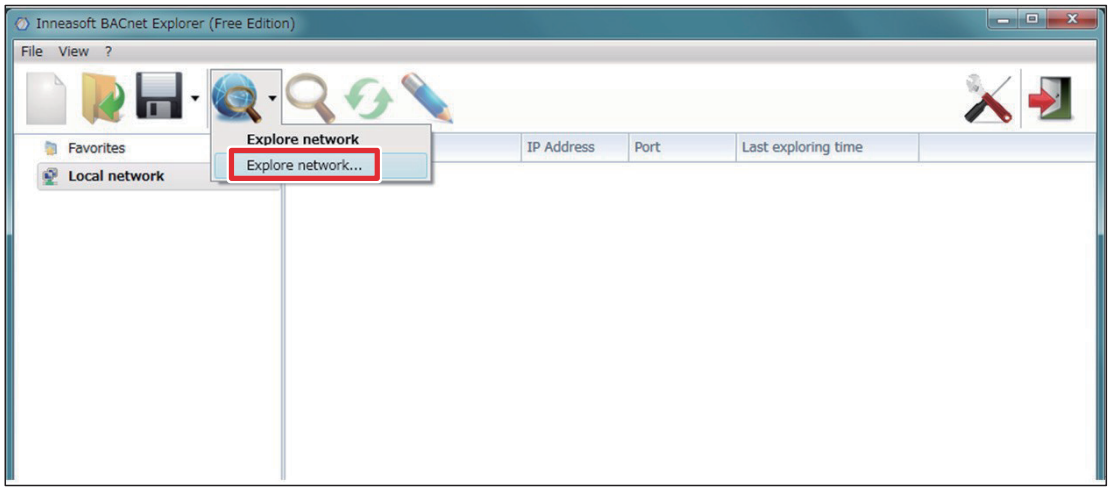
Click [Start button] - [All Programs] - [Inneasoft] - [InneaBACnetExplorerFree] - [InneaBACnetExplorer Free Edition].

3. Overview of InneaBACnetExplorer

An overview of InneaBACnetExplorer appears. Click [Close].

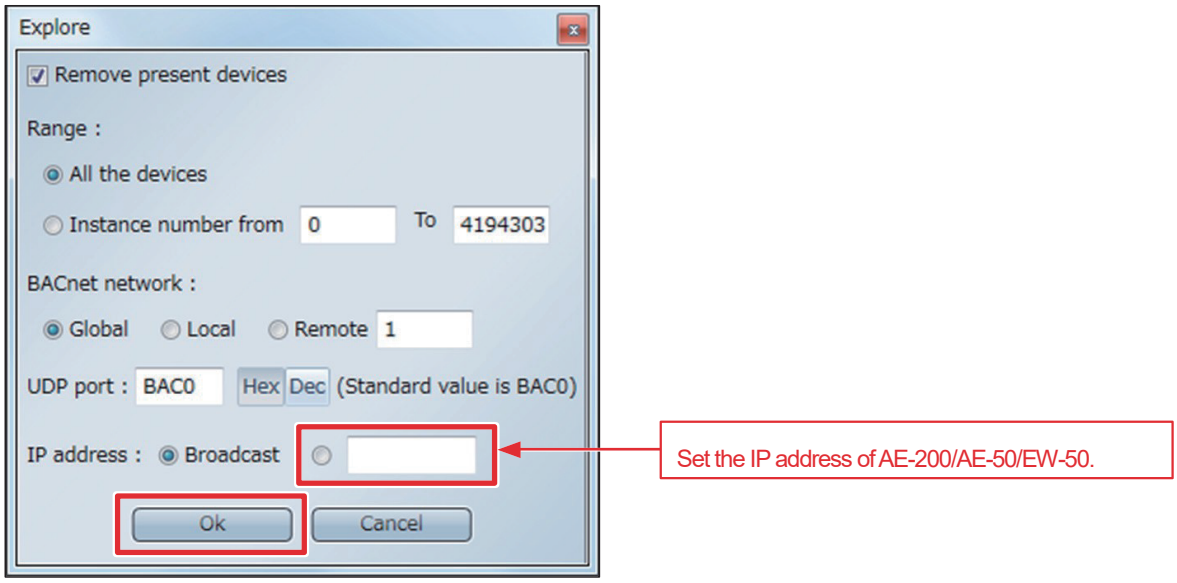
4. Searching for BACnet® device

(1) Click [Explore network...] from the globe icon in the toolbar on the main screen of InneaBACnetExplorer.



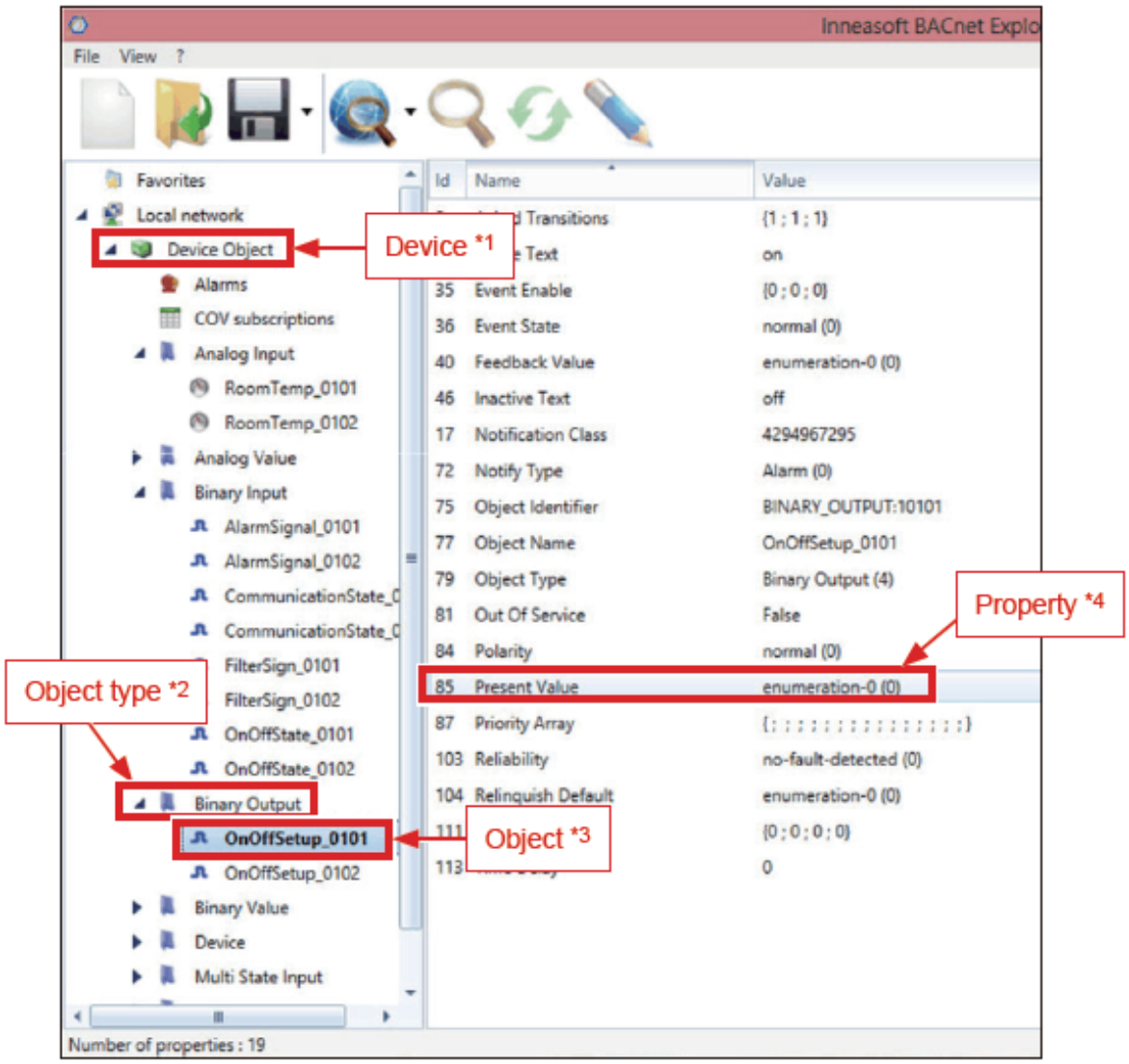
(2) Set the BACnet® device search range and then click [Ok].

The search range is the entire range by default so there is normally no need to change the setting, but if there are multiple AE-200/AE-50/EW-50 units connected to BACnet®, set the IP address of the AE-200/AE-50/EW-50 target for the check.



5. Checking the BACnet® objects

The BACnet® devices within the search range are displayed. You can expand device, object type, and object items to check the properties of a BACnet® object.



*1 This is the device name (“Object_Name” property value of the device object). It is fixed to “Device Object” with AE-200/AE-50/EW-50.

*2 For object types that can be used with AE-200/AE-50/EW-50, refer to section “Objects” in the AE-200/AE-50/EW-50 Instruction Book (BACnet® function).

*3 This is the object name (“Object_Name” property value of the object).

*4 For the “Present_Value” property values of AE-200/AE-50/EW-50 and their meanings, refer to section “Basic functions” in the AE-200/AE-50/EW-50 Instruction Book (BACnet® function).

MITSUBISHI ELECTRIC CORPORATION

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HWE1402A

New publication effective Mar. 2020
Specifications subject to change without notice

MITSUBISHI ELECTRIC

SPLIT-TYPE, HEAT PUMP AIR CONDITIONERS

June 2021

No. OCH715
REVISED EDITION-A

TECHNICAL & SERVICE MANUAL

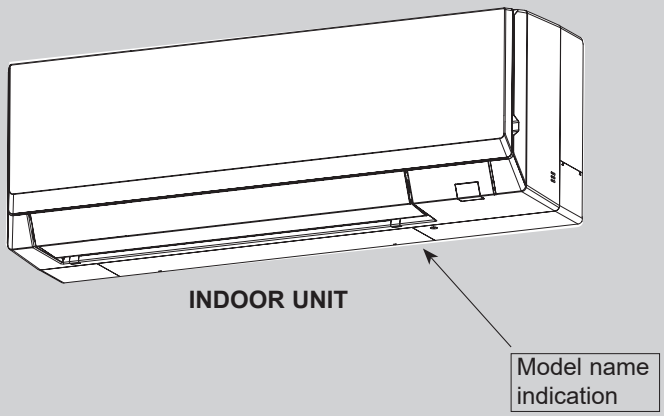
Series PKFY Wall Mounted R410A

Indoor unit [Model Name]	[Service Ref.]
PKFY-P04NLMU-E	PKFY-P04NLMU-E.TH
PKFY-P06NLMU-E	PKFY-P06NLMU-E.TH
PKFY-P08NLMU-E	PKFY-P08NLMU-E.TH
PKFY-P12NLMU-E	PKFY-P12NLMU-E.TH
PKFY-P15NLMU-E	PKFY-P15NLMU-E.TH
PKFY-P18NLMU-E	PKFY-P18NLMU-E.TH

Revision:
- Outlines and dimensions have been modified in REVISED EDITION-A.

OCH715 is void.

Note:
- This manual describes service data of the indoor units only.



CONTENTS

PARTS CATALOG (OCB715)

CITY MULTI

1 SAFETY PRECAUTION

Cautions for units utilizing refrigerant R410A

Do not use the existing refrigerant piping.

The old refrigerant and lubricant in the existing piping contains a large amount of chlorine which may cause the lubricant deterioration of the new unit.

Use "low residual oil piping"

If there is a large amount of residual oil (hydraulic oil, etc.) inside the piping and joints, deterioration of the lubricant will result.

Store the piping indoors, and both ends of the piping sealed until just before brazing. (Leave elbow joints, etc. in their packaging.)

If dirt, dust or moisture enters into refrigerant cycle, that can cause deterioration of refrigerant oil or malfunction of compressor.

The refrigerant oil applied to flare and flange connections must be ester oil, ether oil or alkylbenzene oil in a small amount.

If large amount of mineral oil enters, that can cause deterioration of refrigerant oil etc.

Charge refrigerant from liquid phase of gas cylinder.

If the refrigerant is charged from gas phase, composition change may occur in refrigerant and the efficiency will be lowered.

Do not use refrigerant other than R410A.

If other refrigerant (R22, etc.) is used, chlorine in refrigerant can cause deterioration of refrigerant oil, etc.

Use a vacuum pump with a reverse flow check valve.

Vacuum pump oil may flow back into refrigerant cycle and that can cause deterioration of refrigerant oil, etc.

Use the following tools specifically designed for use with R410A refrigerant.

The following tools are necessary to use R410A refrigerant.

Tools for R410A	
Gauge manifold	Flare tool
Charge hose	Size adjustment gauge
Gas leak detector	Vacuum pump adaptor
Torque wrench	Electronic refrigerant charging scale

Handle tools with care.

If dirt, dust or moisture enters into refrigerant cycle, that can cause deterioration of refrigerant oil or malfunction of compressor.

Do not use a charging cylinder.

If a charging cylinder is used, the composition of refrigerant will change and the efficiency will be lowered.

Use the specified refrigerant only.

Never use any refrigerant other than that specified.
Doing so may cause a burst, an explosion, or fire when the unit is being used, serviced, or disposed of.
Correct refrigerant is specified in the manuals and on the spec labels provided with our products.
We will not be held responsible for mechanical failure, system malfunction, unit breakdown or accidents caused by failure to follow the instructions.

Ventilate the room if refrigerant leaks during operation. If refrigerant comes into contact with a flame, poisonous gases will be released.

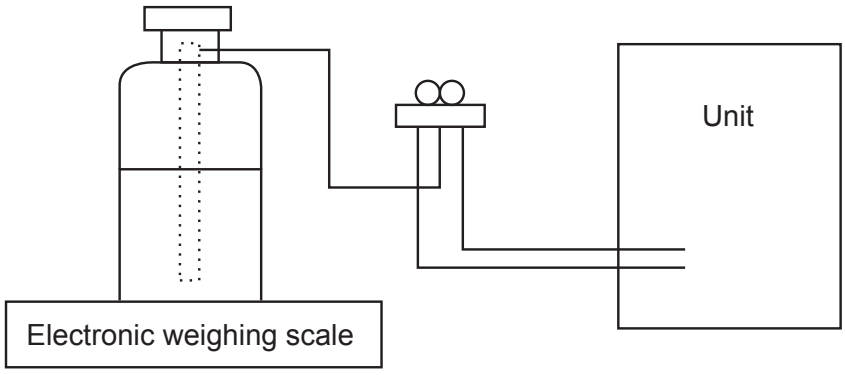
[1] Cautions for service

(1) Perform service after collecting the refrigerant left in the unit completely.
(2) Do not release refrigerant in the air.
(3) After completing service, charge the cycle with specified amount of refrigerant.
(4) When performing service, install a filter drier simultaneously.
Be sure to use a filter drier for new refrigerant.

[2] Additional refrigerant charge

When charging directly from cylinder

(1) Check that cylinder for R410A on the market is syphon type.
(2) Charging should be performed with the cylinder of syphon stood vertically. (Refrigerant is charged from liquid phase.)



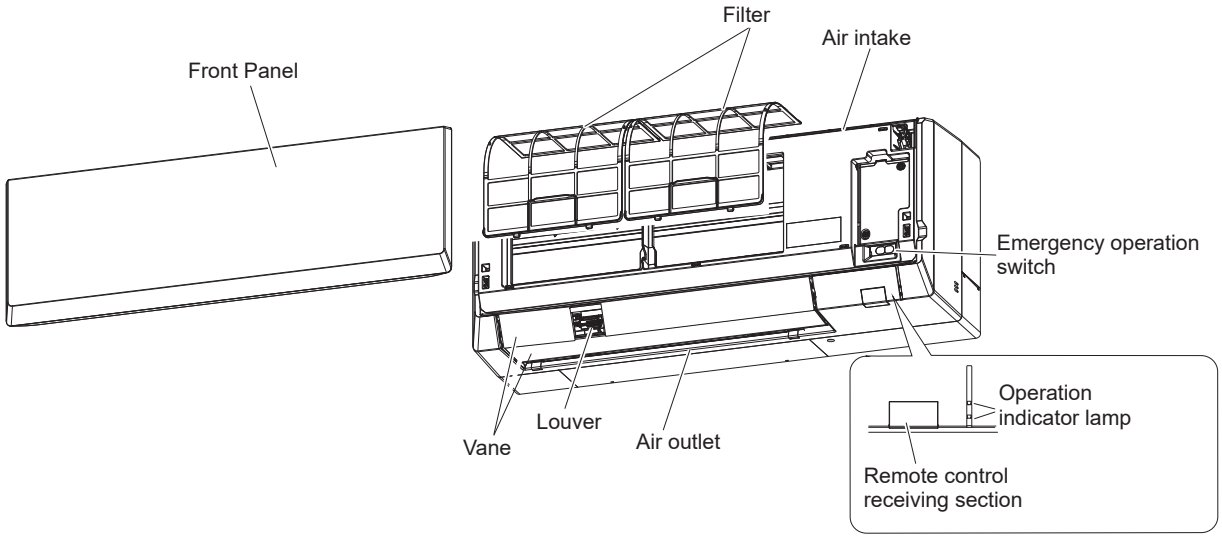
[3] Service tools

Use the below service tools as exclusive tools for R410A refrigerant.

No.	Tool name	Specifications
①	Gauge manifold	· Only for R410A
		· Use the existing fitting specifications. (UNF1/2)
		· Use high-tension side pressure of 768.7 PSIG [5.3MPa.G] or over.
②	Charge hose	· Only for R410A
		· Use pressure performance of 738.2 PSIG [5.09MPa.G] or over.
③	Electronic weighing scale	—
④	Gas leak detector	· Use the detector for R134a, R407C or R410A.
⑤	Adaptor for reverse flow check	· Attach on vacuum pump.
⑥	Refrigerant charge base	—
⑦	Refrigerant cylinder	· Only for R410A Top of cylinder (Pink) Cylinder with syphon
⑧	Refrigerant recovery equipment	—

2 PARTS NAMES AND FUNCTIONS

2-1. Indoor unit



2-2. Wired Remote Controller <PAR-40MAA>

Wired remote controller function

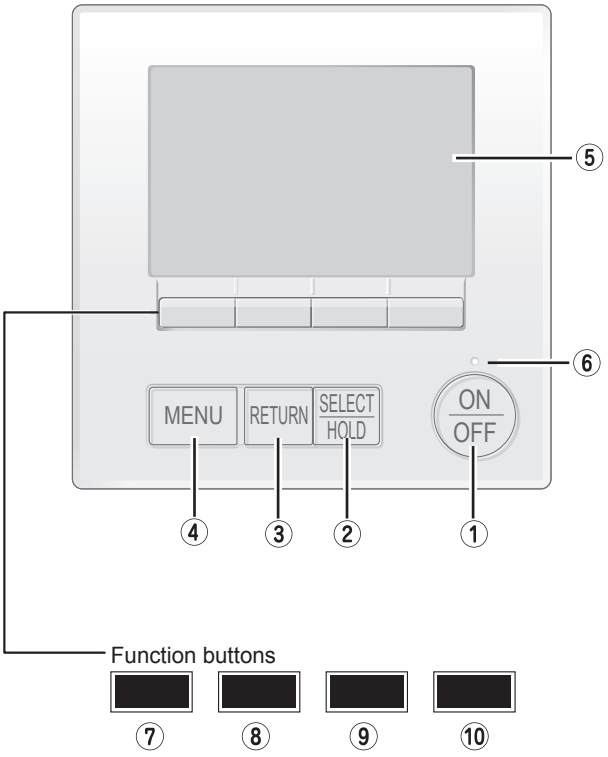
The functions which can be used are restricted according to each model.

○ : Supported × : Unsupported

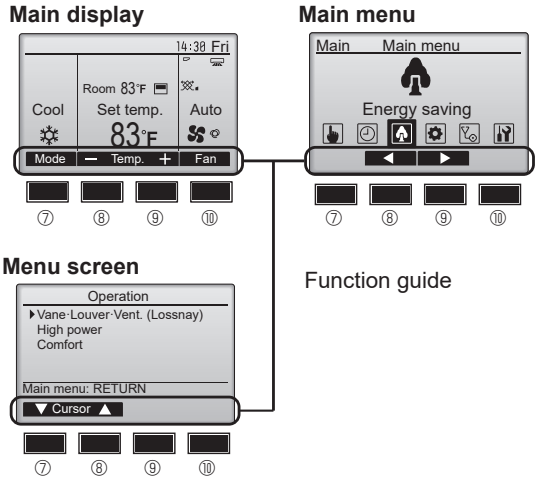
	Function	PAR-40MAA	
		Slim	CITY MULTI
Body	Product size H × W × D (mm)	120 × 120 × 14.5	
	LCD	Full Dot LCD	
	Backlight	○	
Energy saving	Energy saving operation schedule	○	×
	Automatic return to the preset temperature	○	
Restriction	Setting the temperature range restriction	○	
Function*	Operation lock function	○	
	Weekly timer	○	
	ON/OFF timer	○	
	High Power	○	×
	Manual vane angle	○	

*Some functions may not be available depending on model types.

Controller interface



The functions of the function buttons change depending on the screen.
Refer to the button function guide that appears at the bottom of the LCD for the functions they serve on a given screen.
When the system is centrally controlled, the button function guide that corresponds to the locked button will not appear.



① [ON/OFF] button

Press to turn ON/OFF the indoor unit.

② [SELECT/HOLD] button

Press to save the setting.

When the Main menu is displayed, pressing this button will enable/disable the HOLD function.

③ [RETURN] button

Press to return to the previous screen.

④ [MENU] button

Press to bring up the Main menu.

⑤ Backlit LCD

Operation settings will appear.

When the backlight is off, pressing any button turns the backlight on and it will stay lit for a certain period of time depending on the screen.

When the backlight is off, pressing any button turns the backlight on and does not perform its function. (except for the [ON/OFF] button)

⑥ ON/OFF lamp

This lamp lights up in green while the unit is in operation. It blinks while the remote controller is starting up or when there is an error.

⑦ Function button [F1]

Main display: Press to change the operation mode.

Menu screen: The button function varies with the screen.

⑧ Function button [F2]

Main display: Press to decrease temperature.

Main menu: Press to move the cursor left.

Menu screen: The button function varies with the screen.

⑨ Function button [F3]

Main display: Press to increase temperature.

Main menu: Press to move the cursor right.

Menu screen: The button function varies with the screen.

⑩ Function button [F4]

Main display: Press to change the fan speed.

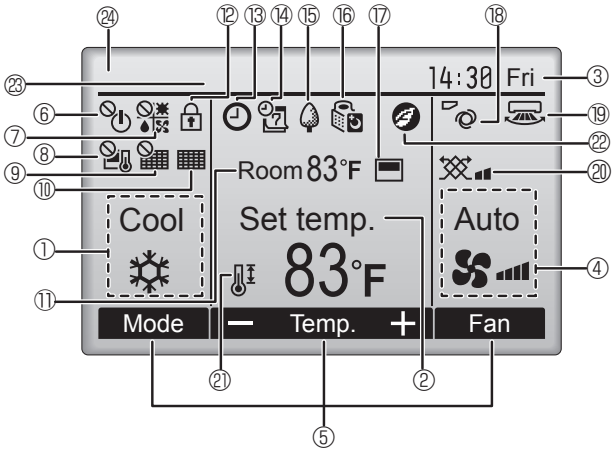
Menu screen: The button function varies with the screen.

Display

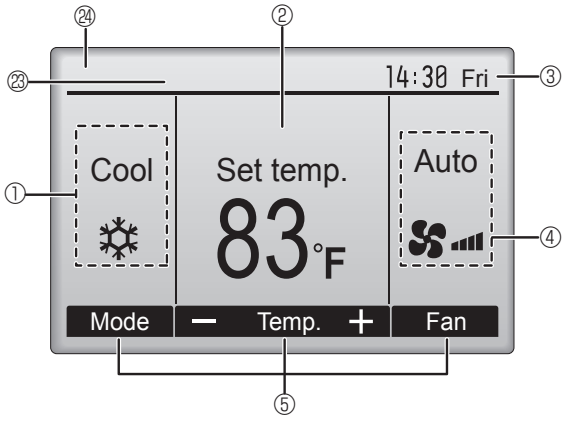
The main display can be displayed in two different modes: “Full” and “Basic”. The factory setting is “Full”. To switch to the “Basic” mode, change the setting on the Main display setting. (Refer to operation manual included with remote controller.)

<Full mode>

* All icons are displayed for explanation.



<Basic mode>



① Operation mode

② Preset temperature

③ Clock

Current time appears here.

④ Fan speed

⑤ Button function guide

Functions of the corresponding buttons appear here.

⑥

Appears when the ON/OFF operation is centrally controlled.

⑦

Appears when the operation mode is centrally controlled.

⑧

Appears when the preset temperature is centrally controlled.

⑨

Appears when the filter reset function is centrally controlled.

⑩

Indicates when filter needs maintenance.

⑪ Room temperature

Current room temperature appears here.

⑫

Appears when the buttons are locked.

⑬

Appears when the On/Off timer, Night setback, or Auto-off timer function is enabled.

appears when the timer is disabled by the centralized control system.

⑭

Appears when the Weekly timer is enabled.

⑮

Appears while the units are operated in the energy-save mode. (Will not appear on some models of indoor units)

⑯

Appears while the outdoor units are operated in the silent mode. (This indication is not available for CITY MULTI models.)

⑰

Appears when the built-in thermistor on the remote controller is activated to monitor the room temperature (⑪).

appears when the thermistor on the indoor unit is activated to monitor the room temperature.

⑱

Indicates the vane setting.

⑲

Indicates the louver setting.

⑳

Indicates the ventilation setting.

㉑

Appears when the preset temperature range is restricted.

㉒

Appears when an energy-saving operation is performed using a “3D i-See sensor” function. (not available)

㉓ Centrally controlled

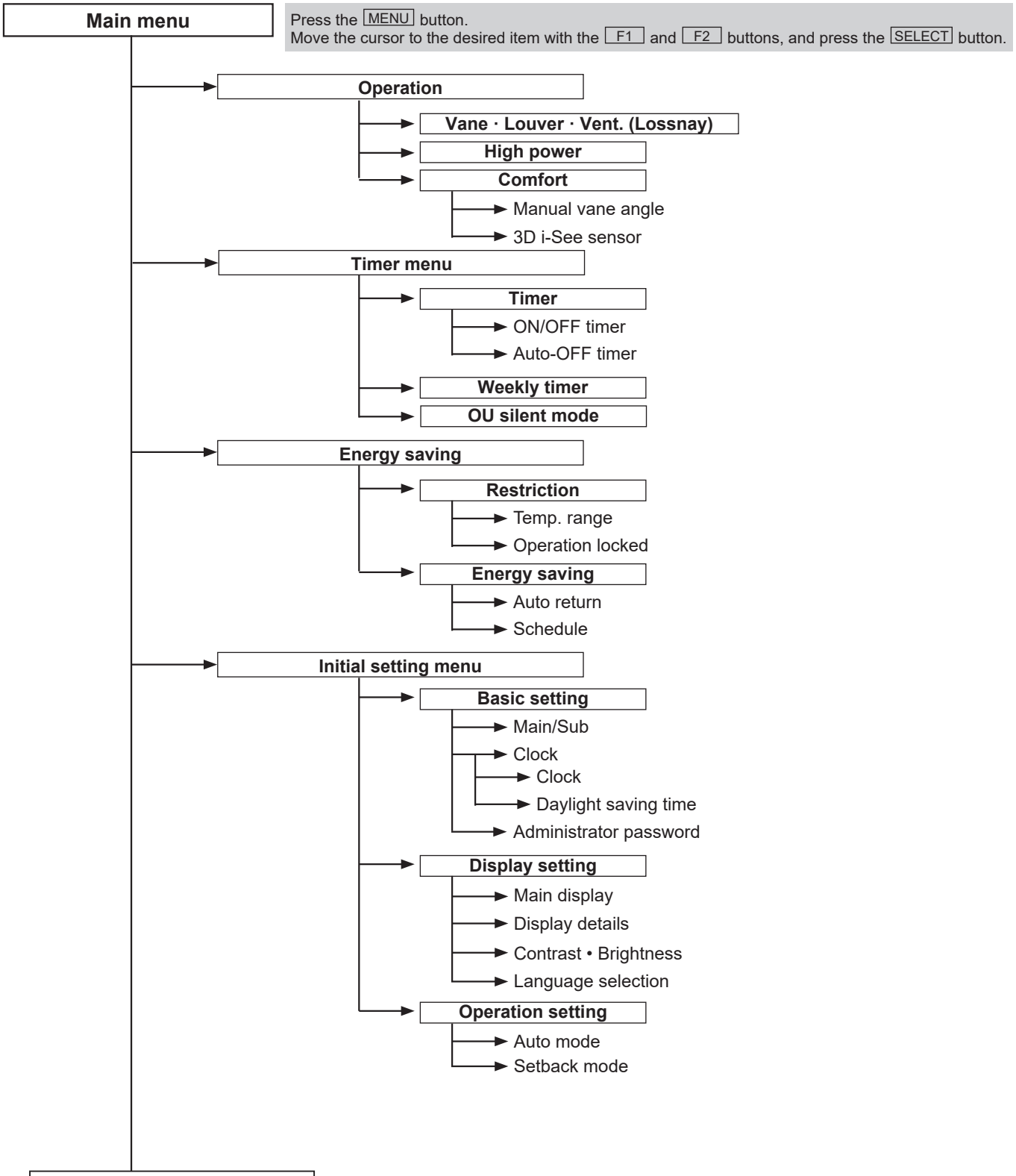
Appears for a certain period of time when a centrally-controlled item is operated.

㉔ Preliminary error display

An error code appears during the preliminary error.

Most settings (except ON/OFF, mode, fan speed, temperature) can be made from the Main menu. (Refer to Page 10.)

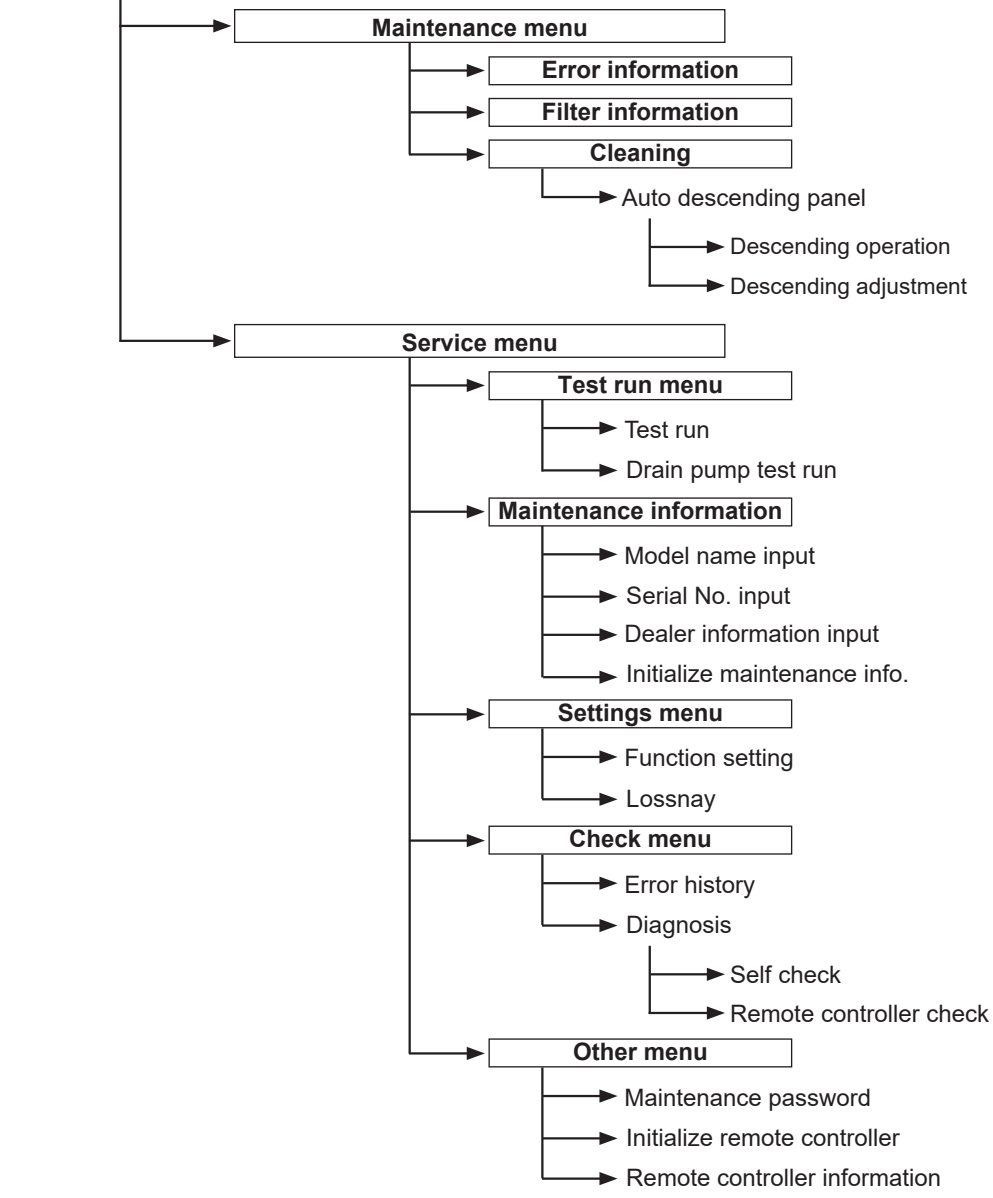
Menu structure



Continue to the next page.

Not all functions are available on all models of indoor units.

Continue from the previous page.



Not all functions are available on all models of indoor units.

Main menu list

Main menu	Setting and display items		Setting details
Operation	**Vane · Louver · Vent. (Lossnay)**		**Use to set the vane angle.** • Select a desired vane setting from 5 different settings. **Use to turn ON/OFF the louver.** • Select a desired setting from "ON" and "OFF." **Use to set the amount of ventilation.** • Select a desired setting from "Off," "Low," and "High."
	High power		**Use to reach the comfortable room temperature quickly.** • Units can be operated in the High-power mode for up to 30 minutes.
	Comfort	**Manual vane angle**	**Use to fix each vane angle.**
		3D i-See sensor	**Use to set the following functions for 3D i-See sensor.** • Air distribution • Energy saving option • Seasonal airflow
Timer	**Timer**	**ON/OFF timer** *1	**Use to set the operation ON/OFF times.** • Time can be set in 5-minute increments.
		Auto-Off timer	**Use to set the Auto-Off time.** • Time can be set to a value from 30 to 240 in 10-minute increments.
	Weekly timer *1, *2		**Use to set the weekly operation ON/OFF times.** • Up to 8 operation patterns can be set for each day. (Not valid when the ON/OFF timer is enabled.)
	OU silent mode *1		**Use to set the time periods in which priority is given to quiet operation of outdoor units over temperature control. Set the Start/Stop times for each day of the week.** •Select the desired silent level from "Normal," "Middle," and "Quiet."
Energy saving	**Restriction**	**Temp. range** *2	**Use to restrict the preset temperature range.** • Different temperature ranges can be set for different operation modes.
		Operation lock	**Use to lock selected functions.** • The locked functions cannot be operated.
	Energy saving	**Auto return** *2	**Use to get the units to operate at the preset temperature after performing energy saving operation for a specified time period.** • Time can be set to a value from 30 and 120 in 10-minute increments. (This function will not be valid when the preset temperature ranges are restricted.)
		Schedule *1	**Set the start/stop times to operate the units in the energy saving mode for each day of the week, and set the energy saving rate.** • Up to 4 energy saving operation patterns can be set for each day. • Time can be set in 5-minute increments. • Energy saving rate can be set to a value from 0% or 50 to 90% in 10% increments.

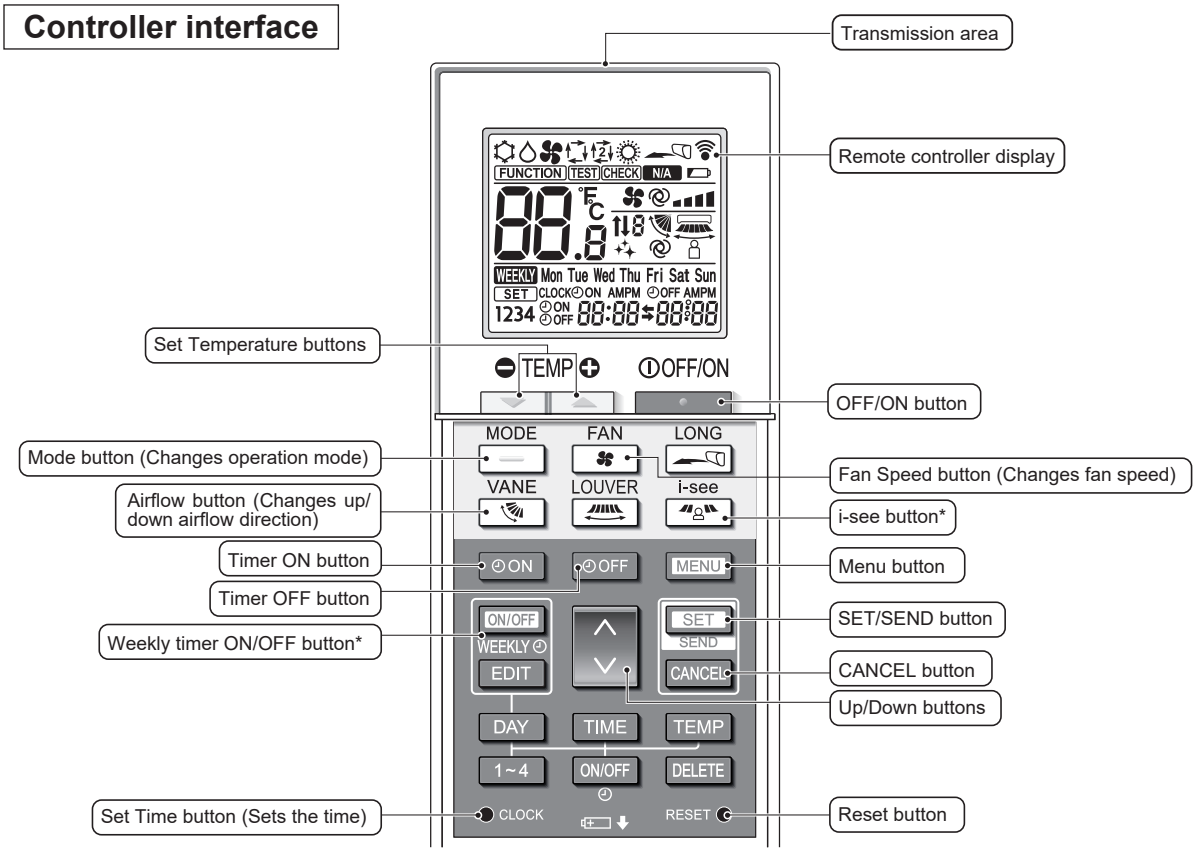
*1 Clock setting is required.

*2 33.8°F (1°C) increments.

Main menu	Setting and display items		Setting details
Initial setting	Basic setting	Main/Sub	**When connecting 2 remote controllers, one of them needs to be designated as a sub controller.**
		Clock	**Use to set the current time.**
		Daylight saving time	**Set the daylight saving time.**
		Administrator password	**The administrator password is required to make the settings for the following items.** • Timer setting • Energy saving setting • Weekly timer setting • Restriction setting • Outdoor unit silent mode setting • Night set back
	Display setting	Main display	**Use to switch between "Full" and "Basic" modes for the Main display, and use to change the background colors of the display to black.**
		Display details	**Make the settings for the remote controller related items as necessary.** **Clock:** The initial settings are "Yes" and "24h" format. **Temperature:** Set either Celsius (°C) or Fahrenheit (°F). **Room temp. :** Set Show or Hide. **Auto mode:** Set the Auto mode display or Only Auto display.
		Contrast • Brightness	**Use to adjust screen contrast and brightness.**
		Language selection	**Use to select the desired language.**
	Operation setting	Auto mode	**Whether or not to use the Auto mode can be selected by using the button. This setting is valid only when indoor units with the Auto mode function are connected.**
		Setback mode	**Whether or not to use the Setback mode can be selected by using the button. This setting is valid only when indoor units with the Setback mode function are connected.**
Maintenance	Error information		**Use to check error information when an error occurs.** • Check code, error source, refrigerant address, unit model, manufacturing number, contact information (dealer's phone number) can be displayed. (The unit model, manufacturing number, and contact information need to be registered in advance to be displayed.)
	Filter information		**Use to check the filter status.** • The filter sign can be reset.
	Cleaning	Auto descending panel	**Use to lift and lower the auto descending panel (Optional parts).**
Service	Test run		**Select "Test run" from the Service menu to bring up the Test run menu.** • Test run • Drain pump test run
	Input maintenance		**Select "Input maintenance Info." from the Service menu to bring up the Maintenance information screen.** **The following settings can be made from the Maintenance Information screen.** • Model name input • Serial No. input • Dealer information input • Initialize maintenance info.
	Settings	Function setting	**Make the settings for the indoor unit functions via the remote controller as necessary.**
		LOSSNAY setting	**This setting is required only when the operation of CITY MULTI units is interlocked with LOSSNAY units.**
	Check	Error history	Display the error history and execute "delete error history".
		Diagnosis	**Self check:** Error history of each unit can be checked via the remote controller. **Remote controller check:** When the remote controller does not work properly, use the remote controller checking function to troubleshoot the problem.
	Other	Maintenance password	**Use to change the maintenance password.**
		Initialize remote controller	**Use to initialize the remote controller to the factory shipment status.**
		remote controller information	**Use to display the remote controller model name, software version, and serial number.**

2-3. Wireless remote controller

Controller interface



Note:

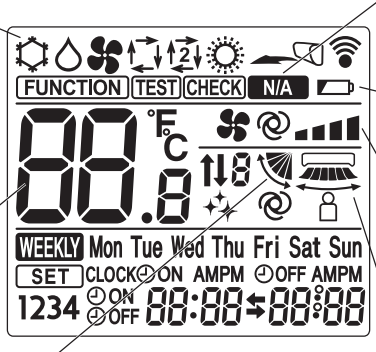
*** This button is enabled or disabled depending on the model of the indoor unit.**

Display

Operation mode

Cool		Dry	
Fan		Auto (single set point)	
Heat		Auto* (dual set point)	

* The initial setting is necessary. Refer to 4) in 3.2.



Not available
Appears when a non-supported function is selected.

Battery replacement indicator
Appears when the remaining battery power is low.

Temperature setting
The units of temperature can be changed. For details, refer to the Installation Manual.

Fan speed setting

Auto

Vane setting

Step 1 Step 2 Step 3 Step 4 Step 5 Swing Auto

3D i-See sensor (Air distribution)

Default Direct Indirect

When Direct or Indirect is selected, the vane setting is set to “Auto”.

3 SPECIFICATION

3-1. SPECIFICATIONS

Model			PKFY-P04NLMU-E	PKFY-P06NLMU-E	PKFY-P08NLMU-E
Power source			1-phase 208-230 V 60 Hz		
Cooling capacity *1		kW	1.1	1.8	2.3
(Nominal) *1		BTU/h	4000	6000	8000
	Power input	kW	0.02	0.02	0.03
	Current input	A	0.20	0.20	0.25
Heating capacity *2		kW	1.3	2.0	2.6
(Nominal) *2		BTU/h	4500	6700	9000
	Power input	kW	0.01	0.01	0.02
	Current input	A	0.15	0.15	0.20
External finish(Munsell No.)			Plastic (0.7PB 9.2/0.4)		
External dimension H x W x D		inch	11-25/32 x 30-7/16 x 9-11/32		
		mm	299 × 773 × 237		
Net weight		lb (kg)	23.6 (10.7)	24.5(11.1)	
Heat exchanger			Cross fin (Aluminum fin and copper tube)		
Fan	Type x Quantity		Line flow fan x 1		
	External static press	Pa (mmH2O)	0 (0)		
	Motor type		DC motor		
	Motor output	kW	0.03		
	Driving mechanism		Direct driven		
	Airflow rate (Low-Mid2 -Mid1-High)	m^3/min	3.3-3.5-3.8-4.2	4.0-4.4-4.9-5.4	4.0-4.6-5.4-6.7
		L/s	55-58-63-70	67-73-82-90	67-77-90-112
		cfm	117-124-134-148	141-155-173-191	141-162-191-237
Noise level (Low-Mid2-Mid1-High) (measured in anechoic room)		dB <A>	22-24-26-28	22-26-29-31	22-27-31-35
Insulation material			Polyethylene sheet		
Air filter			PP Honeycomb		
Protection device			Fuse		
Refrigerant control device			LEV		
Connectable outdoor unit			R410A CITY MULTI		
Diameter of refrigerant pipe	Liquid	in (mm)	ϕ1/4 (ϕ6.35)		
	Gas	in (mm)	ϕ1/2 (ϕ12.7)		
Field drain pipe size		in (mm)	I.D. 5/8 (16)		
Standard attachment			Installation Manual, Instruction Book		
Optional parts	DRAIN PUMP KIT		PAC-SK01DM-E		
Remark			Details on foundation work, duct work, insulation work, electrical wiring, power source switch, and other items shall be referred to the Installation Manual. Due to continuing improvement, above specifications may be subject to change without notice.		

Notes:
*1.Nominal cooling conditions (subject to JIS B8615-1)
Indoor: 81°FD.B./66°FW.B. (27°CD.B./19°CW.B.), Outdoor: 95°FD.B. (35°CD.B.)
Pipe length: 24-9/16 ft (7.5 m), Level difference: 0 ft (0 m)
*2.Nominal heating conditions (subject to JIS B8615-1)
Indoor: 68°FD.B. (20°CD.B.), Outdoor: 45°FD.B./43°FW.B. (7°CD.B./6°CW.B.)
Pipe length: 24-9/16 ft (7.5 m), Level difference: 0 ft (0 m)

Unit converter

kcal/h = kW × 860
Btu/h = kW × 3,412
cfm = m^3/min × 35.31
lb = kg/0.4536
Note: Above specification data is subject to rounding variation.

Model			PKFY-P12NLMU-E	PKFY-P15NLMU-E	PKFY-P18NLMU-E
Power source			1-phase 208-230 V 60 Hz		
Cooling capacity *1		kW	3.5	4.4	5.3
(Nominal) *1		BTU/h	12000	15000	18000
	Power input	kW	0.04	0.04	0.05
	Current input	A	0.35	0.35	0.45
Heating capacity *2		kW	4.0	5.0	5.9
(Nominal) *2		BTU/h	13500	17000	20000
	Power input	kW	0.03	0.03	0.04
	Current input	A	0.30	0.30	0.40
External finish(Munsell No.)			Plastic (0.7PB 9.2/0.4)		
External dimension H x W x D		inch	11-25/32 x 30-7/16 x 9-11/32	11-25/32 x 35-23/64 x 9-11/32	
		mm	299 × 773 × 237	299 x 898 x 237	
Net weight		lb (kg)	24.5 (11.1)	28.4 (12.9)	
Heat exchanger			Cross fin (Aluminum fin and copper tube)		
Fan	Type x Quantity		Line flow fan x 1		
	External static press	Pa (mmH2O)	0 (0)		
	Motor type		DC motor		
	Motor output	kW	0.03		
	Driving mechanism		Direct driven		
	Airflow rate (Low-Mid2 -Mid1-High)	m^3/min	4.3-5.4-6.9-8.4	6.3-7.4-8.6-10.0	6.8-8.3-10.2-12.4
		L/s	72-90-115-140	105-123-143-167	113-138-170-207
		cfm	152-191-244-297	222-261-304-353	240-293-360-438
Noise level (Low-Mid2-Mid1-High) (measured in anechoic room)		dB <A>	24-31-37-41	29-34-37-40	31-36-41-46
Insulation material			Polyethylene sheet		
Air filter			PP Honeycomb		
Protection device			Fuse		
Refrigerant control device			LEV		
Connectable outdoor unit			R410A CITY MULTI		
Diameter of refrigerant pipe	Liquid	in (mm)	ϕ1/4 (ϕ6.35)		
	Gas	in (mm)	ϕ1/2 (ϕ12.7)		
Field drain pipe size		in (mm)	I.D. 5/8 (16)		
Standard attachment			Installation Manual, Instruction Book		
Optional parts	DRAIN PUMP KIT		PAC-SK01DM-E		
Remark			Details on foundation work, duct work, insulation work, electrical wiring, power source switch, and other items shall be referred to the Installation Manual. Due to continuing improvement, above specifications may be subject to change without notice.		

Notes:
*1.Nominal cooling conditions (subject to JIS B8615-1)
Indoor: 81°FD.B./66°FW.B. (27°CD.B./19°CW.B.), Outdoor: 95°FD.B. (35°CD.B.)
Pipe length: 24-9/16 ft (7.5 m), Level difference: 0 ft (0 m)
*2.Nominal heating conditions (subject to JIS B8615-1)
Indoor: 68°FD.B. (20°CD.B.), Outdoor: 45°FD.B./43°FW.B. (7°CD.B./6°CW.B.)
Pipe length: 24-9/16 ft (7.5 m), Level difference: 0 ft (0 m)

3-2. ELECTRICAL PARTS SPECIFICATIONS

Service ref. / Parts name	Symbol	PKFY-P04NLMU-E.TH PKFY-P06NLMU-E.TH PKFY-P08NLMU-E.TH	PKFY-P12NLMU-E.TH PKFY-P15NLMU-E.TH PKFY-P18NLMU-E.TH
Room temperature detection thermistor	TH21	Resistance 32°F/15 kΩ, 50°F/9.6 kΩ, 68°F/6.3 kΩ, 77°F/5.4 kΩ, 86°F/4.3 kΩ, 104°F/3.0 kΩ	
Pipe temperature detection thermistor/liquid	TH22	Resistance 32°F/15 kΩ, 50°F/9.6 kΩ, 68°F/6.3 kΩ, 77°F/5.4 kΩ, 86°F/4.3 kΩ, 104°F/3.0 kΩ	
Pipe temperature detection thermistor/gas	TH23	Resistance 32°F/15 kΩ, 50°F/9.6 kΩ, 68°F/6.3 kΩ, 77°F/5.4 kΩ, 86°F/4.3 kΩ, 104°F/3.0 kΩ	
Fuse (Indoor controller board)	FUSE	T3.15AL250V	
Fan motor (with thermal fuse)	MF	8 X 30W / RC0J30-QD	
Vane motor (Upper)	MV1	NSEK302 DC12V	
Vane motor (Lower)	MV2	MSBPC20 DC12V	
Linear expansion valve	LEV	DC12V Stepping motor drive Port ϕ3/32 (P04), ϕ7/64 (P06/08/12/15/18) (0-2000pulse)	
Power supply terminal block	TB2	(L1,L2) Rated to 250V 20A *	
Transmission terminal block	TB5	(M1, M2, S) Rated to 250V 20A *	
MA-Remote controller terminal block	TB15	(1, 2) Rated to 250V 10A *	

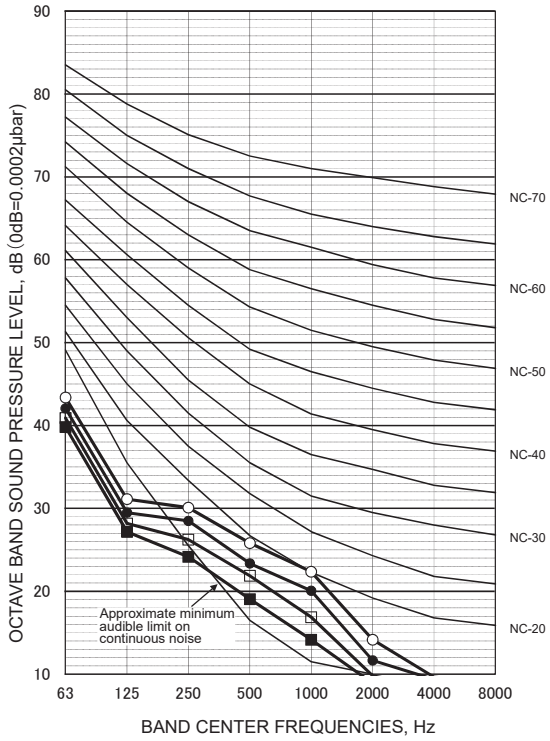
* Refer to WIRING DIAGRAM for the supplied voltage.

4 NOISE CRITERION CURVES

NOISE CRITERION CURVES

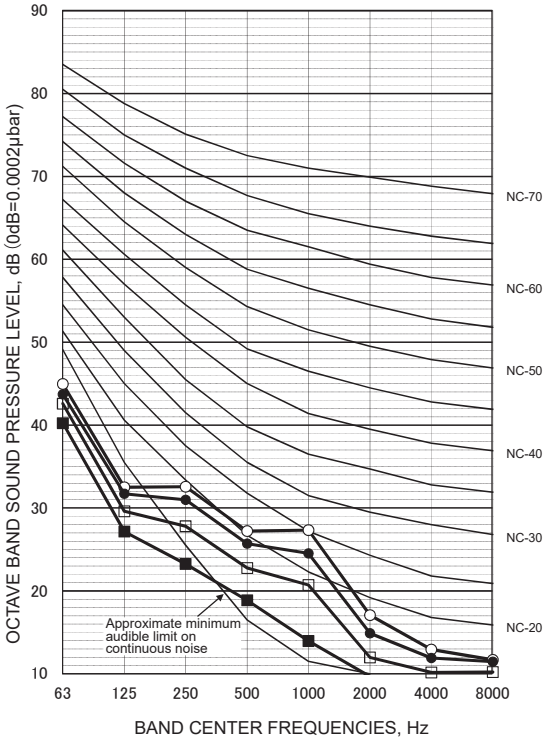
PKFY-P04NLMU-E

FAN	SPL(dB)	LINE
High	28	
Medium1	26	
Medium2	24	
Low	22	



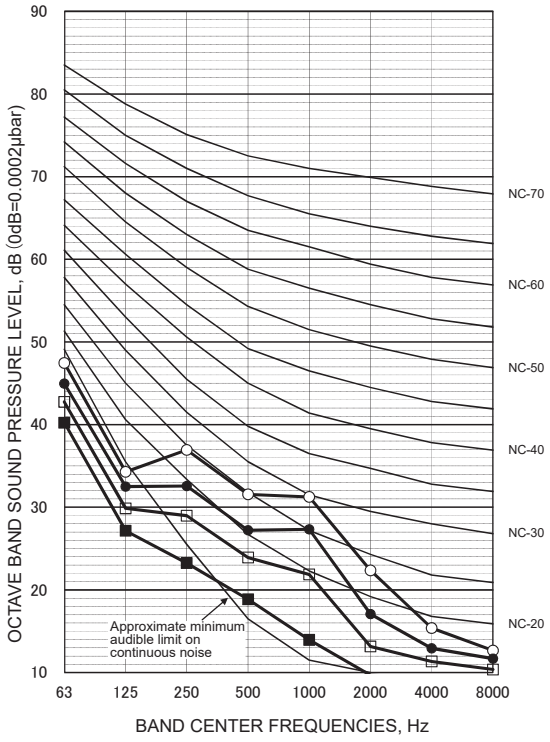
PKFY-P06NLMU-E

FAN	SPL(dB)	LINE
High	31	
Medium1	29	
Medium2	26	
Low	22	



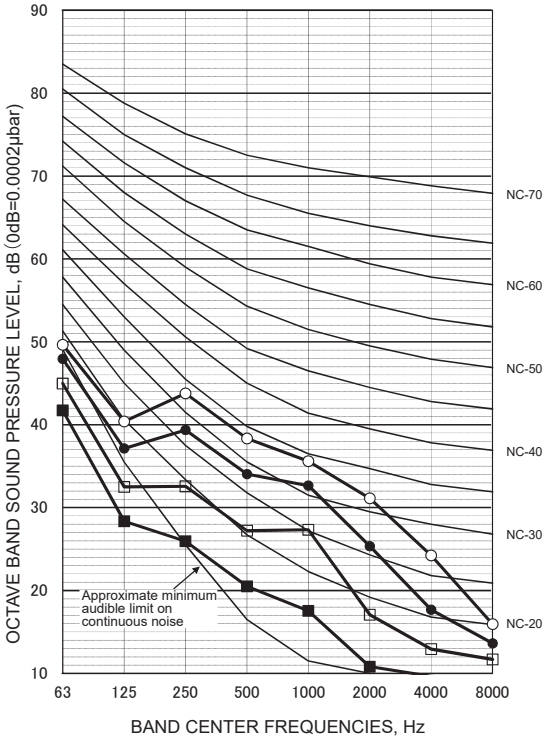
PKFY-P08NLMU-E

FAN	SPL(dB)	LINE
High	35	
Medium1	31	
Medium2	27	
Low	22	



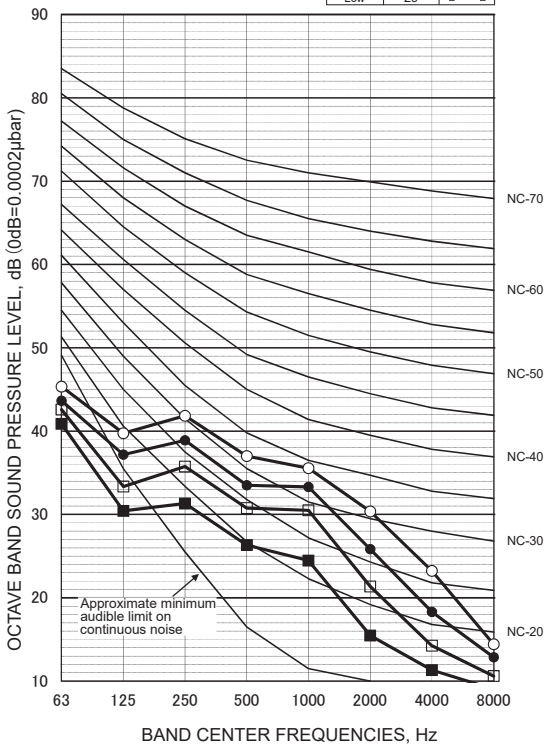
PKFY-P12NLMU-E

FAN	SPL(dB)	LINE
High	41	
Medium1	37	
Medium2	31	
Low	24	



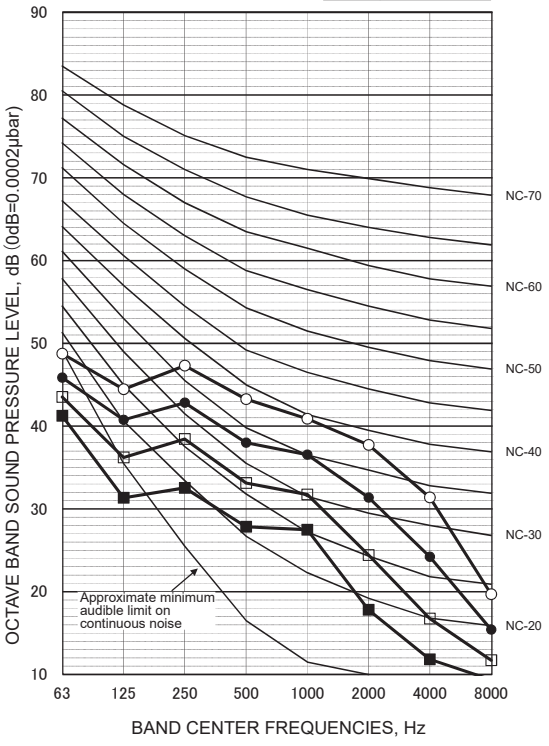
PKFY-P15NLMU-E

FAN	SPL(dB)	LINE
High	40	
Medium1	37	
Medium2	34	
Low	29	



PKFY-P18NLMU-E

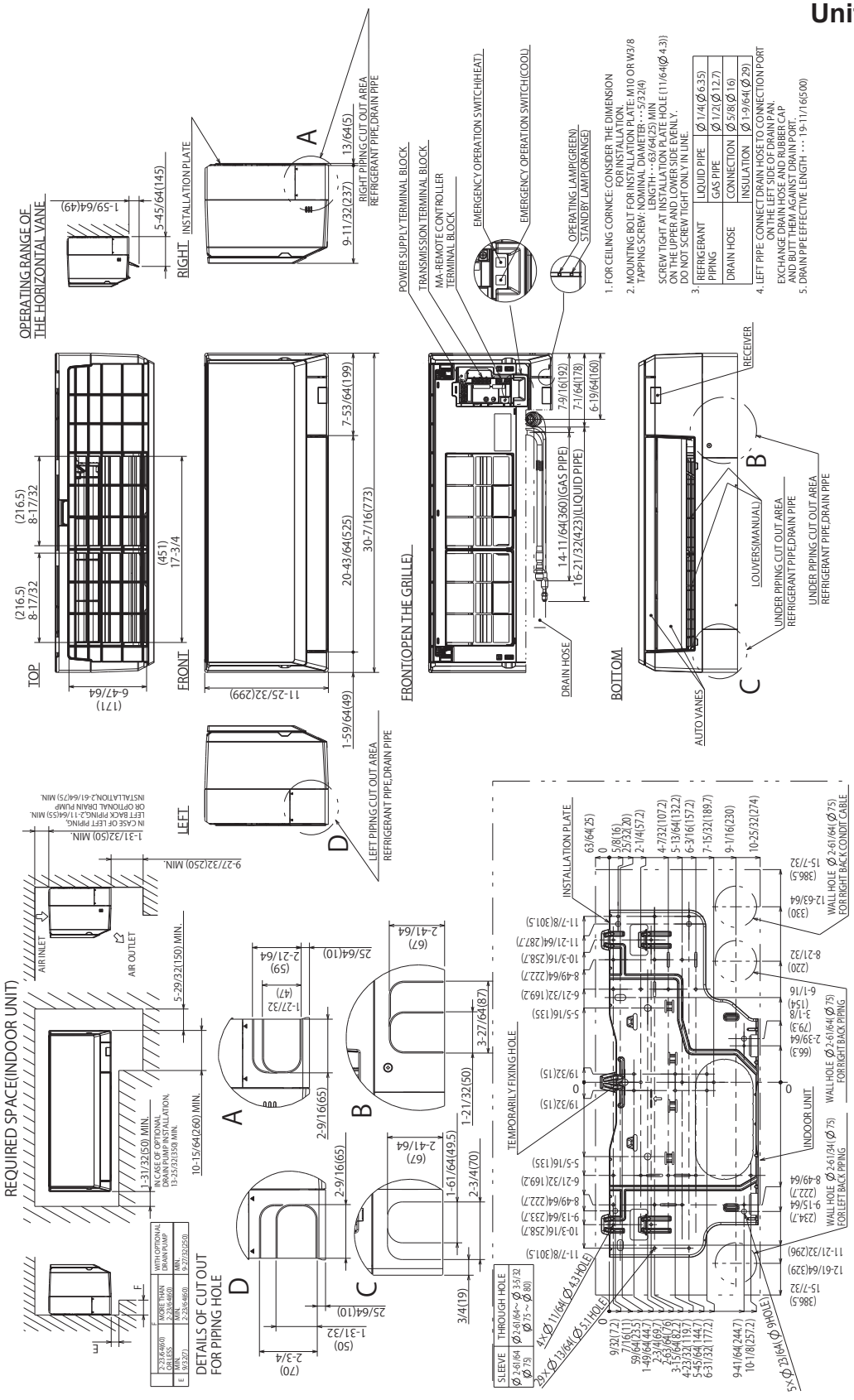
FAN	SPL(dB)	LINE
High	46	
Medium1	41	
Medium2	36	
Low	31	



5 OUTLINES AND DIMENSIONS

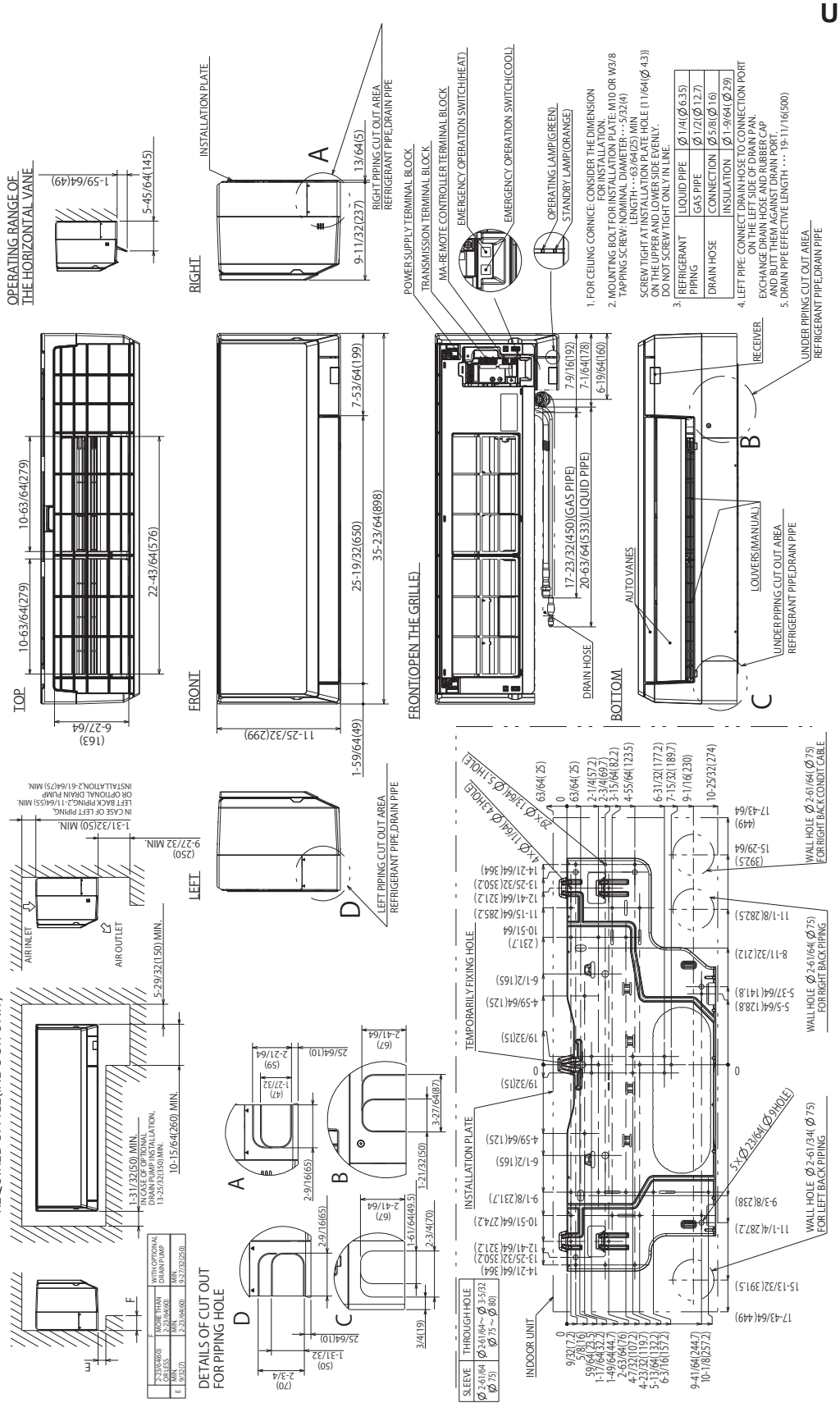
PKFY-P04NLMU-E.TH **PKFY-P06NLMU-E.TH**
PKFY-P08NLMU-E.TH **PKFY-P12NLMU-E.TH**

Unit: inch(mm)



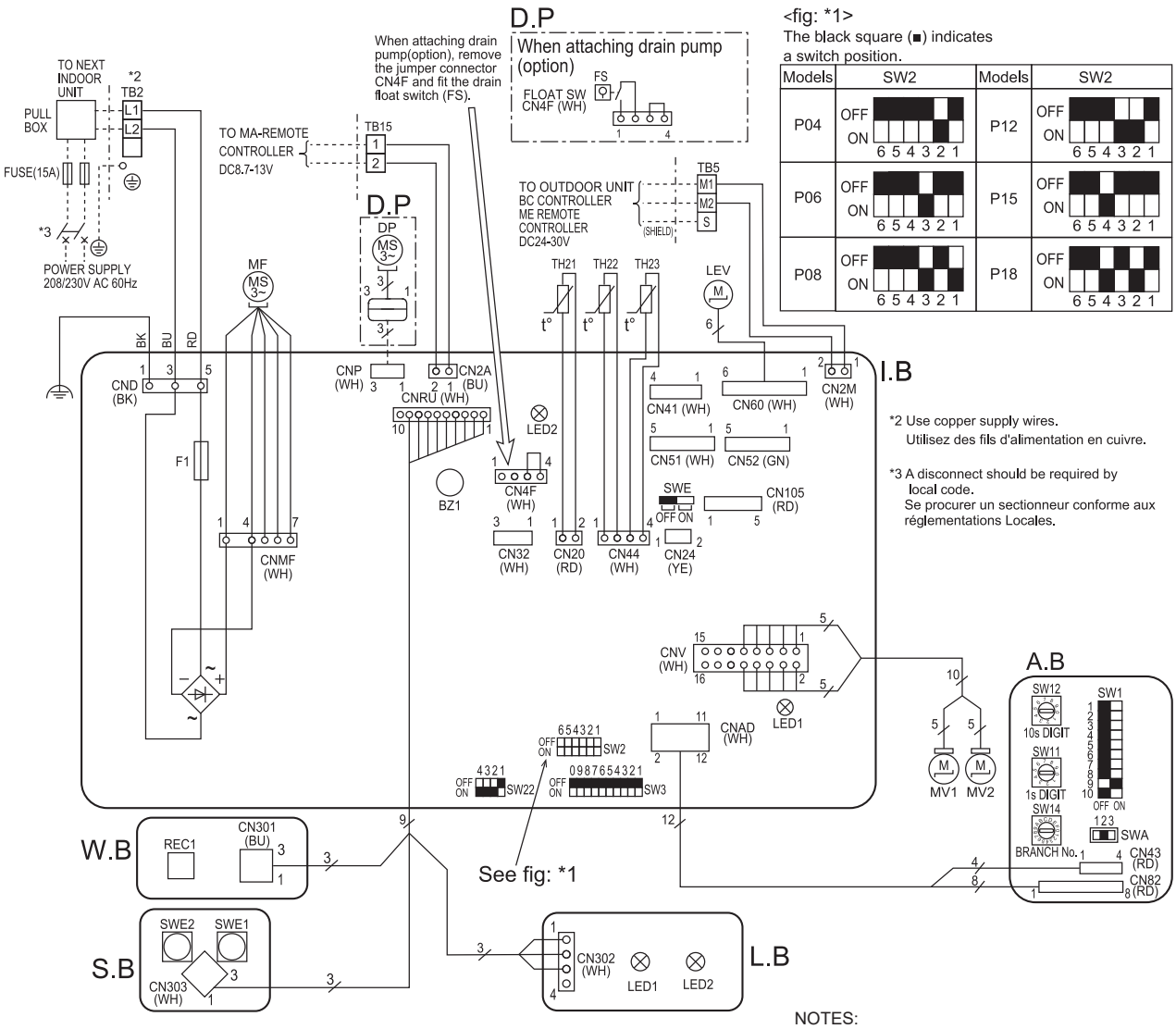
PKFY-P15NLMU-E.TH **PKFY-P18NLMU-E.TH**

Unit: inch(mm)



6 WIRING DIAGRAM

PKFY-P04NLMU-E.TH **PKFY-P06NLMU-E.TH** **PKFY-P08NLMU-E.TH**
PKFY-P12NLMU-E.TH **PKFY-P15NLMU-E.TH** **PKFY-P18NLMU-E.TH**



<fig: *1>
The black square (■) indicates a switch position.

Models	SW2	Models	SW2
P04	OFF / ON 6 5 4 3 2 1	P12	OFF / ON 6 5 4 3 2 1
P06	OFF / ON 6 5 4 3 2 1	P15	OFF / ON 6 5 4 3 2 1
P08	OFF / ON 6 5 4 3 2 1	P18	OFF / ON 6 5 4 3 2 1

SYMBOL	NAME		SYMBOL	NAME	
I.B	INDOOR CONTROLLER BOARD		TH21	THERMISTOR	ROOM TEMP. DETECTION (0°C/15kΩ, 25°C/5.4kΩ) (32°F/15kΩ, 77°F/5.4kΩ)
CN24	CONNECTOR	EXTERNAL HEATER			
CN32		REMOTE SWITCH	TH22		PIPE TEMP. DETECTION / LIQUID (0°C/15kΩ, 25°C/5.4kΩ) (32°F/15kΩ, 77°F/5.4kΩ)
CN51		CENTRALLY CONTROL			
CN52		REMOTE INDICATION	TH23		PIPE TEMP. DETECTION / GAS (0°C/15kΩ, 25°C/5.4kΩ) (32°F/15kΩ, 77°F/5.4kΩ)
CN105		IT TERMINAL			
BZ1	BUZZER		A.B	ADDRESS BOARD	
F1	FUSE (T3.15AL250V)		SW1	SWITCH	MODE SELECTION
LED1	POWER SUPPLY (I.B)		SW11		ADDRESS SETTING 1s DIGIT
LED2	POWER SUPPLY (MA-REMOTE CONTROLLER)		SW12		ADDRESS SETTING 10s DIGIT
SW2	SWITCH	CAPACITY CODE	SW14		BRANCH No.
SW3		MODE SELECTION	S.B	SWITCH BOARD	
SW22		PAIR NO. SETTING	SWE1		EMERGENCY OPERATION(HEAT)
SWE		FAN•DRAIN PUMP (TEST MODE)	SWE2		EMERGENCY OPERATION(COOL)
LEV	LINEAR EXPANSION VALVE		W.B	PCB FOR WIRELESS REMOTE CONTROLLER	
MF	FAN MOTOR		REC1	RECEIVING UNIT	
MV1	VANE MOTOR (UPPER)		L.B	LED BOARD	
MV2	VANE MOTOR (LOWER)		LED1	LED(OPERATING INDICATOR:GREEN)	
TB2	TERMINAL BLOCK	POWER SUPPLY	LED2	LED(STANDBY FOR HEATING : ORANGE)	
TB5		TRANSMISSION	D.P	DRAIN PUMP KIT (OPTION)	
TB15		MA-REMOTE CONTROLLER	FS	DRAIN FLOAT SWITCH	
			DP	DRAIN PUMP	

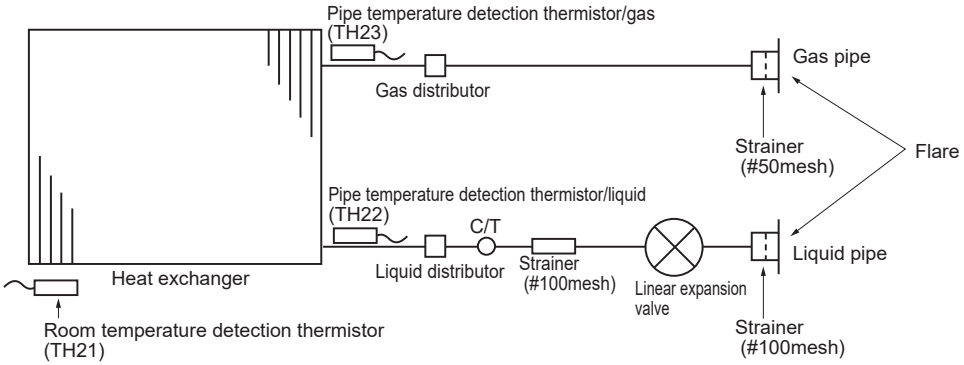
NOTES:
1. At servicing for outdoor unit,always follow the wiring diagram of outdoor unit.
2. In case of using MA-Remote controller, please connect to TB15. (Remote controller wire is non-polar.)
3. In case of using M-NET, please connect to TB5. (Transmission line is non-polar.)
4. Symbol [S]of TB5 is the shield wire connection.
5. Symbols used in wiring diagram above are, □□□ : terminal block, ○○○ □□□ :connecter.
6. The setting of the SW2 dip switches differs in the capacity. For the detail, refer to the fig : *1.

LED on indoor controller board for service

Symbol	Meaning	Function
LED1	Main power supply	Main power supply (Indoor unit:208/230V) Power on → lamp is lit
LED2	Power supply for MA-Remote controller	Power supply for MA-Remote controller on → lamp is lit

7 REFRIGERANT SYSTEM DIAGRAM

PKFY-P04NLMU-E.TH **PKFY-P06NLMU-E.TH** **PKFY-P08NLMU-E.TH**
PKFY-P12NLMU-E.TH **PKFY-P15NLMU-E.TH** **PKFY-P18NLMU-E.TH**

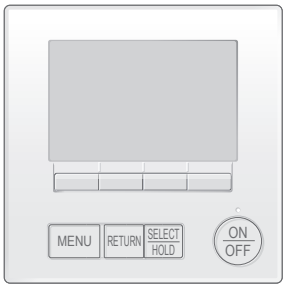


Unit: inch (mm)

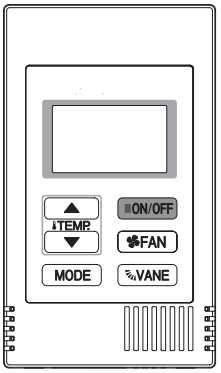
Gas pipe	ϕ1/2" (12.7)
Liquid pipe	ϕ1/4" (6.35)

8 MICROPROCESSOR CONTROL

INDOOR UNIT CONTROL
8-1. COOL OPERATION



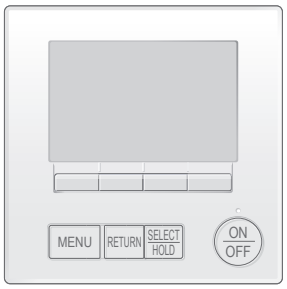
<How to operate>
① Press ON/OFF button.
② Press [F1] button to display COOL.
③ Press [F2] [F3] button to set the set temperature.
NOTE: The settable temperature range varies with the model of outdoor units and remote controller.



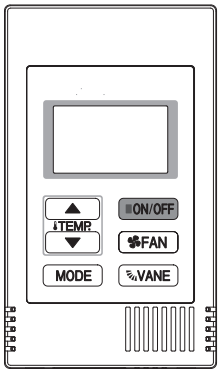
<How to operate>
① Press POWER ON/OFF button.
② Press the operation MODE button to display COOL.
③ Press the TEMP. button to set the set temperature.
NOTE: The set temperature changes 1°F when the ▽ or △ button is pressed one time. Cooling 67 to 87°F

Control Mode	Control Details	Remarks
1. Temperature adjustment function	1-1. Determining temperature adjustment function (Function to prevent restarting for 3 minutes) • Room temperature ≧ Set temperature + 2°F ⋯Thermo-ON • Room temperature ≦ Set temperature ⋯Thermo-OFF 1-2. Anti-freeze control ■ Condition to detect When the pipe temperature detection thermistor/liquid (TH22) detects 32°F or less in 16 minutes from thermo-ON, the anti-freeze control initiates, and the unit enters to the thermo-OFF. ■ Condition to release The timer which prevents reactivating is set for 3 minutes, and anti-freeze control is cancelled when any one of the following conditions has been satisfied: ① Pipe temperature detection thermistor/liquid (TH22) reaches 50°F or above. ② The condition of thermo-OFF has been completed by the thermostat. ③ The operation has changed to a mode other than COOLING.	• The ON/OFF commands by the indoor unit thermostatic control are not an ON/OFF commands to the compressor but an open/close commands to the linear expansion valve. (The compressor stops only when the thermostatic control for all the indoor units connected to the same outdoor unit turns OFF.)
2. Fan	By the remote controller setting (switch of 4 speeds+Auto) Type: 4 speeds + Auto type; Fan speed notch: Auto When [Auto] is set, fan speed is changed depending on the value of: ΔT = Room temperature − Set temperature High / Med2 / Med1 / Low 1.8°F 3.15°F 5.4°F ⊿T	
3. Drain pump	3-1. Drain pump control • The drain pump will always run when the unit is in COOL or DRY mode. (Regardless of the thermo ON/OFF) • Whenever the operation is changed over to the other modes (including Stop), the drain pump will stop pumping after approximately 3 minutes.	
	Float switch control • Float switch control judges whether the sensor is in the air or in the water by turning the float switch ON/OFF. In the water: Detected that the float switch is ON for 15 seconds. In the air: Detected that the float switch is OFF for 15 seconds Float SW ON / OFF 15 s 15 s 15 s 1 min 30 s 1 min 30 s In the water In the air In the water Error postponement Drain pump abnormal	
4. Vane (up/down vane change)	(1) The initial vane setting for COOL mode will be the horizontal position. (2) Vane position: Horizontal →Downward A →Downward B →Downward C→Downward D→Swing→Auto (3) Restriction of the downward vane setting If the vane position is set to Downward A/B/C/D in [Med1], [Med2], or [Low], the vane will return to the horizontal position after 1 hour has passed.	• "1h" appears on the wired remote controller.

8-2. DRY OPERATION



<How to operate>
① Press ON/OFF button.
② Press [F1] button to display DRY.
③ Press [F2] [F3] button to set the set temperature.

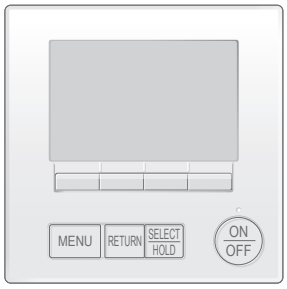


<How to operate>
① Press POWER ON/OFF button.
② Press the operation MODE button to display DRY.
③ Press the TEMP. button to set the set temperature.
NOTE: The set temperature changes 1°F when the ▽ or △ button is pressed one time. Dry 67 to 87°F

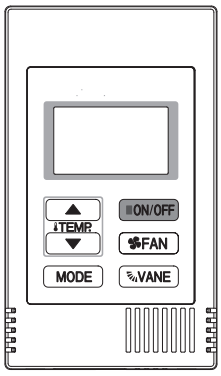
<table>
<tr><th>Control Mode</th><th>Control Details</th><th>Remarks</th></tr>
<tr><td>1. Temperature adjustment function</td><td>1-1. Determining temperature adjustment function
(Function to prevent restarting for 3 minutes)
Setting the Dry thermo by the thermostat signal and the room temperature (TH21).
Dry thermo-ON Room temperature ≧ Set temperature + 2°F
Dry thermo-OFF Room temperature ≦ Set temperature

<table>
<tr><th rowspan="2">Room temperature</th><th colspan="2">3 minutes passed since starting operation</th><th rowspan="2">Dry thermo-ON time (min)</th><th rowspan="2">Dry thermo-OFF time (min)</th></tr>
<tr><th>Thermostat signal</th><th>Room temperature (T1)</th></tr>
<tr><td rowspan="5">Over 64°F</td><td rowspan="4">ON</td><td>T1 ≧ 83°F</td><td>9</td><td>3</td></tr>
<tr><td>83°F > T1 ≧ 79°F</td><td>7</td><td>3</td></tr>
<tr><td>79°F > T1 ≧ 75°F</td><td>5</td><td>3</td></tr>
<tr><td>75°F > T1</td><td>3</td><td>3</td></tr>
<tr><td>OFF</td><td>Unconditional</td><td>3</td><td>10</td></tr>
<tr><td>Below 64°F</td><td colspan="4">Dry thermo OFF</td></tr>
</table>
1-2. Anti-freeze control
No control function</td><td></td></tr>
<tr><td>2. Fan</td><td>Indoor fan operation controlled depends on the compressor conditions.
<table>
<tr><th>Dry thermo</th><th colspan="2">Fan speed notch</th></tr>
<tr><td>ON</td><td colspan="2">[Low]</td></tr>
<tr><td rowspan="2">OFF</td><td>Excluding the following</td><td>Stop</td></tr>
<tr><td>Room temp. < 64°F</td><td>[Low]</td></tr>
</table>
Note: Fan speed change is not allowed during DRY operation.</td><td></td></tr>
<tr><td>3. Drain pump</td><td>Operates as it would in COOL operation.</td><td></td></tr>
<tr><td>4. Vane (up/down vane change)</td><td>Settings are the same in DRY operation as they are in COOL operation.</td><td></td></tr>
</table>

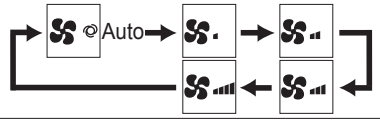
8-3. FAN OPERATION



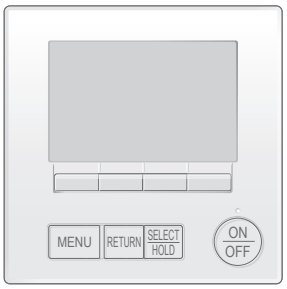
<How to operate>
① Press ON/OFF button.
② Press [F1] button to display FAN.



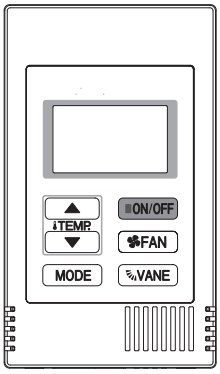
<How to operate>
① Press POWER ON/OFF button.
② Press the operation MODE button to display FAN.

Control Mode	Control Details	Remarks
1. Temperature adjustment function	Set by remote controller. Type: 4 speeds + Auto type Fan speed notch:  When [Auto] is set, fan speed becomes [Low].	
2. Drain pump	2-1. Drain pump control The drain pump turns ON for the specified amount of time when any of the following conditions has been satisfied: ① ON for 3 minutes after the operation mode is switched from COOL or DRY to another operation mode (FAN). ② ON for 6 minutes after the float switch is submerged in the water when the float switch control judges the sensor is in the water.	
	2-2. Float switch control • Float switch control judges whether the sensor is in the air or in the water by turning the float switch ON/OFF. In the water : Detected that the float switch is ON for 15 seconds. In the air : Detected that the float switch is OFF for 15 seconds.	• Operates as it would in COOL operation.
3. Vane (up/down vane change)	Same as the control performed during the COOL operation, but with no restriction on the vane's downward blow setting	

8-4. HEAT OPERATION



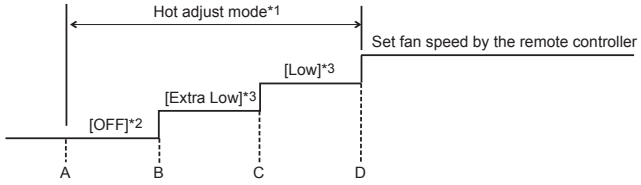
<How to operate>
① Press ON/OFF button.
② Press [F1] button to display HEAT.
③ Press [F2] [F3] button to set the set temperature.
NOTE: The settable temperature range varies with the model of outdoor units and remote controller.



<How to operate>
① Press POWER ON/OFF button.
② Press the operation MODE button to display HEAT.
③ Press the TEMP. button to set the set temperature.
NOTE: The set temperature changes 1°F when the ▽ or △ button is pressed one time. Heating 63 to 83°F

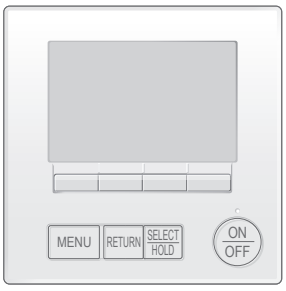
Control Mode	Control Details	Remarks
1. Temperature adjustment function	1-1. Determining temperature adjustment function (Function to prevent restarting for 3 minutes) • Room temperature ≦ Set temperature −2°F ···Thermo-ON • Room temperature ≧ Set temperature ···Thermo-OFF	
2. Fan	By the remote controller setting (switch of 4 speeds+Auto) Type: 4 speeds + Auto type — Fan speed notch: Auto → ↔ When [Auto] is set, fan speed is changed depending on the value of: ΔT = Set temperature − Room temperature Give priority to under-mentioned controlled mode 2-1. Hot adjust mode 2-2. Residual heat exclusion mode 2-3. Thermo-OFF mode (When the compressor off by the temperature adjustment function) 2-4. Cool air prevention mode (Defrosting mode)	

Continue to the next page.

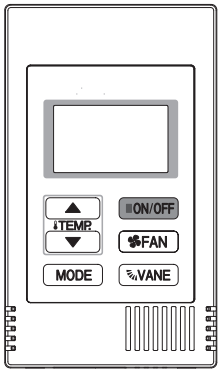
<table>
<tr><th>Control Mode</th><th>Control Details</th><th>Remarks</th></tr>
<tr><td></td><td>2-1. Hot adjust mode
The fan controller becomes the hot adjuster mode for the following conditions.
① When starting the HEAT operation
② When the temperature adjustment function changes from OFF to ON.
③ When release the HEAT defrosting operation
 

A: Hot adjust mode starts.
B: 5 minutes have passed since the condition A or the indoor liquid pipe temperature reached 86°F or more.
C: 5 minutes have passed since the condition A or the indoor liquid pipe temperature reached 95°F or more.
D: 2minutes have passed since the condition C.
(Terminating the hot adjust mode)
<table><tr><th colspan="2" rowspan="2"></th><th colspan="2">DIP SW 1-8</th></tr><tr><th>ON</th><th>OFF</th></tr><tr><td rowspan="2">DIP SW 1-7</td><td>ON</td><td>B to C [Extra Low]
C to D [Low]</td><td>B to C [Low]
C to D [Low]</td></tr><tr><td>OFF</td><td>B to C [Setting airflow]
C to D [Setting airflow]</td><td>B to C [Extra Low]
C to D [Low]
Note: Initial setting</td></tr></table></td><td>*1 "Heat Standby" will be displayed during the hot adjust mode.
*2 The step change of A to B will not be performed at the first thermo-ON mode since the HEAT operation has started.
*3 The fan speed varies according to the setting of DIP SW1-7 and 1-8 as shown in the table below.</td></tr>
<tr><td></td><td>2-2. Residual heat exclusion mode
When the condition changes the auxiliary heater ON to OFF (temperature adjustment function, or operation stop, etc.), the indoor fan operates in [Low] mode for 1 minute.</td><td>• This control is same for the model without auxiliary heater.</td></tr>
<tr><td></td><td>2-3. Thermo-OFF mode
When the temperature adjustment function changes to OFF, the indoor fan operates in [Extra low].</td><td></td></tr>
<tr><td></td><td>2-4. Heat defrosting mode
The indoor fan stops.</td><td></td></tr>
<tr><td>3. Drain pump</td><td>3-1. Drain pump control
The drain pump turns ON for the specified amount of time when any of the following conditions has been satisfied:
① ON for 3 minutes after the operation mode is switched from COOL or DRY to another operation mode (FAN).
② ON for 6 minutes after the float switch is submerged in the water when the float switch control judges the sensor is in the water.</td><td></td></tr>
<tr><td></td><td>3-2. Float switch control
• Float switch control judges whether the sensor is in the air or in the water by turning the float switch ON/OFF.
In the water: Detected that the float switch is ON for 15 seconds.
In the air : Detected that the float switch is OFF for 15 seconds.</td><td>• Operates as it would in COOL operation.</td></tr>
<tr><td>4. Vane control (Up/down vane change)</td><td>(1) Initial setting: OFF → HEAT⋯[last setting]
When the last setting is [Swing] ⋯ [Downward D]
When changing the mode from exception of HEAT to HEAT operation
⋯[Downward D]
(2) Vane position:
Horizontal →Downward A →Downward B →Downward C→Downward D→Swing→Auto
(3) Restriction of vane position
① The vane is horizontally fixed for the following modes.
(The control by the remote controller is temporally invalidated and control by the unit.)
• Thermo-OFF
• Hot adjust [Extra low] mode
• Heat defrost mode</td><td></td></tr>
</table>

8-5. AUTO OPERATION [AUTOMATIC COOL/HEAT CHANGE OVER OPERATION]



<How to operate>
① Press ON/OFF button.
② Press [F1] button to display AUTO.
③ Press [F2] [F3] button to set the set temperature.
NOTE: The settable temperature range varies with the model of outdoor units and remote controller.



<How to operate>
① Press POWER ON/OFF button.
② Press the operation MODE button to display AUTO.
③ Press the TEMP. button to set the set temperature.
NOTE: The set temperature changes 1°F when the ▽ or △ button is pressed one time. Automatic 67 to 83°F

Control Mode	Control Details	Remarks
1. Initial value of operation mode	HEAT mode for room temperature < Set temperature COOL mode for room temperature ≧ Set temperature	
2. Mode change	(1) HEAT mode → COOL mode Room temperature ≧ Set temperature + 3°F or 3 minutes have passed. (2) COOL mode → HEAT mode Room temperature ≦ Set temperature − 3°F or 3 minutes have passed.	
3. COOL mode	Operates as it would in COOL operation.	
4. HEAT mode	Operates as it would in HEAT operation.	

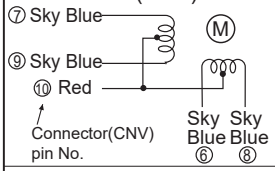
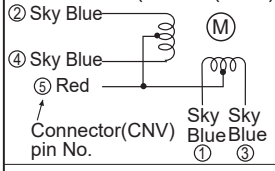
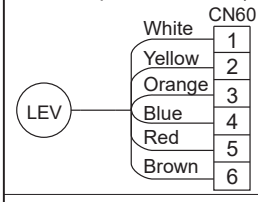
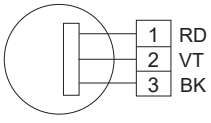
8-6. WHEN UNIT IS STOPPED CONTROL MODE

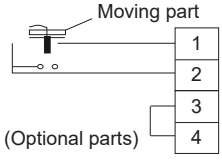
Control Mode	Control Details	Remarks
1. Drain pump	1-1. Drain pump control The drain pump turns ON for the specified amount of time when any of the following conditions has been satisfied: ① ON for 3 minutes after the operation mode is switched from COOL or DRY to another operation mode (FAN). ② ON for 6 minutes after the float switch is submerged in the water when the float switch control judges the sensor is in the water.	
	1-2. Float switch control • Float switch control judges whether the sensor is in the air or in the water by turning the float switch ON/OFF. In the water : Detected that the float switch is ON for 15 seconds. In the air : Detected that the float switch is OFF for 15 seconds.	• Operates as it would in COOL operation.

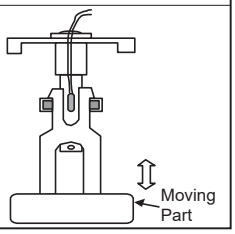
9 TROUBLESHOOTING

9-1. HOW TO CHECK THE PARTS

PKFY-P04NLMU-E.TH PKFY-P06NLMU-E.TH PKFY-P08NLMU-E.TH
PKFY-P12NLMU-E.TH PKFY-P15NLMU-E.TH PKFY-P18NLMU-E.TH

<table>
<tr><th>Parts name</th><th>Check points</th></tr>
<tr><td>Room temperature detection thermistor (TH21)
Pipe temperature detection thermistor/liquid (TH22)
Pipe temperature detection thermistor/gas (TH23)</td><td>Disconnect the connector then measure the resistance with a tester.
(At the ambient temperature 10 to 30℃)
<table><tr><th>Normal</th></tr><tr><td>4.3 to 9.6 kΩ</td></tr></table>Refer to “8-1-1. Thermistor”.</td></tr>
<tr><td>Vane motor (MV1)
 
</td><td>Measure the resistance between the terminals with a tester. (At the ambient temperature 25℃)
<table><tr><th colspan="4">Normal</th></tr><tr><td>⑩-⑨
Red-Sky Blue</td><td>⑩-⑧
Red-Sky Blue</td><td>⑩-⑦
Red-Sky Blue</td><td>⑩-⑥
Red-Sky Blue</td></tr><tr><td colspan="4">300 Ω±7%</td></tr></table></td></tr>
<tr><td>Vane motor (Lower (MV2))
 
</td><td>Measure the resistance between the terminals with a tester. (At the ambient temperature 25℃)
<table><tr><th colspan="4">Normal</th></tr><tr><td>⑤-④
Red-Sky Blue</td><td>⑤-③
Red-Sky Blue</td><td>⑤-②
Red-Sky Blue</td><td>⑤-①
Red-Sky Blue</td></tr><tr><td colspan="4">300±26.3 Ω</td></tr></table></td></tr>
<tr><td>Fan motor (MF)</td><td>Refer to “8-1-3. DC Fan motor (fan motor/indoor controller board)</td></tr>
<tr><td>Linear expansion valve (LEV)
 
</td><td>Disconnect the connector then measure the resistance valve with a tester. (Coil temperature 20℃)
<table><tr><th colspan="4">Normal</th></tr><tr><td>(1)-(5)
White-Red</td><td>(2)-(6)
Yellow-Brown</td><td>(3)-(5)
Orange-Red</td><td>(4)-(6)
Blue-Brown</td></tr><tr><td colspan="4">200 Ω±10%</td></tr></table></td></tr>
<tr><td>Drain pump (DP)
 

(Optional parts)</td><td>① Check if the drain float switch works properly.
② Check if the drain pump works and drains water properly in cooling operation.
③ If no water drains, confirm that the check code 2502 will not be displayed 10 minutes after the operation starts.
Note: The drain pump for this model is driven by the internal DC motor, so it is not possible to measure the resistance between the terminals.
Normal: Red–Black: Input 13 V DC → The pump motor starts to rotate.</td></tr>
<tr><td>Drain float switch (FS)
 

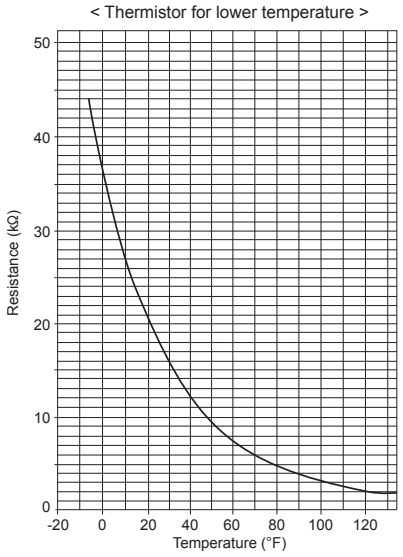
(Optional parts)</td><td>Measure the resistance between the terminals with a tester.
<table><tr><th>State of moving part</th><th>Normal</th><th>Abnormal</th><th>Drain float switch connector terminal</th></tr><tr><td>UP</td><td>Short</td><td>Other than short</td><td>①(+) – ②(-)</td></tr><tr><td>DOWN</td><td>Open</td><td>Other than open</td><td>①(+) – ②(-)</td></tr><tr><td>–</td><td>Short</td><td>Other than short</td><td>③(+) – ④(-)</td></tr></table> 
</td></tr>
</table>

9-1-1. Thermistor

<Thermistor characteristic graph>

Thermistor for lower temperature

Room temperature detection thermistor (TH21)
Pipe temperature detection thermistor/liquid (TH22)
Pipe temperature detection thermistor/gas (TH23)



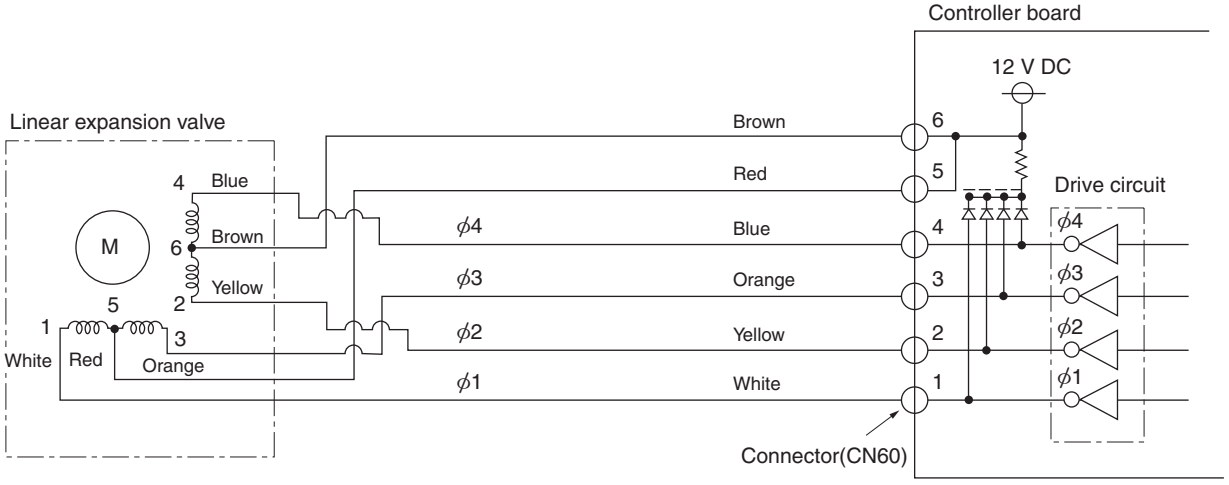
Thermistor R_0=15 kΩ ± 3%
Fixed number of B=3480 ± 2%

$$Rt=15\exp\{3480(\frac{1}{273+(t-32)/1.8}-\frac{1}{273})\}$$

30°F	15.8 kΩ
50°F	9.6 kΩ
70°F	6.0 kΩ
80°F	4.8 kΩ
90°F	3.9 kΩ
100°F	3.2 kΩ

9-1-2. Linear expansion valve

① **Operation summary of the linear expansion valve**
• Linear expansion valve opens/closes through stepping motor after receiving the pulse signal from the indoor controller board.
• Valve position can be changed in proportion to the number of pulse signal.
<Connection between the indoor controller board and the linear expansion valve>



Note : Since the number of the connector at the controller board side and the relay connector are different, follow the color of the lead wire.

9-1-3. DC Fan motor (fan motor/indoor controller board)

Check method of indoor fan motor (fan motor/indoor controller board)

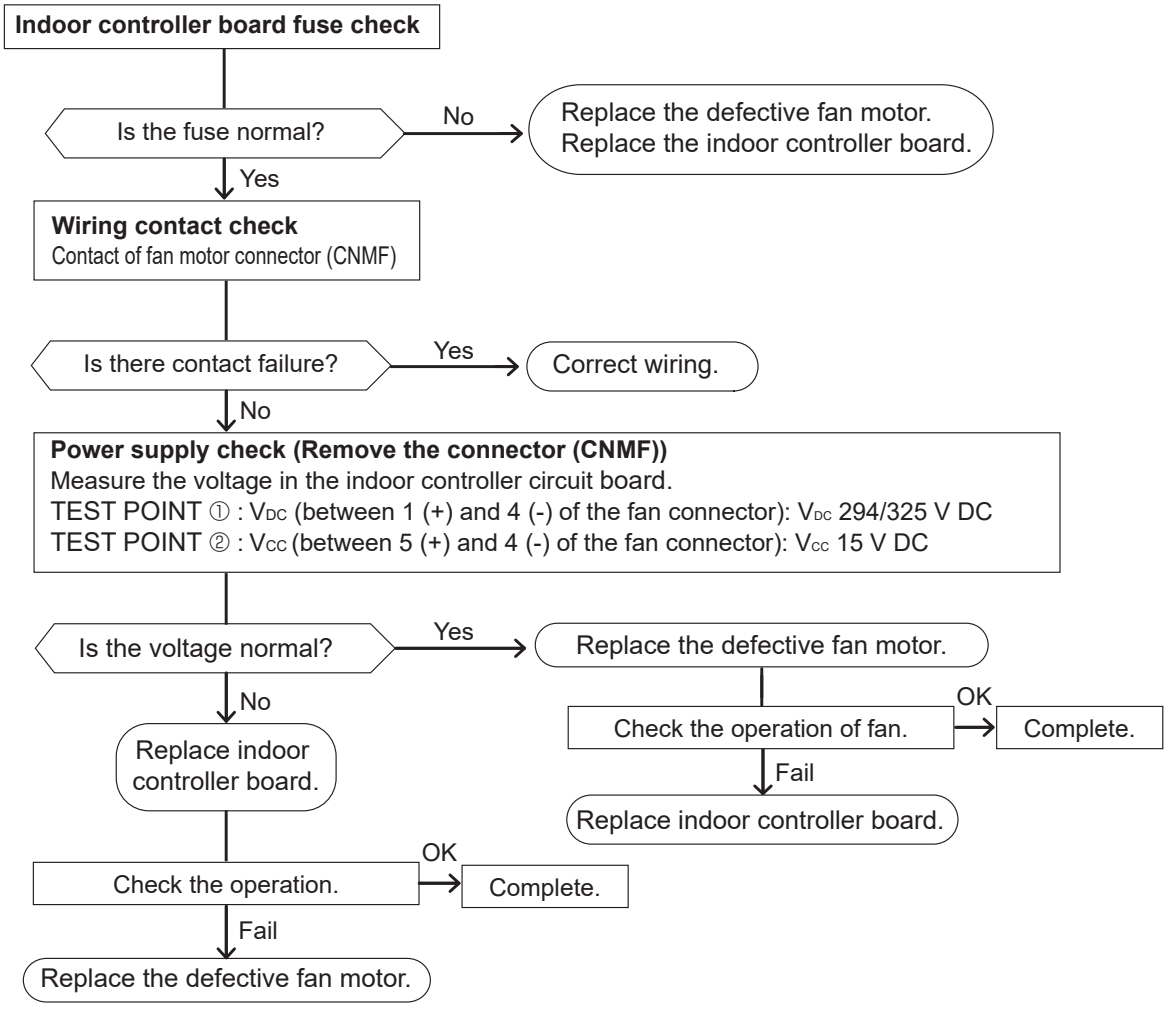
① Notes

· High voltage is applied to the connector (CNMF) for the fan motor. Pay attention to the service.

· Do not pull out the connecter (CNMF) for the motor with the power supply on.
(It causes trouble of the indoor controller board and fan motor.)

② Self check

Conditions : The indoor fan cannot rotate.



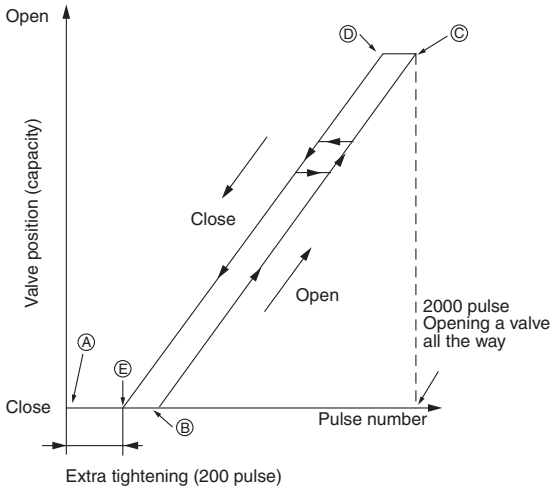
<Output pulse signal and the valve operation>

Output (Phase)	Output			
	1	2	3	4
ϕ1	ON	OFF	OFF	ON
ϕ2	ON	ON	OFF	OFF
ϕ3	OFF	ON	ON	OFF
ϕ4	OFF	OFF	ON	ON

The output pulse shifts in below order.
Closing a valve : 1 → 2 → 3 → 4 → 1
Opening a valve : 4 → 3 → 2 → 1 → 4

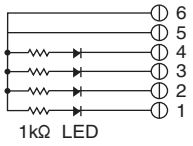
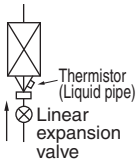
- When linear expansion valve operation stops, all output phase become OFF.
- At phase interruption or when phase does not shift in order, motor does not rotate smoothly and motor will lock and vibrate.

② Linear expansion valve operation



- When the power is turned on, 2200 pulse closing valve signal will be sent till it goes to point Ⓐ in order to define the valve position.
- When the valve moves smoothly, there is no noise or vibration occurring from the linear expansion valves : however, when the pulse number moves from Ⓔ to Ⓐ or when the valve is locked, more noise can be heard than in a normal situation.
- Noise can be detected by placing the ear against the screw driver handle while putting the screw driver tip to the linear expansion valve.

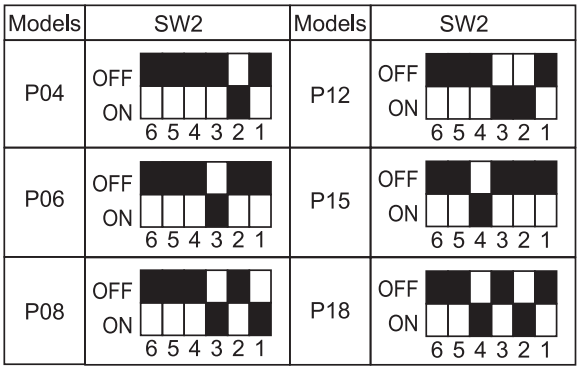
③ Troubleshooting

Symptom	Check points	Countermeasures
Operation circuit failure of the micro- processor	Disconnect the connector on the controller board, then connect LED for checking.  When power is turned on, pulse signals will output for 10 seconds. There must be some defects in the operation circuit if the LED does not light while the signals are output or keeps lighting even after the signals stop.	Exchange the indoor controller board at drive circuit failure.
Linear expansion valve mechanism is locked.	Motor will idle and make a ticking noise when the motor is operated while the linear expansion valve is locked. This ticking sound is the sign of the abnormality.	Exchange the linear expansion valve.
Short or breakage of the motor coil of the linear expansion valve	Measure the resistance between each coil (white-red, yellow-brown, orange-red, blue-brown) using a tester. It is normal if the resistance is in the range of 200 Ω ±10%.	Exchange the linear expansion valve.
Valve does not close completely.	To check the linear expansion valve, operate the indoor unit in fan mode and at the same time operate other indoor units in cooling mode, then check the pipe temperature <liquid pipe temperature> of the indoor unit by the outdoor multi controller board operation monitor. During fan operation, linear expansion valve is closed completely and if there is any leaking, detecting temperature of the thermistor will go lower. If the detected temperature is much lower than the temperature indicated in the remote controller, it means the valve is not closed all the way. It is not necessary to exchange the linear expansion valve, if the leakage is small and not affecting normal operation. 	If large amount of refrigerant is leaked, exchange the linear expansion valve.
Wrong connection of the connector or contact failure	Check the color of lead wire and missing terminal of the connector.	Disconnect the connector at the controller board, then check the continuity.

9-2. FUNCTION OF DIP SWITCH

PKFY-P04NLMU-E.TH PKFY-P06NLMU-E.TH PKFY-P08NLMU-E.TH
PKFY-P12NLMU-E.TH PKFY-P15NLMU-E.TH PKFY-P18NLMU-E.TH

The black square (■) indicates a switch position.

Switch	Pole	Function	Operation by switch		Effective timing	Remarks
			ON	OFF		
SW1 Mode Selection	1	Thermistor <Intake temperature detection> position	Built-in remote controller	Indoor unit	Under suspension	Address board <Initial setting> ON / OFF 1 2 3 4 5 6 7 8 9 10 *1 The model is not capable of fresh air intake. *2 Refer to <Table A> below.
	2	Filter clogging	Provided	Not provided		
	3	Filter sign indication	2,500 hr	100 hr		
	4	Air intake*1	Not effective	Not effective		
	5	Remote indication switching	Thermo-ON signal indication	Fan output indication		
	6	Humidifier control	Fan operation at Heating mode	Thermo-ON operation at heating mode		
	7	Air flow set in case of heat thermo-OFF	Low*2	Extra low*2		
	8		Setting air flow*1	Depends on SW1-7		
	9	Auto restart function	Effective	Not effective		
	10	Power ON/OFF	Effective	Not effective		
SW2 Capacity code setting	1–4				Before power supply ON	Indoor controller board <Initial setting> Set for each capacity.
SW3 Function Selection	1	Heat pump/Cool only	Cooling only	Heat pump	Under suspension	Indoor controller board <Initial setting> ON / OFF 1 2 3 4 5 6 7 8 9 0
	2	—	—	—		
	3	—	—	—		
	4	—	—	—		
	5	—	—	—		
	6	—	—	—		
	7	Changing the opening of linear expansion valve	Effective	Not effective		
	8	Heating 4 degree up	Not effective	Effective		
	9	—	—	—		
	10	—	—	—		

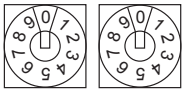
<Table A>

SW1-7	SW1-8	
OFF	OFF	Extra low
ON	OFF	Low
OFF	ON	Setting air flow
ON	ON	stop

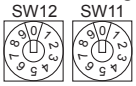
Continue to the next page

The black square (■) indicates a switch position.

<table>
<tr><th>Switch</th><th>Pole</th><th>Function</th><th>Effective timing</th><th>Remarks</th></tr>
<tr><td>SW11
1s digit address setting

SW12
10s digit address setting</td><td>Rotary switch</td><td>SW12 SW11
 
10 1

Address setting should be done when M-NET remote controller is being used.</td><td rowspan="2">Before power supply ON</td><td>Address board

<Initial setting>
SW12 SW11
  </td></tr>
<tr><td>SW14
Connection No. setting</td><td>Rotary switch</td><td>SW14
 

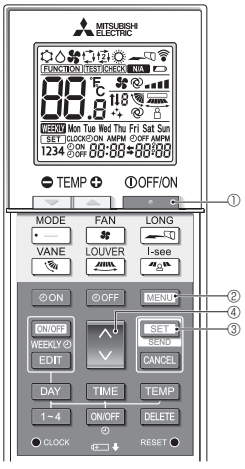
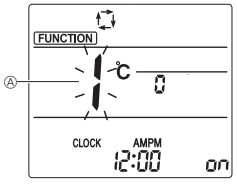
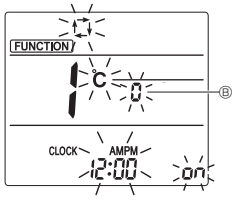
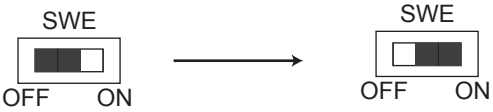
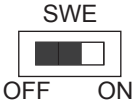
This is the switch to be used when the indoor unit is operated with R2 series outdoor unit as a set.</td><td>Address board

<Initial setting>
SW14
  </td></tr>
<tr><td>SW22
Function selection</td><td>Jumper</td><td>
<table>
<tr><th></th><th>Function</th><th>ON</th><th>OFF</th></tr>
<tr><td>1</td><td>—</td><td>—</td><td>—</td></tr>
<tr><td>2</td><td>—</td><td>—</td><td>—</td></tr>
<tr><td>3</td><td>Pair No. of wireless remote controller</td><td rowspan="2">Depends on SW22-3, 22-4</td></tr>
<tr><td>4</td><td>Pair No. of wireless remote controller</td></tr>
</table>
• To operate each indoor unit by each remote controller when installed 2 indoor units or more are near, Pair No. setting is necessary.
●Pair No. setting is available with the 4 patterns (Setting patterns A to D).

• You may not set it when operating it by one remote controller. Setting for indoor unit.

Wireless remote controller pair number:
●Setting operation (Fig. 1 Ⓐ)
1. Press the [·] button ① to stop the air conditioner.
2. Press the [MENU] button ②.
3. Check that function No."1" is displayed, and then press the [SET] button ③. The Screen display setting screen will be displayed. (Fig. 2.)

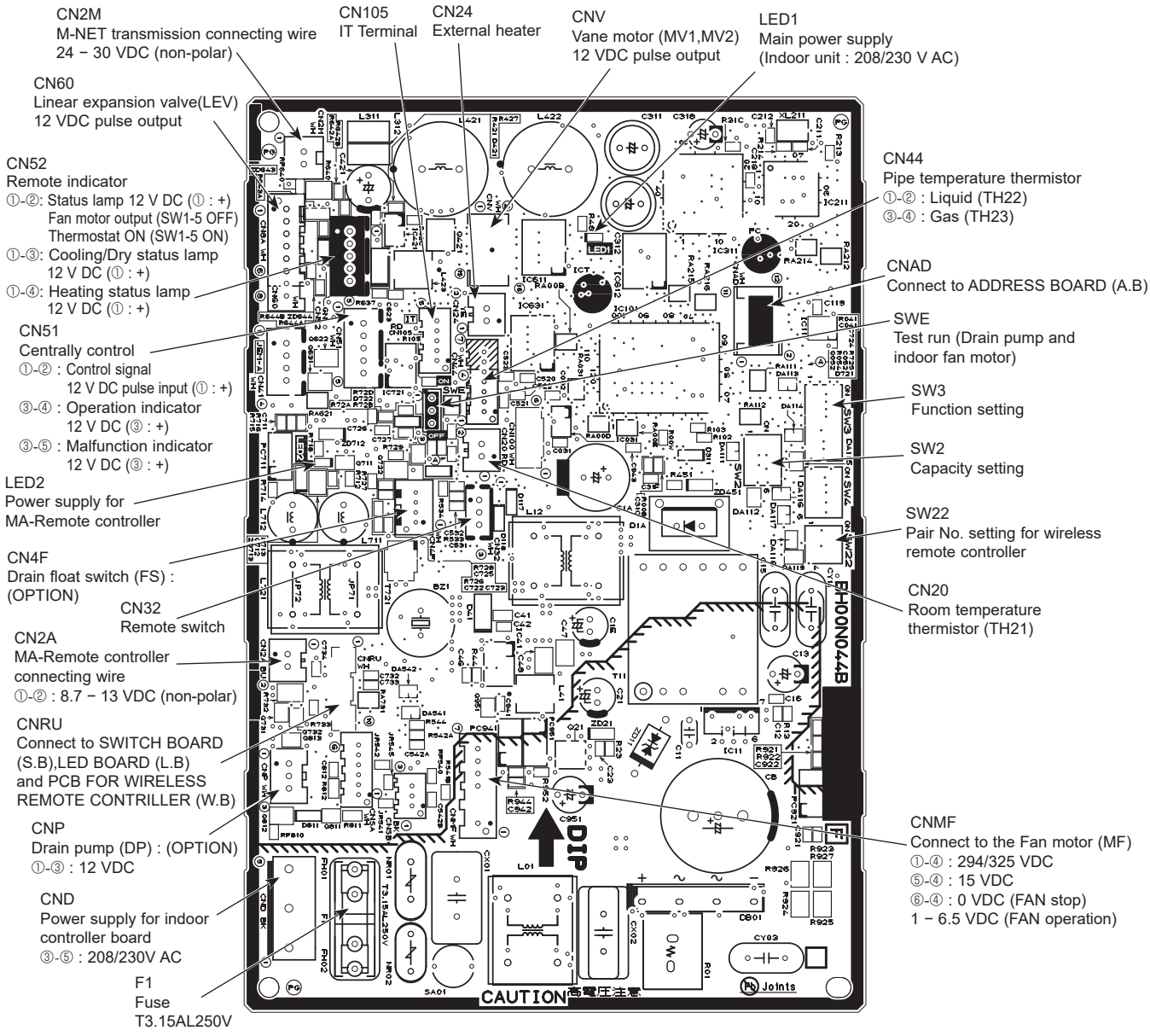
●Pair No. changing operation (Fig. 2 Ⓑ)
1. Press the [∧∨] button ④.
2. Each time the [∧∨] button ④ is pressed, the pair No.0–3 changes.
3. Press the [SET] button ③ to check the setting.
4. Press the [MENU] button ②.

<table>
<tr><th colspan="2">Indoor unit SW22</th><th rowspan="2">Pair No. of wireless remote controller</th><th></th></tr>
<tr><th>SW22-3</th><th>SW22-4</th><th></th></tr>
<tr><td>ON</td><td>ON</td><td>0</td><td>Initial setting</td></tr>
<tr><td>OFF</td><td>ON</td><td>1</td><td>—</td></tr>
<tr><td>ON</td><td>OFF</td><td>2</td><td>—</td></tr>
<tr><td>OFF</td><td>OFF</td><td>3–9</td><td>—</td></tr>
</table>
</td><td>Under operation or suspension</td><td><Initial setting>
 
 
Fig. 1
 
Fig. 2</td></tr>
<tr><td>SWE
Test run for Drain pump</td><td>Connector</td><td>Drain pump and fan are activated simultaneously after the connector SWE is set to ON and turn on the power.
 
The connector SWE is set to OFF after test run.</td><td>Under operation</td><td><Initial setting>
  </td></tr>
</table>

9-3. TEST POINT DIAGRAM

9-3-1. Indoor controller board (I.B)

PKFY-P04NLMU-E.TH **PKFY-P06NLMU-E.TH** **PKFY-P08NLMU-E.TH**
PKFY-P12NLMU-E.TH **PKFY-P15NLMU-E.TH** **PKFY-P18NLMU-E.TH**

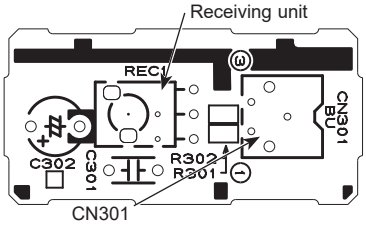


Note: The voltage range of 12 V DC in this page is between 11.5 to 13.7 V DC.

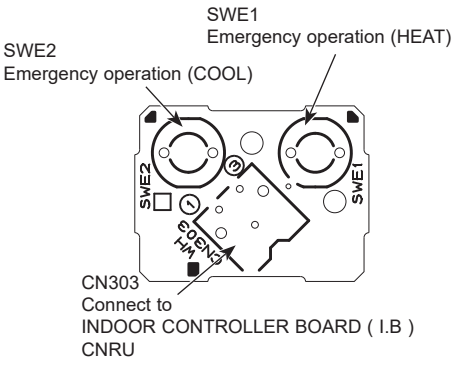
9-3-2. PCB FOR WIRELESS REMOTE CONTROLLER (W.B), SWITCH BOARD (S.B) and LED BOARD (L.B)

PKFY-P04NLMU-E.TH **PKFY-P06NLMU-E.TH** **PKFY-P08NLMU-E.TH**
PKFY-P12NLMU-E.TH **PKFY-P15NLMU-E.TH** **PKFY-P18NLMU-E.TH**

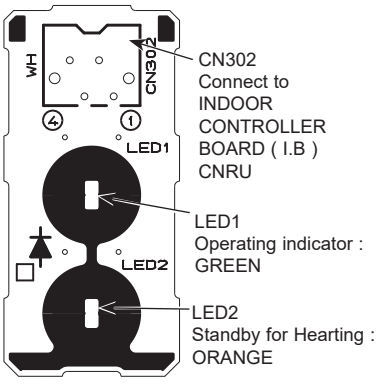
PCB FOR WIRELESS REMOTE CONTROLLER (W.B)



SWITCH BOARD (S.B)

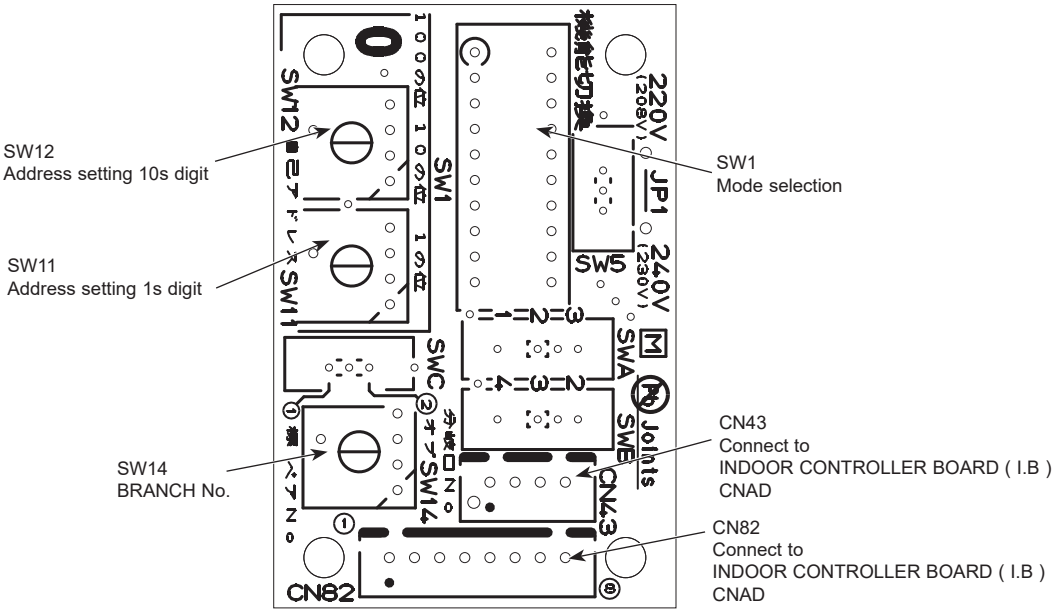


LED BOARD (L.B)



9-3-3. Address board (A.B)

PKFY-P04NLMU-E.TH **PKFY-P06NLMU-E.TH** **PKFY-P08NLMU-E.TH**
PKFY-P12NLMU-E.TH **PKFY-P15NLMU-E.TH** **PKFY-P18NLMU-E.TH**



10 DISASSEMBLY PROCEDURE

PKFY-P04NLMU-E.TH **PKFY-P06NLMU-E.TH** **PKFY-P08NLMU-E.TH**
PKFY-P12NLMU-E.TH **PKFY-P15NLMU-E.TH** **PKFY-P18NLMU-E.TH**

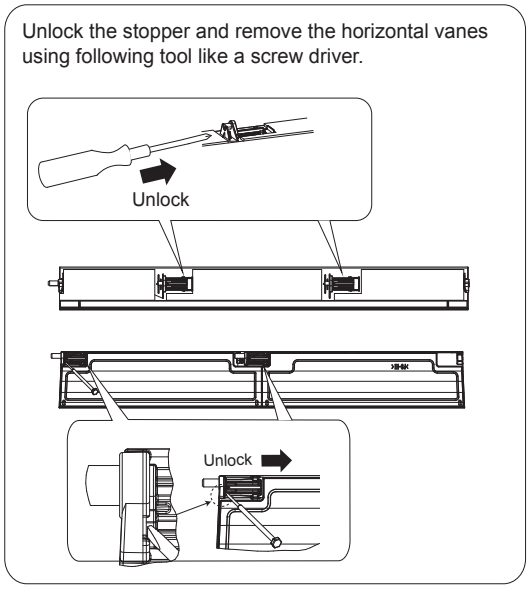
Be careful when removing heavy parts.
NOTE: Turn OFF the power supply before assembly.

——→ : Indicates the visible parts in the photos/figures.
--------→ : Indicates the invisible parts in the photos/figures.

OPERATION PROCEDURE

1. REMOVING THE PANEL

(1) Insert the driver to the hole at VANE LOWER shaft and slide the VANE LOWER shaft (2 places each). Push VANE UPPER shaft with the driver.
(2) Pull the VANE LOWER and VANE UPPER from unit.
(3) Remove 2 screw caps of the front panel. Remove 2 screws. (See Photo 1)
(4) Hold the lower part of both ends of the front panel and pull it slightly toward you, and then remove the front panel by pushing it upward.
(5) Remove the screw of the corner box. (See Photo 1)
Remove the corner box.



2. REMOVING THE ELECTRICAL BOX

(1) Remove the panel and the corner box. (Refer procedure to 1)
(2) Remove the front and side electrical box covers (each 2 screw). (See Photo 2)
(3) Disconnect the connectors below.
CNMF : For fan motor
CN44 : For indoor piping (2 phase pipe and liquid pipe)
CN60 : For LEV
(4) Disconnect the connectors below.
CN2M : For transmission
CND : For power supply
CN2A : For MA-remote controller
(5) Disconnect the connector for ground wire.
(6) Remove the screw on lower side of the electrical box. (See Photo 3)
(7) Push up the upper fixture catch to remove the box, then remove it from the box fixture.

PHOTOS/FIGURES

Photo 1

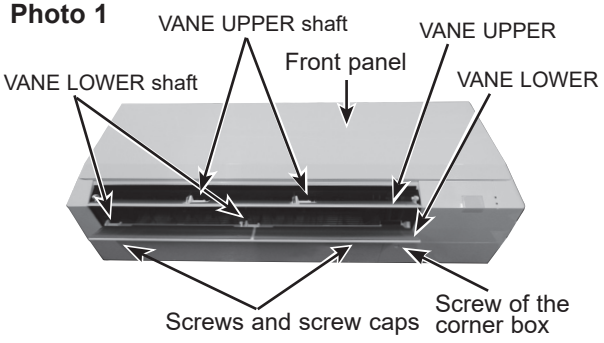


Photo 2

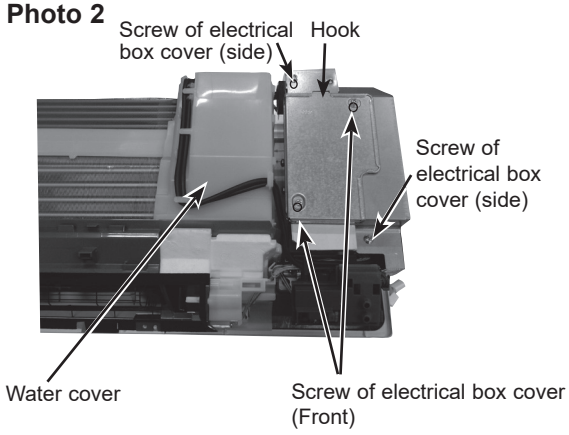
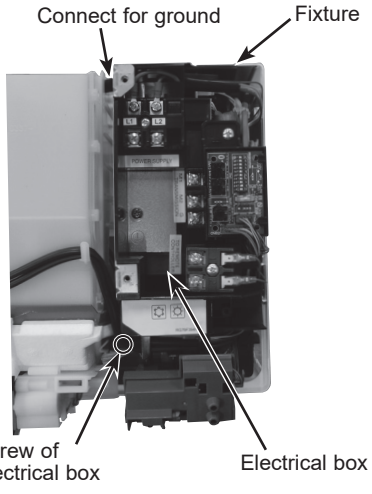


Photo 3



OPERATION PROCEDURE

3. REMOVING THE ADDRESS BOARD, THE INDOOR CONTROLLER BOARD, THE WIRELESS CONTROLLER BOARD, LED BOARD

(1) Remove the panel and the corner box. (Refer to procedure 1)
(2) Remove the front and side electrical box covers (each 2 screw).
(3) Disconnect the connectors of address board.
(4) Disconnect the connectors on the indoor controller board. (See Photo 4)
(5) Remove the switch board holder and open the cover.
(6) Pull out the indoor controller board toward you then remove the indoor controller board and switch board. (See Photo 4)
(7) Remove the holder of wireless remote controller board and LED board.
(8) Disconnect the connector of wireless remote controller board and LED board.
(9) Remove the wireless remote controller board and LED board from the holder.

4. REMOVING THE NOZZLE ASSEMBLY (with VANE and VANE MOTOR) AND DRAIN HOSE

(1) Remove the panel and corner box. (Refer to procedure 1)
(2) Remove the electrical box covers. (Refer to procedure 2)
(3) Disconnect the vane motor connector (CNV) on the indoor controller board.
(4) Push fixture and pull out the drain hose from the nozzle assembly, and remove nozzle assembly. (See Photo 6)

5. REMOVING THE VANE MOTOR

(1) Remove the nozzle assembly. (Refer to procedure 4)
(2) Remove 2 screws of the vane motor unit cover, and pull out the vane motor unit. (See Photo 6)
(3) Remove screw of the vane motor (LOWER).
(4) Remove the vane motor (LOWER) from the vane motor unit cover.
(5) Disconnect the connector (white) from the vane motor. (LOWER)
(6) Remove 2 screw of the vane motor (UPPER).
(7) Remove the vane motor (UPPER) from the vane motor unit cover. (See Photo 7)
(8) Disconnect the connector (blue) from the vane motor (UPPER).

PHOTOS/FIGURES

Photo 4

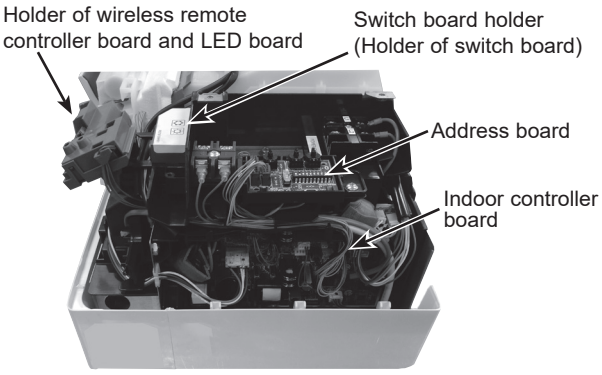


Photo 5 (see the bottom)

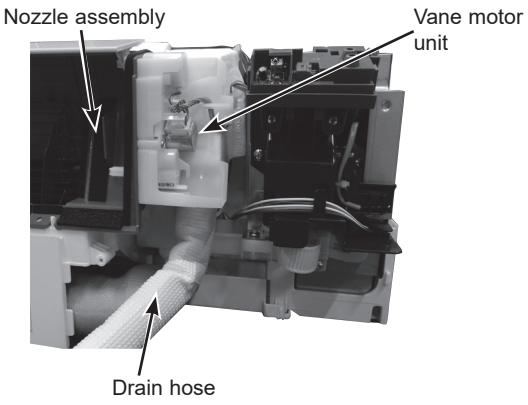


Photo 6

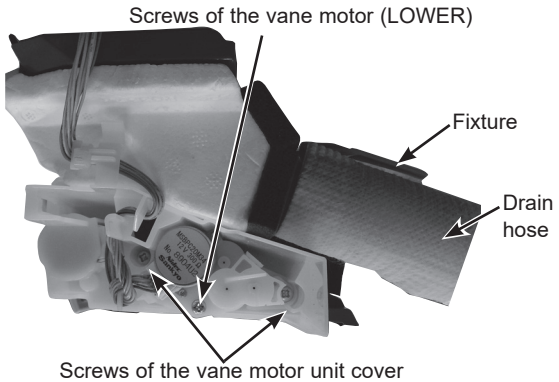
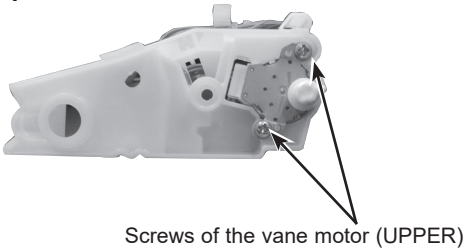
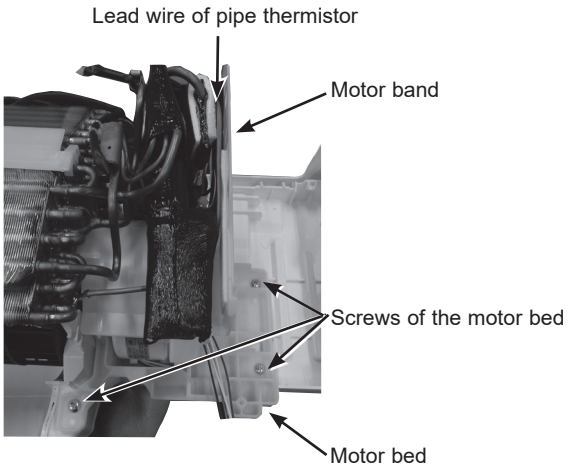
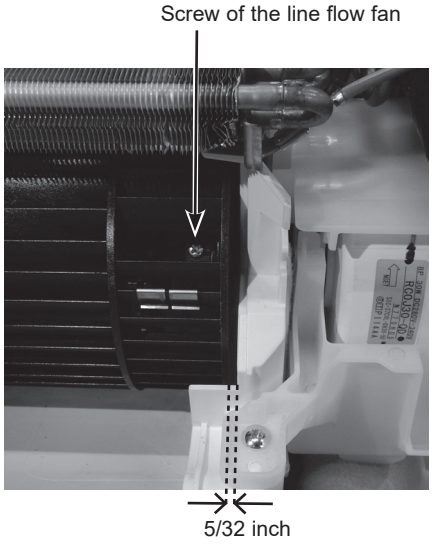
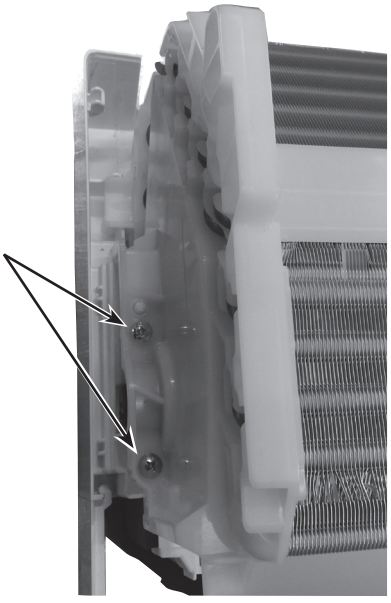
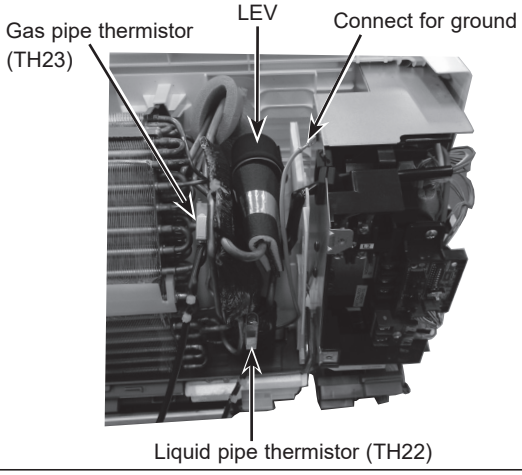
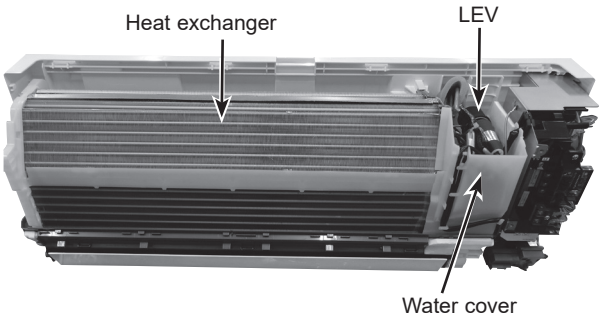
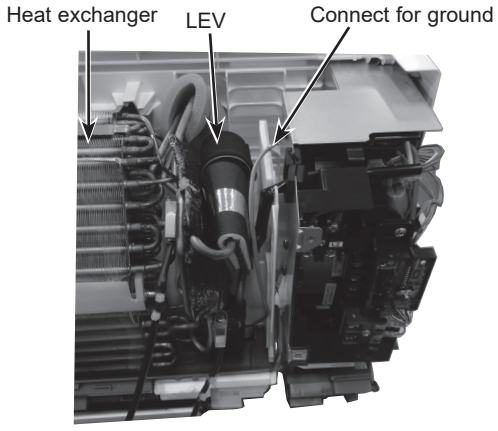
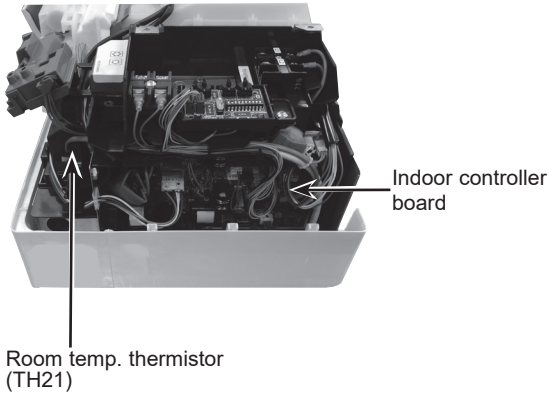


Photo 7



OPERATION PROCEDURE	PHOTOS/FIGURES
6. REMOVING THE INDOOR FAN MOTOR AND THE LINE FLOW FAN (1) Remove the panel and the corner box. (Refer to procedure 1) (2) Remove the electrical box (Refer to procedure 2) and the nozzle assembly (Refer to procedure 4). (3) Remove the water cover. (See Photo 2) (4) Loosen the screw fixing the line flow fan. (See Photo 9) (5) Remove 3 screws fixing the motor bed. (See Photo 8) (6) Remove the motor bed together with fan motor and motor band. (7) Release the 2 hooks of the motor band. Remove the motor band. Pull out the indoor fan motor. (8) Remove 2 screws fixing the left side of the heat exchanger. (See Photo 10) (9) Lift the heat exchanger, and pull out the line flow fan to the lower-left. * When attaching the line flow fan, screw the line flow fan so 4mm gap is provided between the right end of the line flow fan and the right wall of the air passage of the box. (Photo 9)	**Photo 8**  **Photo 9** 
Photo 10  	
7. REMOVING THE LIQUID PIPE THERMISTOR AND GAS PIPE THERMISTOR (1) Remove the panel and the corner box. (Refer to procedure 1) (2) Remove the electrical box covers. (Refer to procedure 2) (3) Remove the water cover. (See Photo 2) (4) Remove the liquid pipe thermistor and gas pipe thermistors. (5) Disconnect the connector (CN44) on the indoor controller board. (TH22 and TH23/CN44)	**Photo 11** 

OPERATION PROCEDURE	PHOTOS/FIGURES
8. REMOVING THE HEAT EXCHANGER AND LEV (1) Remove the panel and the corner box (Refer to procedure 1). (2) Remove the electrical box (Refer to procedure 3) and the nozzle assembly (Refer to procedure 4). (3) Remove the water cover. (4) Remove the pipe thermistors. (Refer to procedure 7). (5) Disconnect the connector (CN60) on the indoor controller board. (6) Remove the motor bed together with fan motor and motor band (Refer to procedure 6). (7) Remove 2 screws fixing the left side of the heat exchanger. (See Photo 10) (8) Remove the heat exchanger with LEV.	**Photo 12**  **Photo 13** 
9. REMOVING THE ROOM TEMPERATURE THERMISTOR (1) Remove the panel and corner box. (Refer to procedure 1) (2) Remove the electrical box covers. (Refer to procedure 2) (3) Remove the room temperature thermistor. (4) Disconnect the connector (CN20) on the indoor controller board.	**Photo 14** 

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BUILDING, 2-7-3, MARUNOUCHI, CHIYODA-KU TOKYO 100-8310, JAPAN

Issued: Jun. 2021 No. OCH715 REVISED EDITION-A
Published: Mar. 2020 No. OCH715
Made in Japan

Changes for the Better

MITSUBISHI ELECTRIC

SPLIT-TYPE, HEAT PUMP AIR CONDITIONERS

April 2012
No. OC341
REVISED EDITION-F

TECHNICAL & SERVICE MANUAL

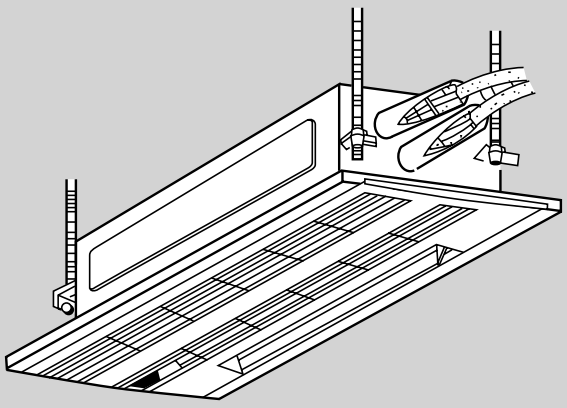
CITY MULTI Series Ceiling Cassettes R410A / R22

Indoor unit [Model names]	[Service Ref.]	
PMFY-P06NBMU-E	PMFY-P06NBMU-E	PMFY-P06NBMU-E$_1$
	PMFY-P06NBMU-E#2	PMFY-P06NBMU-ER3
	PMFY-P06NBMU-ER4	PMFY-P06NBMU-ER5
PMFY-P08NBMU-E	PMFY-P08NBMU-E	PMFY-P08NBMU-E$_1$
	PMFY-P08NBMU-E#2	PMFY-P08NBMU-ER3
	PMFY-P08NBMU-ER4	PMFY-P08NBMU-ER5
PMFY-P12NBMU-E	PMFY-P12NBMU-E	PMFY-P12NBMU-E$_1$
	PMFY-P12NBMU-E#2	PMFY-P12NBMU-ER3
	PMFY-P12NBMU-ER4	PMFY-P12NBMU-ER5
PMFY-P15NBMU-E	PMFY-P15NBMU-E	PMFY-P15NBMU-E$_1$
	PMFY-P15NBMU-E#2	PMFY-P15NBMU-ER3
	PMFY-P15NBMU-ER4	PMFY-P15NBMU-ER5

Revision:
- PMFY-P06/08/12/15NBMU-ER5 have been added in REVISED EDITION-F.
- Some descriptions have been modified.

- Please void OC341 REVISED EDITION-E.

NOTE:
- This manual describes only service data of the indoor units.
- RoHS compliant products have <G> mark on the spec name plate.
- For servicing RoHS compliant products, refer to the RoHS PARTS LIST.



INDOOR UNIT

CONTENTS

CITY MULTI

Use the specified refrigerant only

Never use any refrigerant other than that specified.

Doing so may cause a burst, an explosion, or fire when the unit is being used, serviced, or disposed of.
Correct refrigerant is specified in the manuals and on the spec labels provided with our products.
We will not be held responsible for mechanical failure, system malfunction, unit breakdown or accidents caused by failure to follow the instructions.

1 TECHNICAL CHANGES

PMFY-P06NBMU-ER4 → PMFY-P06NBMU-ER5
PMFY-P08NBMU-ER4 → PMFY-P08NBMU-ER5
PMFY-P12NBMU-ER4 → PMFY-P12NBMU-ER5
PMFY-P15NBMU-ER4 → PMFY-P15NBMU-ER5

• INDOOR CONTROLLER BOARD (I.B) has been changed. (S/W version up)

PMFY-P06NBMU-ER3 → PMFY-P06NBMU-ER4
PMFY-P08NBMU-ER3 → PMFY-P08NBMU-ER4
PMFY-P12NBMU-ER3 → PMFY-P12NBMU-ER4
PMFY-P15NBMU-ER3 → PMFY-P15NBMU-ER4

1. DRAIN PIPE has been changed.
2. JOINT SOCKET (FOR DRAIN PIPE) has been added.

PMFY-P06NBMU-E#2 → PMFY-P06NBMU-ER3
PMFY-P08NBMU-E#2 → PMFY-P08NBMU-ER3
PMFY-P12NBMU-E#2 → PMFY-P12NBMU-ER3
PMFY-P15NBMU-E#2 → PMFY-P15NBMU-ER3

• CONTROLLER BOARD (I.B) has been changed. (It is possible to extract a signal for an external heater.)

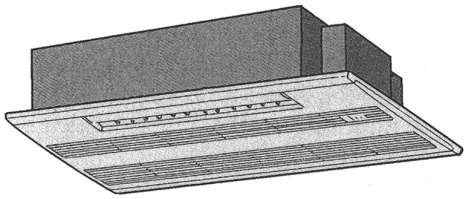
PMFY-P06NBMU-E$_1$ → PMFY-P06NBMU-E#2
PMFY-P08NBMU-E$_1$ → PMFY-P08NBMU-E#2
PMFY-P12NBMU-E$_1$ → PMFY-P12NBMU-E#2
PMFY-P15NBMU-E$_1$ → PMFY-P15NBMU-E#2

1. CONTROLLER BOARD (I.B) has been changed.
2. PANEL has been changed.
   PMP-16BMU → PMP-16BMUW
   (White : 0.98Y 8.99/0.63) (Pure white : 6.4Y 8.9/0.4)
3. FAN MOTOR (MF) has been changed.
4. THERMISTORs (TH22, TH23) have been changed.

PMFY-P06NBMU-E → PMFY-P06NBMU-E$_1$
PMFY-P08NBMU-E → PMFY-P08NBMU-E$_1$
PMFY-P12NBMU-E → PMFY-P12NBMU-E$_1$
PMFY-P15NBMU-E → PMFY-P15NBMU-E$_1$

1. FAN MOTOR (MF) has been changed.
2. CONTROLLER BOARD (I.B) has been changed.

2 FEATURES



Indoor Unit

Models	Cooling capacity / Heating capacity
PMFY-P06NBMU-E	6,000 / 6,700 Btu/h
PMFY-P08NBMU-E	8,000 / 9,000 Btu/h
PMFY-P12NBMU-E	12,000 / 13,500 Btu/h
PMFY-P15NBMU-E	15,000 / 17,000 Btu/h

1. Fresh Air Intake

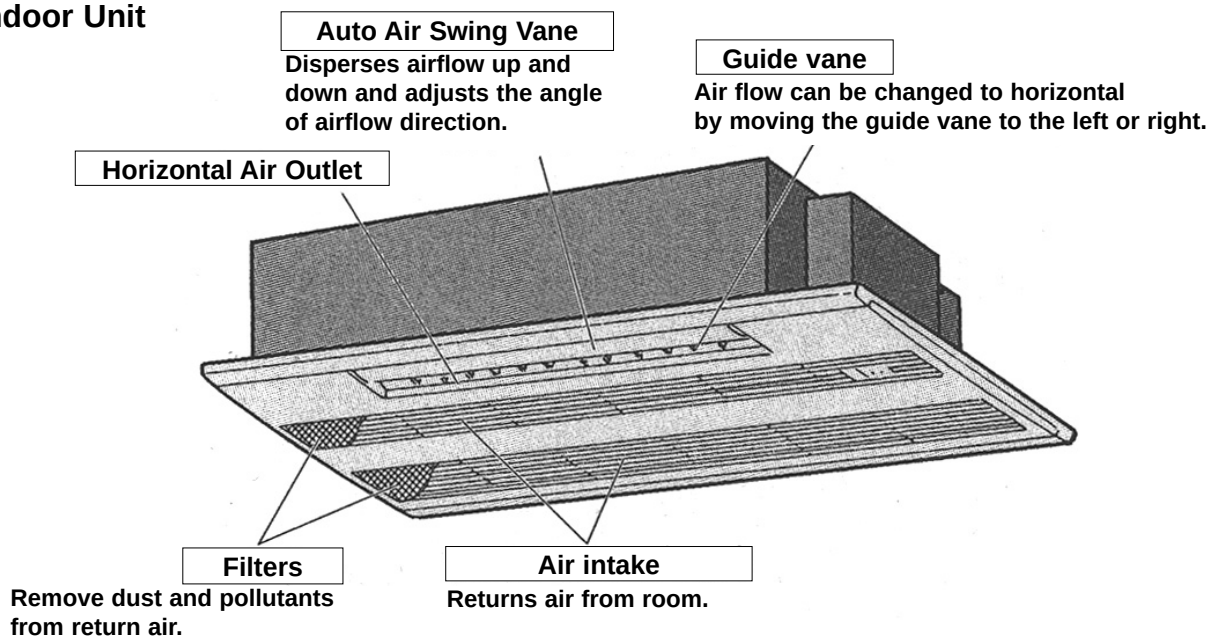
Air recycled indefinitely can become stale and stagnant with air quality suffering significantly. Fresh air is the answer and it is for this reason that the PMFY- series takes in air directly from outdoors. This fresh air intake allows you to enjoy the comfort of crisp, refreshing air in the confines of your living or working space.

2. Light and Compact

The main unit weighs only 31 lb. and the panel merely 7 lb. This makes the PMFY- series one of the lightest in the industry. The unit size is also quite small, having been standardized to a strikingly compact 33-5/8 inch. All of this make the chore of installation and maintenance that much simpler and easier.

3 PART NAMES AND FUNCTIONS

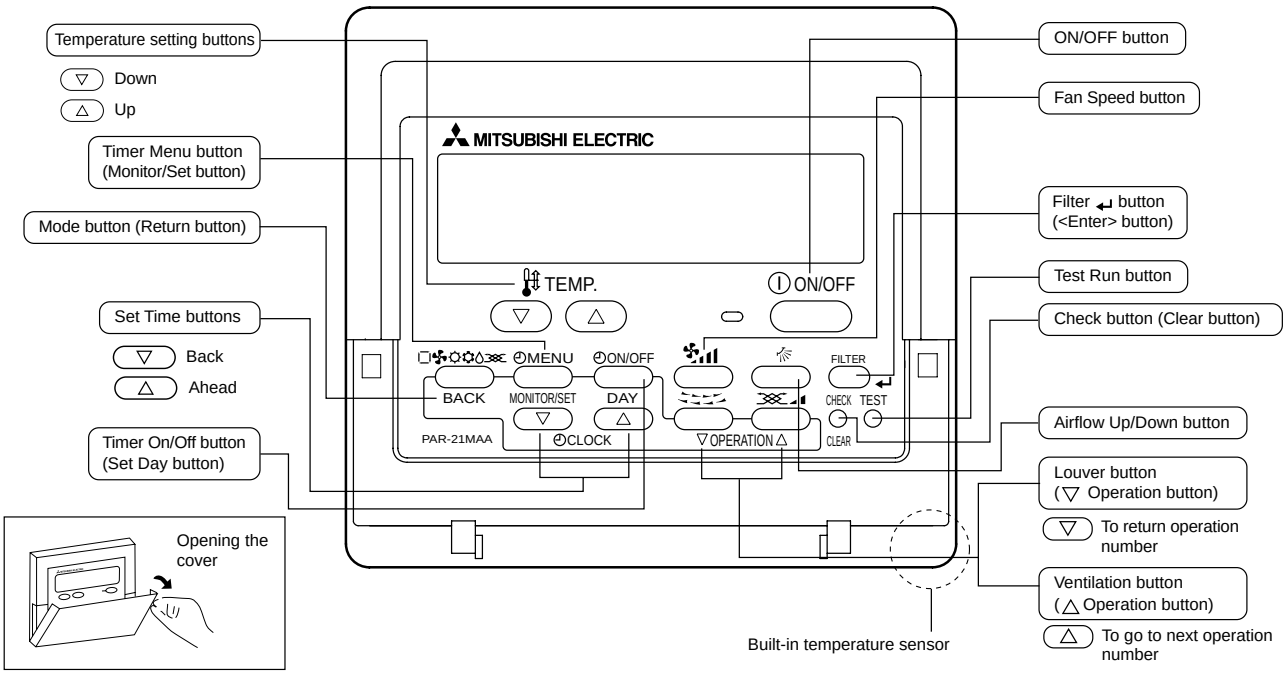
• Indoor Unit



● Wired remote controller

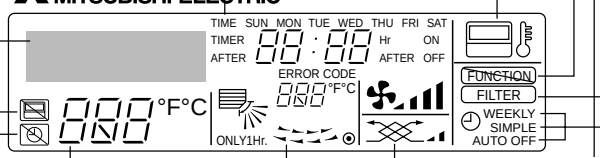
Once the controllers are set, the same operation mode can be repeated by simply pressing the ON/OFF button.

Note:
The phrase "Wired remote controller" in this manual refers only to the PAR-21MAA.
If you need any information for the other remote controller, please refer to either the installation manual or initial setting manual which are included in remote controller's box.



Display Section

For the purposes of this explanation, all parts of the display are shown. During actual operation, only the relevant items will be lit.



Day-of-Week
Shows the current day of the week.

Time/Timer Display
Shows the current time, unless the simple or Auto Off timer is set.
If the simple or Auto Off timer is set, the time to be switched off is shown.

Identifies the current operation
Shows the operating mode, etc.
*Multilanguage display is available.

"Centrally Controlled" indicator
Indicates that operation from the remote controller has been prohibited by a master controller.

"Timer is Off" indicator
Indicates that the timer is off.

Temperature Setting
Shows the target temperature.

Up/Down Air Direction indicator
Shows the direction of the outcoming airflow.

"One Hour Only" indicator
Displays if the airflow is set to low or downward during COOL or DRY mode. (Operation varies according to model.)
The indicator goes off in one hour, when the airflow direction also changes.

Room Temperature display
Shows the room temperature. The room temperature display range is 46~102°F. The display blinks if the temperature is less than 46°F or 102°F or more.

Louver display
Indicates the action of the swing louver. Does not appear if the louver is not running.

(Power On indicator)
Indicates that the power is on.

"Sensor" indication
Displays when the remote controller sensor is used.

"Locked" indicator
Indicates that remote controller buttons have been locked.

"Clean The Filter" indicator
To be displayed on when it is time to clean the filter.

Timer indicators
The indicator comes on if the corresponding timer is set.

Fan Speed indicator
Shows the selected fan speed.

Ventilation indicator
Appears when the unit is running in Ventilation mode.

4 SPECIFICATION

4-1. SPECIFICATIONS

Item \ Service ref.				PMFY-P06NBMU-E PMFY-P06NBMU-E$_1$ PMFY-P06NBMU-E#2 PMFY-P06NBMU-ER3 PMFY-P06NBMU-ER4 PMFY-P06NBMU-ER5	PMFY-P08NBMU-E PMFY-P08NBMU-E$_1$ PMFY-P08NBMU-E#2 PMFY-P08NBMU-ER3 PMFY-P08NBMU-ER4 PMFY-P08NBMU-ER5	PMFY-P12NBMU-E PMFY-P12NBMU-E$_1$ PMFY-P12NBMU-E#2 PMFY-P12NBMU-ER3 PMFY-P12NBMU-ER4 PMFY-P12NBMU-ER5	PMFY-P15NBMU-E PMFY-P15NBMU-E$_1$ PMFY-P15NBMU-E#2 PMFY-P15NBMU-ER3 PMFY-P15NBMU-ER4 PMFY-P15NBMU-ER5
Power			V · Hz	Single phase 208-230V 60Hz			
Cooling capacity			Btu/h	6,000	8,000	12,000	15,000
Heating capacity			Btu/h	6,700	9,000	13,500	17,000
Electric characteristic	Input	Cooling	kW	0.042	0.042	0.044	0.054
		Heating	kW	0.042	0.042	0.044	0.054
	Current	Cooling	A	0.20	0.20	0.21	0.26
		Heating	A	0.20	0.20	0.21	0.26
Exterior (munsell symbol)			—	Unit : Galvanized sheets · Standard grilles : ABS resin acrylic coating Munsell <0.98Y 8.99/0.63> (PMFY-P·NBMU-E$_{(1)}$) / <6.4Y 8.9/0.4> (PMFY-P·NBMU-E#2/ER3/ER4/ER5)			
Dimensions		Height	in.	9-1/16<1-3/16>			
		Width	in.	31-15/16<39-3/8>			
		Depth	in.	15-9/16<18-1/2>			
Heat exchanger			—	Cross fin			
Fan	Fan × No		—	Line flow fan × 1			
	Air flow ※3		CFM	230-250-280-300	250-280-300-320		270-300-340-370
	External static pressure		in W.G.	0			
	Fan motor output		kW	0.028			
Insulator			—	Polyethylene sheet			
Air filter			—	PP honey comb fabric			
Pipe dimensions		Gas side	ϕin.	1/2			
		Liquid side	ϕin.	1/4			
Field drain pipe size			ϕin.	1 O.D. (PVC pipe VP-20 connectable)			
Noise level ※3			dB	27-30-33-35	32-34-36-37		33-35-37-39
Product weight			lb.	31<7>			

Note 1. Rating conditions

Cooling: Indoor: D.B. 80°F W.B. 67°F
outdoor: D.B. 95°F W.B. 75°F
Heating: Indoor: D.B. 70°F
outdoor: D.B. 47°F W.B. 43°F

Note 2. The number indicated in < > is for the grille.

※ 3. Air flow and the noise level are indicated as Low - Medium2 - Medium1 - High.

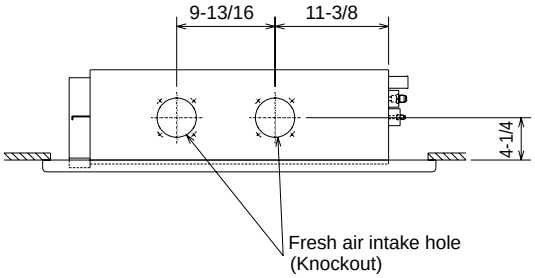
4-2. ELECTRICAL PARTS SPECIFICATIONS

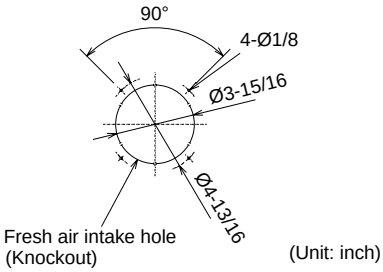
Service Ref. / Parts name	Symbol	PMFY-P06NBMU-E PMFY-P06NBMU-E$_1$ PMFY-P06NBMU-E#2 PMFY-P06NBMU-ER3 PMFY-P06NBMU-ER4 PMFY-P06NBMU-ER5	PMFY-P08NBMU-E PMFY-P08NBMU-E$_1$ PMFY-P08NBMU-E#2 PMFY-P08NBMU-ER3 PMFY-P08NBMU-ER4 PMFY-P08NBMU-ER5	PMFY-P12NBMU-E PMFY-P12NBMU-E$_1$ PMFY-P12NBMU-E#2 PMFY-P12NBMU-ER3 PMFY-P12NBMU-ER4 PMFY-P12NBMU-ER5	PMFY-P15NBMU-E PMFY-P15NBMU-E$_1$ PMFY-P15NBMU-E#2 PMFY-P15NBMU-ER3 PMFY-P15NBMU-ER4 PMFY-P15NBMU-ER5
Room temperature thermistor	TH21	Resistance 30°F/15.8kΩ, 50°F/9.6kΩ, 70°F/6.0kΩ, 80°F/4.8kΩ, 90°F/3.9kΩ, 100°F/3.2kΩ			
Liquid pipe thermistor	TH22	Resistance 30°F/15.8kΩ, 50°F/9.6kΩ, 70°F/6.0kΩ, 80°F/4.8kΩ, 90°F/3.9kΩ, 100°F/3.2kΩ			
Gas pipe thermistor	TH23	Resistance 30°F/15.8kΩ, 50°F/9.6kΩ, 70°F/6.0kΩ, 80°F/4.8kΩ, 90°F/3.9kΩ, 100°F/3.2kΩ			
Fuse (Indoor controller board)	FUSE	250V 6A (PMFY-P·NBMU-E$_{(1)}$) 250V 6.3A (PMFY-P·NBMU-E#2/ER3/ER4/ER5)			
Fan motor	MF	DC Brushless Motor 8-pole OUTPUT 28W PN0H28-MB			
Vane motor	MV	MSFJC 20M23 12V/380Ω			
Drain pump	DP	PJV-1063 208-240V 50/60Hz			
Drain sensor	DS	Thermistor resistance 30°F/6.3kΩ, 50°F/3.9kΩ, 70°F/2.5kΩ, 80°F/2.0kΩ, 90°F/1.6kΩ, 100°F/1.3kΩ			
Linear expansion valve	LEV	DC12V Stepping motor drive port dimension ϕ3.2 (0~2000pulse) EDM-40YGME			
Power supply terminal block	TB2	(L1, L2, GR) Rated to 330V 30A ※			
Transmission terminal block	TB5	(M1, M2, S) Rated to 250V 20A ※			
MA-remote controller terminal block	TB15	(1,2) Rated to 250V 10A ※			

※Note : Refer to WIRING DIAGRAM for the supplied voltage.

4-3. AIR CAPACITY TAKEN FROM OUTSIDE

PMFY-P·NBMU-E series are capable of taking air from outside. When taking air from outside, the duct fan is used. The air capacity should be 20% or less of the airflow SPEC (Hi).





(Unit: inch)

Service Ref.	Air flow (Hi)	Air capacity taken from outside
PMFY-P06NBMU-E/E1/E#2/ER3/ER4/ER5	300 CFM	60CFM
PMFY-P08NBMU-E/E1/E#2/ER3/ER4/ER5	320 CFM	64CFM
PMFY-P12NBMU-E/E1/E#2/ER3/ER4/ER5	320CFM	64CFM
PMFY-P15NBMU-E/E1/E#2/ER3/ER4/ER5	370CFM	74CFM

Operation in conjunction with duct fan (Booster fan)

- Whenever the indoor unit is operating, the duct fan operates.

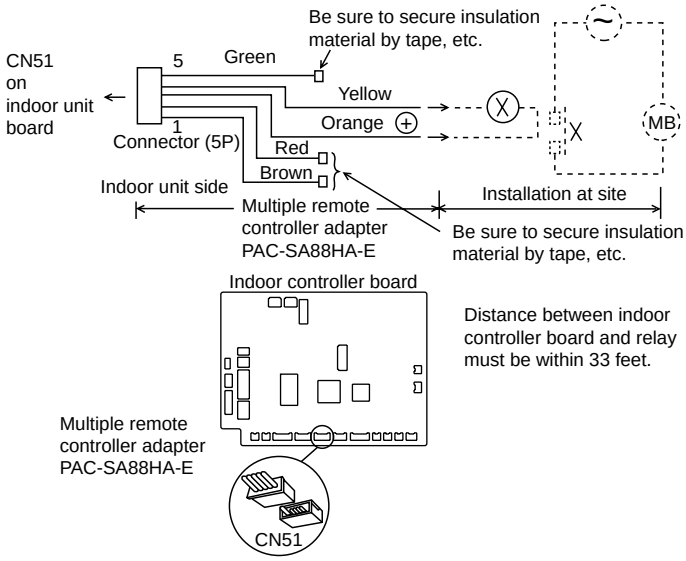
(1) Connect the optional multiple remote controller adaptor (PAC-SA88HA-E) to the connector CN51 on the indoor controller board.

(2) Drive the relay after connecting the 12V DC relay between the Yellow and Orange connector lines.

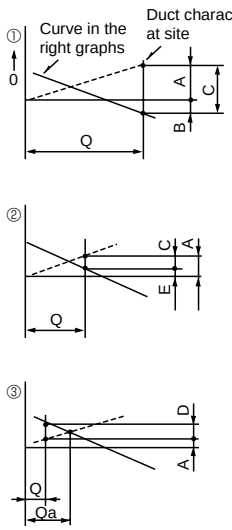
(※)Use a relay of 1W or smaller.

MB: Electromagnetic switch power relay for duct fan.

X: Auxiliary relay (12V DC LY-1F)



How to read curves



Q…Designed amount of fresh air intake <CFM>

A…Static pressure loss of fresh air intake duct system with air flow amount Q <in. W.G>

B…Forced static pressure at air conditioner inlet with air flow amount Q <in. W.G>

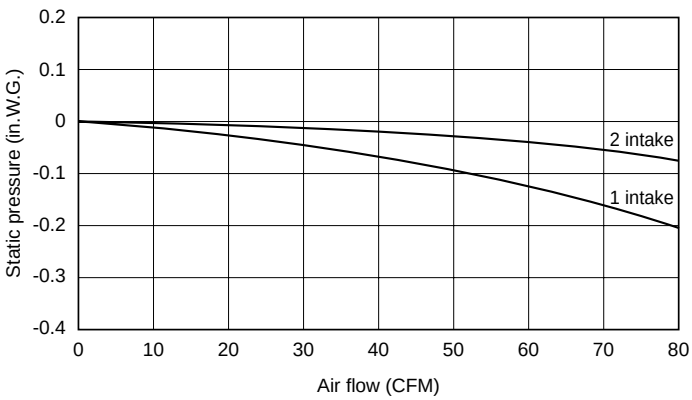
C…Static pressure of booster fan with air flow amount Q <in. W.G>

D…Static pressure loss increase amount of fresh air intake duct system for air flow amount Q <in. W.G>

E…Static pressure of indoor unit with air flow amount Q <in. W.G>

Qa…Estimated amount of fresh air intake without D <CFM>

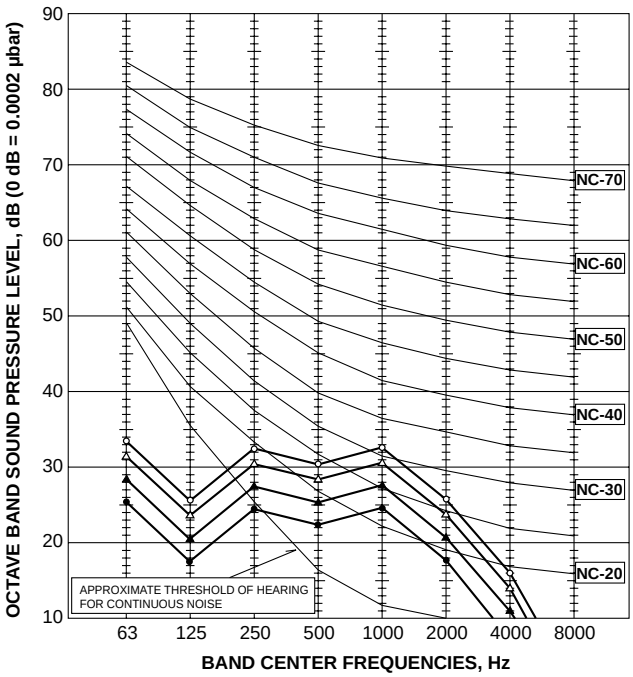
Characteristic diagram of air capacity taken from outside of PMFY-P·NBMU-E



4-4. NOISE CRITERION CURVES

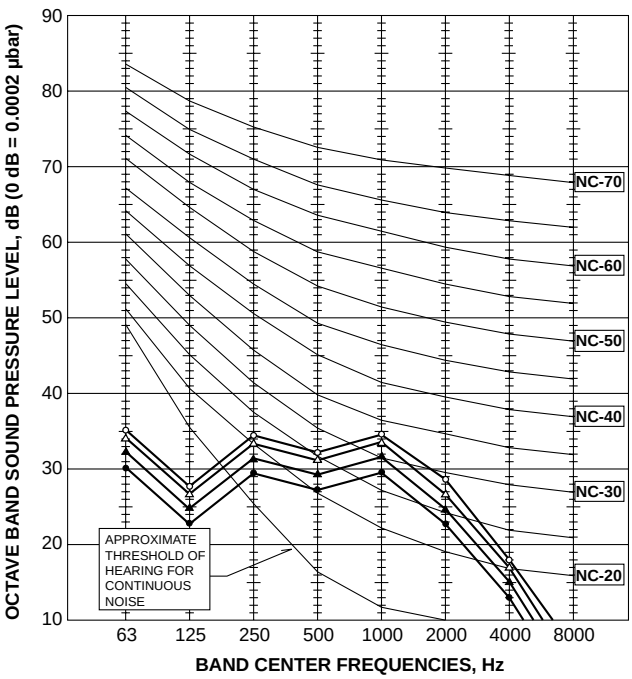
PMFY-P06NBMU-E
PMFY-P06NBMU-E$_1$
PMFY-P06NBMU-E#2
PMFY-P06NBMU-ER3
PMFY-P06NBMU-ER4
PMFY-P06NBMU-ER5

NOTCH	SPL(dB)	LINE
High	35	○—○
Medium1	33	△—△
Medium2	30	▲—▲
Low	27	●—●



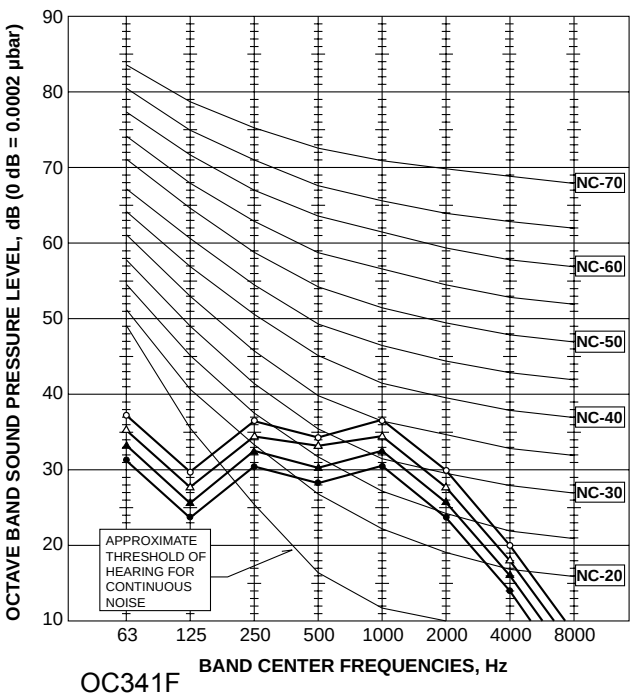
PMFY-P08/12NBMU-E
PMFY-P08/12NBMU-E$_1$
PMFY-P08/12NBMU-E#2
PMFY-P08/12NBMU-ER3
PMFY-P08/12NBMU-ER4
PMFY-P08/12NBMU-ER5

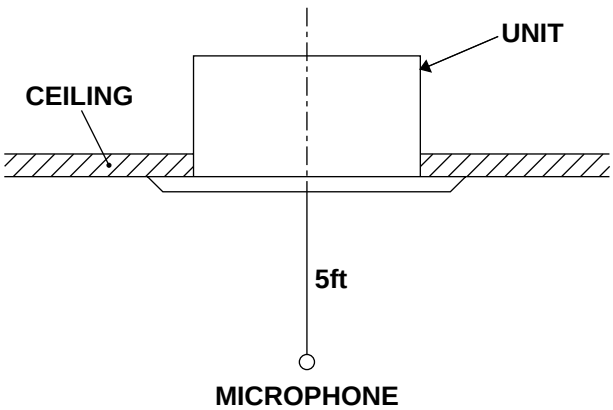
NOTCH	SPL(dB)	LINE
High	37	○—○
Medium1	36	△—△
Medium2	34	▲—▲
Low	32	●—●



PMFY-P15NBMU-E
PMFY-P15NBMU-E$_1$
PMFY-P15NBMU-E#2
PMFY-P15NBMU-ER3
PMFY-P15NBMU-ER4
PMFY-P15NBMU-ER5

NOTCH	SPL(dB)	LINE
High	39	○—○
Medium1	37	△—△
Medium2	35	▲—▲
Low	33	●—●

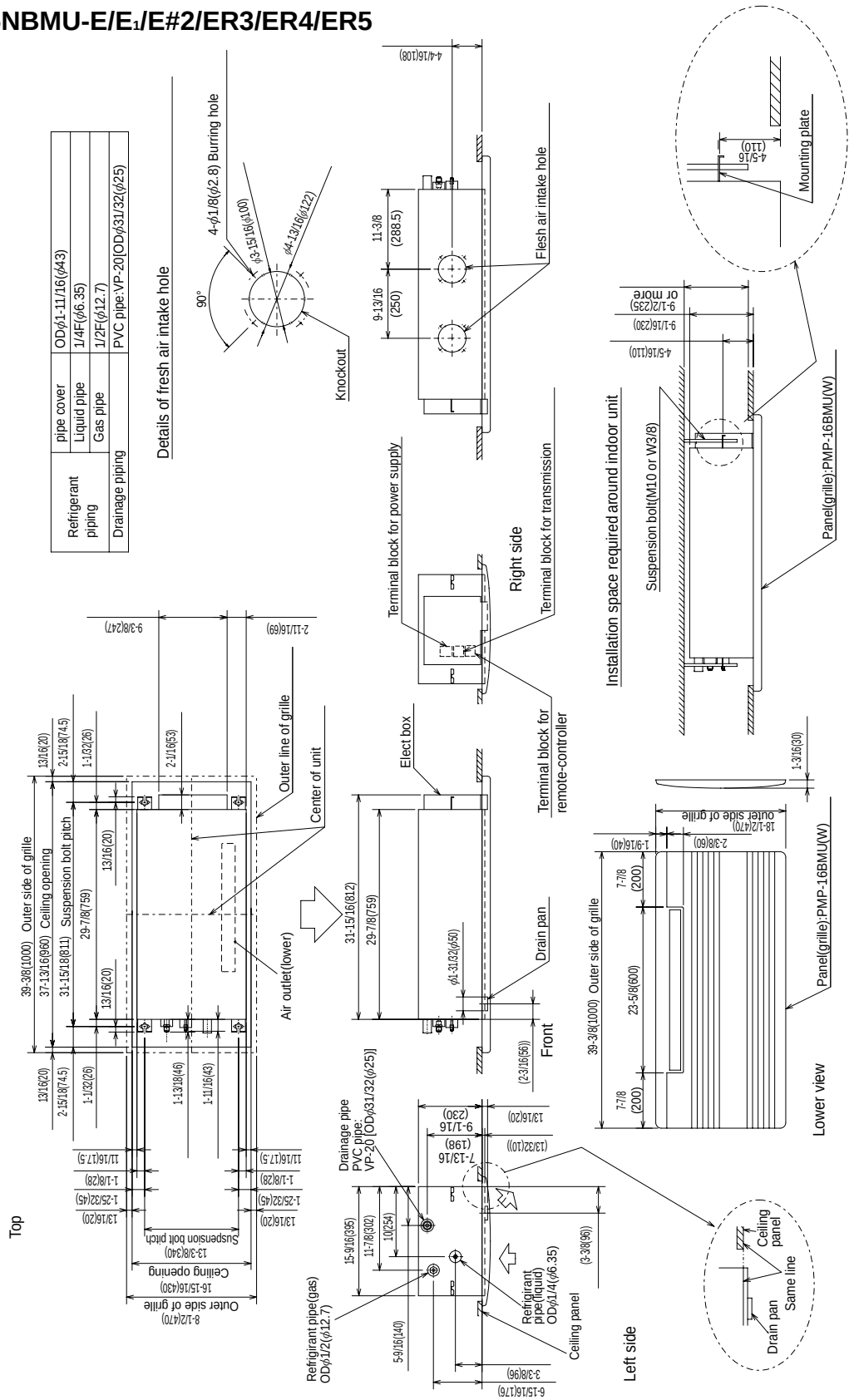




5 OUTLINES AND DIMENSIONS

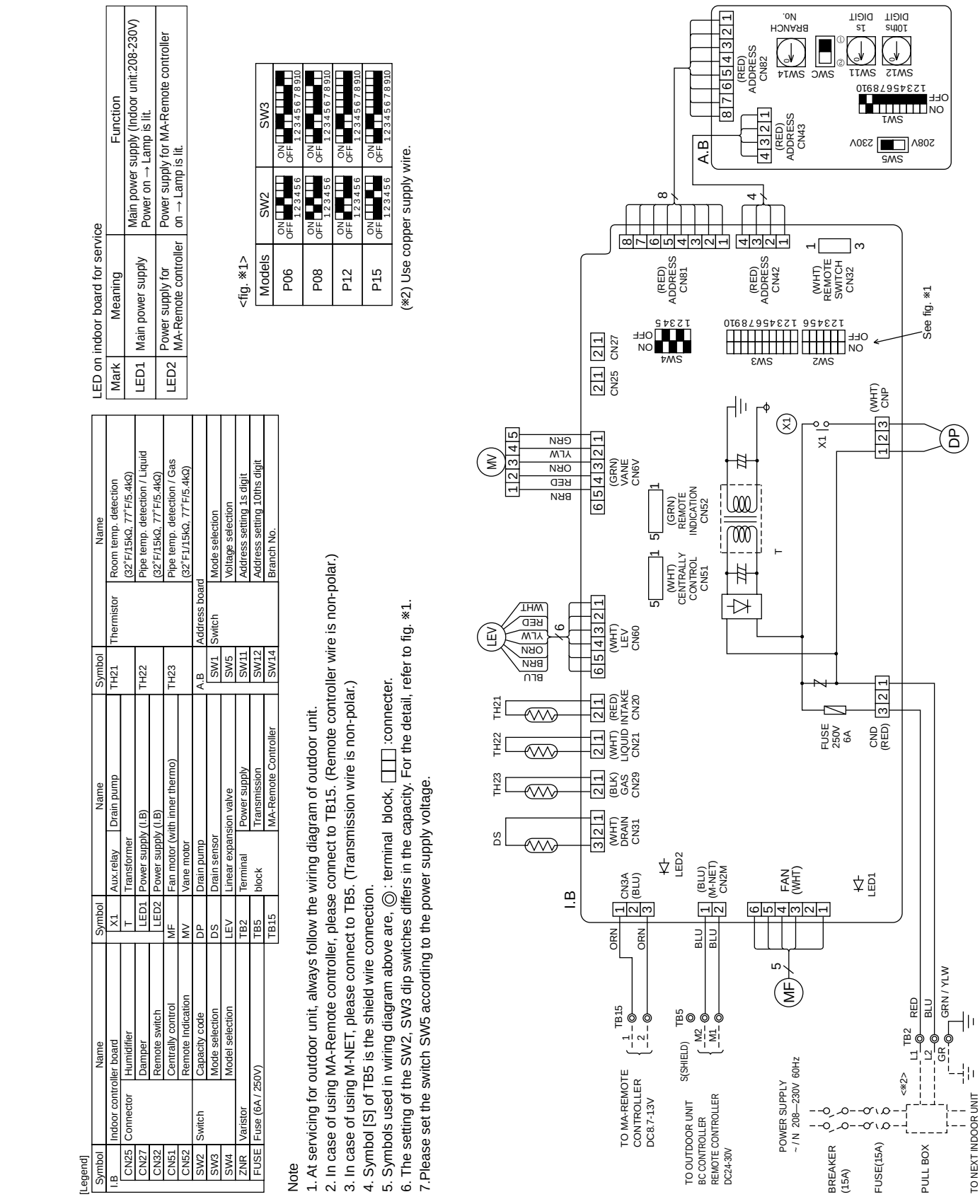
PMFY-P06NBMU-E/E1/E#2/ER3/ER4/ER5
PMFY-P08NBMU-E/E1/E#2/ER3/ER4/ER5
PMFY-P12NBMU-E/E1/E#2/ER3/ER4/ER5
PMFY-P15NBMU-E/E1/E#2/ER3/ER4/ER5

Unit : inch (mm)



6 WIRING DIAGRAM

PMFY-P06NBMU-E PMFY-P08NBMU-E PMFY-P12NBMU-E PMFY-P15NBMU-E



Note

1. At servicing for outdoor unit, always follow the wiring diagram of outdoor unit.
2. In case of using MA-Remote controller, please connect to TB15. (Remote controller wire is non-polar.)
3. In case of using M-NET, please connect to TB5. (Transmission wire is non-polar.)
4. Symbol [S] of TB5 is the shield wire connection.
5. Symbols used in wiring diagram above are, ◎: terminal block, □□: connecter.
6. The setting of the SW2, SW3 dip switches differs in the capacity. For the detail, refer to fig. ※1.
7. Please set the switch SW5 according to the power supply voltage.

[Legend]

Symbol	Name		Symbol	Name		Symbol	Name	
I.B	Indoor controller board		X1	Aux.relay	Drain pump	TH21	Thermistor	Room temp. detection (32˚F/15kΩ, 77˚F/5.4kΩ)
CN25	Connector	Humidifier	T	Transformer				
CN27		Damper	LED1	Power supply(I.B)		TH22		Pipe temp. detection / Liquid (32˚F/15kΩ, 77˚F/5.4kΩ)
CN32		Remote switch	LED2	Power supply(I.B)				
CN51		Centrally control	MF	Fan motor		TH23		Pipe temp. detection / Gas (32˚F/15kΩ, 77˚F/5.4kΩ)
CN52		Remote Indication	MV	Vane motor				
SW2	Switch	Capacity code	DP	Drain pump		A.B	Address board	
SW3		Mode selection	DS	Drain sensor		SW1	Switch	Mode selection
SW4		Model selection	LEV	Linear expansion valve		SW5		Voltage selection
ZNR	Varistor		TB2	Terminal block	Power supply	SW11		Address setting 1s digit
FUSE	Fuse (6A / 250V)		TB5		Transmission	SW12		Address setting 10ths digit
			TB15		MA-Remote Controller	SW14		Branch No.

LED on indoor board for service

Mark	Meaning	Function
LED1	Main power supply	Main power supply (Indoor unit:208-230V) Power on → Lamp is lit.
LED2	Power supply for MA-Remote controller	Power supply for MA-Remote controller on → Lamp is lit.

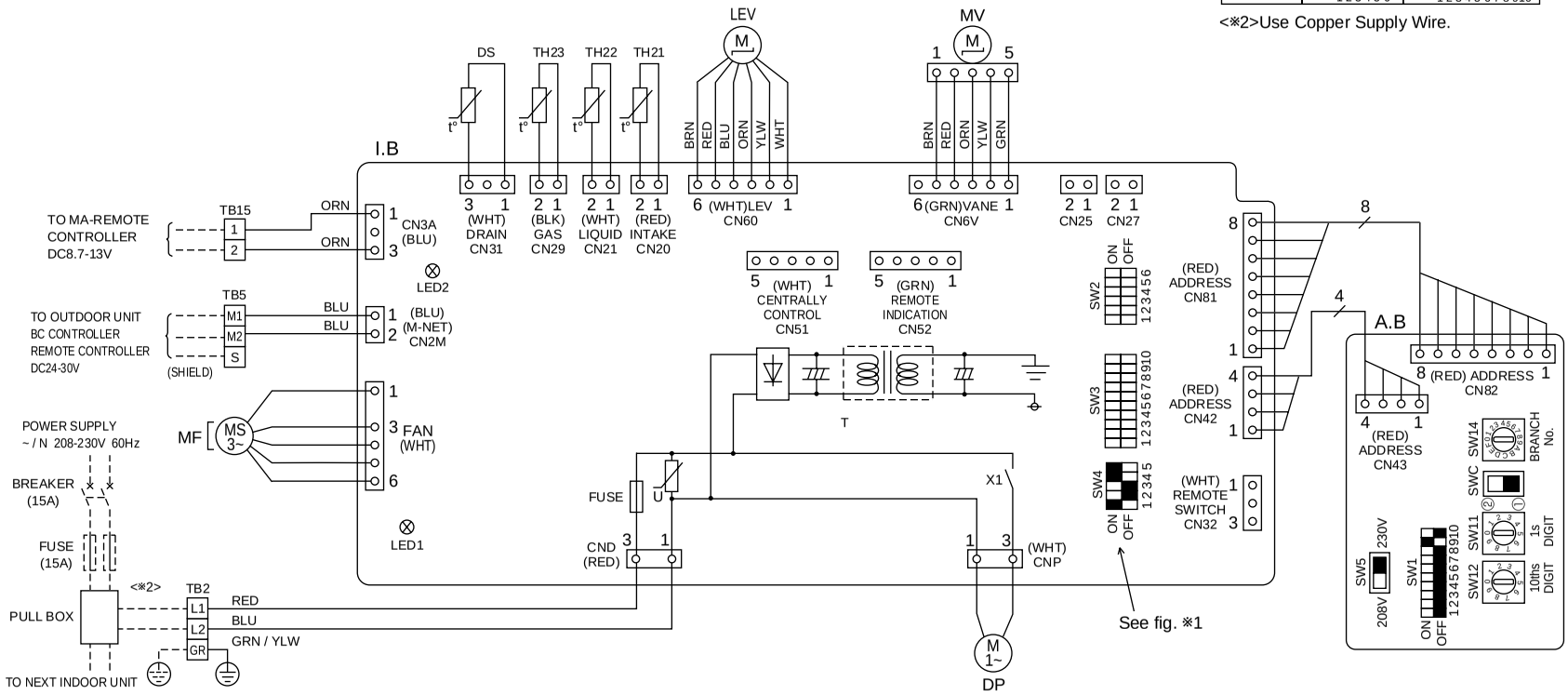
Note

1. At servicing for outdoor unit, always follow the wiring diagram of outdoor unit.
2. In case of using MA-Remote controller, please connect to TB15. (Remote controller wire is non-polar.)
3. In case of using M-NET, please connect to TB5. (Transmission line is non-polar.)
4. Symbol [S] of TB5 is the shield wire connection.
5. Symbols used in wiring diagram above are, ☐☐☐ : terminal block, ⊙⊙⊙ :connector.
6. The setting of the SW2, SW3 dip switches differs in the capacity. For the detail, refer to fig. ※1.
7. Please set the switch SW5 according to the power supply voltage.

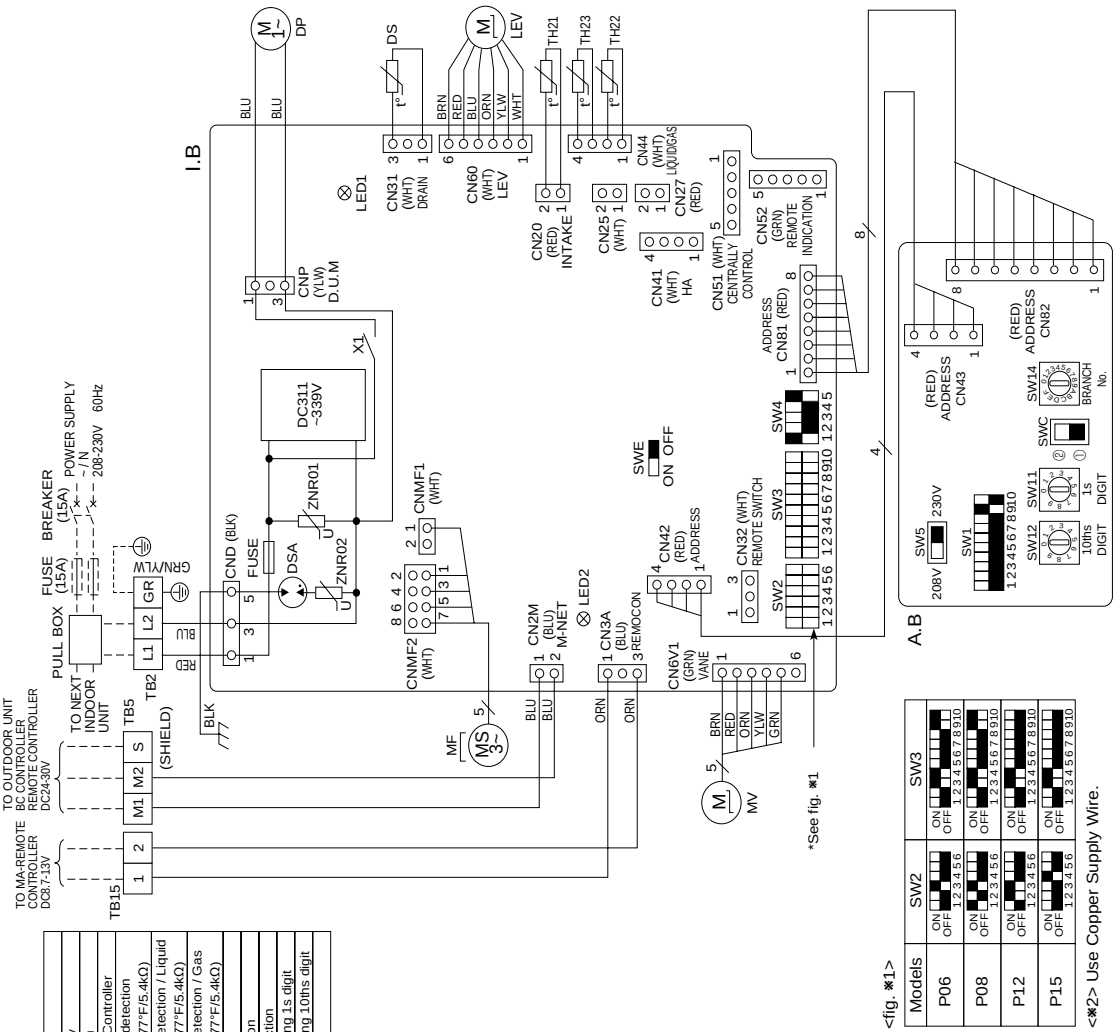
<fig. ※1>

Models	SW2	SW3
P06	ON OFF 1 2 3 4 5 6	ON OFF 1 2 3 4 5 6 7 8 9 10
P08	ON OFF 1 2 3 4 5 6	ON OFF 1 2 3 4 5 6 7 8 9 10
P12	ON OFF 1 2 3 4 5 6	ON OFF 1 2 3 4 5 6 7 8 9 10
P15	ON OFF 1 2 3 4 5 6	ON OFF 1 2 3 4 5 6 7 8 9 10

<※2>Use Copper Supply Wire.



PMFY-P06NBMU-E#2 **PMFY-P08NBMU-E#2** **PMFY-P12NBMU-E#2** **PMFY-P15NBMU-E#2**
PMFY-P06NBMU-ER3 **PMFY-P08NBMU-ER3** **PMFY-P12NBMU-ER3** **PMFY-P15NBMU-ER3**
PMFY-P06NBMU-ER4 **PMFY-P08NBMU-ER4** **PMFY-P12NBMU-ER4** **PMFY-P15NBMU-ER4**



[Legend]

Symbol	Name	Symbol		Name
I.B	Indoor controller board	TB2	Terminal block	Power supply
CN25	Connector	Humidifier	TB5	Transmission
CN27		Damper	TB15	MA-Remote Controller
CN32		Remote switch	TH21	Thermistor Room temp. detection (32°F/15kΩ, 77°F/5.4kΩ)
CN51		Centrally control		
CN52		Remote Indication	TH22	Pipe temp. detection / Liquid (32°F/15kΩ, 77°F/5.4kΩ)
SW2	Switch	Capacity code		
SW3		Mode selection	TH23	Pipe temp. detection / Gas (32°F/15kΩ, 77°F/5.4kΩ)
SW4		Model selection		
SWE		DRAIN UP MACHINE(TEST MODE)	A.B	Address board
ZNR	Varistor		SW1	Switch Mode selection
FUSE	Fuse (T6.3AL 250V)		SW5	Voltage selection
X1	Aux.relay	Drain pump	SW11	Address setting 1s digit
LED1	Power supply (I.B)		SW12	Address setting 10ths digit
LED2	Power supply (I.B)		SW14	Branch No.
MF	Fan motor			
MV	Vane motor			
DP	Drain pump			
DS	Drain sensor			
LEV	Linear expansion valve			

Note
1. At servicing for outdoor unit, always follow the wiring diagram of outdoor unit.
2. In case of using MA-Remote controller, please connect to TB15. (Remote controller wire is non-polar.)
3. In case of using M-NET, please connect to TB5. (Transmission line is non-polar.)
4. Symbol [S] of TB5 is the shield wire connection.
5. Symbols used in wiring diagram above are, □□□ : terminal block, [○○○] :connector.
6. The setting of the SW2, SW3 dip switches differs in the capacity. For the detail, refer to fig. ※1.
7. Please set the switch SW5 according to the power supply voltage.

LED on indoor board for service

Mark	Meaning	Function
LED1	Main power supply	Main power supply (Indoor unit:208-230V) Power on → lamp is lit
LED2	Power supply for MA-Remote controller	Power supply for MA-Remote controller on → lamp is lit

<fig. ※1>

Models	SW2	SW3
P06	ON OFF 1 2 3 4 5 6	ON OFF 1 2 3 4 5 6 7 8 9 10
P08	ON OFF 1 2 3 4 5 6	ON OFF 1 2 3 4 5 6 7 8 9 10
P12	ON OFF 1 2 3 4 5 6	ON OFF 1 2 3 4 5 6 7 8 9 10
P15	ON OFF 1 2 3 4 5 6	ON OFF 1 2 3 4 5 6 7 8 9 10

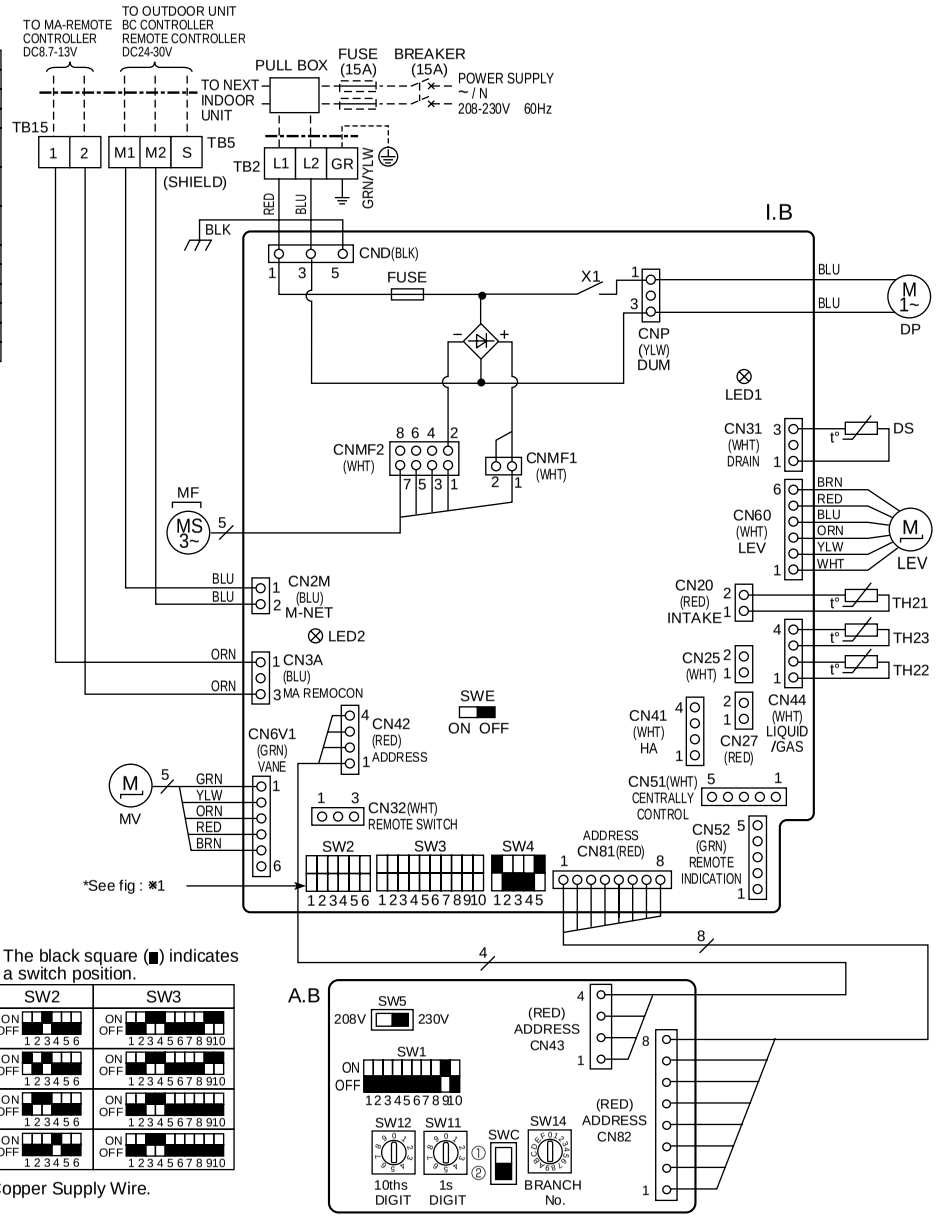
<※2> Use Copper Supply Wire.

[Legend]

Symbol	Name		Symbol	Name	
I.B	Indoor controller board		TB2	Terminal block	Power supply
CN25	Connector	Humidifier	TB5		Transmission
CN27		Damper	TB15		MA-Remote Controller
CN32		Remote switch	TH21	Thermistor	Room temp. detection (32°F/15kΩ, 77°F/5.4kΩ)
CN51		Centrally control			
CN52		Remote Indication	TH22		Pipe temp. detection / Liquid (32°F/15kΩ, 77°F/5.4kΩ)
SW2	Switch	Capacity code			
SW3		Mode selection	TH23		Pipe temp. detection / Gas (32°F/15kΩ, 77°F/5.4kΩ)
SW4		Model selection			
SWE		DRAIN UP MACHINE(TEST MODE)	A.B	Address board	
FUSE	Fuse (T6.3AL 250V)		SW1	Switch	Mode selection
X1	Aux.relay	Drain pump	SW5		Voltage selection
LED1	Power supply (I.B)		SW11		Address setting 1s digit
LED2	Power supply (I.B)		SW12		Address setting 10ths digit
MF	Fan motor		SW14		Branch No.
MV	Vane motor				
DP	Drain water lifting-up mech.				
DS	Drain sensor				
LEV	Linear expansion valve				

Note

1.At servicing for outdoor unit, always follow the wiring diagram of outdoor unit.
2.In case of using MA-Remote controller, please connect to TB15.
(Remote controller wire is non-polar.)
3.In case of using M-NET, please connect to TB5.
(Transmission line is non-polar.)
4.Symbol [S] of TB5 is the shield wire connection.
5.Symbols used in wiring diagram above are, □□□: terminal block,
○○○ :connector.
6.The setting of the SW2, SW3 dip switches differs in the capacity for the detail, refer to the fig : ※1.
7.Please set the switch SW5 according to the power supply voltage.



LED on indoor board for service

Mark	Meaning	Function
LED1	Main power supply	Main power supply (Indoor unit:208-230V) Power on → lamp is lit
LED2	Power supply for MA-Remote controller	Power supply for MA-Remote controller on → lamp is lit

<fig : ※1> The black square (■) indicates a switch position.

Models	SW2	SW3
P06	ON OFF 1 2 3 4 5 6	ON OFF 1 2 3 4 5 6 7 8 9 10
P08	ON OFF 1 2 3 4 5 6	ON OFF 1 2 3 4 5 6 7 8 9 10
P12	ON OFF 1 2 3 4 5 6	ON OFF 1 2 3 4 5 6 7 8 9 10
P15	ON OFF 1 2 3 4 5 6	ON OFF 1 2 3 4 5 6 7 8 9 10

<※2> Use Copper Supply Wire.

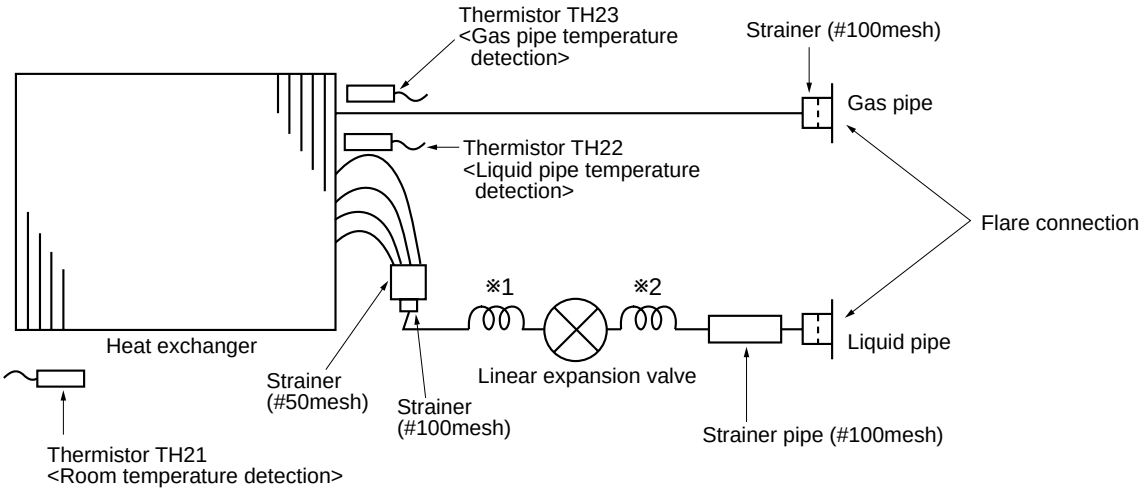
7 REFRIGERANT SYSTEM DIAGRAM

PMFY-P06NBMU-E
PMFY-P06NBMU-E1
PMFY-P06NBMU-E#2
PMFY-P06NBMU-ER3
PMFY-P06NBMU-ER4
PMFY-P06NBMU-ER5

PMFY-P08NBMU-E
PMFY-P08NBMU-E1
PMFY-P08NBMU-E#2
PMFY-P08NBMU-ER3
PMFY-P08NBMU-ER4
PMFY-P08NBMU-ER5

PMFY-P12NBMU-E
PMFY-P12NBMU-E1
PMFY-P12NBMU-E#2
PMFY-P12NBMU-ER3
PMFY-P12NBMU-ER4
PMFY-P12NBMU-ER5

PMFY-P15NBMU-E
PMFY-P15NBMU-E1
PMFY-P15NBMU-E#2
PMFY-P15NBMU-ER3
PMFY-P15NBMU-ER4
PMFY-P15NBMU-ER5



Unit: in.(mm)

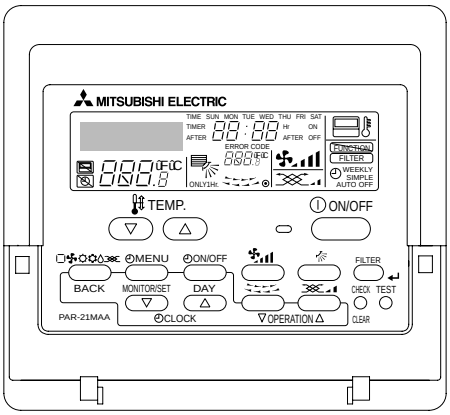
Service Ref. / Item	PMFY-P06/P08/P12/P15NBMU-E PMFY-P06/P08/P12/P15NBMU-E1 PMFY-P06/P08/P12/P15NBMU-E#2 PMFY-P06/P08/P12/P15NBMU-ER3 PMFY-P06/P08/P12/P15NBMU-ER4 PMFY-P06/P08/P12/P15NBMU-ER5
Gas pipe	ϕ1/2"(12.7)
Liquid pipe	ϕ1/4"(6.35)

Unit: mm

Service Ref. / Item	PMFY-P06/P08NBMU-E PMFY-P06/P08NBMU-E1 PMFY-P06/P08NBMU-E#2 PMFY-P06/P08NBMU-ER3 PMFY-P06/P08NBMU-ER4 PMFY-P06/P08NBMU-ER5	PMFY-P12/P15NBMU-E PMFY-P12/P15NBMU-E1 PMFY-P12/P15NBMU-E#2 PMFY-P12/P15NBMU-ER3 PMFY-P06/P08NBMU-ER4 PMFY-P06/P08NBMU-ER5
Capillary tube ※1	O.D.ϕ4.6 × I.D.Ø3.4 × ℓ 200	O.D.ϕ3.6 × I.D.Ø2.4 × ℓ 200
Capillary tube ※2	O.D.ϕ3.6 × I.D.Ø2.4 × ℓ 80	

8 MICROPROCESSOR CONTROL

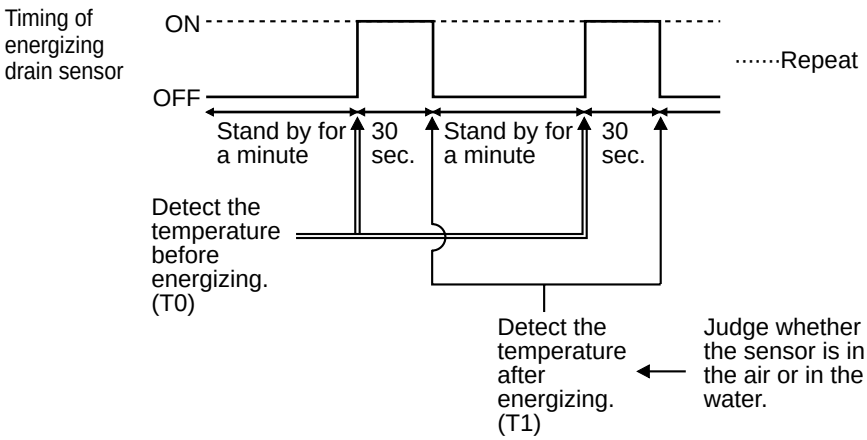
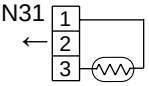
INDOOR UNIT CONTROL
8-1. COOL OPERATION



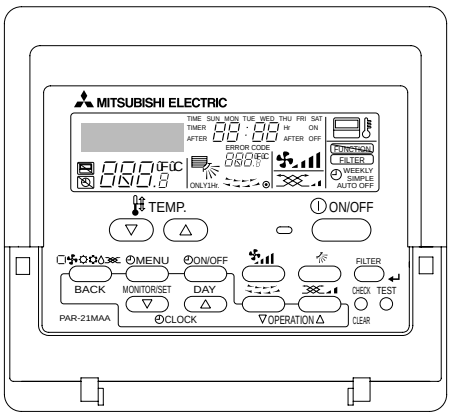
<How to operate>

① Press POWER ON/OFF button.
② Press the operation MODE button to display COOL.
③ Press the TEMP. button to set the desired temperature.
NOTE: The set temperature changes 2°F when the ▽ or △ button is pressed once. Cooling 67 to 87°F.

Control modes	Control details	Remarks
1. Thermostat function	1-1. Thermostat function • Room temperature ≧ desired temperature + 2 °F: Thermo ON • Room temperature ≦ desired temperature: Thermo OFF	
	1-2. Anti-freezing control Detected condition: When the liquid pipe temp. (TH22) is 32˚F or less in 16 minutes from compressors start up, anti-freezing control starts and the thermostat OFF. Released condition: The timer which prevents reactivating is set for 3 minutes, and anti-freezing control is cancelled when any one of the following conditions is satisfied. ① Liquid pipe temp. (TH22) turns to be 50˚F or above. ② The condition of the thermostat OFF becomes complete by thermostat, etc. ③ The operation mode becomes a mode other than COOL. ④ The operation stops. 1-3. Compressor time delay • 3 minutes minimum off cycle.	
2. Fan	By the remote controller setting (switch of 4 speeds) Type: 4 speeds — Fan speed notch: [Low], [Medium2], [Medium1], [High]	

Control modes	Control details	Remarks
3. Drain pump	3-1. Drain pump control • Always drain pump ON during the COOL and DRY mode operation. (Regardless of the thermostat ON/OFF) • When the operation mode is changed from COOL or DRY to any other mode (including Stop), the drain pump continues to run for 3 minutes.	
	Drain sensor function • The indoor circuit board energizes the drain sensor at a fixed voltage for a fixed duration. After energizing, the circuit board compares the drain sensor's temperature to the one before energizing, and judges whether the sensor is in the air or in the water. **Basic control system** • While drain pump is turned on, it will repeat the following control system and judge whether the sensor is in the air or in the water.  •Drain sensor temperature rise (t) •Temperature of drain sensor before current is applied (T_0) •Temperature of drain sensor after current is applied (T_1) [$t = T_1 - T_0$]	※1 Drain sensor Indoor controller board CN31 
4. Vane (up/down vane change)	(1) Initial setting : Start at COOL mode and horizontal vane. (2) Vane position : Horizontal→Downward A →Downward B →Downward C→Swing (3) Restriction of the downward vane setting When setting the downward vane A, B or C in [Medium1], [Medium2] or [Low] of the fan speed notch, the vane changes to horizontal position after 1 hour has passed.	※1 "Only 1 Hr" appears on the wired remote controller.

8-2. DRY OPERATION

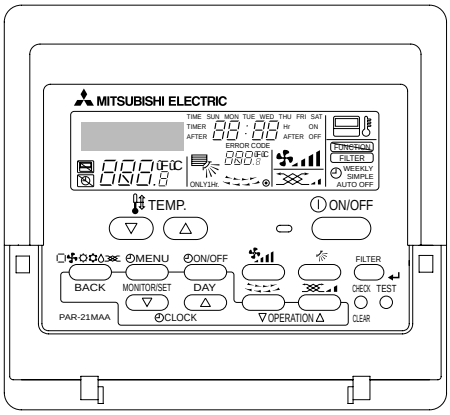


<How to operate>

① Press POWER ON/OFF button.
② Press the operation MODE button to display DRY.
③ Press the TEMP. button to set the desired temperature.
NOTE: The set temperature changes 2°F when the ▽ or △ button is pressed once. Dry 67 to 87°F.

<table>
<tr><th>Control modes</th><th>Control details</th><th>Remarks</th></tr>
<tr><td>1. Thermostat function</td><td>1-1. Dry mode temperature is controlled by TH21.
Dry mode ON Room temperature ≧ desired temperature + 2˚F
Dry mode OFF Room temperature ≦ desired temperature
<table>
<tr><th rowspan="2">Room temperature</th><th colspan="2">3 min. passed since starting operation</th><th rowspan="2">Dry mode ON time (min)</th><th rowspan="2">Dry mode OFF time (min)</th></tr>
<tr><th>Dry mode</th><th>Room temperature (Ta)</th></tr>
<tr><td rowspan="5">Over 64˚F</td><td rowspan="4">ON</td><td>Ta ≧ 83˚F</td><td>9</td><td>3</td></tr>
<tr><td>83˚F > Ta ≧ 79˚F</td><td>7</td><td>3</td></tr>
<tr><td>79˚F > Ta ≧ 75˚F</td><td>5</td><td>3</td></tr>
<tr><td>75˚F > Ta</td><td>3</td><td>3</td></tr>
<tr><td>OFF</td><td>Unconditional</td><td>3</td><td>10</td></tr>
<tr><td>Less than 64˚F</td><td colspan="4">Dry mode OFF</td></tr>
</table></td><td></td></tr>
<tr><td></td><td>1-2. Frozen prevention control
No control function</td><td></td></tr>
<tr><td>2. Fan</td><td>Indoor fan operation control depends on the compressor conditions.
<table>
<tr><th>Dry mode</th><th>Fan speed notch</th></tr>
<tr><td>ON</td><td>[Low]</td></tr>
<tr><td>OFF</td><td>Stop</td></tr>
</table>
Note: Remote controller setting is not acceptable.</td><td></td></tr>
<tr><td>3. Drain pump</td><td>Same control as COOL operation</td><td></td></tr>
<tr><td>4. Vane
(up/down vane change)</td><td>Same control as COOL operation</td><td></td></tr>
</table>

8-3. FAN OPERATION



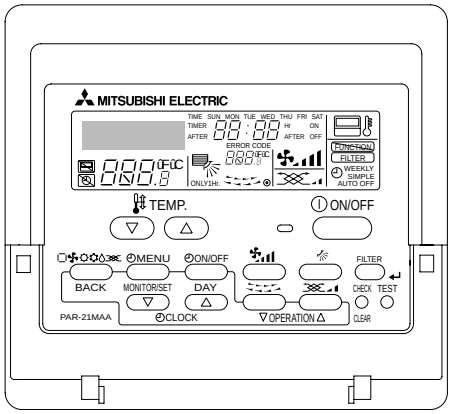
<How to operate>

① Press POWER ON/OFF button.

② Press the operation MODE button to display FAN.

Control modes	Control details	Remarks
1. Fan	Set by remote controller. Type: 4 speeds type — Fan speed notch: [Low], [Medium2], [Medium1], [High]	
2. Drain pump	2-1. Drain pump control The drain pump turns ON for the specified amount of time when any of the following conditions is satisfied: ① ON for 3 minutes after the operation mode is switched from COOL or DRY to another operation mode (FAN). ② ON for 6 minutes after the drain sensor is determined to be submerged using the liquid level detection method given below. ③ ON for 6 minutes after indoor piping (liquid piping) temperature – indoor room temperature ≦ -18˚F, AND the drain sensor input is at the short or open level. (If condition ② or ③ is still being met after the drain pump has been turned ON for 6 minutes, the drain pump is kept ON for a further 6 minutes.)	
	2-2. Liquid level detection method The liquid level is detected by determining whether or not the drain sensor is submerged, based on the amount the temperature rises after self-heating the sensor. This process is performed if any of the following conditions is satisfied: ① Drain pump is ON. ② Indoor piping (liquid piping) temperature – indoor room temperature ≦ -18˚F ③ Indoor piping (liquid piping) temperature or indoor room temperature is at the short or open level temperature. ④ Every 1 hour after the drain pump has been switched from ON to OFF.	
3. Vane (up/down vane change)	Same as the control performed during the COOL operation, but with no restriction on the vane's downward blow setting.	

8-4. HEAT OPERATION



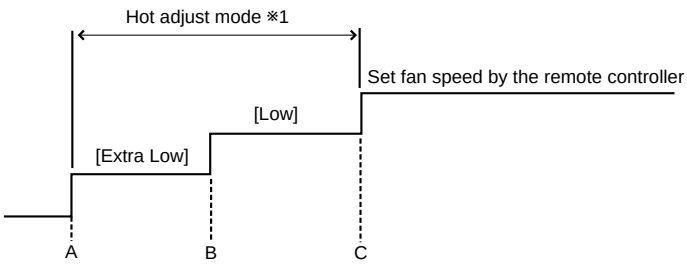
<How to operate>

① Press POWER ON/OFF button.
② Press the operation MODE button to display HEAT.
③ Press the TEMP. button to set the desired temperature.
NOTE: The set temperature changes 2°F when the ▽ or △ button is pressed once. Heating 63 to 83°F.

<Display in HEAT operation>

[DEFROST]
The [DEFROST] symbol is only displayed during the defrost operation.

[STANDBY]
The [STANDBY] symbol is only displayed during hot adjust mode.

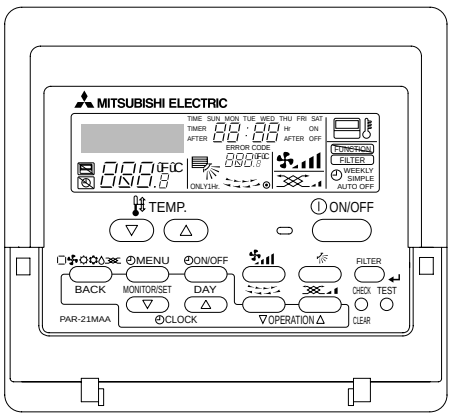
Control modes	Control details	Remarks
1. Thermostat function	1-1. Minimum compressor off cycle is 3 minutes. • Room temperature ≦ desired temperature -2˚F: Thermo ON • Room temperature ≧ desired temperature: Thermo OFF	
2. Fan	Controlled by the remote controller (4-speed) Priority is given to below-mentioned control mode 2-1. Stand by (hot adjust) mode 2-2. Preheating exclusion mode 2-3. Thermo OFF mode (When the compressor off by the thermostat) 2-4. Cool air prevention mode (Defrosting mode)	
	2-1. Stand by (hot adjust) mode The fan controller becomes the stand by (hot adjust) mode for the following conditions. ① When starting the HEAT operation ② When the thermostat function changes from OFF to ON. ③ When releasing the HEAT defrosting operation  A: Stand by (hot adjust) mode start B: 5 minutes have passed since the condition A or the indoor liquid pipe temperature turned 95°F or more C: 2 minutes have passed since the condition A (Terminating the stand by (hot adjust) mode)	※1 "STAND BY" will be displayed during the stand by (hot adjust) mode.
	2-2. Preheating exclusion mode When the condition changes the auxiliary heater ON to OFF (thermostat or operation stop, etc), the indoor fan operates in [Low] mode for 1 minute.	※1 This control is same for the model without auxiliary heater.

To be continued to the next page

From the preceding page

Control modes	Control details	Remarks
2. Fan	2-3. Thermo OFF mode When the thermostat function changes to OFF, the indoor fan operates in [Extra low].	
	2-4. Heat defrosting mode The indoor fan stops.	
3. Drain pump	No drain pump operation However, when the control changes from COOL or DRY operation, the drain pump operates for 3 minutes.	
4. Vane control (Up/down vane change)	(1) Initial setting : OFF → HEAT···[last setting] When changing the mode from exception of HEAT to HEAT operation ···[Downward C] (2) Vane position : Horizontal →Downward A →Downward B →Downward C→Swing ↑ ↵ (3) Restriction of vane position ① The vane is horizontally fixed for the following modes. (The control by the remote controller is temporarily invalidated and controlled by the unit.) • Thermo OFF • Stand by (hot adjust) [Extra low] mode • Heat defrost mode	

8-5. AUTO OPERATION [AUTOMATIC COOL/HEAT CHANGE OVER OPERATION]



<How to operate>

① Press POWER ON/OFF button.
② Press the operation MODE button to display AUTO.
③ Press the TEMP. button to set the desired temperature.
NOTE: The set temperature changes 2°F when the ▽ or △ button is pressed once. Automatic 67 to 83°F.
When in AUTO mode, the unit will switch from either heat or cool automatically to maintain the set temperature.

Control modes	Control details	Remarks
1. Initial value of operation mode	HEAT mode for room temperature < Desired temperature COOL mode for room temperature ≧ Desired temperature	
2. Mode change	(1) HEAT mode → COOL mode Room temperature ≧ Desired temperature + 3˚F or 3 minutes has passed (2) COOL mode → HEAT mode Room temperature ≦ Desired temperature - 3˚F or 3 minutes has passed	
3. COOL mode	Same control as cool operation	
4. HEAT mode	Same control as heat operation	

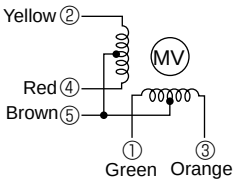
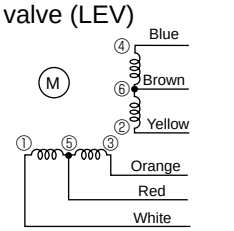
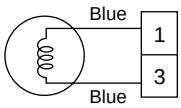
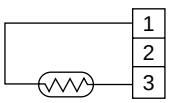
8-6. WHEN UNIT IS STOPPED

Control modes	Control details	Remarks
1. Drain pump	1-1. Drain pump control The drain pump turns ON for the specified amount of time when any of the following conditions is satisfied. (regardless of whether the compressor is ON or OFF) ① ON for 3 minutes after the operation mode is switched from COOL or DRY to another operation mode (HEAT mode). ② ON for 6 minutes after the drain sensor is determined to be submerged using the liquid level detection method given below. ③ ON for 6 minutes after indoor piping (liquid piping) temperature – indoor room temperature ≦ 14˚F, and the drain sensor input is at the short or open level. (If condition ② or ③ is still being met after the drain pump has been turned ON for 6 minutes, the drain pump is kept ON for a further 6 minutes.)	
	1-2. Liquid level detection method The liquid level is detected by determining whether or not the drain sensor is submerged, based on the amount the temperature rises after self-heating the sensor. This process is performed if any of the following conditions is satisfied: ① Drain pump is ON. ② Indoor piping (liquid piping) temperature – indoor room temperature ≦ 14˚F (except during defrosting) ③ Indoor piping (liquid piping) temperature or indoor room temperature is at the short or open level temperature. ④ Every 1 hour after the drain pump has been switched from ON to OFF.	

9 TROUBLESHOOTING

9-1. HOW TO CHECK THE PARTS

PMFY-P06NBMU-E **PMFY-P08NBMU-E** **PMFY-P12NBMU-E** **PMFY-P15NBMU-E**
PMFY-P06NBMU-E$_1$ **PMFY-P08NBMU-E$_1$** **PMFY-P12NBMU-E$_1$** **PMFY-P15NBMU-E$_1$**
PMFY-P06NBMU-E#2 **PMFY-P08NBMU-E#2** **PMFY-P12NBMU-E#2** **PMFY-P15NBMU-E#2**
PMFY-P06NBMU-ER3 **PMFY-P08NBMU-ER3** **PMFY-P12NBMU-ER3** **PMFY-P15NBMU-ER3**
PMFY-P06NBMU-ER4 **PMFY-P08NBMU-ER4** **PMFY-P12NBMU-ER4** **PMFY-P15NBMU-ER4**
PMFY-P06NBMU-ER5 **PMFY-P08NBMU-ER5** **PMFY-P12NBMU-ER5** **PMFY-P15NBMU-ER5**

<table>
<tr><th>Parts name</th><th>Check points</th></tr>
<tr><td>Thermistor (TH21)
<Room temperature detection>
Thermistor (TH22)
<Liquid pipe temperature detection>
Thermistor (TH23)
<Gas pipe temperature detection></td><td>Disconnect the connector then measure the resistance with a tester.
(At the ambient temperature 50˚F~86˚F)
<table><tr><th>Normal</th><th>Abnormal</th></tr><tr><td>4.3kΩ ~ 9.6kΩ</td><td>Open or short</td></tr></table>Refer to the next page for the details.</td></tr>
<tr><td>Vane motor (MV)
 
</td><td>Measure the resistance between the terminals with a tester.
(At the ambient temperature 68˚F~86˚F)
<table><tr><th>Connector</th><th>Normal</th><th>Abnormal</th></tr><tr><td>Brown — Yellow</td><td rowspan="4">380Ω ± 7%</td><td rowspan="4">Open or short</td></tr><tr><td>Brown — Red</td></tr><tr><td>Brown — Orange</td></tr><tr><td>Brown — Green</td></tr></table></td></tr>
<tr><td>Linear expansion valve (LEV)
 
</td><td>Disconnect the connector then measure the resistance with a tester.
<table><tr><th colspan="4">Normal</th><th>Abnormal</th></tr><tr><td>White-Red</td><td>Yellow-Brown</td><td>Orange-Red</td><td>Blue-Brown</td><td rowspan="2">Open or short</td></tr><tr><td colspan="4">200Ω ± 10%</td></tr></table>Refer to the next page for the details.</td></tr>
<tr><td>Drain pump (DP)
 
</td><td>Measure the resistance between the terminals with a tester.
(At the ambient temperature 68˚F)
<table><tr><th>Normal</th><th>Abnormal</th></tr><tr><td>400Ω~480Ω</td><td>Open or short</td></tr></table></td></tr>
<tr><td>Drain sensor (DS)
 
</td><td>Measure the resistance after 3 minutes have passed since the power supply was turned off.
(At the ambient temperature 32˚F~140˚F
<table><tr><th>Normal</th><th>Abnormal</th></tr><tr><td>0.6kΩ~6.0kΩ</td><td>Open or short</td></tr></table>Refer to the next page for the details.</td></tr>
</table>

<Thermistor characteristic graph>

Thermistor for lower temperature

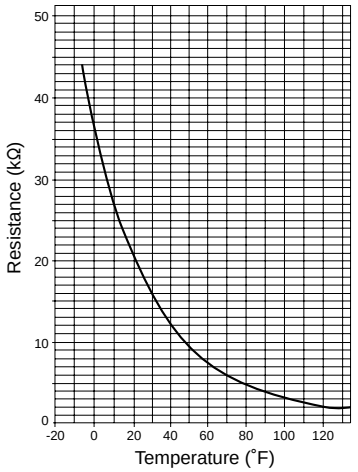
Thermistor <Room temperature detection> (TH21)
Thermistor <Liquid pipe temperature detection> (TH22)
Thermistor <Gas pipe temperature detection> (TH23)

Thermistor R_0=15kΩ ± 3%
Fixed number of B=3480 ± 2%

$$Rt=15\exp\{3480(\frac{1}{273+(t-32)/1.8}-\frac{1}{273})\}$$

30°F	15.8kΩ
50°F	9.6kΩ
70°F	6.0kΩ
80°F	4.8kΩ
90°F	3.9kΩ
100°F	3.2kΩ

< Thermistor for lower temperature >



Thermistor for drain sensor

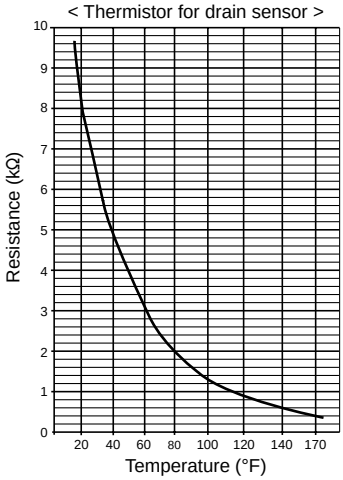
Drain sensor (DS)

Thermistor R_0=6.0kΩ ±5%
Fixed number of B=3390 ±2%

$$Rt=6\exp\{3390(\frac{1}{273+(t-32)/1.8}-\frac{1}{273})\}$$

30°F	6.3kΩ	90°F	1.6kΩ
50°F	3.9kΩ	100°F	1.3kΩ
70°F	2.5kΩ	140°F	0.6kΩ
80°F	2.0kΩ		

< Thermistor for drain sensor >

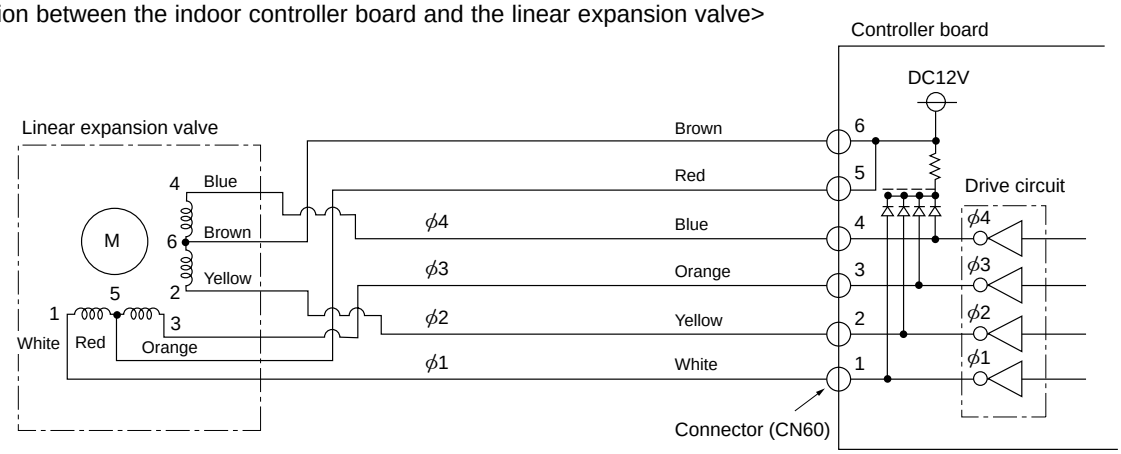


Linear expansion valve

① **Operation summary of the linear expansion valve**

- Linear expansion valves open/close through the use of a stepping motor after receiving the pulse signal from the indoor controller board.
- Valve position can be changed in proportion to the number of pulse signals.

<Connection between the indoor controller board and the linear expansion valve>



Note : Since the number of the connector at the controller board side and the relay connector are different, follow the color of the lead wire.

<Output pulse signal and the valve operation>

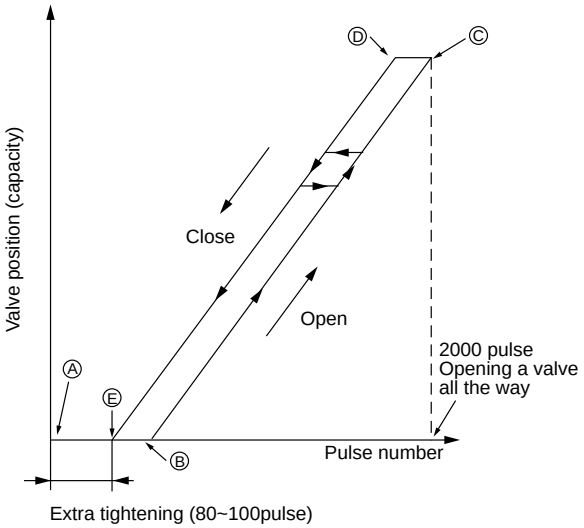
Output (Phase)	Output			
	1	2	3	4
ϕ1	ON	OFF	OFF	ON
ϕ2	ON	ON	OFF	OFF
ϕ3	OFF	ON	ON	OFF
ϕ4	OFF	OFF	ON	ON

Closing a valve : 1 → 2 → 3 → 4 → 1
Opening a valve : 4 → 3 → 2 → 1 → 4

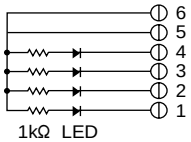
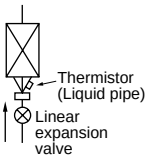
The output pulse shifts in above order.

- When linear expansion valve operation stops, all output phase become OFF.
- At phase interruption or when phase does not shift in order, motor does not rotate smoothly and motor will lock and vibrate.
- When the switch is turned on, 2200 pulse closing valve signal will be sent till it goes to point Ⓐ in order to define the valve position.
- When the valve moves smoothly, there is no sound or vibration occurring from the linear expansion valves : however, when the pulse number moves from Ⓔ to Ⓐ or when the valve is locked, more sound can be heard than in a normal situation.
- Sound can be detected by placing the ear against the screw driver handle while putting the screw driver tip to the linear expansion valve.

② **Linear expansion valve operation**



③ **Troubleshooting**

Symptom	Check points	Countermeasures
Operation circuit failure of the micro processor	Disconnect the connector on the controller board, then connect LED for checking.  When power is turned on, pulse signals will send for 10 seconds. If the LED does not light or keeps lighting even after the signals stop, that means some failures in the operation circuit.	Exchange the indoor controller board at drive circuit failure.
Linear expansion valve mechanism is locked.	Motor will idle and make a ticking noise when the motor is operated while the linear expansion valve is locked. This ticking sound is the sign of the abnormality.	Exchange the linear expansion valve.
Short or breakage of the motor coil of the linear expansion valve	Measure the resistance between each coil (white-red, yellow-brown, orange-red, blue-brown) with a tester. It is normal if the resistance is in the range of 200Ω ±10%.	Exchange the linear expansion valve.
Valve does not close completely.	To check the linear expansion valve, operate the indoor unit in fan mode and at the same time operate other indoor units in cooling mode, then check the pipe temperature <liquid pipe temperature> of the indoor unit by the outdoor multi controller board operation monitor. During fan operation, linear expansion valve is closed completely and if there is any leaking, detecting temperature of the thermistor will go lower. If the detected temperature is much lower than the temperature indicated in the remote controller, it means the valve is not closed all the way.  Linear expansion valve It is not necessary to exchange the linear expansion valve, if the leakage is small and not affecting normal operation.	If large amount of refrigerant is leaked, exchange the linear expansion valve.
Wrong connection of the connector or contact failure	Check the color of lead wire and missing terminal of the connector.	Disconnect the connector at the controller board, then check the continuity.

9-2. FAN MOTOR CHECK

Check method of indoor fan motor (fan motor/controller board)

① Notes

· High voltage is applied to the connecter (FAN)(CNMF1, 2) for the fan motor. Pay attention to the service.

· Do not pull out the connector (FAN)(CNMF1, 2) for the motor with the power supply on, doing so may result in damage to the board.

(FAN)

PMFY-P06/08/12/15NBMU-E PMFY-P06/08/12/15NBMU-E1

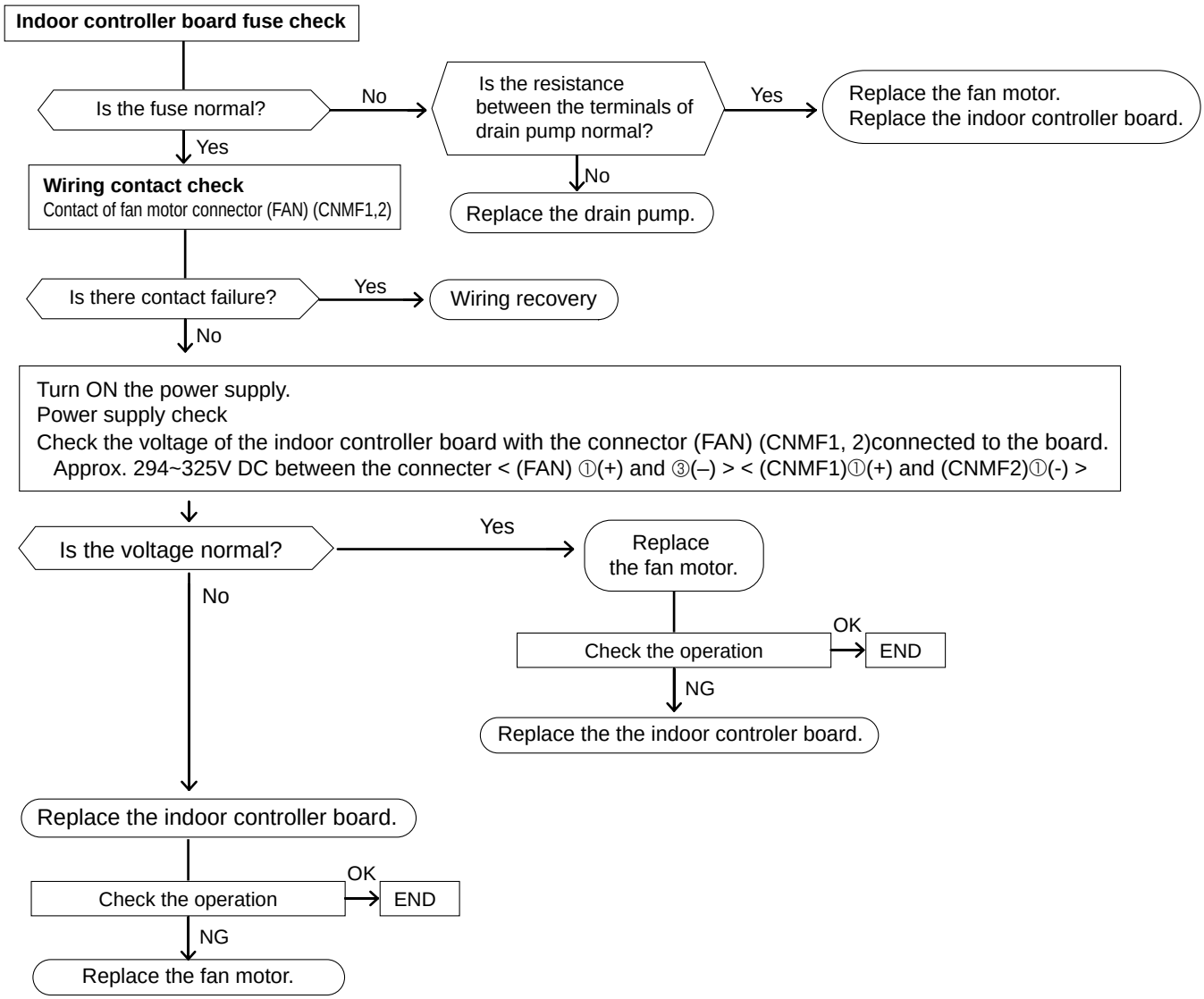
(CNMF1, 2)

PMFY-P06/08/12/15NBMU-E#2 PMFY-P06/08/12/15NBMU-ER3

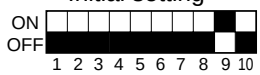
PMFY-P06/08/12/15NBMU-ER4 PMFY-P06/08/12/15NBMU-ER5

② Self check

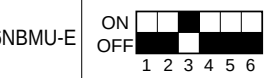
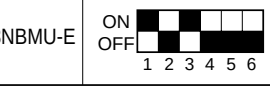
Symptom : The indoor fan can not rotate.

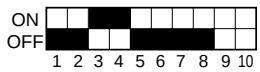


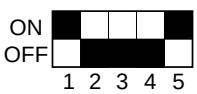
9-3. FUNCTION OF DIP SWITCH

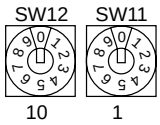
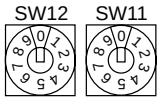
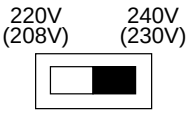
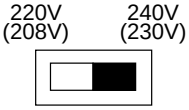
Switch	Pole	Function	Operation by switch		Effective timing	Remarks
			ON	OFF		
SW1 Function setting	1	Thermistor <Room temperature detection> position	Built-in remote controller	Indoor unit	Under suspension	Address board <Initial setting>  ※
	2	Filter clogging detection	Provided	Not provided		
	3	Filter cleaning sign	2,500h	100h		
	4	Fresh air intake	Effective	Not effective		
	5	Switching remote controller display	Thermo ON signal display	Indicating fan operation ON/OFF		
	6	Humidifier control	Fan operation at Heating mode	Thermo ON operation at Heating mode		
	7	Air flow at	Low ※	Extra low ※		
	8	Heat thermo OFF	Setting air flow	Depends on SW1-7		
	9	Auto restart function	Effective	Not effective		
	10	Power ON/OFF by breaker	Effective	Not effective		

SW 1-7	SW 1-8	
OFF	OFF	Extra low
ON	OFF	Low
OFF	ON	Setting air flow
ON	ON	Stop

SW2 Capacity code setting	1~6	MODELS	SW 2	MODELS	SW 2	Before power supply ON	Indoor controller board <Initial setting> Set for each capacity.
		PMFY-P06NBMU-E		PMFY-P12NBMU-E			
		PMFY-P08NBMU-E		PMFY-P15NBMU-E			

SW3 Function setting	1	Heat pump/Cool only	Cooling only	Heat pump	Under suspension	Indoor controller board <Initial setting>  (※4) At cooling mode, each angle can be used only 1 hour. (※5) SW 3-9 setting PMFY-P06, P08NBMU-E=ON PMFY-P12, P15NBMU-E=OFF SW 3-10 setting PMFY-P06, P08NBMU-E=ON PMFY-P12, P15NBMU-E=OFF Do not use SW3-9, 10 as trouble might be caused by the usage condition. ※6 Second setting means first setting.
	2	Louver	Available	Not available		
	3	Vane	Available	Not available		
	4	Vane swing function	Available	Not available		
	5	Vane horizontal angle	Second setting ※6	First setting		
	6	Vane cooling limit angle setting ※4	Horizontal angle	Down B, C		
	7	Changing the opening of linear expansion valve when the thermostat is OFF	Effective	Not effective		
	8	Heating 4deg. up	Not effective	Effective		
	9	Target superheat setting ※5	—	—		
	10	Target sub cool setting ※5	—	—		

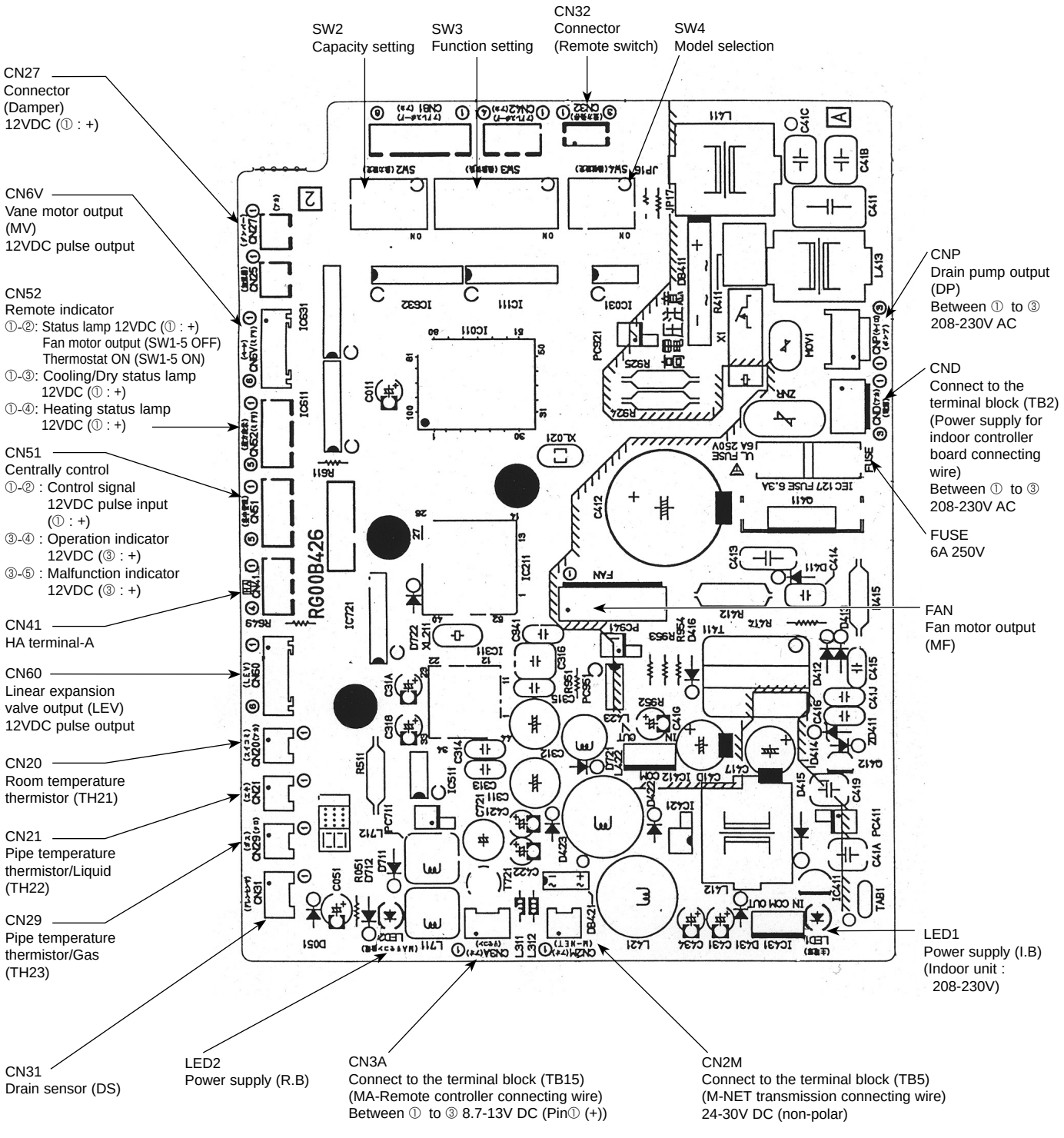
SW4 Model Selection (Setting for PMFY series)	1~5	In case replacing the indoor controller board, make sure to set the switch to the initial setting, which is shown below. PMFY-P·NBMU-E  PMFY-P·NBMU-E1  PMFY-P·NBMU-E#2/ER3/ER4/ER5 	Before power supply ON	Indoor controller board

Switch	Pole	Operation by switch	Effective timing	Remarks
SW11 1s digit address setting SW12 10ths digit address setting	Rotary switch	 How to set addresses Example : If address is “3”, remain SW12 (for over 10) at “0”, and match SW11 (for 1 to 9) with “3”.	Before power supply ON	Address board <Initial setting> 
SW14 Branch No. setting	Rotary switch	 How to set branch numbers SW14 (Series R2 only) Match the indoor unit’s refrigerant pipe with the BC controller’s end connection number. Remain other than series R2 at “0”.		Address board <Initial setting> 
SW5 Voltage Selection	2	 If the unit is used at the 230V area, set the voltage to 230V. If the unit is used at the 208V, set the voltage to 208V.		Address board <Initial setting> 

9-4. TEST POINT DIAGRAM

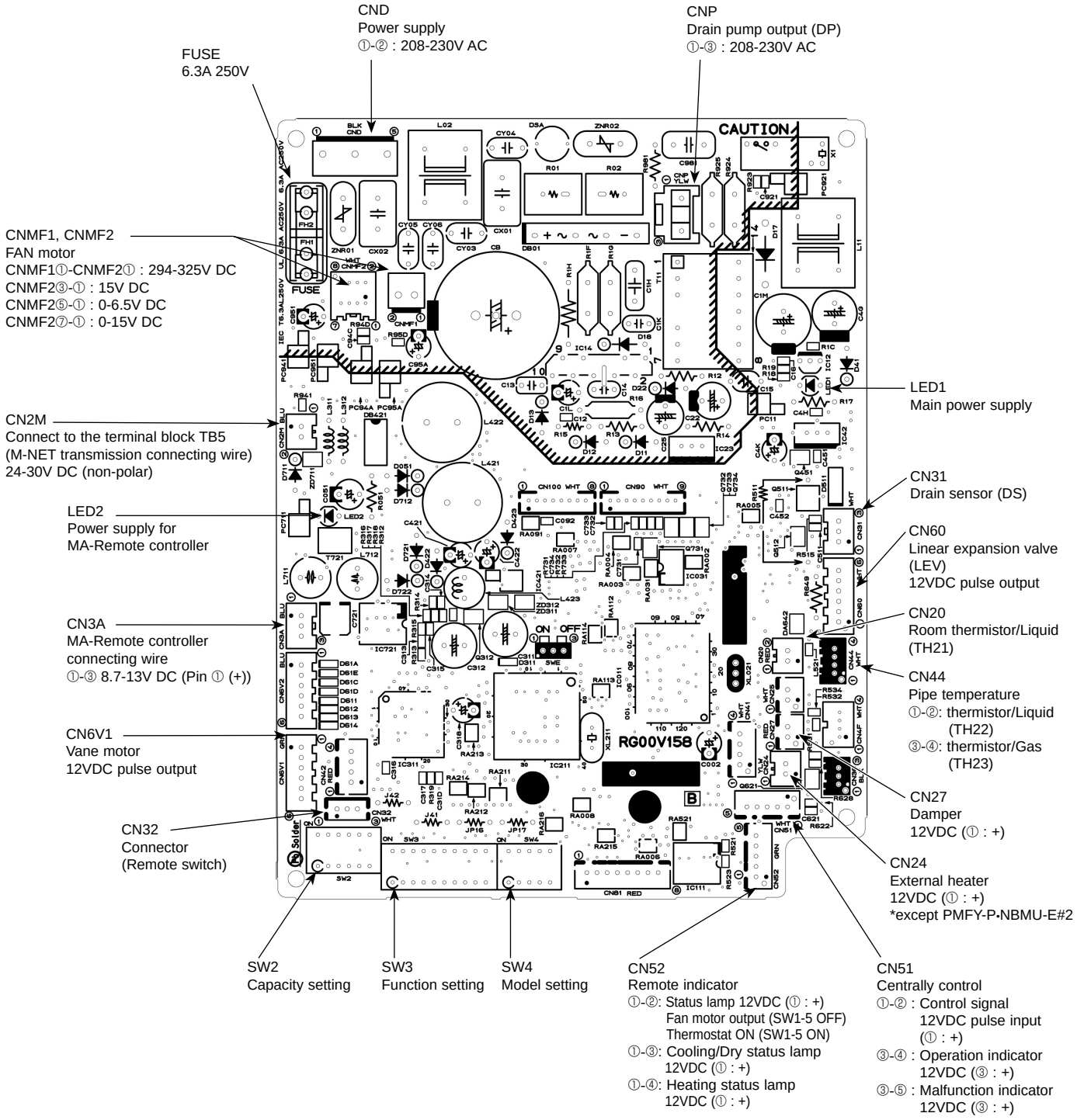
9-4-1. Indoor controller board

PMFY-P06NBMU-E PMFY-P08NBMU-E PMFY-P12NBMU-E PMFY-P15NBMU-E
PMFY-P06NBMU-E$_1$ PMFY-P08NBMU-E$_1$ PMFY-P12NBMU-E$_1$ PMFY-P15NBMU-E$_1$



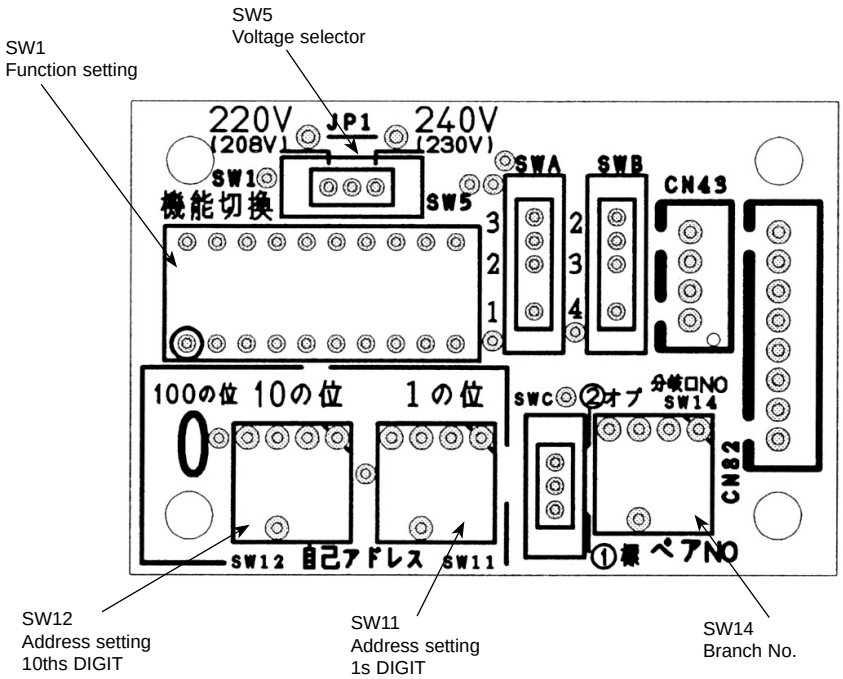
Indoor controller board

PMFY-P06NBMU-E#2 PMFY-P08NBMU-E#2 PMFY-P12NBMU-E#2 PMFY-P15NBMU-E#2
PMFY-P06NBMU-ER3 PMFY-P08NBMU-ER3 PMFY-P12NBMU-ER3 PMFY-P15NBMU-ER3
PMFY-P06NBMU-ER4 PMFY-P08NBMU-ER4 PMFY-P12NBMU-ER4 PMFY-P15NBMU-ER4
PMFY-P06NBMU-ER5 PMFY-P08NBMU-ER5 PMFY-P12NBMU-ER5 PMFY-P15NBMU-ER5



9-4-2. Address board

PMFY-P06NBMU-E	**PMFY-P08NBMU-E**	**PMFY-P12NBMU-E**	**PMFY-P15NBMU-E**
PMFY-P06NBMU-E1	**PMFY-P08NBMU-E1**	**PMFY-P12NBMU-E1**	**PMFY-P15NBMU-E1**
PMFY-P06NBMU-E#2	**PMFY-P08NBMU-E#2**	**PMFY-P12NBMU-E#2**	**PMFY-P15NBMU-E#2**
PMFY-P06NBMU-ER3	**PMFY-P08NBMU-ER3**	**PMFY-P12NBMU-ER3**	**PMFY-P15NBMU-ER3**
PMFY-P06NBMU-ER4	**PMFY-P08NBMU-ER4**	**PMFY-P12NBMU-ER4**	**PMFY-P15NBMU-ER4**
PMFY-P06NBMU-ER5	**PMFY-P08NBMU-ER5**	**PMFY-P12NBMU-ER5**	**PMFY-P15NBMU-ER5**



10 DISASSEMBLY PROCEDURE

PMFY-P06NBMU-E
PMFY-P06NBMU-E$_1$
PMFY-P06NBMU-E#2
PMFY-P06NBMU-ER3
PMFY-P06NBMU-ER4
PMFY-P06NBMU-ER5

PMFY-P08NBMU-E
PMFY-P08NBMU-E$_1$
PMFY-P08NBMU-E#2
PMFY-P08NBMU-ER3
PMFY-P08NBMU-ER4
PMFY-P08NBMU-ER5

PMFY-P12NBMU-E
PMFY-P12NBMU-E$_1$
PMFY-P12NBMU-E#2
PMFY-P12NBMU-ER3
PMFY-P12NBMU-ER4
PMFY-P12NBMU-ER5

PMFY-P15NBMU-E
PMFY-P15NBMU-E$_1$
PMFY-P15NBMU-E#2
PMFY-P15NBMU-ER3
PMFY-P15NBMU-ER4
PMFY-P15NBMU-ER5

Be careful when removing heavy parts.

OPERATING PROCEDURE

1. Removing the grille

Opening the air intake grille

(1) Press the PUSH of the air intake grille. (See Figure 1)
(2) Put your fingers on the both ends of nut of the air intake grille and put it down after the grille clicked.

Removing the air intake grille

(1) Press the PUSH of the air intake grille, and pull down the both ends of nut with your fingers after the grille clicked. (See Figure 1)
(2) Pull out the handle of air intake grille strongly toward you. (See Figure 2)
(3) Draw the string of the air intake grille to prevent the air intake grille from dropping. (See Figure 3)

Checks before setting the grille in place

(1) Before installing the grille, make sure the indoor unit is square with the ceiling opening (or parallel to the angle between the wall and the ceiling).
(2) Check that the 4 points where the grille will be secured are in contact with the ceiling surface.
(3) Check that the insulation for the refrigerant pipes, drainage pipes, etc. is in place and that wiring connections and arrangements are complete.

Figure 4

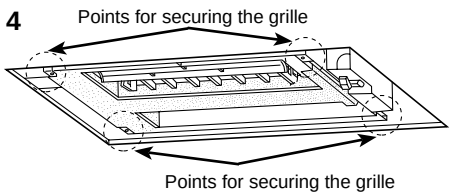
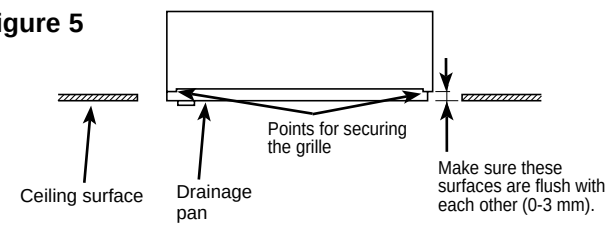


Figure 5



PHOTOS & ILLUSTRATIONS

Photo 1

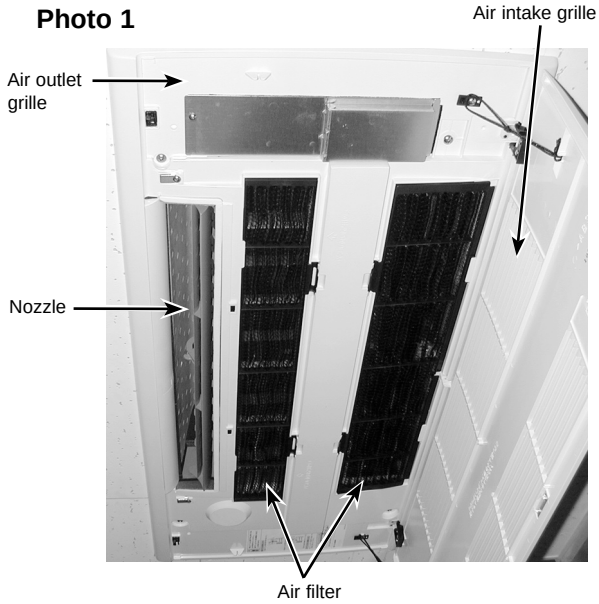


Figure 1

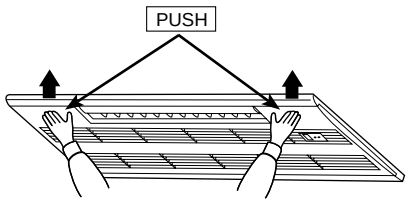


Figure 2

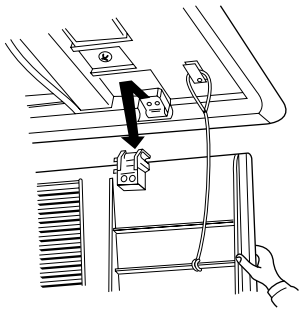
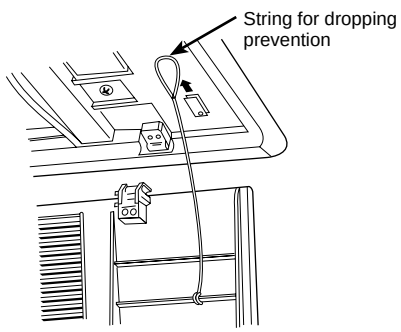


Figure 3



OPERATING PROCEDURE

Removing the grille

(1) Open the intake grille by pressing PUSH of the air intake grille and remove the air filter (× 2). (See Figure 1)
(2) Remove the screw cover in the middle of the air outlet. (See Figure 7)
(3) Open the upper and lower flaps on the indoor unit completely. (See Figure 7)
(4) Remove the securing screws (× 7).
(Ⓐ: M5 × 0.8 × 16, 6pcs)
(Ⓑ: 4 × 16, 1pc)
(5) Remove the temporary holding tabs on the grille to the hooks on the indoor unit.

Attaching the grille

(1) Open the upper and lower flaps on the indoor unit completely.
(2) Hook the temporary holding tabs on the front panel to the hooks on the indoor unit.
(3) Adjust the grille so that it fits properly in the angle between the ceiling and the wall, and install the securing screws Ⓐ (supplied with this grille) in their 4 places at left and right, leaving them slightly loose.
(4) Tighten the securing bolts Ⓐ and securing screws Ⓑ in the centre 3 places. (See Figure 6)
(5) Tighten the securing bolts Ⓐ in the 4 places at left and right.
* Make sure there are no gaps between the indoor unit and the grille, and between the grille and the ceiling surface. If there are gaps, the wind may come in and it may cause water to drip. (See Figure 8)
* Tighten the securing bolts Ⓐ and securing screws Ⓑ completely.
(6) Replace the air filter and screw cover, and press PUSH of the intake grille until you hear it snap into place.

Checks after setting the grille

(1) Check that there are no gaps between the indoor unit and the grille, between the grille and the ceiling surface. If there are gaps, the wind may come in and condensation may result.
(2) Check that the air filter is in place.

PHOTOS & ILLUSTRATIONS

Figure 6

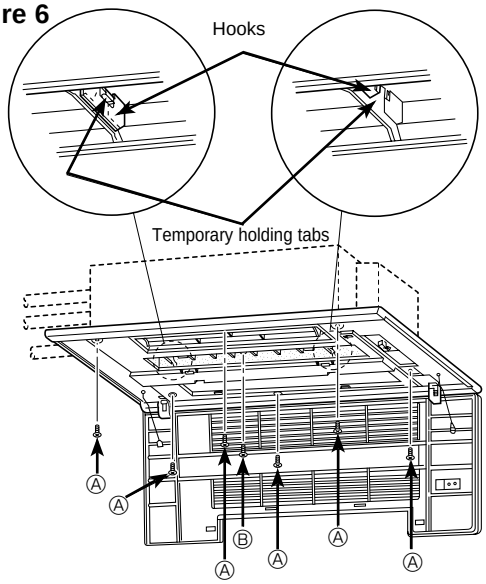


Figure 7

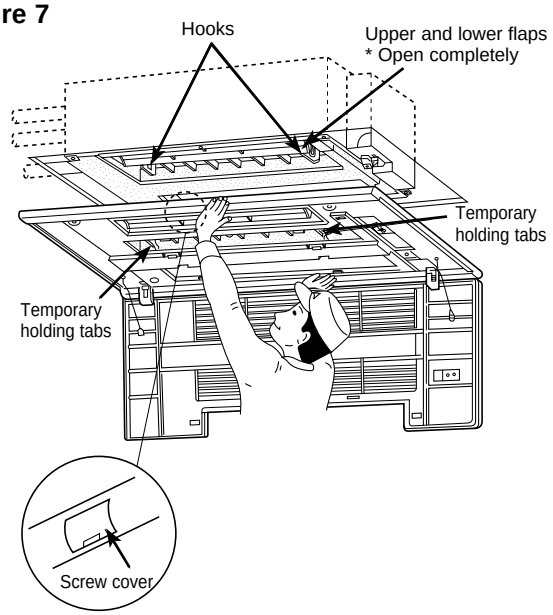
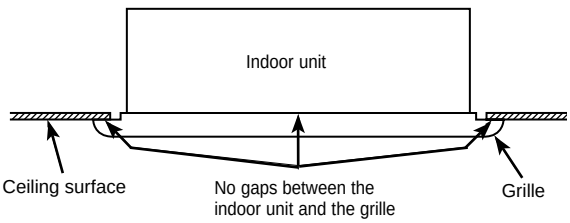
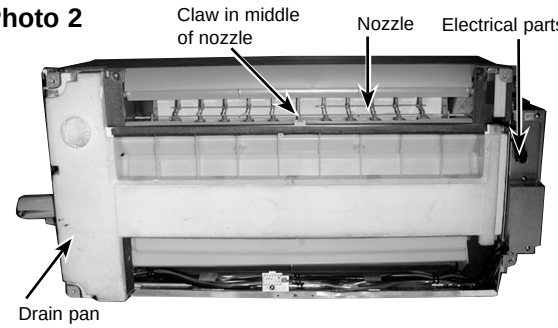
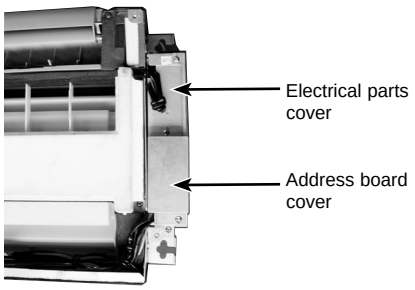
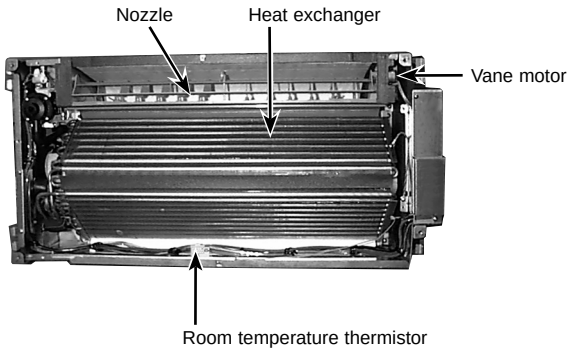
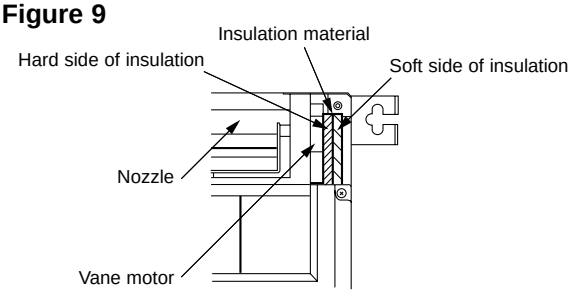
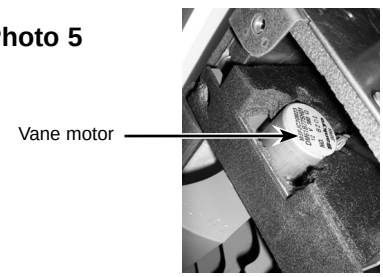
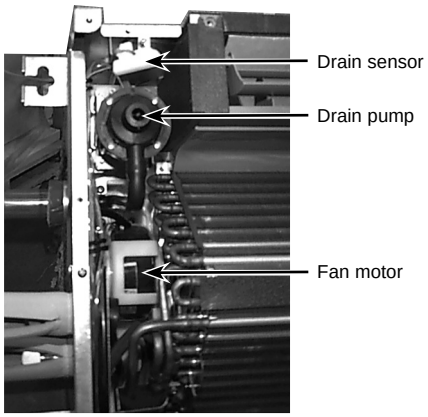
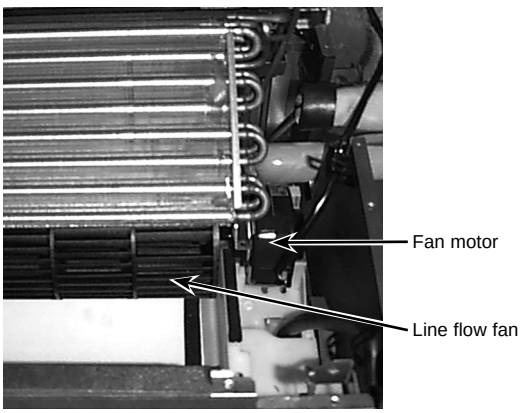


Figure 8

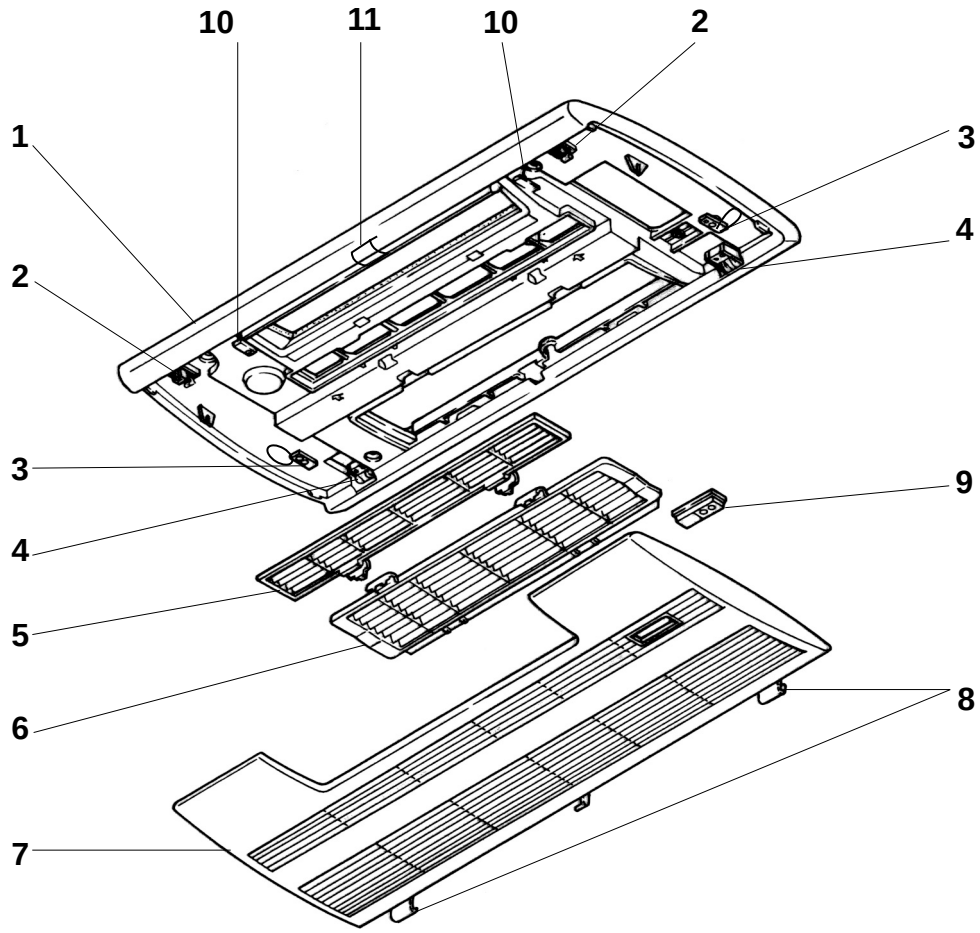


OPERATING PROCEDURE	PHOTOS & ILLUSTRATIONS
2. Removing the electrical parts box (1) Remove the panel. (2) Remove the address board cover. (3) Remove the electrical parts cover. (4) Disconnect the connectors of fan motor, vane motor, drain pump, room temperature thermistor, pipe temperature thermistor (Liquid. Gas), condenser/evaporator temperature thermistor, and drain sensor on the electrical controller board. (5) Disconnect the lead wire and earth wire from terminal block. (6) Remove the electrical parts box.	**Photo 2**  **Photo 3** 
3. Removing the nozzle **Note when the nozzle is removed.** **· The insulation material (white) which prevents water drop is mounted to the side of vane motor. Remove the insulation material before removing nozzle. (See Figure 4)** **· After completing the service, re-mount the insulation material as before as shown in right figure.** **· After service, mount the double layer insulation without fail. The hard material side should be faced toward the nozzle. (See Figure 4)** (1) Remove the panel. (2) Remove the room temperature thermistor. (3) Unhook the claws in the middle of nozzle and remove the drain pan. (5 screws) (See Photo 2) (4) Remove the nozzle side of the heat exchanger. (2 screws) (5) Remove the address board cover. (See Photo 3) (6) Remove the electrical parts cover. (See Photo 3) (7) Disconnect the connector of vane motor. (8) Remove the insulation material (white) on the right side of nozzle. (9) Remove the nozzle. (6 screws)	**Photo 4**  **Figure 9** 
4. Removing the vane motor (1) Remove the nozzle. Refer to above-mentioned 3. Removing the nozzle. (2) Remove the vane motor from the nozzle.	**Photo 5** 

OPERATING PROCEDURE	PHOTOS & ILLUSTRATIONS
5. Removing the drain pump (1) Remove the panel. (2) Unhook the claw in the middle of nozzle and remove the drain pan. (See Photo 2) (3) Remove the address board cover. (See Photo 3) (4) Remove the electrical parts cover. (See Photo 3) (5) Disconnect the connector of drain pump. (6) Remove the drain hose. (7) Remove the drain pump. (2 screws)	**Photo 6** 
6. Removing the fan motor and line flow fan (1) Remove the panel. (2) Unhook the claw in the middle of nozzle and remove the drain pan. (See Photo 2) (3) Unscrew 2 screws at the nozzle side of the heat exchanger. (4) Remove the address board cover. (See Photo 3) (5) Remove the electrical parts cover. (See Photo 3) (6) Disconnect the connector of vane motor, fan motor and drain pump. (7) Remove the nozzle side of the heat exchanger. (2 screws) (8) Remove the nozzle. (9) Remove the drain pump. (10) Unscrew 2 screws in the motor support. (11) Remove the fan motor and line flow fan. (The fan motor and line flow fan can be removed without removing the heat exchanger.)	**Photo 7** 
7. Removing the thermistor <Room temperature detection> (1) Remove the panel. (2) Remove the address board cover. (3) Remove the electrical parts cover. (4) Remove the thermistor. <Intake temperature detector> (5) Disconnect the lead wire from the cord clamp. (5 points) (6) Disconnect the connector (CN20) on the indoor controller board.	
8. Removing the thermistor **<Liquid pipe temperature detection>** **<Gas pipe temperature detection>** (1) Remove the panel. (2) Remove the address board cover. (3) Remove the electrical parts cover. (4) Remove the drain pan. (5) Remove the thermistor <Gas pipe temperature detection>/ <Liquid pipe temperature detection>. (6) Disconnect the lead wire from the cord clamp. (7) Disconnect the connector (CN21)/(CN29), (CN44) on the indoor controller board. Connector (CN21) / Liquid ($NBMU_{(1)}$) (CN29) / Gas ($NBMU_{(1)}$) (CN44) / Liquid and Gas (NBMU#2, NBMUR3, NBMUR4, NBMUR5)	

11 RoHS PARTS LIST

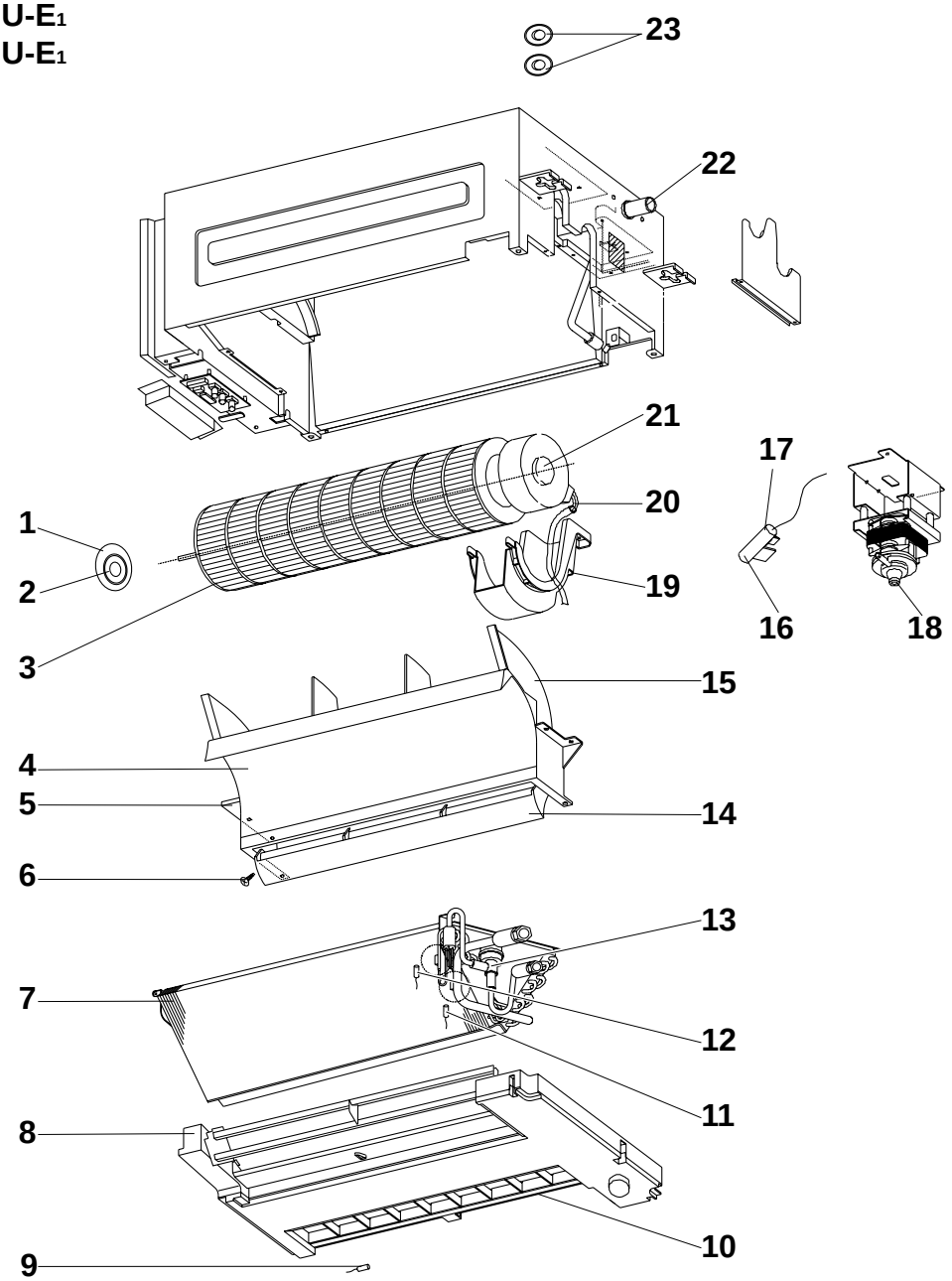
PANEL PARTS
PMP-16BMU (FOR PMFY-P06/08/12/15NBMU-E • PMFY-P06/08/12/15NBMU-E$_1$)
PMP-16BMUW (FOR PMFY-P06/08/12/15NBMU-E#2 • PMFY-P06/08/12/15NBMU-ER3 • PMFY-P06/08/12/15NBMU-ER4 • PMFY-P06/08/12/15NBMU-ER5)



No.	RoHS	Part No.	Part Name	Specification	Q'ty/set		Remarks (Drawing No.)	Wiring Diagram Symbol	Recommended Q'ty
					PMP-16				
					BMU	BMUW			
1	G	T7W E16 003	AIR OUTLET GRILLE		1				
	G	T7W E22 003	AIR OUTLET GRILLE			1			
2	G	R01 E01 055	LATCH		2	2			
3	G	R01 E01 099	PANEL HOOK		2	2			
4	G	R01 E07 054	GRILLE CATCH		2	2			
5	G	R01 E14 500	L.L.FILTER		1	1			
6	G	R01 E15 500	L.L.FILTER		1	1			
7	G	T7W E04 691	INTAKE GRILLE		1				
	G	T7W E06 691	INTAKE GRILLE			1			
8	G	R01 E06 054	GRILLE SHAFT		2	2			
9	G	R01 E01 648	RECEIVER COVER		1	1			
10	G	R01 E01 044	MAGNET		2	2			
11	G	R01 E04 096	SCREW CAP		1				
	G	R01 E07 096	SCREW CAP			1			

RoHS PARTS LIST

FUNCTIONAL PARTS
PMFY-P06NBMU-E
PMFY-P08NBMU-E
PMFY-P12NBMU-E
PMFY-P15NBMU-E
PMFY-P06NBMU-E$_1$
PMFY-P08NBMU-E$_1$
PMFY-P12NBMU-E$_1$
PMFY-P15NBMU-E$_1$



RoHS PARTS LIST

Part number that is circled is not shown in the figure.

No.	RoHS	Part No.	Part Name	Specification	Q'ty/set PMFY- P·NBMU-E 06/08	Q'ty/set PMFY- P·NBMU-E 12/15	Q'ty/set PMFY- P·NBMU-E1 06/08	Q'ty/set PMFY- P·NBMU-E1 12/15	Remarks (Drawing No.)	Wiring Diagram Symbol	Recommended Q'ty
1	G	R01 23A 102	BEARING MOUNT		1	1	1	1			
2	G	R01 E04 103	SLEEVE BEARING		1	1	1	1			
3	G	R01 E32 114	LINE FLOW FAN		1	1	1	1			
4	G	R01 E01 079	STABILIZER ASSY		1	1	1	1			
5	G	R01 E18 223	VANE MOTOR		1	1	1	1		MV	
6	G	R01 E02 092	VANE SLEEVE		1	1	1	1			
7	G	T7W H08 480	HEAT EXCHANGER		1		1				
	G	T7W H09 480	HEAT EXCHANGER			1		1			
8	G	R01 E30 529	DRAIN PAN ASSY		1	1	1	1			
9	G	R01 H12 202	THERMISTOR	ROOM	1	1	1	1		TH21	
10	G	R01 E03 038	GUIDE VANE		1	1	1	1	8pcs/set		
11	G	R01 H16 202	THERMISTOR	LIQUID	1	1	1	1		TH22	
12	G	R01 H17 202	THERMISTOR	GAS	1	1	1	1		TH23	
13	G	R01 H06 401	EXPANSION VALVE		1	1	1	1		LEV	
14	G	R01 E16 002	VANE		1	1	1	1			
15	G	R01 E05 110	CASING ASSY		1	1	1	1			
16	G	R01 32K 241	SENSOR HOLDER		1	1	1	1			
17	G	R01 E11 266	DRAIN SENSOR		1	1	1	1		DS	
18	G	T7W E11 355	DRAIN PUMP		1	1	1	1		DP	
19	G	R01 E35 130	MOTOR SUPPORT		1	1	1	1			
20	G	R01 E24 220	FAN MOTOR		1	1				MF	
	G	R01 E45 220	FAN MOTOR				1	1		MF	
21	G	R01 E13 105	MOTOR MOUNT		1	1	1	1			
22	G	R01 E05 527	DRAIN PIPE ASSY		1	1	1	1			
23	G	R01 E03 673	SCREW & WASHER		1	1	1	1	set		

RoHS PARTS LIST

FUNCTIONAL PARTS
PMFY-P06NBMU-E#2
PMFY-P08NBMU-E#2
PMFY-P12NBMU-E#2
PMFY-P15NBMU-E#2
PMFY-P06NBMU-ER3
PMFY-P08NBMU-ER3
PMFY-P12NBMU-ER3
PMFY-P15NBMU-ER3
PMFY-P06NBMU-ER4
PMFY-P08NBMU-ER4
PMFY-P12NBMU-ER4
PMFY-P15NBMU-ER4
PMFY-P06NBMU-ER5
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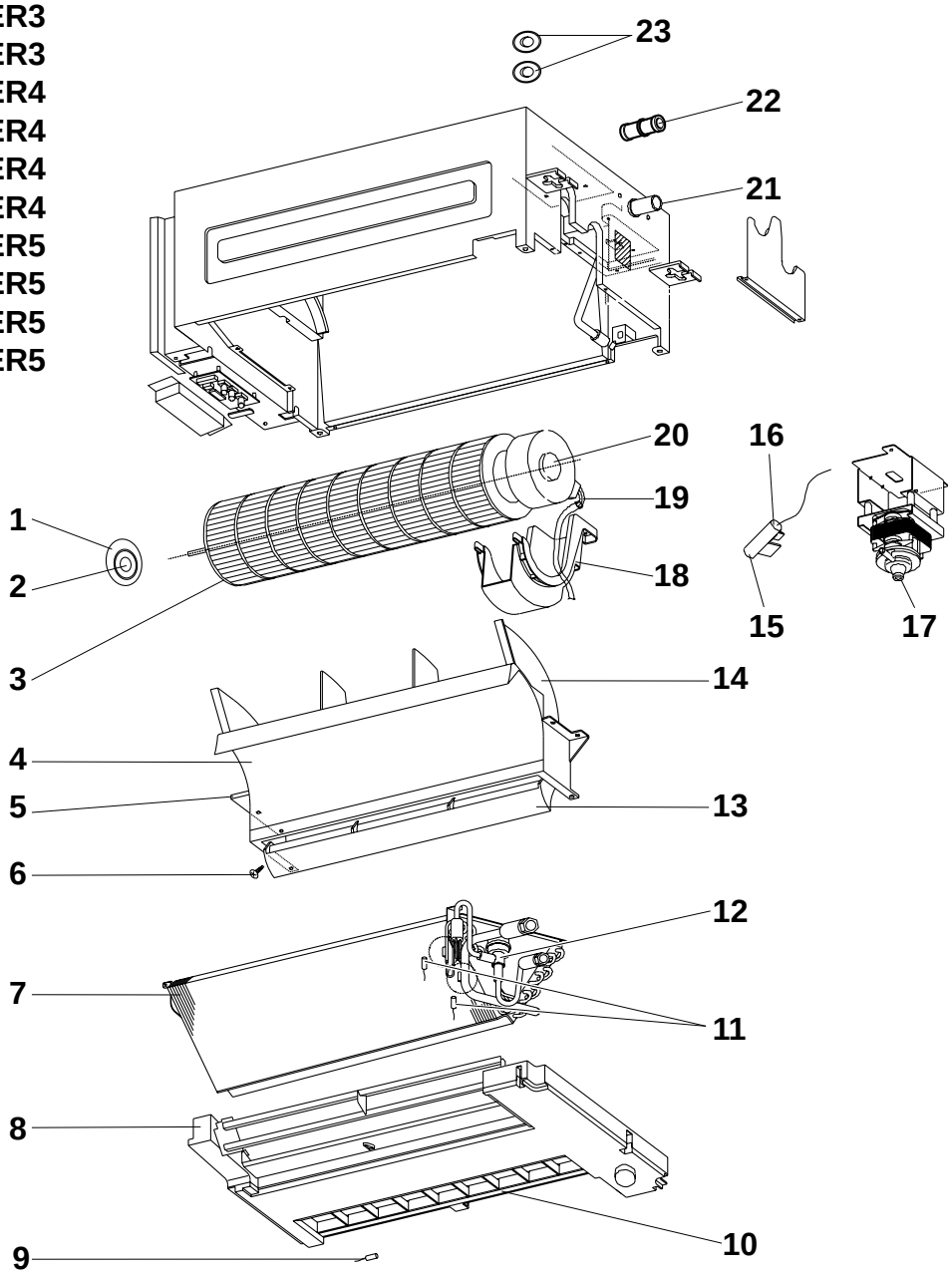
PMFY-P15NBMU-ER5



RoHS PARTS LIST

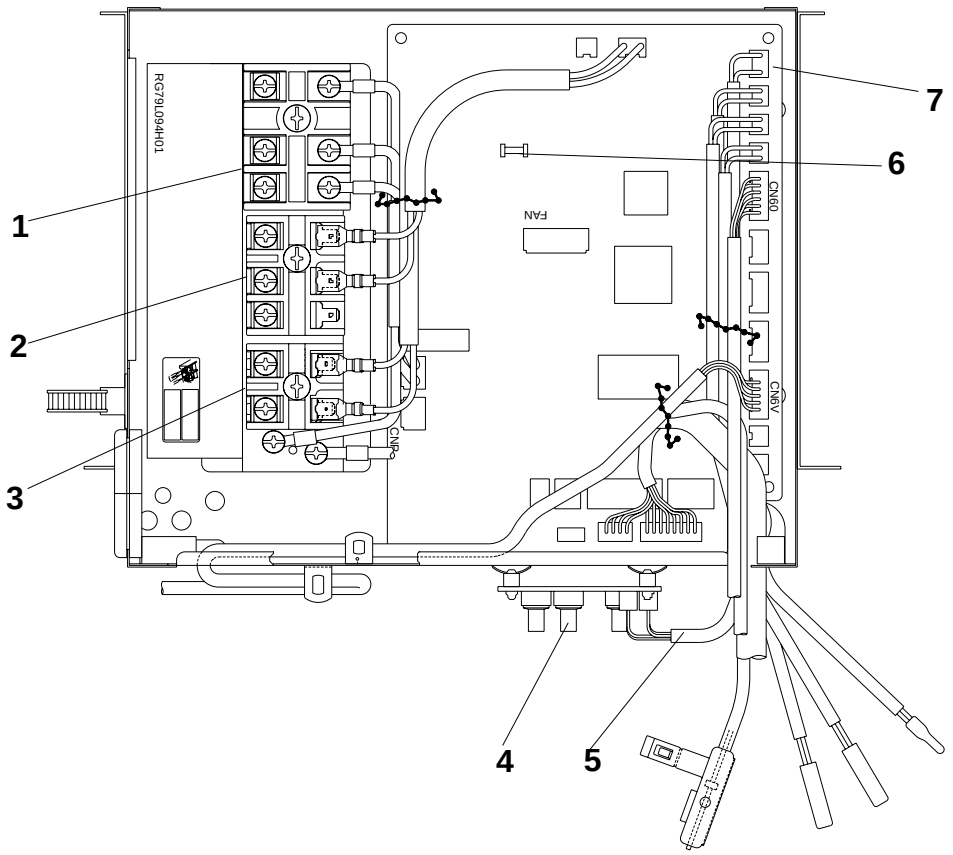
Part number that is circled is not shown in the figure.

No.	RoHS	Part No.	Part Name	Specification	Q'ty/set				Remarks (Drawing No.)	Wiring Diagram Symbol	Recom-mended Q'ty
					PMFY-P·						
					NBMU-E#2 NBMU-ER3		NBMU-ER4 NBMU-ER5				
					06/08	12/15	06/08	12/15			
1	G	R01 23A 102	BEARING MOUNT		1	1	1	1			
2	G	R01 E04 103	SLEEVING BEARING		1	1	1	1			
3	G	R01 E32 114	LINE FLOW FAN		1	1	1	1			
4	G	R01 E01 079	STABILIZER ASSY		1	1	1	1			
5	G	R01 E18 223	VANE MOTOR		1	1	1	1		MV	
6	G	R01 E02 092	VANE SLEEVE		1	1	1	1			
7	G	T7W H92 480	HEAT EXCHANGER		1		1				
	G	T7W H93 480	HEAT EXCHANGER			1		1			
8	G	R01 E30 529	DRAIN PAN ASSY		1	1	1	1			
9	G	R01 H12 202	THERMISTOR	ROOM	1	1	1	1		TH21	
10	G	R01 E03 038	GUIDE VANE		1	1	1	1	8pcs/set		
11	G	R01 N15 202	THERMISTOR	LIQUID/GAS	1	1	1	1		TH22,23	
12	G	R01 H06 401	EXPANSION VALVE		1	1	1	1		LEV	
13	G	R01 E16 002	VANE		1	1	1	1			
14	G	R01 E05 110	CASING ASSY		1	1	1	1			
15	G	R01 32K 241	SENSOR HOLDER		1	1	1	1			
16	G	R01 E11 266	DRAIN SENSOR		1	1	1	1		DS	
17	G	T7W E11 355	DRAIN PUMP		1	1	1	1		DP	
18	G	R01 E35 130	MOTOR SUPPORT		1	1	1	1			
19	G	R01 E49 220	FAN MOTOR		1	1	1	1		MF	
20	G	R01 E13 105	MOTOR MOUNT		1	1	1	1	L/R set		
21	G	R01 E05 527	DRAIN PIPE ASSY		1	1					
	G	R01 E10 527	DRAIN PIPE ASSY				1	1			
22	G	R01 18J 523	JOINT SOCKET				1	1			
23	G	R01 E03 673	SCREW & WASHER		1	1	1	1	set		

RoHS PARTS LIST

ELECTRICAL PARTS

PMFY-P06NBMU-E	**PMFY-P08NBMU-E**	**PMFY-P12NBMU-E**	**PMFY-P15NBMU-E**
PMFY-P06NBMU-E$_1$	**PMFY-P08NBMU-E$_1$**	**PMFY-P12NBMU-E$_1$**	**PMFY-P15NBMU-E$_1$**
PMFY-P06NBMU-E#2	**PMFY-P08NBMU-E#2**	**PMFY-P12NBMU-E#2**	**PMFY-P15NBMU-E#2**
PMFY-P06NBMU-ER3	**PMFY-P08NBMU-ER3**	**PMFY-P12NBMU-ER3**	**PMFY-P15NBMU-ER3**
PMFY-P06NBMU-ER4	**PMFY-P08NBMU-ER4**	**PMFY-P12NBMU-ER4**	**PMFY-P15NBMU-ER4**
PMFY-P06NBMU-ER5	**PMFY-P08NBMU-ER5**	**PMFY-P12NBMU-ER5**	**PMFY-P15NBMU-ER5**



No.	RoHS	Part No.	Part No.	Specification	Q'ty/set						Remarks (Drawing No.)	Wiring Diagram Symbol	Recommended Q'ty
					PMFY-P06/08/12/15								
					NBMU-E	NBMU-E$_1$	NBMU-E#2	NBMU-ER3	NBMU-ER4	NBMU-ER5			
1	G	T7W E41 716	TERMINAL BLOCK	3P (L1, L2, GR)	1	1	1	1	1	1		TB2	
2	G	R01 E27 246	TERMINAL BLOCK	3P (M1, M2, S)	1	1	1	1	1	1		TB5	
3	G	R01 E53 246	TERMINAL BLOCK	2P (1, 2)	1	1	1	1	1	1		TB15	
4	G	T7W E01 294	ADDRESS BOARD		1	1	1	1	1	1		A.B	
5	G	R01 E10 304	CABLE ASSY		1	1	1	1	1	1			
6	G	T7W 420 239	FUSE	250V, 6A	1	1						FUSE	
	G	R01 E06 239	FUSE	250V, 6.3A			1	1	1	1		FUSE	
7	G	T7W E59 310	INDOOR CONTROLLER BOARD		1							I.B	
	G	T7W E67 310	INDOOR CONTROLLER BOARD			1						I.B	
	G	T7W E72 310	INDOOR CONTROLLER BOARD				1					I.B	
	G	T7W E85 310	INDOOR CONTROLLER BOARD					1	1			I.B	
	G	T7W C04 310	INDOOR CONTROLLER BOARD							1		I.B	

CITY MULTI™

MITSUBISHI ELECTRIC CORPORATION

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Distributed in Apr. 2012 No. OC341 REVISED EDITION-F
Distributed in Dec. 2009 No. OC341 REVISED EDITION-E PDF 7
Distributed in Dec. 2008 No. OC341 REVISED EDITION-D PDF 7
Distributed in May 2008 No. OC341 REVISED EDITION-C PDF 7
Distributed in Jul. 2007 No. OC341 REVISED EDITION-B PDF 9
Distributed in Aug. 2006 No. OC341 REVISED EDITION-A PDF 9
Distributed in Jun. 2005 No. OC341 PDF 10
Made in Japan

New publication, effective Apr. 2012
Specifications are subject to change without notice.

MITSUBISHI ELECTRIC

Changes for the Better

AIR CONDITIONER

2020

R410A

Service Handbook

Model

PUHY-P72, P96, P120, P144, P168T(Y)NU-A

PUHY-P192, P216, P240, P264, P288, P312, P336, P360, P384, P408, P432T(Y)SNU-A

PUHY-EP72, EP96, EP120, EP144, EP168, EP192, EP216, EP240T(Y)NU-A

PUHY-EP192, EP216, EP240, EP264, EP288, EP312, EP336, EP360, EP384, EP408, EP432T(Y)SNU-A

4th edition

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 CORPORATION 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 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.

⚠CAUTION

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.

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

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

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

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

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

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

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

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

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

Transportation and Installation

⚠WARNING

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

⚠CAUTION

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

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

Installation

⚠WARNING

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

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

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

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

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

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

Consult your dealer and take appropriate measures to safeguard against refrigerant leakage and resultant oxygen starvation. An installation of a refrigerant gas detector is recommended.

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.

⚠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.

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.

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 leaks out and comes in contact with an open flame, toxic gases may be generated.

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.

To reduce the risk of oxygen deprivation and gas poisoning, check for gas leakage and keep fire sources away.

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.

⚠CAUTION

To reduce the risk of pipe bursting and explosion due to abnormal pressure rise, do not allow any substances other than R410A (such as air) to enter the refrigerant circuit.

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.

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 inverter circuit breaker on the power supply to each unit.

Use properly rated breakers and fuses (inverter circuit 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.

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.

⚠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.

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 R410A. Do not use the following tools if they have been used with the conventional refrigerant (R22): gauge manifold, charging hose, refrigerant leak detector, check valve, refrigerant charge spout, vacuum gauge, and refrigerant recovery equipment. R410A does not contain chloride, so leak detectors for use with older types of refrigerants will not detect an R410A leak. 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. Because R410A operates at a higher pressure than R22, tools not intended for use with R410A may be damaged if used with R410A.

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 R410A. Consult your nearest Mitsubishi Electric Dealer.

Keep dust, dirt, and water off charging hose and flare tool. 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.

Apply ester oil, ether oil, or a small amount of alkyl benzene to flares and flanges. The use and accidental infiltration of mineral oil into the system 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 refrigerant in the liquid state. If refrigerant is charged in the gas phase, the composition of the refrigerant in the cylinder will change, compromising the unit's performance.

Do not use a charging cylinder. The use of a charging cylinder will change the composition of the refrigerant, compromising the unit's performance.

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

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

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

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

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Chapter 8 Troubleshooting Based on Observed Symptoms

Chapter 9 USB Function

Chapter 10 LED Status Indicators on the Outdoor Unit Circuit Board

Chapter 1 Check Before Servicing

1-1 Preparation for Piping Work

1-1-1 Read before Servicing

1. Check the type of refrigerant used in the system to be serviced.

Refrigerant Type

Multi air conditioner for building application CITY MULTI:R410A

2. Check the symptoms exhibited by the unit to be serviced.

Refer to this service handbook for symptoms relating to the refrigerant cycle.

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

4. Preparing necessary tools: Prepare a set of tools to be used exclusively with each type of refrigerant.

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

5. Verification of the connecting pipes: Verify the type of refrigerant used for the unit to be moved or replaced.

- Use refrigerant pipes made of phosphorus deoxidized copper. Keep the inner and outer surfaces of the pipes clean and free of such contaminants as sulfur, oxides, dust, dirt, shaving particles, oil, and water.
- These types of contaminants inside the refrigerant pipes may cause the refrigerant oil to deteriorate.

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

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.

8XP○○○ ···

- 1~9: Jan to Sept. / X~Z: Oct to Dec. (Production month)
- 8: April 2018 to March 2019 (Production year)

ex)	8ZP	December	2018
	81P	January	2019
	82P	February	2019
	83P	March	2019
	94P	April	2019

1-1-2 Tool Preparation

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

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

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

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

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

Tools/Materials	Use	Notes
Gas Leak Detector	Gas leak detection	The ones for use with HFC refrigerant may be used.
Vacuum Pump	Vacuum drying	May be used if a check valve adapter is attached.
Flare Tool	Flare processing	Flare processing dimensions for the piping in the system using the new refrigerant differ from those of R22. Refer to the following page(s). [1-2-1 Piping Materials]
Refrigerant Recovery Equipment	Refrigerant recovery	May be used if compatible with R410A.

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

Tools/Materials	Use	Notes
Vacuum Pump with a Check Valve	Vacuum drying	
Bender	Bending pipes	
Torque Wrench	Tightening flare nuts	Only the flare processing dimensions for pipes that have a diameter of ø12.7 (1/2") and ø15.88 (5/8") have been changed.
Pipe Cutter	Cutting pipes	
Welder and Nitrogen Cylinder	Welding pipes	
Refrigerant Charging Meter	Refrigerant charging	
Vacuum Gauge	Vacuum level check	

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

Tools/Materials	Use	Notes
Charging Cylinder	Refrigerant charging	Prohibited to use
Tools containing abrasive materials	Pipe cutting, cut edge treatment	Prohibited to use

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

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

1-2-1 Piping Materials

Do not use the existing piping!

1. Copper pipe materials

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]	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 R410A.

5. Flare processing

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

6. Flare nut

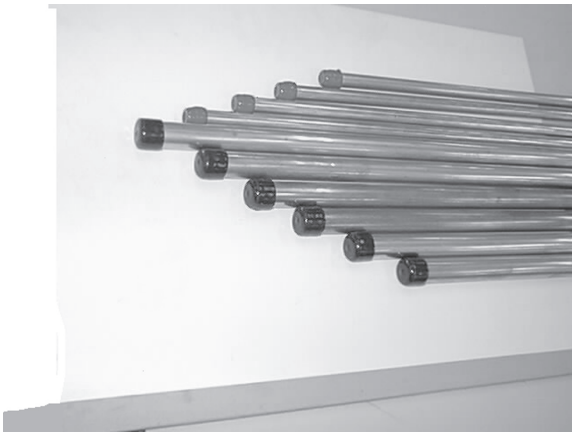
Select piping materials that meet the requirements set forth in ASTM.

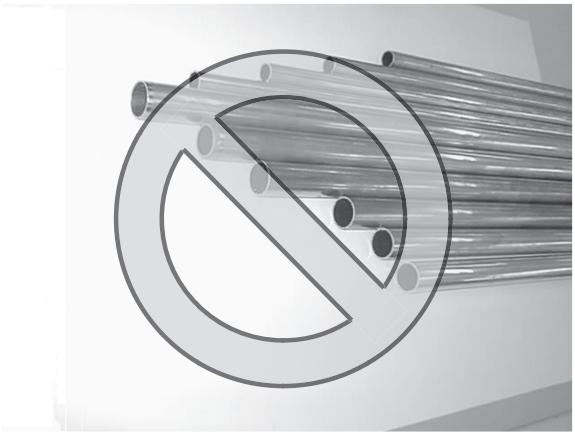
1-2-2 Storage of Piping Materials

1. Storage location

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

2. Sealing the pipe ends





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

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

1-2-3 Pipe Processing

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

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

1-2-4 Differences in Refrigerant Properties

1. Chemical property

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

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

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

2. Refrigerant composition

R410A is a pseudo-azeotropic HFC blend and can almost be handled the same way as a single refrigerant, such as R22. To be safe, however, draw out the refrigerant from the cylinder in the liquid phase. If the refrigerant in the gaseous phase is drawn out, the composition of the remaining refrigerant will change and become unsuitable for use.
If the refrigerant leaks out, it may be replenished.

3. Pressure characteristics

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

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

1-2-5 Refrigerant Oil

1. Refrigerating machine oil in the HFC refrigerant system

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

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

2. Effects of contaminants*1

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

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

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

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

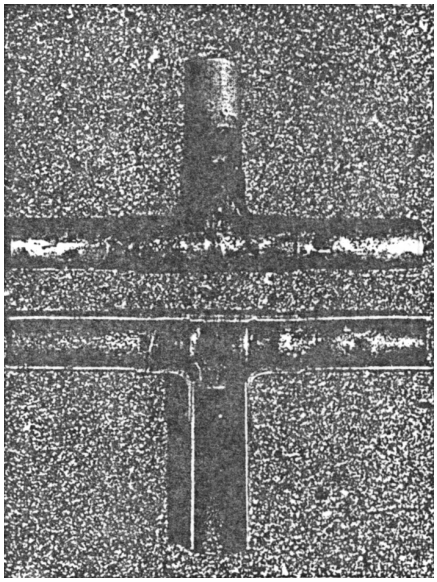
1-3 Working with Refrigerant Piping

1-3-1 Pipe Brazing

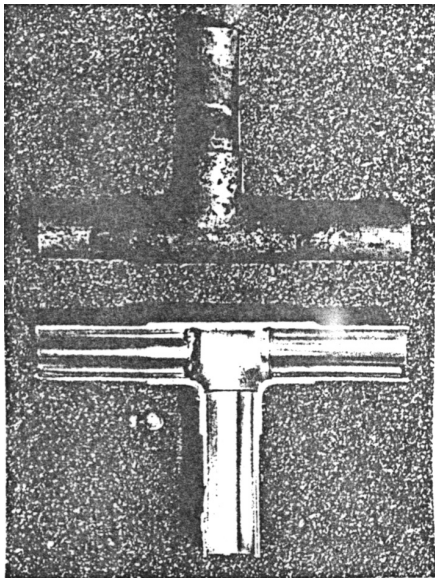
Perform brazing with special care to keep foreign objects (such as oxide scale, copper powder, water, and dust) out of the refrigerant system.

Example: Inside the brazed connection

Use of no inert gas during brazing



Use of inert gas during brazing



1. Items to be strictly observed

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

2. Reasons

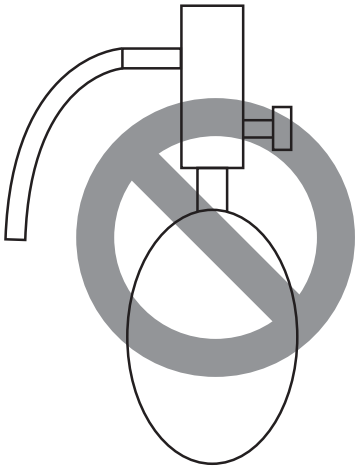
- Refrigerant oil is highly hygroscopic and is likely to cause unit failure if moisture infiltrates into the system.
- Residual flux in the refrigerant circuit will cause sludge to form.

3. Notes

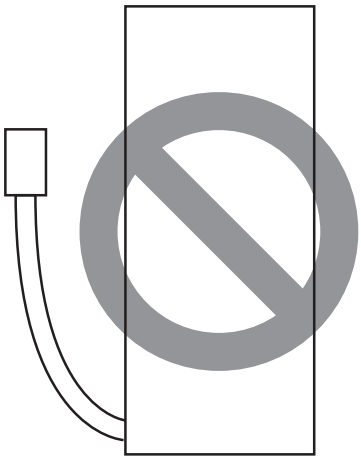
Do not use commercially available antioxidants because they may cause the pipes to corrode or refrigerating machine oil to deteriorate.

1-3-2 Air Tightness Test

Note that a refrigerant leak detector for R22 will not detect an R410A leak.



Halide torch



R22 leakage detector

1. Items to be strictly observed

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

2. Reasons

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

3. Notes

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

1-3-3 Vacuum Drying

(Photo1) 15010H

(Photo2) 14010

Recommended vacuum gauge:
ROBINAIR 14010 Thermistor Vacuum Gauge

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

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

2. Standard of vacuum degree (Photo 2)

Use a vacuum pump that attains 0.5 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

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

4. Evacuation time

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

Degree of vacuum (reference)

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

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

- Verify that the vacuum degree has not risen by more than 1 Torr (130 Pa) 1hour after evacuation. A rise by less than 1 Torr (130 Pa) is acceptable.
- If the vacuum is lost by more than 1 Torr (130 Pa), conduct evacuation, following the instructions in section 6. Special vacuum drying.

5. Procedures for stopping vacuum pump

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

6. Special vacuum drying

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

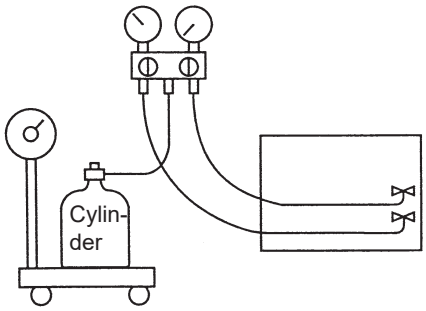
7. Triple Evacuation

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

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

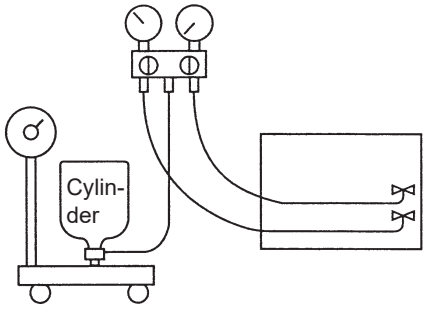
1-3-4 Refrigerant Charging

Cylinder with a siphon

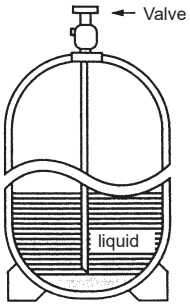


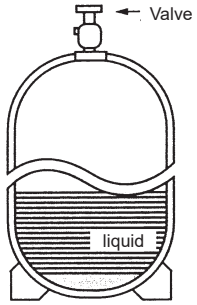
Cylinder color R410A is pink.

Cylinder without a siphon



Refrigerant charging in the liquid state





1. Reasons

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

2. Notes

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

If the refrigerant leaks out, it may be replenished. The entire refrigerant does not need to be replaced. (Charge refrigerant in the liquid state.)

Refer to the following page(s).[8-11 Measures for Refrigerant Leakage]

1-4 Precautions for Wiring

- Control boxes house high-voltage and high-temperature electrical parts.
- They may still remain energized or hot after the power is turned off.
- When opening or closing the front cover of the control box, keep out of contact with the internal parts.

  Before inspecting the inside of the control box, turn off the power, leave the unit turned off for at least 10 minutes, and check that the voltage across pins 1 and 5 of connector RYPN has dropped to 20 VDC or less.

  It will take approximately 10 minutes until the voltage is discharged after power off.
- Disconnect the relay connectors (RYFAN 1 and RYFAN 2) on the outdoor unit fan before performing maintenance work.

  On (E)P72, disconnect RYFAN1 only.

  Before connecting or disconnecting the connector, check that the outdoor unit fan is stopped and that the voltage across pins 1 and 5 of connector RYPN has dropped to 20 VDC or less.

  If the outdoor unit fan is rotated by external forces such as strong winds, the main circuit capacitor can be charged and cause an electric shock.

  Refer to the wiring nameplate for details.

  Reconnect the relay connectors (RYFAN 1 and RYFAN 2) after completion of maintenance work.
- Before turning on the power, make sure the power-supply wire is properly connected. Also, perform a voltage check at the power-supply terminal block. (Refer to item (5) in section [6-1 Read before Test Run])
- When the power is on, the compressor is energized even while the compressor is stopped.
  It is energized to evaporate the liquid refrigerant that has accumulated in the compressor.
- Before connecting wiring to TB7, check that the voltage has dropped below 20 VDC.
- When a system controller is connected to the centralized control transmission cable to which power is supplied from the outdoor unit (power jumper on the outdoor unit is connected to CN40), be aware that power can be supplied to the centralized control transmission and the system controller may detect an error and send an error notice if the outdoor unit fan is rotated by external forces, such as strong winds, even when power to the outdoor unit is turned off.
- 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]
M4	1.47 [1.08]
M5	2.55 [1.88]
M6	2.75 [2.03]
M8	6.20 [4.57]

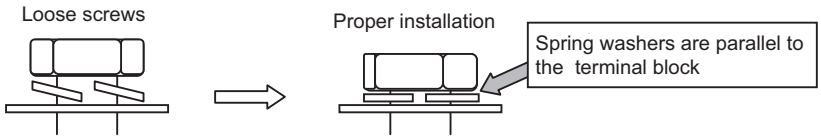
∗1 When replacing semiconductor modules (e.g., INV board, fan board), apply heatsink silicone evenly to the semiconductor module on the back of the circuit board. Next, tighten the screws holding the semiconductor module to one-third of the specified torque, and then tighten the screws to the specified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

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

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

1) Ensure that the spring washers are parallel to the terminal block.

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



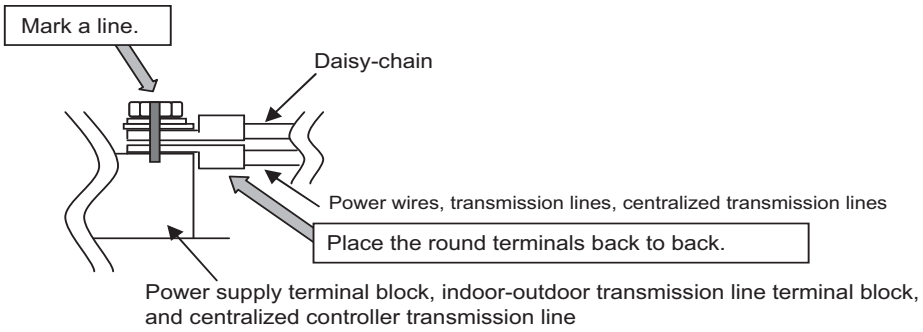
2) Check the wires are securely fastened to the screw terminals.

•Screw the screws straight down so as not to damage the screw threads.

Hold the two round terminals back to back to ensure that the screw will screw down straight.

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

Example



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

1-5 Cautionary notes on installation environment and maintenance

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

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

Chapter 2 Restrictions

2-1 System Configurations

1. Table of compatible indoor units

The table below shows the types of indoor units connectable to this series of outdoor units.
The ones not listed are incompatible with this series of outdoor units. The PUHY-P***TNU-A, PUHY-P***YNU-A, PUHY-EP***TNU-A, and PUHY-EP***YNU-A outdoor units cannot be used in combination across the series.

(1) Standard series

Outdoor units		Composing units			Maximum total capacity of connectable indoor units	Maximum number of connectable indoor units	Types of connectable indoor units
P72	T(Y)NU-A	-	-	-	36 - 93	15	P05 - P96 models R410A series indoor units
P96	T(Y)NU-A	-	-	-	48 - 124	20	
P120	T(Y)NU-A	-	-	-	60 - 156	28	
P144	T(Y)NU-A	-	-	-	72 - 187	31	
P168	T(Y)NU-A	-	-	-	84 - 218	36	
P192	T(Y)SNU-A	P96	P96	-	96 - 249	41	
P216	T(Y)SNU-A	P120	P96	-	108 - 280	46	
P240	T(Y)SNU-A	P120	P120	-	120 - 312	50	
P264	T(Y)SNU-A	P96	P96	P72	132 - 343		
P288	T(Y)SNU-A	P120	P96	P72	144 - 374		
P312	T(Y)SNU-A	P120	P120	P72	156 - 405		
P336	T(Y)SNU-A	P120	P120	P96	168 - 436		
P360	T(Y)SNU-A	P120	P120	P120	180 - 468		
P384	T(Y)SNU-A	P144	P120	P120	192 - 499		
P408	T(Y)SNU-A	P144	P144	P120	204 - 530		
P432	T(Y)SNU-A	P144	P144	P144	216 - 561		

Note

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

(2) High COP series

Outdoor units		Composing units			Maximum total capacity of connectable indoor units	Maximum number of connectable indoor units	Types of connectable indoor units
EP72	T(Y)NU-A	-	-	-	36 - 93	15	P05 - P96 models R410A series indoor units
EP96	T(Y)NU-A	-	-	-	48 - 124	20	
EP120	T(Y)NU-A	-	-	-	60 - 156	28	
EP144	T(Y)NU-A	-	-	-	72 - 187	31	
EP168	T(Y)NU-A	-	-	-	84 - 218	36	
EP192	T(Y)NU-A	-	-	-	96 - 249	41	
EP216	T(Y)NU-A	-	-	-	108 - 280	46	
EP240	T(Y)NU-A	-	-	-	120 - 312	50	
EP192	T(Y)SNU-A	EP96	EP96	-	96 - 249	41	
EP216	T(Y)SNU-A	EP120	EP96	-	108 - 280	46	
EP240	T(Y)SNU-A	EP120	EP120	-	120 - 312	50	
EP264	T(Y)SNU-A	EP96	EP96	EP72	132 - 343		
EP288	T(Y)SNU-A	EP120	EP96	EP72	144 - 374		
EP312	T(Y)SNU-A	EP120	EP120	EP72	156 - 405		
EP336	T(Y)SNU-A	EP120	EP120	EP96	168 - 436		
EP360	T(Y)SNU-A	EP120	EP120	EP120	180 - 468		
EP384	T(Y)SNU-A	EP144	EP120	EP120	192 - 499		
EP408	T(Y)SNU-A	EP144	EP144	EP120	204 - 530		
EP432	T(Y)SNU-A	EP144	EP144	EP144	216 - 561		

Note

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

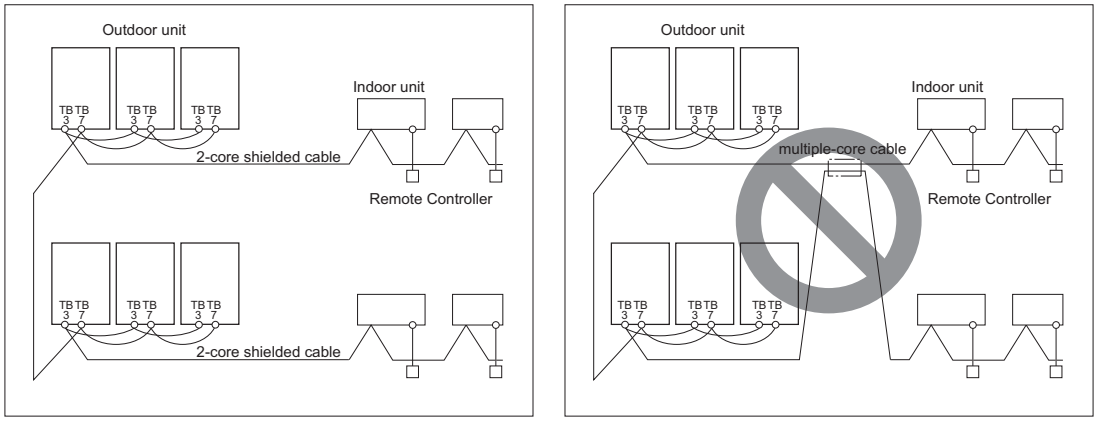
2-2 Types and Maximum Allowable Length of Cables

1. Wiring work

(1) Notes

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

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



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

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

(2) Control wiring

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

Types and maximum allowable length of cables

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

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

1) M-NET transmission line

Cable type	Facility type	All facility types
	Type	Shielded cable CVVS, CPEVS, MVVS
	Number of cores	2-core cable
	Cable size	Larger than 1.25mm^2 [AWG16]
Maximum transmission line distance between the outdoor unit and the farthest indoor unit		200 m [656ft] max.
Maximum transmission line distance for centralized control and Indoor/outdoor transmission line (Maximum line distance via outdoor unit)		1000 m [3280ft] (500 m [1640ft]) max. *1*The maximum overall line length from the power supply unit on the transmission lines for centralized control to each outdoor unit or to the system controller is 200m [656ft] max. *1 If a given system includes one or more unit or remote controller that does not support the maximum allowable cable distance of 1,000 m [3280 ft], the maximum allowable cable distance in the system will be 500 m [1640 ft]. Refer to the latest catalog for information on which units and remote controllers support the maximum allowable cable distance of 1,000 m [3280 ft].

2) Remote controller wiring

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

*1 MA remote controller refers to MA remote controller (PAR-20MAU, PAR-21MAAU, PAR-30MAAU), MA simple remote controller, and wireless remote controller.

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

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

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

*5 When connecting PAR-30MAAU or MA Simple remote controller, use sheathed cables with a minimum thickness of 0.3 mm^2.

2-3 Switch Settings

1. Switch setting

The necessary switch settings depend on system configuration. Before performing wiring work, refer to the following page(s).
[2-7 Example System with an MA Remote Controller]
[2-8 Example System with an ME Remote Controller]
[2-9 Example System with an MA and an ME Remote Controller]
If the switch settings are changed while the unit is being powered, those changes will not take effect, and the unit will not function properly.

Units on which to set the switches		Symbol	Units to which the power must be shut off
CITY MULTI indoor unit	Main/sub unit	IC	Outdoor units *3 and Indoor units
LOSSNAY, OA processing unit *1		LC	Outdoor units *3 and LOSSNAY
ATW	Water Hex Unit	AU	Outdoor units and Water Hex Unit
Air handling kit		IC	Outdoor units *3 or field supplied air handling unit
ME remote controller	Main/sub remote controller	RC	Outdoor units *3
MA remote controller*4	Main/sub remote controller	MA	Indoor units
CITY MULTI outdoor unit*2		OC,OS1,OS2	Outdoor units *3 *5

*1. Applicable when LOSSNAY units are connected to the indoor-outdoor transmission line.
*2. The outdoor units in the same refrigerant circuit are automatically designated as OC, OS1, and OS2 in the order of capacity from large to small (if two or more units have the same capacity, in the order of address from small to large).
*3. Turn off the power to all the outdoor units in the same refrigerant circuit.
*4. When setting the switch SW4 of the control board, set it with the outdoor unit power on. Refer to the following page(s).
[5-1-1 Outdoor Unit Switch Functions and Factory Settings]

2-4 M-NET Address Settings

2-4-1 Address Settings List

1. M-NET Address settings

(1) Address settings table

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

Unit or controller		Address setting range	Setting method	Factory setting
CITY MULTI indoor unit	Main/sub unit	00, 01 to 50*1*6	Assign the smallest address to the main indoor unit in the group, and assign sequential address numbers to the rest of the indoor units in the same group. *4	00
M-NET adapter				
M-NET control interface				
Free Plan adapter				
LOSSNAY, OA processing unit Air handling kit		00, 01 to 50*1*6	Assign an arbitrary but unique address to each of these units after assigning an address to all indoor units.	00
ATW	Water Hex Unit			
ME remote controller	Main remote controller	101 to 150	Add 100 to the smallest address of all the indoor units in the same group.	101
	Sub remote controller	151 to 200*2	Add 150 to the smallest address of all the indoor units in the same group.	
MA remote controller		No address settings required. (The main/sub setting must be made if 2 remote controllers are connected to the system.)		Main
CITY MULTI outdoor unit		00, 51 to 100*1,*3,*6	Assign sequential addresses to the outdoor units in the same refrigerant circuit. The outdoor units in the same refrigerant circuit are automatically designated as OC and OS. *5	00
System controller	Group remote controller	201 to 250	Assign an address that equals the sum of the smallest group number of the group to be controlled and 200.	201
	System remote controller		Assign an arbitrary but unique address within the range listed on the left to each unit.	
	ON/OFF remote controller		Assign an address that equals the sum of the smallest group number of the group to be controlled and 200.	
	Schedule timer (compatible with M-NET)		Assign an arbitrary but unique address within the range listed on the left to each unit.	202
	Central controller AE-200 AG-150A GB-50ADA G(B)-50A	000, 201 to 250	Assign an arbitrary but unique address within the range listed on the left to each unit. The address must be set to "000" to control the K-control unit.	000
	LM adapter	201 to 250	Assign an arbitrary but unique address within the range listed on the left to each unit.	247

*1. Address setting is not required for a City Multi system that consists of a single refrigerant circuit (with some exceptions).
*2. To set the ME remote controller address to "200", set the rotary switches to "00".
*3. To set the outdoor unit address to "100," set the rotary switches to "50."
*4. Some indoor units have 2 or 3 controller boards that require address settings.
No. 2 controller board address must be equal to the sum of the No. 1 controller board address and 1, and the No.3 controller board address must equal to the No. 1 controller address and 2.
*5. The outdoor units in the same refrigerant circuit are automatically designated as OC, OS1, and OS2 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).
*6. If a given address overlaps any of the addresses that are assigned to other units, use a different, unused address within the setting range.

2-4-2 Outdoor Unit Power Jumper Connector Connection

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

System configuration	Connection to the system controller	Power supply unit for transmission lines	Group operation of units in a system with multiple outdoor units	Power supply switch connector connection
System with one outdoor unit	–	–	–	CN41 (Factory setting)
System with multiple outdoor units	Not connected	–	Not grouped	
		Not required	Grouped	Disconnect the male connector from the female power supply switch connector (CN41) and connect it to the female power supply switch connector (CN40) on only one of the outdoor units.*2 *Connect the S (shielded) terminal on the terminal block (TB7) on the outdoor unit whose CN41 was replaced with CN40 to the ground terminal (⏚) on the electric box.
	With connection to the indoor unit system	Not required	Grouped/not grouped	
	With connection to the centralized control system	Not required*1 (Powered from the outdoor unit)	Grouped/not grouped	
		Required *1	Grouped/not grouped	CN41 (Factory setting)

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

2-4-3 Outdoor Unit Centralized Controller Switch Setting

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

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

2-4-4 Room Temperature Detection Position Selection

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

1) To use the built-in sensor on the remote controller, set the SW1-1 to ON.
(Factory setting: SW1-1 set to "OFF".)

- Some models of remote controllers are not equipped with a built-in temperature sensor. Use the built-in temperature sensor on the indoor unit instead.
- When using the built-in sensor on the remote controller, install the remote controller where room temperature can be detected.

(Note) Factory setting for SW1-1 on the indoor unit of the All-Fresh Models is ON.

2) When an optional temperature sensor is used, set SW1-1 to OFF, and set SW3-8 to ON.

- When using an optional temperature sensor, install it where room temperature can be detected.

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

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

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

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

2-4-6 Miscellaneous Settings

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

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

(1) Various connection options

Type	Usage	Function	Terminal to be used*1	Option
Input	Prohibiting cooling/heating operation (thermo OFF) by an external input to the outdoor unit. *It can be used as the DEMAND control device for each system.	DEMAND (level)	CN3D*2	Adapter for external input (PAC-SC36NA-E)
	Performs a low level noise operation of the outdoor unit by an external input to the outdoor unit. * It can be used as the silent operation device for each refrigerant system.	Low-noise mode (level) *3*4		
	Forces the outdoor unit to perform a fan operation by receiving signals from the snow sensor.*5*7	Snow sensor signal input (level)	CN3S	
	Cooling/heating operation can be changed by an external input to the outdoor unit.	Auto-changeover	CN3N	
	The operation mode of the unit can be changed from normal cooling operation (performance priority) to energy-saving cooling mode by an external signal input. The unit will automatically slide the evaporating temperature depending on the ΔT °C. (Control activate: ΔT is 1°C or lower.)	Energy-saving mode*9 (Shifts evaporating temp. depending on the load)	CN3K	
Output	How to extract signals from the outdoor unit *It can be used as an operation status display device. *It can be used for an interlock operation with external devices.	Operation status of the compressor*5	CN51	Adapter for external output (PAC-SC37SA-E)
		Error status*6*8		

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

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

*3 Low-noise mode is valid when Dip SW6-8 on the outdoor unit is set to OFF. When DIP SW6-8 is set to ON, 4 levels of on-DEMAND are possible, using different configurations of low-noise mode input and DEMAND input settings.When 2 or more outdoor units exist in one refrigerant circuit system, 8 levels of on-DEMAND are possible. When 3 outdoor units exist in one refrigerant circuitsystem, 12 levels of on-DEMAND are possible.

*4 By setting Dip SW6-7, the Low-noise mode can be switched between the Capacity priority mode and the Low-noise priority mode.
When SW6-7 is set to ON: The Low-noise mode always remains effective.
When SW6-7 is set to OFF: The Low-noise mode is cancelled when certain outside temperature or pressure criteria are met, and the unit goes into normal operation (capacity priority mode).

Low-noise mode is effective		Capacity priority mode becomes effective	
Cooling	Heating	Cooling	Heating
TH7 < 30°C [86°F] and 63HS1 < 3.13 MPa [454 psi]	TH7 > 3°C [37°F] and 63LS > 0.45 MPa [65 psi]	TH7 > 35°C [95°F] or 63HS1 > 3.43 MPa [497 psi]	TH7 < 0°C [32°F] or 63LS < 0.38 MPa [55 psi]

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

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

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

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

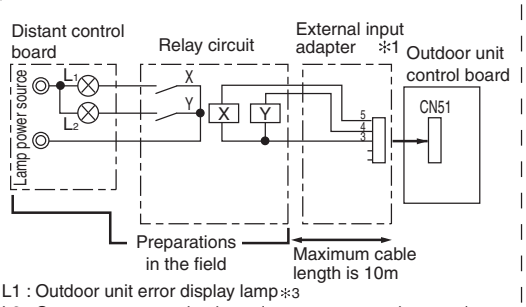
*9 This control can be enabled also from the system controller. For the procedure, refer to the manual of the system controller.

(2) Example of wiring connection

⚠ CAUTION

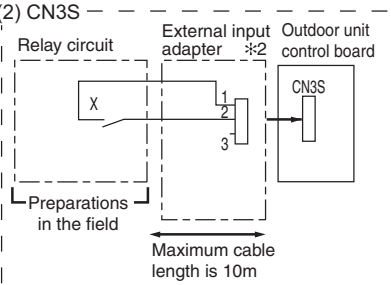
1) Wiring should be covered by insulation tube with supplementary insulation.
2) Use relays or switches with IEC or equivalent standard.
3) The electric strength between accessible parts and control circuit should have 2750V or more.

(1) CN51



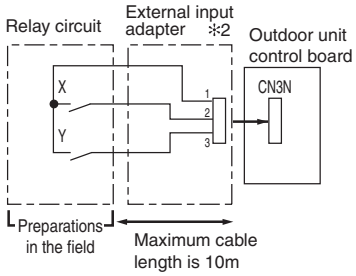
L1 : Outdoor unit error display lamp ※3
L2 : Compressor operation lamp (compressor running state)
X, Y : Relay (coil =<0.9W : DC12V)
※1. Optional part : PAC-SC37SA-E or field supply.
※3. When using a base heater, error output will not be available.

(2) CN3S



X : Relay Contact rating voltage >= DC15V
Contact rating current >= 0.1A
Minimum applicable load =< 1mA at DC
Snow sensor : The outdoor fan runs when X is closed in stop mode or thermostat mode.
※2. Optional part : PAC-SC36NA-E or field supply.

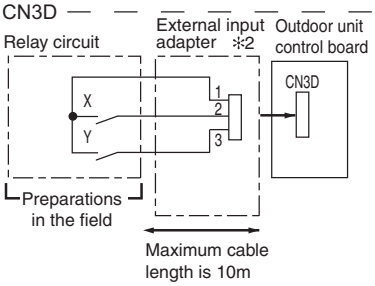
(3) CN3N



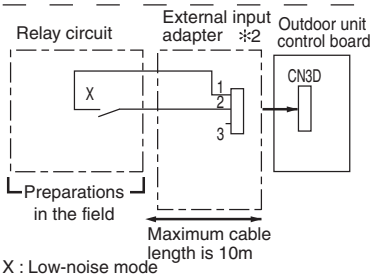
		X	
		OFF	ON
Y	OFF	Normal	
	ON	Cooling	Heating

X : Cooling / Heating
Y : Validity / Invalidity of X
X,Y : Relay Contact rating voltage >= DC15V
Contact rating current >= 0.1A
Minimum applicable load =< 1mA at DC
※2. Optional part : PAC-SC36NA-E or field supply.

(4) CN3D

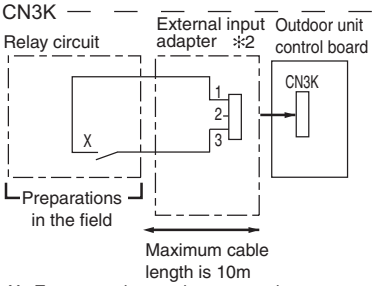


X : Low-noise mode
Y : Compressor ON/OFF
X,Y : Relay Contact rating voltage >= DC15V
Contact rating current >= 0.1A
Minimum applicable load =< 1mA at DC
※2. Optional part : PAC-SC36NA-E or field supply.



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

(5) CN3K



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

2-5 Demand Control Overview

(1) General outline of control

Demand control is performed by using the external signal input to the 1-2 and 1-3 pins of CN3D on the outdoor units (OC, OS1, and OS2).
Between 2 and 12 steps of demand control is possible by setting DIP SW6-8 on the outdoor units (OC, OS1, and OS2).

No	Demand control switch	DipSW6-8			Input to CN3D *2
		OC	OS1	OS2	
(a)	2 steps(0-100%)	OFF	OFF	OFF	OC
(b)	4 steps(0-50-75-100%)	ON	OFF	OFF	OC
(c)		OFF	ON	OFF	OS1
(d)		OFF	OFF	ON	OS2
(e)	8 steps(0-25-38-50-63-75-88-100%)	ON	ON	OFF	OC and OS1
(f)		ON	OFF	ON	OC and OS2
(g)		OFF	ON	ON	OS1 and OS2
(h)	12 steps(0-17-25-34-42-50-59-67-75-84-92-100%)	ON	ON	ON	OC, OS1, and OS2

*1. Available demand functions
(E)P72-EP240, P168T/YNU models (single-outdoor-unit system): 2 and 4 steps shown in the rows (a) and (b) in the table above only.
(E)P192-(E)P240T/YSNU models (two-outdoor-unit system OC+OS1): 2-8 steps shown in the rows (a), (b), (c), and (e) in the table above only.
(E)P264-(E)P432T/YSNU models (three-outdoor-unit system OC+OS1+OS2): 2-12 steps shown in the rows (a)-(h) in the table above.

*2. External signal is input to CN3D on the outdoor unit whose SW6-8 is set to ON. When SW6-8 is set to OFF on all outdoor units, the signal is input to the CN3D on the OC.
Outdoor units whose SW6-8 is set to ON are selectable in a single refrigerant system.

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

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

*5. Notes on using demand control in combination with the low-noise mode
To enable the low-noise mode, it is necessary to short-circuit 1-2 pin of CN3D on the outdoor unit whose SW6-8 is set to OFF.
When SW6-8 is set to ON on all outdoor units, the following operations cannot be performed.
- Performing 4-step demand in combination with the low-noise operation in a single-outdoor-unit system.
- Performing 8-step demand in combination with the low-noise operation in a two-outdoor-unit system.
- Performing 12-step demand in combination with the low-noise operation in a three-outdoor-unit system.

(2) Contact input and control content

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

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

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

*1. When SW6-8 on the outdoor unit in one refrigerant circuit system is set to ON , this function cannot be used.
*2. This function and the 4 levels or 8 levels on-DEMAND function can be used together. Input the order to CN3D 1-2P on the outdoor unit whose SW6-8 is set to OFF.

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

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

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

Note the following steps to be taken when using the STEP DEMAND

(Example) When switching from 100% to 50%

Demand control steps

(Wrong) 100% → 0% → 50%

(Correct) 100% → 75% → 50%

If the step listed as the wrong example above is taken, thermo may go off.
The percentage of the demand listed in the table above is an approximate value based on the compressor volume and does not necessarily correspond with the capacity.
When this function is enabled, the night mode cannot be enabled.

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

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

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

4) When SW6-8 on the all outdoor units in one refrigerant circuit system is set to ON (12 levels of on-DEMAND) (*4)

12 levels of on-DEMAND	No.2 CN3D	1-2P	Open							
		1-3P	Open				Short-circuit			
	No.3 CN3D	1-2P	Open		Short-circuit		Open		Short-circuit	
No.1 CN3D	1-2P	1-3P	Open	Short-circuit	Open	Short-circuit	Open	Short-circuit	Open	Short-circuit
	Open	Open	100%	67%	92%	84%	67%	34%	59%	50%
		Short-circuit	67%	34%	59%	50%	34%	0%	25%	17%
	Short-circuit	Open	92%	59%	84%	75%	59%	25%	50%	42%
		Short-circuit	84%	50%	75%	67%	50%	17%	42%	34%

12 levels of on-DEMAND	No.2 CN3D	1-2P	Short-circuit							
		1-3P	Open				Short-circuit			
	No.3 CN3D	1-2P	Open		Short-circuit		Open		Short-circuit	
No.1 CN3D	1-2P	1-3P	Open	Short-circuit	Open	Short-circuit	Open	Short-circuit	Open	Short-circuit
	Open	Open	92%	59%	84%	75%	84%	50%	75%	67%
		Short-circuit	59%	25%	50%	42%	50%	17%	42%	34%
	Short-circuit	Open	84%	50%	75%	67%	75%	42%	67%	59%
		Short-circuit	75%	42%	67%	59%	67%	34%	59%	50%

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

2-6 System Connection Example

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

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

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

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

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

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

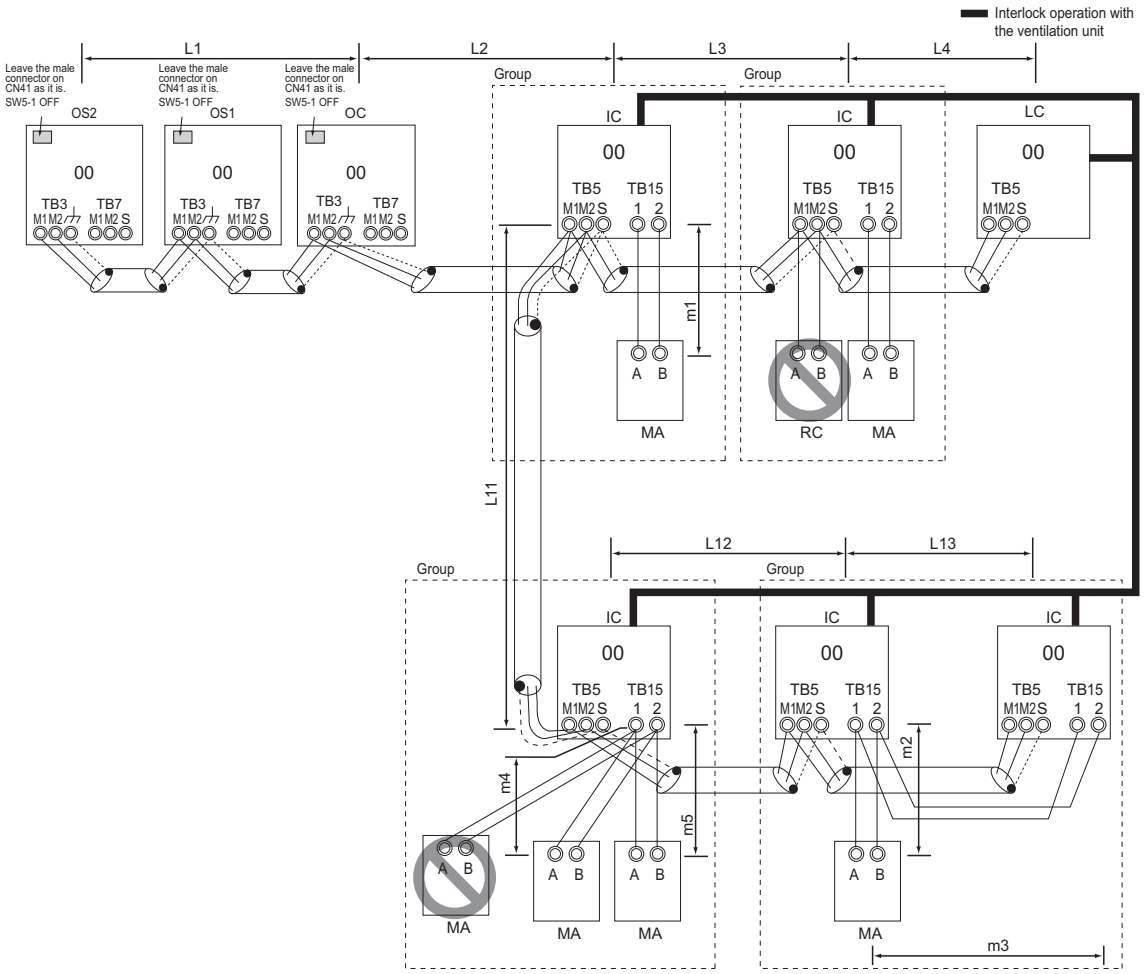
	System configuration	Connection to the system controller	Address start up for indoor and outdoor units	Notes
1	System with one outdoor unit	With connection to transmission line for centralized control	Manual address setup	

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

2-7 Example System with an MA Remote Controller

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

(1) Sample control wiring



(2) Cautions

1) ME remote controller and MA remote controller cannot both be connected to the same group of indoor units.
2) No more than 2 MA remote controllers can be connected to a group of indoor units.
3) A transmission booster is required in a system to which more than 32 indoor units (26 units if one or more indoor units of the 72 model or above is connected) are connected.
4) Automatic address setup is not available if start-stop input (CN32, CN51, CN41) is used for a group operation of indoor units or when multiple indoor units with different functions are grouped in the same group. Refer to the following page(s). [2-7-2 Single Refrigerant System with Two or More LOSSNAY Units]
5) For information about connecting two or more LOSSNAY units to a system, refer to the following page(s). [2-7-2 Single Refrigerant System with Two or More LOSSNAY Units]

(3) Maximum allowable length

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

(4) Wiring method

1) Indoor/outdoor transmission line

Daisy-chain terminals M1 and M2 on the terminal block for indoor-outdoor transmission line (TB3) on the outdoor units (OC, OS1, OS2) (Note), and terminals M1 and M2 on the terminal block for indoor-outdoor transmission line (TB5) on each indoor unit (IC). (Non-polarized two-wire)

- Only use shielded cables.

Note

The outdoor units in the same refrigerant circuit are automatically designated as OC, OS1, and OS2 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).

Shielded cable connection

Daisy-chain the ground terminal (⏚) on the outdoor units (OC, OS1, OS2), and the S terminal on the terminal block (TB5) on the indoor unit (IC) with the shield wire of the shielded cable.

2) Transmission line for centralized control

No connection is required.

3) MA remote controller wiring

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

When 2 remote controllers are connected to the system

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

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

Group operation of indoor units

To perform a group operation of indoor units (IC), daisy-chain terminals 1 and 2 on the terminal block (TB15) on all indoor units (IC) in the same group, and then connect terminals 1 and 2 on the terminal block (TB15) on the indoor unit on one end to the terminal block on the MA remote controller. (Non-polarized two-wire)

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

4) LOSSNAY connection

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

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

5) Switch setting

No address settings required.

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

(5) Address setting method

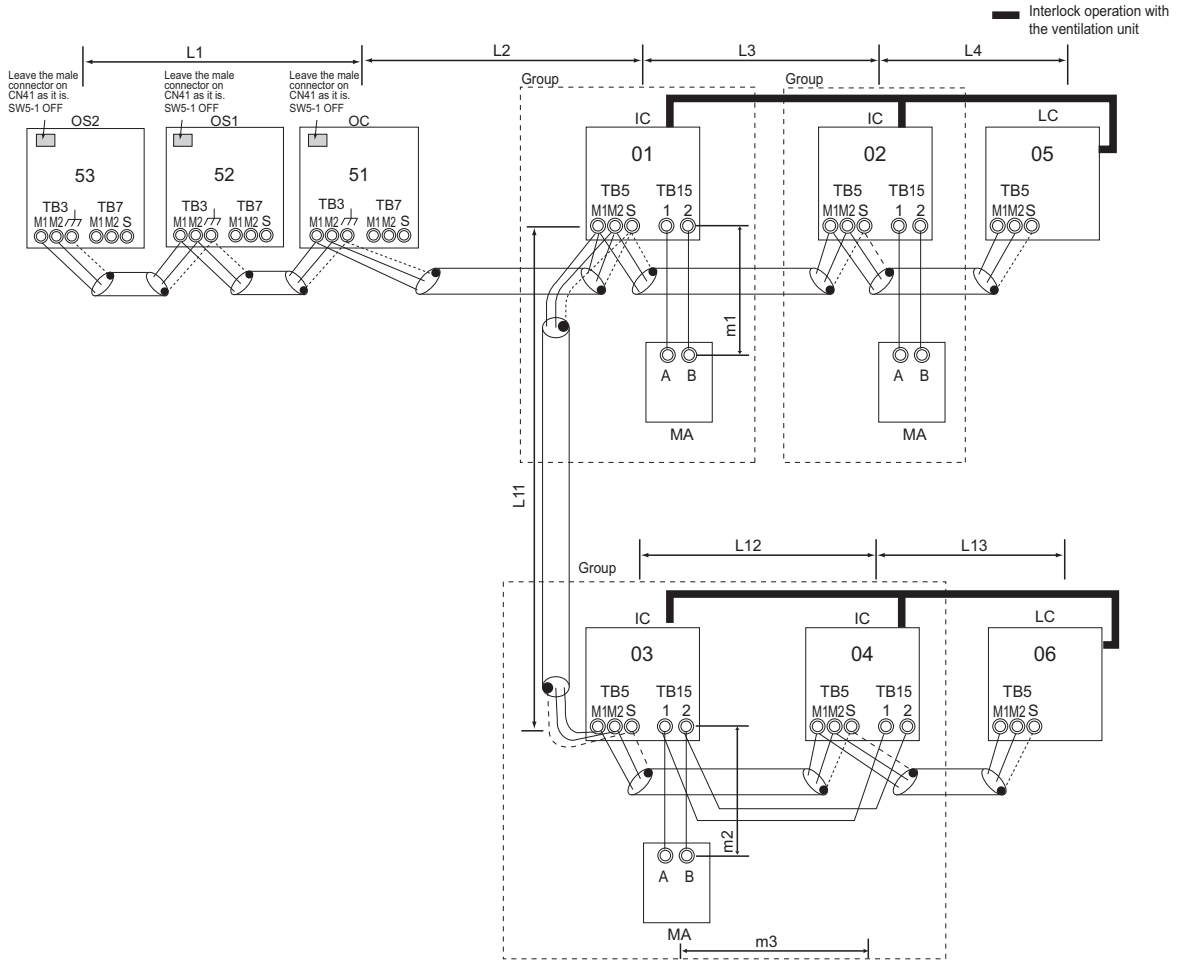
Procedures	Unit or controller			Address setting range	Setting method	Notes	Factory setting
1	Indoor unit	Main unit	IC	No settings required.	-	For information about how to perform a group operation of indoor units that feature different functions, refer to the following page(s). [2-7-2 Single Refrigerant System with Two or More LOSSNAY Units]	00
		Sub unit	IC				
2	LOSSNAY		LC	No settings required.	-		00
3	MA remote controller	Main remote controller	MA	No settings required.	-		Main
		Sub remote controller	MA	Sub remote controller	Settings to be made according to the remote controller function selection		
4	Outdoor unit (Note)		OC OS1 OS2	No settings required.	-		00

Note

The outdoor units in the same refrigerant circuit are automatically designated as OC, OS1, and OS2.
The outdoor units are designated as OC, OS1, and OS2 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).

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

(1) Sample control wiring



(2) Cautions

1) ME remote controller and MA remote controller cannot both be connected to the same group of indoor units.
2) No more than 2 MA remote controllers can be connected to a group of indoor units.
3) A transmission booster is required in a system to which more than 32 indoor units (26 units if one or more indoor units of the 72 model or above is connected) are connected.

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

(3) Maximum allowable length

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

(4) Wiring method

1) Indoor/outdoor transmission line

Same as 2-7-1

Shielded cable connection

Same as 2-7-1

2) Transmission line for centralized control

No connection is required.

3) MA remote controller wiring

Same as 2-7-1

When 2 remote controllers are connected to the system

Same as 2-7-1

Group operation of indoor units

Same as 2-7-1

4) LOSSNAY connection

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

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

5) Switch setting

Address setting is required as follows.

(5) Address setting method

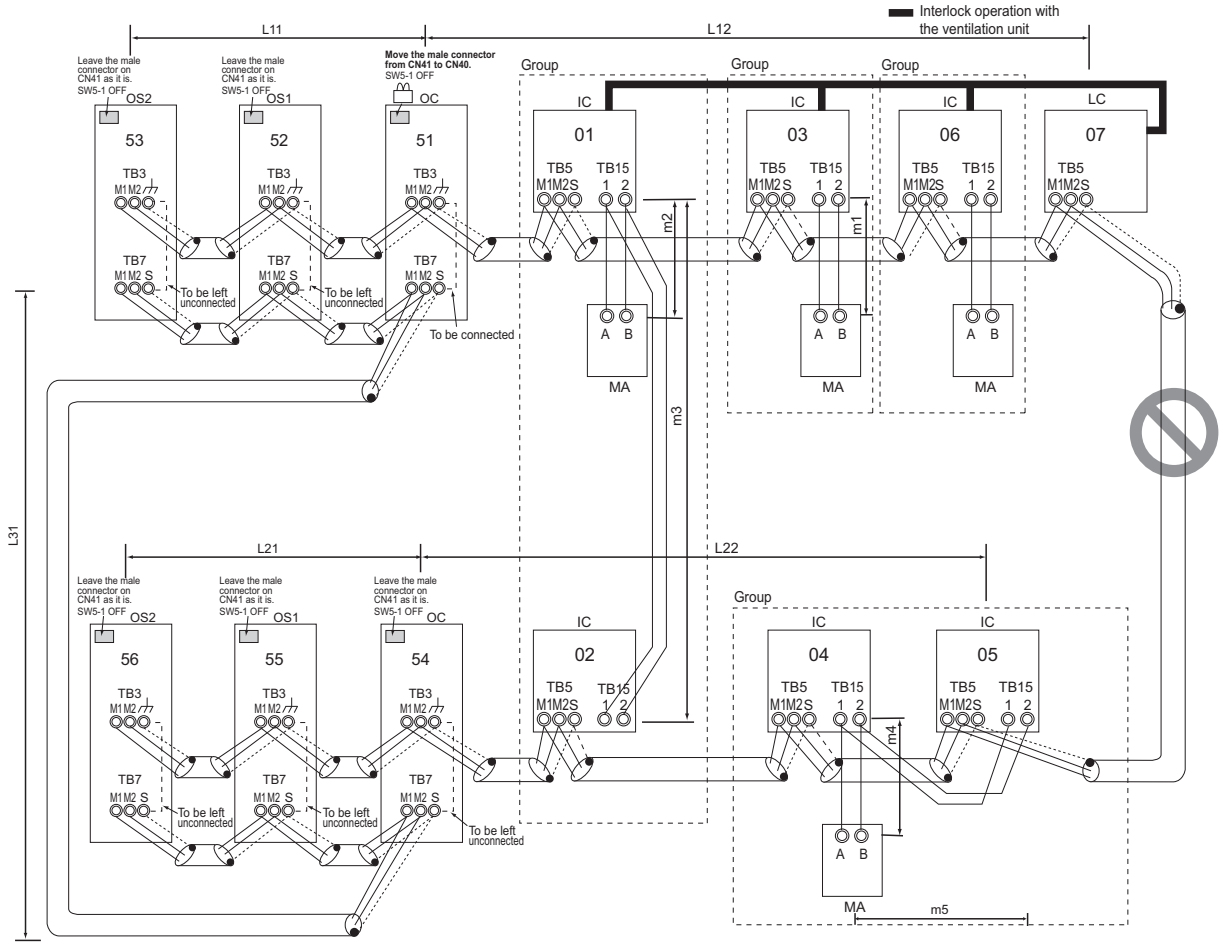
Procedures	Unit or controller			Address setting range	Setting method	Notes	Factory setting
1	Indoor unit	Main unit	IC	01 to 50	Assign the smallest address to the main unit in the group.	To perform a group operation of indoor units that have different functions, designate the indoor unit in the group with the greatest number of functions as the main unit.	00
		Sub unit			Assign sequential numbers starting with the address of the main unit in the same group +1. (Main unit address +1, main unit address +2, main unit address +3, etc.)		
2	LOSSNAY		LC	01 to 50	Assign an arbitrary but unique address to each of these units after assigning an address to all indoor units.	None of these addresses may overlap any of the indoor unit addresses.	00
3	MA remote controller	Main remote controller	MA	No settings required.	-		Main
		Sub remote controller	MA	Sub remote controller	Settings to be made according to the remote controller function selection		
4	Outdoor unit		OC OS1 OS2	51 to 100	Assign sequential address to the outdoor units in the same refrigerant circuit. The outdoor units are automatically designated as OC, OS1, and OS2.(Note)	To set the address to 100, set the rotary switches to 50.	00

Note

The outdoor units in the same refrigerant circuit are automatically designated as OC, OS1, and OS2.
The outdoor units are designated as OC, OS1, and OS2 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).

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

(1) Sample control wiring



(2) Cautions

1) ME remote controller and MA remote controller can not both be connected to the same group of indoor units.
2) No more than 2 MA remote controllers can be connected to a group of indoor units.
3) Do not connect the terminal blocks (TB5) on the indoor units that are connected to different outdoor units with each other.
4) Replacement of male power jumper connector (CN41) must be performed only on one of the outdoor units.
5) Provide grounding to S terminal on the terminal block for transmission line for centralized control (TB7) on only one of the outdoor units.
6) A transmission booster is required in a system to which more than 32 indoor units (26 units if one or more indoor units of the 72 model or above is connected) are connected.

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

(3) Maximum allowable length

1) Indoor/outdoor transmission line

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

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

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

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

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

(4) Wiring method

1) Indoor/outdoor transmission line

Same as 2-7-1

- Only use shielded cables.

Shielded cable connection

Same as 2-7-1

2) Transmission line for centralized control

Daisy-chain terminals M1 and M2 on the terminal block for transmission line for centralized control (TB7) on the outdoor units (OC) in different refrigerant circuits and on the OC, OS1, and OS2 (Note a) in the same refrigerant circuit

If a power supply unit is not connected to the transmission line for centralized control, replace the power jumper connector on the control board from CN41 to CN40 on only one of the outdoor units.

Note

a) The outdoor units in the same refrigerant circuit are automatically designated as OC, OS1, and OS2 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) When not daisy-chaining TB7's on the outdoor units in the same refrigerant circuit, connect the transmission line for centralized control to TB7 on the OC (Note a). To maintain centralized control even during an OC failure or a power failure, daisy-chain TB7 of OC, OS1, and OS2. (If there is a problem with the outdoor unit whose power jumper was moved from CN41 to CN40, centralized 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.

Shielded cable connection

Daisy-chain the S terminal on the terminal block (TB7) on the outdoor units (OC, OS1, OS2) with the shield wire of the shielded cable. Short-circuit the earth terminal (⏚) and the S terminal on the terminal block (TB7) on the outdoor unit whose power jumper connector is mated with CN40.

3) MA remote controller wiring

Same as 2-7-1

When 2 remote controllers are connected to the system

Same as 2-7-1

Group operation of indoor units

Same as 2-7-1

4) LOSSNAY connection

Same as 2-7-2

5) Switch setting

Address setting is required as follows.

(5) Address setting method

Procedures	Unit or controller			Address setting range	Setting method	Notes	Factory setting
1	Indoor unit	Main unit	IC	01 to 50	Assign the smallest address to the main unit in the group.	To perform a group operation of indoor units that have different functions, designate the indoor unit in the group with the greatest number of functions as the main unit.	00
		Sub unit			Assign sequential numbers starting with the address of the main unit in the same group +1. (Main unit address +1, main unit address +2, main unit address +3, etc.)		
2	LOSSNAY		LC	01 to 50	Assign an arbitrary but unique address to each of these units after assigning an address to all indoor units.	None of these addresses may overlap any of the indoor unit addresses.	00
3	MA remote controller	Main remote controller	MA	No settings required.	-		Main
		Sub remote controller	MA	Sub remote controller	Settings to be made according to the remote controller function selection		
4	Outdoor unit		OC OS1 OS2	51 to 100	Assign sequential address to the outdoor units in the same refrigerant circuit. The outdoor units are automatically designated as OC, OS1, and OS2. (Note)	To set the address to 100, set the rotary switches to 50.	00

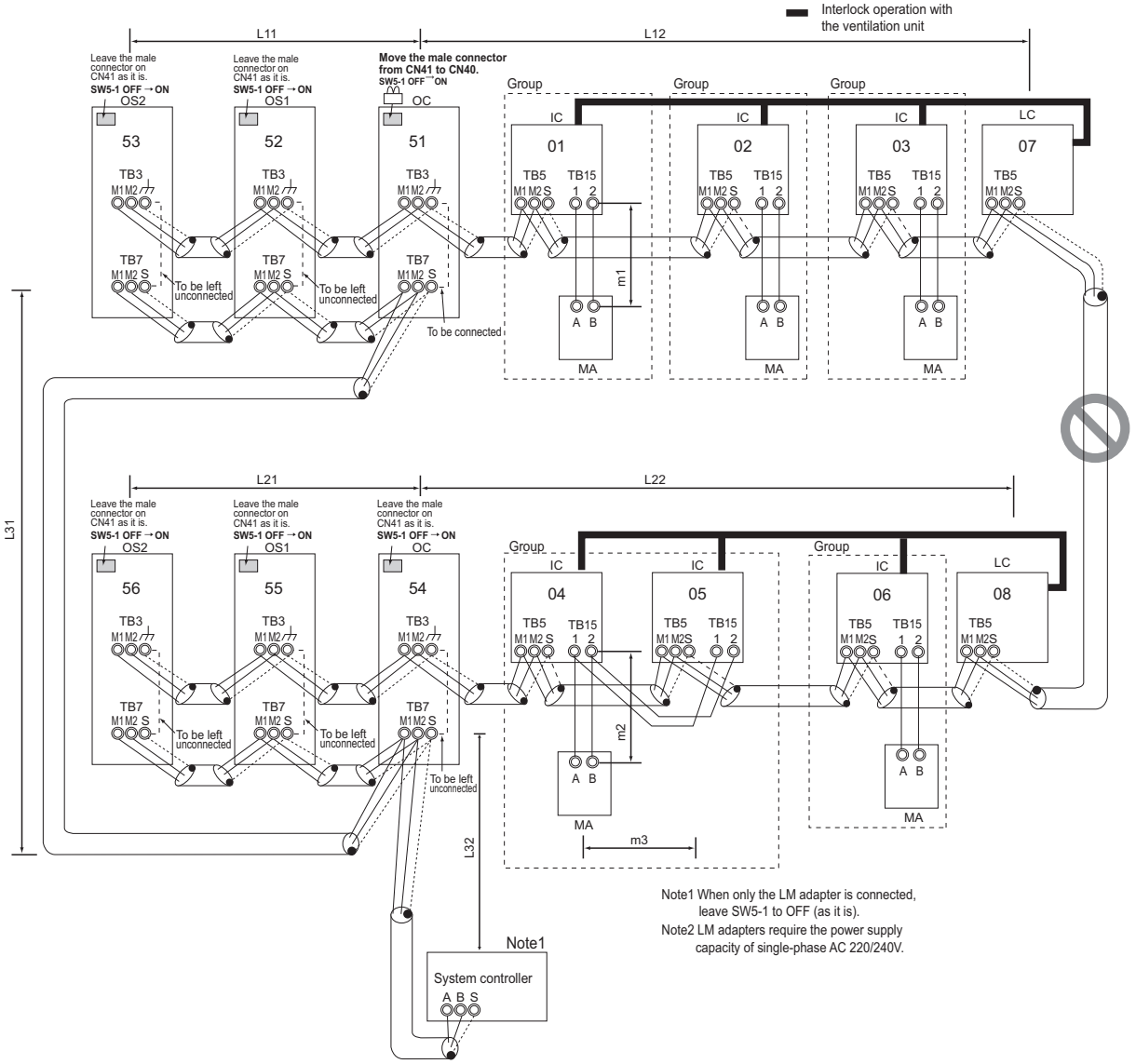
Note

The outdoor units in the same refrigerant circuit are automatically designated as OC, OS1, and OS2.
The outdoor units are designated as OC, OS1, and OS2 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).

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

(1) Sample control wiring

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



Note1 When only the LM adapter is connected, leave SW5-1 to OFF (as it is).
Note2 LM adapters require the power supply capacity of single-phase AC 220/240V.

(2) Cautions

1) ME remote controller and MA remote controller cannot both be connected to the same group of indoor units.
2) No more than 2 MA remote controllers can be connected to a group of indoor units.
3) Do not connect the terminal blocks (TB5) on the indoor units that are connected to different outdoor units with each other.
4) Replacement of male power jumper connector (CN41) must be performed only on one of the outdoor units (not required if power to the transmission line for centralized control is supplied from a controller with a power supply function, such as GB-50ADA).
5) Short-circuit the shield terminal (S terminal) and the earth terminal (⏚) on the terminal block for transmission line for centralized control (TB7) on the outdoor unit whose power jumper connector is mated with CN40.
6) A transmission booster is required in a system to which more than 32 indoor units (26 units if one or more indoor units of the 72 model or above is connected) are connected.
   ♦Refer to the DATABOOK for further information about how many booster units are required for a given system.
7) When a power supply unit is connected to the transmission line for centralized control, leave the power jumper connector on CN41 as it is (factory setting).

(3) Maximum allowable length

1) Indoor/outdoor transmission line
   Same as 2-7-3
2) Transmission line for centralized control
   L31+L32(L21) ≦200m [656ft]
3) MA remote controller wiring
   Same as 2-7-1
4) Maximum line distance via outdoor unit
   (1.25mm^2 [AWG16] or larger)
   L32+L31+L12(L11) ≦1000 m [3280ft] (500 m [1640ft])*1
   L32+L22(L21) ≦1000 m [3280ft] (500 m [1640ft])*1
   L12(L11)+L31+L22(L21) ≦1000 m [3280ft] (500 m [1640ft])*1
   *1 If a given system includes one or more unit or remote controller that does not support the maximum allowable cable distance of 1,000 m [3280 ft], the maximum allowable cable distance in the system will be 500 m [1640 ft]. Refer to the latest catalog for information on which units and remote controllers support the maximum allowable cable distance of 1,000 m [3280 ft].

(4) Wiring method

1) Indoor/outdoor transmission line

Same as 2-7-1

Shielded cable connection

Same as 2-7-1

2) Transmission line for centralized control

Daisy-chain terminals A and B on the system controller, terminals M1 and M2 on the terminal block for transmission line for centralized control (TB7) on the outdoor units (OC) in different refrigerant circuits and on the outdoor units (OC, OS1, and OS2) in the same refrigerant circuit. (Note b)

If a power supply unit is not connected to the transmission line for centralized control, replace the power jumper connector on the control board from CN41 to CN40 on only one of the outdoor units.

If a system controller is connected, set the central control switch (SW5-1) on the control board of all outdoor units to "ON."

Note

a) The outdoor units in the same refrigerant circuit are automatically designated as OC, OS1, and OS2 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) When not daisy-chaining TB7's on the outdoor units in the same refrigerant circuit, connect the transmission line for centralized control to TB7 on the OC (Note a). To maintain centralized control even during an OC failure or a power failure, daisy-chain TB7 of OC, OS1, and OS2. (If there is a problem with the outdoor unit whose power jumper was moved from CN41 to CN40, centralized 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.

Shielded cable connection

Daisy-chain the S terminal on the terminal block (TB7) on the outdoor units (OC, OS1, OS2) with the shield wire of the shielded cable. Short-circuit the earth terminal (⏚) and the S terminal on the terminal block (TB7) on the outdoor unit whose power jumper connector is mated with CN40.

3) MA remote controller wiring

Same as 2-7-1

When 2 remote controllers are connected to the system

Same as 2-7-1

Group operation of indoor units

Same as 2-7-1

4) LOSSNAY connection

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

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

5) Switch setting

Address setting is required as follows.

(5) Address setting method

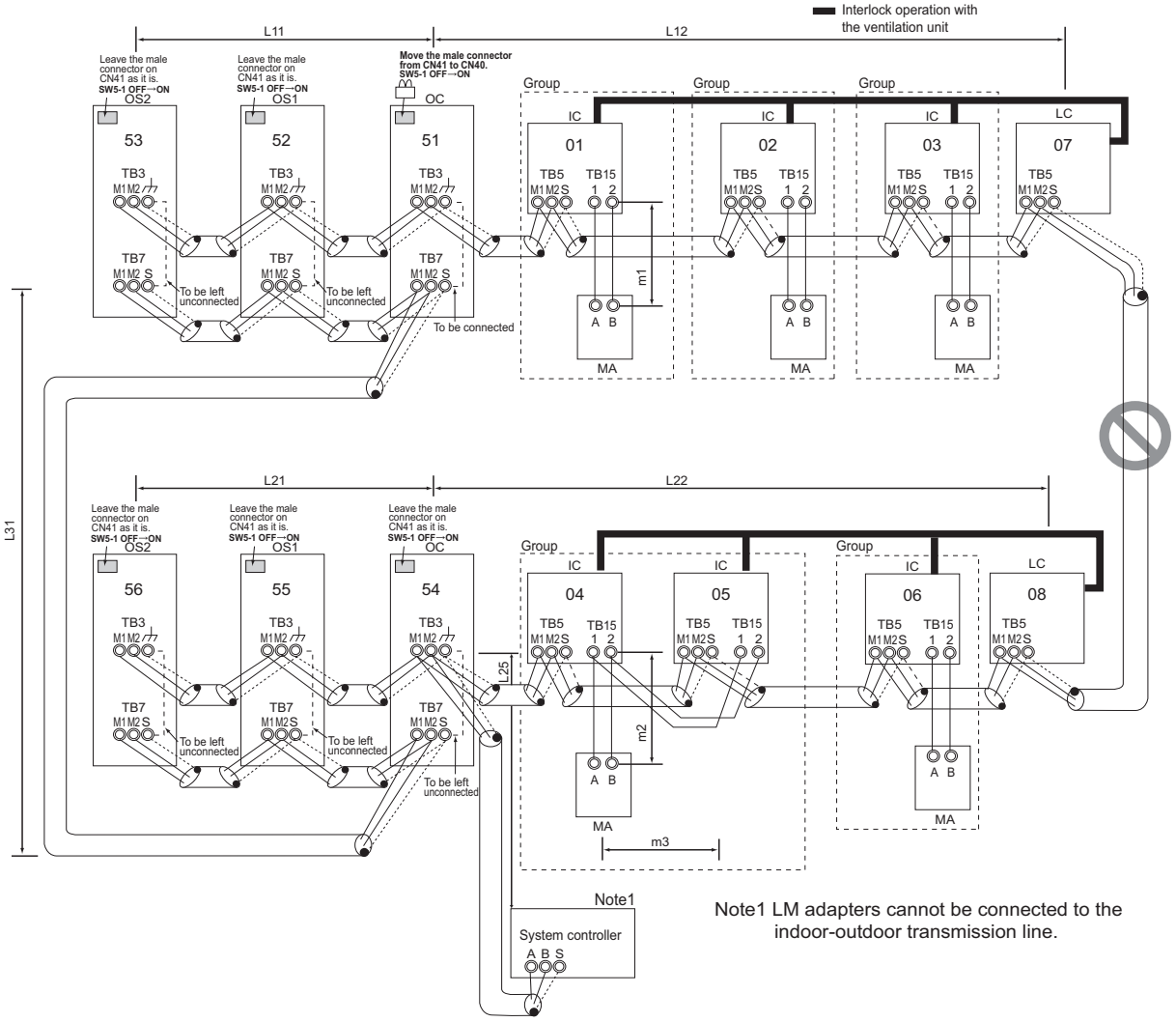
Procedures	Unit or controller			Address setting range	Setting method	Notes	Factory setting
1	Indoor unit	Main unit	IC	01 to 50	Assign the smallest address to the main unit in the group.	To perform a group operation of indoor units that have different functions, designate the indoor unit in the group with the greatest number of functions as the main unit.	00
		Sub unit			Assign sequential numbers starting with the address of the main unit in the same group +1. (Main unit address +1, main unit address +2, main unit address +3, etc.)		
2	LOSSNAY		LC	01 to 50	Assign an arbitrary but unique address to each of these units after assigning an address to all indoor units.	None of these addresses may overlap any of the indoor unit addresses.	00
3	MA remote controller	Main remote controller	MA	No settings required.	-	Enter the same indoor unit group settings on the system controller as the ones that were entered on the MA remote controller.	Main
		Sub remote controller	MA	Sub remote controller	Settings to be made according to the remote controller function selection		
4	Outdoor unit		OC OS1 OS2	51 to 100	Assign sequential address to the outdoor units in the same refrigerant circuit. The outdoor units are automatically designated as OC, OS1, and OS2. (Note)	To set the address to 100, set the rotary switches to 50.	00

Note

The outdoor units in the same refrigerant circuit are automatically designated as OC, OS1, and OS2.
The outdoor units are designated as OC, OS1, and OS2 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).

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

(1) Sample control wiring



Note1 LM adapters cannot be connected to the indoor-outdoor transmission line.

(2) Cautions

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

   In a system to which more than 18 indoor units including one or more indoor units of 72 model or above are connected, there may be cases in which the system controller cannot be connected to the indoor-outdoor transmission line.

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

(3) Maximum allowable length

1) Indoor/outdoor transmission line

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

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

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

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

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

(4) Wiring method

1) Indoor/outdoor transmission line

Daisy-chain terminals M1 and M2 on the terminal block for indoor-outdoor transmission line (TB3) on the outdoor units (OC, OS1, OS2) (Note a), terminals M1 and M2 on the terminal block for indoor-outdoor transmission line (TB5) on each indoor unit (IC), and the S terminal on the system controller. (Non-polarized two-wire)

- Only use shielded cables.

Note

a) The outdoor units in the same refrigerant circuit are automatically designated as OC, OS1, and OS2. The outdoor units are designated as OC, OS1, and OS2 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).

Shielded cable connection

Daisy-chain the ground terminal (⏚) on the outdoor units (OC, OS1, OS2), the S terminal on the terminal block (TB5) on the indoor unit (IC), and the S terminal on the system controller with the shield wire of the shielded cable.

2) Transmission line for centralized control

Daisy-chain terminals M1 and M2 on the terminal block for transmission line for centralized control (TB7) on the outdoor units (OC) in different refrigerant circuits and on the OC, OS1, and OS2 in the same refrigerant circuit. (Note b)

If a power supply unit is not connected to the transmission line for centralized control, replace the power jumper connector on the control board from CN41 to CN40 on only one of the outdoor units.

Set the central control switch (SW5-1) on the control board of all outdoor units to "ON."

Note

b) When not daisy-chaining TB7's on the outdoor units in the same refrigerant circuit, connect the transmission line for centralized control to TB7 on the OC (Note a). To maintain centralized control even during an OC failure or a power failure, daisy-chain TB7 of OC, OS1, and OS2. (If there is a problem with the outdoor unit whose power jumper was moved from CN41 to CN40, centralized 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.

Shielded cable connection

Daisy-chain the S terminal on the terminal block (TB7) on the outdoor units (OC, OS1, OS2) with the shield wire of the shielded cable. Short-circuit the earth terminal (⏚) and the S terminal on the terminal block (TB7) on the outdoor unit whose power jumper connector is mated with CN40.

3) MA remote controller wiring

Same as 2-7-1

When 2 remote controllers are connected to the system

Same as 2-7-1

Group operation of indoor units

Same as 2-7-1

4) LOSSNAY connection

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

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

5) Switch setting

Address setting is required as follows.

(5) Address setting method

Procedures	Unit or controller			Address setting range	Setting method	Notes	Factory setting
1	Indoor unit	Main unit	IC	01 to 50	Assign the smallest address to the main unit in the group.	To perform a group operation of indoor units that have different functions, designate the indoor unit in the group with the greatest number of functions as the main unit.	00
		Sub unit			Assign sequential numbers starting with the address of the main unit in the same group +1. (Main unit address +1, main unit address +2, main unit address +3, etc.)		
2	LOSSNAY		LC	01 to 50	Assign an arbitrary but unique address to each of these units after assigning an address to all indoor units.	None of these addresses may overlap any of the indoor unit addresses.	00
3	MA remote controller	Main remote controller	MA	No settings required.	-	Enter the same indoor unit group settings on the system controller as the ones that were entered on the MA remote controller.	Main
		Sub remote controller	MA	Sub remote controller	Settings to be made according to the remote controller function selection		
4	Outdoor unit		OC OS1 OS2	51 to 100	Assign sequential address to the outdoor units in the same refrigerant circuit. The outdoor units are automatically designated as OC, OS1, and OS2. (Note)	To set the address to 100, set the rotary switches to 50.	00

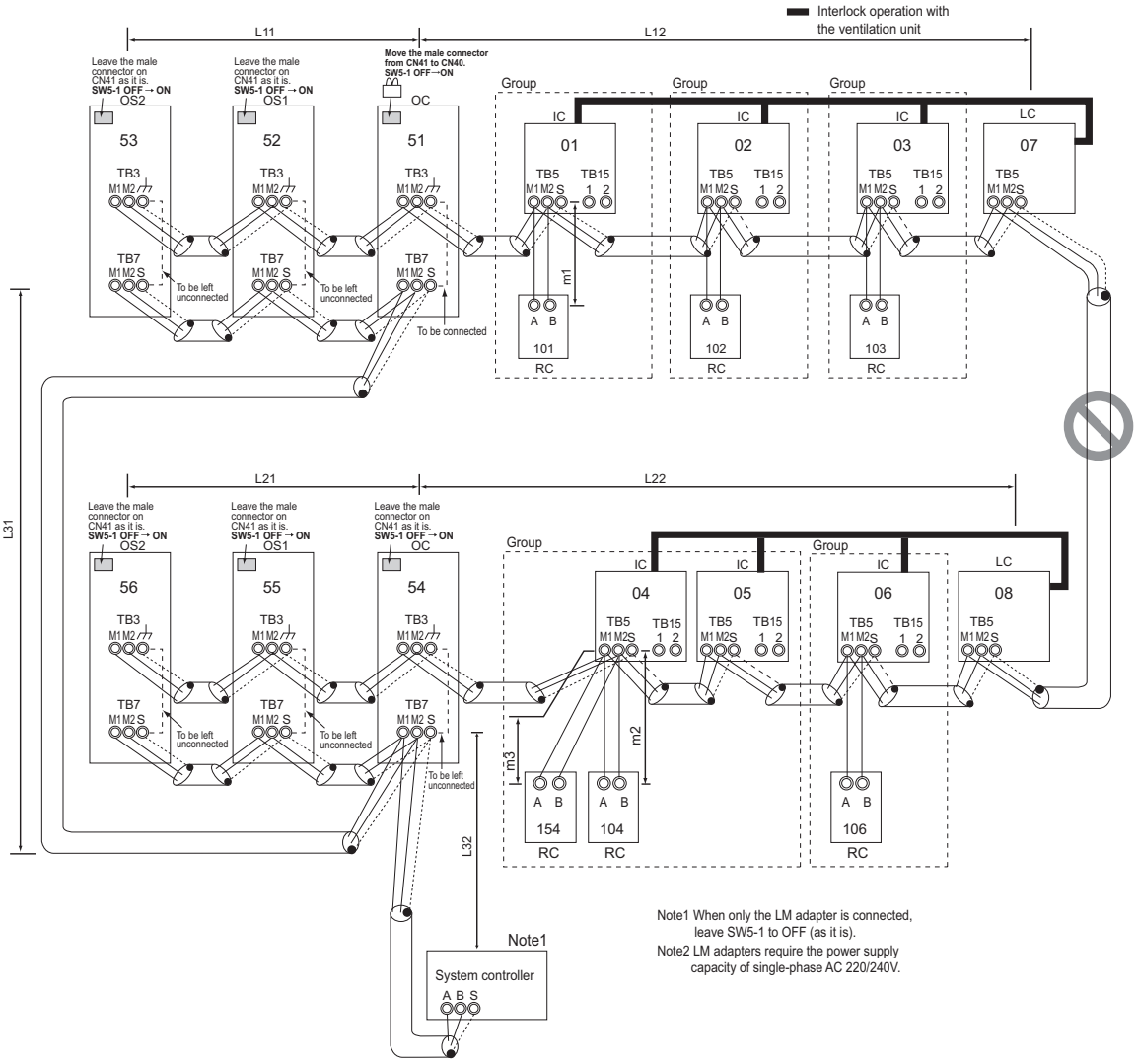
Note

The outdoor units in the same refrigerant circuit are automatically designated as OC, OS1, and OS2.
The outdoor units are designated as OC, OS1, and OS2 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).

2-8 Example System with an ME Remote Controller

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

(1) Sample control wiring



(2) Cautions

1) ME remote controller and MA remote controller cannot both be connected to the same group of indoor units.
2) No more than 2 ME remote controllers can be connected to a group of indoor units.
3) Do not connect the terminal blocks (TB5) on the indoor units that are connected to different outdoor units with each other.
4) Replacement of male power jumper connector (CN41) must be performed only on one of the outdoor units (not required if power to the transmission line for centralized control is supplied from a controller with a power supply function, such as GB-50ADA).
5) Provide an electrical path to ground for the S terminal on the terminal block for centralized control (TB7) on only one of the outdoor units.
6) A transmission booster must be connected to a system in which the total number of connected indoor units exceeds 20.
7) A transmission booster is required in a system to which more than 16 indoor including one or more indoor units of the 72 model or above are connected.
   - Refer to the DATABOOK for further information about how many booster units are required for a given system.
8) When a power supply unit is connected to the transmission line for centralized control, leave the power jumper connector on CN41 as it is (factory setting).

(3) Maximum allowable length

1) Indoor/outdoor transmission line
   Same as 2-7-3
2) Transmission line for centralized control
   Same as 2-7-4
3) M-NET remote controller wiring
   Maximum overall line length
   (0.3 to 1.25mm^2 [AWG22 to 16])
   m1≦10m [32ft]
   m2+m3≦10m [32ft]
   If the standard-supplied cable must be extended, use a cable with a diameter of 1.25mm^2 [AWG16]. The section of the cable that exceeds 10m [32ft] must be included in the maximum indoor-outdoor transmission line distance described in 1).
   *When connected to the terminal block on the Simple remote controller, use cables that meet the following cable size specifications: 0.75 - 1.25 mm^2 [AWG18-14].
4) Maximum line distance via outdoor unit
   (1.25 mm^2 [AWG16] min.)
   Same as 2-7-4

(4) Wiring method

1) Indoor/outdoor transmission line

   Same as 2-7-1

   Shielded cable connection

   Same as 2-7-1

2) Transmission line for centralized control

   Same as 2-7-4

   Shielded cable connection

   Same as 2-7-4

3) ME remote controller wiring

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

   When 2 remote controllers are connected to the system

   Refer to the section on Switch Setting.

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

   Refer to the section on Switch Setting.

4) LOSSNAY connection

   Same as 2-7-4

5) Switch setting

   Address setting is required as follows.

(5) Address setting method

Procedures	Unit or controller			Address setting range	Setting method	Notes	Factory setting
1	Indoor unit	Main unit	IC	01 to 50	Assign the smallest address to the main unit in the group.	To perform a group operation of indoor units that have different functions, designate the indoor unit in the group with the greatest number of functions as the main unit.	00
		Sub unit			Assign sequential numbers starting with the address of the main unit in the same group +1. (Main unit address +1, main unit address +2, main unit address +3, etc.)		
2	LOSSNAY		LC	01 to 50	Assign an arbitrary but unique address to each of these units after assigning an address to all indoor units.	None of these addresses may overlap any of the indoor unit addresses.	00
3	ME remote controller	Main remote controller	RC	101 to 150	Add 100 to the main unit address in the group	♦It is not necessary to set the 100s digit. ♦To set the address to 200, set the rotary switches to 00.	101
		Sub remote controller	RC	151 to 200	Add 150 to the main unit address in the group		
4	Outdoor unit		OC OS1 OS2	51 to 100	Assign sequential address to the outdoor units in the same refrigerant circuit. The outdoor units are automatically designated as OC, OS1, and OS2. (Note)	To set the address to 100, set the rotary switches to 50.	00

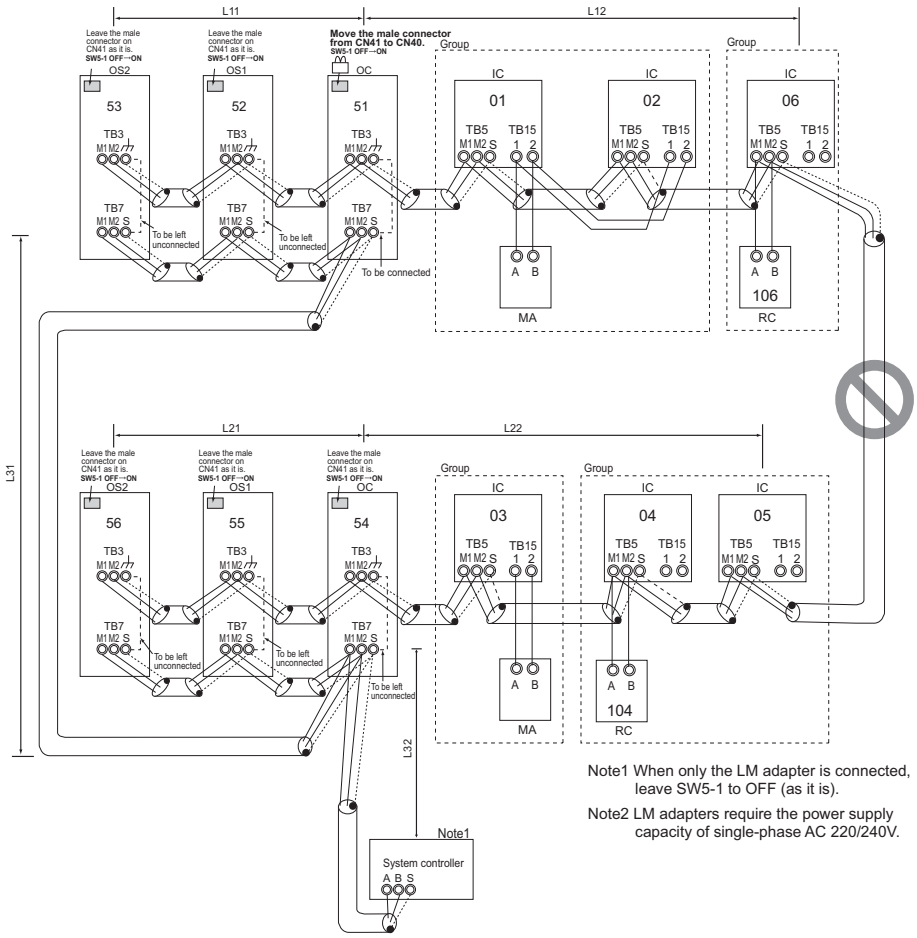
Note

The outdoor units in the same refrigerant circuit are automatically designated as OC, OS1, and OS2.
The outdoor units are designated as OC, OS1, and OS2 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).

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

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

(1) Sample control wiring



Note1 When only the LM adapter is connected, leave SW5-1 to OFF (as it is).

Note2 LM adapters require the power supply capacity of single-phase AC 220/240V.

(2) Cautions

1) Be sure to connect a system controller.
2) ME remote controller and MA remote controller cannot both be connected to the same group of indoor units.
3) Assign to the indoor units connected to the MA remote controller addresses that are smaller than those of the indoor units that are connected to the ME remote controller.
4) No more than 2 ME remote controllers can be connected to a group of indoor units.
5) No more than 2 MA remote controllers can be connected to a group of indoor units.
6) Do not connect the terminal blocks (TB5) on the indoor units that are connected to different outdoor units with each other.
7) Replacement of male power jumper connector (CN41) must be performed only on one of the outdoor units (not required if power to the transmission line for centralized control is supplied from a controller with a power supply function, such as GB-50ADA).
8) Provide an electrical path to ground for the S terminal on the terminal block for centralized control (TB7) on only one of the outdoor units.
9) A transmission booster must be connected to a system in which the total number of connected indoor units exceeds 20.
10) A transmission booster is required in a system to which more than 16 indoor including one or more indoor units of the 72 model or above are connected.
    - Refer to the DATABOOK for further information about how many booster units are required for a given system.
11) When a power supply unit is connected to the transmission line for centralized control, leave the power jumper connector on CN41 as it is (factory setting).

(3) Maximum allowable length

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

(4) Wiring method

1) Indoor/outdoor transmission line

   Same as 2-7-1

   Shielded cable connection

   Same as 2-7-1

2) Transmission line for centralized control

   Same as 2-7-4

   Shielded cable connection

   Same as 2-7-4

3) MA remote controller wiring

   Same as 2-7-1

   When 2 remote controllers are connected to the system

   Same as 2-7-1

   Group operation of indoor units

   Same as 2-7-1

4) ME remote controller wiring

   Same as 2-8-1

   When 2 remote controllers are connected to the system

   Same as 2-7-1

   Group operation of indoor units

   Same as 2-7-1

5) LOSSNAY connection

   Same as 2-7-4

6) Switch setting

   Address setting is required as follows.

(5) Address setting method

Procedures	Unit or controller				Address setting range	Setting method	Notes	Factory setting
1	Operation with the MA remote controller	Indoor unit	Main unit	IC	01 to 50	Assign the smallest address to the main unit in the group.	•Assign an address smaller than that of the indoor unit that is connected to the ME remote controller. •Enter the same indoor unit group settings on the system controller as the ones that were entered on the MA remote controller. •To perform a group operation of indoor units that have different functions, designate the indoor unit in the group with the greatest number of functions as the main unit.	00
			Sub unit			Assign sequential numbers starting with the address of the main unit in the same group +1. (Main unit address +1, main unit address +2, main unit address +3, etc.)		
		MA remote controller	Main remote controller	MA	No settings required.	-		Main
			Sub remote controller	MA	Sub remote controller	Settings to be made according to the remote controller function selection		
2	Operation with the ME remote controller	Indoor unit	Main unit	IC	01 to 50	Assign the smallest address to the main unit in the group.	•Enter the indoor unit group settings on the system controller (MELANS). •Assign an address larger than those of the indoor units that are connected to the MA remote controller. •To perform a group operation of indoor units that have different functions, designate the indoor unit in the group with the greatest number of functions as the main unit.	00
			Sub unit			Assign sequential numbers starting with the address of the main unit in the same group +1. (Main unit address +1, main unit address +2, main unit address +3, etc.)		
		ME remote controller	Main remote controller	RC	101 to 150	Add 100 to the main unit address in the group.	•It is not necessary to set the 100s digit. •To set the address to 200, set the rotary switches to 00.	101
			Sub remote controller	RC	151 to 200	Add 150 to the main unit address in the group.		
3	LOSSNAY			LC	01 to 50	Assign an arbitrary but unique address to each of these units after assigning an address to all indoor units.	None of these addresses may overlap any of the indoor unit addresses.	00
4	Outdoor unit			OC OS1 OS2	51 to 100	Assign sequential address to the outdoor units in the same refrigerantcircuit. The outdoor units are automatically designated as OC, OS1, and OS2. (Note)	To set the address to 100, set the rotary switches to 50.	00

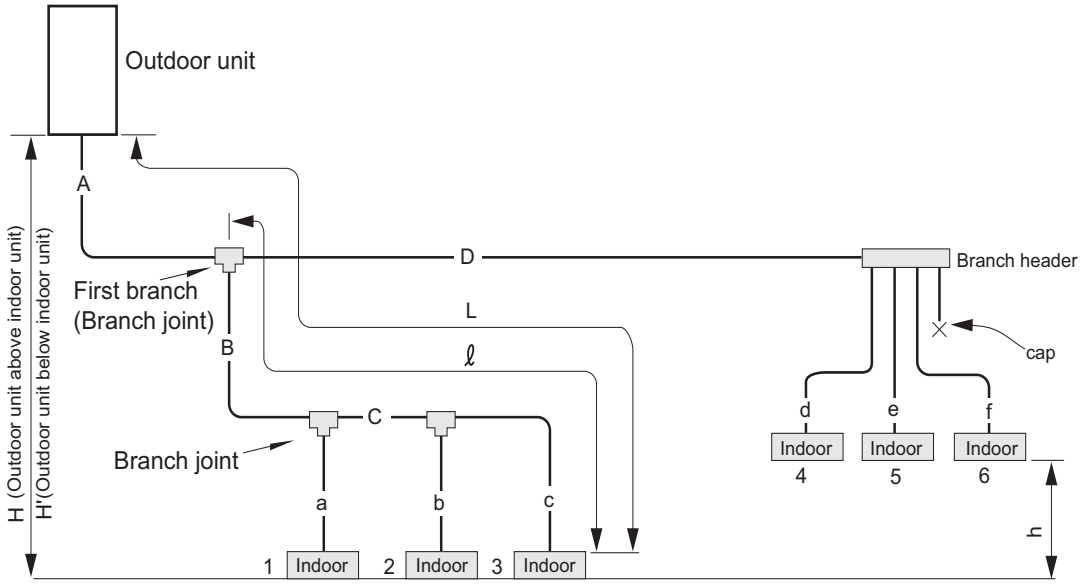
Note

The outdoor units in the same refrigerant circuit are automatically designated as OC, OS1, and OS2.
The outdoor units are designated as OC, OS1, and OS2 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).

2-10 Restrictions on Refrigerant Pipes

2-10-1 Restrictions on Refrigerant Pipe Length

(1) (E)P72 - (E)P168, EP192, EP216, EP240 models



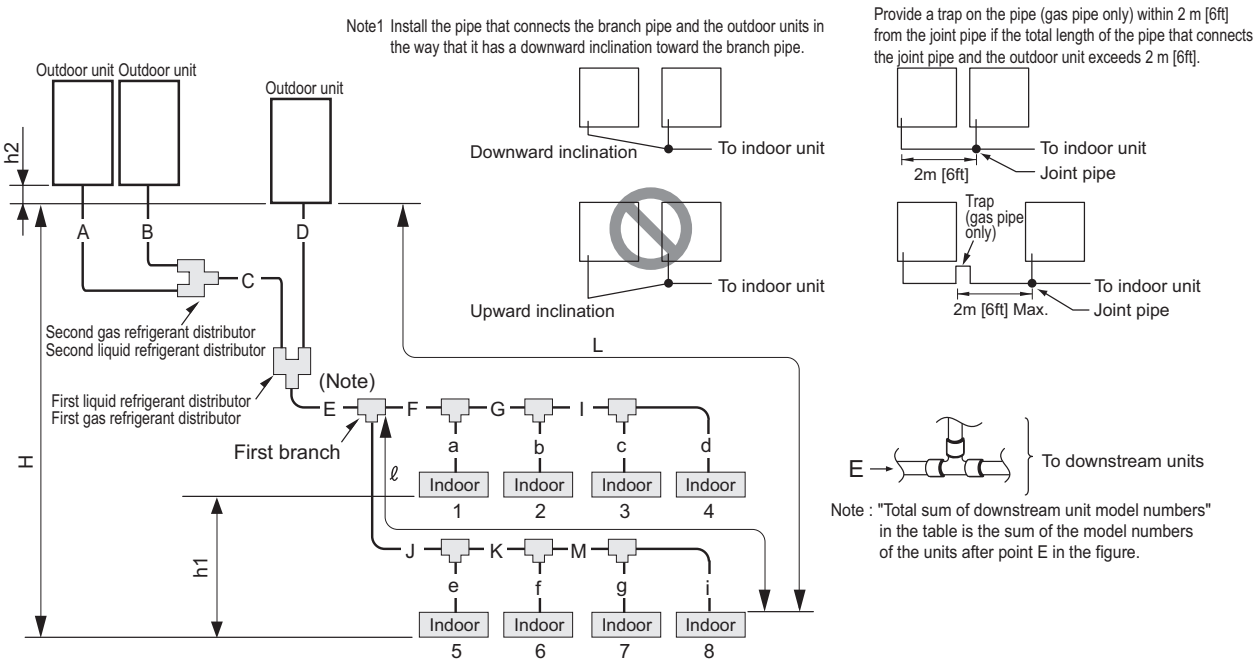
Unit: m [ft]

Operation			Pipe sections	Allowable length of pipes
Length	Total pipe length		A+B+C+D +a+b+c+d+e+f	1000 [3280] or less
	Total pipe length (L) from the outdoor unit to the farthest indoor unit		A+B+C+c or A+D+f	165 [541] or less (Equivalent length 190 [623] or less)
	Total pipe length from the first branch to the farthest indoor unit (ℓ)		B+C+c or D+f	40 [131] or less*1
Height difference	Between indoor and outdoor units	Outdoor unit above indoor unit	H	50 [164] or less
		Outdoor unit below indoor unit	H'	40 [131] or less
	Between indoor units		h	15 [49] or less*2

*1. If the piping length exceeds 40 meters [131 feet] (but does not exceed 90 meters [295 feet]), use one-size larger pipes for all the liquid pipes beyond 40 meters [131 feet]. In the figure above, the pipes whose size should be increased by one size are indicated by "C," "b," and "c" when the piping length exceeds 40 meters [131 feet] at point C.

*2. If the vertical difference between indoor units exceeds 15 meters [49 feet] (but does not exceed 30 meters [98 feet]), use one-size larger liquid pipes for piping between the first branch and the relevant indoor units. In the figure above, the pipes whose size should be increased by one size are indicated by "B," "C," "a," "b," and "c" when the "h" exceeds 15 meters [49 feet].

(2) (E)P192 - (E)P432 models



Unit: m [ft]

Operation		Pipe sections	Allowable length of pipes
Length	Between outdoor units	A+B+C+D	10 [32] or less
	Total pipe length	A+B+C+D+E+F+G+I+J +K+M+a+b+c+d+e+f+g +i	1000 [3280] or less
	Total pipe length (L) from the outdoor unit to the farthest indoor unit	A(B)+C+E+J+K+M+i	165 [541] or less (Equivalent length 190 [623] or less)
	Total pipe length from the first branch to the farthest indoor unit (ℓ)	G+I+J+i	40 [131] or less*1
Height difference	Between indoor and outdoor units	H	50 [164] or less (40 [131] or below if outdoor unit is below indoor unit)
	Between indoor units	h1	15 [49] or less*2
	Between outdoor units	h2	0.1[0.3] or less

*1. If the piping length exceeds 40 meters [131 feet] (but does not exceed 90 meters [295 feet]), use one-size larger pipes for all the liquid pipes beyond 40 meters [131 feet]. In the figure above, the pipes whose size should be increased by one size are indicated by "I," "c," and "d" when the piping length exceeds 40 meters [131 feet] at point I.

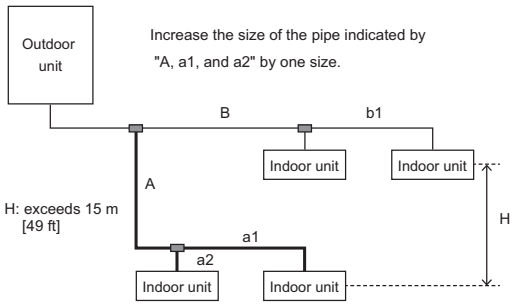
*2. If the vertical difference between indoor units exceeds 15 meters [49 feet] (but does not exceed 30 meters [98 feet]), use one-size larger liquid pipes for piping between the first branch and the relevant indoor units. In the figure above, the pipes whose size should be increased by one size are indicated by "J," "K," "M," "e," "f," "g,"and "i" when the "h1" exceeds 15 meters [49 feet].

See the next page for the detailed description of the sample application above.

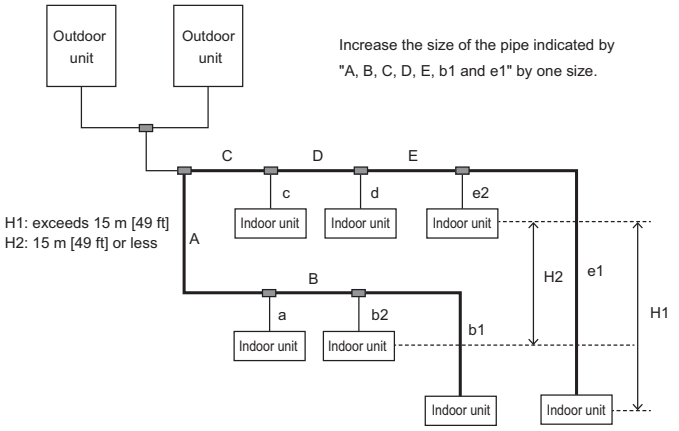
When the vertical separation between indoor units exceeds 15 m [49 ft]

Outdoor unit above indoor unit

example 1

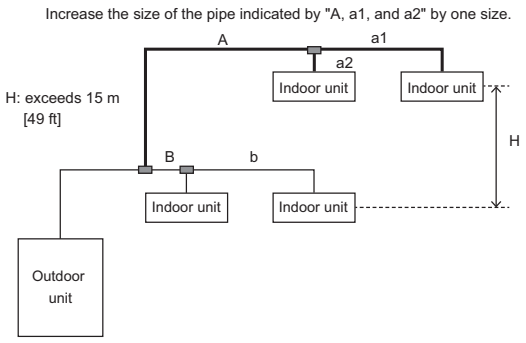


example 2



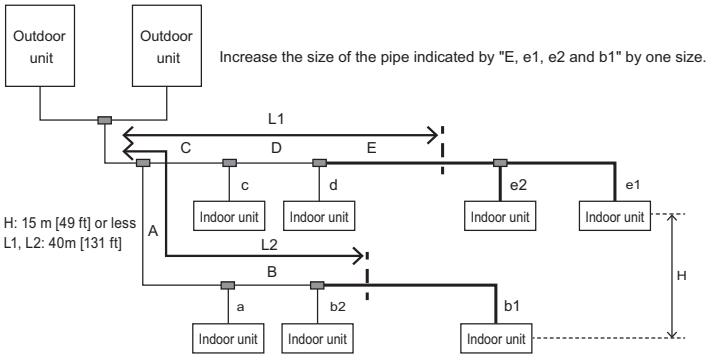
Outdoor unit below indoor unit

example 3



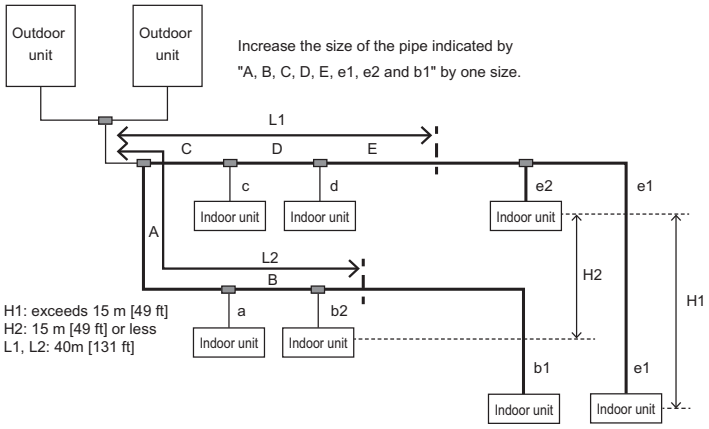
When the distance from the first branch to the farthest indoor unit exceeds 40 m [131 ft]

example 4



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

example 5



2-10-2 Restrictions on Refrigerant Pipe Size

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

Outdoor unit set name (total capacity)	Liquid pipe size (mm) [inch]	Gas pipe size (mm) [inch]
72 model	ø9.52 [3/8"]	ø22.2 [7/8"]
96 model	ø9.52 [3/8"]*1	ø22.2 [7/8"]
120 model	ø9.52 [3/8"]*2	ø28.58 [1-1/8"]
144 model	ø12.7 [1/2"]	ø28.58 [1-1/8"]
168 model	ø15.88 [5/8"]	ø28.58 [1-1/8"]
192 model	ø15.88 [5/8"]	ø28.58 [1-1/8"]
216 model	ø15.88 [5/8"]	ø28.58 [1-1/8"]
240 model	ø15.88 [5/8"]	ø34.93 [1-3/8"]
240 model (combination)	ø15.88 [5/8"]	ø28.58 [1-1/8"]
264 - 312 models	ø19.05 [3/4"]	ø34.93 [1-3/8"]
336 - 432 models	ø19.05 [3/4"]	ø41.28 [1-5/8"]

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

*2. Use ø12.7 [1/2"] pipes if the piping length to the farthest indoor unit exceeds 40 m [131 ft].

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

model	Pipe diameter (mm) [inch]	
05 - 15 models	Liquid pipe	ø6.35 [1/4"]
	Gas pipe	ø12.7 [1/2"]
18 - 54 models	Liquid pipe	ø9.52 [3/8"]
	Gas pipe	ø15.88 [5/8"]
72 model	Liquid pipe	ø9.52 [3/8"]
	Gas pipe	ø19.05 [3/4"]
96 model	Liquid pipe	ø9.52 [3/8"]
	Gas pipe	ø22.2 [7/8"]

(3) Size of the refrigerant pipe between the branches for connection to indoor units

Total capacity of the downstream units	Liquid pipe size (mm) [inch]	Gas pipe size (mm) [inch]
- 54	ø9.52 [3/8"]	ø15.88 [5/8"]
P55 - P72	ø9.52 [3/8"]	ø19.05 [3/4"]
P73 - P108	ø9.52 [3/8"]	ø22.2 [7/8"]
P109 - P144	ø12.7 [1/2"]	ø28.58 [1-1/8"]
P145 - P240	ø15.88 [5/8"]	ø28.58 [1-1/8"]
P241 - P308	ø19.05 [3/4"]	ø34.93 [1-3/8"]
P309 -	ø19.05 [3/4"]	ø41.28 [1-5/8"]

(4) Size of the refrigerant pipe between the first distributor and the second distributor

Liquid pipe size (mm) [inch]	Gas pipe size (mm) [inch]
ø19.05 [3/4"]	ø34.93 [1-3/8"]

(5) Size of the refrigerant pipe between the first distributor or the second distributor and outdoor units

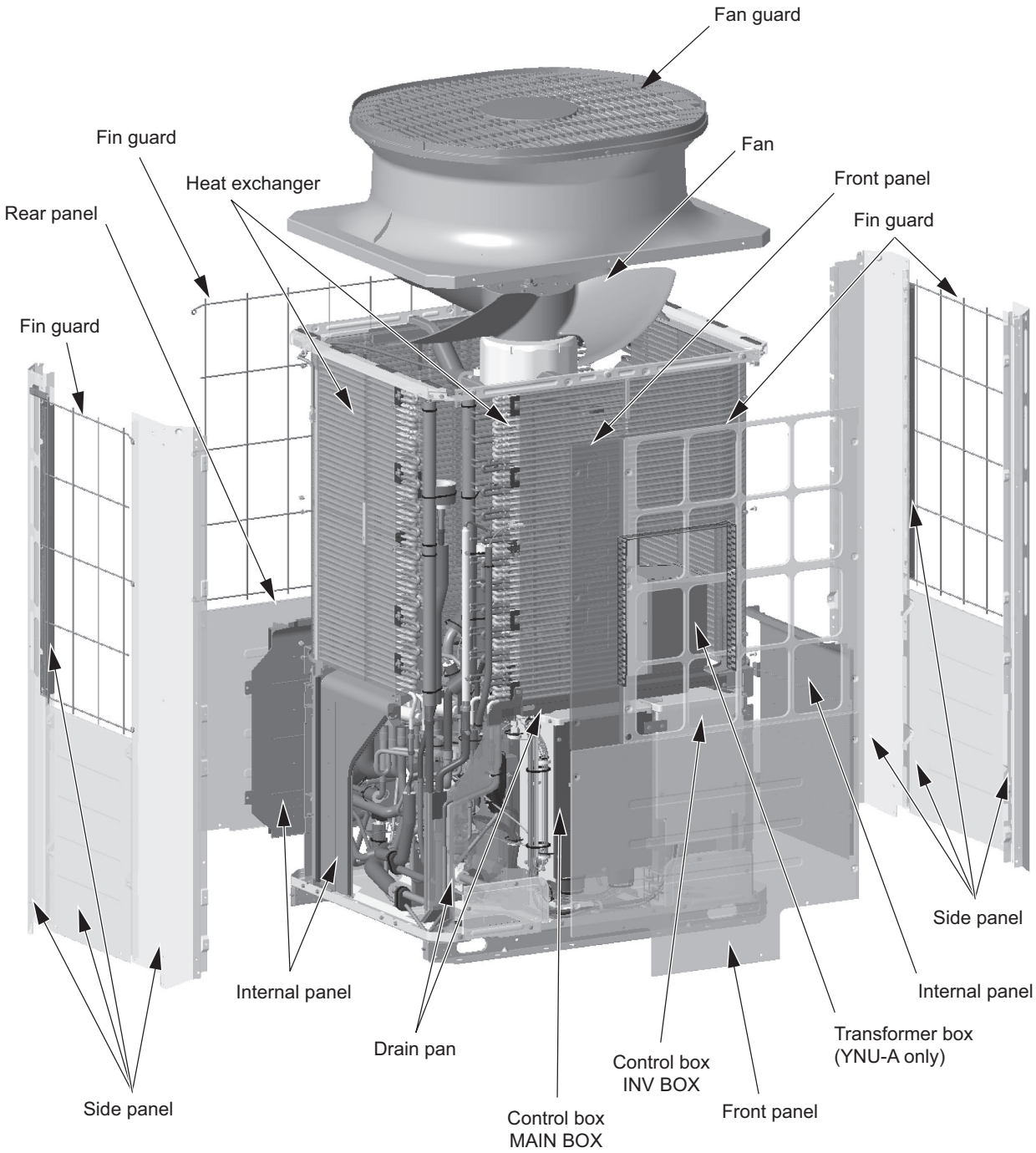
	Liquid pipe size (mm) [inch]	Gas pipe size (mm) [inch]
72 model	ø9.52 [3/8"]	ø22.2 [7/8"]
96 model		
120 model	ø12.7 [1/2"]	ø28.58 [1-1/8"]
144 model		

Chapter 3 Major Components, Their Functions and Refrigerant Circuits

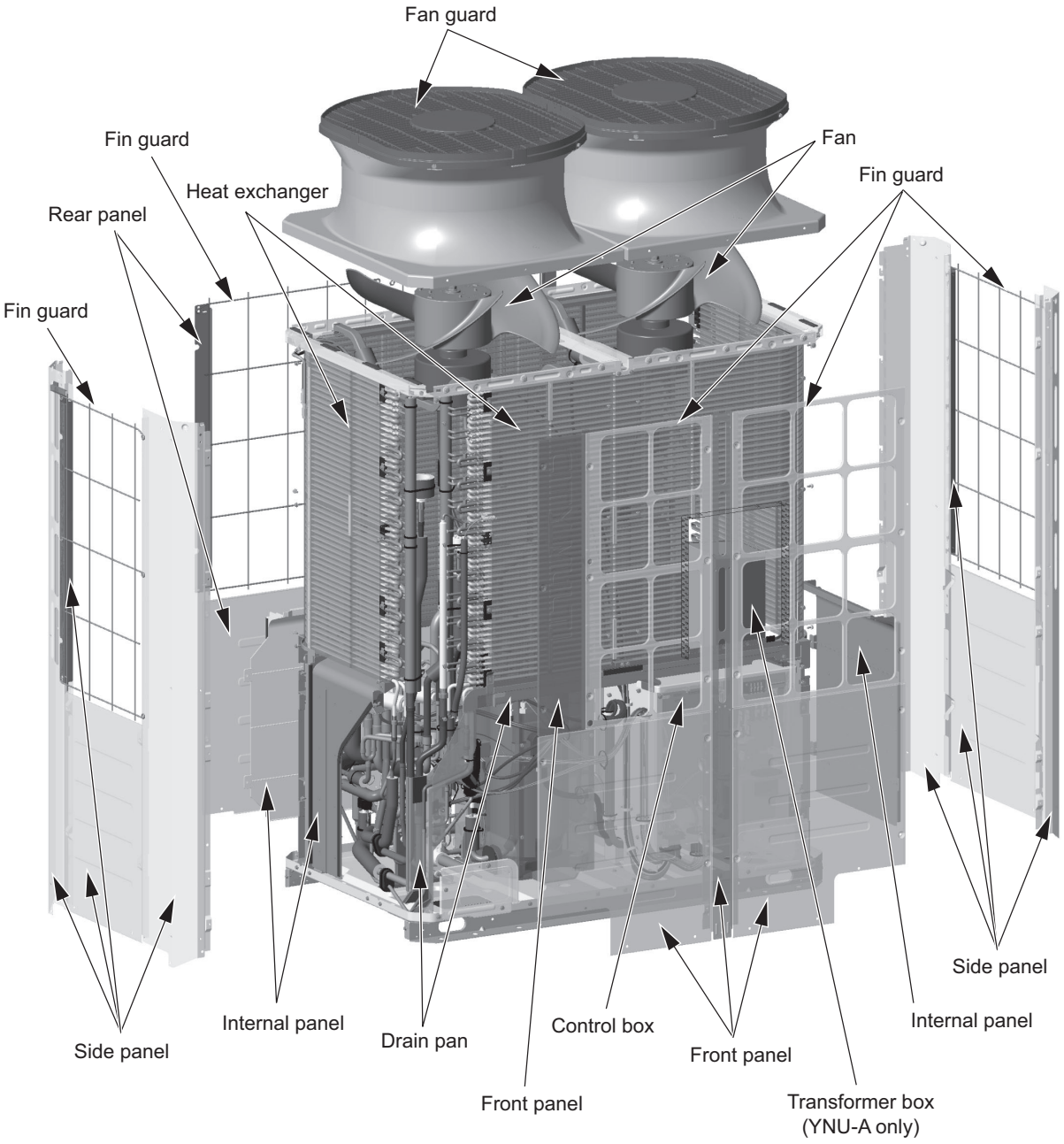
3-1 External Appearance and Refrigerant Circuit Components of Outdoor Unit

3-1-1 External Appearance of Outdoor Unit

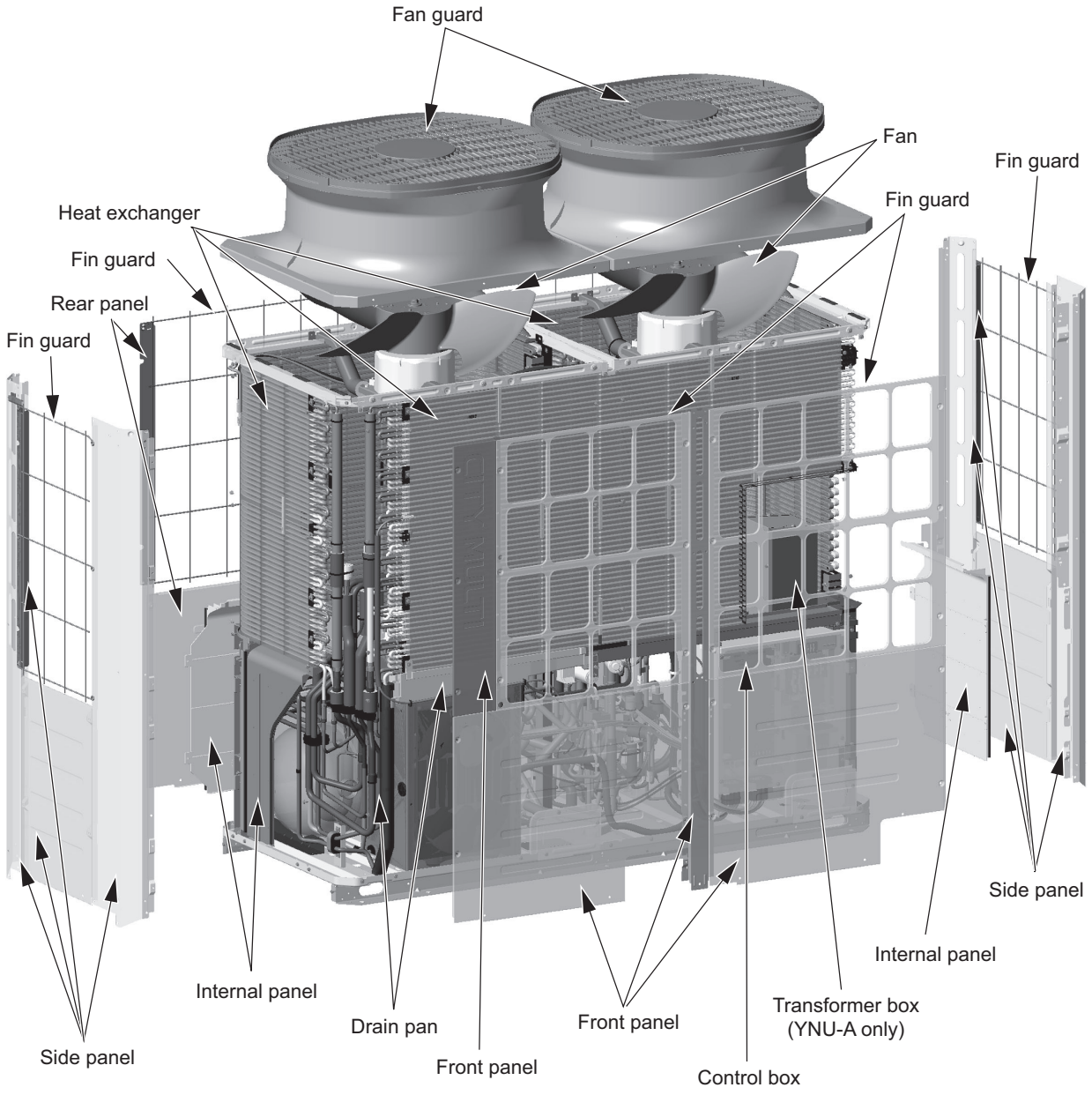
(1) PUHY-P72T(Y)NU-A
PUHY-EP72T(Y)NU-A



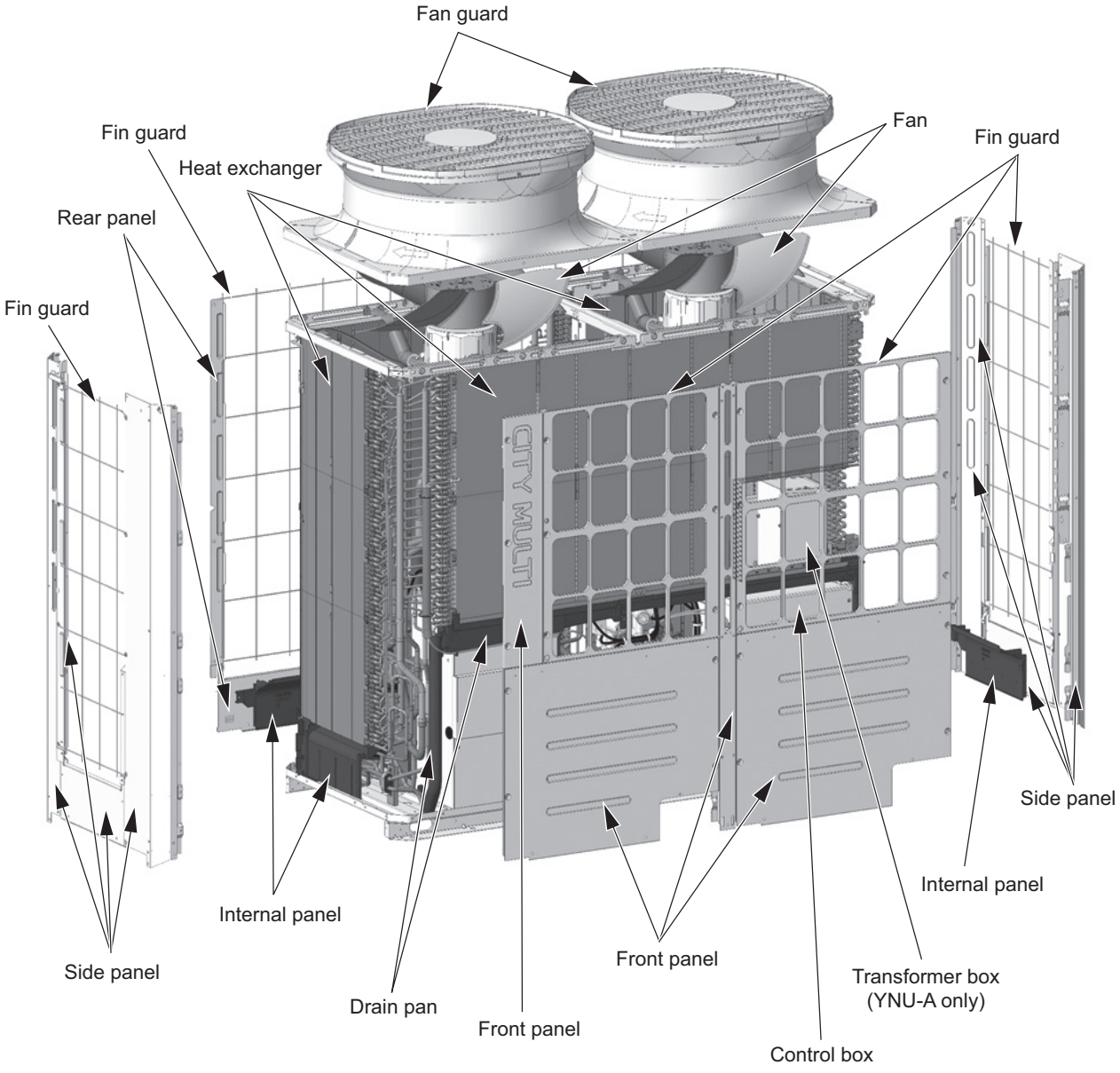
(2) PUHY-P96, P120, P144T(Y)NU-A
PUHY-EP96, EP120, EP144T(Y)NU-A



(3) PUHY-P168T(Y)NU-A
PUHY-EP168, EP192T(Y)NU-A

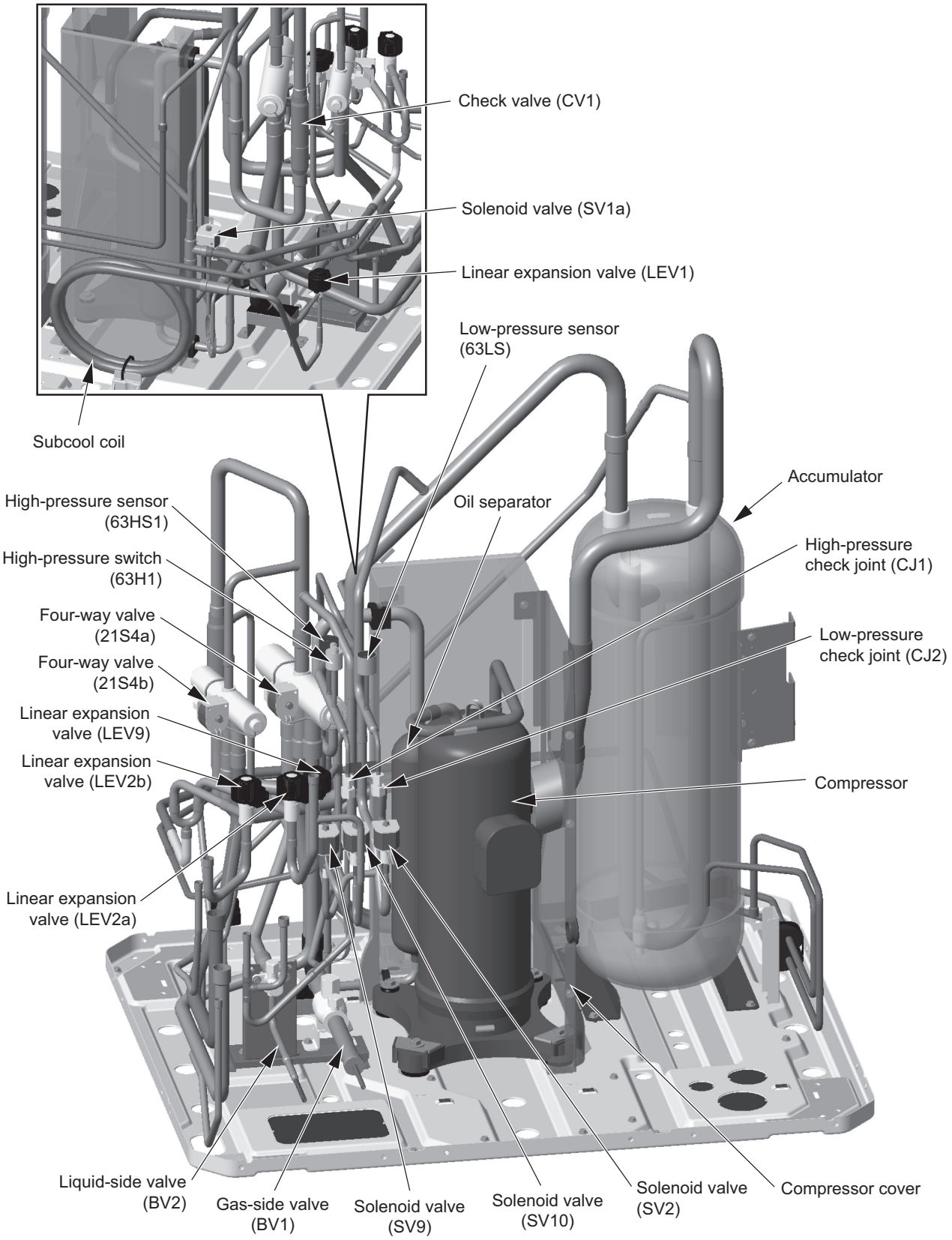


(4) PUHY-EP216, EP240T(Y)NU-A

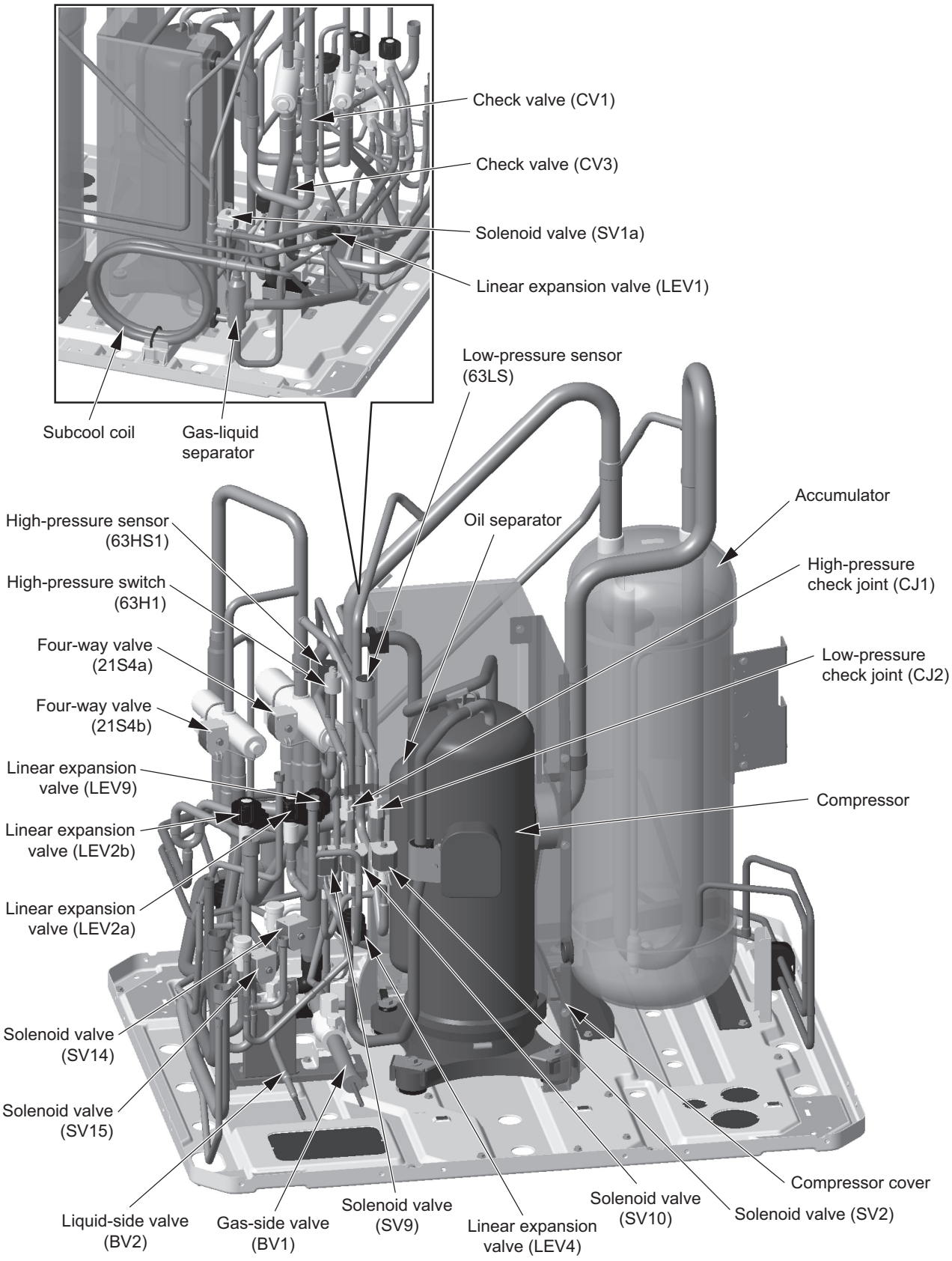


3-1-2 Outdoor Unit Refrigerant Circuits

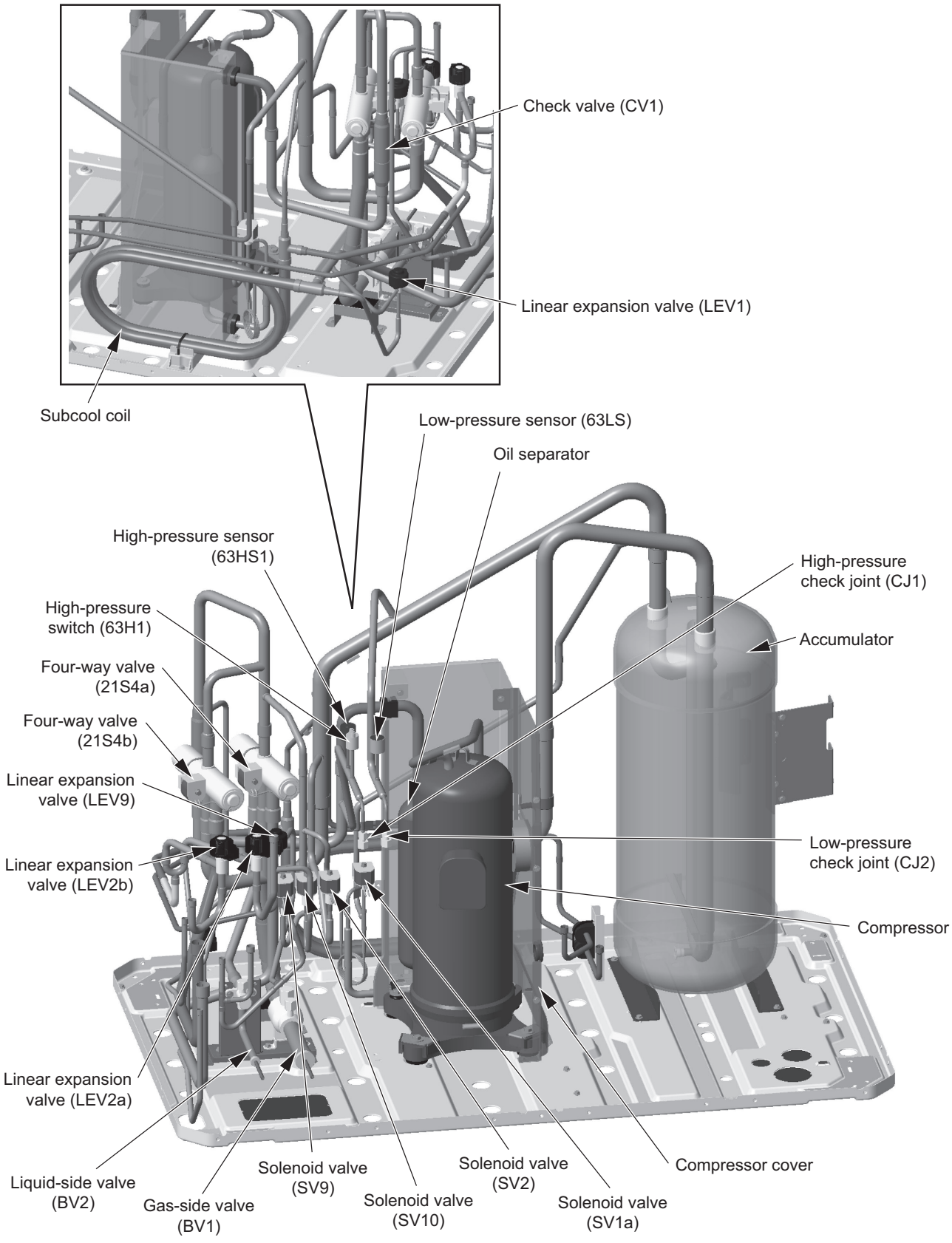
(1) PUHY-P72T(Y)NU-A



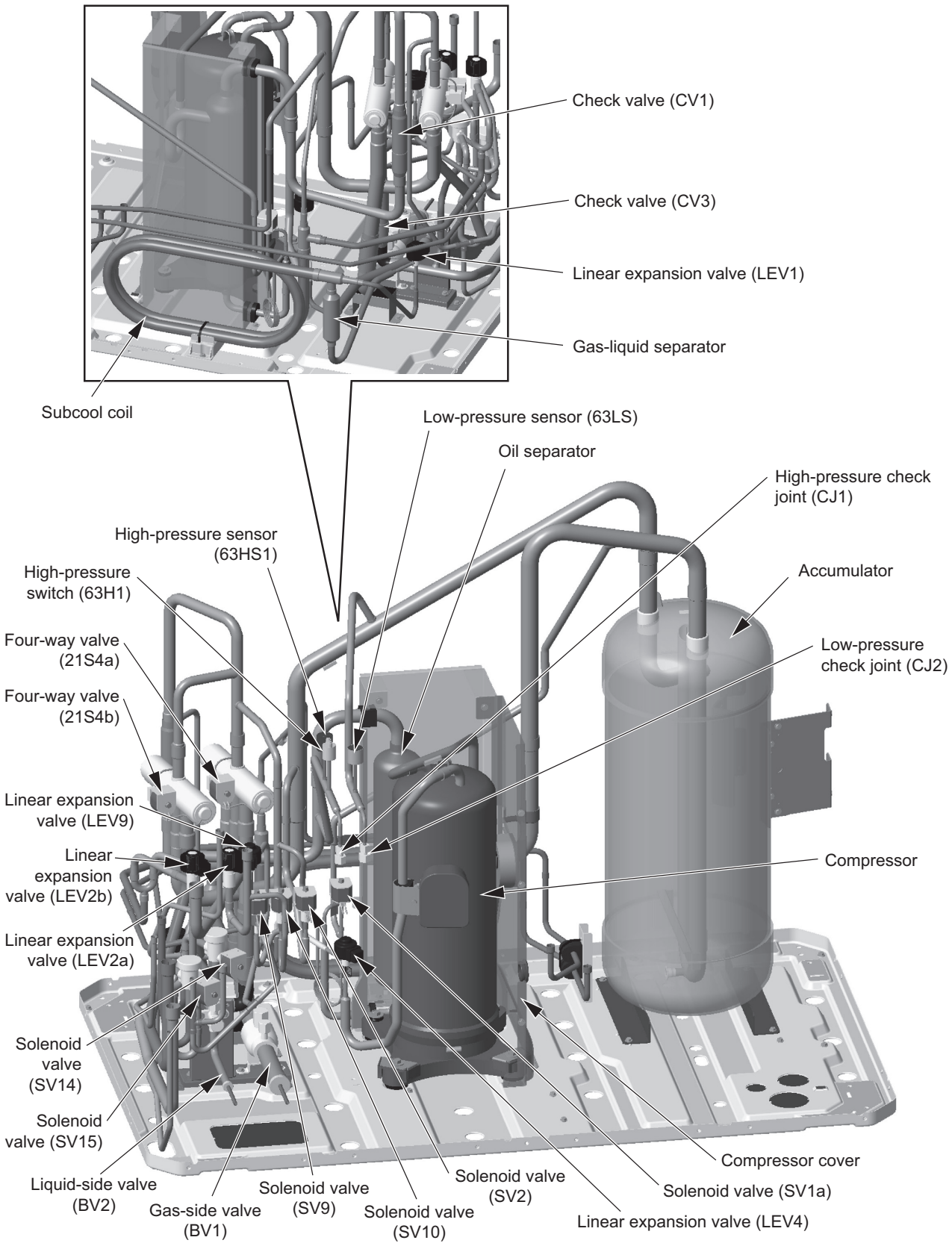
(2) PUHY-EP72T(Y)NU-A



(3) PUHY-P96, P120, P144T(Y)NU-A

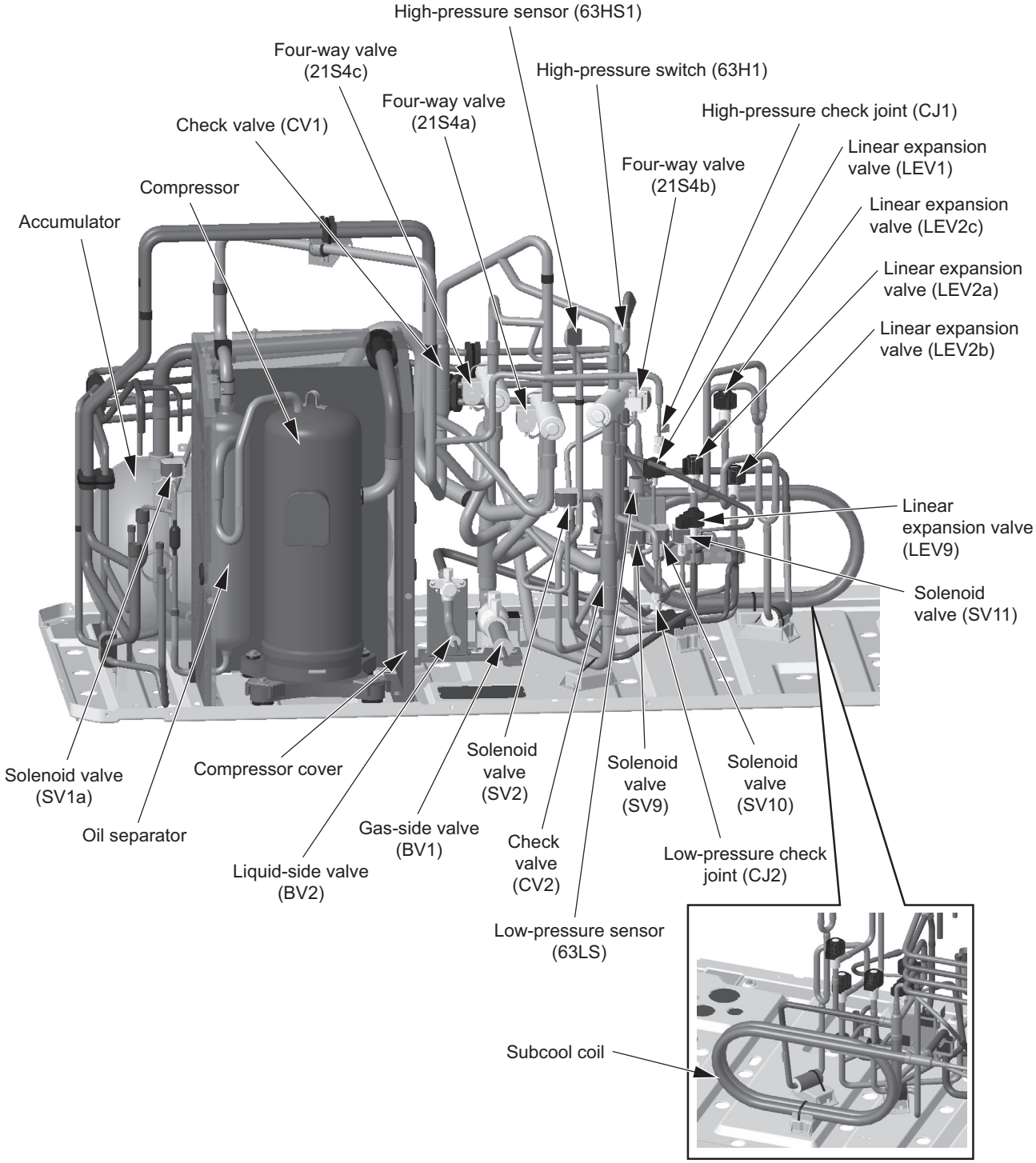


(4) PUHY-EP96, EP120, EP144T(Y)NU-A



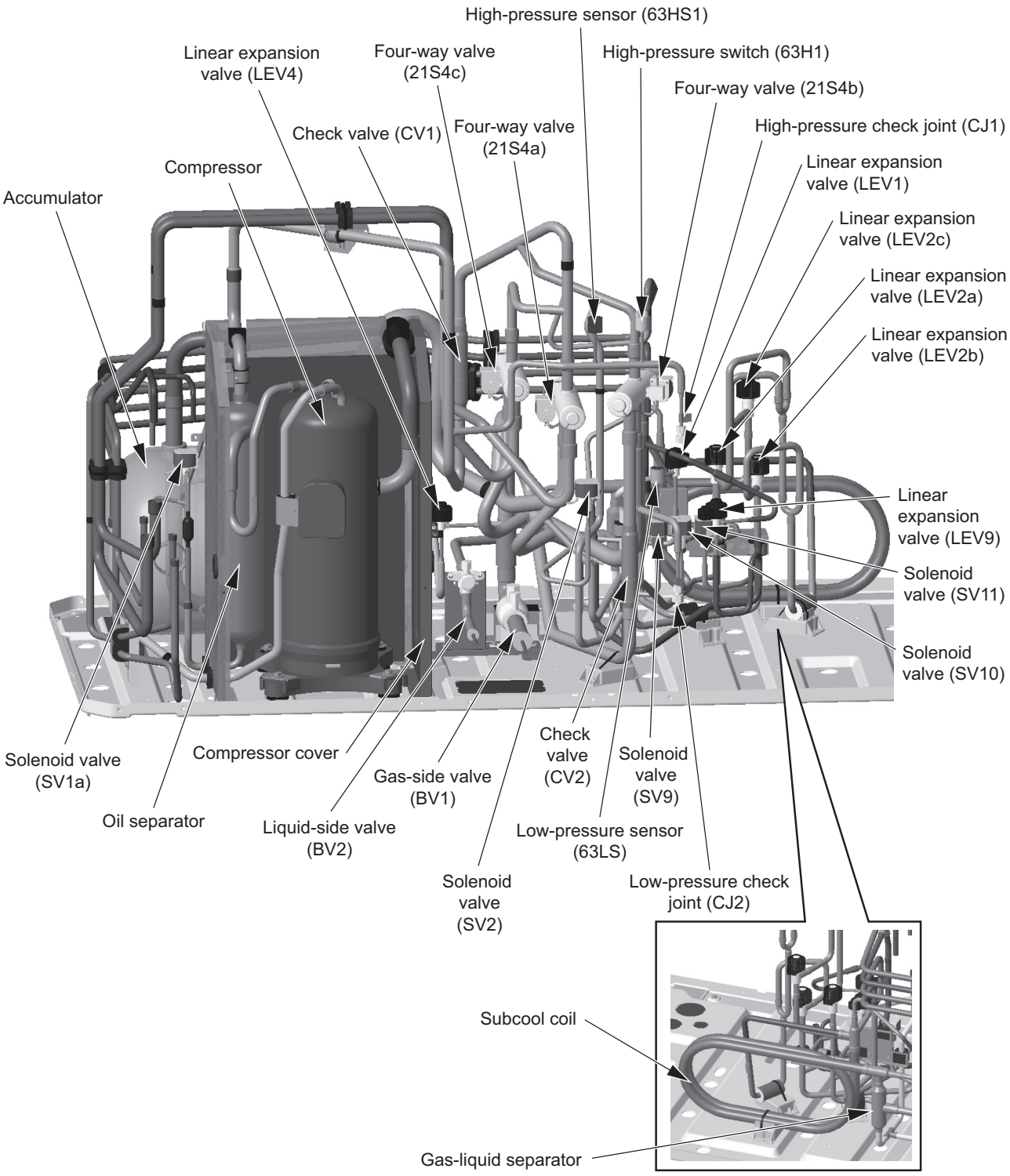
(5) PUHY-P168T(Y)NU-A

* Products manufactured in July 2020 and earlier

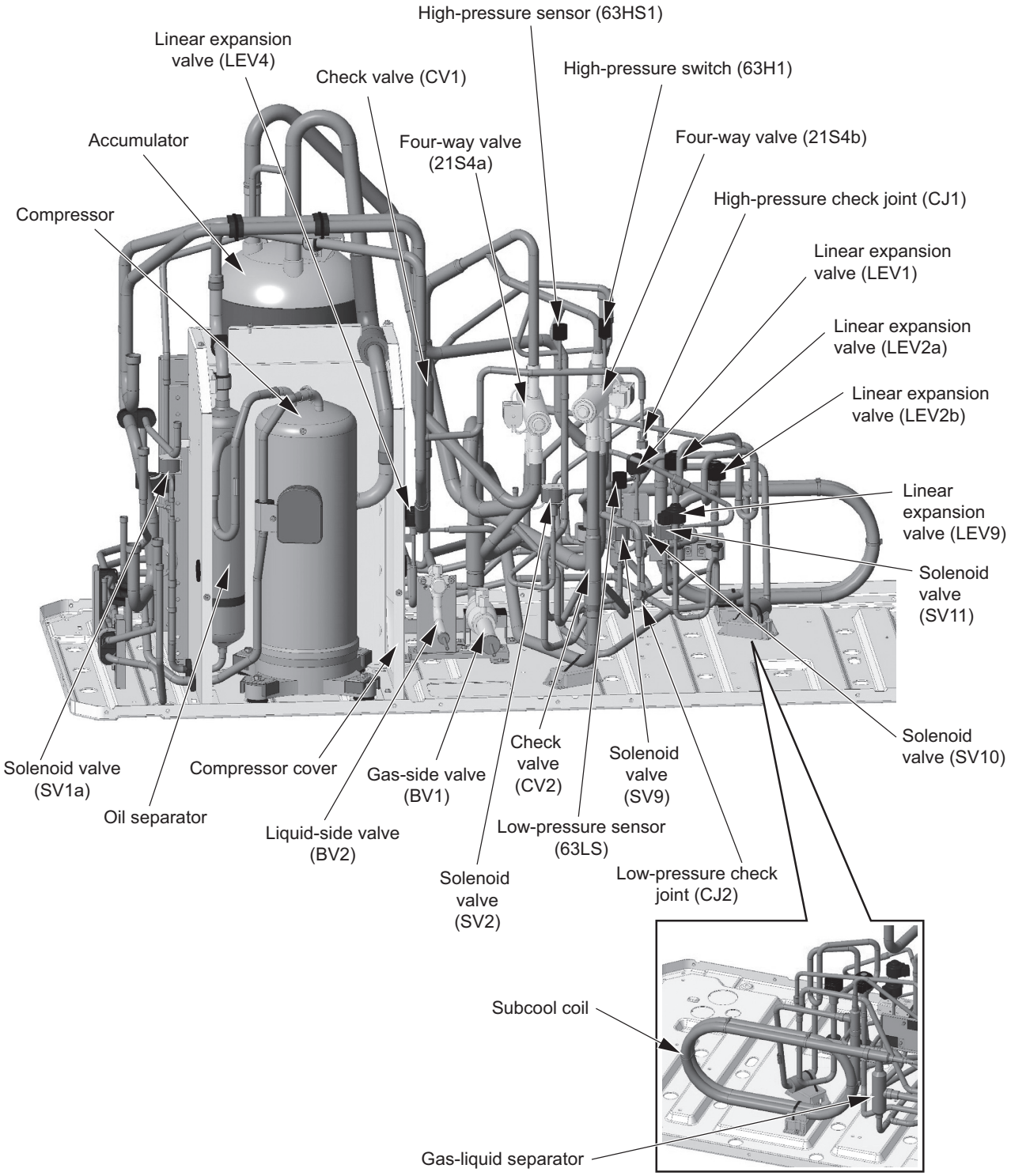


(6) PUHY-EP168, EP192T(Y)NU-A

* Products manufactured in July 2020 and earlier

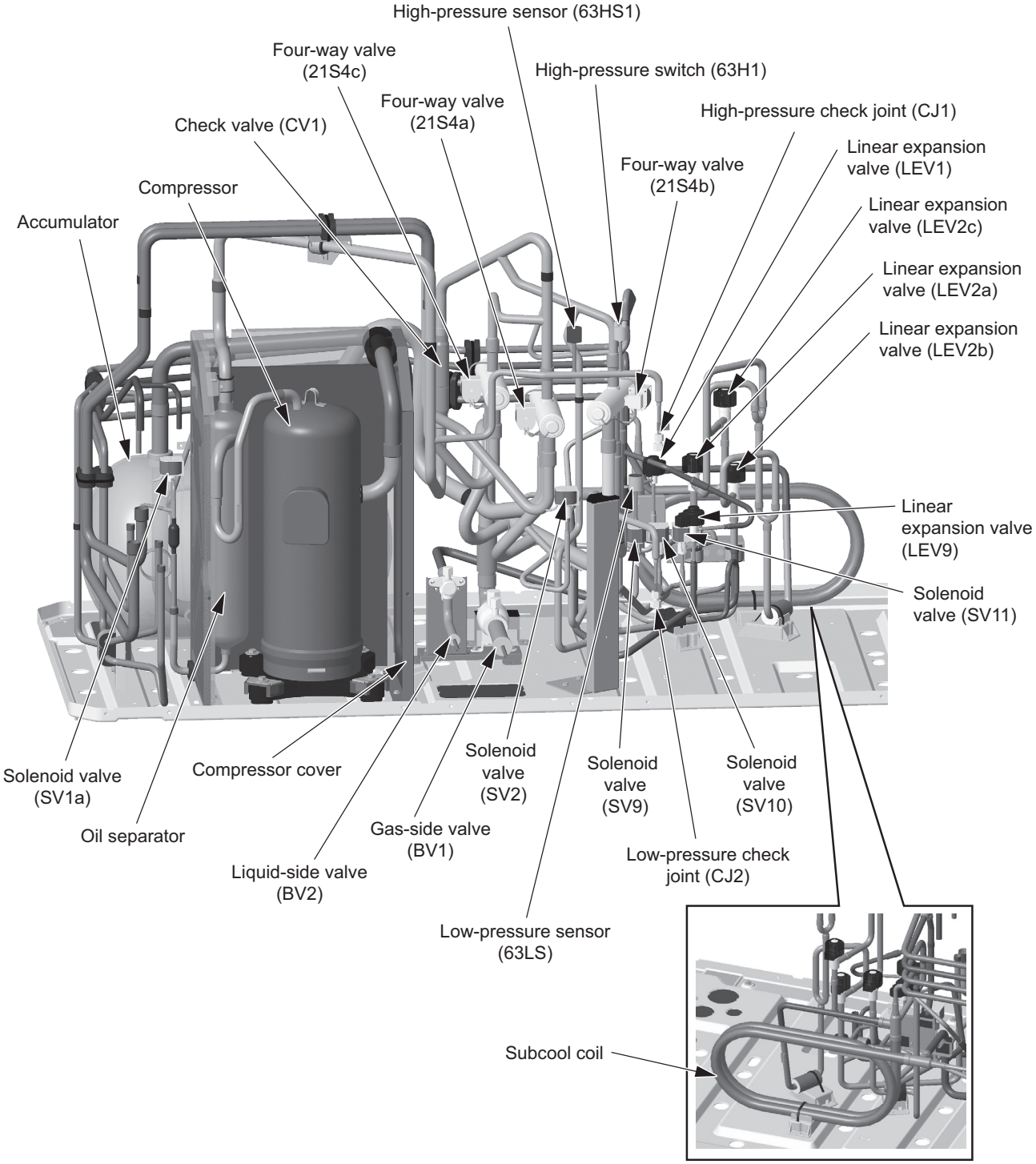


(7) PUHY-EP216, EP240T(Y)NU-A



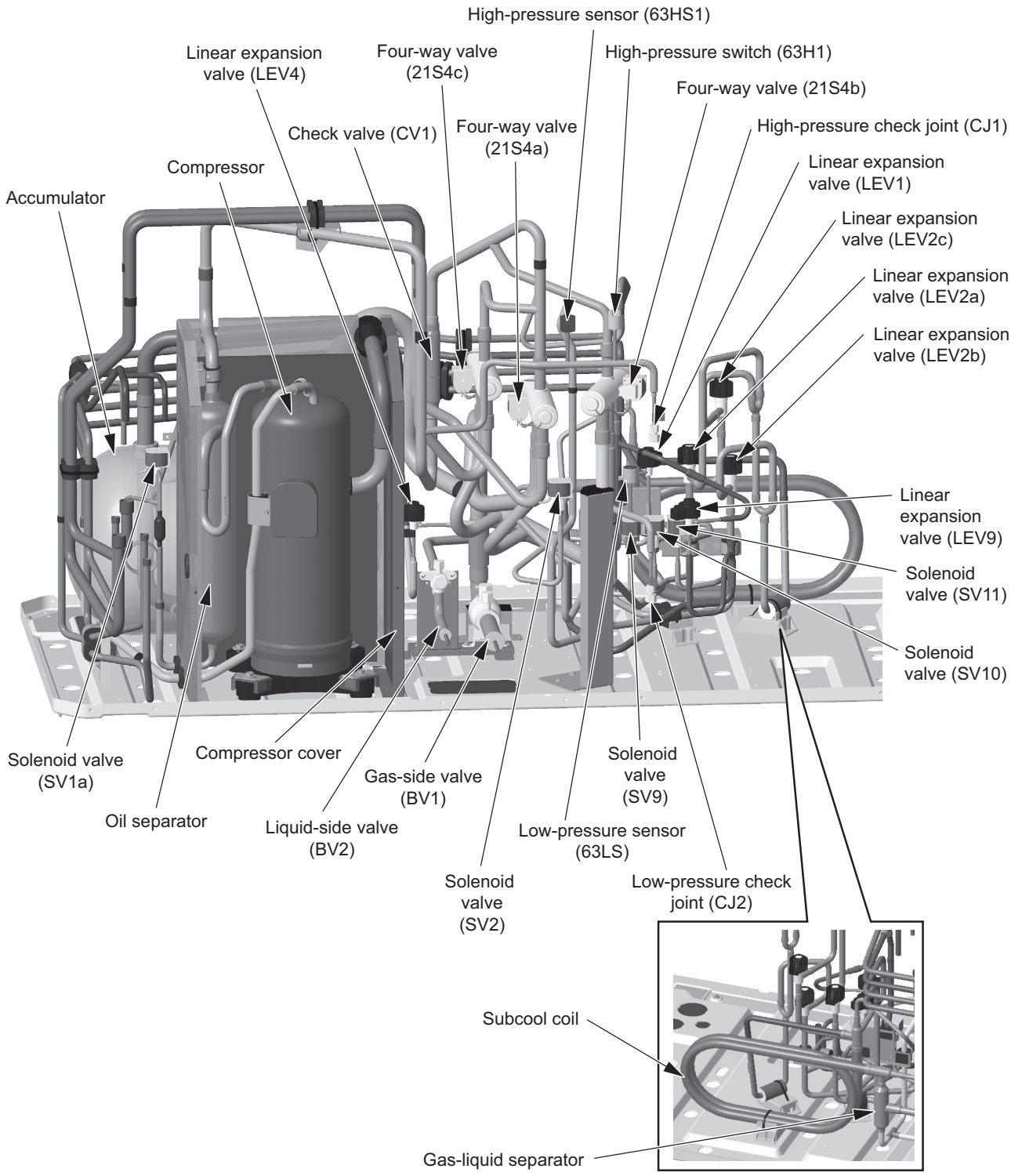
(8) PUHY-P168T(Y)NU-A

* Products manufactured in August 2020 and later



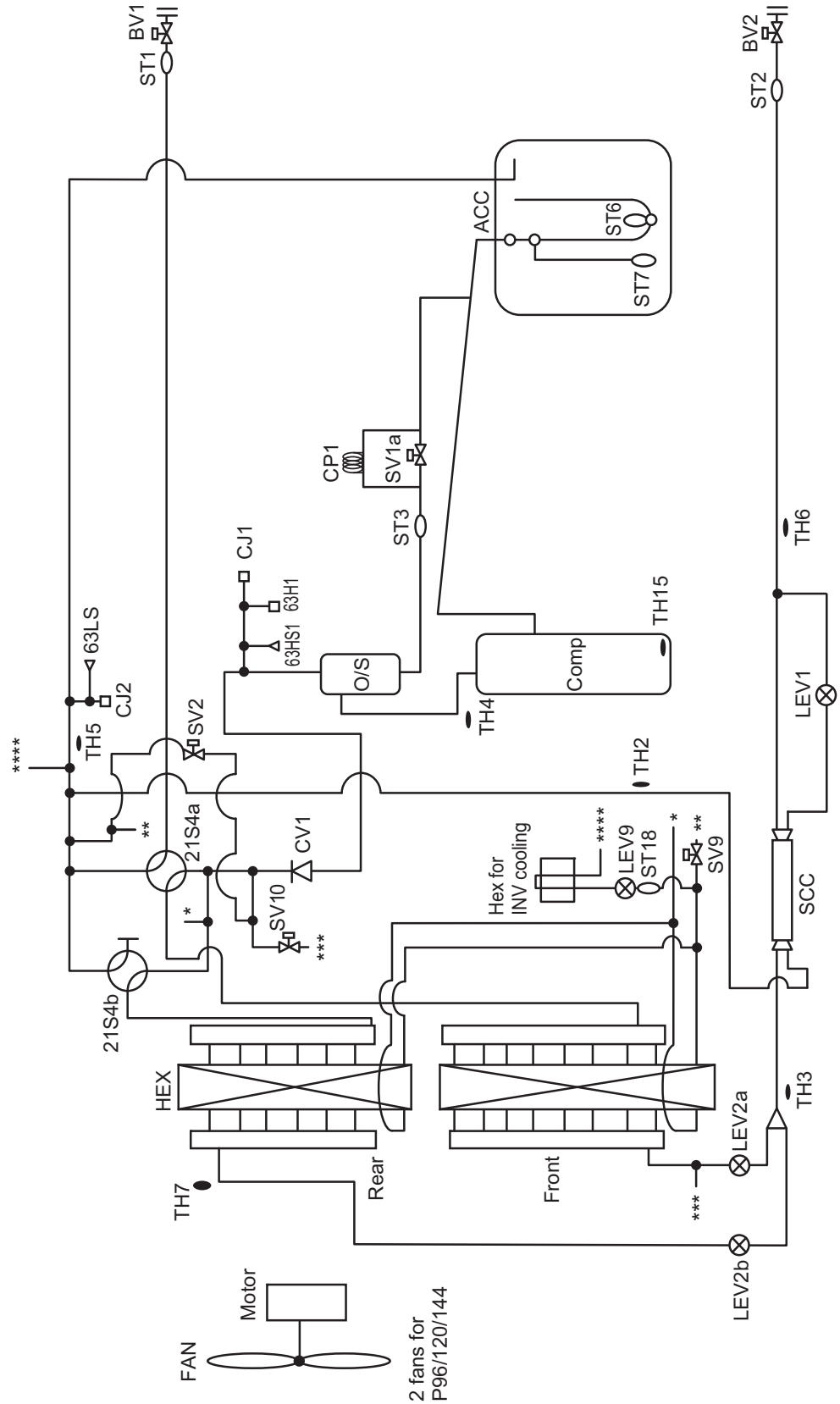
(9) PUHY-EP168, EP192T(Y)NU-A

* Products manufactured in August 2020 and later

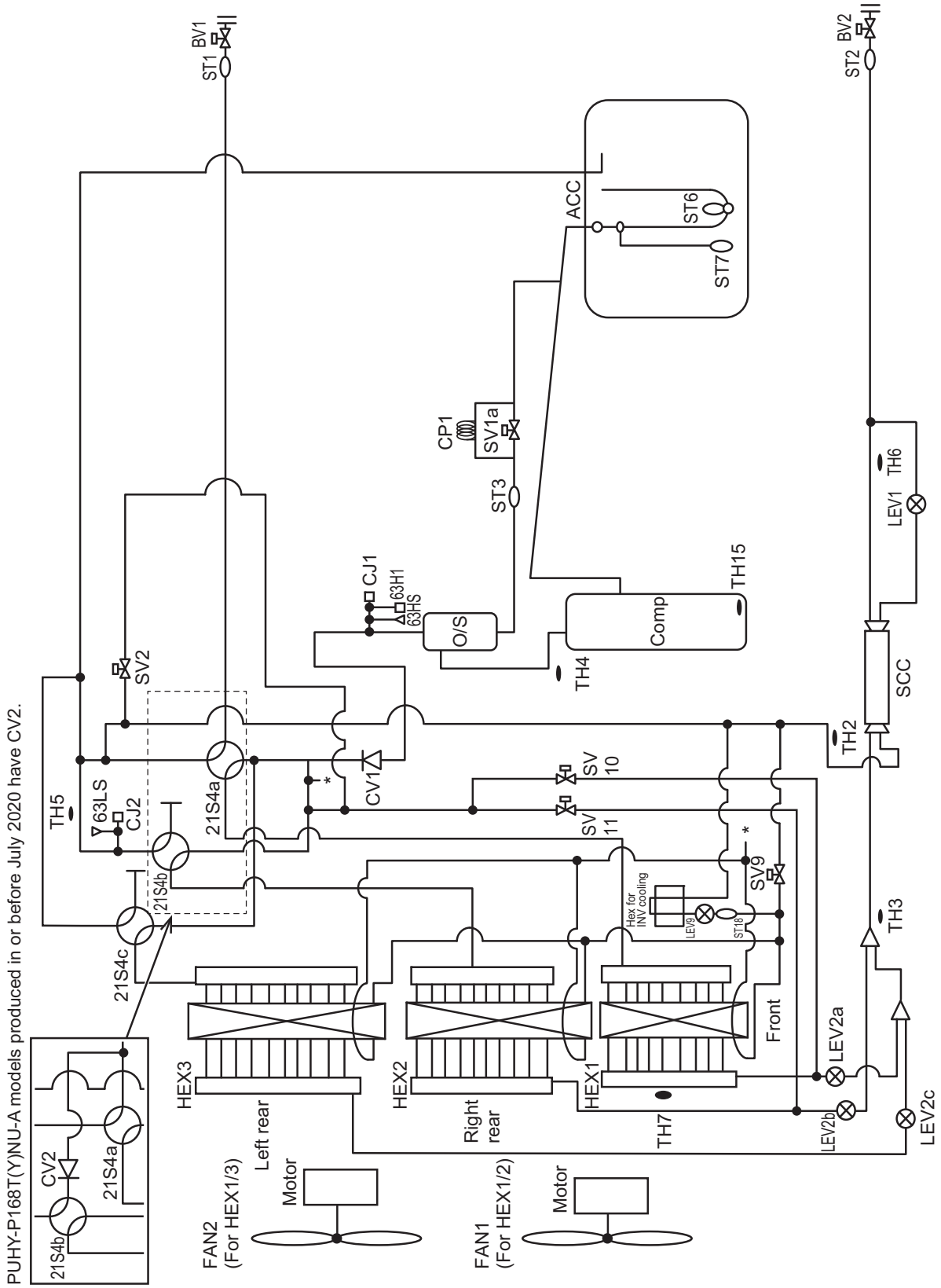


3-2 Outdoor Unit Refrigerant Circuit Diagrams

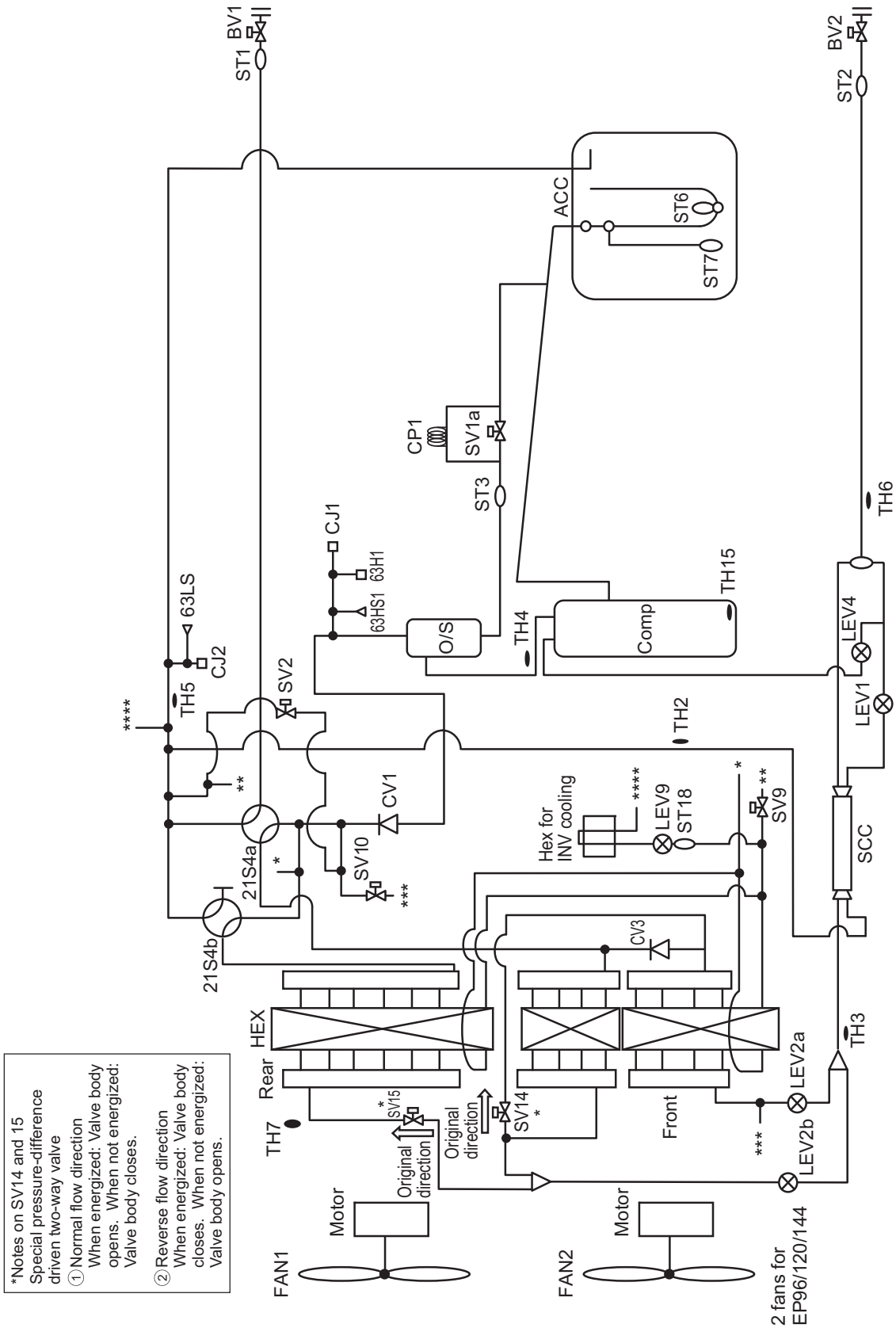
(1) PUHY-P72-P144T(Y)NU-A



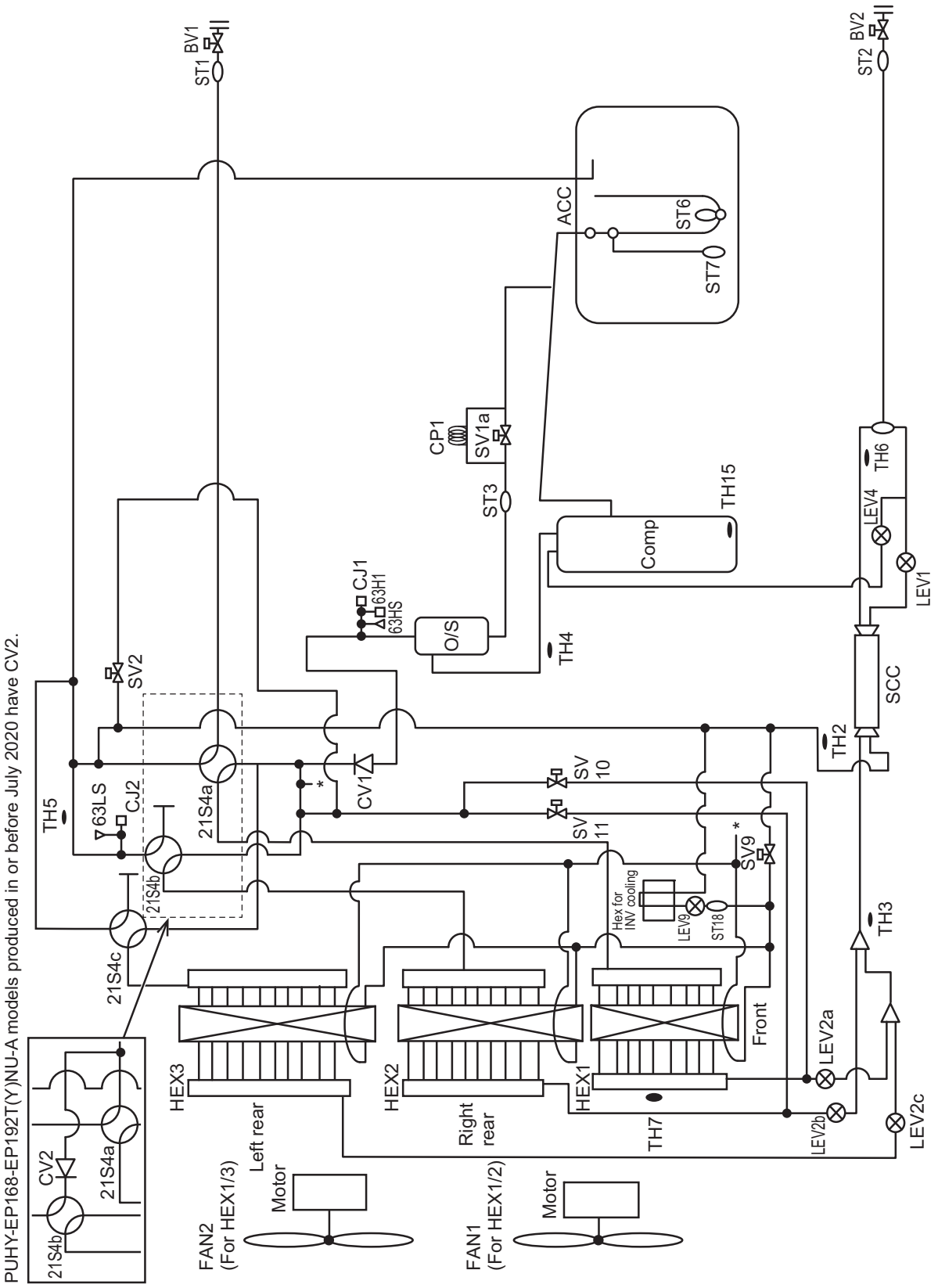
(2) PUHY-P168T(Y)NU-A



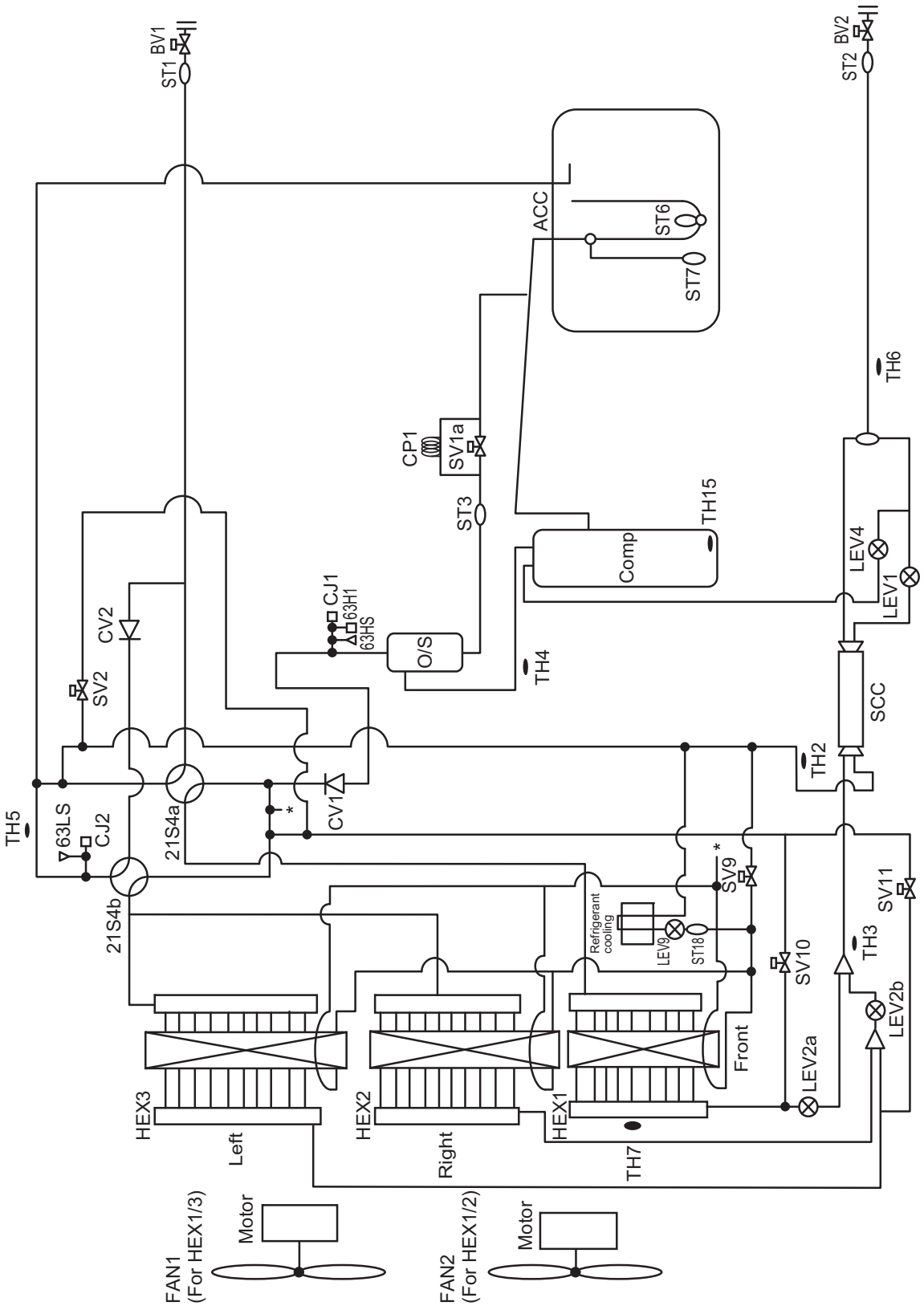
(3) PUHY-EP72-EP144T(Y)NU-A



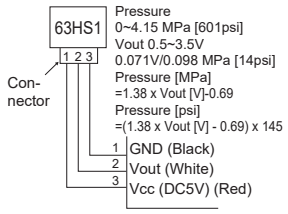
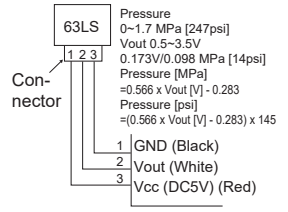
(4) PUHY-EP168-EP192T(Y)NU-A



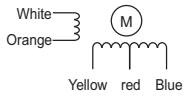
(5) PUHY-EP216-EP240T(Y)NU-A



3-3 Functions of the Major Components of Outdoor Unit

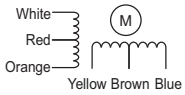
Part name	Symbols (functions)	Notes	Usage	Specifications	Check method
Compressor	MC1 (Comp1)		Adjusts the amount of circulating refrigerant by adjusting the operating frequency based on the operating pressure data	P72, P96 models Low-pressure shell scroll compressor wirewound resistance 20°C [68°F] : 0.72 Ω (YNU), 0.2 Ω (TNU) P120, P144, P168, EP72, EP96 models Low-pressure shell scroll compressor wirewound resistance 20°C [68°F] : 0.192 Ω (YNU), 0.078Ω (TNU) EP120, EP144, EP168, EP192 models Low-pressure shell scroll compressor wirewound resistance 20°C [68°F] : 0.219 Ω (YNU), 0.087 Ω (TNU) EP216, EP240 models Low-pressure shell scroll compressor wirewound resistance 20°C [68°F] : 0.212 Ω (YNU), 0.079 Ω (TNU)	
High pressure sensor	63HS1		1) Detects high pressure 2) Regulates frequency and provides high-pressure protection		
Low pressure sensor	63LS		1) Detects low pressure 2) Provides low-pressure protection 3) Defrost control during heating operation		
Pressure switch	63H1		1) Detects high pressure 2) Provides high-pressure protection	4.15MPa[601psi] OFF setting	
Power supply transformer	Transformer	YNU only	Decreases the power supply voltage (460V) supplied to the circuit board	Primary rated voltage: 460V, 50/60Hz Secondary rated voltage: 229V (No-load voltage)	

Part name	Symbols (functions)	Notes	Usage	Specifications	Check method
Thermistor	TH4 (Discharge temperature)		1) Detects discharge air temperature 2) Provides high-pressure protection 0°C[32°F] :698 kΩ 10°C[50°F] :413 kΩ 20°C[68°F] :250 kΩ 30°C[86°F] :160 kΩ 40°C[104°F] :104 kΩ 50°C[122°F] : 70 kΩ 60°C[140°F] : 48 kΩ 70°C[158°F] : 34 kΩ 80°C[176°F] : 24 kΩ 90°C[194°F] :17.5 kΩ 100°C[212°F] :13.0 kΩ 110°C[230°F] : 9.8 kΩ	Degrees Celsius R_{120} = 7.465kΩ $R_{25/120}$ = 4057 $R_t = 7.465\exp\{4057(\frac{1}{273+t}-\frac{1}{393})\}$	Resistance check
	TH2 (Pipe temperature)		LEV 1 is controlled based on the TH2, TH3, and TH6 values.	Degrees Celsius R_0 = 15kΩ $R_{0/80}$ = 3460 $R_t = 15\exp\{3460\ (\frac{1}{273+t}-\frac{1}{273})\}$ 0°C[32°F] :15 kΩ 10°C[50°F] :9.7 kΩ 20°C[68°F] :6.4 kΩ 25°C[77°F] :5.3 kΩ 30°C[86°F] :4.3 kΩ 40°C[104°F] :3.1 kΩ	Resistance check
	TH3 (Pipe temperature)		1) Controls frequency 2) LEV1 is controlled based on the subcool at heat exchange outlet that is obtained based on the HPS data and TH3 value.		
	TH7 (Outdoor temperature)		1) Detects outdoor air temperature 2) Controls fan operation		
	TH5 (Pipe temperature)		LEV2 are controlled based on the 63LS and TH5 values.		
	TH6 (Pipe temperature)		Controls LEV1 based on TH2, TH3, and TH6 data.		
	TH15 (Compressor shell bottom temperature)		Detects compressor shell bottom temperature		
	THHS Inverter heat sink temperature	IPM is built in. Do not attempt to measure resistance.	Inverter overheating protection	Degrees Celsius R_{50} = 17kΩ $R_{25/120}$ = 4016 $R_t = 17\exp\{4016\ (\frac{1}{273+t}-\frac{1}{323})\}$ 0°C[32°F] :161 kΩ 10°C[50°F] :97 kΩ 20°C[68°F] :60 kΩ 25°C[77°F] :48 kΩ 30°C[86°F] :39 kΩ 40°C[104°F] :25 kΩ	-
	THL DCL temperature	EP168 and EP192 models only	DCL overheat protection	Degrees Celsius R_{100} = 3.3kΩ $B_{0/100}$ = 3970 $R_t = 3.3\exp\{3970(\frac{1}{273+t}-\frac{1}{373})\}$ 0°C[32°F] :162.2 kΩ 10°C[50°F] :98.3 kΩ 25°C[77°F] :49.1 kΩ 50°C[122°F] :17.6 kΩ 100°C[212°F] :3.3 kΩ	Resistance check

Part name	Symbols (functions)	Notes	Usage	Specifications	Check method
Solenoid valve	SV1a Discharge-suction bypass		1) High/low pressure bypass at start-up and stopping, and capacity control during low-load operation 2) High-pressure-rise prevention	AC208-230V Open while being powered/ closed while not being powered	Continuity check with a tester
	SV2		Makes excessive refrigerant in the accumulator evaporate	Open while being powered/ closed while not being powered	
	SV9		High-pressure-rise prevention	Open while being powered/ closed while not being powered	
	SV10		Continuous heating cycle mode	Open while being powered/ closed while not being powered	
	SV11		Continuous heating cycle mode	Open while being powered/ closed while not being powered	
	SV14, 15	EP72-EP144 models only	Controls outdoor unit heat exchanger capacity	(1) Normal direction flow Open while being powered/ closed while not being powered (2) Reverse direction flow Closed while being powered/ open while not being powered	
Linear expansion valve	LEV1 (SC control)		Adjusts the amount of bypass flow from the liquid pipe on the outdoor unit during cooling	DC12V Opening of a valve driven by a stepping motor 0-480 pulses	Same as indoor LEV The resistance value differs from that of the indoor LEV. Refer to the following page(s). [8-8 Troubleshooting LEV Problems]
	LEV9 (Refrigerant flow adjustment)		Adjusts the flow of refrigerant bypassed from the pipe for cooling the control board when the control board temperature rises		
	LEV2a (Refrigerant flow adjustment)		Adjusts refrigerant flow during heating Cut off the refrigerant flow during continuous heating cycle	DC12V Opening of a valve driven by a stepping motor 2100 pulses (Max. 3000 pulses)	Continuity Test with a Tester. Continuity between white and orange. Continuity between yellow, red, and blue. 
	LEV2b (Refrigerant flow adjustment)				
	LEV2c (Refrigerant flow adjustment)	(E)P168 and (E)P192 models only			
4-way valve	21S4a		Changeover between heating and cooling	AC208-230V Dead: cooling cycle Live: heating cycle	Continuity check with a tester
	21S4b		1) Changeover between heating and cooling 2) Controls outdoor unit heat exchanger capacity	AC208-230V Dead: cooling cycle Outdoor unit heat exchanger capacity at 100% Live: heating cycle Outdoor unit heat exchanger capacity at 25%, 50% or heating cycle	
	21S4c	(E)P168 and (E)P192 models only			

Part name	Symbols (functions)	Notes	Usage	Specifications	Check method
Fan motor	FAN motor 1,2	FAN motor 2 is only on the (E)P96-(E)P192 and EP216-EP240 models.	Regulates the heat exchanger capacity by adjusting the operating frequency and operating the propeller fan based on the operating pressure.	♦(E)P72, (E)P168/192, EP216/240 AC380-460V, 920W (YNU) AC200-230V, 920W (TNU) ♦(E)P96-(E)P144 AC380-460V, 460W (YNU) AC200-230V, 460W (TNU) *The (E)P72, (E)P168/192, EP216/240 models and (E)P96-144 models are equipped with different types of fan motors.	

3-4 Functions of the Major Components of Indoor Unit

Part Name	Symbol (functions)	Notes	Usage	Specification	Check method
Linear expansion valve	LEV		1) Adjusts superheat at the indoor heat exchanger outlet during cooling 2) Adjusts subcool at the indoor unit heat exchanger outlet during heating	DC12V Opening of stepping motor driving valve 0-(1800) pulses	Continuity between white, red, and orange. Continuity between yellow, brown, and blue. 
Thermistor	TH1 (Suction air temperature)		Indoor unit control (Thermo)	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	Resistance check
	TH2 (Pipe temperature)		1) Indoor unit control (Frost prevention, Hot adjust) 2) LEV control during heating operation (subcool detection).		
	TH3 (Gas pipe temperature)		LEV control during cooling operation (superheat detection)		
	TH4 Outdoor air temperature)		Indoor unit control (Thermo)		
	Temperature sensor (Indoor air temperature)		Indoor unit control (Thermo)		

Chapter 4 Electrical Components and Wiring Diagrams

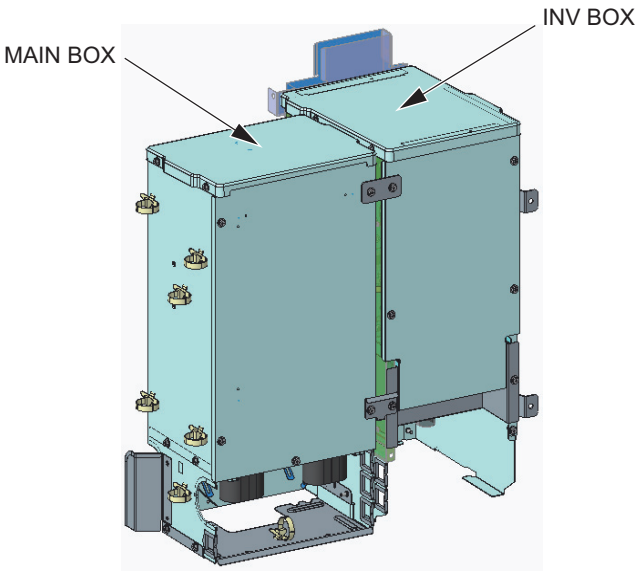
4-1 Outdoor Unit Circuit Board Arrangement

4-1-1 Outdoor Unit Control Box

<HIGH VOLTAGE WARNING>

- Control box houses high-voltage parts.
- When opening or closing the front panel of the control box, do not let it come into contact with any of the internal components.
- Before inspecting the inside of the control box, turn off the power, keep the unit off for at least 10 minutes, and confirm that the voltage of the capacitor in the main circuit has dropped to 20 VDC or less.

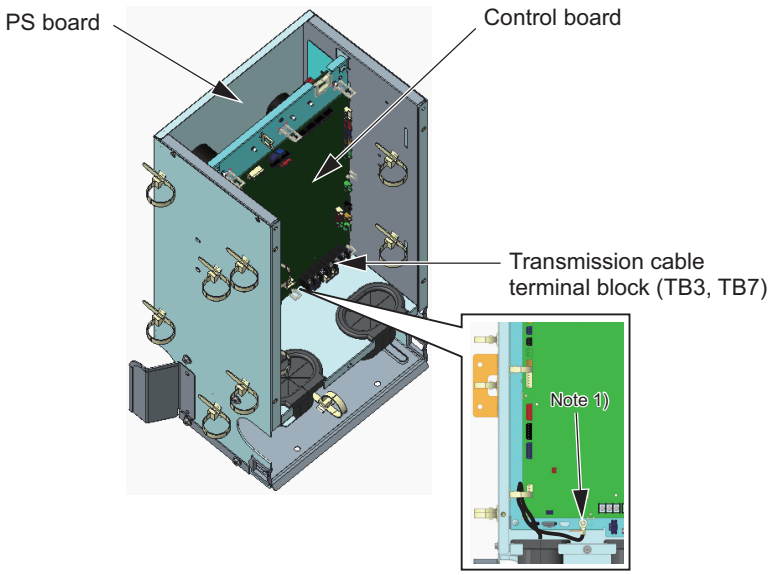
(1) PUHY-(E)P72T(Y)NU-A



Note

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

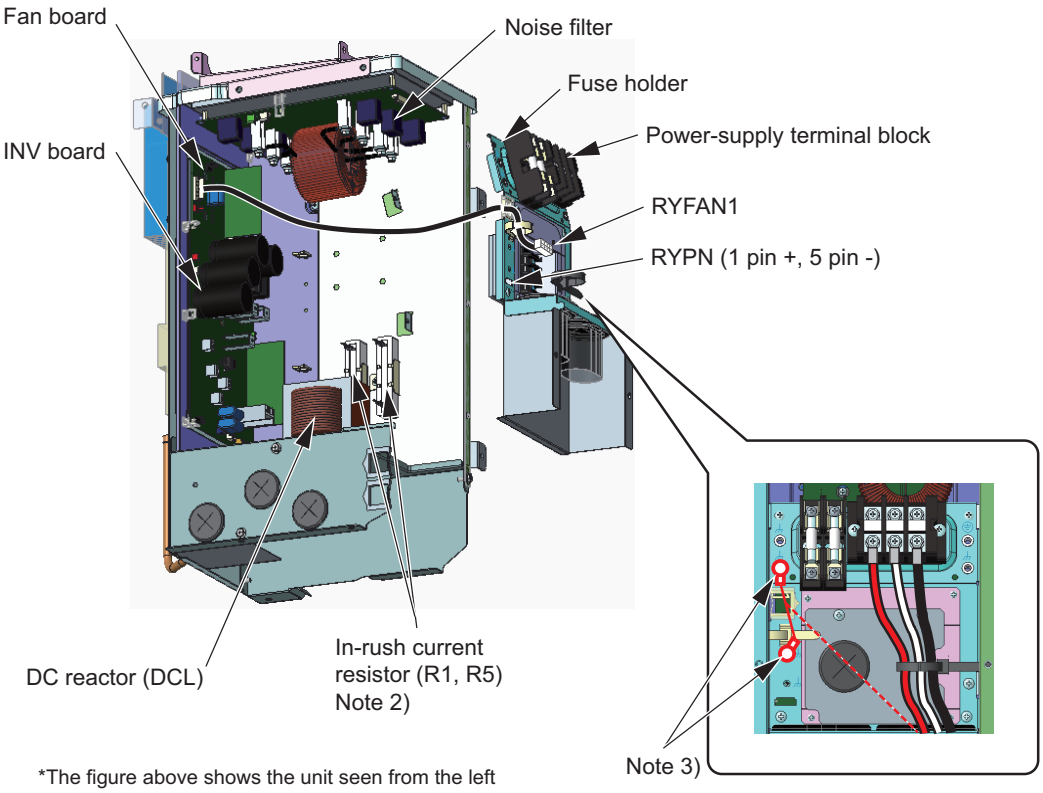
MAIN BOX



Note

1) Leave the grounding connected during maintenance.

INV BOX (YNU)

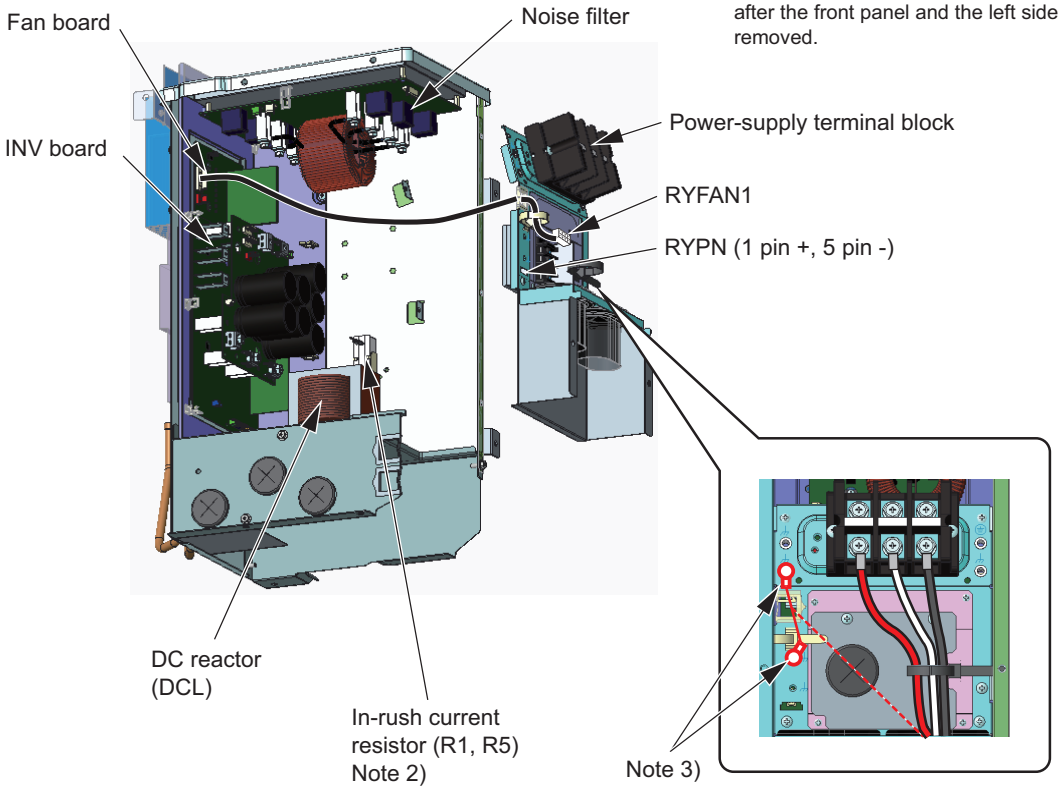


*The figure above shows the unit seen from the left after the front panel and the left side panel were removed.

Note

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

INV BOX (TNU)



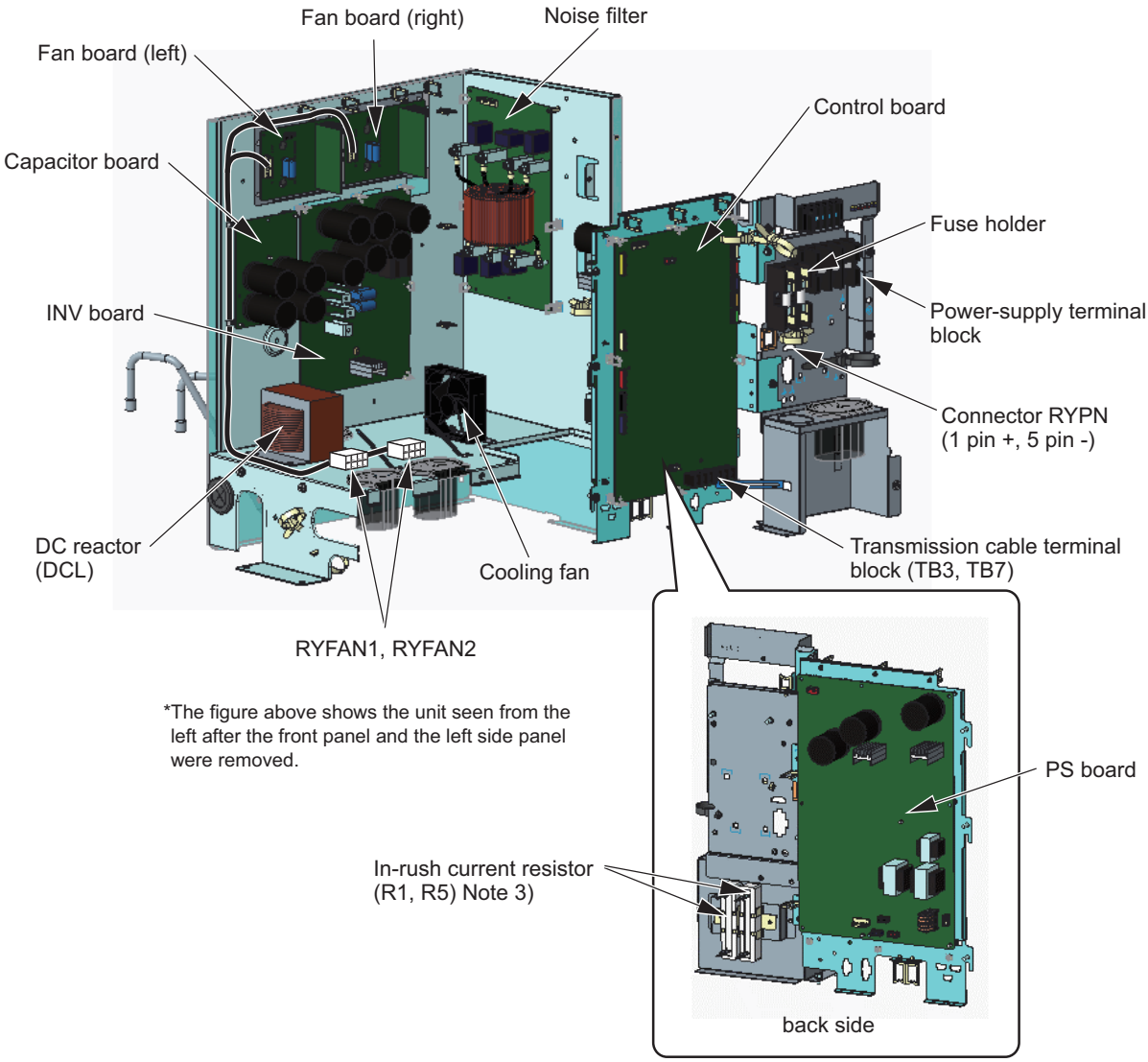
*The figure at left shows the unit seen from the left after the front panel and the left side panel were removed.

Note

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

(2) PUHY-(E)P96, (E)P120, (E)P144, P168

(YNU)

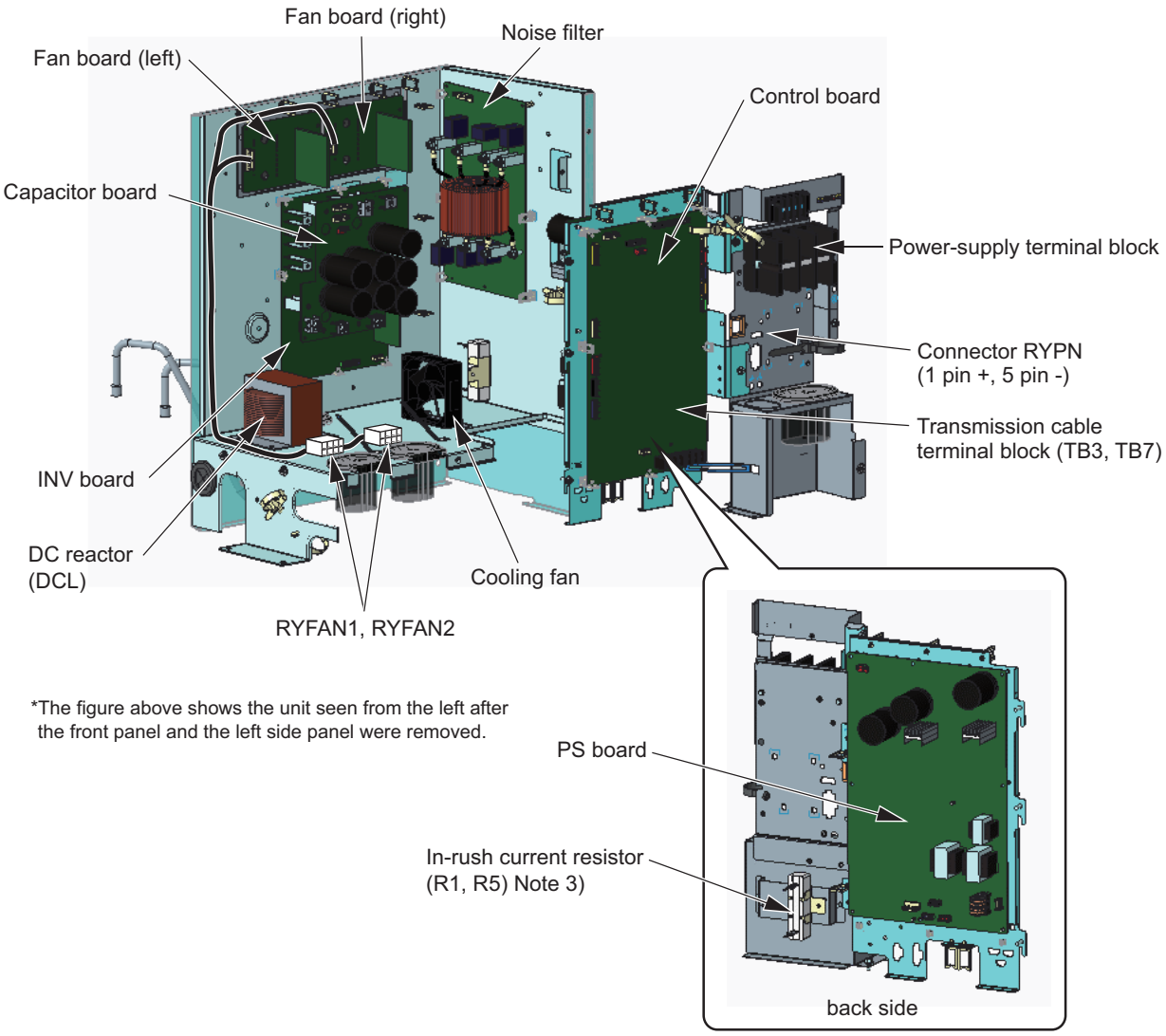


*The figure above shows the unit seen from the left after the front panel and the left side panel were removed.

Note

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

(TNU)



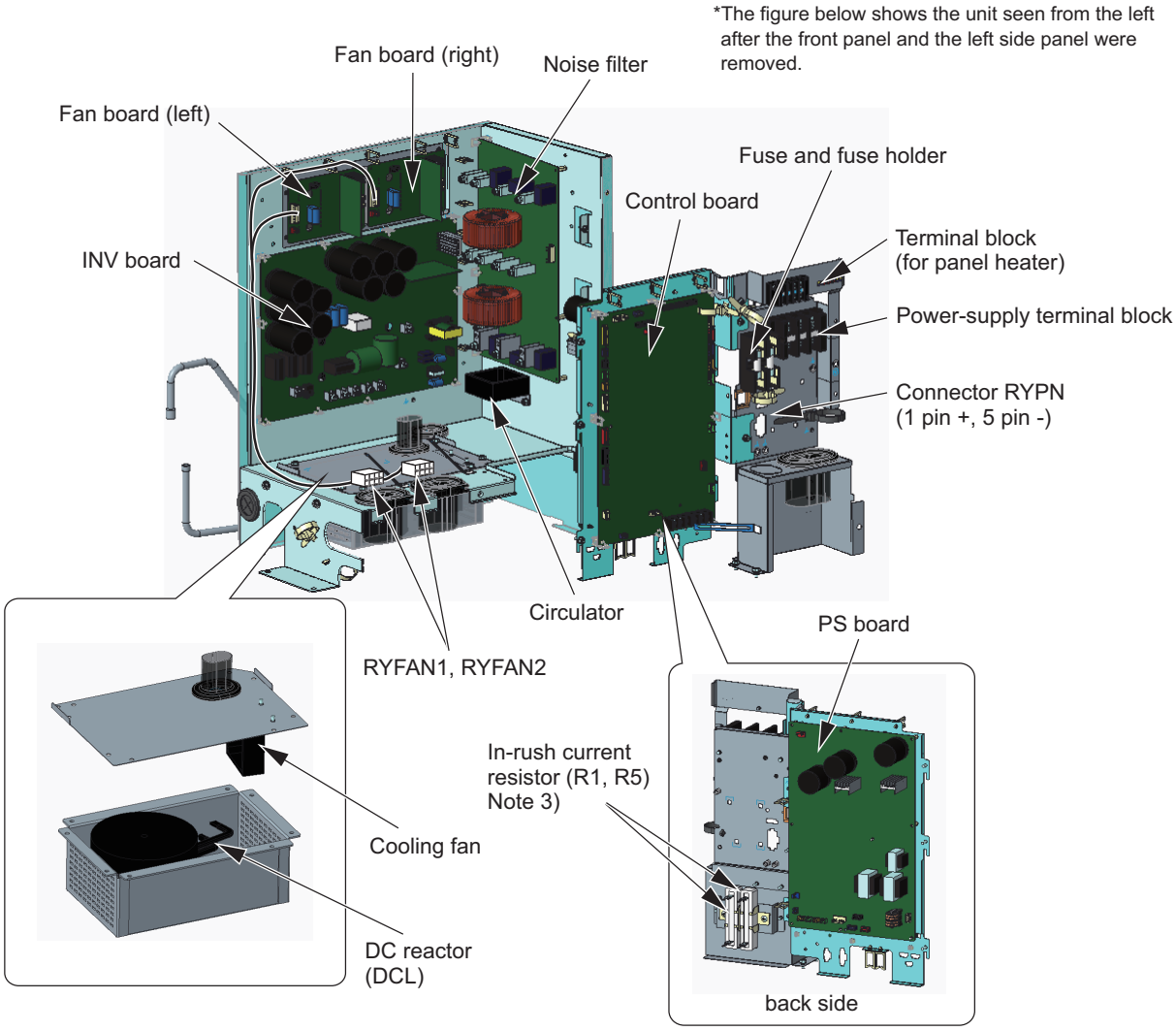
*The figure above shows the unit seen from the left after the front panel and the left side panel were removed.

Note

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

(3) PUHY-EP168, EP192, EP216, EP240

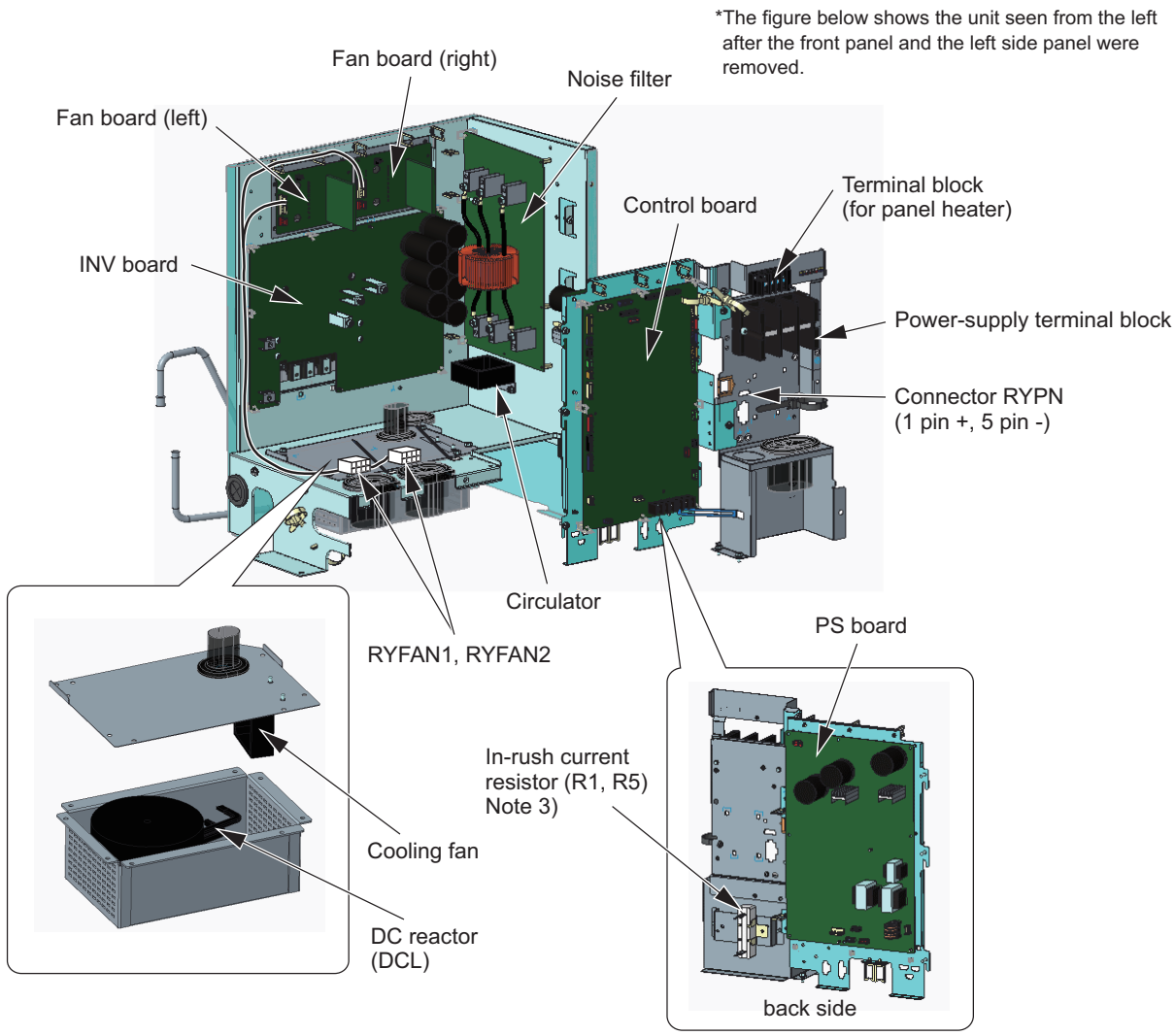
(YNU)



Note

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

(TNU)

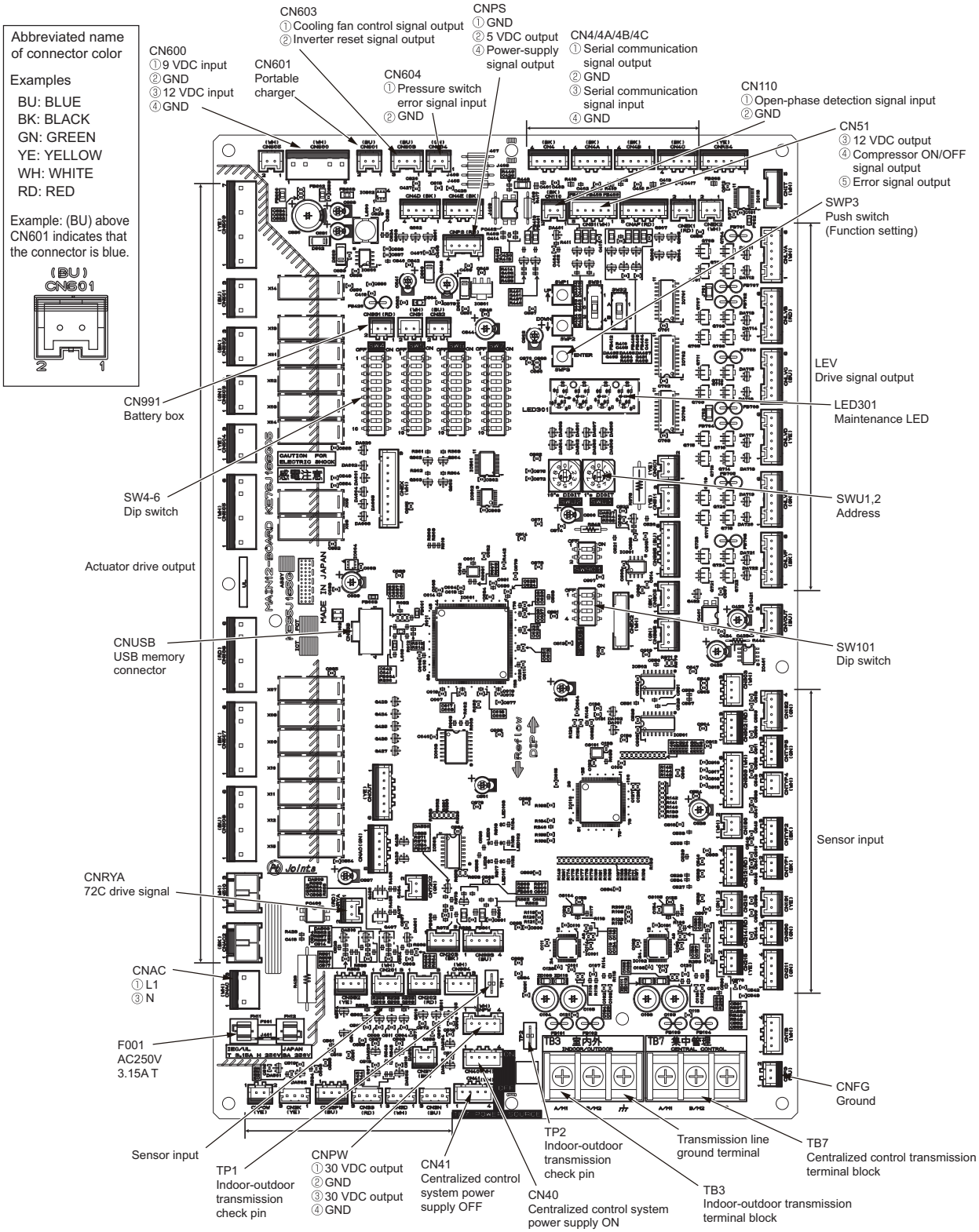


Note

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

4-2 Outdoor Unit Circuit Board Components

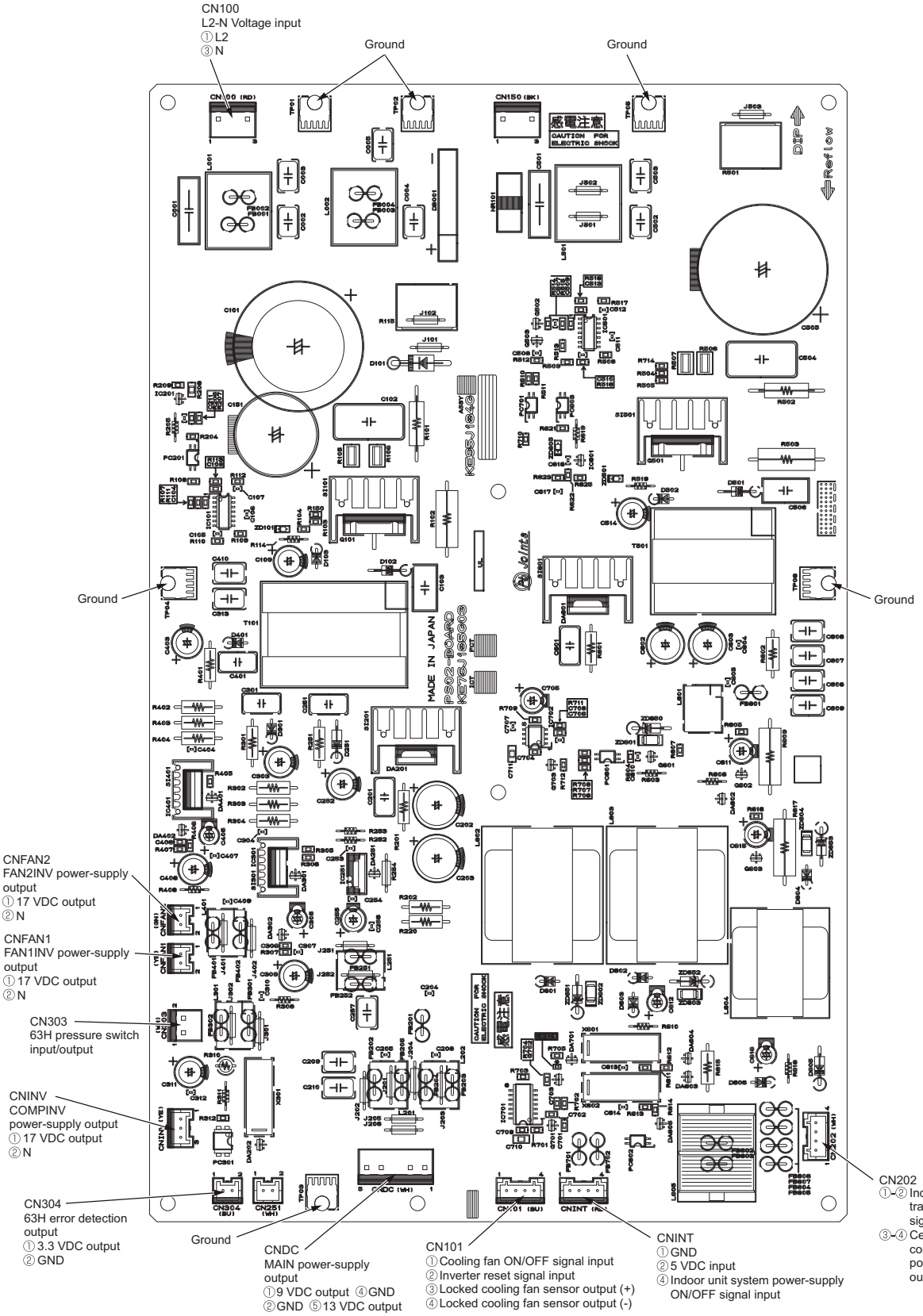
4-2-1 Control Board



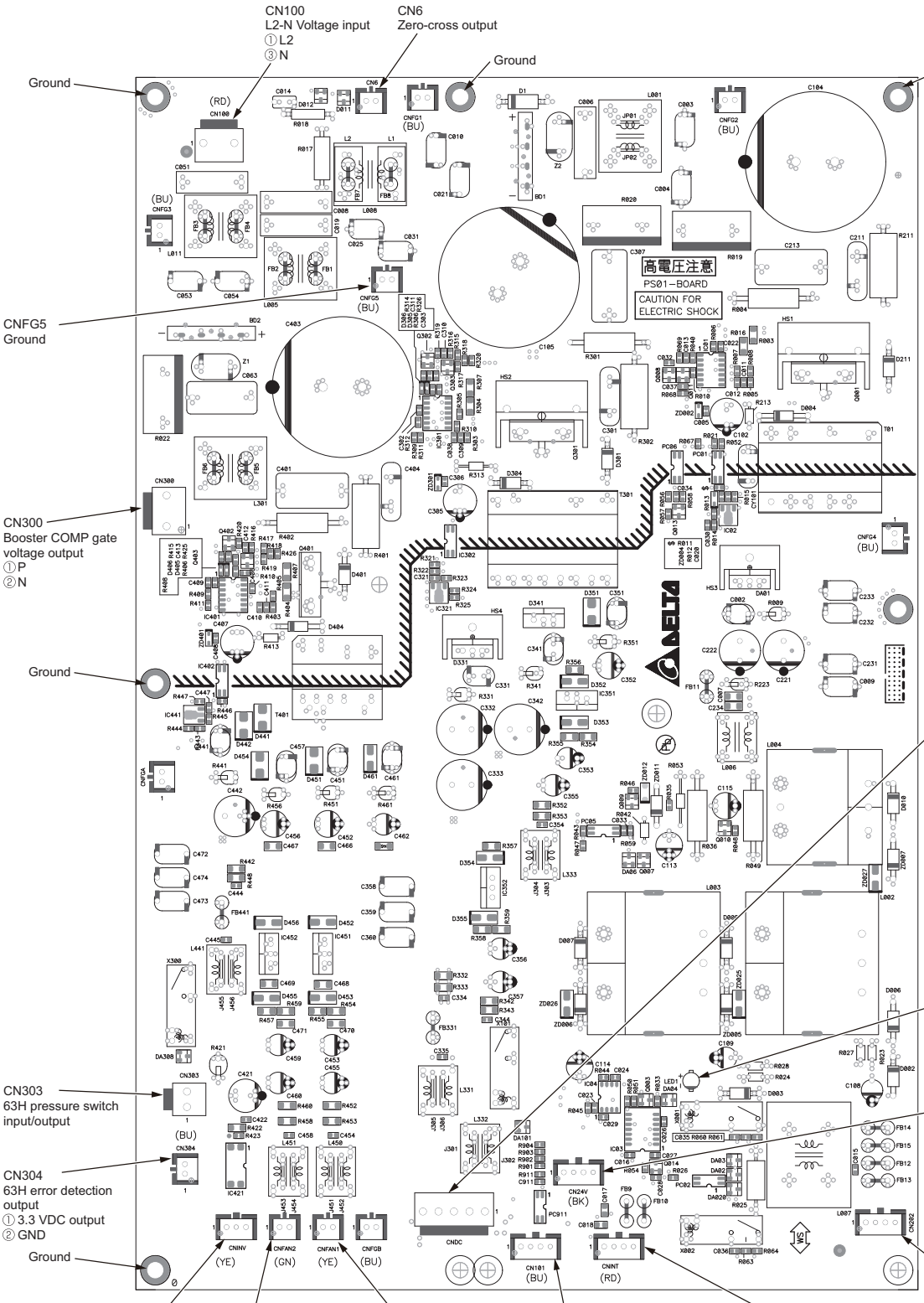
*For information about the display of SW4 function settings, refer to the following page(s). [5-1-1 Outdoor Unit Switch Functions and Factory Settings]

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

(1) PUHY-(E)P72T(Y)NU-A

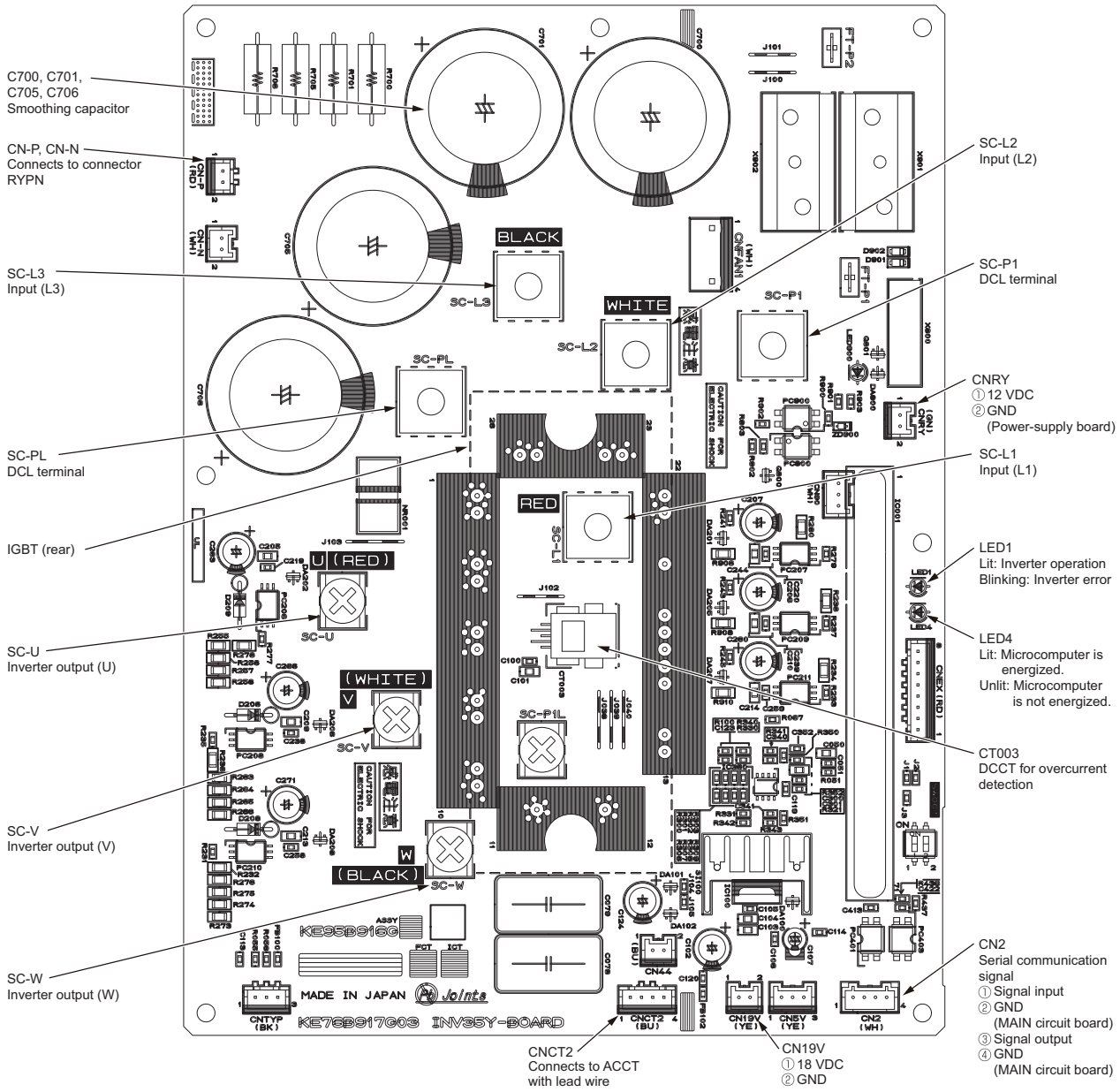


(2) PUHY-(E)P96, (E)P120, (E)P144, (E)P168, EP192, EP216, EP240T(Y)NU-A



4-2-3 Inverter Board (INV Board)

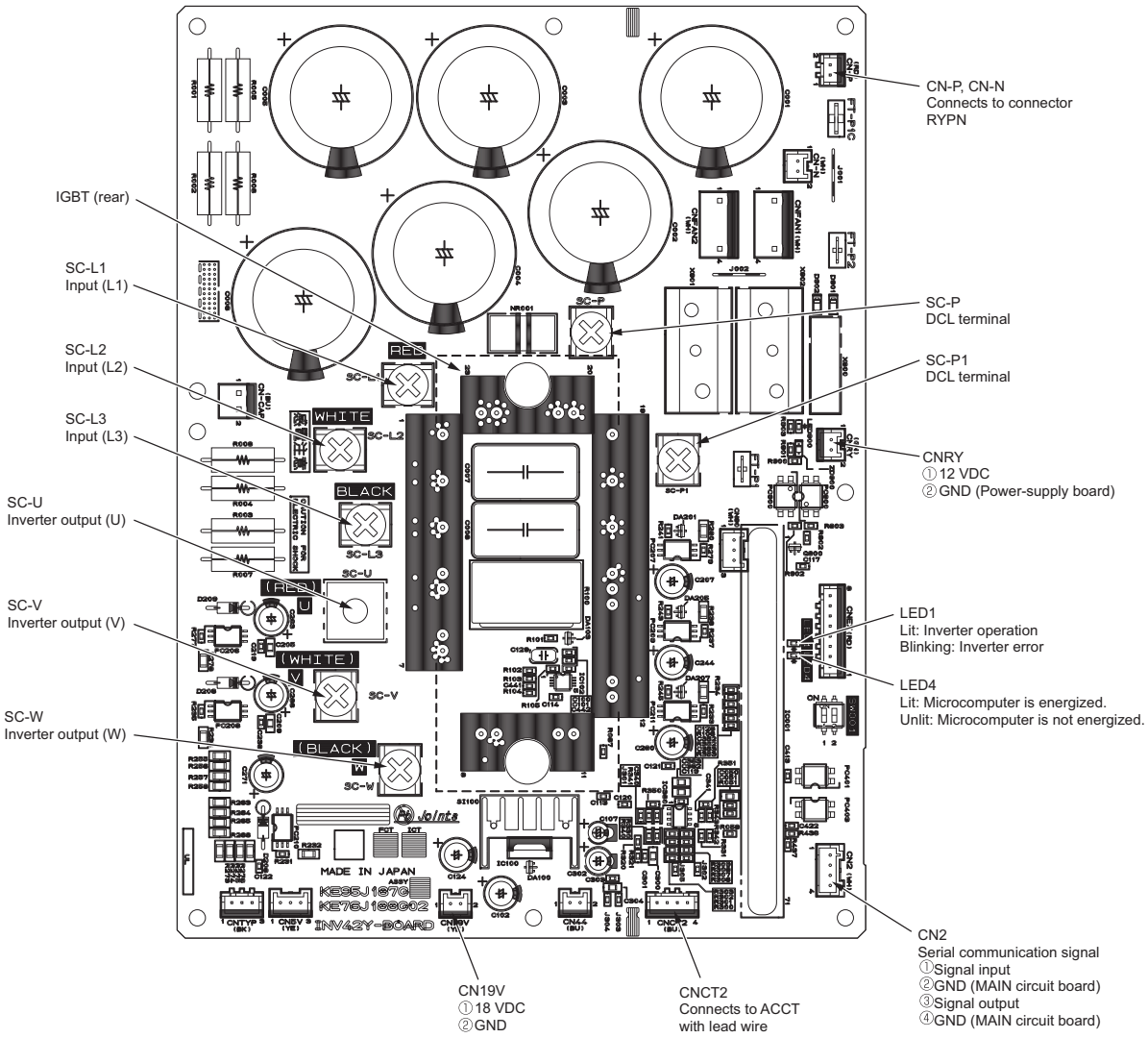
(1) PUHY-(E)P72YNU-A



Note

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

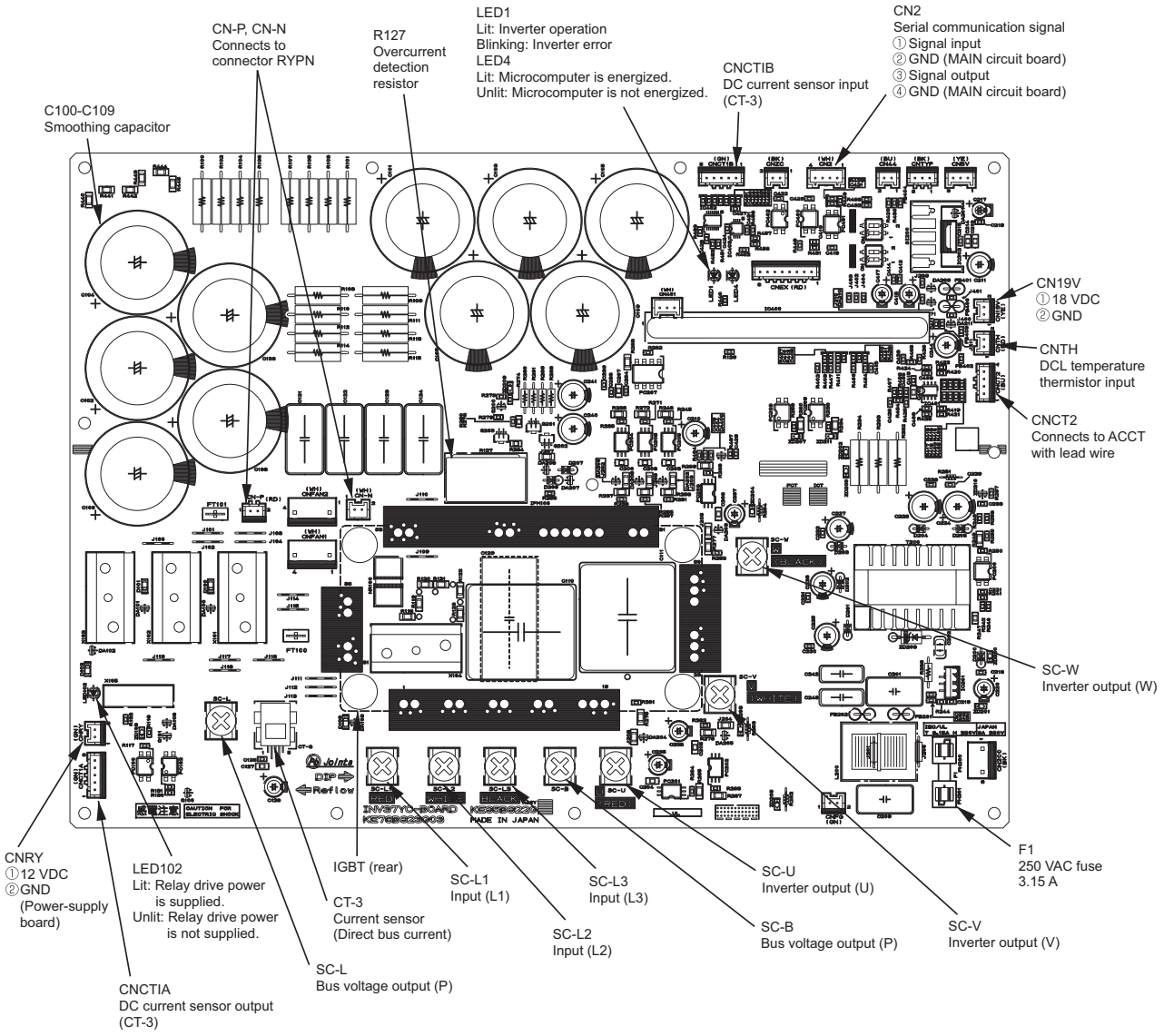
(2) PUHY-(E)P96, (E)P120, (E)P144, P168YNU-A



Note

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

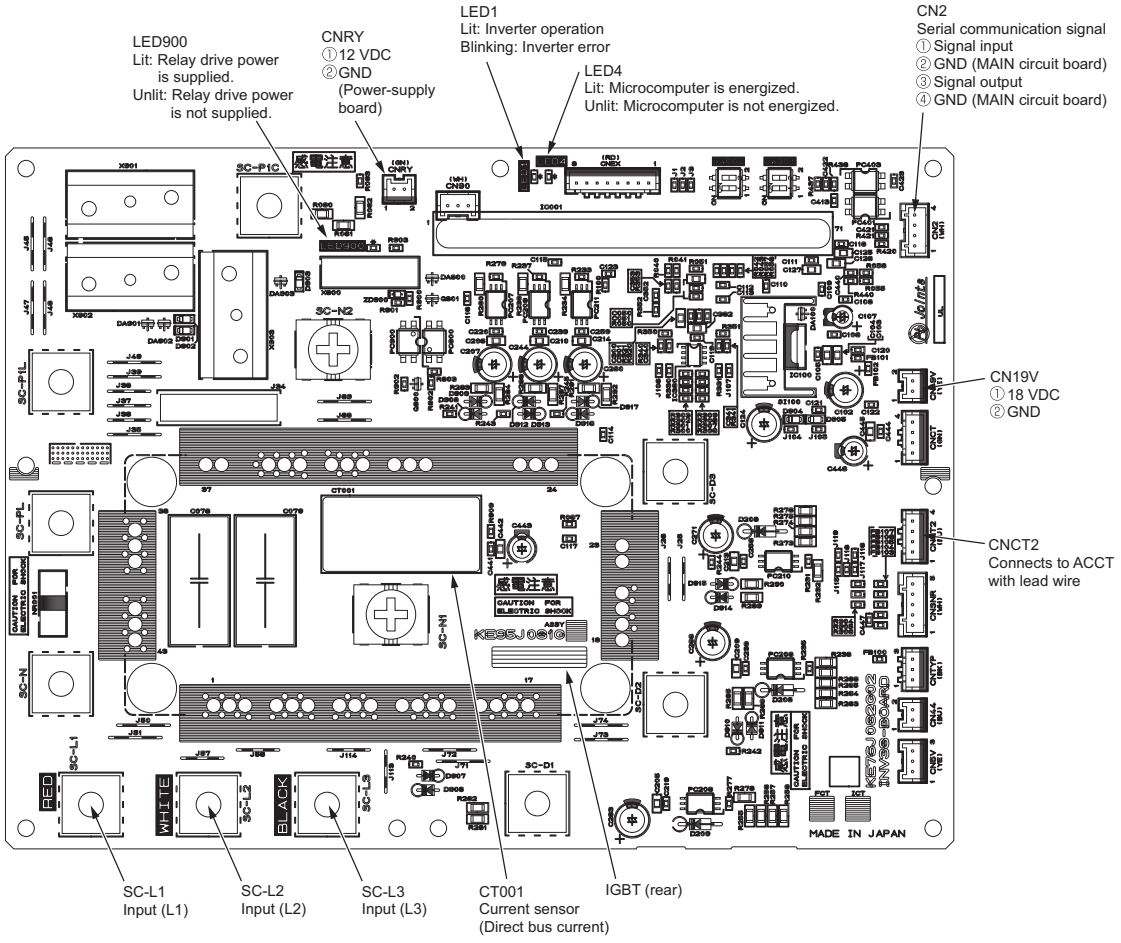
(3) PUHY-EP168, EP192, EP216, EP240YNU-A



Note

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

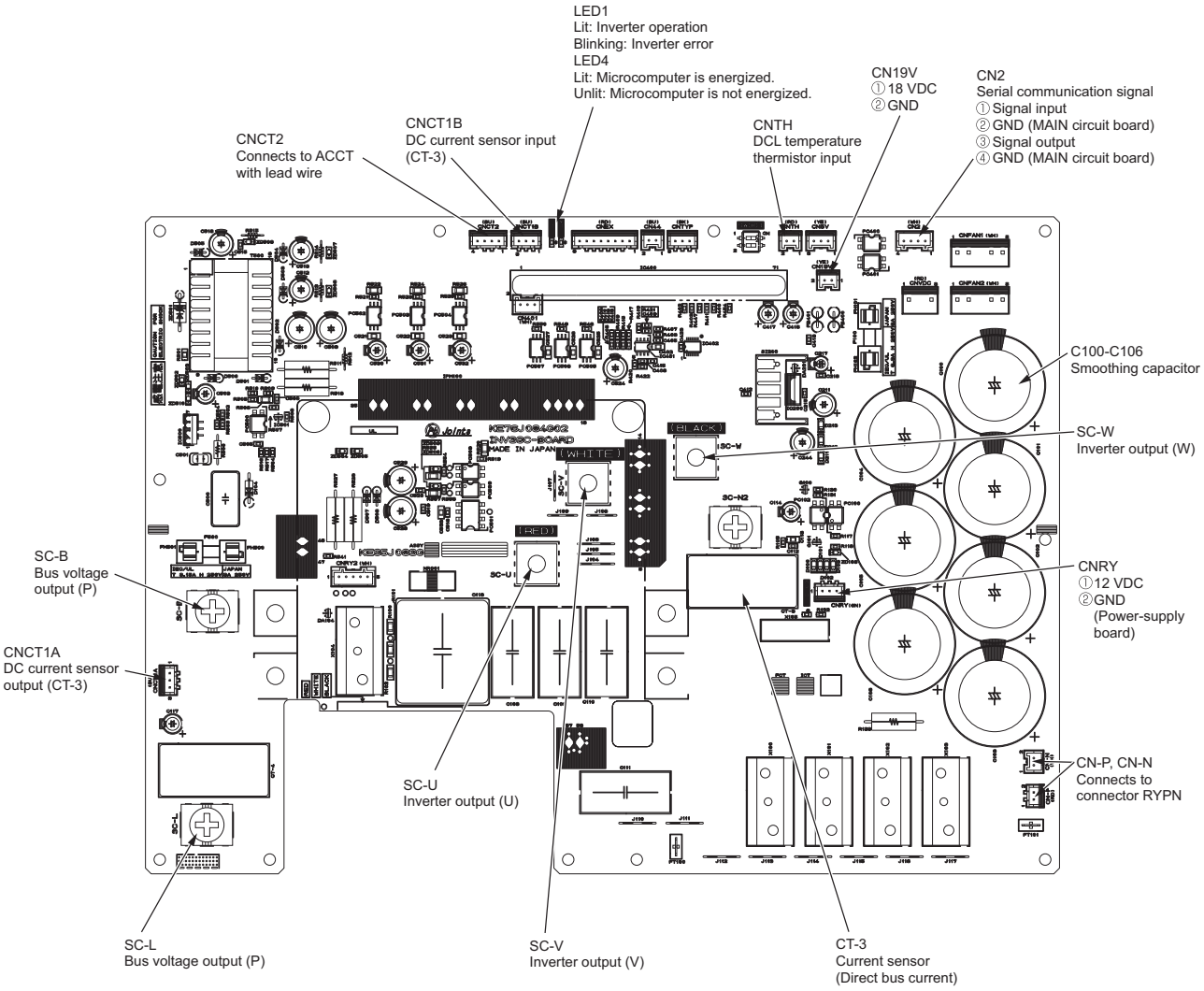
(4) PUHY-(E)P72, (E)P96, (E)P120, (E)P144, P168TNU-A



Note

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

(5) PUHY-EP168, EP192, EP216, EP240TNU-A

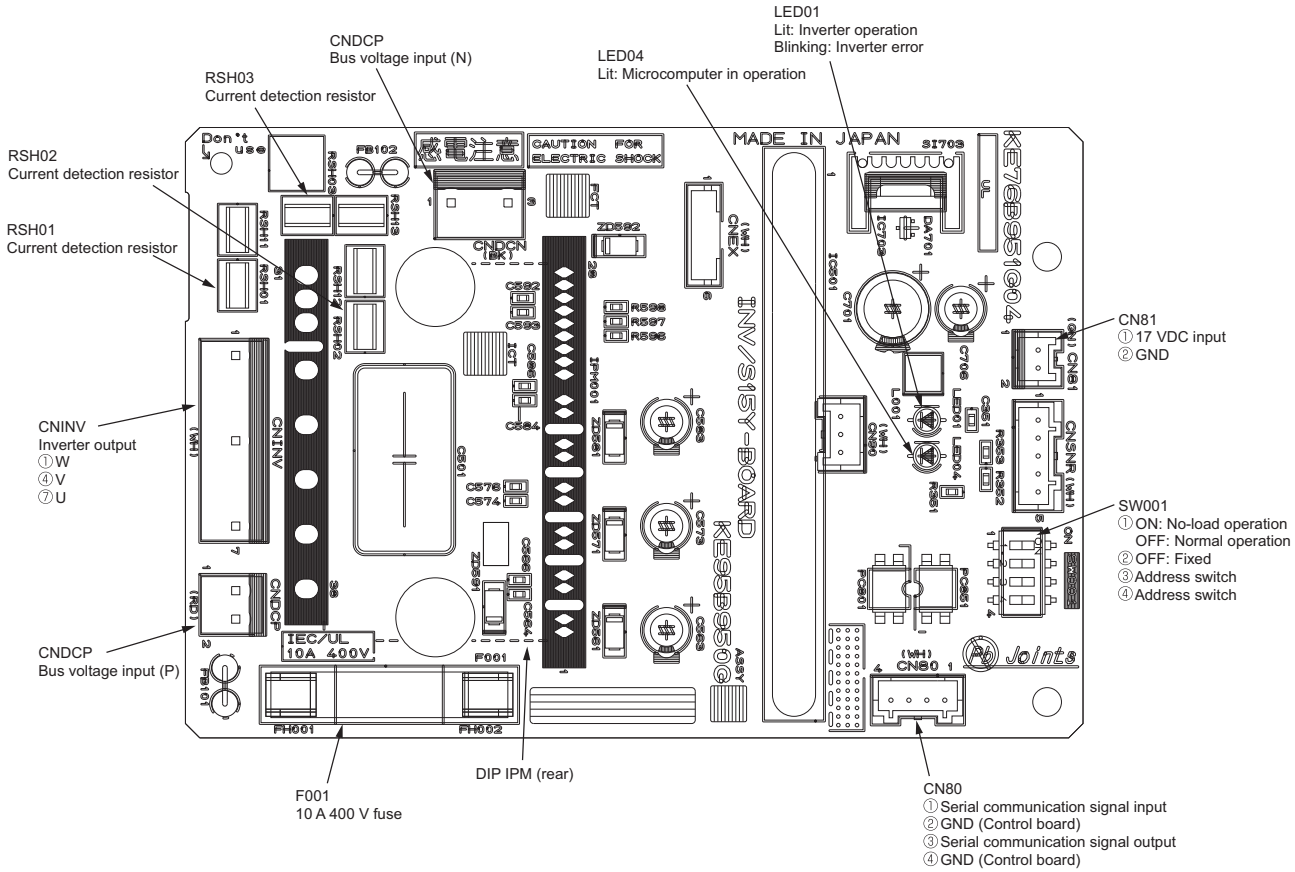


Note

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

4-2-4 Fan Board

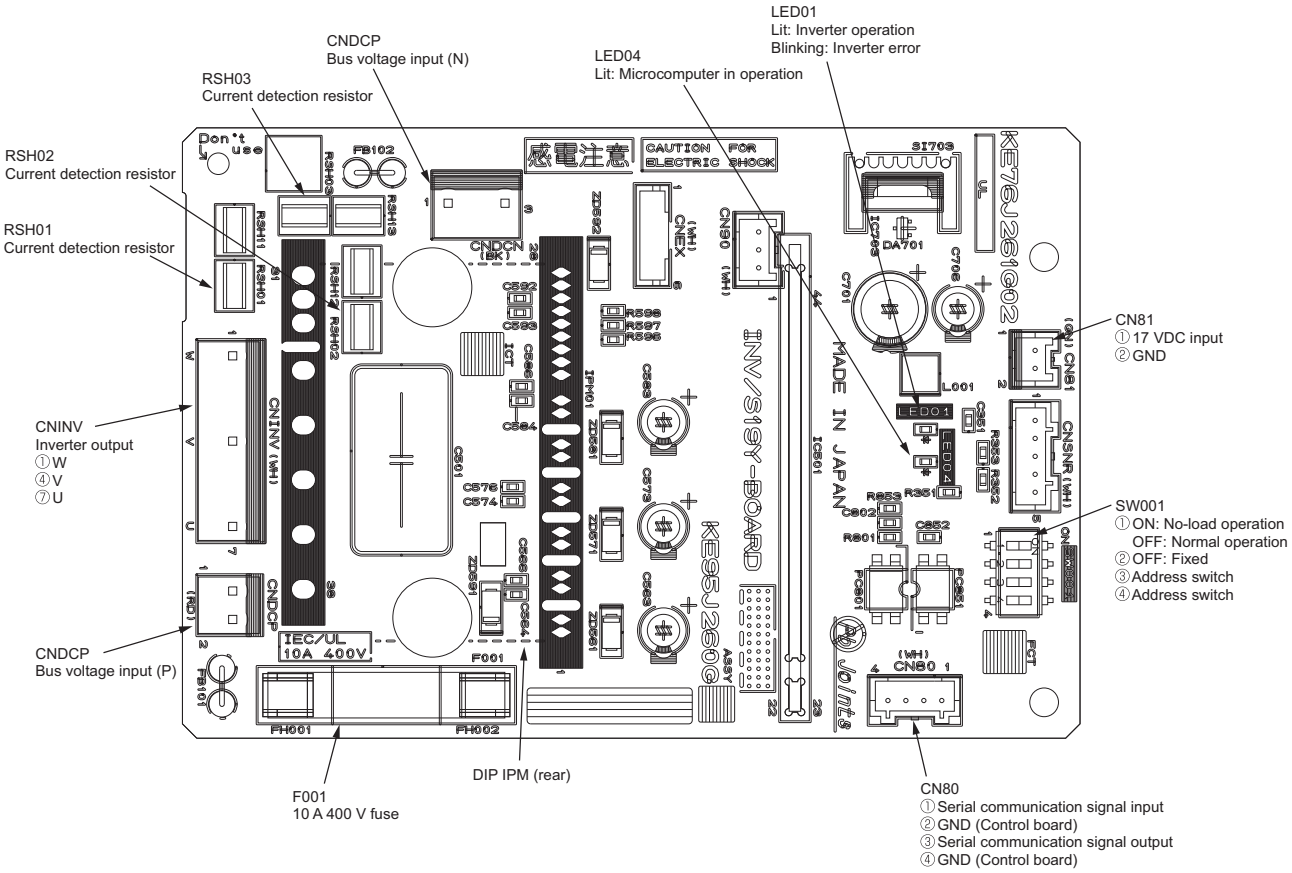
(1) PUHY-(E)P72, (E)P96, (E)P120, (E)P144, (E)P168, EP192YNU-A



Note

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

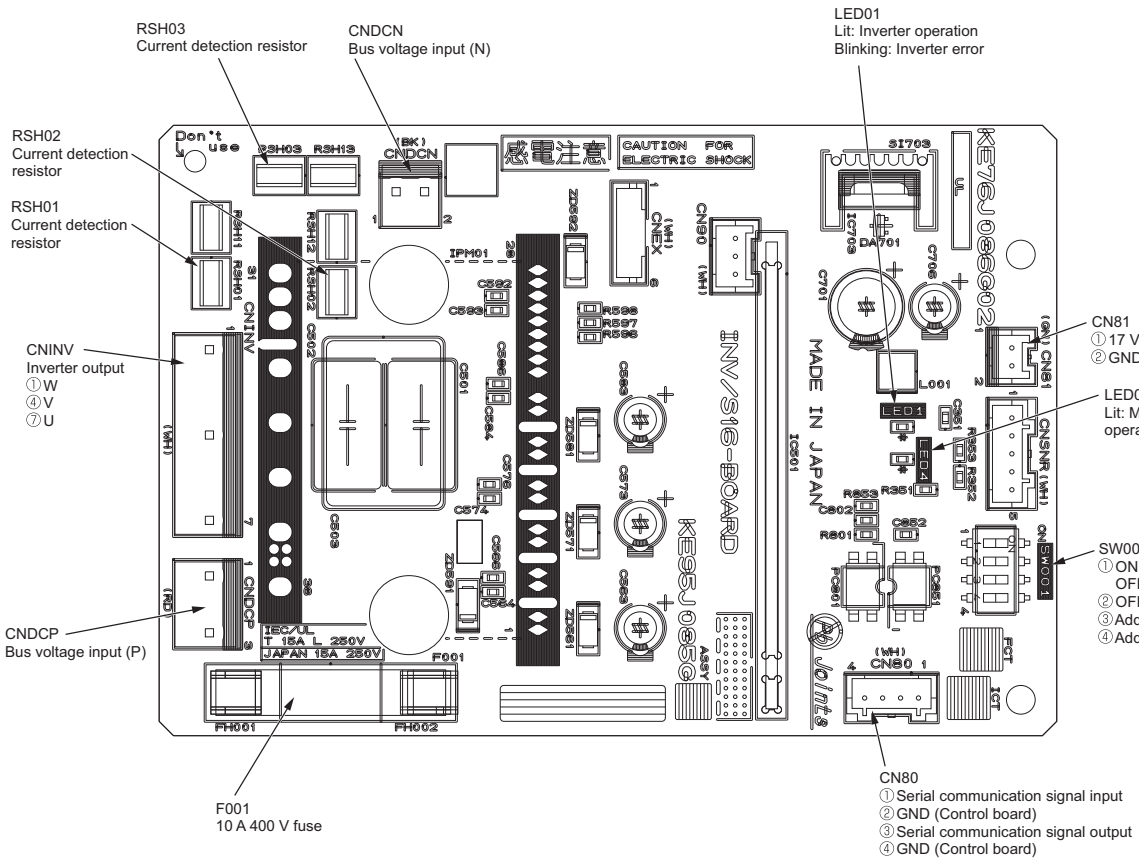
(2) PUHY-EP216, EP240YNU-A



Note

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

(3) TNU

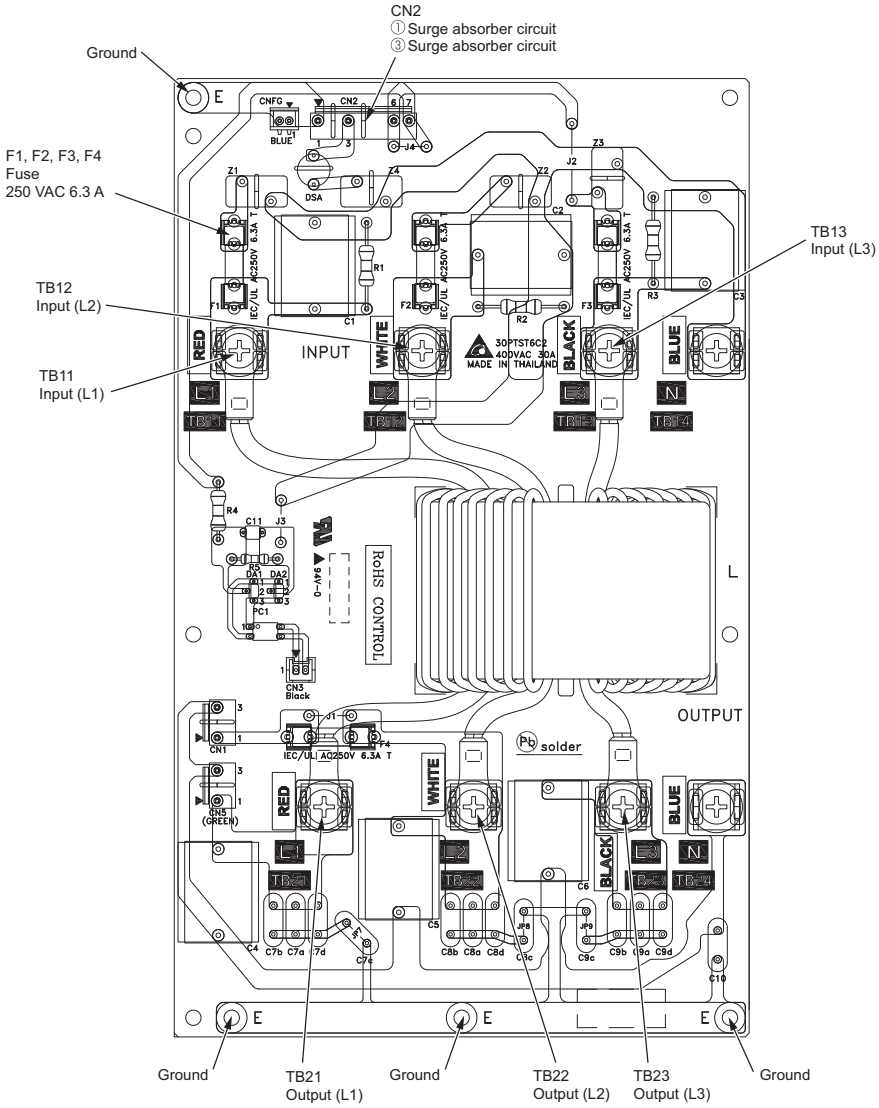


Note

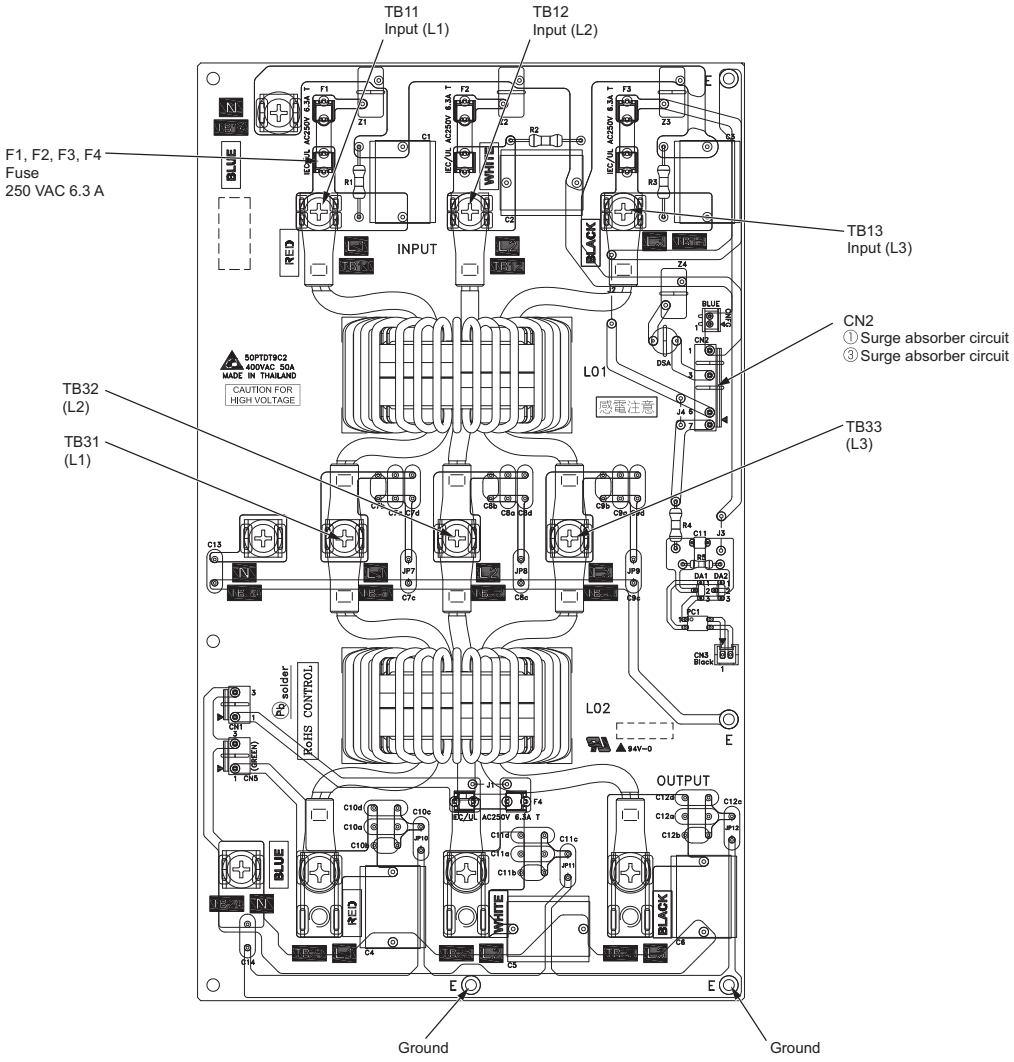
1) When opening or closing the front panel of the control box, do not let it come into contact with any of the internal components. Before inspecting the inside of the control box, turn off the power, keep the unit off for at least 10 minutes, and confirm that the capacitor voltage (inverter main circuit)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

4-2-5 Noise Filter

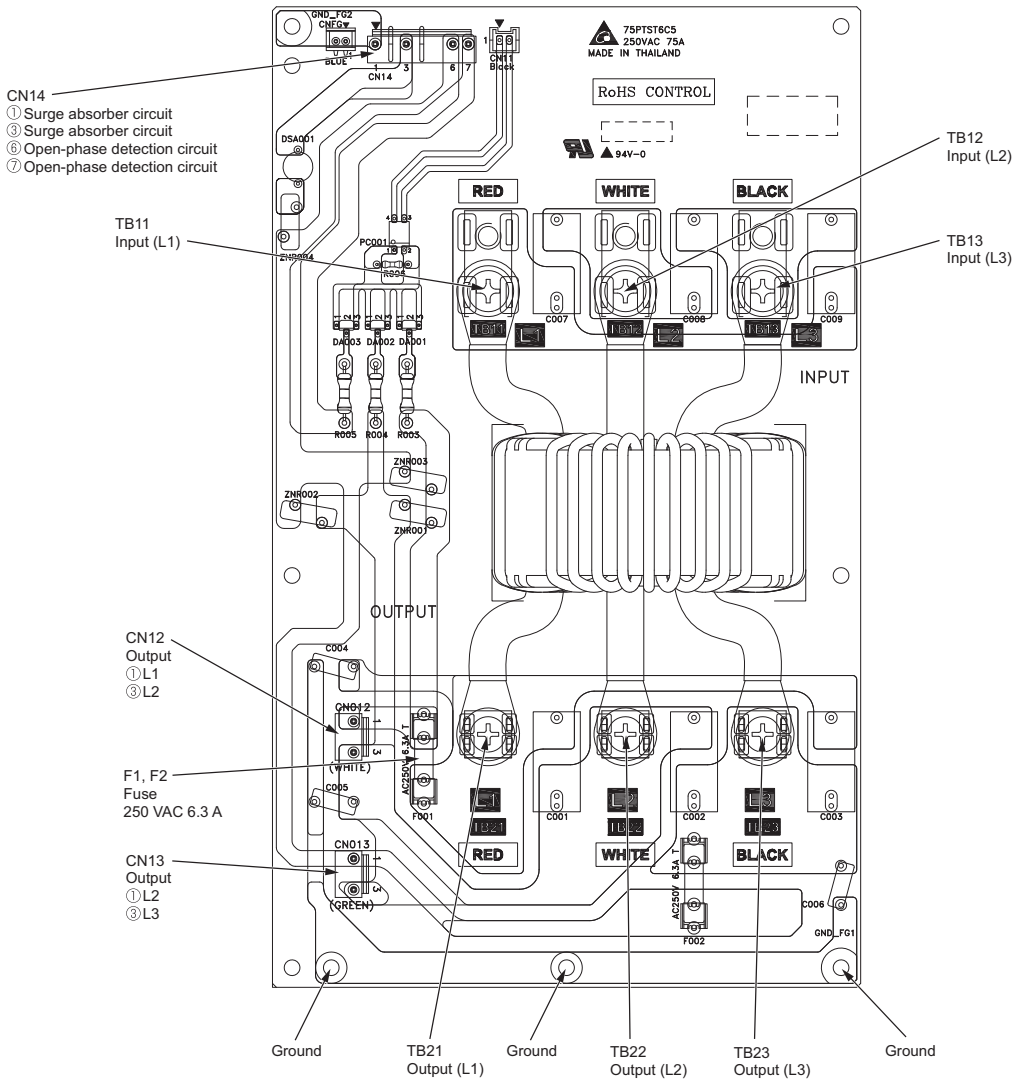
(1) PUHY-(E)P72, (E)P96, (E)P120, (E)P144, P168YNU-A



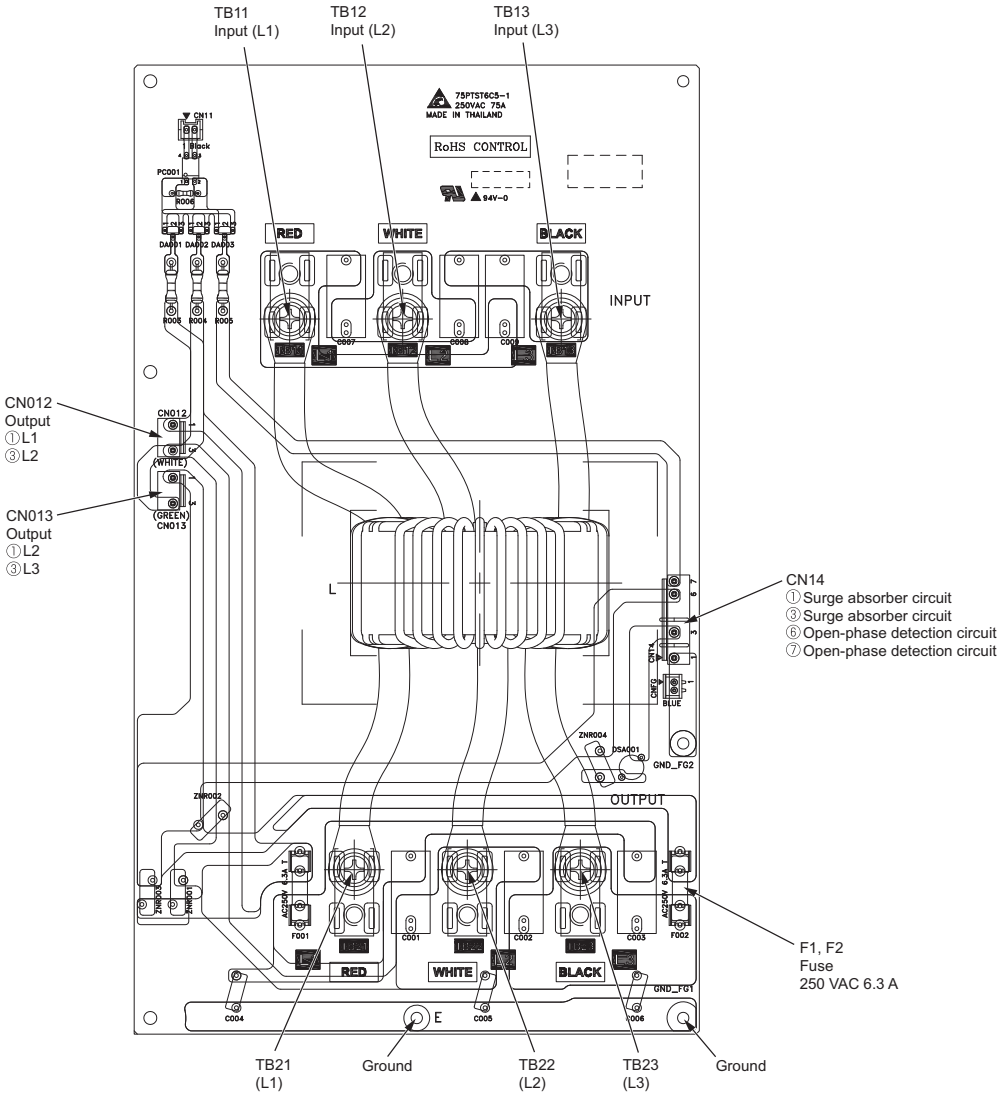
(2) PUHY-EP168, EP192, EP216, EP240YNU-A



(3) PUHY-(E)P72, (E)P96, (E)P120, (E)P144, P168TNU-A

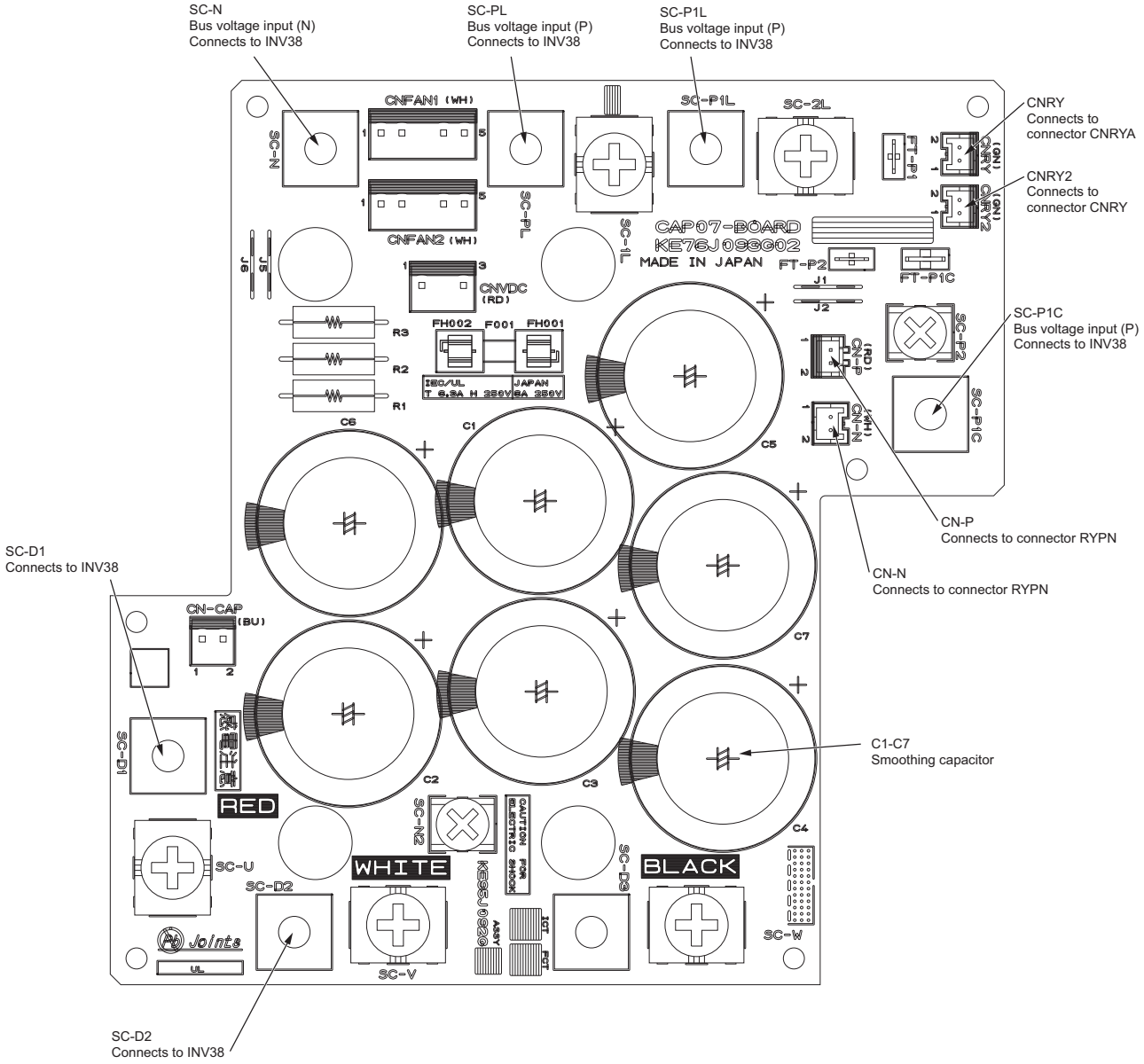


(4) PUHY-EP168, EP192, EP216, EP240TNU-A



4-2-6 Capacitor Board (CAP Board)

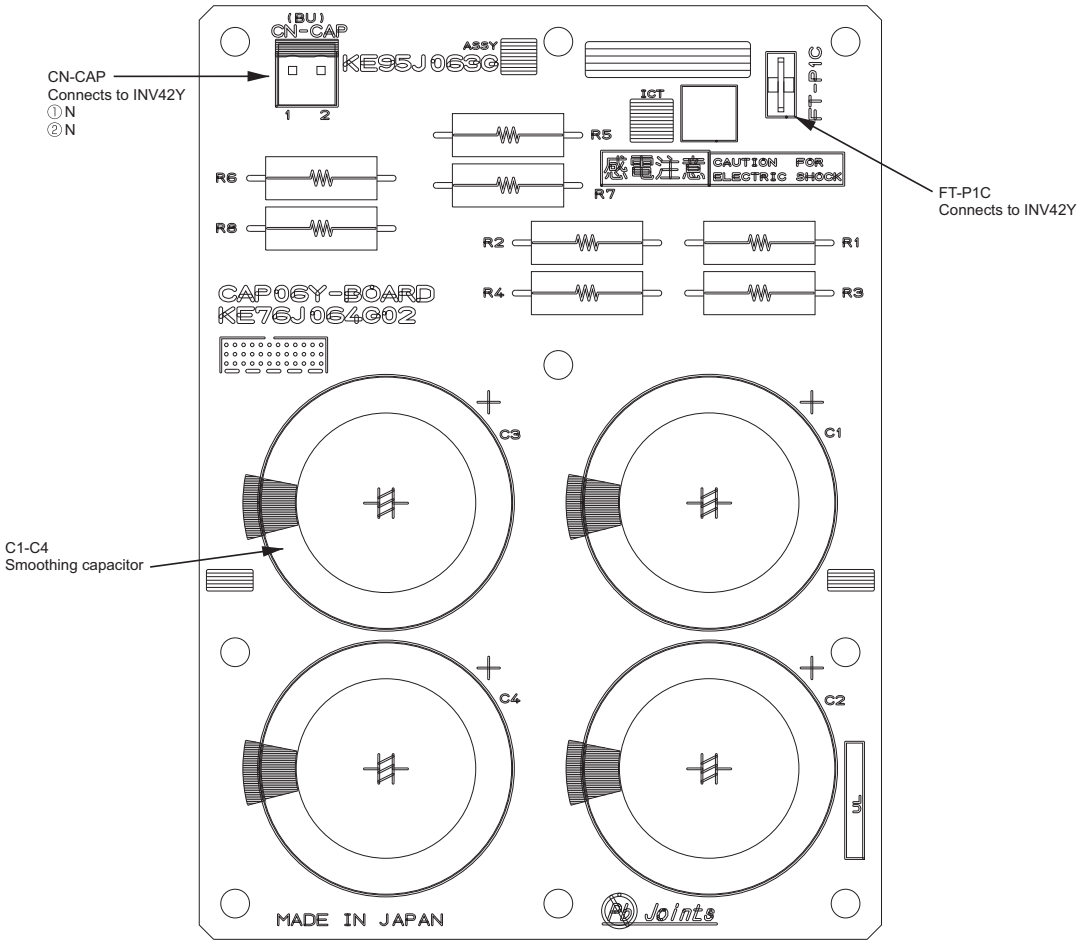
(1) PUHY-(E)P72, (E)P96, (E)P120, (E)P144, P168TNU-A



Note

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

(2) PUHY-(E)P96, (E)P120, (E)P144, P168YNU-A

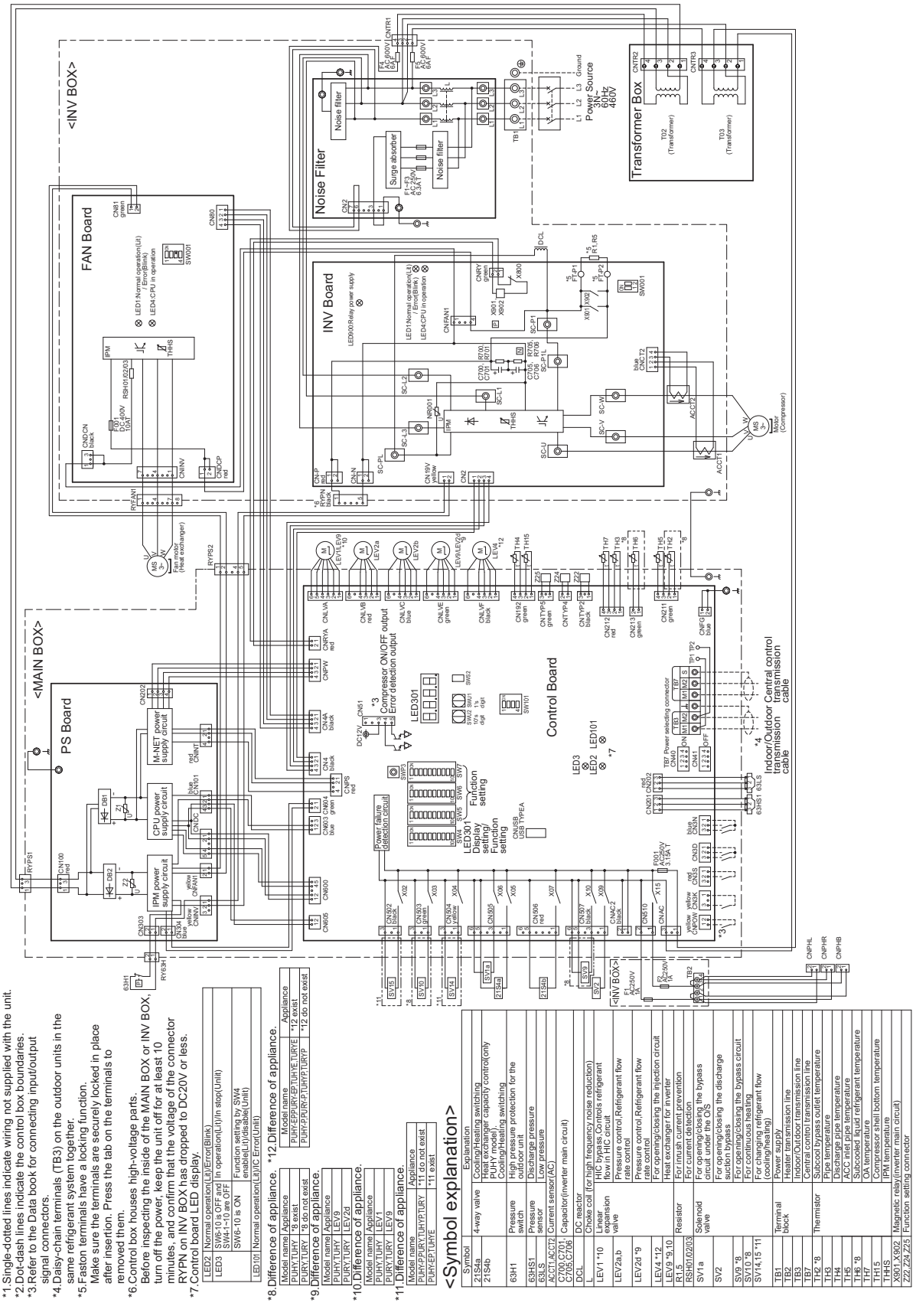


Note

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

4-3 Outdoor Unit Electrical Wiring Diagrams

(1) PUHY-(E)P72YNU-A



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

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

*8. Difference of appliance.

Model name	Appliance
PUHY-P72YNU-A	*12 exist
PUHY-P72YNU	*12 do not exist

*9. Difference of appliance.

Model name	Appliance
PUHY-P72YNU-A	*9 exist
PUHY-P72YNU	*9 do not exist

*10. Difference of appliance.

Model name	Appliance
PUHY-P72YNU-A	LEV4
PUHY-P72YNU	LEV2d

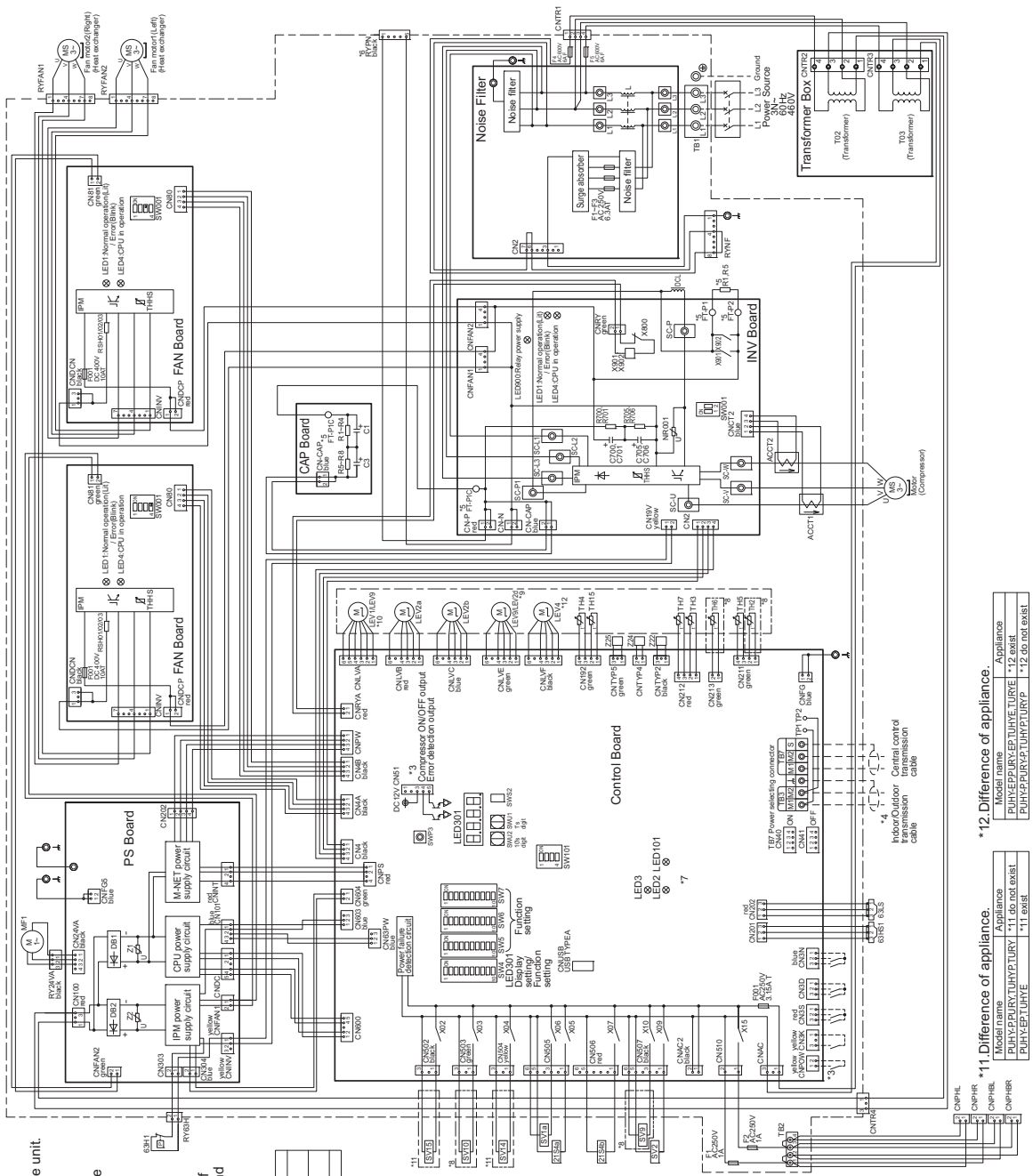
*11. Difference of appliance.

Model name	Appliance
PUHY-P72YNU-A, PUHY-P72YNU	*11 do not exist
PUHY-EP72YNU-A	*11 exist

*12. Difference of appliance.

Model name	Appliance
PUHY-EP72YNU-A, PUHY-EP72YNU	*12 exist
PUHY-P72YNU-A, PUHY-P72YNU	*12 do not exist

(2) PUHY-(E)P96, (E)P120, (E)P144YNU-A



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

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

*8. Difference of appliance.

Model name	Appliance
PUHY-(E)P96YNU-A	LEV1
PURY-(E)P96YNU-A	LEV9

*9. Difference of appliance.

Model name	Appliance
PUHY-(E)P96YNU-A	LEV9
PURY-(E)P96YNU-A	LEV2d

*10. Difference of appliance.

Model name	Appliance
PUHY-(E)P96YNU-A	LEV1
PURY-(E)P96YNU-A	LEV9

*11. Difference of appliance.

Model name	Appliance
PUHY-(E)P96YNU-A	*11 do not exist
PUHY-(E)P120YNU-A	*11 exist

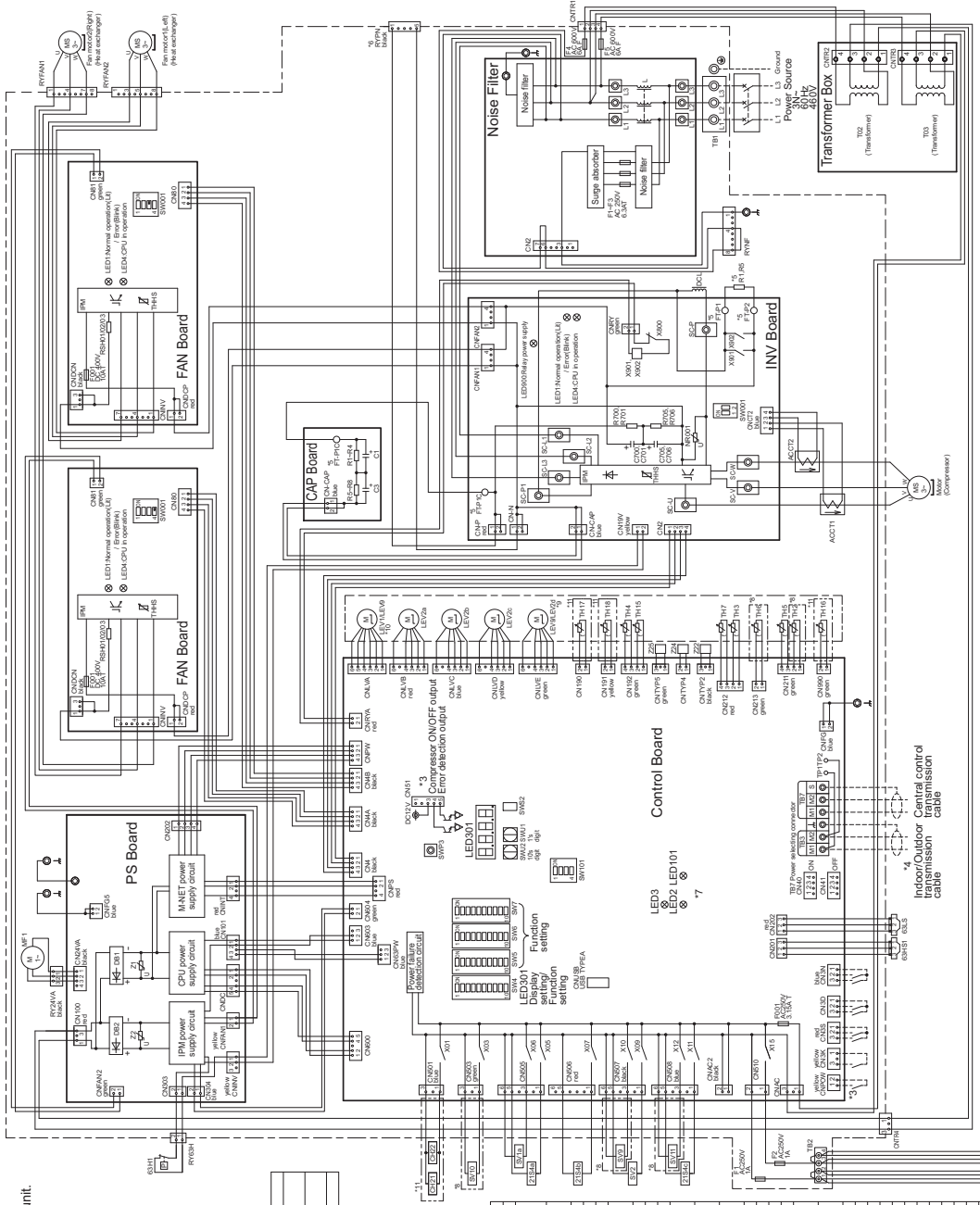
*12. Difference of appliance.

Model name	Appliance
PUHY-(E)P96YNU-A	*12 exist
PURY-(E)P96YNU-A	*12 do not exist

<Symbol explanation>

Symbol		Explanation
21S4a	4-way valve	Cooling/Heating switching
21S4b		Heat exchanger capacity control(only PUHY model)
		Cooling/Heating switching
63H1	Pressure switch	High pressure protection for the outdoor unit
63HS1	Pressure sensor	Discharge pressure
63LS	Pressure switch	Low pressure
ACCT, ACCT2	Current sensor(AC)	
C1, C3, C700~C706	Capacitor (inverter main circuit)	
DCL	DC reactor	
L	Choke coil (for high frequency noise reduction)	
LEV1 *10	Linear expansion valve	HIC bypass,Controls refrigerant flow in HIC circuit
LEV2a,b		Pressure control,Refrigerant flow rate control
LEV2d *9		Pressure control,Refrigerant flow rate control
LEV4 *12		For opening/closing the injection circuit
LEV9 *9,*10		Heat exchanger for inverter
MF1	Fan motor(for cooling in control box)	
R1,5	Resistor	For inush current prevention
RSH01/02/03		For current detection
SV1a	Solenoid valve	For opening/closing the bypass circuit during defrost
SV2		For opening/closing the discharge section of compressor
SV9 *8		For opening/closing the bypass circuit
SV10 *8		For continuous heating
SV14, 15 *11		For changing refrigerant flow (cooling/heating)
TB1	Terminal block	Power supply
TB2		Heater transmission line
TB3		Indoor/Outdoor transmission line
TB7		Central control transmission line
TH2 *8	Thermistor	Subcool bypass outlet temperature
TH3		Pipe temperature
TH4		Discharge pipe temperature
TH5		ACC inlet pipe temperature
TH6 *8		Subcooled liquid refrigerant temperature
TH7		OA temperature
TH15		Compressor shell bottom temperature
THHS		IPM temperature
X901,X902	Magnetic relay(inverter main circuit)	
222,24,25	Function setting connector	

(3) PUHY-P168YNU-A



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

LED2	Normal operation(Lit)/Error(Blink)
LED3	SW6-1 is OFF: Off in operation(Lit)/In stop(Unlit) SW6-1 is ON: Off in operation(Unlit)
	SW6-10 is ON: Function setting by SW4 enable(Lit)/disable(Unlit)
LED101	Normal operation(Lit)/Error(Unlit)

*8. Difference of appliance.

Model name	Appliance
PUHY,TUHY	*8 exist
PURY,TURY	*8 do not exist

*9. Difference of appliance.

Model name	Appliance
PUHY,TUHY	LEV2d
PURY,TURY	LEV2d

*10. Difference of appliance.

Model name	Appliance
PUHY,TUHY	LEV1
PURY,TURY	LEV9

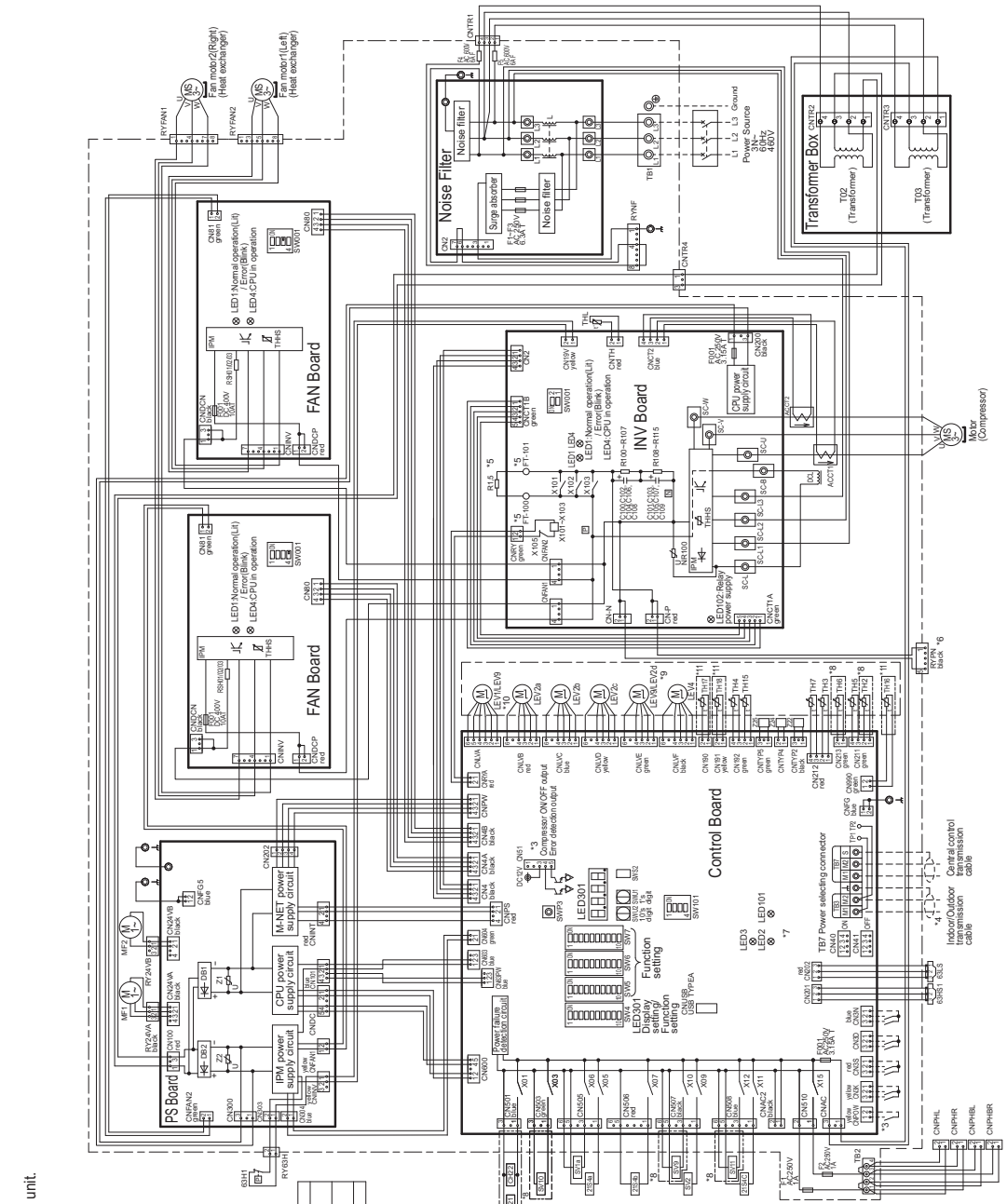
*11. Difference of appliance.

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

<Symbol explanation>

Symbol		Explanation
21S4a	4-way valve	Cooling/Heating switching
21S4b,c		Heat exchanger capacity control(only PUHY model) Cooling/Heating switching
63H1	Pressure switch	High pressure protection for the outdoor unit
63HS1	Pressure switch	Discharge pressure
63LS	Pressure switch	Low pressure
ACCT1,ACCT2	Current sensor(AC)	Capacitor (inverter main circuit)
C1, C4, C7,C8,C106		
CH21,22 *11	Belt heater	for heating the accumulator)
DCL	DC reactor	
L	Choke coil	(for high frequency noise reduction)
LEV1 *10	Linear expansion valve	HIC bypass,Controls refrigerant flow in HIC circuit
LEV2a,b,c		Pressure control,Refrigerant flow rate control
LEV2d *9		Pressure control,Refrigerant flow rate control
LEV9 *9,10		Heat exchanger for inverter
MF1	Fan motor	(for cooling in control box)
R1,5	Resistor	For inrush current prevention
RSH01/02/03		For current detection
SV1a	Solenoid valve	For opening/closing the bypass circuit under the O/S
SV2		For opening/closing the discharge suction bypass
SV9 *8		For opening/closing the bypass circuit
SV10,11 *8		For continuous heating
TB1	Terminal block	Power supply
TB2		Indoor/Outdoor transmission line
TB3		Indoor/Outdoor transmission line
TB7		Central control transmission line
TH2 *8	Thermistor	Subcool bypass outlet temperature
TH3		Pipe temperature
TH4		Discharge pipe temperature
TH5		ACC inlet pipe temperature
TH6 *8		Subcooled liquid refrigerant temperature
TH7		OA temperature
TH15		Compressor shell bottom temperature
TH16 *11		Accumulator temperature (Bottom)
TH17 *11		Accumulator temperature (Middle)
TH18 *11		Accumulator temperature (Hi)
THHS		IPM temperature
X901,X902	Magnetic relay	(Inverter main circuit)
Z22,24,25	Function setting	connector

(4) PUHY-EP168, EP192YNU-A



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

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

*8.Difference of appliance.

Model name	Appliance
PUHY-(P)168YNU	LEV9
PURY-(P)168YNU	LEV2d

*9.Difference of appliance.

Model name	Appliance
PUHY-(P)168YNU	LEV9
PURY-(P)168YNU	LEV2d

*10.Difference of appliance.

Model name	Appliance
PUHY-(P)168YNU	LEV9
PURY-(P)168YNU	LEV2d

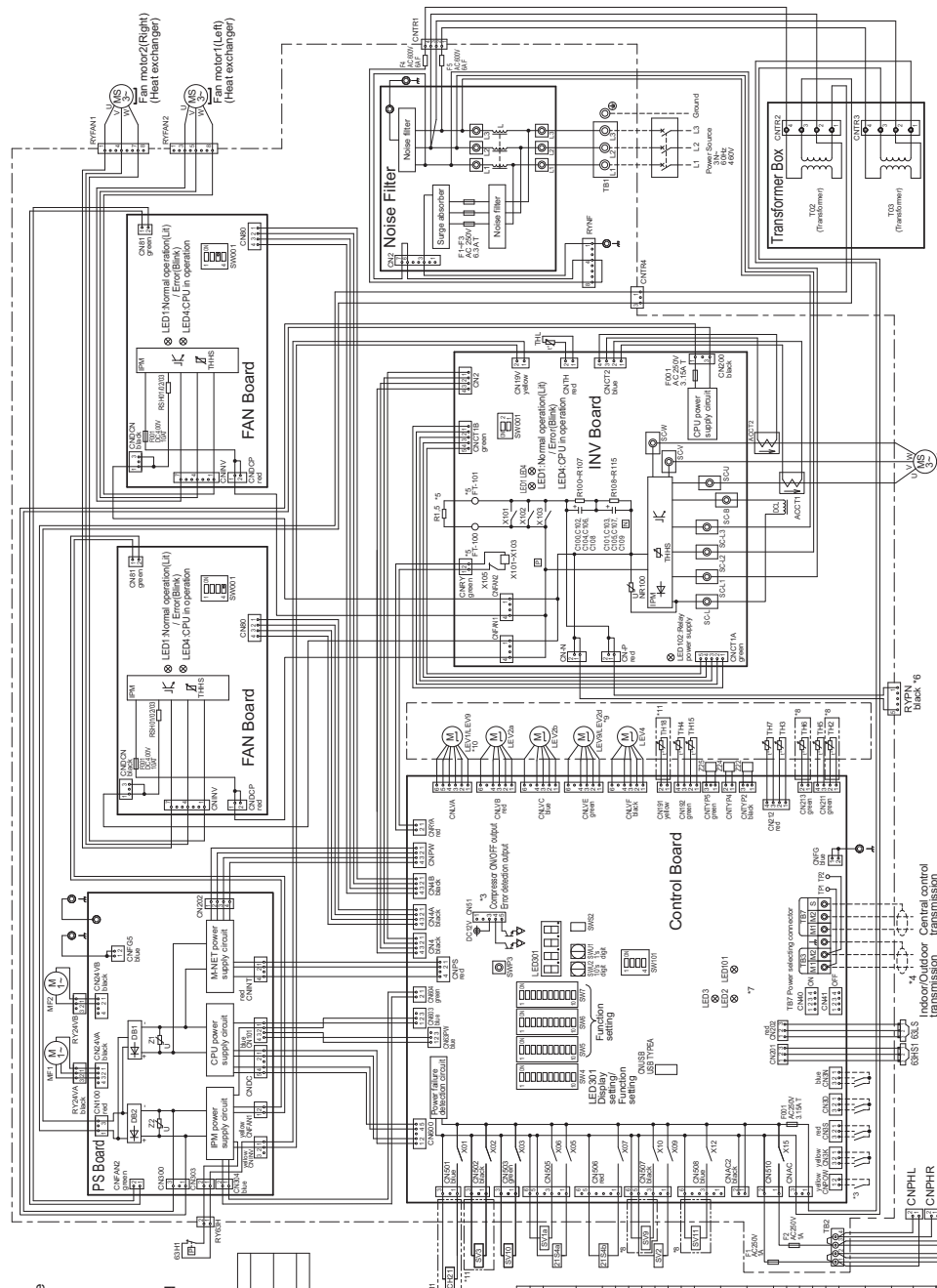
*11.Difference of appliance.

Model name	Appliance
PUHY-(P)168YNU	*9 do not exist
PURY-(P)168YNU	*11 exist

<Symbol explanation>

Symbol		Explanation
21S4a	4-way valve	Cooling/Heating switching
21S4b,c		Heat exchanger capacity control(only PUHY-(P)168YNU) Cooling/heating switching
63H1	Pressure switch	High pressure protection for the outdoor unit
63HS1	Pressure sensor	Discharge pressure
63LS		Low pressure
ACCT1,ACCT2	Current sensor(AC)	
C100~C109	Capacitor(inverter main circuit)	
CH21,22*11	Belt heater(for heating the accumulator)	
DCL	DC reactor	
L	Choke coil (for high frequency noise reduction)	
LEV1*10	Linear expansion valve	HIC bypass,Controls refrigerant flow in HIC circuit
LEV2a,b,c		Pressure control,Refrigerant flow rate control
LEV2d*9		Pressure control,Refrigerant flow rate control
LEV4		For opening/closing the injection circuit
LEV9,*9,10		Heat exchanger for inverter
MF1,2	Fan motor(for cooling in control box)	
Rt.5	Resistor	For inrush current prevention
RSH0102/03		For current detection
SV1a	Solenoid valve	For opening/closing the bypass circuit under the O/S
SV2		For opening/closing the discharge suction bypass
SV9,*8		For opening/closing the bypass circuit
SV10,11,*8		For continuous heating
TB1	Terminal block	Power supply
TB2		Heater transmission line
TB3		Indoor/Outdoor transmission line
TB7		Central control transmission line
TH2*8	Thermistor	Subcool bypass outlet temperature
TH3		Pipe temperature
TH4		Discharge pipe temperature
TH5		ACC inlet pipe temperature
TH7*8		Subcooled liquid refrigerant temperature
TH9*8		OA temperature
TH15		Compressor shell bottom temperature
TH16*11		Accumulator temperature (Bottom)
TH17*11		Accumulator temperature (Middle)
TH18*11		Accumulator temperature (Hi)
THHS		IPM temperature
X101~X103		Magnetic relay(Inverter main circuit)
Z2,Z4,Z5		Function setting connector

(5) PUHY-EP216, EP240YNU-A



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

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

*8. Difference of appliance.

Model name	Appliance
PUHY, TUHY	*9 do not exist
PUHY, TUHY	*9 exist

*9. Difference of appliance.

Model name	Appliance
PUHY, TUHY	LEV9
PUHY, TUHY	LEV24

*10. Difference of appliance.

Model name	Appliance
PUHY, TUHY	LEV1
PUHY, TUHY	LEV9

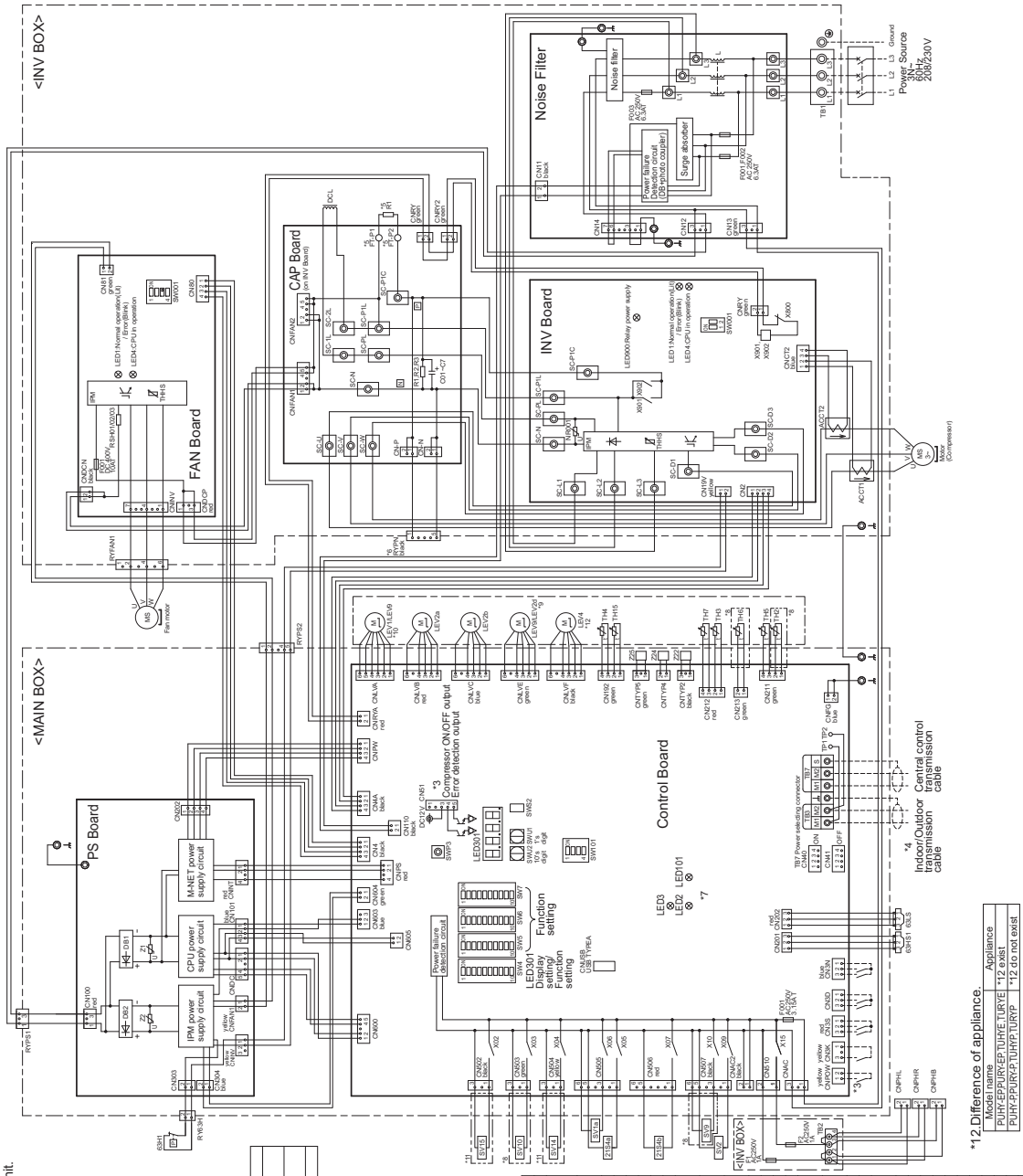
*11. Difference of appliance.

Model name	Appliance
PUHY, TUHY	*11 do not exist
PUHY, TUHY	*11 exist

<Symbol explanation>

Symbol		Explanation
21S4	4-way valve	Cooling/Heating switching
21S6		Heat exchanger capacity control(only PUHY model)
		Cooling/heating switching
63H1	Pressure switch	High pressure protection for the outdoor unit
63HS1	Pressure sensor	Discharge pressure
63LS		Low pressure
ACCT1, ACCT2	Current sensor(AC)	
C100~C109	Capacitor (inverter main circuit)	
CH2*, *11	Belt heater(for heating the accumulator)	
DCL	DC reactor	
L	Choke coil (for high frequency noise reduction)	
LEV1 *10	Linear expansion valve	HIC bypass,Controls refrigerant flow in HIC circuit
LEV2a, b		Pressure control,Refrigerant flow rate control
LEV2d *9		Pressure control,Refrigerant flow rate control
LEV4		Heat exchange closing the injection circuit
LEV8 *9, *10		Heat exchange for inverter
MF1, 2	Fan motor	for cooling in control box
R1, 5	Resistor	For inrush current prevention
RSH01/02/03		For current detection
SV1a	Solenoid valve	For opening/closing the bypass circuit under the O/S
SV2		For opening/closing the discharge suction bypass
SV3 *11, SV9 *8		For opening/closing the bypass circuit
SV10, SV11 *8		For continuous heating
TB1	Terminal block	Power supply
TB2		Heater transmission line
TB3		Indoor/Outdoor transmission line
TB7		Central control transmission line
TH2 *8	Thermistor	Subcool bypass outlet temperature
TH3		Pipe temperature
TH4		Discharge pipe temperature
TH5		ACC inlet pipe temperature
TH6 *8		Subcooled liquid refrigerant temperature
TH7		OA temperature
TH15		Compressor shell bottom temperature
TH18 *11		Accumulator temperature (Hi)
THHS		IPM temperature
X101~X103	Magnetic relay(inverter main circuit)	
Z22, 24, 25	Function setting connector	

(6) PUHY-(E)P72TNU-A



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

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

*8. Difference of appliance.

Model name	Appliance
PUHY-TUHY	*8 exist
PURY-TURY	*8 do not exist

*9. Difference of appliance.

Model name	Appliance
PUHY-TUHY	LEV9
PURY-TURY	LEV2d

*10. Difference of appliance.

Model name	Appliance
PUHY-TUHY	LEV1
PURY-TURY	LEV9

*11. Difference of appliance.

Model name	Appliance
PUHY-P(P)URY-TUHY-P-TURY	*11 do not exist
PUHY-EP-TUHYE	*11 exist

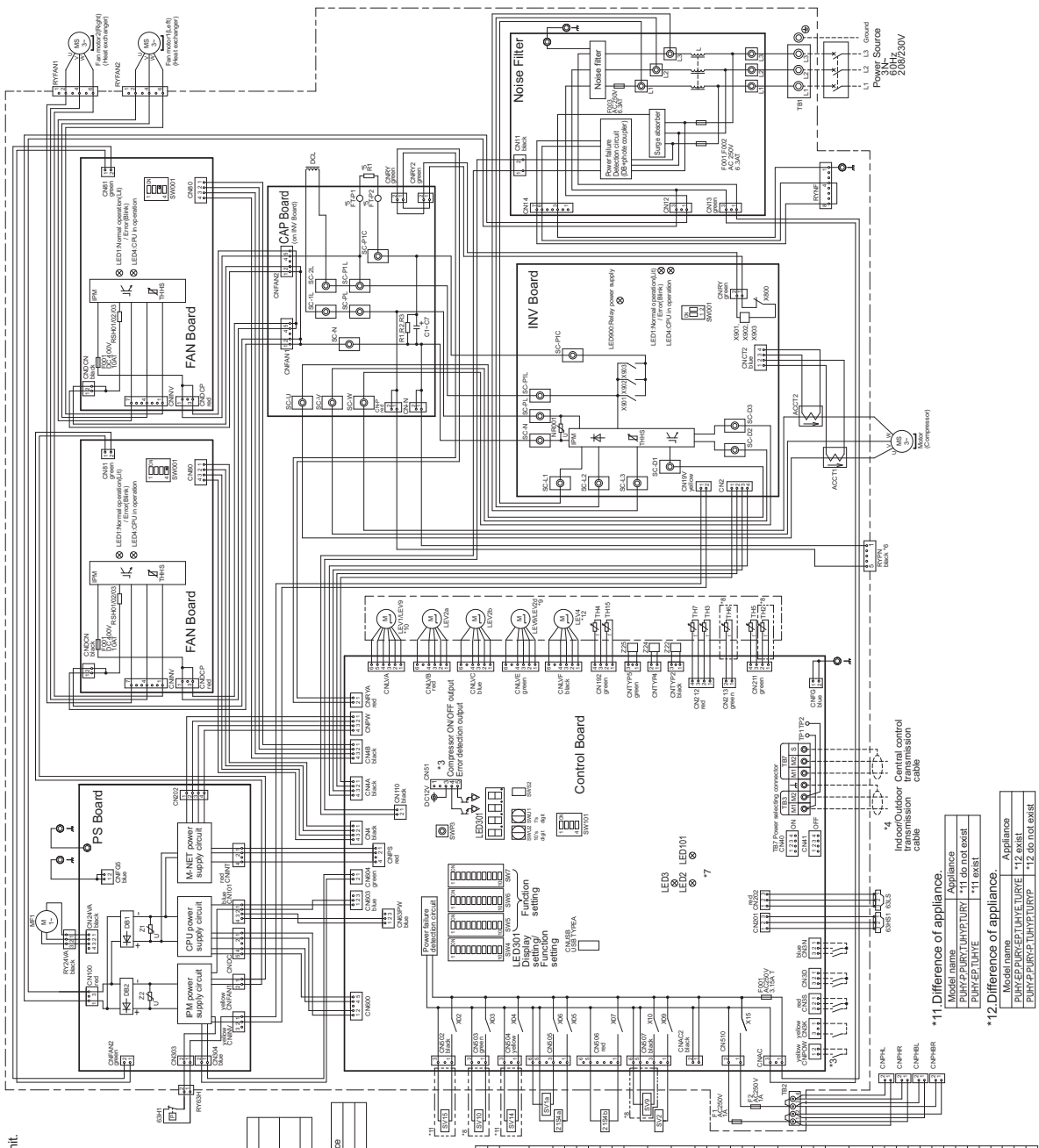
*12. Difference of appliance.

Model name	Appliance
PUHY-EP(P)URY-EP-TUHYE-TURYE	*12 exist
PUHY-P(P)URY-P-TUHYP-TURYP	*12 do not exist

<Symbol explanation>

Symbol		Explanation
21S4a	4-way valve	Cooling/Heating switching
21S4b		Heat exchanger capacity control(only PUHY model).
		Cooling/Heating switching
63H1	Pressure switch	High pressure protection for the outdoor unit
63HS1	Pressure sensor	Discharge pressure
63LS		Low pressure
AGCT1,AGCT2	Current sensor(AC)	
C1~C7	Capacitor(Inverter main circuit)	
DCL	DC reactor	
L	Choke coil (for high frequency noise reduction)	
LEV1 *10	Linear expansion valve	HIC bypass,Controls refrigerant flow in HIC circuit
LEV2a,b		Pressure control,Refrigerant flow rate control
LEV2d *9		Pressure control,Refrigerant flow rate control
LEV4 *12		For opening/closing the injection circuit
LEV9 *9,10		Heat exchanger for inverter
R1	Resistor	For inrush current prevention
RSH01/0203		For current detection
SV1a	Solenoid valve	For opening/closing the bypass circuit under the O/S
SV2		For opening/closing the discharge suction bypass
SV9 *8		For opening/closing the bypass circuit
SV10 *8		For continuous heating
SV14,15 *11		For changing refrigerant flow (cooling/heating)
TB1	Terminal block	Power supply
TB2		Heater,transmission line
TB3		Indoor/Outdoor transmission line
TB7		Central control transmission line
TH2 *8	Thermistor	Suction pipe temperature
TH3		Pipe temperature
TH4		Discharge pipe temperature
TH5		ACC inlet pipe temperature
TH6 *8		Subcooled liquid refrigerant temperature
TH7		OA temperature
TH15		Compressor shell bottom temperature
THHS		IPM temperature
X901,X902	Magnetic relay(inverter main circuit)	
Z22,24,25	Function setting connector	

(7) PUHY-(E)P96, (E)P120, (E)P144TNU-A



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

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

*8.Difference of appliance.

Model name	Appliance
PUHY,TUHY	LEV1
PURY,TURY	LEV9

*9.Difference of appliance.

Model name	Appliance
PUHY,TUHY	LEV9
PURY,TURY	LEV2d

*10.Difference of appliance.

Model name	Appliance
PUHY,TUHY	*8 exist
PURY,TURY	*8 do not exist

*11.Difference of appliance.

Model name	Appliance
PUHY,P PURY,TUHY,PTURY	*11 do not exist
PUHY,EP,TUHYE	*11 exist

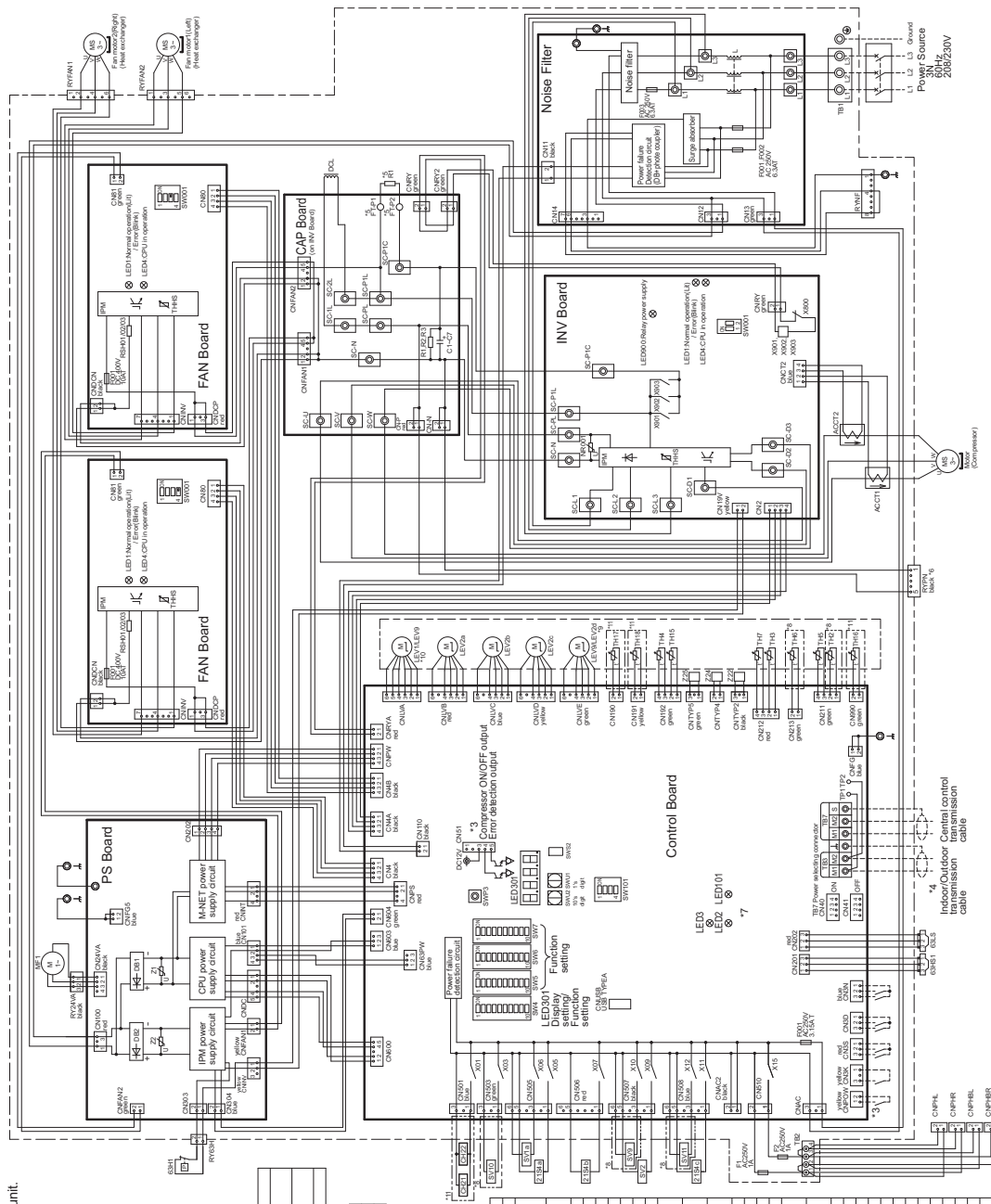
*12.Difference of appliance.

Model name	Appliance
PUHY-EP,PURY-EP,TUHYE,TURYE	*12 exist
PUHY-P,PURY-P,TUHYP,TURYP	*12 do not exist

<Symbol explanation>

Symbol		Explanation
21S4a	4-way valve	Cooling/Heating switching
21S4b		Heat exchanger capacity control(only PUHY model) / Cooling/Heating switching
63H1	Pressure switch	High pressure protection for the outdoor unit
63HS1	Pressure sensor	Discharge pressure
63LS		Low pressure
ACCT1,ACCT2	Current sensor(AC)	
C1~C7	Capacitor (inverter main circuit)	
DCL	DC reactor	
L	Choke coil (for high frequency noise reduction)	
LEV1 *10	Linear expansion valve	HIC bypass,Controls refrigerant flow in HIC circuit
LEV2a,b		Pressure control,Refrigerant flow rate control
LEV2d *9		Pressure control,Refrigerant flow rate control
LEV4 *12		For opening/closing the injection circuit
LEV9 *9,10		Heat exchanger for inverter
MF1	Fan motor	for cooling in control box)
R1	Resistor	For inrush current prevention
RSH0102/03		For current detection
SV1a	Solenoid valve	For opening/closing the bypass circuit under the O/S
SV2		For opening/closing the discharge suction pipe
SV9 *8		For opening/closing the bypass circuit
SV10 *8		For continuous heating
SV14 *11		For changing refrigerant flow (cooling/heating)
SV15 *11		For changing refrigerant flow (cooling/heating)
TB1	Terminal block	Power supply
TB2		Heater transmission line
TB3		Indoor/Outdoor transmission line
TB7		Central control transmission line
TH2 *8	Thermistor	Subcool bypass outlet temperature
TH3		Pipe temperature
TH4		Discharge pipe temperature
TH5		ACC inlet pipe temperature
TH6 *8		Subcooled liquid refrigerant temperature
TH7		OA temperature
TH15		Compressor shell bottom temperature
THHS		IPM temperature
X901~X903	Magnetic relay(inverter main circuit)	
Z2,Z4,Z5	Function setting connector	

(8) PUHY-P168TNU-A



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

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

*8.Difference of appliance.

Model name	Appliance
PUHY,TUHY	*8 exist.
PURY,TURY	*8 do not exist.

*9.Difference of appliance.

Model name	Appliance
PUHY,TUHY	LEV9
PURY,TURY	LEV2d

*10.Difference of appliance.

Model name	Appliance
PUHY,TUHY	LEV1
PURY,TURY	LEV9

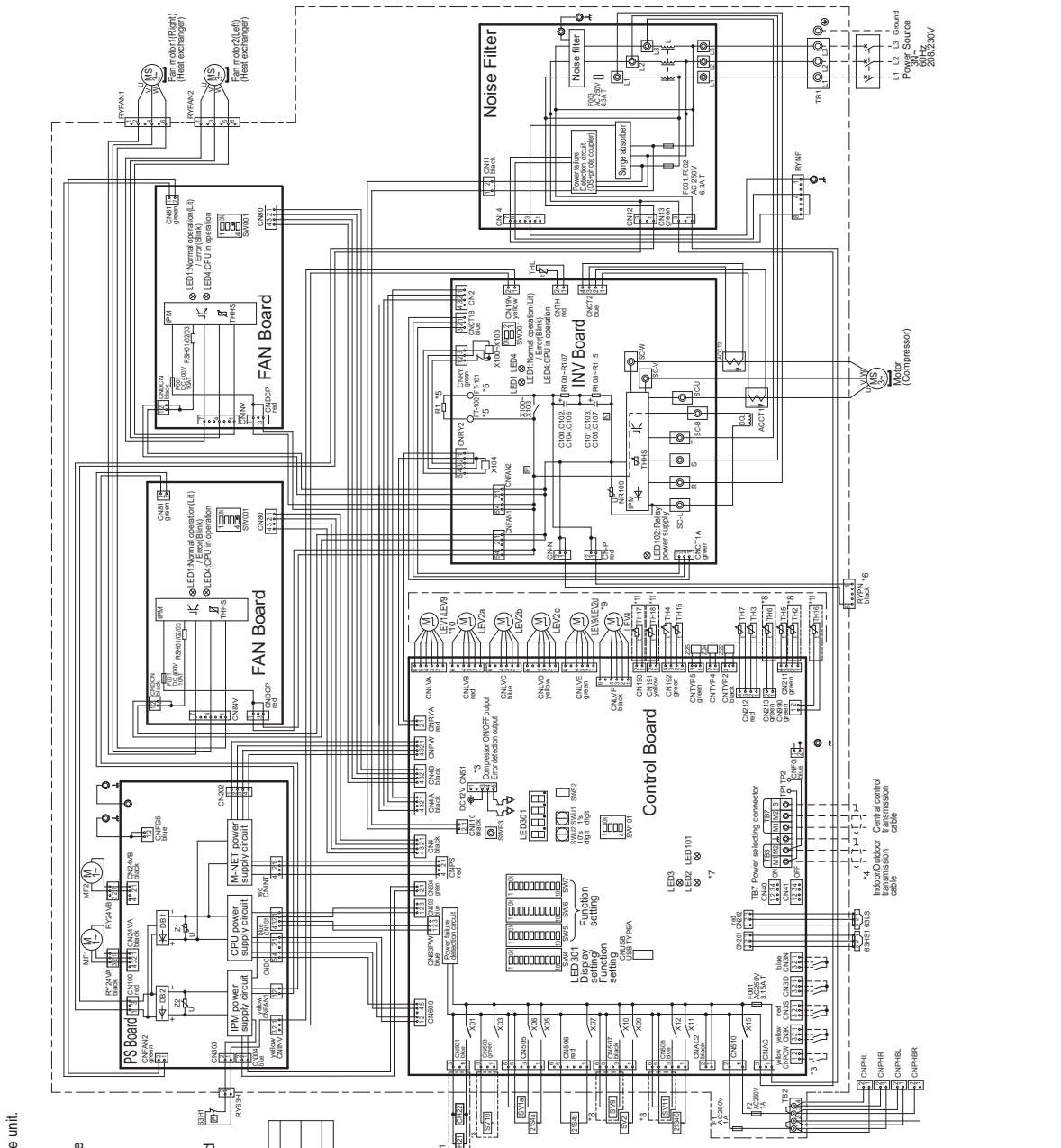
*11.Difference of appliance.

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

<Symbol explanation>

Symbol		Explanation
21S4a	4-way valve	Cooling/Heating switching
21S4b,c		Heat exchanger capacity control(only U(H)Y model)
		Cooling/Heating switching
63H1	Pressure switch	High pressure protection for the outdoor unit
63HS1	Pressure sensor	Discharge pressure
63LS		Low pressure
ACCT1,ACCT2	Current sensor(AC)	
C1~C7	Capacitor (inverter main circuit)	
CH21,22 *11	Belt heater(for heating the accumulator)	
DCL	DC reactor	
L	Choke coil (for high frequency noise reduction)	
LEV1 *10	Linear expansion valve	HIC bypass,Controls refrigerant flow in HIC circuit
LEV2a,b,c		Pressure control,Refrigerant flow rate control
LEV2d *9		Pressure control,Refrigerant flow rate control
LEV9 *9,10		Heat exchanger for inverter
MF1	Fan motor(for cooling in control box)	
R1	Resistor	For inrush current prevention
RS91/102/103		For current detection
SV1a	Solenoid valve	For opening/closing the bypass circuit under the OS
SV2		For opening/closing the discharge suction bypass
SV9 *8		For opening/closing the bypass circuit
SV10 *8		For continuous heating
SV11 *8		For continuous heating
TB1	Terminal block	Power supply
TB2		Heater transmission line
TB3		Indoor/Outdoor transmission line
TB7		Central control transmission line
TH2 *8	Thermistor	Subcool bypass outlet temperature
TH3		Pipe temperature
TH4		Discharge pipe temperature
TH5		ACC inlet pipe temperature
TH6 *8		Subcooled liquid refrigerant temperature
TH7		OA temperature
TH15		Compressor shell bottom temperature
TH16 *11		Accumulator temperature (Bottom)
TH17 *11		Accumulator temperature (Middle)
TH18 *11		Accumulator temperature (Hi)
THHS		IPM temperature
X901~X903	Magnetic relay(Inverter main circuit)	
Z22,24,Z25	Function setting connector	

(9) PUHY-EP168, EP192TNU-A



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

LED2	Normal operation(Lit)/Error(Blink)	
LED3	SW6-10 is OFF and SW6-14 is OFF	In operation(Lit)/In stop(Unit)
	SW6-10 is ON	Function setting by SW4 enable(Lit)/disable(Unit)
LED101	Normal operation(Lit)/IC Error(Unit)	

*8.Difference of appliance.

Model name	Appliance
PUHY,TUHY	*9 exist
PURY,TURY	*9 do not exist

*9.Difference of appliance.

Model name	Appliance
PUHY,TUHY	LEV9
PURY,TURY	LEV2d

*10.Difference of appliance.

Model name	Appliance
PUHY,TUHY	LEV1
PURY,TURY	LEV9

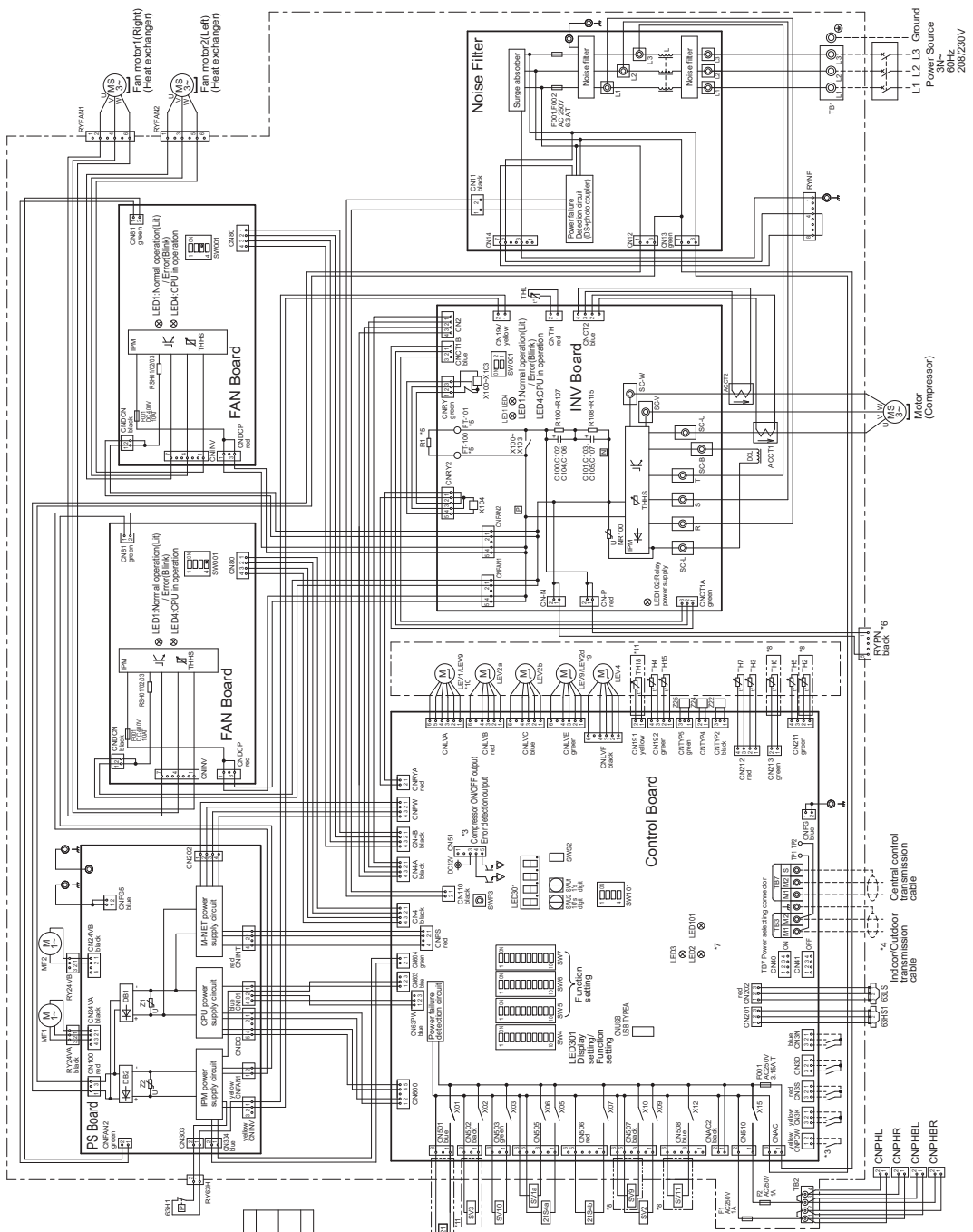
*11.Difference of appliance.

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

<Symbol explanation>

Symbol		Explanation
21/34a	4-way valve	Cooling/Heating switching
21/34b,c		Heat exchanger capacity control(only PUHY model)
		Cooling/heating switching
63H1	Pressure switch	High pressure protection for the outdoor unit
63HS1	Pressure sensor	Discharge pressure
63LS		Low pressure
ACCT1,ACCT2	Current sensor(AC)	
C100~C107	Capacitor (inverter main circuit)	
CH21/22 *11	Belt heater(for heating the accumulator)	
DCL	DC reactor	
L	Choke coil (for high frequency noise reduction)	
LEV1 *10	Electronic expansion valve	HIC bypass Controls refrigerant flow in HIC circuit
LEV2a,b,c		Pressure control,Refrigerant flow rate control
LEV2d *9		Pressure control,Refrigerant flow rate control
LEV4		For opening/closing the injection circuit
LEV9 *9,10		Heat exchanger for inverter
MF1,2	Fan motor	For cooling (in control box)
R1	Resistor	For inrush current prevention
RSH0102/03		For current detection
SV1a	Solenoid valve	For opening/closing the bypass circuit under the O/S
SV2		For opening/closing the discharge suction bypass
SV6 *8		For opening/closing the bypass circuit
SV11 *8		For continuous heating
SV12 *8		For continuous heating
TB1	Terminal block	Power supply
TB2		Heater transmission line
TB3		Indoor/Outdoor transmission line
TB7		Central control transmission line
TH2 *8	Thermistor	Subcool bypass outlet temperature
TH3		Pipe temperature
TH4		Discharge pipe temperature
TH5		ACC inlet pipe temperature
TH6 *8		Subcooled liquid refrigerant temperature
TH7		OA temperature
TH15		Compressor shell bottom temperature
TH16 *11		Accumulator temperature (Bottom)
TH17 *11		Accumulator temperature (Middle)
TH18 *11		Accumulator temperature (Hi)
THHS		IPM temperature
X63	Magnetic relay	For opening/closing (main circuit)
Z2,Z4,Z5	Function setting connector	

(10) PUHY-EP216, EP240TNU-A



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

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

*8. Difference of appliance.

Model name	Appliance
PUHY, TUHY	*8 exist
PURY, TURY	*8 do not exist

*9. Difference of appliance.

Model name	Appliance
PUHY, TUHY	LEV9
PURY, TURY	LEV2d

*10. Difference of appliance.

Model name	Appliance
PUHY, TUHY	LEV1
PURY, TURY	LEV9

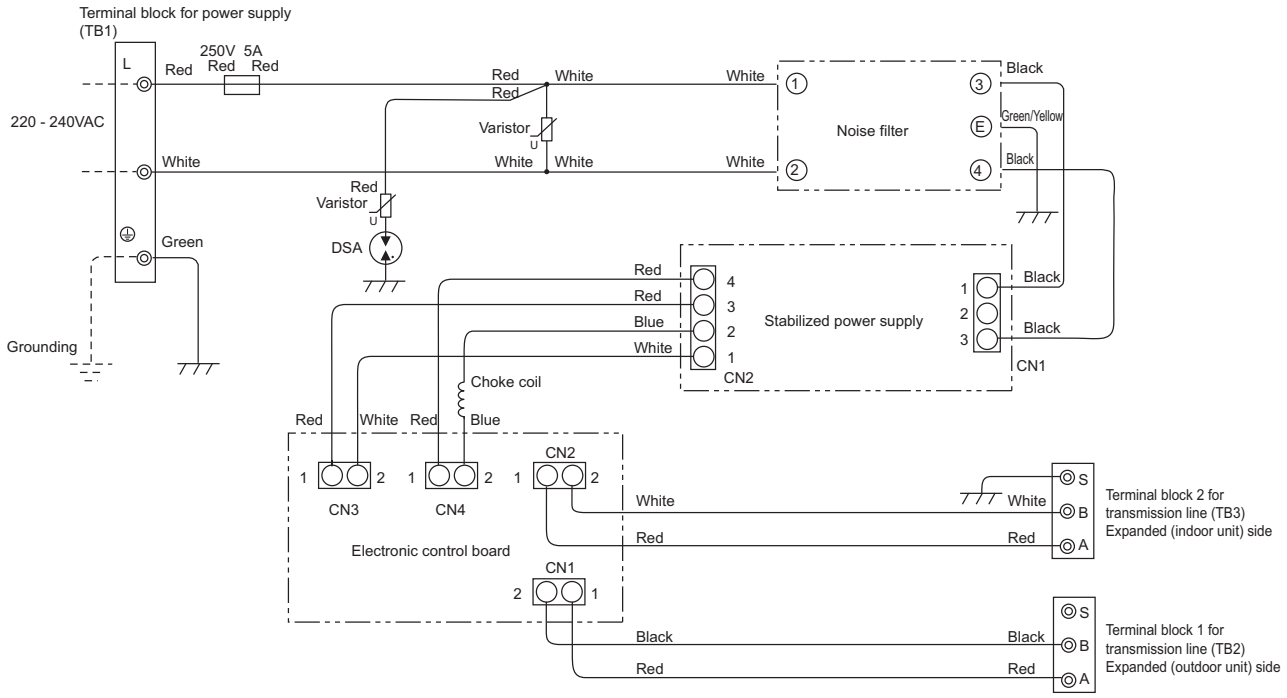
*11. Difference of appliance.

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

<Symbol explanation>

Symbol	Explanation	
21S4a	4-way valve	Cooling/Heating switching
21S4b		Heat exchanger capacity control(only PUHY, TUHY models)
		Cooling/heating switching
63H1	Pressure switch	High pressure protection for the outdoor unit
63HS1	Pressure sensor	Discharge pressure
63LS		Low pressure
ACCT1, ACCT2	Current sensor(AC)	
C100~C107	Capacitor (inverter main circuit)	
CH21 *11	Belt heater(for heating the accumulator)	
DCL	DC reactor	
L	Choke coil (for high frequency noise reduction)	
LEV1 *10	Linear expansion valve	HIC bypass,Controls refrigerant flow in HIC circuit
LEV2a, b		Pressure control,Refrigerant flow rate control
LEV2d *9		Pressure control,Refrigerant flow rate control
LEV4		For opening/closing the injection circuit
LEV9 *9, 10		Heat exchanger for inverter
MF1, 2	Fan motor(for cooling in control box)	
R1	Resistor	For inrush current prevention
RSH01/02/03		For current detection
SV1a	Solenoid valve	For opening/closing the bypass circuit under the O/S
SV2		For opening/closing the discharge suction bypass
SV3 *11 SV9 *8		For opening/closing the bypass circuit
SV10 SV11 *8		For continuous heating
TB1	Terminal block	Power supply
TB2		Heater transmission line
TB3		Indoor/Outdoor transmission line
TB7		Central control transmission line
TH2 *8	Thermistor	Subcool bypass outlet temperature
TH3		Pipe temperature
TH4		Discharge pipe temperature
TH5		ACC inlet pipe temperature
TH6 *8		Subcooled liquid refrigerant temperature
TH7		OA temperature
TH15		Compressor shell bottom temperature
TH18 *11		Accumulator temperature (Hi)
THHS		IPM temperature
X101~X103	Magnetic relay(inverter main circuit)	
Z22, 24, 25	Function setting connector	

4-4 Transmission Booster Electrical Wiring Diagrams



Chapter 5 Control

5-1 Dipswitch Functions and Factory Settings

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

(1) Control board

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

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

Note

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

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

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

(2) Additional dipswitch settings at time of shipment

Switch			Function	Function according to switch setting		Switch setting timing	Units that require switch setting (Note 2)
				OFF (LED3 Unlit)	ON (LED3 Lit)		
SW4 SW6-10: OFF	1-10 1:ON, 0:OFF		Self-diagnosis/operation monitor			Anytime after power on	C
SW4 1-10 [0:OFF, 1:ON] (Note 1) SW6-10:ON	No.769	1000000011	Test run mode: ON/OFF	Stops all ICs	Sends a test-run signal to all IC	Anytime after power on	A
	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.832	0000001011	Cumulative compressor operation time deletion	Retained	Cleared	Any time after being energized (When changed from OFF to ON)	C
	No.848	0000101011	Continuous heating cycle function	Disabled	Enabled	After being energized and while the compressor is stopped	B
	No.852	0010101011	Shifts evaporating temp. depending on the load.	Depends on the setting combination with No. 853 (Note 6) (Factory setting: OFF)		Anytime after power on	A
	No.853	1010101011	Shifts evaporating temp. depending on the load.	Depends on the setting combination with No. 852 (Note 6) (Factory setting: OFF)		Anytime after power on	A
	No.891	1101111011	Rapid mode during startup of heating operation	Disabled	Enabled	After being energized and while the compressor is stopped	A
	No.896	0000000111	Clearance of error history OC	Retained (IC/OC)	Deleted (IC/OC)	Anytime after power on (OFF→ON)	C
			Clearance of error history OS	Retained (OS)	Deleted (OS)		
	No.897	1000000111	High sensible heat operation setting	Depends on the combined setting with No. 900 (Note 4) (Factory setting: OFF)		After being energized and while the compressor is stopped	A
	No.900	0010000111	High sensible heat operation setting	Depends on the combined setting with No. 897 (Note 4) (Factory setting: OFF)		After being energized and while the compressor is stopped	A
	No.912	0000100111	Pump down function	Normal control	Pump down operation	After being energized and while the compressor is stopped	A
	No.913	1000100111	Forced defrost (Note 3)	Normal control	Forced defrost starts	Anytime after power on 10 minutes after the completion of defrost operation (OFF→ON) or 10 minutes after compressor start-up (OFF→ON)	D
	No.915	1100100111	Defrost start temperature (Note 3)	(E)P72: -13°C [9°F] (E)P96 - 192, EP216, EP240: -11°C [12°F]	-8°C [18°F]	Anytime after power on	B
	No.916	0010100111	Defrost end temperature (Note 3)	(E)P72: 10°C [50°F] (E)P96 - 192, EP216, EP240: 7°C [45°F]	5°C [41°F]	Anytime after power on	B
	No.918	0110100111	Changes the defrost timer setting (Note 3)	50 minutes	90 minutes	Anytime after power on (OFF→ON)	B
	No.921	1001100111	Temperature/pressure unit selection	°C/kgf/cm^2	°F/psi	Anytime after power on	C
	No.922	0101100111	Refrigerant amount adjustment	Normal control	Refrigerant amount adjust mode	Anytime after power on (except during initial startup/becomes ineffective 90 minutes after compressor started up.)	A
	No.932	0010010111	Heating backup	Disabled	Enabled	Anytime after power on	A
	No.933	1010010111	Snow sensor setting	Effective only when TH7 ≤ 5 is true or the snow sensor contact input is on.	Effective when TH7 ≤ 5 is true	Anytime after power on	C
	No.934	0110010111	Snow sensor setting	Continuous fan operation (FAN=50%)	Intermittent fan operation (The fan operates in the cycle of being in operation at 100% capacity for 5 minutes and then stops and remains stopped for 30 minutes.)	Anytime after power on	C
	No.964	0010001111	Target evaporation temperature setting	Depends on the setting combination with No. 982 (Note 5) (Factory setting: OFF)		Anytime after power on	A
	No.972	0011001111	Automatic cooling/heating mode (IC with the smallest address)	Normal control	Automatic cooling/heating mode	Before power on (After configuring the setting, perform a power reset.)	A
	No.982	0110101111	Target evaporation temperature setting	Depends on the setting combination with No. 964 (Note 5) (Factory setting: OFF)		Anytime after power on	A
	No.988	0011101111	Refrigerant recovery/Evacuation (LEV2, LEV1, SV2 open)	Disabled	Enabled	After being energized and when units are stopped	C
	No.997	1010011111	Multiple-stage low-noise setting	See note 9 below. (Factory setting: OFF)		After power on and while the compressor is stopped	A
	No.1006	0111011111					

Note

1) To change the settings, set SW6-10 to ON, set SW4, and press and hold SWP3 for 2 seconds or longer (OFF↔ON).
   LED3 will light up when the switch setting is ON, and lights off when OFF.
   Use the LED3 display to confirm that the settings are properly made.
   The settings will need to be set again when the control board is replaced. Write down the settings on the electrical wiring drawing label.
2) A: Only the switch on OC needs to be set for the setting to be effective.
   B: The switches on both the OC and OS need to be set to the same setting for the setting to be effective.
   C: The switches on both the OC and OS need to be set.
   D: The switch on either the OC or OS needs to be set.
3) For details, refer to the following page(s).[5-2-7 Defrost Operation Control]
4) The table below shows the combinations of the settings for items No. 897 and No. 900 and the target evaporating temperature setting that corresponds to each combination.

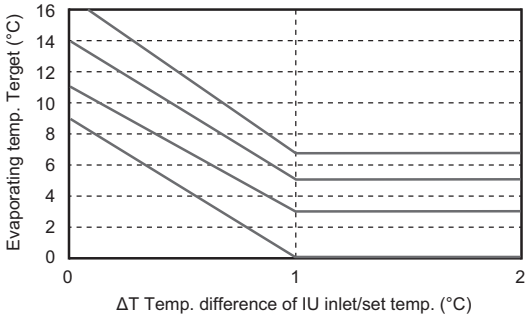
Switch		No.900	
		OFF	ON
No.897	OFF	0°C [32°F]	9°C [48°F]
	ON	6°C [43°F]	14°C [57°F]

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

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

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

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



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

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

10) Shaded areas (▭) indicate factory settings.

(3) Fan board

Switch		Function	Function according to switch setting		Switch setting timing
			OFF	ON	
SW1	1	Enabling/Disabling no-load operation No-load operation will continue for approximately 30 seconds, and then the unit will come to an abnormal stop. For details, refer to the following page(s). [8-9-9 Checking the Fan Board for Damage at No Load]	No-load operation disabled	No-load operation enabled	Anytime after power on
	2	-	-	-	-
	3	Address setting. See the notes below.	0	5	Before power on
	4	Address setting. See the notes below.	0	6	Before power on

Note

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

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

(1) Dipswitches

1) SW1,3

Switch		Function	Function according to switch setting		Switch setting timing	Notes
			OFF	ON		
SW1	1	Room temperature detection position	Indoor unit inlet	Built-in sensor on the remote controller	While the unit is stopped (Remote controller OFF)	Set to ON (built-in sensor on the remote controller) on All Fresh (PEFY-VMH-F) model units
	2	Clogged filter detection	Not available	Available		
	3	Filter check reminder time setting	100h	2500h		
	4	Outside air intake	Disabled	Enabled		Always set to OFF on PKFY-VBM model units
	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		Applicable to All Fresh model units (PEFY-VMH-F) only
	8	Fan speed setting for Heating Thermo-OFF	According to the SW1-7 setting	Preset speed		
		-	-	-		Applicable to All Fresh model units (PEFY-VMH-F) only
	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		Always set to OFF on PKFY-VBM model units
	5	-	-	-		
	6	Vane angle limit setting for cooling operation	Downblow B,C	Horizontal		Always set to Downblow B or C on PKFY-VBM model units
		Initial vane position	Enabled	Disabled		PLFY-VLMD model only
	7	Automatic LEV value conversion function	Not available	Available		
	8	Heating 4°C [39.2°F] up	Enabled	Disabled		Set to OFF on floor-standing (PFFY) type units
	9	SHm setting	2°C [35.6°F]	5°C [41°F]		The setting depends on the model and type.
	10	SCm setting	10°C [50°F]	15°C [59°F]		The setting depends on the model and type.

Note 1. Settings in the shaded areas are factory settings.(Refer to the table below for the factory setting of the switches whose factory settings are not indicated by the shaded cells.)
Note 2. If both SW1-7 and SW1-8 are set to ON, the fan remains stopped during heating Thermo-OFF.
To prevent incorrect temperature detection due to a build-up of warm air around the indoor unit, use the built-in temperature sensor on the remote controller (SW1-1) instead of the one on the indoor unit inlet thermistor.
Note 3. By setting SW3-1, SW1-7, and SW1-8 to a certain configuration, the fan can be set to remain stopped during cooling Thermo-OFF. See the table below for details.

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

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

Note

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

(2) Address switch

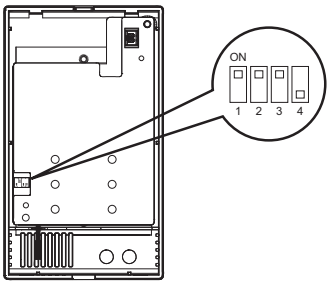
Actual indoor unit address setting varies in different systems. Refer to the installation manual for the outdoor unit for details on how to make the address setting.
Each address is set with a combination of the settings for the 10's digit and 1's digit.
(Example)

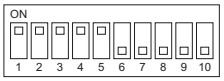
When setting the address to "3", set the 1's digit to 3, and the 10's digit to 0.
When setting the address to "25", set the 1's digit to 5, and the 10's digit to 2.

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

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

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





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

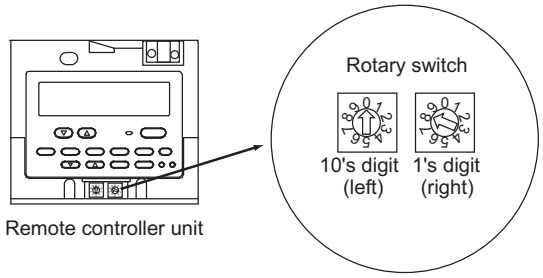
SW No.	SW contents Main	ON	OFF	Comment	Switch setting timing
1	Remote controller Main/Sub setting	Main	Sub	Set one of the two remote controllers at one group to “ON”.	Before power on
2	Temperature display units setting	Celsius	Fahrenheit	When the temperature is displayed in [Fahrenheit], set to “OFF”.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

Note

The MA remote controllers (PAR-21MAAU, PAR-30MAAU) do not have the switches listed above. Refer to the installation manual for the function setting.

(2) ME remote controller (PAR-F27MEA-US)

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



Example: In case of address 108

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

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

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

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

Note

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

Note

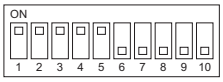
The ME remote controllers (PAR-U01MEDU) do not have the switches listed above. Refer to the installation manual for the function setting.

5-2 Outdoor Unit Control

5-2-1 Overview

- The outdoor units are designated as OC, OS1 and OS2 in the order of capacity from large to small (if two or more units have the same capacity, in the order of address from small to large).
- The setting of outdoor unit can be verified by using the self-diagnosis switch (SW4).

SW4 (SW6-10:OFF)	Display
	• The unit is designated as the OC: "OC" appears on the display. • The unit is designated as OS1: "OS-1" appears on the display • The unit is designated as OS2: "OS-2" appears on the display.

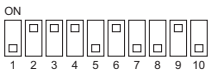


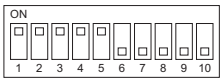
The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

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

5-2-2 Rotation Control

- At the initial startup, outdoor units start up in the order of "OC, OS1 and OS2." After two or more hours of operation, the startup sequence changes to "OS1, OS2 and OC" or "OS2, OC and OS1".
- 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.)
- For information about rotation control at initial startup, refer to the following page(s). [5-2-15 Control at Initial Startup]
- Performing startup sequence rotation does not change the basic operation of OC and OS. Only startup sequence is changed.
- Startup sequence of the outdoor units can be checked with the self-diagnosis switch (SW4) on the OC.

SW4 (SW6-10:OFF)	Display
	• OC→OS1→OS2: "OC" and the OC address appear alternately on the display. • OS1→OS2→OC: "OS-1" and the OS1 address appear alternately on the display. • OS2→OC→OS1: "OS-2" and the OS2 address appear alternately on the display.



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

5-2-3 Initial Control

- When the power is turned on, the initial processing of the microcomputer is given top priority.
- During the initial processing, control processing of the operation signal is suspended. (The control processing is resumed after the initial processing is completed. Initial processing involves data processing in the microcomputer and initial setting of each of the LEV opening. This process will take up to 5 minutes.)
- During the initial processing, the LED monitor on the outdoor unit's control board displays S/W version → refrigerant type → Model and capacity → and communication address in turn every second.

5-2-4 Startup Control

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

5-2-5 Refrigerant Bypass Control

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

(1) Bypass solenoid valve (SV1a) (ON = Open), (SV2) (ON = Open), (SV9) (ON = Open), (SV10, 11) (ON = Open)

Operation	SV1a	
	ON	OFF
When starting-up the compressor of each outdoor unit	ON for 4 minutes.	
After the restoration of thermo or 3 minutes after restart	ON for 4 minutes.	
During cooling or heating operation with the compressor stopped	Always ON. Exception: OFF when 63HS1-63LS is 0.2 MPa [29 psi] or less	
After the operation has stopped	ON for 3 minutes. Exception: OFF when 63HS1-63LS is 0.2 MPa [29 psi] or less	
During defrost operation	ON	
During compressor operation at Fmin frequency in the cooling mode and when the low pressure (63LS) drops (three or more minutes after compressor startup)	When low pressure (63LS) drops below 0.23 MPa [33 psi].	When low pressure (63LS) exceeds 0.38 MPa [55 psi].
The following conditions are met during the heating mode: Compressor frequency after power on is greater than 0. The low pressure (63LS) drops (One or more minutes after compressor startup if the cumulative compressor operation time is one hour or less; three or more minutes if the cumulative compressor operation time is one hour or more)	When the low pressure (63LS) drops below 0.12 MPa [17 psi]	When the low pressure (63LS) rises above 0.16 MPa [23 psi]
When high pressure (63HS1) rises	When 63HS1 exceeds 3.62 MPa [525 psi]	When 63HS1 is 3.43MPa [497 psi] or below in 30 seconds

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

Operation	SV9	
	ON	OFF
When high pressure (63HS1) rises during the heating operation	When 63HS1 exceeds 3.50MPa [507psi]	When 63HS1 is or below 2.70Mpa [391psi]
During defrost	Always ON	
Others	Always OFF	

Operation	SV10	
	ON	OFF
When Continuous heating mode	(E)P72-144: Front part of heat exchanger is being defrosted. (E)P168, 192: Front part of heat exchanger is being defrosted. EP216, 240: Front part of heat exchanger is being defrosted.	Other than on the left *(E)P72-144: When the rear part of heat exchanger is being defrosted, 21S4b will be OFF. *(E)P168, 192: When the left part of heat exchanger is being defrosted, 21S4c will be OFF.

Operation	SV11	
	ON	OFF
When Continuous heating mode	(E)P168, 192: Right part of heat exchanger is being defrosted. EP216, 240: Rear, right, and left parts of heat exchanger are being defrosted.	Other than on the left *(E)P168, 192: When the left part of heat exchanger is being defrosted, 21S4c will be OFF.

5-2-6 Frequency Control

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

Model	Frequency/cooling (Hz)		Frequency/heating (Hz)	
	Max	Min	Max	Min
P72 model	52	11	56	24
P96 model	65	11	71	24
P120 model	74	13	88	27
P144 model	97	13	110	18
P168 model	111	16	122	22
EP72 model	52	13	56	27
EP96 model	65	13	71	27
EP120 model	74	18	88	37
EP144 model	97	18	110	37
EP168 model	111	18	122	37
EP192 model	123	18	129	37
EP216 model	132	20	150	37
EP240 model	159	20	178	37

Note

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

(1) Pressure limit

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

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

(2) Discharge temperature limit

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

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

(3) Periodic frequency control

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

Periodic control cycle

Periodic control is performed after the following time has passed

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

The amount of frequency change

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

5-2-7 Defrost Operation Control

(1) Starting the defrost operation

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

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

Note

1) Evaporating temperature (Te)

	(E)P72	(E)P96 - 168, EP192 - 240
SW4 (915) OFF	-13 ºC	-11 ºC
SW4 (915) ON	-8 ºC	-8 ºC

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

(2) Defrost operation

Compressor frequency		Model	Compressor frequency
	Standard	P72 model	60 Hz
		P96 model	79 Hz
		P120 model	103 Hz
		P144-168 models	113 Hz
	High COP	EP72 model	91 Hz
		EP96-120 models	107 Hz
		EP144 model	117 Hz
		EP168-192 models	147 Hz
		EP216-240 models	191 Hz
Outdoor unit fan		Stopped	
SV1a		ON	
21S4a		OFF	
21S4b, 21S4c		OFF	
SV2		ON	
SV9		ON	
SV10,SV11		OFF (Closed)	
SV14*1		ON (Open)	
SV15*1		OFF (Open)	
LEV1		0 pulses*2	
LEV2a, b, c		3000 pulses	
LEV4		0 pulses	

*1. Only the EP72 through 144 models have SV14 and SV15.

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

(3) Stopping the defrost operation

- The defrost cycle ends when 12 minutes have passed since the beginning of the cycle, or when the pipe temperature (TH3) has been continuously detected for 4 minutes (when SW4 (916) is set to OFF) or 2 minutes (when SW4 (916) is set to ON) that exceeds the values in the table below.
- Contact AC&R Systems Works regarding the setting for SW4 (916).
- The defrost cycle will not end for two minutes once started unless one of the following conditions is met : Pipe temperature reaches 25°C [77°F] and SW4 (916) is set to OFF or α*1 =25+TH7°C [77°F+TH7] and SW4 (916) is set to ON.
  *1 (5°C [41°F] $\leq \alpha \leq$ 25°C [77°F]).
- In the multiple-outdoor-unit system, defrosting is stopped on all units at the same time.

Model	TH3	
	SW4 (916) OFF	SW4 (916) ON
(E)P72 models	10°C [50°F]	5°C [41°F]
(E)P96 - (E)P240 models	7°C [45°F]	5°C [41°F]

(4) Problems during defrost operation

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

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

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

5-2-8 Continuous heating mode control

(1) Continuous heating mode start conditions

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

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

(2) Valve operation during Continuous heating cycle

1) (E)P72-144

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

*1. Only the fixed-time control is available on (E)P72 models.

*2. SV14 and SV15 are only on EP72-144 models.

2) (E)P168/192

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

3) EP216/240

	Rear/right and left HEX in defrost cycle	Front HEX in defrost cycle
Outdoor unit fan	Left fan: Fixed time control Right fan: Fixed time control	Left fan: Fixed time control Right fan: Fixed time control
SV1a	OFF	
SV2	OFF	
SV9	ON	
SV10	OFF	ON
SV11	ON	OFF
21S4a	ON	ON
21S4b	ON	ON

5-2-9 Refrigerant Recovery Control

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

(1) During heating operation

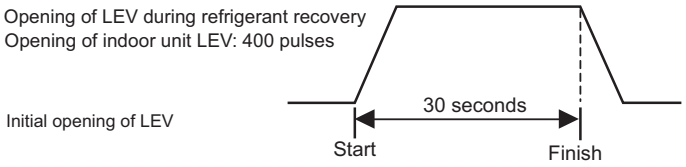
Starting refrigerant recovery mode

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

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

Refrigerant recovery

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



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

(2) During cooling operation

Starting refrigerant recovery mode

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

- 30 minutes have passed since the completion of previous refrigerant recovery.
- When the unit keeps running for 3 minutes in a row or more with high discharge temperature
- TH4 > 105°C [221°F] or 63HS1 > 3.43 MPa [497 psi] (35 kg/cm^{2}G) and SC0 > 10°C [50°F]

Refrigerant recovery

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

5-2-10 Outdoor Unit Fan Control

(1) Control method

- Depending on the capacity required, the rotation speed of the outdoor unit fan is controlled by the inverter, targeting a constant evaporation temperature of (0°C [32°F]= 0.71 MPa [103 psi]) during cooling operation and constant condensing temperature of (49°C [120°F]= 2.88 MPa [418 psi]) during heating operation.
- The OS in the multiple-outdoor-unit system operates at the actual outdoor unit fan control value that is calculated by the OS based on the preliminary outdoor unit fan control value that the OC determines.

(2) Control

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

5-2-11 Subcool Coil Control (Linear Expansion Valve <LEV1>)

- The OC, OS1, and OS2 controls the subcool coil individually.
- The LEV is controlled every 30 seconds to maintain constant the subcool at the outdoor unit heat exchanger outlet that is calculated from the values of high pressure (63HS1) and liquid piping temperature (TH3), or the superheat that is calculated from the values of low pressure (63LS) and the bypass outlet temperature (TH2) of the subcool coil.
- LEV opening is controlled based on the values of the inlet (TH6) and the outlet (TH3) temperatures of the subcool coil, high pressure (63HS1), and discharge temperature (TH4). In a single-outdoor-unit system, the LEV is closed (0) in the heating mode, while the compressor is stopped, and during cooling Thermo-OFF. In a multiple-outdoor-unit system, the LEV closes (0) during heating operation, while the compressor is stopped, or during cooling Thermo-OFF. The LEV opens to a specified position when 15 minutes have passed after Thermo-OFF. (65 pulses)
- During the defrost cycle, normally, the valve initially operates at 0 pulses, although it may operate at higher pulses depending on the 63LS and TH4 status.

5-2-12 Refrigerant Flow Control (Linear Expansion Valves <LEV2a, LEV2b, and LEV2c>)

- Refrigerant flow is controlled by each unit in the combined models during heating. Refrigerant flow control is performed by the OC, OS1, and OS2 individually. The valve opens to a specified angle during cooling (Opening: 2100 pulses)
- Valve opening is controlled based on the values of high pressure (63HS1), discharge temperature (TH4), low pressure (63LS), and piping temperature (TH5).
- The valve moves to the predetermined position while the unit is stopped.
- The valve opening may increase to 3000 pulses during the defrost cycle or when the units are operated in unusual operating conditions.

5-2-13 Control of Controller Cooling Function (Electronic Expansion Valve <LEV9>)

- Control of controller cooling function is performed individually for OC, OS1, and OS2.
- The opening of LEV9 is adjusted every three seconds to keep the controller heatsink temperature (THHS) below the threshold value, which is determined by the setting of the outside temperature (TH7).

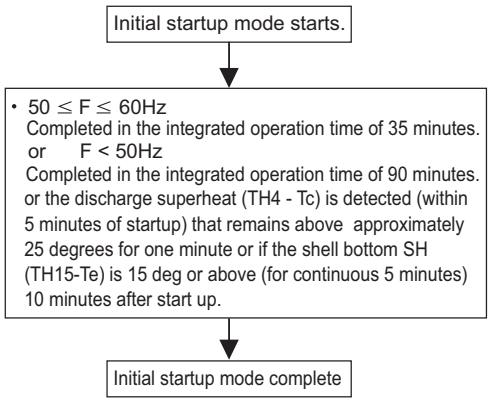
5-2-14 Injection Control (Linear Expansion Valve <LEV4>)

- LEV4 opening is adjusted every 30 seconds to keep the discharge temperature (TH4) within the predetermined range.
- Injection control starts when the outside temperature (TH7) drops below 3°C (37.4°F).
- Injection control is disabled in the cooling mode.

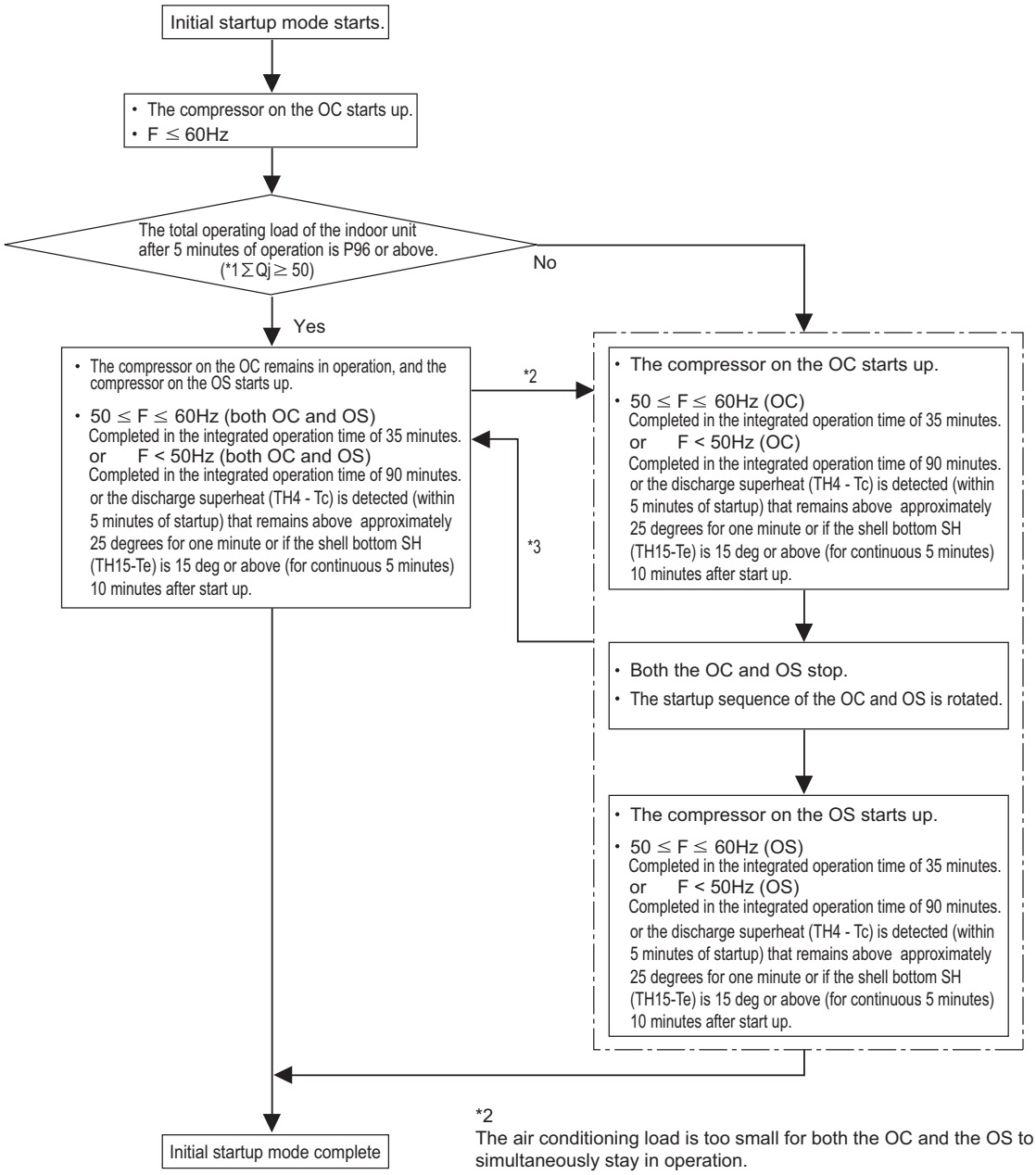
5-2-15 Control at Initial Startup

- When started up for the first time before 12 hours have elapsed after power on, the unit goes into the initial startup mode.
- At the completion of the initial operation mode on the OC, OS1, and OS2, they will go into the normal control mode.

(1) (E)P72 - P168, EP192, EP216, EP240T(Y)NU models



(2) (E)P192 - (E)P240T(Y)SNU models

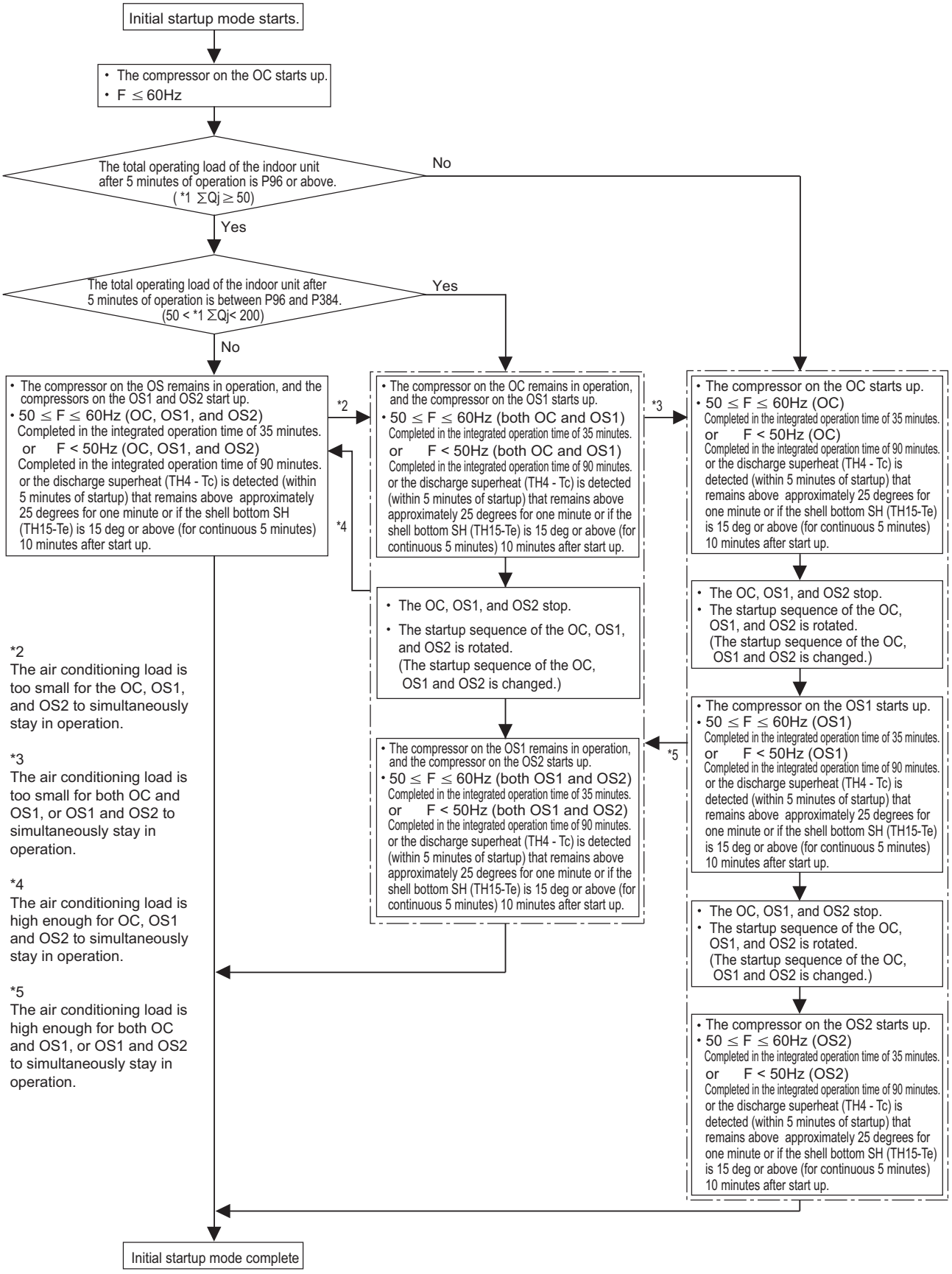


*2
The air conditioning load is too small for both the OC and the OS to simultaneously stay in operation.
*3
The air conditioning load is high enough for both OC and OS to simultaneously stay in operation.

∗1 ∑Qj:Total capacity (models) code

For information about capacity codes, refer to the following page(s). [5-1-2 Indoor Unit Switch Functions and Factory Settings]

(3) (E)P264 - (E)P432T(Y)SNU models



∗1 ∑Qj:Total capacity (models) code

For information about capacity codes, refer to the following page(s).[5-1-2 Indoor Unit Switch Functions and Factory Settings]

5-2-16 Emergency Operation Mode

1. Problems with the outdoor unit

- Emergency operation mode is a mode in which outdoor units that are operating normally take over the operation of the outdoor units that are experiencing problems. ((E)P192-(E)P240T(Y)SNU models go into an emergency operation mode when one outdoor unit is in trouble, and (E)P264-(E)P432T(Y)SNU models go into an emergency operation mode when one or two outdoor units are 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 Fan motor Inverter		0403	Serial communication error
		4220,4225,4226	Bus voltage drop
		4230,4235	Heatsink overheat protection
		4240,4245	Overload protection
		4250,4255,4256	Overcurrent relay trip
		5110	Heatsink temperature sensor failure (THHS)
		5120	DCL temperature sensor circuit fault
		5301	Current sensor/circuit failure
		5305,5306	Position error
Thermistor	TH2	5102	Subcool heat exchanger bypass outlet temperature sensor failure
	TH3	5103	Pipe temperature sensor failure
	TH4	5104	Discharge temperature sensor failure
	TH5	5105	Accumulator inlet temperature sensor failure
	TH6	5106	Subcool heat exchanger liquid outlet sensor failure
	TH7	5107	Outside air temperature sensor failure
	TH15	5115	Compressor shell bottom temperature sensor fault
Power		4102	Open phase
		4115	Power supply sync signal abnormality

Emergency operation pattern (2 outdoor units)

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

Emergency operation pattern (3 outdoor units)

		OC failure pattern	OS1 failure pattern	OS2 failure pattern	OC, OS1 failure pattern	OC, OS2 failure pattern	OS1, OS2 failure pattern
OC		Trouble	Normal	Normal	Trouble	Trouble	Normal
OS1		Normal	Trouble	Normal	Trouble	Normal	Trouble
OS2		Normal	Normal	Trouble	Normal	Trouble	Trouble
Emergency operation	Cooling	Permitted	Permitted	Permitted	Permitted	Permitted	Permitted
	Heating	Permitted	Permitted	Permitted	Permitted	Permitted	Permitted
Maximum total capacity of indoor units (Note 1)		60%			40%		

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

(2) Ending the emergency operation

1) End conditions

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

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

2) Control at or after the completion of emergency operation

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

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

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

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

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

Precautions before servicing the unit

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

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

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

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

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

Emergency operation pattern (2 outdoor units)

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

Emergency operation pattern (3 outdoor units)

		OC failure pattern	OS1 failure pattern	OS2 failure pattern	OC, OS1 failure pattern	OC, OS2 failure pattern	OS1, OS2 failure pattern
OC		Trouble	Normal	Normal	Trouble	Trouble	Normal
OS1		Normal	Trouble	Normal	Trouble	Normal	Trouble
OS2		Normal	Normal	Trouble	Normal	Trouble	Trouble
Emergency operation	Cooling	Permitted	Permitted	Permitted	Permitted	Permitted	Permitted
	Heating	Permitted	Permitted	Permitted	Permitted	Permitted	Permitted
Maximum total capacity of indoor units (Note 1)		Indoor unit capacity that matches the total capacity of the operable outdoor units					

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

(3) Ending the emergency operation

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

5-2-17 Operation Mode

(1) Indoor unit operation mode

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

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

(2) Outdoor unit operation mode

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

Note

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

5-2-18 Demand Control

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

Note

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

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

5-2-19 Control of IH energization without the compressor in operation

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

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

Chapter 6 Test Run

6-1 Read before Test Run

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

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

Note

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

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

Note

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

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

Note

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

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

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

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

Note

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

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

Note

Insufficient powering time may result in compressor damage.

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

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

6-2 Operation Characteristics and Refrigerant Charge

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

The following shows items of particular importance.

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

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

6-3 Evaluating and Adjusting Refrigerant Charge

6-3-1 Refrigerant Overcharge and undercharge

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

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

6-3-2 Checking the Refrigerant Charge during Operation

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

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

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

6-3-3 Maximum refrigerant charge

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

♦P72-168T(Y)NU-A

Total index of the outdoor units	P72	P96	P120	P144	P168
Factory charge (kg)	6.5	9.8	9.8	10.8	10.8
Factory charge (lbs - oz)	14 - 5	21 - 10	21 - 10	23 - 13	23 - 13
Maximum additional refrigerant charge on site (kg)	14.0	22.6	24.0	24.3	32.2
Maximum additional refrigerant charge on site (lbs - oz)	30 - 14	49 - 13	52 - 15	53 - 9	70 - 16
Maximum refrigerant charge (kg)	20.5	32.4	33.8	35.1	43.0
Maximum refrigerant charge (lbs - oz)	45 - 3	71 - 7	74 - 8	77 - 6	94 - 13

♦P192-432T(Y)SNU-A

Total index of the outdoor units	P192	P216	P240	P264	P288	P312	P336
Factory charge (kg)	19.6	19.6	19.6	26.1	26.1	26.1	29.4
Factory charge (lbs - oz)	43 - 3	43 - 3	43 - 3	57 - 9	57 - 9	57 - 9	64 - 13
Maximum additional refrigerant charge on site (kg)	32.2	34.0	34.9	44.1	44.1	44.1	45.6
Maximum additional refrigerant charge on site (lbs - oz)	70 - 16	74 - 15	76 - 15	97 - 4	97 - 4	97 - 4	100 - 8
Maximum refrigerant charge (kg)	51.8	53.6	54.5	70.2	70.2	70.2	75.0
Maximum refrigerant charge (lbs - oz)	114 - 3	118 - 3	120 - 2	154 - 12	154 - 12	154 - 12	165 - 6

Total index of the outdoor units	P360	P384	P408	P432
Factory charge (kg)	29.4	30.4	31.4	32.4
Factory charge (lbs - oz)	64 - 13	67 - 0	69 - 4	71 - 7
Maximum additional refrigerant charge on site (kg)	45.6	47.3	47.2	47.1
Maximum additional refrigerant charge on site (lbs - oz)	100 - 8	104 - 4	104 - 1	103 - 13
Maximum refrigerant charge (kg)	75.0	77.7	78.6	79.5
Maximum refrigerant charge (lbs - oz)	165 - 6	171 - 5	173 - 5	175 - 4

♦EP72-240T(Y)NU-A

Total index of the outdoor units	EP72	EP96	EP120	EP144	EP168	EP192	EP216
Factory charge (kg)	6.5	9.8	9.8	10.8	10.8	10.8	11.8
Factory charge (lbs - oz)	14 - 5	21 - 10	21 - 10	23 - 13	23 - 13	23 - 13	26 - 1
Maximum additional refrigerant charge on site (kg)	14.0	22.6	24.0	24.3	32.2	33.1	38.5
Maximum additional refrigerant charge on site (lbs - oz)	30 - 14	49 - 13	52 - 15	53 - 9	70 - 16	72 - 16	84 - 15
Maximum refrigerant charge (kg)	20.5	32.4	33.8	35.1	43.0	43.9	50.3
Maximum refrigerant charge (lbs - oz)	45 - 3	71 - 7	74 - 8	77 - 6	94 - 13	96 - 13	110 - 15

Total index of the outdoor units	EP240
Factory charge (kg)	11.8
Factory charge (lbs - oz)	26 - 1
Maximum additional refrigerant charge on site (kg)	38.5
Maximum additional refrigerant charge on site (lbs - oz)	84 - 15
Maximum refrigerant charge (kg)	50.3
Maximum refrigerant charge (lbs - oz)	110 - 15

♦EP192-432T(Y)SNU-A

Total index of the outdoor units	EP192	EP216	EP240	EP264	EP288	EP312	EP336
Factory charge (kg)	19.6	19.6	19.6	26.1	26.1	26.1	29.4
Factory charge (lbs - oz)	43 - 3	43 - 3	43 - 3	57 - 9	57 - 9	57 - 9	64 - 13
Maximum additional refrigerant charge on site (kg)	32.2	34.0	34.9	44.1	44.1	44.1	45.6
Maximum additional refrigerant charge on site (lbs - oz)	70 - 16	74 - 15	76 - 15	97 - 4	97 - 4	97 - 4	100 - 8
Maximum refrigerant charge (kg)	51.8	53.6	54.5	70.2	70.2	70.2	75.0
Maximum refrigerant charge (lbs - oz)	114 - 3	118 - 3	120 - 2	154 - 12	154 - 12	154 - 12	165 - 6

Total index of the outdoor units	EP360	EP384	EP408	EP432
Factory charge (kg)	29.4	30.4	31.4	32.4
Factory charge (lbs - oz)	64 - 13	67 - 0	69 - 4	71 - 7
Maximum additional refrigerant charge on site (kg)	45.6	47.3	47.2	47.1
Maximum additional refrigerant charge on site (lbs - oz)	100 - 8	104 - 4	104 - 1	103 - 13
Maximum refrigerant charge (kg)	75.0	77.7	78.6	79.5
Maximum refrigerant charge (lbs - oz)	165 - 6	171 - 5	173 - 5	175 - 4

6-3-4 Refrigerant Charge Adjustment Mode

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

When the function switch (SW4 (922)) on the main board on the outdoor unit (OC only) is turned to ON, the unit goes into the refrigerant amount adjust mode, and the following sequence is followed.

Note

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

Operation

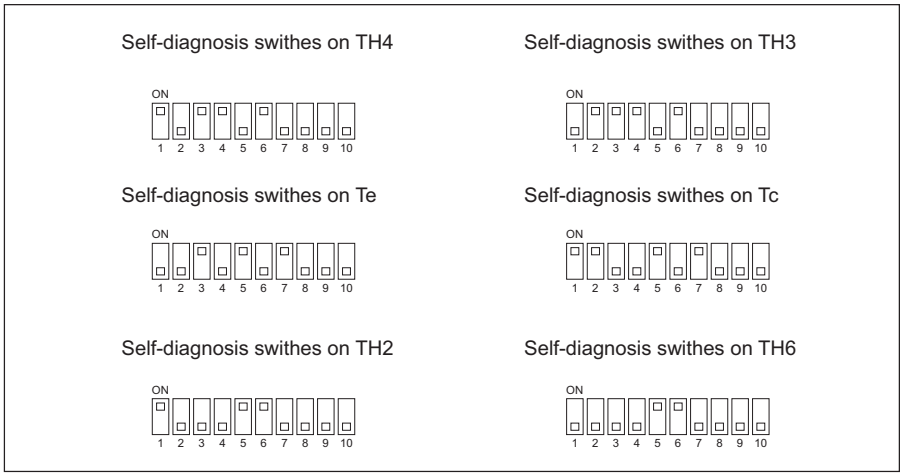
When the unit is in the refrigerant amount adjust mode, the LEV on the indoor unit does not open as fully as it normally does during cooling operation to secure subcooling.

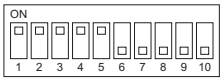
Note

1) Using the flowchart on the next page, adjust the refrigerant charge. Check the TH4, TH3, TH2, TH6, Te, and Tc values of OC, OS1, and OS2 by setting the diagnostic switch (SW4 (SW6-10: OFF) first, and use these values to diagnose the refrigerant charge.
2) There may be cases when the refrigerant amount may seem adequate for a short while after starting the unit in the refrigerant amount adjust mode but turn out to be inadequate later on (when the refrigerant system stabilizes).

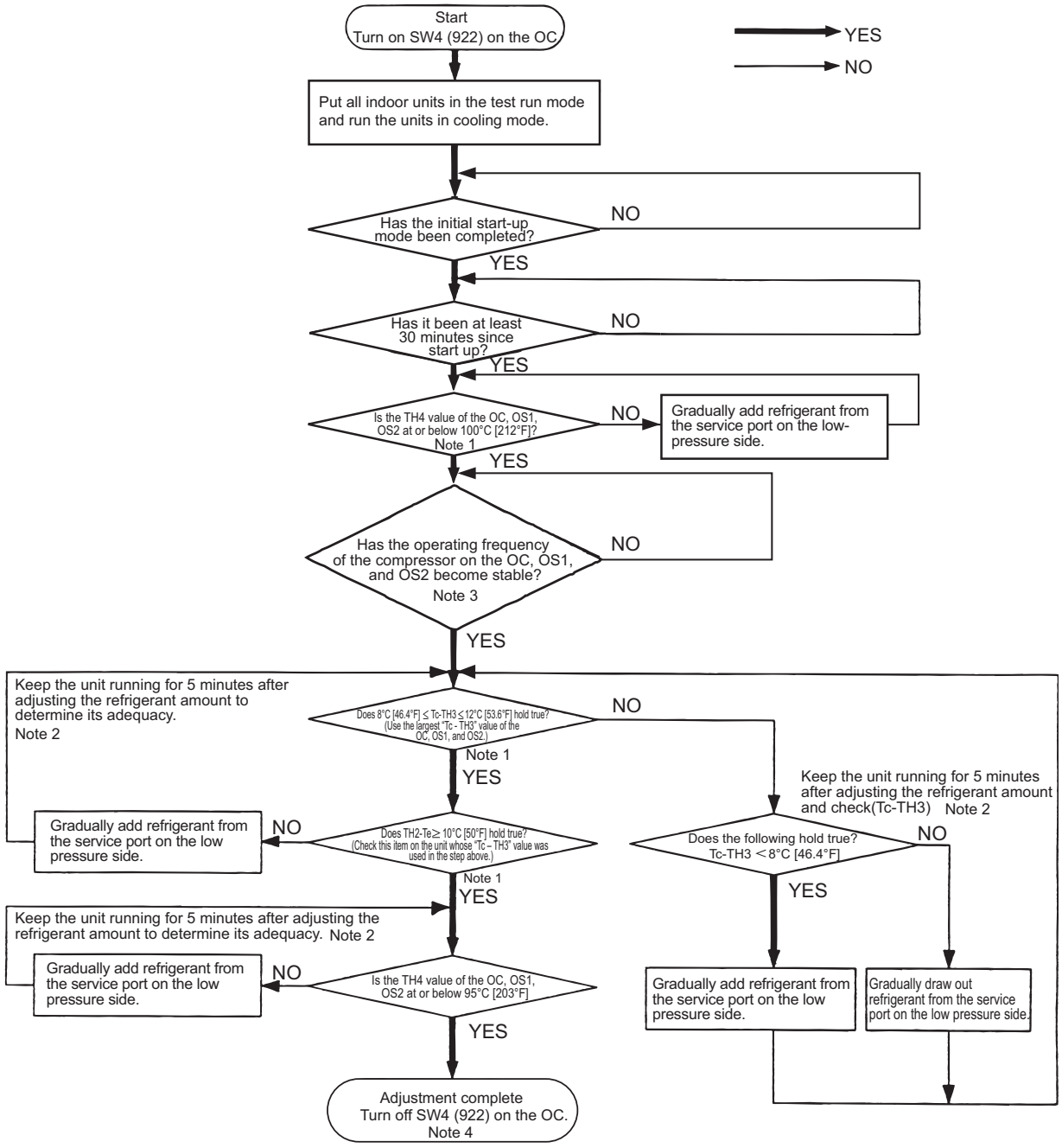
   When the amount of refrigerant is truly adequate.
   TH3-TH6 on the outdoor unit is 5°C [41°F] or above and SH on the indoor unit is between 5 and 15°C [41 and 59°F].
   The refrigerant amount may seem adequate at the moment, but may turn out to be inadequate later on.
   TH3-TH6 on the outdoor unit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

SW4 settings





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



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

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

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

6-4 The Following Symptoms Are Normal

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

Chapter 7 Troubleshooting Using Error Codes

7-1 Error Code and Preliminary Error Code Lists

Error Code	Prelimi-nary error code	Error (prelim-inary) detail code	Error code definition	Searched unit				Notes
				Outdoor unit	Indoor unit	LOSSNAY	Remote controller	
0403	4300 4305 4306	1 5 6 (Note)	Serial communication error	O	O			(page 7)
0404	-	-	Indoor unit control-related errors		O			(page 8)
0900	-	-	Test run			O		
1102	1202	-	Discharge temperature fault	O				(page 9)
1301	-	-	Low pressure fault	O				(page 10)
1302	1402	-	High pressure fault	O				(page 11)
1500	1600	-	Refrigerant overcharge	O				(page 12)
-	1605	-	Preliminary suction pressure fault	O				
2500	-	-	Drain sensor submergence		O			(page 13)
2502	-	-	Drain pump fault		O			(page 15)
2503	-	-	Drain sensor (Thd) fault		O	O		(page 17)
2600	-	-	Water leakage			O		(page 18)
2601	-	-	Water supply cutoff			O		(page 18)
3121	-	-	Out-of-range outside air temperature	O				(page 19)
3511	3611	-	Refrigerant overcooling	O				(page 20)
3512	3612	-	Cooling fan locking	O				(page 21)
4102	4152	-	Open phase	O				(page 22)
4106	-	-	Transmission power supply fault	O				(page 23)
4109	-	-	Indoor unit fan operation error		O			(page 23)
4114	-	-	Indoor unit fan motor error		O			(page 24)
4116	-	-	RPM error/Motor error		O	O		(page 24)
4121	4171	–	Function setting error	O				(page 24)
4124	-	–	Electric system not operate due to damper abnormality		O			(page 25)
4220 4225 4226 (Note)	4320 4325 4326 (Note)	[0]	Backup operation	O				
		[108]	Abnormal bus voltage drop (Software detection) (YNU)	O				(page 26)
			Abnormal bus voltage drop (Software detection) (TNU)	O				(page 27)
		[109]	Abnormal bus voltage rise (Software detection)	O				(page 28)
		[110]	VDC error (Hardware detection)	O				(page 28)
		[111]	Logic error	O				(page 29)
		[112]	Logic error	O				(page 29)
		[123]	Voltage boost control error	O				(page 29)
		[129]	Control power-supply fault	O				(page 30)
		[131]	Low bus voltage at startup (YNU)	O				(page 30)
			Low bus voltage at startup (TNU)	O				(page 31)

Error Code	Preliminary error code	Error (preliminary) detail code	Error code definition		Searched unit: Outdoor unit	Searched unit: Indoor unit	Searched unit: LOSSNAY	Searched unit: Remote controller	Notes
4230 4235 4236	4330 4335 4336	[125]	Heatsink overheat protection		O				(page 31)
4230	4330	[126]	DCL temperature fault		O				(page 32)
4240 4245 4246	4340	-	Overload protection (YNU)		O				(page 33)
			Overload protection (TNU)		O				(page 33)
4250 4255 4256 (Note)	4350 4355 4356 (Note)	[0]	Backup operation		O				
		[101]	IPM error		O				(page 34)
		[104]	Short-circuited IPM/Ground fault		O				(page 35)
		[105]	Overcurrent error due to short-circuited motor		O				(page 36)
		[106]	Instantaneous overcurrent (S/W detection)		O				(page 37)
		[107]	Overcurrent (effective value)(S/W detection)		O				(page 37)
		[121]	DCL overcurrent error (hardware detection)		O				(page 38)
		[122]	DCL overcurrent error (software detection)		O				(page 38)
4250	4350	[128]	DCL overcurrent error (hardware detection)		O				(page 38)
4255 4256	4355 4356	[137]	Motor synchronization loss		O				(page 38)
4260	-	-	Heatsink overheat protection at startup		O				(page 39)
5101	1202	-	Temperature sensor fault	Return air temperature (TH21)		O			(page 40)
				OA processing unit inlet temperature (TH4)			O		(page 40)
5102	1217	-	Temperature sensor fault	Indoor unit pipe temperature (TH22)		O			(page 40)
				OA processing unit pipe temperature (TH2)			O		(page 40)
				HIC bypass circuit outlet temperature (TH2)	O				(page 41)
5103	1205	00	Temperature sensor fault	Indoor unit gas-side pipe temperature (TH23)		O			(page 40)
				OA processing unit gas-side pipe temperature (TH3)			O		(page 40)
				Pipe temperature at heatexchanger outlet (TH3)	O				(page 41)
5104	1202	-	Temperature sensor fault	OA processing unit intake air temperature (TH1)			O		(page 40)
				Outside temperature (TH24)		O			(page 40) Detectable only by the All-Fresh type indoor units
				Outdoor unit discharge temperature (TH4)	O				(page 41)
5105	1204	-	Temperature sensor fault	Accumulator inlet temperature (TH5)	O				(page 41)

Error Code	Preliminary error code	Error (preliminary) detail code	Error code definition		Searched unit				Notes
					Outdoor unit	Indoor unit	LOSSNAY	Remote controller	
5106	1216	-	Temperature sensor fault	HIC circuit outlet temperature (TH6)	O				(page 41)
5107	1221	-	Temperature sensor fault	Outside temperature (TH7)	O				(page 41)
5115			Temperature sensor fault	Shell bottom temperature (TH15)	O				(page 41)
5110	1214	[0]	Backup operation		O				
		01	Temperature sensor fault	Heatsink temperature (THHS)	O				(page 42)
5120	1248	[0]	Backup operation		O				
		01	Temperature sensor fault	DCL(THL)	O				(page 42)
5201	-	-	High-pressure sensor fault (63HS1)		O				(page 43)
5301	4300	[0]	Backup operation		O				
		[115]	ACCT sensor fault (YNU)		O				(page 43)
			ACCT sensor fault (TNU)		O				(page 44)
		[117]	ACCT sensor circuit fault		O				(page 44)
		[119]	Open-circuited IPM/Loose ACCT connector		O				(page 45)
		[120]	Faulty ACCT wiring		O				(page 45)
		[127]	DCL electric current circuit error		O				(page 46)
5305 5306	4305 4306	[0]	Backup operation		O				
		[135]	Current sensor fault		O				(page 46)
		[136]	Current sensor / circuit fault		O				(page 47)
5701	-	-	Loose float switch connector			O			(page 47)
6201	-	-	Remote controller board fault (nonvolatile memory error)					O	(page 48)
6202	-	-	Remote controller board fault (clock IC error)					O	(page 48)
6600	-	[001]	Detection of overlapped address in centralized control system		O	O	O	O	(page 49)
		[002]	Detection of overlapped address in indoor unit system		O	O	O	O	(page 49)
6601	-	[001]	Detection of polarity setting error in centralized control system					O	(page 49)
		[002]	Detection of polarity setting error in indoor unit system					O	(page 49)
6602	-	[001]	Transmission processor hardware error in centralized control system		O	O	O	O	(page 50)
		[002]	Transmission processor hardware error in indoor unit system		O	O	O	O	(page 50)
6603	-	[001]	Transmission Bus-Busy error in centralized control system		O	O	O	O	(page 51)
		[002]	Transmission Bus-Busy error in indoor unit system		O	O	O	O	(page 51)
6606	-	[003]	Communication error between device processor on circuit board and M-NET processor		O	O	O	O	(page 51)
6607	-	-	No ACK error		O	O	O	O	(page 52)
6608	-	-	No response error		O	O	O	O	(page 60)

Error Code	Preliminary error code	Error (preliminary) detail code	Error code definition	Searched unit				Notes
				Outdoor unit	Indoor unit	LOSSNAY	Remote controller	
6831	-	-	MA controller signal reception error (No signal reception)		O		O	(page 61)
6832	-	-	MA remote controller signal transmission error (Synchronization error)		O		O	(page 62)
6833	-	-	MA remote controller signal transmission error (Hardware error)		O		O	(page 63)
6834	-	-	MA controller signal reception error (Start bit detection error)		O		O	(page 64)
6840	-	-	Indoor/outdoor unit communication error		O			(page 65)
6841	-	-	A control communication synchronism not recover		O			(page 65)
6842	-	-	A control communication transmission/reception hardware trouble		O			(page 66)
6843	-	-	A control communication start bit detection error		O			(page 67)
6846	-	-	Start-up time over		O			(page 68)
7100	-	-	Total capacity error	O				(page 69)
7101	-	-	Capacity code setting error	O	O	O		(page 70)
7102	-	-	Wrong number of connected units	O				(page 71)
7105	-	-	Address setting error	O				(page 72)
7106	-	-	Attribute setting error			O		(page 72)
7110	-	-	Connection information signal transmission/reception error	O				(page 73)
7111	-	-	Remote controller sensor fault		O	O		(page 73)
7113	-	-	Function setting error (improper connection of CNTYP)	O				(page 74)
7117	-	-	Model setting error	O				(page 75)
7130	-	-	Incompatible unit combination	O				(page 76)

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

Note

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

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

The last digit	Inverter system
0 or 1	Compressor inverter system
5 or 6	Fan inverter system

<Compressor inverter>

INV board	Outdoor units	Overload protection Imax (Arms)	Current effective value error (Arms)	Current peak value error (Apeak)	Temperature protection TOL (°C)
INV35Y	P72YNU	19	23	38	95
INV42Y	P96YNU	27	33	56	
	P120YNU				
	P144YNU				
	P168YNU				
INV35Y	EP72YNU	19	23		
INV42Y	EP96YNU	27	33		
	EP120YNU				
	EP144YNU				
INV37YC	EP168YNU				89
	EP192YNU				
	EP216YNU				
	EP240YNU				
INV38	P72TNU	35	42	71	95
	P96TNU				
	P120TNU	48	58	99	
	P144TNU				
	P168TNU	51	61	104	
	EP72TNU	45	54	99	
	EP96TNU	48	58		
	EP120TNU	51	61	104	
	EP144TNU				
INV39C	EP168TNU	48	58		
	EP192TNU				
	EP216TNU				
	EP240TNU				

<Fan inverter>

INV board	Outdoor units	Overload protection Imax (Arms)	Current effective value error (Arms)	Current peak value error (Apeak)	Temperature protection TOL (°C)
INVS/15Y	(E)P72YNU	3.9	Off	7.0	Off
	(E)P96YNU	4.5		8.5	
	(E)P120YNU				
	(E)P144YNU				
	P168YNU	3.9		7.0	
	EP168YNU				
	EP192YNU				
INVS/19Y	EP216YNU	3.9	Off	7.0	Off
	EP240YNU				
INVS/16	(E)P72TNU	8	Off	13.3	Off
	(E)P96TNU	6.5		12	
	(E)P120TNU				
	(E)P144TNU				
	P168TNU	8		13.3	
	EP168TNU				
	EP192TNU				
	EP216TNU				
	EP240TNU				

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

7-2-1 Error Code [0403]

1. Error code definition

Serial communication error

2. Error definition and error detection method

Serial communication error between the control board and the INV board on the compressor, and between the control board and the Fan board
Detail code 1: Between the control board and the INV board
Detail code 5, 6: Between the control board and the Fan board

3. Cause, check method and remedy

(1) Faulty wiring

Check the following wiring connections.

1) Between Control board and Fan board

Control board	FAN board
CN4A	CN80
CN4B	CN80

2) Between control board and INV board

Control board	INV board
CN4	CN2

3) Between power-supply board and INV board

Power-supply board	INV board
CNINV	CN19V

4) Between power-supply board and Fan board

Power-supply board	FAN board
CNFAN1	CN81
CNFAN2	CN81

(2) PS board failure

Replace the PS board if the LED on the INV board, Fan board, or control board is not lit.
Using the detail codes, check the status of the LEDs on the circuit boards below.
Detail code 1: LED on the INV board
Detail code 5: LED on the right Fan board
Detail code 6: LED on the left Fan board
*When the power-supply board is normal, all LEDs will be lit.

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

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

(4) Incorrect DIPSW setting on the Fan board

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

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

7-2-2 Error Code [0404]

1. Error code definition

Indoor unit control-related errors

2. Error definition and error detection method

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

3. Cause, check method and remedy

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

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

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

7-3-1 Error Code [1102]

1. Error code definition

Discharge temperature fault

2. Error definition and error detection method

1) If the discharge temperature of 120 °C [248°F] or more is detected during the operation (the first detection), the outdoor unit stops once, turns to anti-restart mode for 3 minutes, and restarts after 3 minutes automatically.
2) If the discharge temperature of 120° C [248°F] or more is detected again (the second detection) within 30 minutes after the second stop of the outdoor unit described, the mode will be changed to 3 - minute restart mode, then the outdoor unit will restart in 3 minutes.
3) If the discharge temperature of 120°C [248°F] or more is detected (the 30th detection) within 30 minutes after the stop of the outdoor unit described (regardless of the first or the 29th stop), the outdoor unit will make an error stop, and the error code "1102" will be displayed.
4) If the discharge temperature of 120°C [248°F] or more is detected more than 30 minutes after the previous stop of the outdoor unit, the detection is regarded as the first detection, and the operation described in step 1) above will start.
5) For 30 minutes after the stop (the first stop or the second stop) of the outdoor unit, preliminary errors will be displayed on the LED display.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Gas leak, gas shortage	Refer to the following page(s). [6-3 Evaluating and Adjusting Refrigerant Charge]
(2)	Overload operation	Check operating conditions and operation status of indoor/ outdoor units.
(3)	LEV failure on the indoor unit	Perform a cooling or heating operation to check the operation. Cooling: Indoor unit LEV, LEV1, LEV2, LEV4 Heating: Indoor unit LEV, LEV2, LEV4 Refer to the following page(s). [8-8 Troubleshooting LEV Problems]
(4)	Outdoor unit LEV1 actuation failure Outdoor unit LEV2 actuation failure Outdoor unit LEV4 actuation failure	
(5)	Closed refrigerant service valve	Confirm that the refrigerant service valve is fully open.
(6)	Outdoor fan (including fan parts) failure, motor failure, or fan controller malfunction Rise in discharge temp. by low pressure drawing for (3) - (6).	Check the fan on the outdoor unit. Refer to the following page(s). [8-7 Troubleshooting Outdoor Unit Fan Problems]
(7)	Gas leak between low and high pressures (4-way valve failure, Compressor failure, Solenoid valve (SV1a) failure)	Perform a cooling or heating operation and check the operation.
(8)	Thermistor failure (TH4)	Refer to the following page(s). [7-7-2 Error Code [5102,5103,5104,5105,5106,5107,5115]]
(9)	Input circuit failure on the controller board thermistor	Check the inlet air temperature on the LED monitor.

7-3-2 Error Code [1301]

1. Error code definition

Low pressure fault

2. Error definition and error detection method

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

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Inner pressure drop due to a leakage.	Refer to the following page(s). [8-5-3 Comparing the Low-Pressure Sensor Measurement and Gauge Pressure]
(2)	Low pressure sensor failure	
(3)	Short-circuited pressure sensor cable due to torn outer rubber	
(4)	A pin on the male connector is missing.	
(5)	Disconnected wire	
(6)	Failure of the low pressure input circuit on the controller board	

Note

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

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

1. Error code definition

High pressure fault 1 (Outdoor unit)

2. Error definition and error detection method

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

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Indoor unit LEV2 actuation failure -> Cooling Indoor unit LEV actuation failure -> Heating	Perform a cooling or heating operation to check the operation. Cooling: Indoor unit LEV2 Heating: Indoor unit LEV Refer to the following page(s). [8-8 Troubleshooting LEV Problems]
(2)	Closed refrigerant service valve	Confirm that the refrigerant service valve is fully open.
(3)	Short cycle on the indoor unit side	Check the indoor units for problems and correct them, if any.
(4)	Clogged filter on the indoor unit	
(5)	Reduced air flow due to dirty fan on the indoor unit fan	
(6)	Dirty heat exchanger of the indoor unit	
(7)	Indoor fan (including fan parts) failure or motor failure Rise in high pressure caused by lowered condensing capacity in heating operation for (2) - (7).	
(8)	Short cycle on the outdoor unit	Check the outdoor units for problems and correct them, if any.
(9)	Dirty heat exchanger of the outdoor unit	
(10)	Outdoor fan (including fan parts) failure, motor failure, or fan controller malfunction Rise in discharge temp. by low pressure drawing for (8) - (10).	Check the fan on the outdoor unit. Refer to the following page(s). [8-7 Troubleshooting Outdoor Unit Fan Problems]
(11)	Solenoid valve (SV1a) malfunction (The by-pass valve (SV1a) can not control rise in high pressure).	Refer to the following page(s). [8-6 Troubleshooting Solenoid Valve Problems]
(12)	Thermistor failure (TH3, TH7)	Refer to the following page(s). [7-7-2 Error Code [5102,5103,5104,5105,5106,5107,5115]]
(13)	Pressure sensor failure	Refer to the following page(s). [8-5-1 Comparing the High-Pressure Sensor Measurement and Gauge Pressure]
(14)	Failure of the thermistor input circuit and pressure sensor input circuit on the controller board	Check the temperature and the pressure of the sensor with LED monitor.
(15)	Thermistor mounting problem (TH3, TH7)	Check the temperature and the pressure of the sensor with LED monitor.
(16)	Disconnected male connector on the pressure switch (63H1) or disconnected wire	
(17)	Voltage drop caused by unstable power supply voltage	Check the input voltage at the power supply terminal block (TB1).
(18)	Open phase in the power-supply due to improper power-supply wiring	Refer to item (5) in section [6-1 Read before Test Run].

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

1. Error code definition

High pressure fault 2 (Outdoor unit)

2. Error definition and error detection method

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

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Inner pressure drop due to a leakage.	Refer to the following page(s). [8-5-1 Comparing the High-Pressure Sensor Measurement and Gauge Pressure]
(2)	Pressure sensor failure	
(3)	Shorted-circuited pressure sensor cable due to torn outer rubber	
(4)	A pin on the male connector on the pressure sensor is missing or contact failure	
(5)	Disconnected pressure sensor cable	
(6)	Failure of the pressure sensor input circuit on the controller board	
(7)	Open phase in the power-supply due to improper power-supply wiring	Refer to item (5) in section [6-1 Read before Test Run].

7-3-5 Error Code [1500]

1. Error code definition

Refrigerant overcharge

2. Error definition and error detection method

An error can be detected by the discharge temperature superheat.

1) If the formula "ToilSH (shell bottom SH) ≦10°C [50°F]" is satisfied during operation (first detection), the outdoor unit stops, goes into the 3-minute restart mode, and starts up in three minutes.
2) If the formula "TdSH ≦10°C [50°F]" is satisfied again within 30 minutes of the fifth stoppage of the outdoor unit (sixth detection), the unit comes to an abnormal stop, and the error code "1500" appears.
3) If the formula "ToilSH (shell bottom SH) ≦10°C [50°F]" is satisfied 30 minutes or more after the first stoppage of the outdoor unit, the same sequence as Item 1) above (first detection) is followed.
4) For 30 minutes after the stop of the outdoor unit, preliminary errors will be displayed on the LED display.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Overcharged refrigerant	Refer to the following page(s). [6-3 Evaluating and Adjusting Refrigerant Charge]
(2)	Thermistor input circuit failure on the control board	Check the temperature and pressure readings on the sensor that are displayed on the LED monitor.
(3)	Faulty mounting of thermistor (TH15)	Check the temperature and pressure readings on the thermistor that are displayed on the LED monitor.
(4)	Outdoor unit LEV2 actuation failure -> Heating	Refer to the following page(s). [8-8 Troubleshooting LEV Problems]

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

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

1. Error code definition

Drain sensor submergence

2. Error definition and error detection method

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

3. Cause, check method and remedy

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

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

1. Error code definition

Drain sensor submergence

2. Error definition and error detection method

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

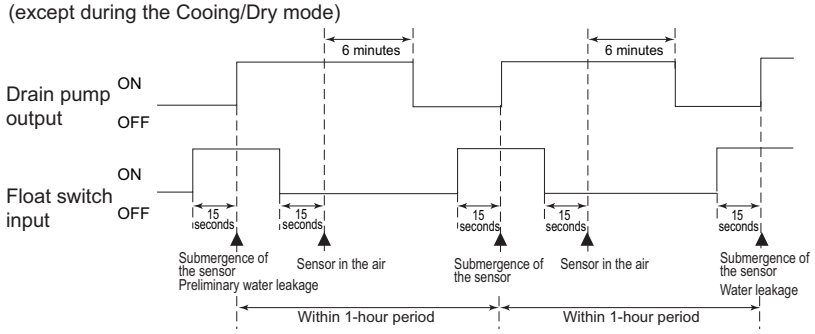
- One hour after the preliminary water leakage was detected, it is not detected that the drain pump goes from OFF to ON.
- The operation mode is changed to Cool/Dry.
- The liquid pipe temperature minus the inlet temperature is - 10°C [-18°F] or less.

3. Cause, check method and remedy

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

<Reference>

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



7-4-3 Error Code [2502] (Models with a drain sensor)

1. Error code definition

Drain pump fault

2. Error definition and error detection method

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

Note

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

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Drain pump failure	Check for proper functioning of the drain pump.
(2) Drain water drainage problem ♦Clogged drain pump ♦Clogged drain piping	Check for proper drainage.
(3) Adhesion of water drops to the drain sensor ♦Trickling of water along the lead wire ♦Rippling of drain water caused by filter clogging	1) 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) Wrong dipswitch setting on the indoor unit controller board ♦Dipswitch for the new indoor unit controller board was wrongly set to "unit model without drain pump" instead of "unit model with drain pump" when the board was replaced.	Check for proper dipswitch model setting on the indoor unit controller board.

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

1. Error code definition

Drain pump fault

2. Error definition and error detection method

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

Note

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

3. Cause, check method and remedy

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

7-4-5 Error Code [2503]

1. Error code definition

Drain sensor (Thd) fault

2. Error definition and error detection method

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

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

3. Cause, check method and remedy

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

7-4-6 Error Code [2600]

1. Error code definition

Water leakage

2. Cause, check method and remedy

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

7-4-7 Error Code [2601]

1. Error code definition

Water supply cutoff

2. Cause, check method and remedy

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

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

7-5-1 Error Code [3121]

1. Error code definition

Out-of-range outside air temperature

2. Error definition and error detection method

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

3. Cause, check method and remedy

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

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

<Reference>

	Short detection	Open detection
TH7	110 ˚C [230 ˚F] and above (0.4 k Ω and below)	-50 ˚C [-58 ˚F] and below (241 k Ω and above)

7-5-2 Error Code [3511]

1. Error code definition

Refrigerant overcooling

2. Error definition and error detection method

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

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

3. Cause, check method and remedy

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

7-5-3 Error Code [3512]

1. Error code definition

Cooling fan locking

2. Error definition and error detection method

♦The motor on the cooling fan locks during operation.

3. Cause, check method and remedy

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

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

7-6-1 Error Code [4102]

1. Error code definition

Open phase

2. Error definition and error detection method

- An open phase of the power supply was detected at power on.

Note

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

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Power supply problem - Open phase voltage of the power supply - Power supply voltage drop	- Check the input voltage to the power supply terminal block TB1. - Possible open phase in the power-supply due to improper power-supply wiring. (Refer to item (5) in section [6-1 Read before Test Run].)
(2) Noise filter problem - Coil problem - Circuit board failure	- Check the coil connections. - Check for coil burnout.
(3) Wiring failure	[TNU models] Check the wiring between CN13 on the noise filter and CNAC on the control board. Check the wiring between CN11 on the noise filter and CN110 on the control board. [YNU 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. TB21/TB22/TB23 of the noise filter - CN2 of the noise filter - Transformer Box - CNAC of the control board.
(4) Blown fuse	[TNU models] Check that F001 on the control board is not blown. →If a blown fuse is found, check for a short-circuiting or earth fault of the actuator. Check noise filter fuses F001 and F002. →If a blown fuse is found, check for a short-circuiting or earth fault of the actuator. [YNU models] Check the fuse F001 on the control board and the fuses F4 and F5 next to the power-supply terminal block for a blown fuse. →If a blown fuse is found, check for a short-circuiting or earth fault of the actuator.
(5) Control board failure	Replace the control board if none of the above is causing the problem.

7-6-2 Error Code [4106]

1. Error code definition

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

2. Error definition and error detection method

Transmission power output failure

3. Cause

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

4. Check method and remedy

Check the transmission power supply circuit on all outdoor units in a given refrigerant circuit for problems. [8-10-2 Trouble-shooting Problems with Outdoor Unit Transmission Power Supply Circuit]

1. Error code definition

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

2.Error definition and error detection method

Transmission power reception failure

3.Cause

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

4.Check method and remedy

Check the transmission power supply circuit on all outdoor units in a given refrigerant circuit for problems. [8-10-2 Trouble-shooting Problems with Outdoor Unit Transmission Power Supply Circuit]

7-6-3 Error Code [4109]

1. Error code definition

Indoor unit fan operation error

2. Error definition and error detection method

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

3. Cause, check method and remedy

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

7-6-4 Error Code [4114]

1. Error code definition

Indoor unit fan motor error

2. Error definition and error detection method

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

3. Cause, check method and remedy

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

7-6-5 Error Code [4116]

1. Error code definition

RPM error/Motor error

2. Error definition and error detection method

♦LOSSNAY

∗The motor keep running even if the power is OFF.

∗The thermal overload relay is ON. (Only for the three-phase model)

♦Indoor unit

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

3. Cause, check method and remedy

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

7-6-6 Error Code [4121]

1. Error code definition

Function setting error

2. Error source, cause, check method and remedy

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

7-6-7 Error Code [4124]

1. Error code definition

Electric system not operate due to damper abnormality

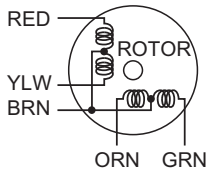
2. Error definition and error detection method

When the damper is not located at the designated position.

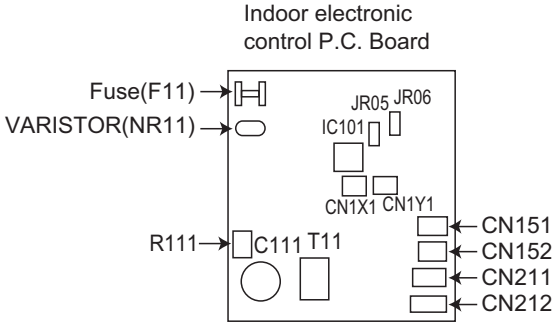
3. Cause, check method and remedy

When the damper is not located at the designated position.

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

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

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



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

7-6-8 Error Code [4220, 4225, 4226] Detail Code 108

1. Error code definition

Abnormal bus voltage drop (Detail code 108) (YNU)

2. Error definition and error detection method

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

3. Cause, check method and remedy

(1) Power supply environment

Check the power-supply wiring for an open phase. Refer to item (5) in section [6-1 Read before Test Run].
Find out if there was a (momentary) power failure.
Check whether the power voltage (Between L1 and L2, L2 and L3, and L1 and L3) is 414 V or less across all phases.

(2) Voltage drop detected

4220

INV35Y, INV42Y, and INV37YC

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

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

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

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

1) Check the coil (L) connections and for broken wiring.
2) Check the wiring connections between noise filter board and INV board and between INV board and R1 through R5.
3) Check the in-rush current resistor. Refer to the following page(s). [8-9-14 Simple Check on Inverter Circuit Components]
4) If the problem persists after reboot, replace the INV board.

4225, 4226

- Check the voltage at relay connector RYPN while the inverter is stopped. If the voltage is below 420 V, check the following items.

1) Check for proper connections of noise filter coil and DC reactor, and for broken wiring.
2) Check the wiring connections between INV board and FAN board.
3) Check item for 4220

Replace the FAN board if no problems are found.

- Check the voltage at connector RYPN while the inverter is stopped. If the voltage is 420 V or above, check the following items.

1) Check the state of the wiring connections between the INV board and the Fan board.
2) Check contents 4220

Replace the Fan board if no problems are found.

(3) Control board failure

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

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-6-9 Error Code [4220, 4225, 4226] Detail Code 108

1. Error code definition

Abnormal bus voltage drop (Detail code 108) (TNU)

2. Error definition and error detection method

If Vdc 160V or less is detected during Inverter operation. (S/W detection)

3. Cause, check method and remedy

(1) Power supply environment

Check the power-supply wiring for an open phase. Refer to item (5) in section [6-1 Read before Test Run].
Find out if there was a (momentary) power failure.
Check whether the power voltage (Between L1 and L2, L2 and L3, and L1 and L3) is 188 V or less across all phases.

(2) Voltage drop detected

4220

INV39C

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

If the voltage is 253 V or above, check the following items.

1) Check the LED monitor to see if the bus voltage is above 160 V, and replace the inverter board if it is 160 V or below.
2) Check the coil (L) connections and for broken wiring.
3) Check the wiring connections between noise filter board and INV board.
4) If the problem persists after reboot, replace the INV board.

If the voltage is below 253 V, check the following items.

1) Check the coil (L) connections and for broken wiring.
2) Check the wiring connections between noise filter board and INV board and between INV board and R1.
3) Check the in-rush current resistor. Refer to the following page(s). [8-9-14 Simple Check on Inverter Circuit Components]
4) If the problem persists after reboot, replace the INV board.

INV38

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

If the voltage is 253 V or above, check the following items.

1) Check the LED monitor to see if the bus voltage is above 160 V, and replace the inverter board if it is 160 V or below.
2) Check the coil (L) connections and for broken wiring.
3) Check the wiring connections between noise filter board and INV board and between INV board and capacitor board.
4) If the problem persists after reboot, replace the INV board.

If the voltage is below 253 V, check the following items.

1) Check the coil (L) connections and for broken wiring.
2) Check the wiring connections between noise filter board and INV board, between INV board and capacitor board, and between INV board and R1.
3) Check the in-rush current resistor. Refer to the following page(s). [8-9-14 Simple Check on Inverter Circuit Components]
4) If the problem persists after reboot, replace the INV board.

4225, 4226

- Check the voltage at relay connector RYPN while the inverter is stopped. If the voltage is below 420 V, check the following items.

1) Check for proper connections of noise filter coil and DC reactor, and for broken wiring.
2) Check the wiring connections between INV board and FAN board.
3) Check item for 4220

Replace the FAN board if no problems are found.

- Check the voltage at connector RYPN while the inverter is stopped. If the voltage is 420 V or above, check the following items.

1) Check the state of the wiring connections between the INV board and the Fan board.
2) Check contents 4220

Replace the Fan board if no problems are found.

(3) Control board failure

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

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-6-10 Error Code [4220, 4225, 4226] Detail Code 109

1. Error code definition

Abnormal bus voltage rise (Detail code 109)

2. Error definition and error detection method

If Vdc ≥830V is detected during inverter operation. (YNU)
If Vdc ≥400V is detected during inverter operation. (TNU)

3. Cause, check method and remedy

(1) Different voltage connection

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

(2) INV board failure

If the problem recurs, replace the INV board or fan board.
In the case of 4220: INV board
In the case of 4225 and 4226: Fan board

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-6-11 Error Code [4220] Detail Code 110

1. Error code definition

VDC error (Detail code 110)

2. Error definition and error detection method

BUS voltage error When Vdc is equal to or greater than 814 volts (hardware detection) (YNU)
BUS voltage error When Vdc is equal to or greater than 407 volts (hardware detection) (TNU)

3. Cause, check method and remedy

Details of 4220 error: See No. 108 and 109.
Also see error details No. 129 of 4220 error (applicable to INV37YC and INV39C only).

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-6-12 Error Code [4220, 4225, 4226] Detail Code 111, 112

1. Error code definition

Logic error (Detail code 111, 112)

2. Error definition and error detection method

Hardware error
If only the hardware error logic circuit operates, and no identifiable error is detected.

3. Cause, Check method and remedy

In the case of 4220

Cause		Check method and remedy
(1)	External noise	Refer to the following page(s). [8-9-2 Checking the Inverter Board Error Detection Circuit]
(2)	INV board failure	

In the case of 4225 and 4226

Cause		Check method and remedy
(1)	External noise	Refer to the following page(s). [8-9-8 Checking the Fan Board Error Detection Circuit at No Load] [8-9-9 Checking the Fan Board for Damage at No Load] [8-9-10 Checking the Fan Board for Damage with Load]
(2)	Fan board failure	

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-6-13 Error Code [4220] Detail Code 123

1. Error code definition

Voltage boost control error (Detail code 123)(outdoor unit)

2. Error definition and error detection method

When a drop in power supply voltage or a malfunction in the booster circuit is detected

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Inverter-output-related items	Refer to the following page(s). [8-9-2 Checking the Inverter Board Error Detection Circuit] Refer to the following page(s). [8-9-3 Checking the Compressor for Ground Fault and Coil Resistance Problems] Refer to the following page(s). [8-9-4 Checking the Inverter for Damage at No-Load] Refer to the following page(s). [8-9-5 Checking the Inverter for Damage during Compressor Operation] Refer to the following page(s). [8-9-11 Checking the Installation Conditions]

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-6-14 Error Code [4220] Detail Code 129

1. Error code definition

Control power supply error (Detail code 129)(outdoor unit)

2. Error definition and error detection method

INV35Y, INV42Y, and INV38
Detection of insufficient drive voltage for relays on INV board

INV37YC and INV39C
Detection of insufficient drive voltage for relays on INV board or for IGBT

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Contact failure	<INV35Y, INV42Y, and INV38> Check the connectors CNRY on INV board and CNRYA on MAIN board for proper connections. <INV37YC> Check the connectors CNRY on INV board and CNRYA on MAIN board for proper connections. Check the connectors CN200 on INV board and CN300 on PS board for proper connections. <INV39C> Check the connectors CNRY and CNRY2 on INV board and CNRYA on MAIN board for proper connections.
(2) Voltage check	Disconnect the connector CNRYA from the control board and check the voltage at the connector CNRYA. If a voltage of 13 V is not output, replace the control board and the PS board.
(3) Inverter board failure	If the problem persists after reboot, replace the INV board.

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-6-15 Error Code [4220, 4225, 4226] Detail Code 131

1. Error code definition

Low bus voltage at startup (Detail code 131) (YNU)

2. Error definition and error detection method

When Vdc ≤289 V is detected just before the inverter operation. (YNU)

3. Cause, check method and remedy

(1) Inverter main circuit failure

Same as detail code 108 of 4220 error

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

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

1. Error code definition

Low bus voltage at startup (Detail code 131) (TNU)

2. Error definition and error detection method

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

3. Cause, check method and remedy

(1) Inverter main circuit failure

Same as detail code 108 of 4220 error

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-6-17 Error Code [4230] Detail Code 125

1. Error code definition

Heatsink overheat protection (Detail code 125)

2. Error definition and error detection method

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

models	TOH
INV35Y, INV42Y, INV38	100°C
INV37YC	94°C
INV39C	98°C

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Fan board failure	Refer to the following page(s). [8-9-8 Checking the Fan Board Error Detection Circuit at No Load] [8-9-9 Checking the Fan Board for Damage at No Load] [8-9-10 Checking the Fan Board for Damage with Load]
(2) THHS failure	1) Check for proper installation of the INV board and FAN board IGBT. (Check for proper installation of the IGBT heatsink.) 2) Check the THHS sensor reading on the LED monitor. →If an abnormal value appears, replace the INV board.
(3) Outdoor unit LEV9 malfunction	Check the operation of the unit in the Cooing or in the Heating mode. LEV9 Refer to the following page(s). [8-8 Troubleshooting LEV Problems]
(4) Low-pressure sensor fault	Refer to the following page(s). [8-5 Pressure Sensor Circuit Configuration and Troubleshooting Pressure Sensor Problems]

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

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

1. Error code definition

Heatsink overheat protection (Detail code 125) (outdoor unit)

2. Error definition and error detection method

Detection of fan INV heatsink temperature (THHS) ≥ 100°C

3. Cause, check method and remedy

Cause	Check method and remedy
(1) FAN board fault	Refer to the following page(s). [8-9-8 Checking the Fan Board Error Detection Circuit at No Load] [8-9-9 Checking the Fan Board for Damage at No Load] [8-9-10 Checking the Fan Board for Damage with Load]
(2) Outdoor unit fan failure	1) Check the outdoor unit fan for proper operation. Check the fan motor if problems are found with the operation of the fan. Refer to the following page(s). [8-9-7 Checking the Fan Motor for Ground Fault and Coil Resistance Problems]
(3) Air passage blockage	1) Check the heatsink and the duct for blockage. Refer to the following page(s). [8-9-16 Checking the Fan Inverter Heatsink for Clogging]
(4) THHS failure	1) Check the IGBT heatsink for proper mounting. 2) Check the THHS sensor reading on the LED. → Replace the INV board if the THHS value is abnormal.

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-6-19 Error Code [4230] Detail Code 126

1. Error code definition

DCL temperature fault (Detail code 126)(outdoor unit)

2. Error definition and error detection method

When DCL temperature that equals or exceeds 150˚C is detected (applicable to INV37YC and INV39C)

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Contact failure	Check the connector CNTH on the INV board for proper connection.
(2) DCL temperature sensor fault	Disconnect the connector (CNTH), and measure the resistance of the DCL temperature sensor. Replace the DCL temperature sensor if the value is abnormal. Refer to [3-3 Functions of the Major Components of Outdoor Unit].
(3) INV board failure	Replace the INV board if the problem persists after the operation is resumed.

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

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

1. Error code definition

Overload protection (YNU)

2. Error definition and error detection method

If the output current of "(Iac) >Imax (Arms)" or "THHS > TOL" is continuously detected for 10 minutes during inverter operation.
Refer to the following page(s). [7-1 Error Code and Preliminary Error Code Lists]

3. Cause, check method and remedy

Cause	Check method and remedy
(1) IPM contact failure	Check the IPM and cooling plate for proper contact. (Remove the inverter board, and check the IPM heatsink grease.)
(2) Air passage blockage	Check that the heat sink cooling air passage is not blocked
(3) Power supply environment	Power supply voltage is 414 V or above.
(4) Inverter, FAN board failure	Refer to the following page(s). [8-9 Troubleshooting Inverter Problems]
(5) Compressor failure	Check that the compressor has not overheated during operation. → Check the refrigerant circuit (oil return section). Refer to the following page(s). [8-9-3 Checking the Compressor for Ground Fault and Coil Resistance Problems]
(6) The model selection switches (SW5-3 - 5-8) on the outdoor unit are set incorrectly.	Check the setting for the model selection switch on the outdoor unit (Dipswitches SW5-3 - 5-8 on the outdoor unit control board). For switch settings, refer to the following page(s). [7-9-2 Error Code [7101]]

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-6-21 Error Code [4240, 4245, 4246]

1. Error code definition

Overload protection (TNU)

2. Error definition and error detection method

If the output current of "(Iac) >Imax (Arms)" or "THHS > TOL" is continuously detected for 10 minutes during inverter operation.
Refer to the following page(s). [7-1 Error Code and Preliminary Error Code Lists]

3. Cause, check method and remedy

Cause	Check method and remedy
(1) IPM contact failure	Check the IPM and cooling plate for proper contact. (Remove the inverter board, and check the IPM heatsink grease.)
(2) Air passage blockage	Check that the heat sink cooling air passage is not blocked
(3) Power supply environment	Power supply voltage is 188 V or above.
(4) Inverter, FAN board failure	Refer to the following page(s). [8-9 Troubleshooting Inverter Problems]
(5) Compressor failure	Check that the compressor has not overheated during operation. → Check the refrigerant circuit (oil return section). Refer to the following page(s). [8-9-3 Checking the Compressor for Ground Fault and Coil Resistance Problems]
(6) The model selection switches (SW5-3 - 5-8) on the outdoor unit are set incorrectly.	Check the setting for the model selection switch on the outdoor unit (Dipswitches SW5-3 - 5-8 on the outdoor unit control board). For switch settings, refer to the following page(s). [7-9-2 Error Code [7101]]

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-6-22 Error Code [4250, 4255, 4256] Detail Code 101

1. Error code definition

IPM error (Detail code 101)

2. Error definition and error detection method

In the case of 4250

If an overcurrent is detected by the overcurrent detection circuit (INV35Y: CT003, INV42Y: R100, INV37YC: R127, INV39C(CT-3)) on the INV board.

In the case of 4255 and 4256

IPM error signal is detected.

3. Cause, check method and remedy

In the case of 4250

Cause	Check method and remedy
(1) Inverter output related	Refer to the following page(s). [8-9-2 Checking the Inverter Board Error Detection Circuit] [8-9-3 Checking the Compressor for Ground Fault and Coil Resistance Problems] [8-9-4 Checking the Inverter for Damage at No-Load] [8-9-5 Checking the Inverter for Damage during Compressor Operation] [8-9-11 Checking the Installation Conditions] Check the IGBT module resistance value of the INV board, if no problems are found. [8-9-15 Troubleshooting Problems with IGBT Module]
(2) The model selection switches (SW5-3 - 5-8) on the outdoor unit are set incorrectly.	Check the setting for the model selection switch on the outdoor unit (Dipswitches SW5-3 - 5-8 on the outdoor unit control board). For switch settings, refer to the following page(s). [7-9-2 Error Code [7101]]
(3) Open phase in the power-supply due to improper power-supply wiring.	Refer to item (5) in section [6-1 Read before Test Run].

In the case of 4255 and 4256

Cause	Check method and remedy
(1) Fan motor abnormality	Refer to the following page(s). [8-9-7 Checking the Fan Motor for Ground Fault and Coil Resistance Problems]
(2) Fan board failure	Refer to the following page(s). [8-9-8 Checking the Fan Board Error Detection Circuit at No Load] [8-9-9 Checking the Fan Board for Damage at No Load] [8-9-10 Checking the Fan Board for Damage with Load]

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-6-23 Error Code [4250, 4255, 4256] Detail Code 104

1. Error code definition

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

2. Error definition and error detection method

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

3. Cause, check method and remedy

In the case of 4250

Cause	Check method and remedy
(1) Grounding fault compressor	Refer to the following page(s). [8-9-3 Checking the Compressor for Ground Fault and Coil Resistance Problems]
(2) Inverter output related	Refer to the following page(s). [8-9-2 Checking the Inverter Board Error Detection Circuit] [8-9-3 Checking the Compressor for Ground Fault and Coil Resistance Problems] [8-9-4 Checking the Inverter for Damage at No-Load] [8-9-5 Checking the Inverter for Damage during Compressor Operation] [8-9-11 Checking the Installation Conditions]
(3) Open phase in the power-supply due to improper power-supply wiring	Refer to item (5) in section [6-1 Read before Test Run]

In the case of 4255 and 4256

Cause	Check method and remedy
(1) Grounding fault of fan motor	Refer to the following page(s). [8-9-7 Checking the Fan Motor for Ground Fault and Coil Resistance Problems]
(2) Fan board failure	Refer to the following page(s). [8-9-8 Checking the Fan Board Error Detection Circuit at No Load] [8-9-9 Checking the Fan Board for Damage at No Load] [8-9-10 Checking the Fan Board for Damage with Load]

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-6-24 Error Code [4250, 4255, 4256] Detail Code 105

1. Error code definition

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

2. Error definition and error detection method

When a short is detected on the load side just before starting the inverter operation.

3. Cause, Check method and remedy

In the case of 4250

Cause	Check method and remedy
(1) Short - circuited compressor	Refer to the following page(s). [8-9-3 Checking the Compressor for Ground Fault and Coil Resistance Problems]
(2) Output wiring	Check for a short circuit.

In the case of 4255 and 4256

Cause	Check method and remedy
(1) Short - circuited fan motor	Refer to the following page(s). [8-9-7 Checking the Fan Motor for Ground Fault and Coil Resistance Problems]
(2) Output wiring	Check for a short circuit.

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-6-25 Error Code [4250, 4255, 4256] Detail Code 106 and 107

1. Error code definition

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

2. Error definition and error detection method

When a current above the specified value is detected by the electric current sensor.
Refer to the relevant pages for the details of model names and the specified values.

3. Cause, check method and remedy

In the case of 4250

Cause	Check method and remedy
(1) Inverter output related	Refer to the following page(s). [8-9-2 Checking the Inverter Board Error Detection Circuit] [8-9-3 Checking the Compressor for Ground Fault and Coil Resistance Problems] [8-9-4 Checking the Inverter for Damage at No-Load] [8-9-5 Checking the Inverter for Damage during Compressor Operation] [8-9-11 Checking the Installation Conditions] Check the IGBT module resistance value of the INV board, if no problems are found. [8-9-15 Troubleshooting Problems with IGBT Module]
(2) The model selection switches (SW5-3 - 5-8) on the outdoor unit are set incorrectly.	Check the setting for the model selection switch on the outdoor unit (Dipswitches SW5-3 - 5-8 on the outdoor unit control board). For switch settings, refer to the following page(s). [7-9-2 Error Code [7101]]

In the case of 4255 and 4256

Cause	Check method and remedy
(1) Fan board failure	Refer to the following page(s). [8-9-8 Checking the Fan Board Error Detection Circuit at No Load] [8-9-9 Checking the Fan Board for Damage at No Load] [8-9-10 Checking the Fan Board for Damage with Load]
(2) Outdoor unit fan failure	Check the outdoor unit fan for proper operation. Check the fan motor if problems are found with the operation of the fan. Refer to the following page(s). [8-9-7 Checking the Fan Motor for Ground Fault and Coil Resistance Problems]
(3) Air passage blockage	Check that the heat sink cooling air passage is not blocked
(4) The model selection switches (SW5-3 - 5-8) on the outdoor unit are set incorrectly.	Check the setting for the model selection switch on the outdoor unit (Dipswitches SW5-3 - 5-8 on the outdoor unit control board). For switch settings, refer to the following page(s). [7-9-2 Error Code [7101]]

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-6-26 Error Code [4250] Detail Code 121, 128, and 122

1. Error code definition

DCL overcurrent error (H/W) (Detail code 121 and 128)(outdoor unit) DCL overcurrent error (S/W) (Detail code 122) (outdoor unit)

2. Error definition and error detection method

When a DCL overcurrent is detected by the electric current sensor

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Inverter-output-related items	Refer to the following page(s). [8-9-2 Checking the Inverter Board Error Detection Circuit] Refer to the following page(s). [8-9-3 Checking the Compressor for Ground Fault and Coil Resistance Problems] Refer to the following page(s). [8-9-4 Checking the Inverter for Damage at No-Load] Refer to the following page(s). [8-9-5 Checking the Inverter for Damage during Compressor Operation] Refer to the following page(s). [8-9-11 Checking the Installation Conditions]

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-6-27 Error Code [4255, 4256] Detail Code 137

1. Error code definition

Motor synchronization loss (Detail code 137)

2. Error definition and error detection method

Fan motor locking was detected during operation.

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Fan motor locking	Check the fan blades for objects obstructing fan rotation.
(2) Fan motor failure	Refer to the following page(s). [8-9-7 Checking the Fan Motor for Ground Fault and Coil Resistance Problems]
(3) Fan board failure	Refer to the following page(s). [8-9-8 Checking the Fan Board Error Detection Circuit at No Load] [8-9-9 Checking the Fan Board for Damage at No Load] [8-9-10 Checking the Fan Board for Damage with Load]

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-6-28 Error Code [4260]

1. Error code definition

Heatsink overheat protection at startup

2. Error definition and error detection method

When heatsink temperature (THHS) remains at or above TOH for 10 minutes or longer after inverter startup

models	TOH
INV35Y, INV42Y, INV38	100˚C
INV37YC	94˚C
INV39C	98˚C

3. Cause, check method and remedy

Same as 4230 error

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

7-7-1 Error Code [5101, 5102, 5103, 5104]

1. Error code definition

5101
Return air temperature sensor (TH21) fault (Indoor unit)
Return air temperature sensor (TH4) fault (OA processing unit)

5102
Pipe temperature sensor (TH22) fault (Indoor unit)
Pipe temperature sensor (TH2) fault (OA processing unit)

5103
Gas-side pipe temperature sensor (TH23) fault (Indoor unit)
Gas-side pipe temperature sensor (TH3) fault (OA processing unit)

5104
Intake air temperature sensor (TH1) fault (OA processing unit)
Intake air temperature sensor (TH24) fault (All-fresh (100% outdoor air) type indoor unit)

2. Error definition and error detection method

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

3. Cause, check method and remedy

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

7-7-2 Error Code [5102,5103,5104,5105,5106,5107,5115]

1. Error code definition

5102
HIC bypass circuit outlet temperature sensor (TH2) fault (Outdoor unit)

5103
Heat exchanger outlet temperature sensor (TH3) fault (Outdoor unit)

5104
Discharge temperature sensor (TH4) fault (Outdoor unit)

5105
Accumulator inlet temperature sensor (TH5) fault (Outdoor unit)

5106
HIC circuit outlet temperature sensor (TH6) fault (Outdoor unit)

5107
Outside temperature sensor (TH7) fault (Outdoor unit)

5115
Shell bottom temperature sensor (TH15) error (outdoor unit)

2. Error definition and error detection method

- When a short (high temperature intake) or an open (low temperature intake) of the thermistor is detected (the first detection), the outdoor unit stops, turns to anti-restart mode for 3 minutes, and restarts when the detected temperature of the thermistor.
- When a short or an open is detected again (the second detection) after the first restart of the outdoor unit, the outdoor unit stops, turns to anti-restart mode for 3 minutes, and restarts in 3 minutes when the detected temperature is within the normal range.
- When a short or an open is detected again (the third detection) after the previous restart of the outdoor unit, the outdoor unit makes an error stop.
- When a short or an open of the thermistor is detected just before the restart of the outdoor unit, the outdoor unit makes an error stop, and the error code "5102", "5103", 5104", "5105", "5106", "5107" or "5115" will appear.
- During 3-minute antirestart mode, preliminary errors will be displayed on the LED display.
- A short or an open described above is not detected for 10 minutes after the compressor start, during defrost mode, or for 3 minutes after defrost mode.

3. Cause, check method and remedy

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

<Reference>

	Short detection	Open detection
TH2	70°C [158°F] and above (1.19kΩ and below)	-50°C [-58°F] and below (241kΩ and above)
TH3	110°C [230°F] and above (0.4kΩ and below)	-50°C [-58°F] and below (241kΩ and above)
TH4	240°C [464°F] and above (0.05kΩ and below)	-20°C [-4°F] and below (40kΩ and above)
TH5	70°C [158°F] and above (1.19kΩ and below)	-50°C [-58°F] and below (241kΩ and above)
TH6	70°C [158°F] and above (1.19kΩ and below)	-50°C [-58°F] and below (241kΩ and above)
TH7	110°C [230°F] and above (0.4kΩ and below)	-50°C [-58°F] and below (241kΩ and above)
TH15	110°C [230°F] and above (0.4kΩ and below)	-50°C [-58°F] and below (241kΩ and above)

7-7-3 Error Code [5110]

1. Error code definition

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

2. Error definition and error detection method

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

3. Cause, check method and remedy

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

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-7-4 Error Code [5120]

1. Error code definition

DCL temperature sensor circuit fault (Detail code 01)(outdoor unit)

2. Error definition and error detection method

When an open phase or a short circuit of the temperature sensor is detected immediately before inverter startup or during operation (applicable to INV37YC and INV39C)

3. Cause, check method and remedy

INV37YC and INV39C

Cause	Check method and remedy
(1) Contact failure	Check the connector (CNTH) on the inverter board for proper connection.
(2) DCL temperature sensor	Disconnect the connector (CNTH), check the resistance value of the DCL temperature sensor. Replace the DCL if the resistance is as follows: 0.5 kΩ or below (short-circuit) or 1963 kΩ or above (open-circuit).
(3) INV board failure	If the problem persists after restart operation, replace the inverter board.

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-7-5 Error Code [5201]

1. Error code definition

High-pressure sensor fault (63HS1)

2. Error definition and error detection method

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

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	High pressure sensor failure	Refer to the following page(s). [8-5-1 Comparing the High-Pressure Sensor Measurement and Gauge Pressure]
(2)	Pressure drop due to refrigerant leak	
(3)	Torn wire coating	
(4)	A pin on the male connector is missing or contact failure	
(5)	Disconnected wire	
(6)	High pressure sensor input circuit failure on the control board	

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

1. Error code definition

ACCT sensor fault (Detail code 115) (YNU)

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)	Contact failure	Check the connector (CNCT2) on the INV board for proper connection.
(2)	INV output phase loss	Check the output wire for proper connection.
(3)	ACCT sensor failure	Refer to the following page(s). [8-9-14 Simple Check on Inverter Circuit Components]
(4)	Compressor failure	Refer to the following page(s). [8-9-3 Checking the Compressor for Ground Fault and Coil Resistance Problems]
(5)	INV board failure	Replace the INV board if the problem persists after the operation is resumed.

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

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

1. Error code definition

ACCT sensor fault (Detail code 115) (TNU)

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) Contact failure	Check the connector (CNCT2) on the INV board for proper connection.
(2) INV output phase loss	Check the output wire for proper connection.
(3) ACCT sensor failure	Refer to the following page(s). [8-9-14 Simple Check on Inverter Circuit Components]
(4) Compressor failure	Refer to the following page(s). [8-9-3 Checking the Compressor for Ground Fault and Coil Resistance Problems]
(5) INV board failure	Replace the INV board if the problem persists after the operation is resumed.

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-7-8 Error Code [5301] Detail Code 117

1. Error code definition

ACCT sensor circuit fault (Detail code 117)

2. Error definition and error detection method

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

3. Cause, check method and remedy

Cause	Check method and remedy
(1) INV board failure	Refer to the following page(s). [8-9-2 Checking the Inverter Board Error Detection Circuit] [8-9-4 Checking the Inverter for Damage at No-Load] [8-9-5 Checking the Inverter for Damage during Compressor Operation]
(2) Compressor failure	Refer to the following page(s). [8-9-3 Checking the Compressor for Ground Fault and Coil Resistance Problems]

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-7-9 Error Code [5301] Detail Code 119

1. Error code definition

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

2. Error definition and error detection method

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

3. Cause, check method and remedy

Cause	Check method and remedy
(1) ACCT sensor disconnection	Check the connector CNCT2 on the INV board for proper connection. Check the ACCT for proper connection.
(2) ACCT sensor failure	Refer to the following page(s). [8-9-14 Simple Check on Inverter Circuit Components]
(3) Inverter failure	Refer to the following page(s). [8-9-4 Checking the Inverter for Damage at No-Load] [8-9-5 Checking the Inverter for Damage during Compressor Operation]
(4) Compressor failure	Refer to the following page(s). [8-9-3 Checking the Compressor for Ground Fault and Coil Resistance Problems]

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-7-10 Error Code [5301] Detail Code 120

1. Error code definition

Faulty ACCT wiring (Detail code 120)

2. Error definition and error detection method

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

3. Cause, check method and remedy

Cause	Check method and remedy
(1) ACCT sensor connection error	Check the ACCT for proper connection. Refer to the following page(s). [8-9-14 Simple Check on Inverter Circuit Components]
(2) ACCT sensor failure	Refer to the following page(s). [8-9-14 Simple Check on Inverter Circuit Components]
(3) Inverter failure	Refer to the following page(s). [8-9-4 Checking the Inverter for Damage at No-Load] [8-9-5 Checking the Inverter for Damage during Compressor Operation]
(4) Compressor failure	Refer to the following page(s). [8-9-3 Checking the Compressor for Ground Fault and Coil Resistance Problems]

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-7-11 Error Code [5301] Detail Code 127

1. Error code definition

DCL electric current circuit error (Detail code 127)(outdoor unit)

2. Error definition and error detection method

When an abnormal value in the DCL electric current sensor detection circuit is detected

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Contact failure	Check the wiring between CNCT1A and CNCT1B.
(2)	Incorrect installation	Check the wiring on the SC-L terminal.
(3)	INV board failure	If the problem persists after restart operation, replace the inverter board.

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-7-12 Error Code [5305, 5306] Detail Code 135

1. Error code definition

Current sensor fault (Detail code 135)

2. Error definition and error detection method

Detection of output current below 0.2 Arms for 10 continuous seconds while fan motor is in operation

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Open output phase of fan board	Check the output wiring from the fan board for proper connection.
(2)	Fan motor error	Refer to the following page(s). [8-9-7 Checking the Fan Motor for Ground Fault and Coil Resistance Problems]
(3)	Fan board failure	Refer to the following page(s). [8-9-8 Checking the Fan Board Error Detection Circuit at No Load] [8-9-9 Checking the Fan Board for Damage at No Load] [8-9-10 Checking the Fan Board for Damage with Load]

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-7-13 Error Code [5305, 5306] Detail Code 136

1. Error code definition

Current sensor/circuit fault (Detail code 136)

2. Error definition and error detection method

Detection of abnormal value by the current detection circuit before the startup of fan motor

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Fan board fault	Refer to the following page(s). [8-9-8 Checking the Fan Board Error Detection Circuit at No Load] [8-9-9 Checking the Fan Board for Damage at No Load] [8-9-10 Checking the Fan Board for Damage with Load]

Note

For inverter-related error codes, refer to the following page(s). [8-9 Troubleshooting Inverter Problems]

7-7-14 Error Code [5701]

1. Error code definition

Loose float switch connector

2. Error definition and error detection method

Detection of the disconnected float switch (open-phase condition) during operation

3. Cause, check method and remedy

(1) CN4F disconnection or contact failure

Check for disconnection of the connector (CN4F) on the indoor unit control board.

7-8 Error Code Definitions and Solutions: Codes [6000 - 6999]

7-8-1 Error Code [6201]

1. Error code definition

Remote controller board fault (nonvolatile memory error)

2. Error definition and error detection method

This error is detected when the data cannot be read out from the built-in nonvolatile memory on the remote controller.

3. Cause, check method and remedy

(1) Remote controller failure

Replace the remote controller.

7-8-2 Error Code [6202]

1. Error code definition

Remote controller board fault (clock IC error)

2. Error definition and error detection method

This error is detected when the built-in clock on the remote controller is not properly functioning.

3. Cause, check method and remedy

(1) Remote controller failure

Replace the remote controller.

7-8-3 Error Code [6600]

1. Error code definition

Address overlap

2. Error definition and error detection method

An error in which signals from more than one indoor units with the same address are received
Detail code 001: Detection of overlapped address in centralized control system
Detail code 002: Detection of overlapped address in indoor unit system

Note

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

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Two or more of the following have the same address: Outdoor units, indoor units, LOSSNAY units, controllers such as ME remote controllers. <Example> 6600 "01" appears on the remote controller Unit #01 detected the error. Two or more units in the system have 01 as their address.	♦Find the unit that has the same address as that of the error source.**Once the unit is found, correct the address. Then, turn off the outdoor units, indoor units, and LOSSNAY units, keep them all turned off for at least five minutes, and turn them back on.** ♦When air conditioning units are operating normally despite the address overlap error Check the transmission wave shape and noise on the transmission line. Refer to the following page(s). [8-4 Checking Transmission Waveform and for Electrical Noise Interference]
(2) Signals are distorted by the noise on the transmission line.	

7-8-4 Error Code [6601]

1. Error code definition

Polarity setting error

2. Error definition and error detection method

The error detected when transmission processor cannot distinguish the polarities of the M-NET transmission line.
Detail code 001: Detection of polarity setting error in centralized control system
Detail code 002: Detection of polarity setting error in indoor unit system

3. Cause, check method and remedy

Cause	Check method and remedy
(1) No voltage is applied to the M-NET transmission line that AE-200E/AG-150A/GB-50ADA/PAC-YG50ECA/BAC-HD150 are connected to. (2) M-NET transmission line to which AE-200E/AG-150A/GB-50ADA/PAC-YG50ECA/BAC-HD150 are connected is short-circuited. (3) When two or more power supplies are connected to the M-NET	Check if power is supplied to the M-NET transmission line of the AE-200E/AG-150A/GB-50ADA/PAC-YG50ECA/BAC-HD150, and correct any problem found.

7-8-5 Error Code [6602]

1. Error code definition

Transmission processor hardware error

2. Error definition and error detection method

Although "0" was surely transmitted by the transmission processor, "1" is displayed on the transmission line.
Detail code 001: Transmission processor hardware error in centralized control system
Detail code 002: Transmission processor hardware error in indoor unit system

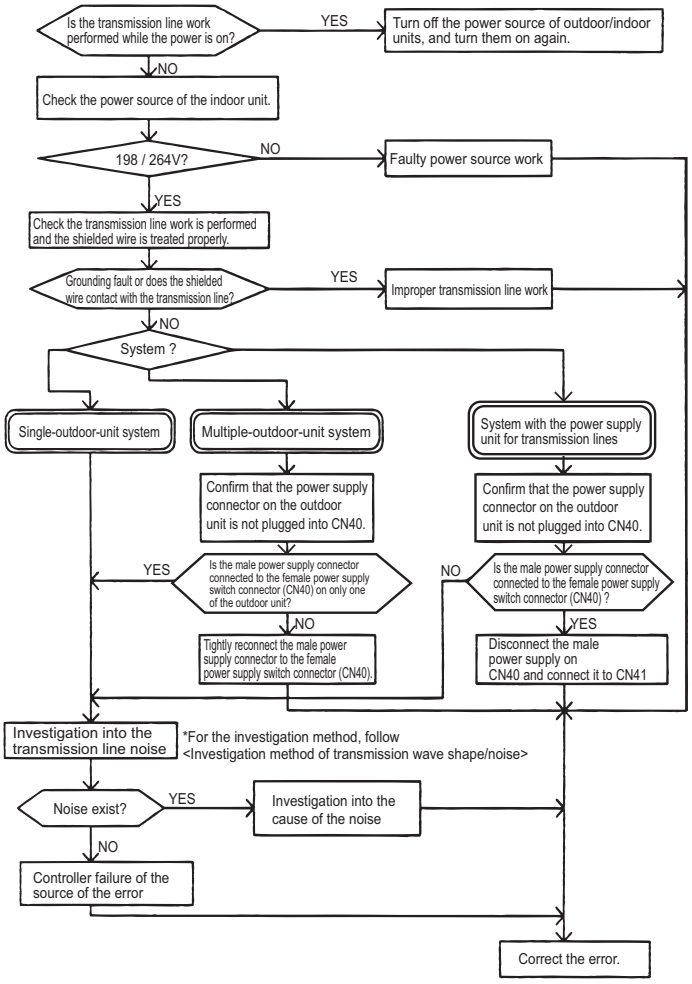
Note

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

3. Cause

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

4. Check method and remedy



7-8-6 Error Code [6603]

1. Error code definition

Transmission line bus busy error

2. Error definition and error detection method

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

Detail code 001: Transmission Bus-Busy error in centralized control system
Detail code 002: Transmission Bus-Busy error in indoor unit system

Note

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

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	The transmission processor cannot be transmitted as the short-wavelength voltage like noise exists consecutively on the transmission line.	Check the transmission wave shape and noise on the transmission line. Refer to the following page(s). [8-4 Checking Transmission Waveform and for Electrical Noise Interference] → No noise indicates that the error source controller is a failure. → If noise exists, investigate the noise.
(2)	Error source controller failure	

7-8-7 Error Code [6606]

1. Error code definition

Communication error between device processor and transmission processor or M-NET processor

2. Error definition and error detection method

Communication error between device processor on circuit board and transmission processor or M-NET processor
Detail code 003: Communication error between device processor on circuit board and M-NET processor

Note

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

3. Cause, check method and remedy

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

7-8-8 Error Code [6607] Error Source Address = Outdoor Unit (OC)

1. Error code definition

No ACK error

2. Error definition and error detection method

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

Note

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

3. Cause, check method and remedy

Cause		Check method and remedy	
(1)	Incidental cause	1)	Turn off the power source of the outdoor unit, and turn it on again.
(2)	Contact failure of transmission line of OC or IC	2)	If the error is accidental, it will run normally. If not, check the causes (2) - (5).
(3)	Decrease of transmission line voltage/signal by exceeding acceptable range of transmission wiring. Farthest: 200 m [656ft] or less Remote controller wiring: 10m [32ft] or less		
(4)	Erroneous sizing of transmission line (Not within the range below). Wire diameter: 1.25mm^2 [AWG16] or more		
(5)	Outdoor unit control board failure		

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

1. Error code definition

No ACK error

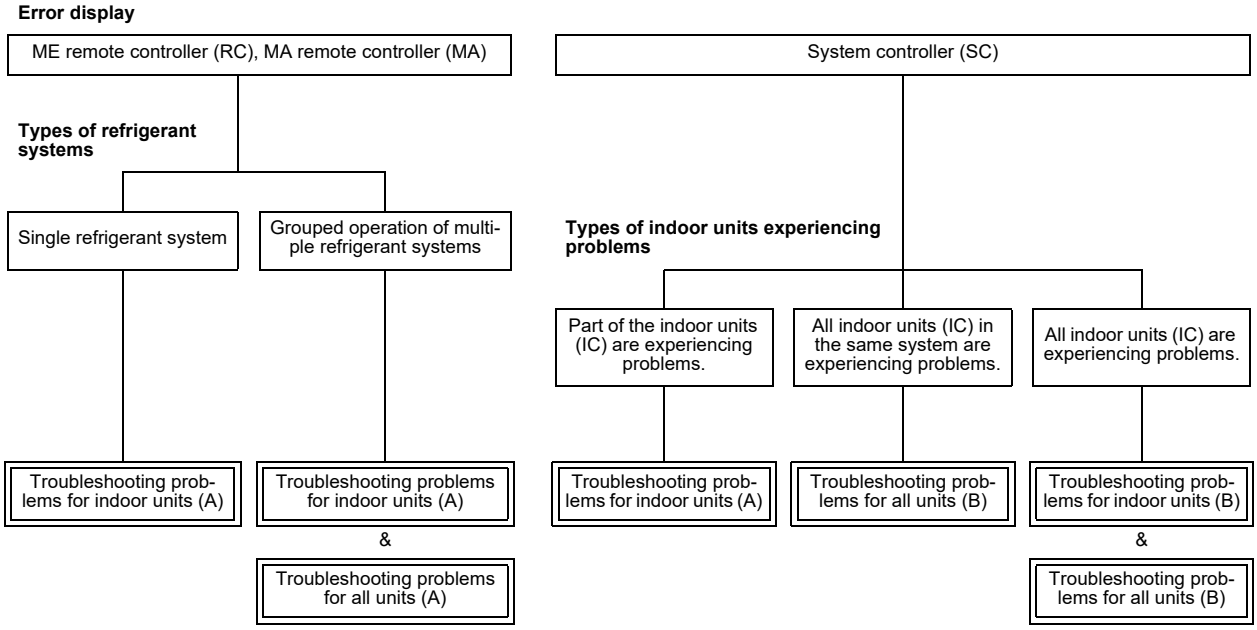
2. Error definition and error detection method

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

Note

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

3. Cause, check method and remedy



(1) Troubleshooting problems for indoor units (A)

Cause	Check method and remedy
(1) Incidental cause	1) Turn off the outdoor/indoor units for 5 or more minutes, and turn them on again.
(2) When IC unit address is changed or modified during operation.	2) If the error is accidental, it will run normally. If not, check the causes (2) - (6).
(3) Faulty or disconnected IC transmission wiring	
(4) Disconnected IC connector (CN2M)	
(5) Indoor unit controller failure	
(6) ME remote controller failure	

(2) Troubleshooting problems for indoor units (B)

Cause		Check method and remedy	
(1)	When the power supply unit for transmission lines is used and the male power supply connector is connected to the female power supply switch connector (CN40) for the transmission line for centralized control	1)	Check voltage of the transmission line for centralized control. •20 V or more: Check (1) on the left. •Less than 20 V: Check (2) on the left.
(2)	Disconnection or shutdown of the power source of the power supply unit for transmission line		
(3)	System controller (MELANS) malfunction	2)	Check the causes of the error indicated by the error codes listed in items (1) through (3) in the "Cause" column.

7-8-10 Error Code [6607] Error Source Address = LOSSNAY (LC)

1. Error code definition

No ACK error

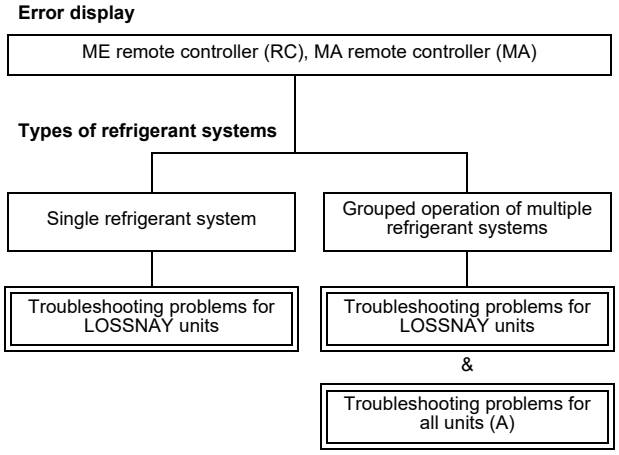
2. Error definition and error detection method

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

Note

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

3. Cause, check method and remedy



(1) Troubleshooting problems for LOSSNAY units

Cause		Check method and remedy	
(1)	Incidental cause	1)	Turn off the power source of LOSSNAY and turn it on again.
(2)	The power source of LOSSNAY has been shut off.	2)	If the error is accidental, it will run normally. If not, check the causes (2) - (6).
(3)	When the address of LOSSNAY is changed in the middle of the operation		
(4)	Faulty or disconnected transmission wiring of LOSSNAY		
(5)	Disconnected connector (CN1) on LOSSNAY		
(6)	Controller failure of LOSSNAY		

7-8-11 Error Code [6607] Error Source Address = ME Remote Controller

1. Error code definition

No ACK error

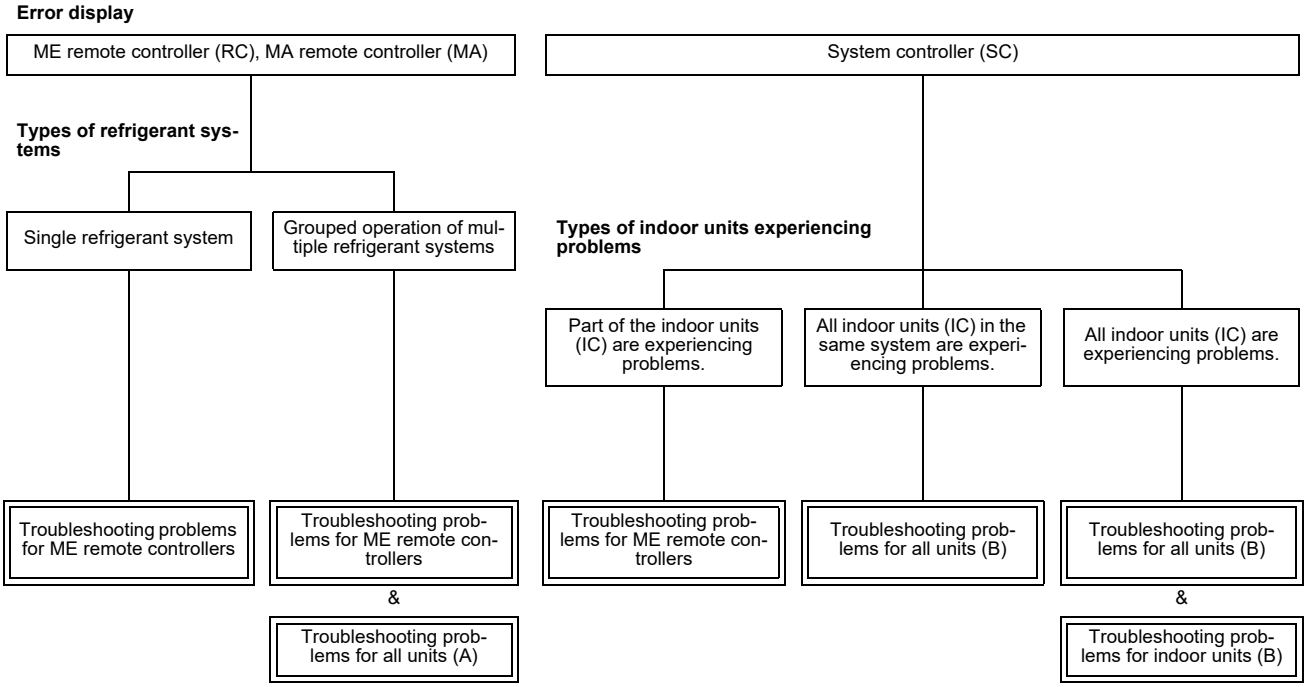
2. Error definition and error detection method

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

Note

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

3. Cause, check method and remedy



(1) Troubleshooting problems for ME remote controllers

Cause	Check method and remedy
(1) Incidental cause	1) Turn off the power source of the outdoor unit for 5 minutes or more, and turn it on again.
(2) Faulty transmission wiring at IC unit side.	2) If not, check the causes (2) - (5).
(3) Faulty wiring of the transmission line for ME remote controller	
(4) When the address of ME remote controller is changed in the middle of the operation	
(5) ME remote controller failure	

7-8-12 Error Code [6607] Error Source Address = System Controller

1. Error code definition

No ACK error

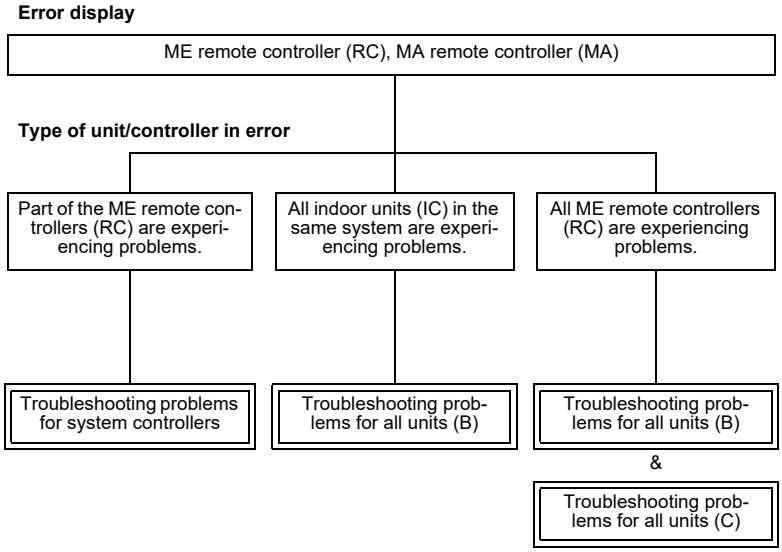
2. Error definition and error detection method

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

Note

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

3. Cause, check method and remedy



(1) Troubleshooting problems for system controllers

Cause	Check method and remedy
(1) Incidental cause	1) Turn off the power source of the outdoor unit for 5 minutes or more, and turn it on again.
(2) Faulty wiring of the transmission line for ME remote controller	2) If not, check the causes (2) - (4).
(3) When the address of ME remote controller is changed in the middle of the operation	
(4) ME remote controller failure	

7-8-13 Error Code [6607] All Error Source Addresses

1. Error code definition

No ACK error

2. Error definition and error detection method

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

Note

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

3. Cause, check method and remedy

(1) Troubleshooting problems for all units (A)

Cause	Check method and remedy
(1) Disconnection or short circuit of the transmission line for the outdoor unit on the terminal block for centralized control line connection (TB7) (2) When multiple outdoor units are connected and the power source of one of the outdoor units has been shut off. (3) The male power supply connector of the outdoor unit is not connected to the female power supply switch connector (CN40). (4) The male power supply connectors on 2 or more outdoor units are connected to the female power supply switch connector (CN40) for centralized control. If an error occurs, after the unit runs normally once, the following causes may be considered. ♦Total capacity error (7100) ♦Capacity code error (7101) ♦Error in the number of connected units (7102) ♦Address setting error (7105)	1) Check the causes of (1) - (4). If the cause is found, correct it. If no cause is found, check 2). 2) Check the LED displays for troubleshooting on other remote controllers whether an error occurs. ♦When an error is present Check the causes of the error indicated by the error codes listed in item (4) in the "Cause" column. ♦When no errors are present Indoor unit circuit board failure

(2) Troubleshooting problems for all units (B)

Cause	Check method and remedy
(1) Total capacity error (7100) (2) Capacity code error (7101) (3) Error in the number of connected units (7102) (4) Address setting error (7105) (5) Disconnection or short circuit of the transmission line for the outdoor unit on the terminal block for centralized control line connection (TB7) (6) Turn off the power source of the outdoor unit (7) Malfunction of electrical system for the outdoor unit	1) Check the LED display for troubleshooting on the outdoor unit. ♦When an error is present Check the causes of the error indicated by the error codes listed in items (1) through (4) in the "Cause" column. ♦When no errors are present Check the causes of the error indicated by the error codes listed in items (5) through (7) in the "Cause" column.

(3) Troubleshooting problems for all units (C)

Cause	Check method and remedy
(1) When the power supply unit for transmission lines is used and the male power supply connector is connected to the female power supply switch connector (CN40) for the transmission line for centralized control (2) Disconnection or shutdown of the power source of the power supply unit for transmission line (3) System controller (MELANS) malfunction	Check the causes of the error indicated by the error codes listed in items (1) through (3) in the "Cause" column.

7-8-14 Error Code [6607] No Error Source Address

1. Error code definition

No ACK error

2. Error definition and error detection method

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

Note

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

3. Cause, check method and remedy

Cause	Check method and remedy
(1) Although the address of ME remote controller has been changed after the group is set using ME remote controller, the indoor unit is keeping the memory of the previous address. The same symptom will appear for the registration with SC.	Delete unnecessary information of non-existing address which some indoor units have. Use either of the following two methods for deletion.
(2) Although the address of LOSSNAY has been changed after the interlock registration of LOSSNAY is made using ME remote controller, the indoor unit is keeping the memory of the previous address.	1) Address deletion by ME remote controller Delete unnecessary address information using the manual setting function of ME remote controller. Refer to the ME remote controller instructions manual for detail. 2) Deletion of connection information of the outdoor unit by the deleting switch Note that the above method will delete all the group settings set via the ME remote controller and all the interlock settings between LOSSNAY units and indoor units. Procedures 1) Turn off the power source of the outdoor unit, and wait for 5 minutes. 2) Turn on the dip switch (SW5-2) on the outdoor unit control board. 3) Turn on the power source of the outdoor unit, and wait for 5 minutes. 4) Turn off the power source of the outdoor unit, and wait for 5 minutes. 5) Turn off the dip switch (SW5-2) on the outdoor unit control board. 6) Turn on the power source of the outdoor unit.

7-8-15 Error Code [6608]

1. Error code definition

No response error

2. Error definition and error detection method

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

Note

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

3. Cause

1) The transmission line work is performed while the power is on, the transmitted data will collide, and the wave shape will be changed.
2) The transmission is sent and received repeatedly due to noise.
3) Decrease of transmission line voltage/signal by exceeding acceptable range of transmission wiring.
   Farthest: 200m [656ft] or less
   Remote controller wiring: 12m [39ft] or less
4) The transmission line voltage/signal is decreased due to erroneous sizing of transmission line.
   Wire diameter: 1.25mm^2[AWG16] or more

4. Check method and remedy

1) When an error occurs during commissioning, turn off the power sources for the outdoor unit, indoor unit, and LOSSNAY for 5 or more minutes, and then turn them on again.
   - When they return to normal operation, the cause of the error is the transmission line work performed with the power on.
   - If an error occurs again, check the cause 2).
2) Check 3) and 4) above.
   - If the cause is found, correct it.
   - If no cause is found, check 3).
3) Check the transmission waveform, and check the transmission line for electrical noise. For details, refer to the following page(s). [8-4 Checking Transmission Waveform and for Electrical Noise Interference]
   Noise is the most possible cause of the error "6608".

7-8-16 Error Code [6831]

1. Error code definition

MA remote controller signal reception error (No signal reception)

2. Error definition and error detection method

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

3. Cause

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

4. Check method and remedy

1) Check for disconnected or loose transmission lines for the indoor units or MA remote controllers.
2) Confirm that the power is supplied to the main power source and the remote controller line.
3) Confirm that MA remote controller's capacity limit is not exceeded.
4) Check the sub/main setting of the MA remote controllers.One of them must be set to MAIN.
5) Diagnose the remote controller (described in the remote controller installation manual).
   [OK]: no problems with the remote controller (check the wiring regulations)
   [NG]: Replace the MA remote controller.
   [6832, 6833, ERC]: Due to noise interference <Go to 6)>
6) Check the transmission waveform, and check the MA remote controller line for electrical noise. For details, refer to the following page(s). [8-4 Checking Transmission Waveform and for Electrical Noise Interference]
7) When no problems are found with items 1) through 6), replace the indoor unit board or the MA remote controller.
   The following status can be confirmed on LED1 and 2 on the indoor unit board.
   - If LED1 is lit, the main power source of the indoor unit is turned on.
   - If LED2 is lit, the MA remote controller line is being powered.

7-8-17 Error Code [6832]

1. Error code definition

MA remote controller signal transmission error (Synchronization error)

2. Error definition and error detection method

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

3. Cause

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

4. Check method and remedy

1) Check for disconnected or loose transmission lines for the indoor units or MA remote controllers.
2) Confirm that the power is supplied to the main power source and the remote controller line.
3) Confirm that MA remote controller's capacity limit is not exceeded.
4) Check the sub/main setting of the MA remote controllers.One of them must be set to MAIN.
5) Diagnose the remote controller (described in the remote controller installation manual).
   [OK]: no problems with the remote controller (check the wiring regulations)
   [NG]: Replace the MA remote controller.
   [6832, 6833, ERC]: Due to noise interference <Go to 6)>
6) Check the transmission waveform, and check the MA remote controller line for electrical noise. For details, refer to the following page(s). [8-4 Checking Transmission Waveform and for Electrical Noise Interference]
7) When no problems are found with items 1) through 6), replace the indoor unit board or the MA remote controller.
   The following status can be confirmed on LED1 and 2 on the indoor unit board.
   - If LED1 is lit, the main power source of the indoor unit is turned on.
   - If LED2 is lit, the MA remote controller line is being powered.

7-8-18 Error Code [6833]

1. Error code definition

MA remote controller signal transmission error (Hardware error)

2. Error definition and error detection method

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

3. Cause

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

4. Check method and remedy

1) Check for disconnected or loose transmission lines for the indoor units or MA remote controllers.
2) Confirm that the power is supplied to the main power source and the remote controller line.
3) Confirm that MA remote controller's capacity limit is not exceeded.
4) Check the sub/main setting of the MA remote controllers.One of them must be set to MAIN.
5) Diagnose the remote controller (described in the remote controller installation manual).

   [OK]: no problems with the remote controller (check the wiring regulations)
   [NG]: Replace the MA remote controller.
   [6832, 6833, ERC]: Due to noise interference <Go to 6)>
6) Check the transmission waveform, and check the MA remote controller line for electrical noise. For details, refer to the following page(s). [8-4 Checking Transmission Waveform and for Electrical Noise Interference]
7) When no problems are found with items 1) through 6), replace the indoor unit board or the MA remote controller.
   The following status can be confirmed on LED1 and 2 on the indoor unit board.
   - If LED1 is lit, the main power source of the indoor unit is turned on.
   - If LED2 is lit, the MA remote controller line is being powered.

7-8-19 Error Code [6834]

1. Error code definition

MA remote controller signal reception error (Start bit detection error)

2. Error definition and error detection method

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

3. Cause

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

4. Check method and remedy

1) Check for disconnected or loose transmission lines for the indoor units or MA remote controllers.
2) Confirm that the power is supplied to the main power source and the remote controller line.
3) Confirm that MA remote controller's capacity limit is not exceeded.
4) Check the sub/main setting of the MA remote controllers.One of them must be set to MAIN.
5) Diagnose the remote controller (described in the remote controller installation manual).
   [OK]: no problems with the remote controller (check the wiring regulations)
   [NG]: Replace the MA remote controller.
   [6832, 6833, ERC]: Due to noise interference <Go to 6)>
6) Check the transmission waveform, and check the MA remote controller line for electrical noise. For details, refer to the following page(s). [8-4 Checking Transmission Waveform and for Electrical Noise Interference]
7) When no problems are found with items 1) through 6), replace the indoor unit board or the MA remote controller.
   The following status can be confirmed on LED1 and 2 on the indoor unit board.
   - If LED1 is lit, the main power source of the indoor unit is turned on
   - If LED2 is lit, the MA remote controller line is being powered.

7-8-20 Error Code [6840]

1. Error code definition

Indoor-outdoor communication: Reception error

2. Error definition and error detection method

- Abnormal if indoor controller board could not receive any signal normally for 6 minutes after turning the power on
- Abnormal if indoor controller board could not receive any signal normally for 3 minutes.
- Consider the unit as abnormal under the following condition. When 2 or more indoor units are connected to an outdoor unit, indoor controller board could not receive a signal for 3 minutes from outdoor controller circuit board, a signal which allows outdoor controller circuit board to transmit signals.

3. Cause, check method and remedy

	Cause	Check method and remedy
(1)	Contact failure, short circuit or miswiring (converse wiring) of indoor/outdoor unit connecting wire.	Check disconnecting or looseness of indoor /outdoor unit connecting wire of indoor unit or outdoor unit. Check all the units in case of twin/triple/quadruple indoor unit system.
(2)	Defective transmitting receiving circuit of outdoor controller circuit board.	Turn the power off, and on again to check. If abnormality generates again, replace indoor controller board or outdoor controller circuit board.
(3)	Defective transmitting receiving circuit of indoor controller board.	
(4)	Noise has entered into indoor/outdoor unit connecting wire.	
(5)	Defective fan motor	Turn the power off, and detach fan motor from connector (CNF1, 2). Then turn the power on again. If abnormality is not displayed, replace fan motor. If abnormality is displayed, replace outdoor controller circuit board.
(6)	Defective rush current resistor of outdoor power circuit board	Check the rush current resistor on outdoor power circuit board with tester. If open is detected, replace the power circuit board.

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

7-8-21 Error Code [6841]

1. Error code definition

A control communication synchronism not recover

2. Error definition and error detection method

Indoor/outdoor unit communication error (Outdoor unit)

- Abnormal if "0" receiving is detected 30 times continuously though outdoor controller circuit board has transmitted "1".
- Abnormal if outdoor controller circuit board could not find blank of transmission path for 3 minutes.

3. Cause, check method and remedy

	Cause	Check method and remedy
(1)	Indoor/outdoor unit connecting wire has contact failure.	Check disconnection or looseness of indoor/ outdoor unit connecting wire.
(2)	Defective communication circuit of outdoor controller circuit board.	Turn the power off, and on again to check. Replace outdoor controller circuit board if abnormality is displayed again.
(3)	Noise has entered power supply.	
(4)	Noise has entered indoor/outdoor unit connecting wire.	

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

7-8-22 Error Code [6842]

1. Error code definition

Indoor-outdoor communication: Transmission error

2. Error definition and error detection method

Indoor/outdoor unit communication error (Transmitting error)
Abnormal if "1" receiving is detected 30 times continuously though indoor controller board has transmitted "0".

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Defective transmitting receiving circuit of indoor controller board	Turn the power off, and on again to check. If abnormality generates again, replace indoor controller board.
(2)	Noise has entered into power supply.	
(3)	Noise has entered into outdoor control wire.	

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

7-8-23 Error Code [6843]

1. Error code definition

A control communication start bit detection error

2. Error definition and error detection method

Indoor/outdoor unit communication error

- Abnormal if indoor controller board could not receive any signal normally for 6 minutes after turning the power on.
- Abnormal if indoor controller board could not receive any signal normally for 3 minutes.
- Consider the unit as abnormal under the following condition. When 2 or more indoor units are connected to an outdoor unit, indoor controller board could not receive a signal for 3 minutes from outdoor controller circuit board, a signal which allows outdoor controller circuit board to transmit signals.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Contact failure, short circuit or miswiring (converse wiring) of indoor/outdoor unit connecting wire	Check disconnecting or looseness of indoor /outdoor unit connecting wire of all indoor units or outdoor units.
(2)	Defective transmitting receiving circuit of outdoor controller circuit board.	Turn the power off, and on again to check. If abnormality generates again, replace indoor controller board or outdoor controller circuit board. Note: other indoor controller board may have defect.
(3)	Defective transmitting receiving circuit of indoor controller board.	
(4)	Noise has entered into indoor/outdoor unit connecting wire.	
(5)	Defective fan motor	Turn the power off, and detach fan motor from connector (CNF1, 2). Then turn the power on again. If abnormality is not displayed, replace fan motor. If abnormality is displayed, replace outdoor controller circuit board.
(6)	Defective rush current resistor of outdoor power circuit board	Check the rush current resistor on outdoor power circuit board with tester. If open is detected, replace the power circuit board.

1. Error code definition

A control communication start bit detection error

2. Error definition and error detection method

Indoor/outdoor unit communication error (Outdoor unit)
Abnormal if outdoor controller circuit board could not receive anything normally for 3 minutes.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Contact failure of indoor/outdoor unit connecting wire	Check disconnection or looseness of indoor/ outdoor unit connecting wire of indoor or outdoor units.
(2)	Defective communication circuit of outdoor controller circuit board	Turn the power off, and on again to check. Replace indoor controller board or outdoor controller circuit board if abnormality is displayed again.
(3)	Defective communication circuit of indoor controller board	
(4)	Noise has entered into indoor/outdoor unit connecting wire.	

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

7-8-24 Error Code [6846]

1. Error code definition

Start-up time over

2. Error definition and error detection method

Start-up time over The unit cannot finish start-up process within 4 minutes after power on.

3. Cause, check method and remedy

Cause		Check method and remedy
(1)	Contact failure of indoor/outdoor unit connecting wire	Check disconnection or looseness or polarity of indoor/outdoor unit connecting wire of indoor and outdoor units.
(2)	Diameter or length of indoor/outdoor unit connecting wire is out of specified capacity.	Check the following: Diameter of the cables used for indoor-outdoor lines; maximum line distance between indoor and outdoor units (max. 50 m); maximum line distance between indoor units (daisy-changed cables) (max. 30 m); and if flat cables such as VVF is used, make sure they are connected in the order of S1, S2, and S3.
(3)	2 or more outdoor units have refrigerant address "0". (In case of group control)	When units are controlled as groups, check the refrigerant address (SW1 (3-6) on the outdoor unit control board settings) for duplicates.
(4)	Noise has entered into power supply or indoor/outdoor unit connecting wire.	Check the transmission lines for problems.

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

7-9 Error Code Definitions and Solutions: Codes [7000 - 7999]

7-9-1 Error Code [7100]

1. Error code definition

Total capacity error

2. Error definition and error detection method

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

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

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

<table>
<tr><th>Error source</th><th>Cause</th><th>Check method and remedy</th></tr>
<tr><td>Outdoor unit</td><td>(1) The model total of indoor units in the system with one outdoor unit exceeds the following table.
<table>
<tr><th>Model</th><th>Capacity total</th></tr>
<tr><td>72 model</td><td>93</td></tr>
<tr><td>96 model</td><td>124</td></tr>
<tr><td>120 model</td><td>156</td></tr>
<tr><td>144 model</td><td>187</td></tr>
<tr><td>168 model</td><td>218</td></tr>
<tr><td>192 model</td><td>249</td></tr>
<tr><td>216 model</td><td>280</td></tr>
<tr><td>240 model</td><td>312</td></tr>
<tr><td>264 model</td><td>330</td></tr>
<tr><td>288 model</td><td>374</td></tr>
<tr><td>312 model</td><td>405</td></tr>
<tr><td>336 model</td><td>436</td></tr>
<tr><td>360 model</td><td>468</td></tr>
<tr><td>384 model</td><td>499</td></tr>
<tr><td>408 model</td><td>530</td></tr>
<tr><td>436 model</td><td>561</td></tr>
</table></td><td>1) Check the Qj total (capacity code total) of indoor units connected.
2) Check the Qj setting (capacity code) of the connected indoor unit set by the switch (SW2 on indoor unit board).
When the model name set by the switch is different from that of the unit connected, turn off the power source of the outdoor and the indoor units, and change the setting of the Qj (capacity code).</td></tr>
<tr><td></td><td>(2) The model selection switches (SW5-3 - 5-8) on the outdoor unit are set incorrectly.
<table>
<tr><th rowspan="2">Model</th><th colspan="6">SW5</th></tr>
<tr><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th></tr>
<tr><td>72 model</td><td>OFF</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td><td rowspan="8">*1</td></tr>
<tr><td>96 model</td><td>ON</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td></tr>
<tr><td>120 model</td><td>OFF</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>144 model</td><td>ON</td><td>ON</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>168 model</td><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td>192 model</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td>216 model</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td>240 model</td><td>ON</td><td>ON</td><td>OFF</td><td>ON</td><td>ON</td></tr>
</table>
*1 ON: EP model; OFF: P model</td><td>Check the setting for the model selection switch on the outdoor unit (Dipswitches SW5-3 - 5-8 on the outdoor unit control board).</td></tr>
<tr><td></td><td>(3) The outdoor unit and the auxiliary unit (OS) that is connected to the same system are not properly connected.</td><td>Confirm that the TB3 on the OC and OS are properly connected.</td></tr>
</table>

7-9-2 Error Code [7101]

1. Error code definition

Capacity code setting error

2. Error definition and error detection method

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

3. Error source, cause, check method and remedy

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

<table>
<tr><th>Error source</th><th>Cause</th><th>Check method and remedy</th></tr>
<tr><td>Outdoor unit
Indoor unit</td><td>(1) The model name (capacity code) set by the switch (SW2) is wrong.

*The capacity of the indoor unit can be confirmed by the self-diagnosis function (SW1 operation) of the outdoor unit.</td><td>1) Check the model name (capacity code) of the indoor unit which has the error source address set by the switch (SW2 on indoor unit board).
When the model name set by the switch is different from that of the unit connected, turn off the power source of the outdoor and the indoor units, and change the setting of the capacity code.</td></tr>
<tr><td>Outdoor unit</td><td>(2) The model selection switches (SW5-3 - 5-8) on the outdoor unit are set incorrectly.

<table>
<tr><th rowspan="2">Model</th><th colspan="6">SW5</th></tr>
<tr><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th></tr>
<tr><td>72 model</td><td>OFF</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td><td rowspan="8">*1</td></tr>
<tr><td>96 model</td><td>ON</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td></tr>
<tr><td>120 model</td><td>OFF</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>144 model</td><td>ON</td><td>ON</td><td>ON</td><td>OFF</td><td>ON</td></tr>
<tr><td>168 model</td><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td>192 model</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td>216 model</td><td>OFF</td><td>ON</td><td>OFF</td><td>ON</td><td>ON</td></tr>
<tr><td>240 model</td><td>ON</td><td>ON</td><td>OFF</td><td>ON</td><td>ON</td></tr>
</table>
*1 ON: EP model; OFF: P model</td><td>Check the setting for the model selection switch on the outdoor unit (Dipswitches SW5-3 - 5-8 on the outdoor unit control board).</td></tr>
</table>

7-9-3 Error Code [7102]

1. Error code definition

Wrong number of connected units

2. Error definition and error detection method

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

3. Error source, cause, check method and remedy

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

<table>
<tr><th>Error source</th><th>Cause</th><th>Check method and remedy</th></tr>
<tr><td>Outdoor unit</td><td>(1) Number of indoor units connected to the outdoor terminal block (TB3) for indoor/ outdoor transmission lines exceeds limitations described below.
<table>
<tr><th>Number of units</th><th>Restriction on the number of units</th></tr>
<tr><td>Total number of indoor units</td><td>15 : 72 model
20 : 96 model
26 : 120 model
31 : 144 model
36 : 168 model
41 : 192 model
46 : 216 model
50 : 240 - 432 models</td></tr>
<tr><td>Total number of LOSSNAY units (During auto address start-up only)</td><td>0 or 1</td></tr>
<tr><td>Total number of outdoor units</td><td>1 : (E)P72 - (E)P168, EP192, EP216, EP240 models
2 : (E)P192 - (E)P240 models
3 : (E)P264 - (E)P432 models</td></tr>
</table></td><td>1) Check whether the number of units connected to the outdoor terminal block (TB3) for indoor/ outdoor transmission lines does not exceed the limitation. (See (1) and (2) on the left.)</td></tr>
<tr><td></td><td>(2) Disconnected transmission line of the outdoor unit</td><td>2) Check (2) - (3) on the left.</td></tr>
<tr><td></td><td>(3) Short-circuited transmission line
When (2) and (3) apply, the following display will appear.
♦ME remote controller
Nothing appears on the remote controller because it is not powered.
♦MA remote controller
"HO" or "PLEASE WAIT" blinks.</td><td>3) Check whether the transmission line for the terminal block for centralized control (TB7) is not connected to the terminal block for the indoor/outdoor transmission line (TB3).</td></tr>
<tr><td></td><td>(4) The model selection switch (SW5-7) on the outdoor unit is set to OFF. (Normally set to ON)
(5) Outdoor unit address setting error
The outdoor units in the same refrigerant circuit do not have sequential address numbers.</td><td>4) Check the setting for the model selection switch on the outdoor unit (Dipswitches SW5-7 on the outdoor unit control board).</td></tr>
</table>

7-9-4 Error Code [7105]

1. Error code definition

Address setting error

2. Error definition and error detection method

Erroneous setting of OC unit address

3. Error source, cause, check method and remedy

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

7-9-5 Error Code [7106]

1. Error code definition

Attribute setting error

2. Error source, cause, check method and remedy

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

Error source	Cause	Check method and remedy
-	A remote controller for use with indoor units, such as the MA remote controller, is connected to the OA processing unit whose attribute is FU.	To operate the OA processing unit directly via a remote controller for use with indoor units, such as the MA remote controller, set the DIP SW 3-1 on the OA processing unit to ON. Operation Method / SW3-1 Interlocked operation with the indoor unit / OFF Direct operation via the MA remote controller / ON

7-9-6 Error Code [7110]

1. Error code definition

Connection information signal transmission/reception error

2. Error definition and error detection method

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

3. Error source, cause, check method and remedy

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

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

7-9-7 Error Code [7111]

1. Error code definition

Remote controller sensor fault

2. Error definition and error detection method

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

3. Error source, cause, check method and remedy

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

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

7-9-8 Error Code [7113]

1. Error code definition

Function setting error (improper connection of CNTYP)

2. Error source, cause, check method and remedy

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

Error source	Cause	Check method and remedy
Outdoor unit	(1) Wiring fault (2) Loose connectors, short-circuit, contact failure (3) Incompatible control board and INV board (replacement with a wrong circuit board) (4) DIP SW setting error on the control board	(Detail code 15) 1) Check the connector CNTYP5 on the control board for proper connection. 2) Check the connector CNTYP4 on the control board for proper connection.
		(Detail code 14) 1) Check the settings of SW5-3 through SW5-6 on the control board. 2) Check the connector CNTYP4 on the control board for proper connection.
		(Detail code 12) 1) Check the settings of SW5-3 through SW5-6 on the control board. 2) Check the connector CNTYP2 on the control board for proper connection. 3) Check the connector CNTYP5 on the control board for proper connection. 4) Check the connector CNTYP on the INV board for proper connection.
		(Detail code 16) 1) Check the settings of SW5-3 through SW5-6 on the control board. 2) Check the connector CNTYP5 on the control board for proper connection. 3) Check the connector CNTYP2 on the control board for proper connection. 4) Check the wiring between the control board and INV board. Refer to the following page(s). [7-2-1 Error Code [0403]] 5) Check the connector CNTYP on the INV board for proper connection.
		(Detail codes 56, 66) 1) Check the settings of SW5-3 through SW5-6 on the control board. 2) Check the wiring between the control board and the Fan INV board. Refer to the following page(s). [7-2-1 Error Code [0403]] 3) Make sure the FAN 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 following page(s). [7-2-1 Error Code [0403]] 2) Check the settings of SW5-3 through SW5-6 on the control board. 3) Check the connector CNTYP5 on the control board for proper connection.
		(Detail code Miscellaneous) *If a set-model-name identification error occurs, check the detail code on the unit on which the error occurred. The detail code that appears on other units will be different from the ones shown above.

7-9-9 Error Code [7117]

1. Error code definition

Model setting error

2. Error source, cause, check method and remedy

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

Error source	Cause	Check method and remedy
Outdoor unit	(1) Wiring fault (2) Loose connectors, short-circuit, contact failure	(Detail code 15) 1) Check the connector CNTYP5 on the control board for proper connection.
		(Detail code 14) 1) Check the connector CNTYP4 on the control board for proper connection.
		(Detail code 12) 1) Check the connector CNTYP2 on the control board for proper connection. 2) Check the connector CNTYP5 on the control board for proper connection. 3) Check the connector CNTYP on the INV board for proper connection.
		(Detail code 16) 1) Check the connector CNTYP5 on the control board for proper connection. 2) Check the connector CNTYP2 on the control board for proper connection. 3) Check the wiring between the control board and INV board. Refer to the following page(s). [7-2-1 Error Code [0403]] 4) Check the connector CNTYP on the INV board for proper connection.
		(Detail codes 56, 66) 1) Check the wiring between the control board and the Fan INV board. Refer to the following page(s). [7-2-1 Error Code [0403]] 2) Make sure the FAN 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 following page(s). [7-2-1 Error Code [0403]] 2) Check the settings of SW5-3 through SW5-6 on the control board. 3) Check the connector CNTYP5 on the control board for proper connection.
		(Detail code Miscellaneous) *If a set-model-name identification error occurs, check the detail code on the unit on which the error occurred. The detail code that appears on other units will be different from the ones shown above.

7-9-10 Error Code [7130]

1. Error code definition

Incompatible unit combination

2. Error definition and error detection method

The check code will appear when the indoor units with different refrigerant systems are connected or when the combination of the outdoor units is not as per [2-1 System Configurations].

3. Error source, cause, check method and remedy

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

Error source	Cause	Check method and remedy
Outdoor unit	(1) Indoor units for use with different refrigerant systems The connected indoor unit is for use with 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.	Check the connected indoor unit model. Check whether the connecting adapter for M-NET is not connected to the indoor unit. (Connect the M-NET adapter to the centralized control system.)
	(2) Combination of outdoor units The outdoor unit (OC) is EP216 or EP240. The combination of the outdoor units is not as per [2-1 System Configurations].	Check the model name of the outdoor units (OC) and (OS). Check whether the combination of the outdoor units is as per [2-1 System Configurations].

Chapter 8 Troubleshooting Based on Observed Symptoms

8-1 MA Remote Controller Problems

8-1-1 The LCD Does Not Light Up.

1. Phenomena

Even if the operation button on the remote controller is pressed, the display remains unlit and the unit does not start running. (Power indicator (◎) is unlit and no lines appear on the remote controller.)

2. Cause

1) The power is not supplied to the indoor unit.
   - The main power of the indoor unit is not on.
   - The connector on the indoor unit board has come off.
   - The fuse on the indoor unit board has melted.
   - Transformer failure and disconnected wire of the indoor unit.
2) Incorrect wiring for the MA remote controller
   - Disconnected wire for the MA remote controller or disconnected line to the terminal block.
   - Short-circuited MA remote controller wiring
   - Incorrect wiring of the MA remote controller cables
   - Incorrect connection of the MA remote wiring to the terminal block for transmission line (TB5) on the indoor unit
   - Wiring mixup between the MA remote controller cable and 220-240 VAC power supply cable
   - Reversed connection of the wire for the MA remote controller and the M-NET transmission line on the indoor unit
3) The number of the MA remote controllers that are connected to an indoor unit exceeds the allowable range (2 units).
4) The length or the diameter of the wire for the MA remote controller are out of specification.
5) Short circuit of the wire for the remote display output of the outdoor unit or reversed polarity connection of the relay.
6) The indoor unit board failure
7) MA remote controller failure

3. Check method and remedy

1) Check the voltage at the MA remote controller terminals.
   - If the voltage is between DC 9 and 12V, the remote controller is a failure.
   - If no voltage is applied, check the causes 1) and 3) and if the cause is found, correct it.
     If no cause is found, refer to 2).
2) Disconnect the remote controller cable from TB15 (MA remote controller terminal) on the indoor unit, and check the voltage across the terminals on TB15.
   - If the voltage is between DC 9 and 12 V, check the causes 2) and 4) and if the cause is found, correct it.
   - If no voltage is applied, check the cause 1) and if the cause is found, correct it.
     If no cause is found, check the wire for the remote display output (relay polarity).
     If no further cause is found, replace the indoor unit board.

8-1-2 The LCD Momentarily Lights Up and Then Goes Off.

1. Phenomena

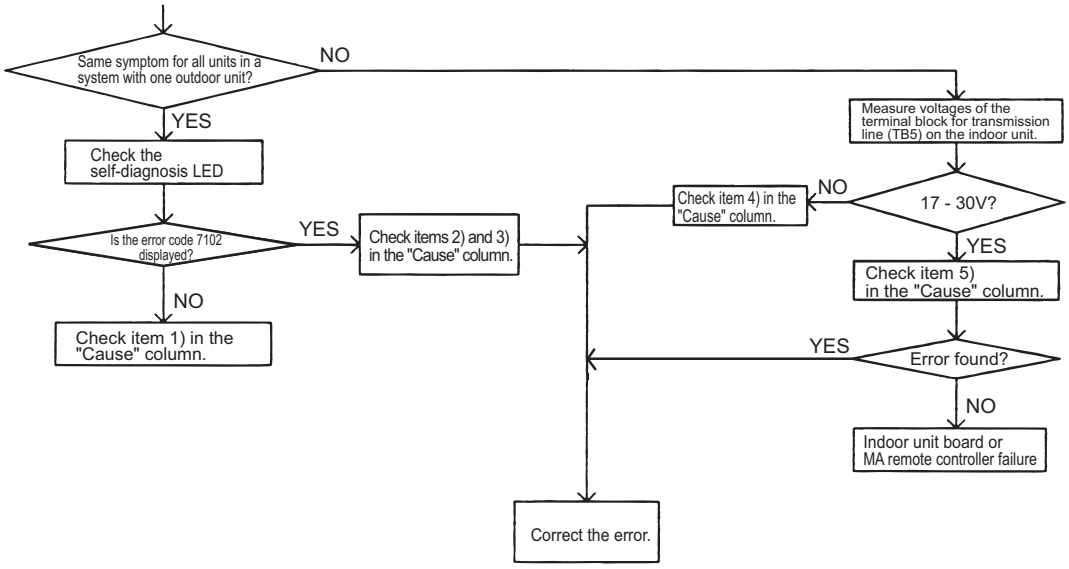
When the remote controller operation SW is turned on, the operation status briefly appears on the display, then it goes off, and the display lights out immediately, and the unit stops.

2. Cause

1) The power for the M-NET transmission line is not supplied from the outdoor unit. For details, refer to the following page(s).[8-10-2 Troubleshooting Problems with Outdoor Unit Transmission Power Supply Circuit]
2) Short circuit of the transmission line.
3) Incorrect wiring of the M-NET transmission line on the outdoor unit.
   - Disconnected wire for the MA remote controller or disconnected line to the terminal block.
   - The indoor transmission line is connected incorrectly to the transmission terminal block for centralized controller (TB7).
   - The male power supply connectors on the multiple outdoor units are connected to the female power supply switch connector (CN40).
   In the system to which the power supply unit for transmission lines is connected, the male power supply connector is connected to the female power supply switch connector (CN40) on the outdoor unit.
4) Disconnected M-NET transmission line on the indoor unit side.
5) Disconnected wire between the terminal block for M-NET line (TB5) of the indoor unit and the indoor unit board (CN2M) or disconnected connector.

3. Check method and remedy

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



8-1-3 "HO" and "PLEASE WAIT" Do Not Go Off the Screen.

1. Phenomena

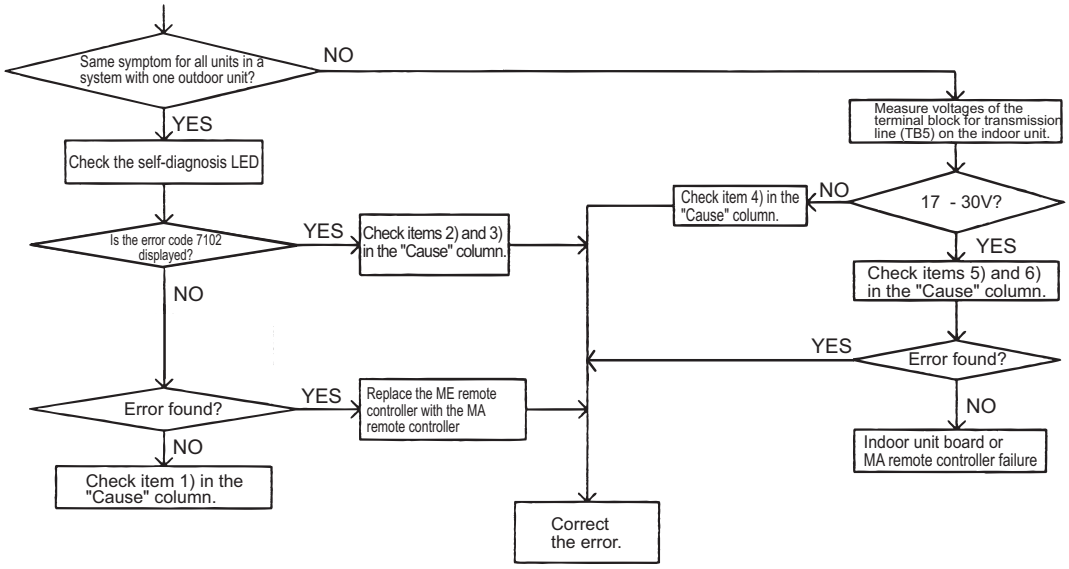
"HO" or "PLEASE WAIT" display on the remote controller does not disappear, and no operation is performed even if the button is pressed. ("HO" or "PLEASE WAIT" display will normally turn off 5 minutes later after the power on.)

2. Cause

1) The power for the M-NET transmission line is not supplied from the outdoor unit. For details, refer to the following page(s). [8-10-2 Troubleshooting Problems with Outdoor Unit Transmission Power Supply Circuit]
2) Short-circuited transmission line
3) Incorrect wiring of the M-NET transmission line on the outdoor unit.
   - Disconnected wire for the MA remote controller or disconnected line to the terminal block.
   - The indoor transmission line is connected incorrectly to the transmission terminal block for centralized controller (TB7).
   - The male power supply connectors on the multiple outdoor units are connected to the female power supply switch connector (CN40).
     In the system to which the power supply unit for transmission lines is connected, the male power supply connector is connected to the female power supply switch connector (CN40) on the outdoor unit
4) Disconnected M-NET transmission line on the indoor unit.
5) Disconnected wire between the terminal block for M-NET line (TB5) of the indoor unit and the indoor unit board (CN2M) or disconnected connector.
6) Incorrect wiring for the MA remote controller
   - Short-circuited wire for the MA remote controller
   - Disconnected wire for the MA remote controller (No.2) and disconnected line to the terminal block.
   - Reversed daisy-chain connection between groups
   - Incorrect wiring for the MA remote controller to the terminal block for transmission line connection (TB5) on the indoor unit
   - The M-NET transmission line is connected incorrectly to the terminal block (TB15) for the MA remote controller.
7) The sub/main setting of the MA remote controller is set to sub.
8) 2 or more main MA remote controllers are connected.
9) Indoor unit board failure (MA remote controller communication circuit)
10) Remote controller failure
11) Outdoor unit failure (Refer to the following page(s). [8-13 Troubleshooting Problems Using the LED Status Indicators on the Outdoor Unit])

3. Check method and remedy

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

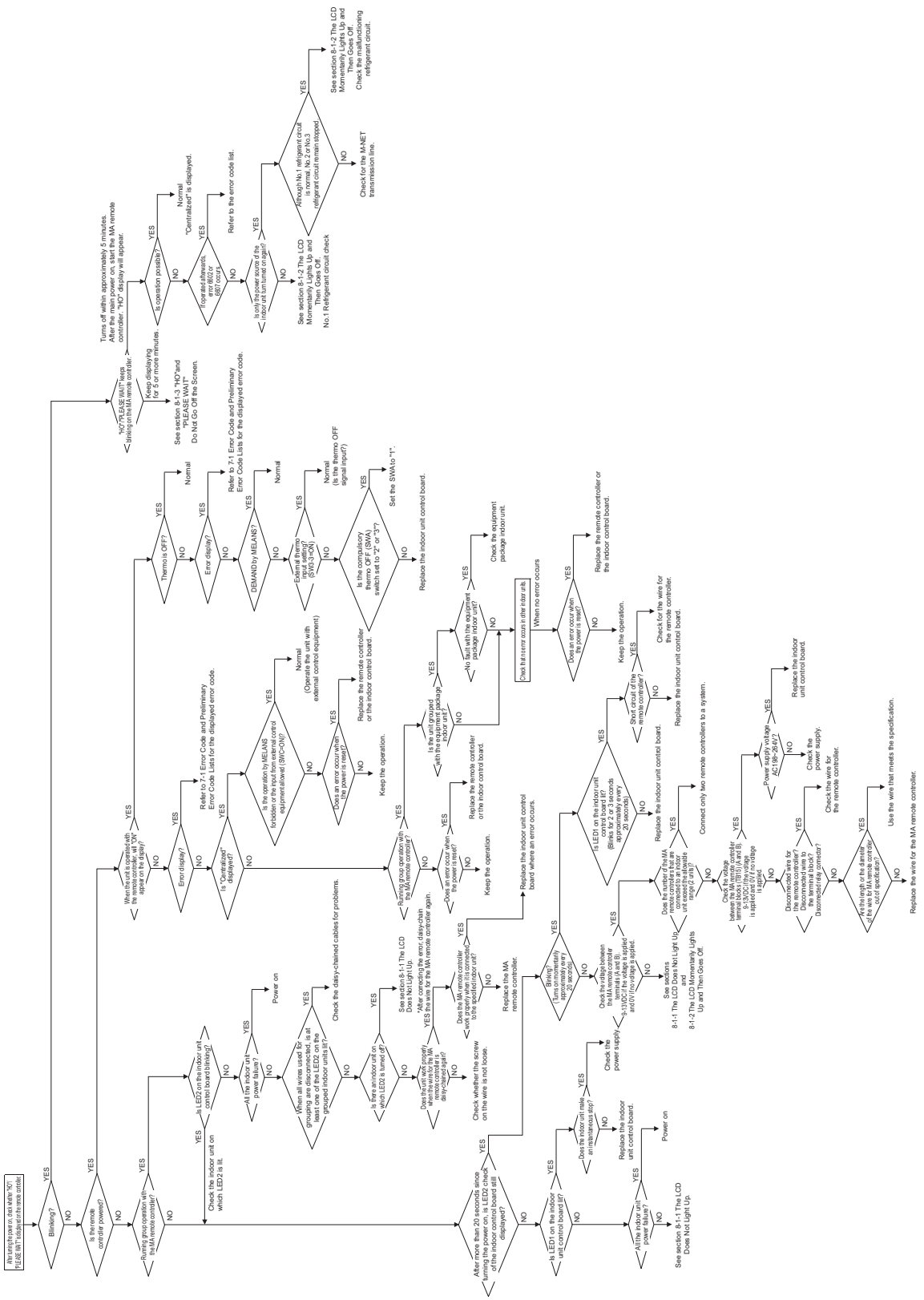


8-1-4 Air Conditioning Units Do Not Operate When the ON Button Is Pressed.

1. Phenomena

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

2. Check method and remedy



8-2 ME remote Controller Problems

8-2-1 The LCD Does Not Light Up.

1. Phenomena

Even if the operation button on the remote controller is pressed, the display remains unlit and the unit does not start running. (Remote controller is not powered.)

2. Cause

1) The power for the M-NET transmission line is not supplied from the outdoor unit.
2) Short circuit of the transmission line.
3) Incorrect wiring of the M-NET transmission line on the outdoor unit.
   - Disconnected wire for the MA remote controller or disconnected line to the terminal block.
   - The indoor transmission line is connected incorrectly to the transmission terminal block for centralized controller (TB7).
4) Disconnected transmission line on the remote controller.
5) Remote controller failure
6) Outdoor unit failure (For details, refer to the following page(s). [8-13 Troubleshooting Problems Using the LED Status Indicators on the Outdoor Unit])

3. Check method and remedy

1) Check voltage of the transmission terminal block for of the ME remote controller.
   - If voltage between is 17V and 30V → ME remote controller failure
   - When voltage is 17V or less → For details, refer to the following page(s). [8-10-2 Troubleshooting Problems with Outdoor Unit Transmission Power Supply Circuit]
2) **When 2) and 3) above apply, check code 7102 will be displayed on the self-diagnosis LED.**

8-2-2 The LCD Momentarily Lights Up and Then Goes Off.

1. Phenomena

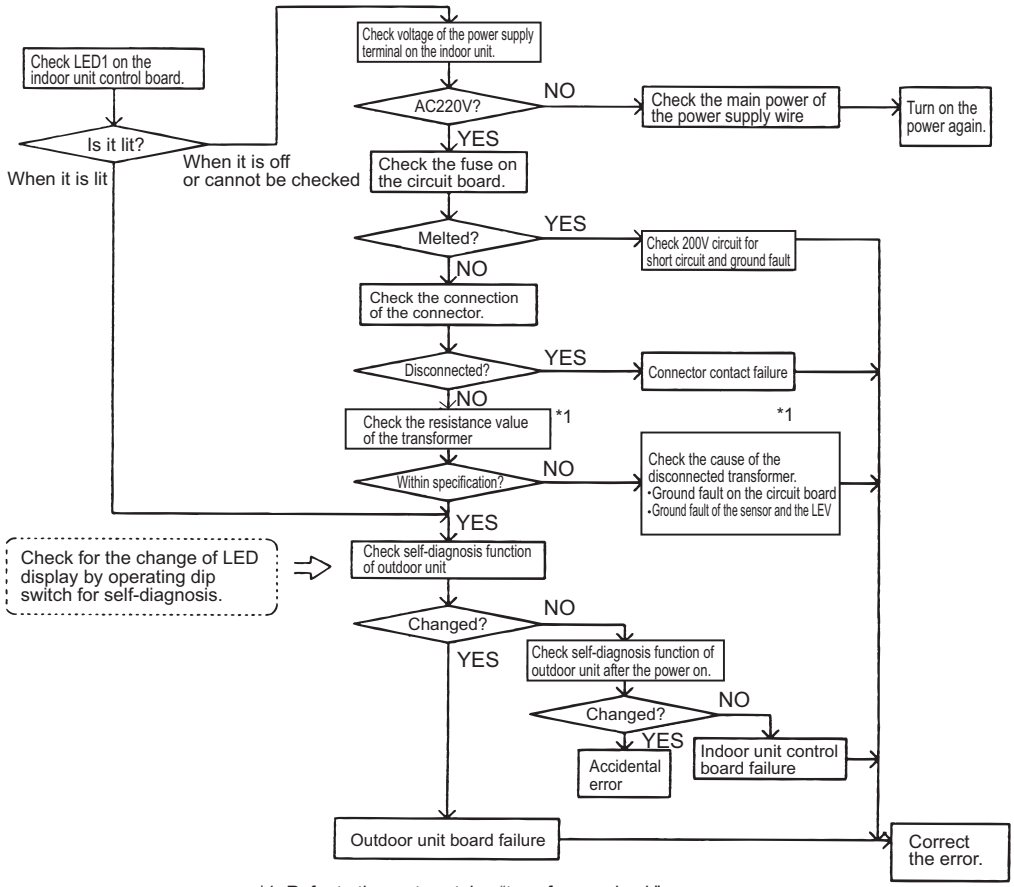
When the remote controller operation SW is turned on, a temporary operation display is indicated, and the display lights out immediately.

2. Cause

1) The power is not supplied to the indoor unit.
   - The main power of the indoor unit (208/230 VAC) is not on.
   - The connector on the indoor unit board has come off.
   - The fuse on the indoor unit board has melted.
   - Transformer failure and disconnected wire of the indoor unit
   - The indoor unit board failure
2) The outdoor control board failure

   As the indoor unit does not interact with the outdoor unit, the outdoor unit model cannot be recognized.

3. Check method and remedy



*1. Refer to the parts catalog “transformer check”.

8-2-3 "HO" or "Waiting for ⋯" Does Not Go Off the Screen.

1. Phenomena

"HO" or "Waiting for ⋯" display on the remote controller does not disappear, and no operation is performed even if the button is pressed.

2. Cause

Without using MELANS

1) Outdoor unit address is set to "00"
2) A wrong address is set.
   - The address of the indoor unit that is connected to the remote controller is incorrect. (It should equal the ME remote controller address minus 100.)
   - A wrong address is set to the ME remote controller. (100 must be added to the address of the indoor unit.)
3) Faulty wiring of the terminal block for transmission line (TB5) of the indoor unit in the same group with the remote controller.
4) The centralized control switch (SW5-1) on the outdoor unit is set to ON.
5) Disconnection or faulty wiring of indoor unit transmission line.
6) Disconnection between the terminal block for M-NET line connection (TB5) of the indoor unit and the male connector (CN2M)
7) The male power supply connectors on 2 or more outdoor units are connected to the female power supply switch connector (CN40) for the transmission line for centralized control.
8) Outdoor unit control board failure
9) Indoor unit control board failure
10) Remote controller failure

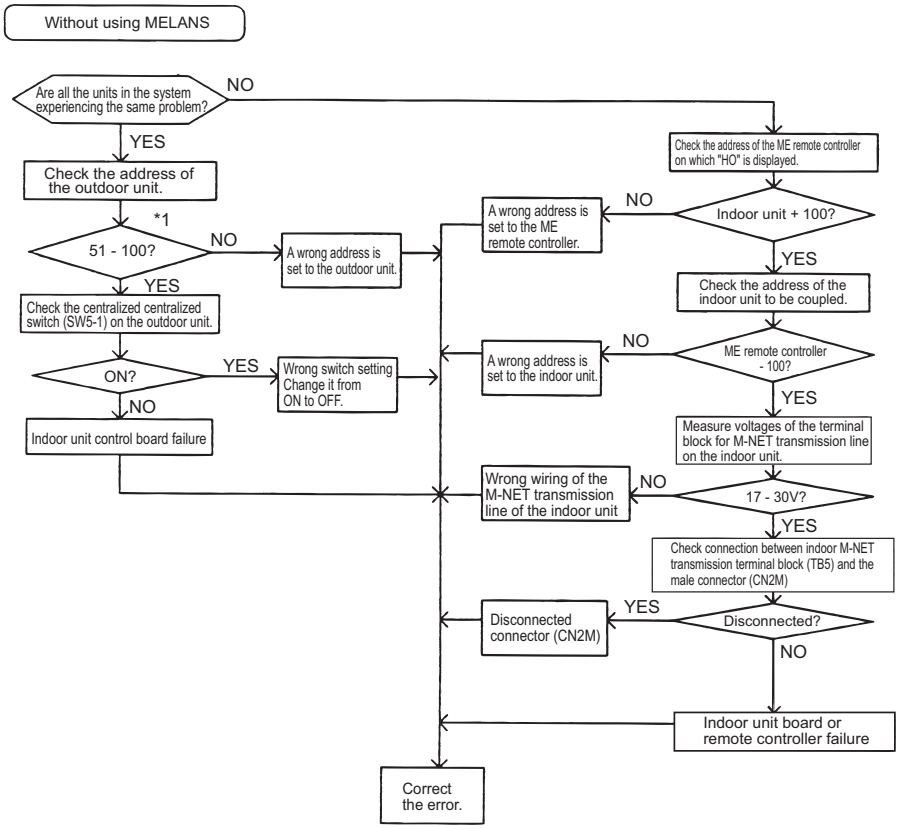
Interlocking control with MELANS

1) No group registration is made using MELANS. (The indoor unit and the ME remote controller are not grouped.)
2) Disconnected transmission line for centralized control (TB7) of the outdoor unit
3) The male power supply connector is connected to CN40 on more than one outdoor unit, or the connector is connected to CN40 on the outdoor unit in the system to which a power supply unit for transmission line is connected.

Using MELANS

1) When MELANS is used, "HO" or "Waiting for ⋯" display on the remote controller will disappear when the indoor unit and the local remote controller (ME remote controller) are grouped.
   If "HO" does not disappear after the registration, check items 1) through 3) in the "Cause" column of the section on interlocked control with MELANS.

3. Check method and remedy



*1. When the outdoor unit address is set to 1 - 50, the address will be forcibly set to 100.

8-2-4 "88", "Request denied." Appears on the LCD.

1. Phenomena

"88", "Request denied." appears on the remote controller when the address is registered or confirmed.

2. Cause, check method and remedy

Cause		Check method and remedy	
An error occurs when the address is registered or confirmed. (common)			
1.	A wrong address is set to the unit to be coupled.	(1)	Confirm the address of unit to be coupled.
2.	The transmission line of the unit to be coupled is disconnected or is not connected.	(2)	Check the connection of transmission line.
3.	Circuit board failure of the unit to be coupled	(3)	Check voltage of the terminal block for transmission line of the unit to be coupled.
		1)	Normal if voltage is between 17 and 30 VDC.
4.	Improper transmission line work	2)	Check (5) in case other than 1).
Generates at interlocking registration between LOSSNAY and the indoor unit			
5.	The power of LOSSNAY is OFF.	(4)	Check for the main power of LOSSNAY.
Generates at confirmation of controllers used in the system in which the indoor units connected to different outdoor units are grouped			
6.	The power of the outdoor unit to be confirmed has been cut off.	(5)	Check the power supply of the outdoor unit which is coupled with the unit to be confirmed.
7.	Transmission line is disconnected from the terminal block for central control system connection (TB7) on the outdoor unit.	(6)	Check that the transmission line for centralized control (TB7) of the outdoor unit is not disconnected.
8.	When the indoor units connected to different outdoor units are grouped without MELANS, the male power supply connector is not connected to the female power supply switch connector (CN40) for the transmission line for centralized control.	(7)	Check voltage of the transmission line for centralized control.
9.	The male power supply connectors on 2 or more outdoor units are connected to the female power supply switch connector (CN40) for the transmission line for centralized control.	1)	Normal when voltage is between 10V and 30V
10.	In the system to which MELANS is connected, the male power supply connector is connected to the female power supply switch connector (CN40) for the transmission line for centralized control.	2)	Check 8 - 11 described on the left in case other than 1).
11.	Short circuit of the transmission line for centralized control		

8-3 Refrigerant Control Problems

8-3-1 Units in the Cooling Mode Do Not Operate at Expected Capacity.

1. Phenomena

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

2. Cause, check method and remedy

Cause	Check method and remedy
1. Compressor frequency does not rise sufficiently. ♦Faulty detection of pressure sensor. ♦Protection works and compressor frequency does not rise due to high discharge temperature ♦Protection works and compressor frequency does not rise due to high pressure ♦Pressure drops excessively.	(1) Check pressure difference between the detected pressure by the pressure sensor and the actual pressure with self-diagnosis LED. → If the accurate pressure is not detected, check the pressure sensor. Refer to the following page(s). [8-5-1 Comparing the High-Pressure Sensor Measurement and Gauge Pressure] Note: Lower inlet pressure by the low pressure sensor than the actual pressure causes insufficient capacity. SW4 setting (SW6-10: OFF) High pressure sensor SW4 ON 1 2 3 4 5 6 7 8 9 10 Low pressure sensor SW4 ON 1 2 3 4 5 6 7 8 9 10 (2) Check temperature difference between the evaporating temperature (Te) and the target evaporating temperature (Tem) with self-diagnosis LED. Note: Higher Te than Tem causes insufficient capacity. SW4 setting (SW6-10: OFF) Evaporating temperature Te SW4 ON 1 2 3 4 5 6 7 8 9 10 Target evaporating temperature Tem SW4 ON 1 2 3 4 5 6 7 8 9 10 Note: Protection works and compressor frequency does not rise even at higher Te than Tem due to high discharge temperature and high pressure. At high discharge temperature: Refer to the following page(s). [7-3-1 Error Code [1102]] At high pressure: Refer to the following page(s). [7-3-3 Error Code [1302] (during operation)]
2. Indoor unit LEV malfunction ♦Insufficient refrigerant flows due to LEV malfunction (not enough opening) or protection works and compressor frequency does not rise due to pressure drop. ♦Refrigerant leak from LEV on the stopping unit causes refrigerant shortage on the running unit.	Refer to the following page(s). [8-8 Troubleshooting LEV Problems]

ON 1 2 3 4 5 6 7 8 9 10 The figure at left shows that the switches 1 through 5 are set to ON and 6 through 10 are set to OFF.

Cause	Check method and remedy
3. RPM error of the outdoor unit FAN ♦Motor failure or board failure, or airflow rate decrease due to clogging of the heat exchanger ♦The fan is not properly controlled as the outdoor temperature cannot be precisely detected by the temperature sensor. ♦The fan is not properly controlled as the pressure cannot be precisely detected by the pressure sensor.	Refer to the following page(s). [8-7 Troubleshooting Outdoor Unit Fan Problems] [7-3-3 Error Code [1302] (during operation)]
4. Long piping length The cooling capacity varies greatly depending on the pressure loss. (When the pressure loss is large, the cooling capacity drops.)	Check the piping length to determine if it is contributing to performance loss. Piping pressure loss can be estimated from the temperature difference between the indoor unit heat exchanger outlet temperature and the saturation temperature (Te) of 63LS. →Correct the piping.
5. Piping size is not proper (thin)	
6. Insufficient refrigerant amount Protection works and compressor frequency does not rise due to high discharge temperature.	Refer to item 1 (Compressor frequency does not rise sufficiently.) on the previous page. Refer to the following page(s). [6-3 Evaluating and Adjusting Refrigerant Charge]
7. Clogging by foreign object	Check the temperature difference between in front of and behind the place where the foreign object is clogging the pipe (upstream side and downstream side). When the temperature drops significantly, the foreign object may clog the pipe. → Remove the foreign object inside the pipe.
8. The indoor unit inlet temperature is excessively low. (Less than 15°C [59°F] WB)	Check the inlet air temperature and for short cycling. Change the environment where the indoor unit is used.
9. Compressor failure The amount of circulating refrigerant decreases due to refrigerant leak in the compressor.	Check the discharge temperature to determine if the refrigerant leaks, as it rises if there is a leak.
10. LEV1 malfunction Sufficient liquid refrigerant is not be supplied to the indoor unit as sufficient sub cool cannot be secured due to LEV1 malfunction.	Refer to the following page(s). [8-8 Troubleshooting LEV Problems] It most likely happens when there is little difference or no difference between TH3 and TH6.
11. TH3, TH6 and 63HS1 sensor failure or damaged wiring LEV1 is not controlled normally.	♦Check the thermistor. ♦Check wiring.
12. LEV2 actuation failure A drop in the low pressure that is caused either by a blockage of liquid pipe or by a pressure loss and the resultant slowing of refrigerant flow causes a tendency for the discharge temperature to rise.	Refer to the following page(s).[8-8 Troubleshooting LEV Problems]
13. LEV9 malfunction Not enough refrigerant is provided to the indoor or outdoor unit due to high-low pressure bypass that results from the malfunction of LEV9.	Refer to the following page(s). [8-8 Troubleshooting LEV Problems]
14. Open phase in the power-supply due to improper power-supply wiring	Make sure that the power-supply wiring is properly connected. (Refer to item (5) in section [6-1 Read before Test Run].) Possible open phase.

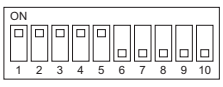
8-3-2 Units in the Heating Mode Do Not Operate at Expected Capacity.

1. Phenomena

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

2. Cause, check method and remedy

Cause	Check method and remedy
1. Compressor frequency does not rise sufficiently. ♦Faulty detection of pressure sensor. ♦Protection works and compressor frequency does not rise due to high discharge temperature ♦Protection works and compressor frequency does not rise due to high pressure.	(1) Check pressure difference between the detected pressure by the pressure sensor and the actual pressure with self-diagnosis LED. → If the accurate pressure is not detected, check the pressure sensor. Refer to the following page(s). [8-5-1 Comparing the High-Pressure Sensor Measurement and Gauge Pressure] Note: Higher inlet pressure by the high pressure sensor than the actual pressure causes insufficient capacity. SW4 setting (SW6-10: OFF) High pressure sensor SW4 ON 1 2 3 4 5 6 7 8 9 10 Low pressure sensor SW4 ON 1 2 3 4 5 6 7 8 9 10 (2) Check the difference between the condensing temperature (Tc) and the target condensing temperature (Tcm) with self-diagnosis LED. Note: Higher Tc than Tcm causes insufficient capacity. SW4 setting (SW6-10: OFF) Condensing temperature Tc SW4 ON 1 2 3 4 5 6 7 8 9 10 Target condensing temperature Tcm SW4 ON 1 2 3 4 5 6 7 8 9 10 Note: Protection works and compressor frequency does not rise even at lower Tc than Tcm due to high discharge temperature and high pressure. At high discharge temperature: Refer to the following page(s). [7-3-1 Error Code [1102]] At high pressure: Refer to the following page(s). [7-3-3 Error Code [1302] (during operation)]



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

Cause	Check method and remedy
2. Indoor unit LEV malfunction Insufficient refrigerant flows due to LEV malfunction (not enough opening).	Refer to the following page(s). [8-8 Troubleshooting LEV Problems]
3. Temperature reading error on the indoor unit piping temperature sensor If the temperature reading on the sensor is higher than the actual temperature, it makes the subcool seem smaller than it is, and the LEV opening decreases too much.	Check the thermistor.
4 RPM error of the outdoor unit FAN ♦Motor failure or board failure, or airflow rate decrease, pressure drop due to clogging of the heat exchanger leading to high discharge temperature ♦The fan is not properly controlled as the temperature cannot be precisely detected with the piping sensor.	Refer to the following page(s). [8-7 Troubleshooting Outdoor Unit Fan Problems]
5. Insulation failure of the refrigerant piping	
6. Long piping length Excessively long piping on the high pressure side causes pressure loss leading to increase in the high pressure.	Confirm that the characteristic of capacity drop due to piping length. → Change the pipe
7. Piping size is not proper (thin)	
8. Clogging by foreign object	Check the temperature difference between the upstream and the downstream of the pipe section that is blocked. Since blockage in the extended section is difficult to locate, operate the unit in the cooling cycle, and follow the same procedures that are used to locate the blockage of pipe during cooling operation. → Remove the blockage in the pipe.
9. The indoor unit inlet temperature is excessively high. (exceeding 28°C [82°F])	Check the inlet air temperature and for short cycling. Change the environment where the indoor unit is used.
10. Insufficient refrigerant amount Protection works and compressor frequency does not rise due to low discharge temperature Refrigerant recovery operation is likely to start.	Refer to item 1 (Compressor frequency does not rise sufficiently.) on the previous page. Refer to the following page(s). [6-3 Evaluating and Adjusting Refrigerant Charge]
11. Compressor failure (same as in case of cooling)	Check the discharge temperature.
12. LEV2 actuation failure A drop in the low pressure that is caused either by a blockage of liquid pipe or by a pressure loss and the resultant slowing of refrigerant flow causes a tendency for the discharge temperature to rise.	Refer to the following page(s). [8-8 Troubleshooting LEV Problems]
13. LEV9 malfunction Not enough refrigerant is provided to the indoor or outdoor unit due to high-low pressure bypass that results from the malfunction of LEV9.	Refer to the following page(s). [8-8 Troubleshooting LEV Problems]
14 LEV4 malfunction Refrigerant flood-back occurs when LEV4 is open due to a malfunction, resulting in an excessively low discharge temperature. When the valve is closed during Heating operation (especially at low outside temperature), compressor frequency does not accelerate properly.	Refer to the following page(s). [8-8 Troubleshooting LEV Problems]
15. Open phase in the power-supply due to improper power-supply wiring	Make sure that the power-supply wiring is properly connected. (Refer to item (5) in section [6-1 Read before Test Run].) Possible open phase.

8-3-3 Outdoor Units Stop at Irregular Times.

1. Phenomena

Outdoor unit stops at times during operation.

2. Cause, check method and remedy

Cause		Check method and remedy	
	The first stop is not considered as an error, as the unit turns to anti-restart mode for 3 minutes as a preliminary error.	(1)	Check the mode operated in the past by displaying preliminary error history on LED display with SW4.
	Error mode		
1.	Abnormal high pressure	(2)	Reoperate the unit to find the mode that stops the unit by displaying preliminary error history on LED display with SW4.
2.	Abnormal discharge air temperature		
3.	Heatsink thermistor failure		→ Refer to the reference page for each error mode. *Display the indoor piping temperature with SW4 to check whether the freeze proof operation runs properly, and check the temperature.
4.	Thermistor failure		
5.	Pressure sensor failure		Refer to the following page(s). [10 LED Status Indicators on the Outdoor Unit Circuit Board]
6.	Over-current break		
7.	Refrigerant overcharge		
8.	Refrigerant cooling error		
Note1:	Frost prevention tripping only under cooling mode may be considered in addition to the above. (Freeze protection is detected by one or all indoor units.)		
Note2:	Even the second stop is not considered as an error when some specified errors occur. (eg. The third stop is considered as an error when the thermistor error occurs.)		

8-4 Checking Transmission Waveform and for Electrical Noise Interference

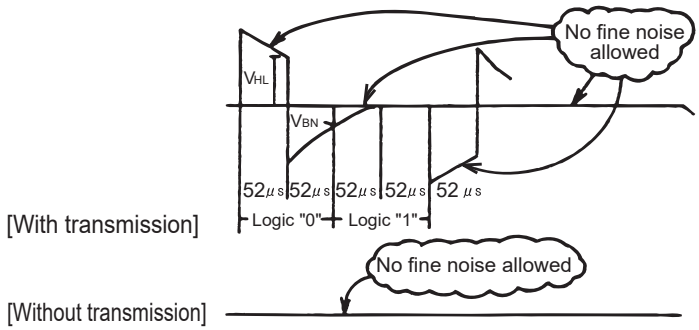
8-4-1 M-NET

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

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

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

(2) Wave shape check



Wave shape check

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

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

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

(3) Check method and remedy

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

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

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

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

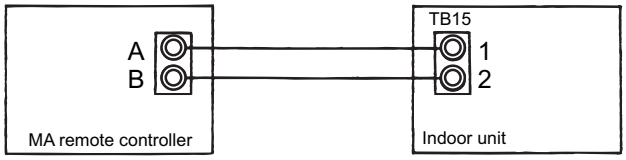
8-4-2 MA Remote Controller

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

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

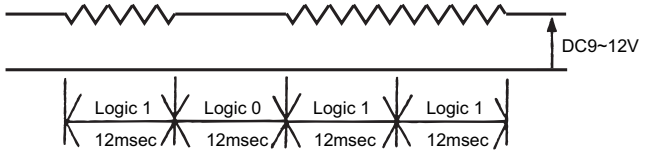
If noise is generated on the transmission line, and the communication between the MA remote controller and the indoor unit is interrupted for 3 minutes in a row, MA transmission error (6831) will occur.

(2) Confirmation of transmission specifications and wave pattern



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

Transmission waveform (Across terminal No.1 - 2)

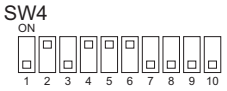


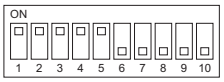
① Satisfies the formula
12 msec/bit ± 5%
② Voltage among terminals must be between DC9 and 12 V.

8-5 Pressure Sensor Circuit Configuration and Troubleshooting Pressure Sensor Problems

8-5-1 Comparing the High-Pressure Sensor Measurement and Gauge Pressure

By configuring the digital display setting switch (SW4 (when SW6-10 is set to OFF)) as shown in the figure below, the pressure as measured by the high-pressure sensor appears on the LED1 on the control board.





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

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

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

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

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

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

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

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

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

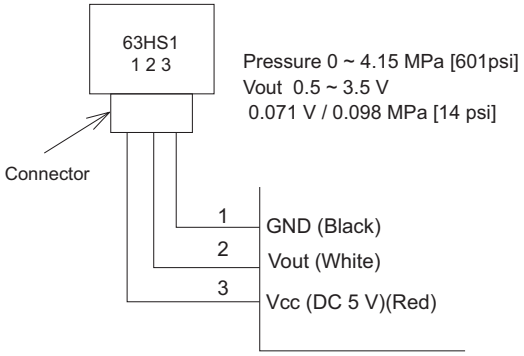
8-5-2 High-Pressure Sensor Configuration (63HS1)

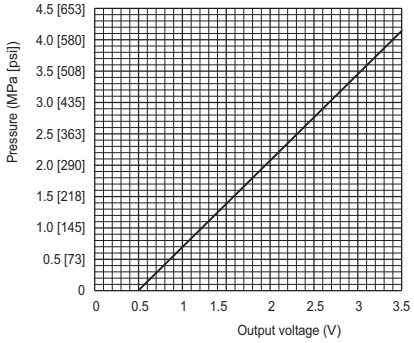
The high pressure sensor consists of the circuit shown in the figure below. If DC 5V is applied between the red and the black wires, voltage corresponding to the pressure between the white and the black wires will be output, and the value of this voltage will be converted by the microcomputer. The output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

Note

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

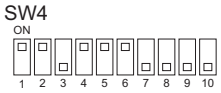
	Body side	Control board side
Vcc	Pin 1	Pin 3
Vout	Pin 2	Pin 2
GND	Pin 3	Pin 1

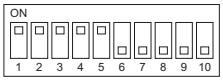




8-5-3 Comparing the Low-Pressure Sensor Measurement and Gauge Pressure

By configuring the digital display setting switch (SW4 (when SW6-10 is set to OFF)) as shown in the figure below, the pressure as measured by the low-pressure sensor appears on the LED1 on the control board.





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

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

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

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

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

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

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

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

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

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

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

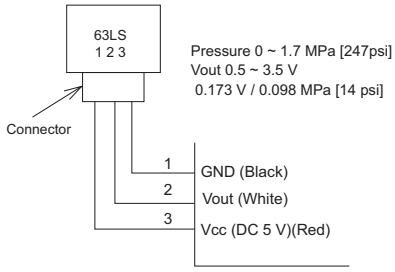
8-5-4 Low-Pressure Sensor Configuration (63LS)

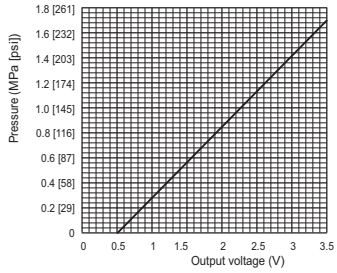
The low pressure sensor consists of the circuit shown in the figure below. If DC5V is applied between the red and the black wires, voltage corresponding to the pressure between the white and the black wires will be output, and the value of this voltage will be converted by the microcomputer. The output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

Note

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

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



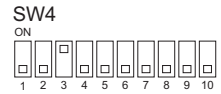


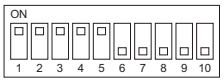
8-6 Troubleshooting Solenoid Valve Problems

Check whether the output signal from the control board and the operation of the solenoid valve match.
Setting the self-diagnosis switch (SW4) as shown in the figure below causes the ON signal of each relay to be output to the LED's. Each LED shows whether the relays for the following parts are ON or OFF. LEDs light up when relays are ON.

Note

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

SW4 (SW6-10:OFF)		Display							
		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8
	Upper	21S4a	SV10			SV1a		SV2	SV11
	Lower			21S4b					
	Upper					21S4c		SV9	
	Lower			SV14		SV15			



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

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

(1) 21S4a (4-way switching valve)

About this 4-way valve
When not powered:
Conducts electricity between the oil separator outlet and heat exchanger 1 (front heat exchanger), and between the gas ball valve (BV1) and the accumulator to complete the circuit for the cooling cycle.
When powered:
The electricity runs between the oil separator and the gas ball valve, and between the heat exchanger and the accumulator. This circulation is for heating.

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

Note

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

(2) 21S4b (4-way switching valve), 21S4c (4-way switching valve) (21S4c is only on the (E) P168 - EP192 models.)

About this 4-way valve
When not powered:
Conducts electricity between the oil separator outlet and heat exchanger 2 (rear or right heat exchanger) (<21S4b>), and between the oil separator outlet and heat exchanger 3 (left exchanger) (<21S4c>) and opens and closes the heat exchanger circuit for the heating and cooling cycles.
When powered:
The electricity runs between the heat exchanger and the accumulator, and the valve opens or closes the heat exchanger circuit when cooling or heating.

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

Note

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

(3) ISV1a (Bypass valve)

This solenoid valve opens when powered (Relay ON).

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

(4) SV2 (solenoid valve)

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

(5) SV9 (Solenoid valve)

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

(6) SV10 (Solenoid valve)

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

(7) SV11 (Solenoid valve)

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

(8) SV14 (solenoid valve)

This solenoid valve is a switching valve that opens when energized if the refrigerant flow is forward. It is closed when energized if the refrigerant flow is reversed. Proper operation of this valve can be checked on the LED and by the switching sound.

(9) SV15 (solenoid valve)

This solenoid valve is a switching valve that opens when energized if the refrigerant flow is forward. It is closed when energized if the refrigerant flow is reversed. Proper operation of this valve can be checked on the LED and by the switching sound.

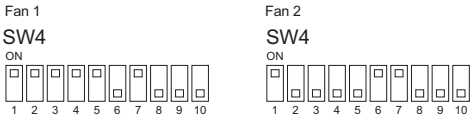
Note

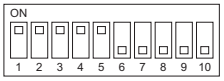
Do not give an impact from outside, as the outer hull will be deformed leading to the malfunction of the inner valve.

8-7 Troubleshooting Outdoor Unit Fan Problems

(1) Fan motor (common items)

- To check the revolution of the fan, check the inverter output state on the self-diagnosis LED, as the inverter on the outdoor fan controls the revolutions of the fan.
- When starting the fan, the fan runs at full speed for 5 seconds.
- When setting the DIP SW4 (when SW6-10 is set to OFF) as shown in the figure below, the inverter output [%] will appear. 100% indicates the full speed and 0% indicates the stopping. (Fan No.2 is only on the (E)P96 - P168, and EP192 models.)





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

- As the revolution of the fan changes under control, at the interphase or when the indoor unit operation capacity is low, the revolution of the fan may change.
- If the fan does not move or it vibrates, fan board problem or fan motor problem is suspected. When checking the fan motor for problems by shutting down the power, be sure to disconnect the motor wire from the fan board. (If a short-circuited fan board malfunctions, it will keep the fan motor from rotating smoothly.) For details, refer to the following page(s).

[8-9-7 Checking the Fan Motor for Ground Fault and Coil Resistance Problems]
[8-9-8 Checking the Fan Board Error Detection Circuit at No Load]
[8-9-9 Checking the Fan Board for Damage at No Load]
[8-9-10 Checking the Fan Board for Damage with Load]

8-8 Troubleshooting LEV Problems

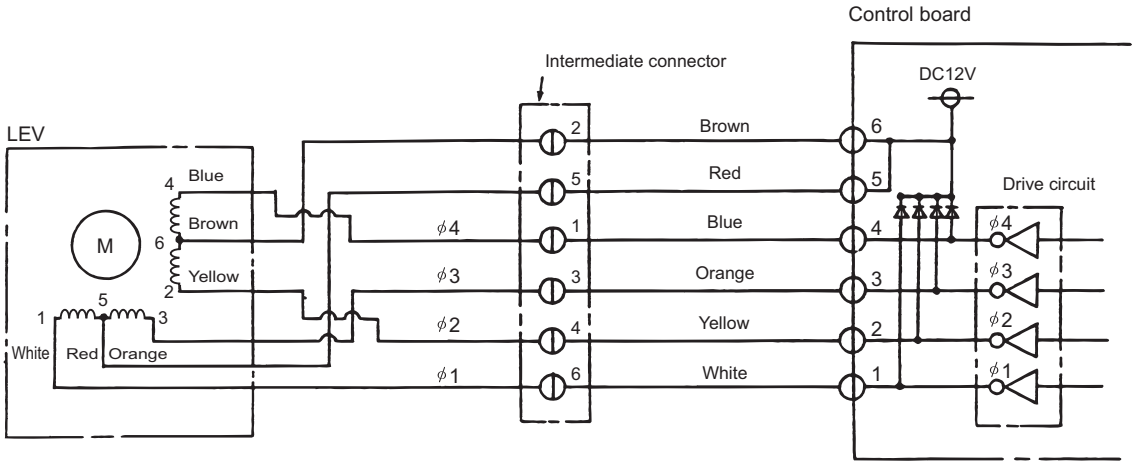
8-8-1 General Overview on LEV Operation

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

(1) Indoor LEV and Outdoor LEV (LEV2)

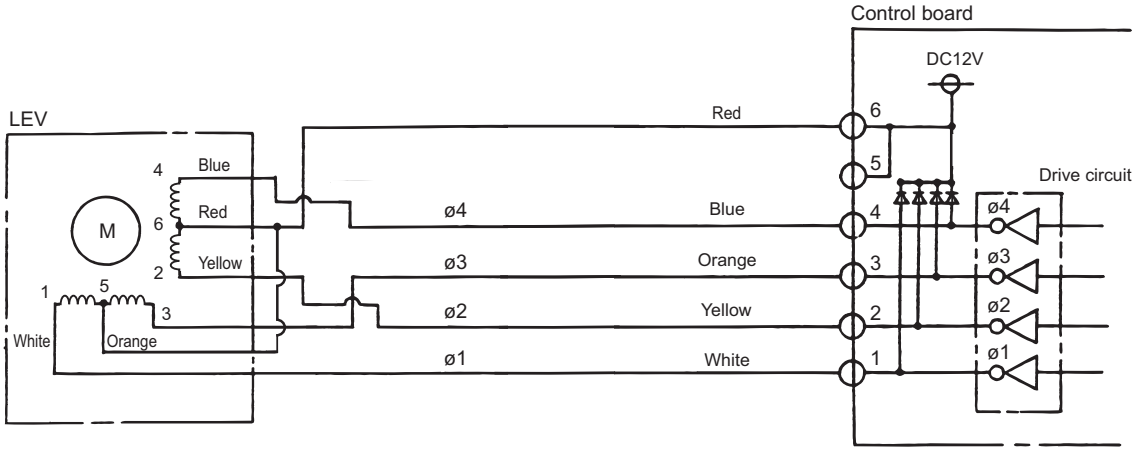
The valve opening changes according to the number of pulses.

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



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

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



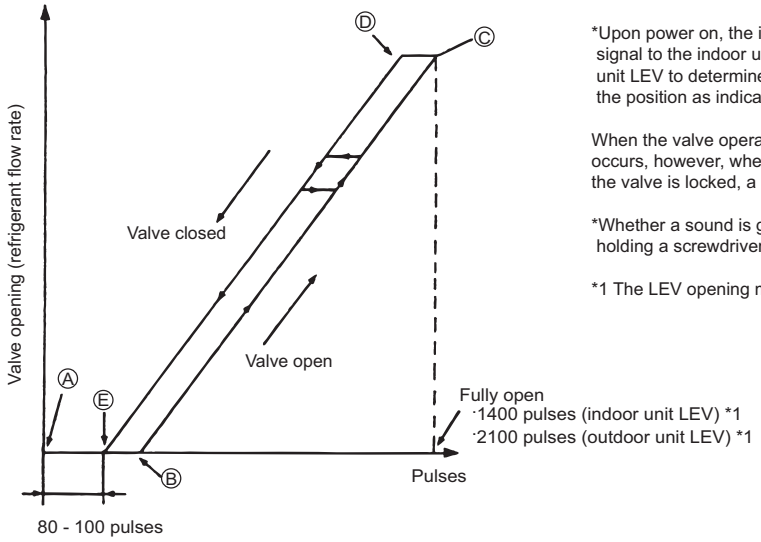
3) Pulse signal output and valve operation

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

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

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

4) LEV closing and opening operation



*Upon power on, the indoor unit circuit board sends a 2200 pulse signal to the indoor unit LEV and a 3200 pulse signal to the outdoor unit LEV to determine the valve position and always brings the valve to the position as indicated by "Ⓐ" in the diagram.

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

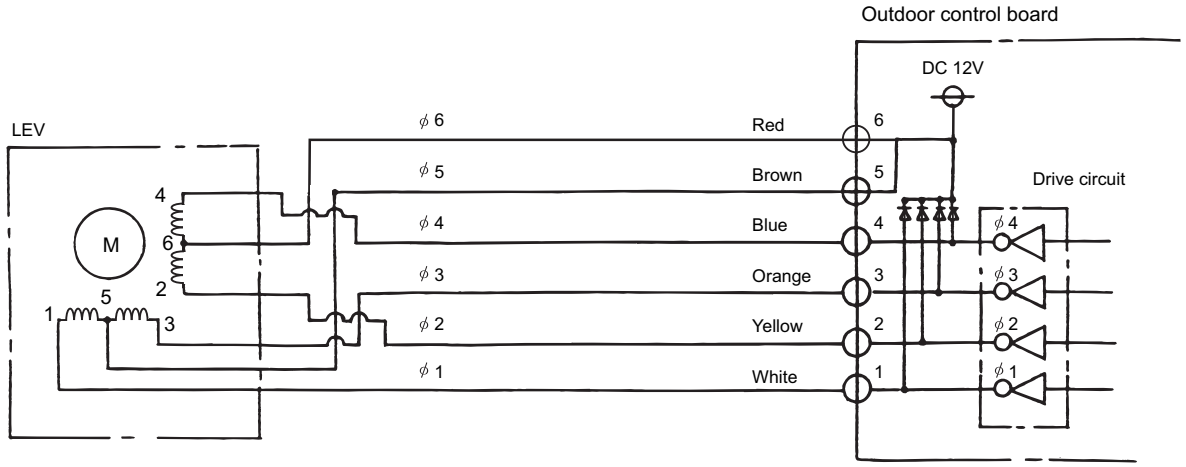
*Whether a sound is generated or not can be determined by holding a screwdriver against it, then placing your ear against the handle.

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

(2) Outdoor LEV (LEV1, LEV4, and LEV9)

The valve opening changes according to the number of pulses.

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



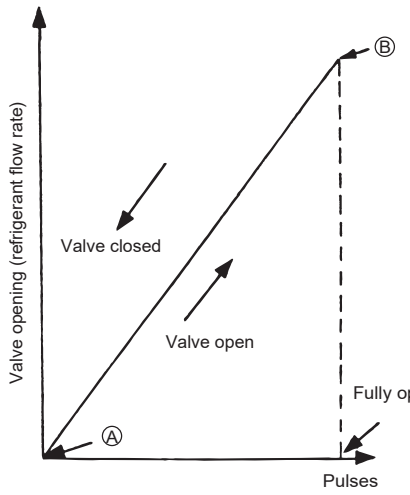
2) Pulse signal output and valve operation

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

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

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

3) LEV valve closing and opening operation



*Upon power on, the indoor unit circuit board sends a 520 pulse signal to the indoor unit LEV to determine the valve position and always brings the valve to the position as indicated by "Ⓐ" in the diagram. (Pulse signal is output for approximately 17 seconds.)

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

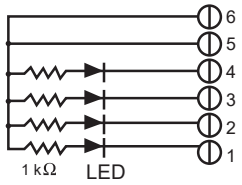
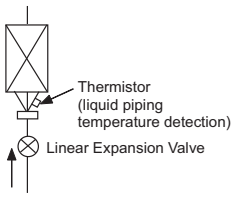
*Whether a sound is generated or not can be determined by holding a screwdriver against it, then placing your ear against the handle.

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

8-8-2 Possible Problems and Solutions

Note

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

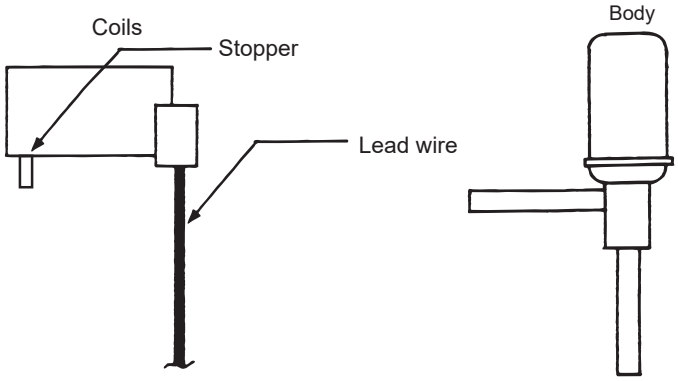
Malfunction mode	Judgment method	Remedy	Target LEV
Microcomputer driver circuit failure	Disconnect the control board connector and connect the check LED as shown in the figure below.  Resistance : 0.25W 1kΩ LED : DC15V 20mA or more When the main power is turned on, the indoor unit circuit board outputs pulse signals to the indoor unit LEV for 10 seconds, and the outdoor unit circuit board outputs pulse signals to the outdoor unit LEV for 17 seconds. If any of the LED remains lit or unlit, the drive circuit is faulty.	When the drive circuit has a problem, replace the control board.	Indoor Outdoor
LEV mechanism is locked	If the LEV is locked, the drive motor runs idle, and makes a small clicking sound. When the valve makes a closing and opening sound, the valve has a problem.	Replace the LEV.	Indoor Outdoor
Disconnected or short-circuited LEV motor coil	Measure the resistance between coils (red-white, red-orange, brown-yellow, brown-blue) with a tester. When the resistance is in the range of 150Ω ± 10%, the LEV is normal.	Replace the LEV coils.	Indoor
	Measure the resistance between coils (red-white, red-orange, red-yellow, red-blue) with a tester. When the resistance is in the range of 100Ω ± 10%, the LEV is normal.	Replace the LEV coils.	Outdoor (LEV2a, LEV2b, LEV2c)
	Measure the resistance between coils (red - white, red - orange, brown - yellow, brown - blue) with a tester. When the resistance is in the range of 46Ω ± 3%, the LEV is normal.	Replace the LEV coils.	Outdoor (LEV1, LEV4, LEV9)
Incomple sealing (leak from the valve)	When checking the refrigerant leak from the indoor LEV, run the target indoor unit in the fan mode, and the other indoor units in the cooling mode. Then, check the liquid temperature (TH2) with the self-diagnosis LED. When the unit is running in the fan mode, the LEV is fully closed, and the temperature detected by the thermistor is not low. If there is a leak, however, the temperature will be low. If the temperature is extremely low compared with the inlet temperature displayed on the remote controller, the LEV is not properly sealed, however, if there is a little leak, it is not necessary to replace the LEV when there are no effects to other parts.  	If there is a large amount of leakage, replace the LEV.	Indoor
Faulty wire connections in the connector or faulty contact	1. Check for loose pins on the connector and check the colors of the lead wires visually 2. Disconnect the control board's connector and conduct a continuity check using a tester.	Check the continuity at the points where an error occurs.	Indoor Outdoor

8-8-3 Coil Removal Instructions

(1) Outdoor unit LEV (LEV1, LEV4, and LEV9)

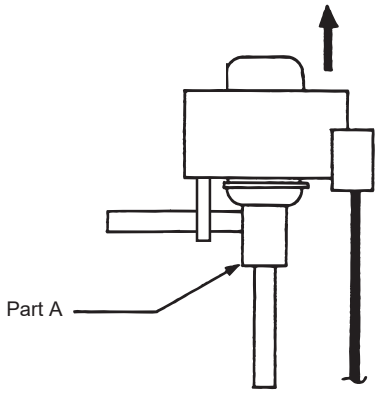
1) LEV component

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



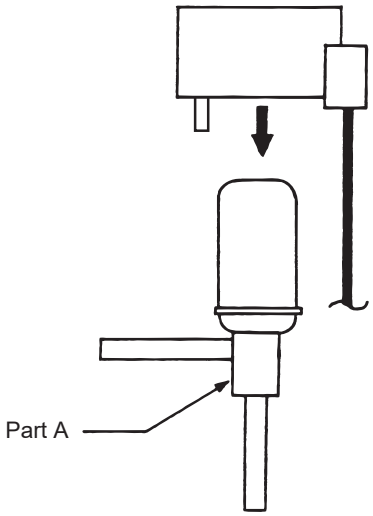
2) Removing the coils

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



3) Installing the coils

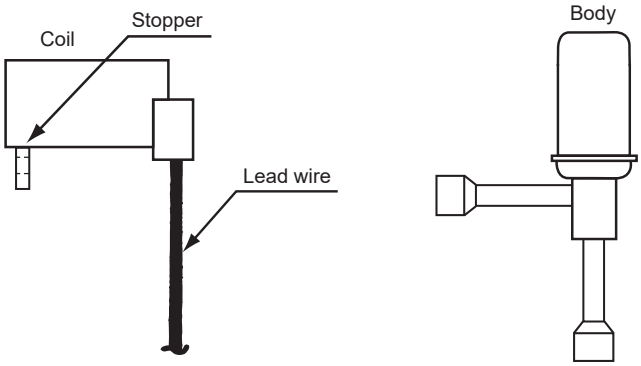
Fix the body tightly at the bottom (Part A in the figure) so that the body will not move, then insert the coils from the top, and insert the coil stopper securely in the pipe on the body.
If the coils are pushed without the body gripped, undue force will be applied and the pipe will be bent. Hold the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



(2) Outdoor unit LEV (LEV2a, LEV2b, LEV2c)

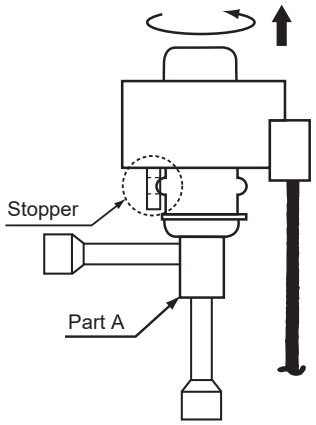
1) Components

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



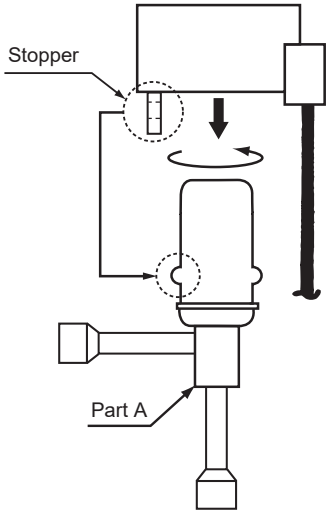
2) Removing the coil

Securely hold the LEV at the bottom (Part A in the figure), and turn the coil. After checking that the stopper is removed, pull up and out the coil.
When removing the coil, hold the LEV body securely to prevent undue force from being placed on the pipe and bending the pipe.



3) Installing the coil

Securely hold the bottom of the LEV (Part A in the figure), insert the coil from above, and turn the coil until the coil stopper is properly installed on the LEV body.
When removing the coil, hold the LEV body securely to prevent undue force from being placed on the pipe and bending the pipe.



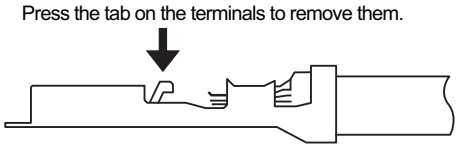
8-9 Troubleshooting Inverter Problems

8-9-1 Inverter-Related Problems and Solutions

- Replace only the compressor if only the compressor is found to be defective. (Overcurrent will flow through the inverter if the compressor is damaged, however, the power supply is automatically cut when overcurrent is detected, protecting the inverter from damage. Make sure that the model selection switches on the outdoor unit (Dip switches SW5-3 through 5-8 on the outdoor unit control board) are set correctly. For switch settings, refer to the following page(s). [7-9-2 Error Code [7101]])
- Replace only the fan motor if only the fan motor is found to be defective. (Overcurrent will flow through the inverter if the fan motor is damaged, however, the power supply is automatically cut when overcurrrent is detected, protecting the inverter from damage.)
- Replace the defective components if the inverter is found to be defective.
- If both the compressor and the inverter are found to be defective, replace the defective component(s) of both devices.

(1) Inverter-related problems: Troubleshooting and remedies

1) Inside the inverter is a large capacity electrolytic capacitor, and the residual voltage that remains after the main power is turned off presents a risk of electric shock. Before inspecting the inside of the control box, turn off the power, leave the unit turned off for at least 10 minutes, and check that the voltage across pins 1 (+) and 5 (-) of relay connector RYPN has dropped to 20 VDC or less. (It takes approximately 10 minutes to discharge electricity after the power is turned off.)
2) Perform the service after disconnecting the relay connectors of the outdoor unit fan (RYFAN1 and RYFAN2). Before plugging in or unplugging connectors, check that the outdoor unit fan is not rotating and that the voltage across Pin 1 (+) and Pin 5 (-) of connector RYPN is 20 VDC or less. The capacitor may collect a charge and cause an electric shock when the outdoor unit fan rotates in windy conditions. Refer to the wiring nameplate for details.
3) Reconnect the relay connectors (RYFAN 1 and RYFAN 2) after completion of maintenance work.
4) The IPM on the inverter becomes damaged if there are loose screws are connectors. If a problem occurs after replacing some of the parts, mixed up wiring is often the cause of the problem. Check for proper connection of the wiring, screws, connectors, and Faston terminals.
5) To avoid damage to the circuit board, do not connect or disconnect the inverter-related connectors with the main power turned on.
6) Faston terminals have a locking function. Make sure the terminals are securely locked in place after insertion.



7) When the IPM or IGBT is replaced, apply a thin layer of heat radiation grease that is supplied evenly to these parts. Wipe off any grease that may get on the wiring terminal to avoid terminal contact failure.
8) Faulty wiring to the compressor damages the compressor. Connect the wiring in the correct phase sequence.
9) When the power is turned on, the compressor is energized even while they are not operating. Before turning on the power, disconnect all power supply wires from the compressor terminal block, and measure the insulation resistance of the compressor. Check the compressor for a ground fault. If the insulation resistance is 1.0 MΩ or below, connect all power supply wires to the compressor, and turn on the power to the outdoor unit. (The liquid refrigerant in the compressor will evaporate by energizing the compressor.)

	Error display/failure condition	Measure/inspection item
[1]	Inverter related errors 4250, 4255, 4256, 4220, 4225, 4226, 4230, 4240, 4260, 5301, 5305, 5306, 0403	Implement solutions that correspond to the error codes or preliminary error codes. Refer to the following page(s). [7-1 Error Code and Preliminary Error Code Lists]
[2]	Main power breaker trip Measure the secondary voltage of the main power breaker before checking because the main power breaker may have been broken.	Refer to the following page(s). [8-9-12 Solutions for the Main Breaker Trip]
[3]	Main power earth leakage breaker trip Measure the secondary voltage of the main power earth leakage breaker before checking because the main power earth leakage breaker may have been broken.	Refer to the following page(s). [8-9-13 Solutions for the Main Earth Leakage Breaker Trip]
[4]	Only the compressor does not operate.	Check the inverter frequency on the LED monitor. If the frequency indicates that the units are in operation, refer to the following page(s). [8-9-5 Checking the Inverter for Damage during Compressor Operation]
[5]	The compressor vibrates violently at all times or makes an abnormal sound.	Refer to the following page(s). [8-9-5 Checking the Inverter for Damage during Compressor Operation]
[6]	Compressor rotation speed does not reach the specified speed.	<1> Check for problems with compressor current and heatsink temperature.
		<2> Check for imbalance in power supply voltage. *Approximate target: 3% or less.
[7]	Only the fan motor does not operate.	Check the inverter frequency on the LED monitor. If the frequency indicates that the units are in operation, refer to the following page(s). [8-9-8 Checking the Fan Board Error Detection Circuit at No Load] [8-9-9 Checking the Fan Board for Damage at No Load] [8-9-10 Checking the Fan Board for Damage with Load]
[8]	The fan motor shakes violently at all times or makes an abnormal sound.	Check the inverter frequency on the LED monitor. If the frequency indicates that the units are in operation, refer to the following page(s). [8-9-8 Checking the Fan Board Error Detection Circuit at No Load] [8-9-9 Checking the Fan Board for Damage at No Load] [8-9-10 Checking the Fan Board for Damage with Load]
[9]	Noise is picked up by the peripheral device	<1> Check that power supply wiring of the peripheral device does not run close to the power supply wiring of the outdoor unit.
		<2> Check if the inverter output wiring is not running parallel to the power supply wiring and the transmission lines.
		<3> Check that the shielded wire is used as the transmission line when it is required, and check that the grounding work is performed properly on the shielded wire.
		<4> Meg failure for electrical system other than the inverter
		<5> Attach a ferrite core to the inverter output wiring. (Contact the factory for details of the service part settings.)
		<6> Provide separate power supply to the air conditioner and other electric appliances.
		<7> If the problem suddenly appeared, inverter output may have had a ground fault. For details, refer to the following page(s). [8-9-5 Checking the Inverter for Damage during Compressor Operation]
		*Contact the factory for cases other than those listed above.
[10]	Sudden malfunction (as a result of external noise.)	<1> Check that the grounding work is performed properly.
		<2>Check that the shielded wire is used as the transmission line when it is required, and check that the grounding work is performed properly on the shielded wire.
		<3>Check that neither the transmission line nor the external connection wiring does not run close to another power supply system or does not run through the same conduit pipe.
		* Contact the factory for cases other than those listed above.

8-9-2 Checking the Inverter Board Error Detection Circuit

Items to be checked	Phenomena	Remedy
(1) Stop the unit. Remove power supply.	1) Overcurrent error Error code: 4250 Detail code: No. 101, 104, 105, 106, and 107	Replace the INV board.
(2) Disconnect the inverter output wires from the compressor terminals (U, V, W).*1	2) Logic error Error code: 4220 Detail code: No. 111	Replace the INV board.
(3) Apply power supply.	3) ACCT sensor circuit failure Error code: 5301 Detail code: No.117	Replace the INV board.
(4) Put the outdoor unit into operation.	4) IPM open Error code: 5301 Detail code: No.119	Normal

*1 Output voltage is present at the inverter output wiring terminal. To avoid short-circuiting and ground fault, do not let the terminal come in contact with the unit or the compressor, and use caution not to damage the terminal.

*2 Compressors on (E)P72 models are located in the back of the MAIN BOX. To disconnect the inverter output wiring, move the MAIN BOX out of the way first, and then disconnect the wiring from the terminal on the compressor. Refer to [8-12-1 Ensuring Maintenance Space (Preparation for the Maintenance of Refrigerant Circuit Parts)]for how to move the MAIN BOX.

8-9-3 Checking the Compressor for Ground Fault and Coil Resistance Problems

Items to be checked	Phenomena	Remedy
Disconnect the compressor wiring, and check the compressor Meg, and coil resistance.	1) Compressor Meg failure Error if less than 1 MΩ.	Check that there is no liquid refrigerant in the compressor. If there is none, replace the compressor.
	2) Compressor coil resistance failure Coil resistance value P72, P96 models 0.72 Ω (YNU), 0.2 Ω (TNU) EP72, EP96, P120, P144, P168 models 0.192 Ω (YNU), 0.078 Ω (TNU) EP120, EP144, EP168, EP192 models 0.219 Ω (YNU), 0.087 Ω (TNU) EP216, EP240 models 0.212 Ω (YNU), 0.079 Ω (TNU)	Replace the compressor.

8-9-4 Checking the Inverter for Damage at No-Load

Items to be checked	Phenomena	Remedy
(1) Stop the unit. Remove power supply.	1) Inverter-related problems are detected.	Set SW7-1 on the MAIN board to ON, and go to [8-9-2 Checking the Inverter Board Error Detection Circuit]. ∗When the MAIN board software version is 21.20 or earlier, this function will not be enabled. In such a case, update the software to the latest version.
(2) Disconnect the inverter output wires from the compressor terminals (U, V, W).*1	2) Inverter voltage is not output at the terminals (U, V, and W)	Replace the INV board.
(3) Set SW7-1 on the MAIN board to ON. (4) Apply power supply.	3) There is an voltage imbalance between the wires. Greater than 5% imbalance or 5V	Replace the INV board.
(5) Put the outdoor unit into operation. Check the inverter output voltage after the inverter output frequency has stabilized.	4) There is no voltage imbalance between the wires.	Normal *When done checking, set SW7-1 on the MAIN board back to as it was.

*1 Output voltage is present at the inverter output wiring terminal. To avoid short-circuiting and ground fault, do not let the terminal come in contact with the unit or the compressor, and use caution not to damage the terminal.

*2 Compressors on (E)P72 models are located in the back of the MAIN BOX. To disconnect the inverter output wiring, move the MAIN BOX out of the way first, and then disconnect the wiring from the terminal on the compressor. Refer to [8-12-1 Ensuring Maintenance Space (Preparation for the Maintenance of Refrigerant Circuit Parts)]for how to move the MAIN BOX.

8-9-5 Checking the Inverter for Damage during Compressor Operation

Items to be checked	Phenomena	Remedy
Put the outdoor unit into operation. Check the inverter output voltage (at the compressor terminal) after the inverter output frequency has stabilized. <INV35Y, INV42Y, and INV38>	1) Overcurrent-related problems occur immediately after compressor startup. Error code : 4250 Detail code : 101, 102, 106, 107	a. Check items [8-9-2 Checking the Inverter Board Error Detection Circuit]through [8-9-4 Checking the Inverter for Damage at No-Load]for problems. b. Check that high and low pressures are balanced. c. Check that no liquid refrigerant is present in the compressor and that there is no liquid backflow. →Go to "d." when the problem persists after compressor startup was repeated several times. d. Check that there is a pressure difference between high and low pressures after compressor start-up. →Check the high pressure with LED monitor for changes. Replace the compressor if there is no pressure difference. (the compressor may be locked.)
	2) There is a voltage imbalance between the wires after the inverter output voltage is stabilized. Greater than the larger of the following values: imbalance of 5% or 5V	Replace the INV board if there is a voltage imbalance. Check the belt heater for problems if there is no voltage imbalance. →When the error occurred, liquid refrigerant may have been present in the compressor.

Items to be checked	Phenomena	Remedy
<INV37YC and INV39C>	3) An overcurrent error occurs during operation. Error code : 4250 Detail code : 121,122	[8-9-6 Checking the Converter for Damage during Compressor Operation]
	4) An overcurrent error occurs immediately after compressor startup. Error code : 4250 Detail code :101,106,107,128	a. Check for refrigerant flooding. →When the problem persists after compressor startup was repeated several times, go to "d" after a certain time after energizing the compressor or the heater. If normal operation is restored, check the belt heater for problems. b. Check that there is a pressure difference between high and low pressures after compressor start-up. →Check the high pressure with LED monitor for changes. Replace the compressor if there is no pressure difference. (the compressor may be locked.) c. Check for interphase voltage imbalance. d. Replace the INV board if no problems were found with the items a or c. e. If the problem persists after replacing the inverter board, [8-9-3 Checking the Compressor for Ground Fault and Coil Resistance Problems]
	5) An overvoltage error occurs during operation. Error code : 4220 Detail code :109,110,112	[8-9-6 Checking the Converter for Damage during Compressor Operation]
	6) No problems were found with items 1) through 5).	Normal [8-9-6 Checking the Converter for Damage during Compressor Operation]

8-9-6 Checking the Converter for Damage during Compressor Operation

Items to be checked	Phenomena	Remedy
(1) Operate the outdoor unit.	1) BUS voltage does not boost (does not change) BUS voltage does not boost to approximately between 650 and 750 VDC, or the following errors are detected. Error code : 4220 Detail code : 123	Replace the inverter board.
(2) Check the BUS voltage after the converter circuit went into operation and the BUS voltage has boost. *The voltage generally boost at or above 80 rps, depending on the power source voltage.	2) An overcurrent error occurs after converter circuit goes into operation. Error code : 4250 Detail code : 121,122	a.If the problem persists after startup, replace the inverter board. b.If the problem persists after replacing the inverter board, replace the DCL.
	3) An overvoltage error occurs after converter circuit goes into operation. Error code : 4220 Detail code : 109,110,112	a.If the problem persists after startup, replace the inverter board. b.If the problem persists after replacing the inverter board, replace the DCL.
	4) No problems were found with items 1) through 3).	Normal

8-9-7 Checking the Fan Motor for Ground Fault and Coil Resistance Problems

Items to be checked	Phenomena	Remedy
Remove fan motor winding. Check insulation resistance and coil resistance.	1) Fan motor insulation failure. If < 1 MΩ, Defect.	Change fan motor.
	2) Fan motor wire failure. Target coil resistance: Approx. 10 Ω. (Changes with temperature)	Change fan motor.

8-9-8 Checking the Fan Board Error Detection Circuit at No Load

Items to be checked	Phenomena	Remedy
(1) Stop the unit. Turn off the breaker. *Be sure to turn off the power.	1) An error other than current sensor error (5305, 5306: Detail code 135) is detected during operation.	Replace the fan board.
(2) Disconnect the output wiring to the fan motor. Disconnect connector RYFAN1. (On a model with two fan motors, RYFAN1 corresponds to the right fan and RYFAN2 corresponds to the left fan (when seen from the front).) (3) Turn on the breaker. (4) Operate the unit.	2) Current sensor fault Error code: 5305, 5306 Detail code: 135	Normal *When done checking, reconnect all connectors as they were. Unless they are properly reconnected, current sensor fault will not be resolved.

8-9-9 Checking the Fan Board for Damage at No Load

Items to be checked	Phenomena	Remedy
(1) Stop the unit. Turn off the breaker. *Be sure to turn off the power.	1) An error other than the current sensor error (5305, 5306 Detail code 135) is detected within 30 seconds from the startup of operation.	Replace the fan board.
(2) To allow for the disconnection of output wiring from the fan motor, disconnect connector RYFAN1. (On a model with two fan motors, RYFAN1 corresponds to the right fan and RYFAN2 corresponds to the left fan (when seen from the front).)	2) Inter-wire voltage imbalance of 5 V or above	Replace the fan board.
(3) Set SW7-2 on the control board to ON. On a model with two fan motors, set SW7-2 (left fan when seen from the front) or SW7-4 (right fan when seen from the front) to ON. (4) Turn on the breaker. (5) Operate the unit	3) No inter-wire voltage imbalance exists. A current sensor error (Detail code 135) is detected 30 seconds after the startup of operation, and the operation stops.	Normal *When done checking, reconnect all connectors as they were. Unless they are properly reconnected, current sensor fault will not be resolved.

8-9-10 Checking the Fan Board for Damage with Load

Items to be checked	Phenomena	Remedy
(1) Turn off breaker.	1) The operation stops within 20 seconds of startup and a step-out error or an overcurrent error occurs. Check code: 4255, 4256 Detail code: 101, 106, 107, 137	Check for fan motor lock. →If locked, change for fan motor. If the same error is still present after changing fan motor, change Fan board. →If not locked, refer to 3) & 4).
(2) Turn on breaker.	2) Motor synchronization loss or electrical current overload during operation Check code: 4255, 4256 Detail code: 101, 106, 107, 137	a. Check for gusts or windy conditions. b. Go to [8-9-8 Checking the Fan Board Error Detection Circuit at No Load]if not windy. c. After checking [8-9-9 Checking the Fan Board for Damage at No Load], and there is no problem, change Fan board. d. If replacing Fan board doesn't resolve issue, change fan motor.
(3) Operate unit.	3) Sensor error during operation Check code: 5305, 5306 Detail code: 135, 136	a. Check for disconnection of fan inverter output wiring and for broken wiring. b. If the error is not associated with any of the items above, replace the fan board. c. Change fan motor if Fan board change doesn't resolve issue.
	4) Voltage overload error Check code: 4225, 4226 Detail code: 109	a. Check for gusts or windy conditions. b. Change Fan board if it is not windy.
	5) Load short circuit Check code: 4255, 4256. Detail code: 105	a. Check [8-9-7 Checking the Fan Motor for Ground Fault and Coil Resistance Problems] and [8-9-8 Checking the Fan Board Error Detection Circuit at No Load]. If no problem, then check wiring forshort circuit. b. If there is no problem with item a. above, change fan motor. c. If same error after motor change, change Fan board.
	6) After RPM has stabilized, voltage unbalance of 5%, or 5V.	a. If voltage is unbalanced, go to [8-9-8 Checking the Fan Board Error Detection Circuit at No Load] b. After checking [8-9-9 Checking the Fan Board for Damage at No Load], and there is no problem, change Fan board. c. If replacing Fan board doesn't resolve issue, change fan motor.

8-9-11 Checking the Installation Conditions

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

8-9-12 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.	Zero to several ohm, or Meg failure	Check each part and wiring. Refer to the following page(s). [8-9-14 Simple Check on Inverter Circuit Components] ♦IGBT module ♦Rush current protection resistor ♦Electromagnetic relay ♦DC reactor
[3]	Turn on the power again and check again.	1) Main power breaker trip	
		2) No remote control display	
[4]	Turn on the outdoor unit and check that it operates normally.	1) Operates normally without tripping the main breaker.	a) The wiring may have been short-circuited. Search for the wire that short-circuited, and repair it. b) If item a) above is not the cause of the problem, refer to [8-9-2 Checking the Inverter Board Error Detection Circuit] - [8-9-10 Checking the Fan Board for Damage with Load]
		2) Main power breaker trip	

8-9-13 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 each part and wiring. Refer to the following page(s). [8-9-14 Simple Check on Inverter Circuit Components] ♦IGBT module ♦Rush current protection resistor ♦Electromagnetic relay ♦DC reactor
[3]	Disconnect the compressor wirings and check the resistance of the compressor with a megger.	Failure compressor if the insulating resistance value is not in specified range. Failure when the insulating resistance value is 1 MΩ or less.	Check that there is no liquid refrigerant in the compressor. If there is none, replace the compressor.
[4]	Disconnect the fan motor wirings and check the resistance of the fan motor with a megger.	Failure fan motor if the insulating resistance value is not in specified range. Failure when the insulating resistance value is 1 MΩ or less.	Replace the fan motor.

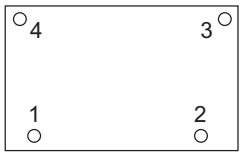
Earth leakage current measurement method

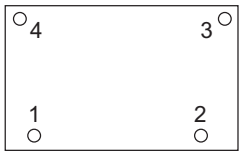
♦For easy on-site measurement of the earth leakage current, enable the filter with a measurement instrument that has filter functions as below, clamp all the power supply wires, and measure.
Recommended measurement instrument: CLAMP ON LEAK HiTESTER 3283 made by HIOKI E.E. CORPORATION
♦When measuring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

8-9-14 Simple Check on Inverter Circuit Components

Note

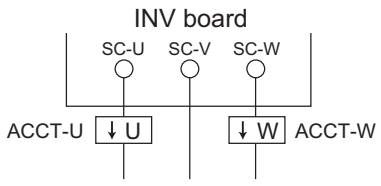
Turn off the power to the unit, and leave it turned off for at least 10 minutes. Check that the voltage across pins 1 (+) and 5 (-) of the connector RYPN1 is 20 VDC or less before removing components from the control box.

<table>
<tr><th>Part name</th><th>Judgment method</th></tr>
<tr><td>IGBT module</td><td>Refer to the following page(s). [8-9-15 Troubleshooting Problems with IGBT Module]</td></tr>
<tr><td>Rush current protection resistor
R1, R5</td><td>Measure the resistance between terminals R1 and R5: 22 Ω±10%</td></tr>
<tr><td>Electromagnetic relay
72C</td><td>This electromagnetic relay is rated at DC12V and is driven by a coil.
Check the resistance between terminals
(YNU)
P72-P168
 

<table><tr><th></th><th>Check point</th><th>Checking criteria</th></tr><tr><td>Coil</td><td>INV board
X901, X902
Across pins 1-2</td><td>160Ω ± 10%</td></tr><tr><td>Contact</td><td>INV board
FT-P1 and FT-P2
*Faston terminal removed</td><td>INV board CNRY
Open: ∞
INV board CNRY
At a voltage input of 12 VDC: 0Ω</td></tr></table>
EP168, EP192, EP216, EP240
 

<table><tr><th></th><th>Check point</th><th>Checking criteria</th></tr><tr><td>Coil</td><td>INV board
X100, X101, X102
Across pins 1-2</td><td>160Ω ± 10%</td></tr><tr><td>Contact</td><td>INV board
FT100 and FT101
*Faston terminal removed</td><td>INV board CNRY
Open: ∞
INV board CNRY
At a voltage input of 12 VDC: 0Ω</td></tr></table>
(TNU)
(E)P72-P168
 

<table><tr><th></th><th>Check point</th><th>Checking criteria</th></tr><tr><td>Coil</td><td>INV board
X901, X902, X903
Across pins 1-2</td><td>160Ω ± 10%</td></tr><tr><td>Contact</td><td>INV board
FT-P1 and FT-P2
*Faston terminal removed</td><td>INV board CNRY
Open: ∞
INV board CNRY
At a voltage input of 12 VDC: 0Ω</td></tr></table>
EP168, EP192, EP216, EP240
 

<table><tr><th></th><th>Check point</th><th>Checking criteria</th></tr><tr><td>Coil</td><td>INV board
X100, X101, X102,
X103 Across pins 1-2</td><td>160Ω ± 10%</td></tr><tr><td>Contact</td><td>INV board
FT100 and FT101
*Faston terminal removed</td><td>INV board CNRY
Open: ∞
INV board CNRY
At a voltage input of 12 VDC: 0Ω</td></tr></table></td></tr>
<tr><td>DC reactor
DCL</td><td>Measure the resistance between terminals: 1Ω or lower (almost 0 Ω)
Measure the resistance between terminals and the chassis: ∞</td></tr>
<tr><td>Current sensor
ACCT</td><td>Disconnect the wiring connector from CNCT2, and measure the inter-teminal resistance: 280Ω±30Ω
Between pins 1 and 2 (U-phase), pins 3 and 4 (W-phase)
 

*Check ACCT wiring for correct phase and direction.</td></tr>
</table>

8-9-15 Troubleshooting Problems with IGBT Module

Measure the resistances between each pair of terminals on the IGBT with a tester, and use the results for troubleshooting. The terminals on the INV board are used for the measurement.

1) Notes on measurement

- Check the polarity before measuring. (On the tester, black normally indicates plus.)
- Check that the resistance is not open (∞ Ω) or not shorted (to 0 Ω).
- The values are for reference, and the margin of errors is allowed.
- The result that is more than double or half of the result that is measured at the same measurement point is not allowed.
- Disconnect all the wiring connected the INV board, and make the measurement.

2) Tester restriction

- Use the tester whose internal electrical power source is 1.5V or greater
- Use the dry-battery-powered tester.

Note

(The accurate diode-specific resistance cannot be measured with the button-battery-powered card tester, as the applied voltage is low.)

- Use a low-range tester if possible. A more accurate resistance can be measured.

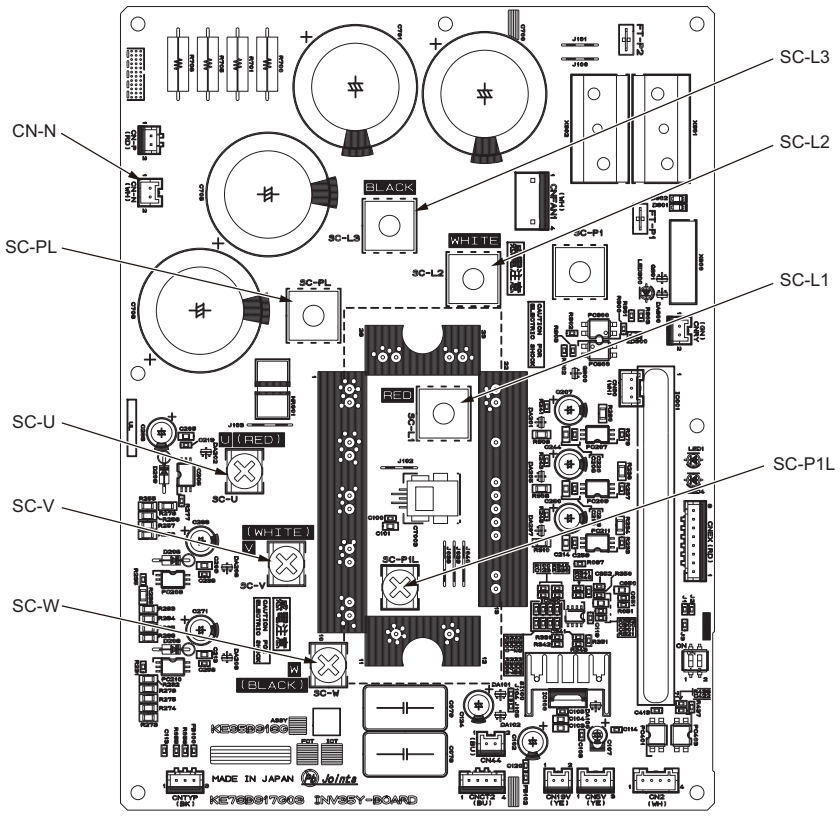
<INV35Y>

Reference resistance value

		Black (+)				
		SC-PL	CN-N	SC-L1	SC-L2	SC-L3
Red (-)	SC-PL	-	-	5-200 Ω	5-200 Ω	5-200 Ω
	CN-N	-	-	∞	∞	∞
	SC-L1	∞	5-200 Ω	-	-	-
	SC-L2	∞	5-200 Ω	-	-	-
	SC-L3	∞	5-200 Ω	-	-	-

		Black (+)				
		SC-P1L	CN-N	SC-U	SC-V	SC-W
Red (-)	SC-P1L	-	-	5-200 Ω	5-200 Ω	5-200 Ω
	CN-N	-	-	∞	∞	∞
	SC-U	∞	5-200 Ω	-	-	-
	SC-V	∞	5-200 Ω	-	-	-
	SC-W	∞	5-200 Ω	-	-	-

INV board outline drawing



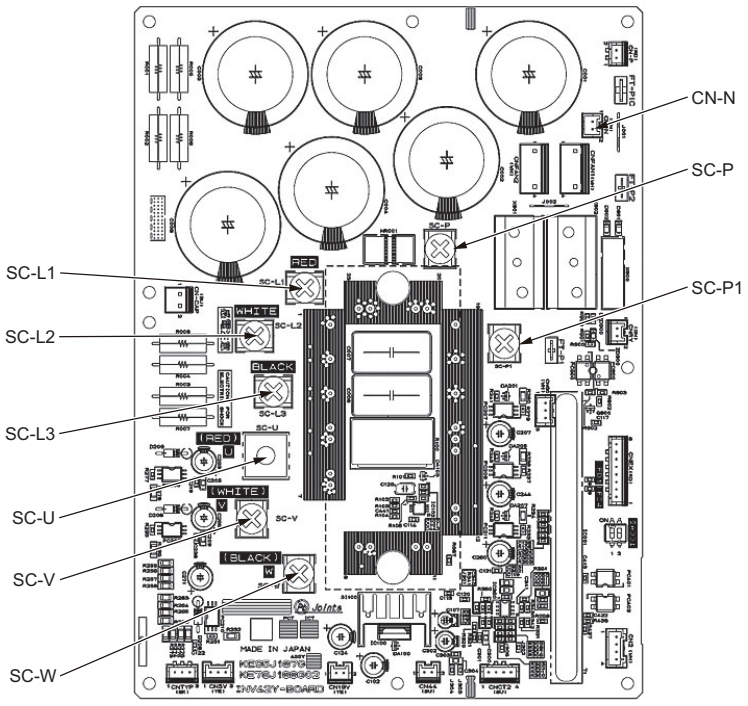
<INV42Y>

Reference resistance value

		Black (+)				
		SC-P	CN-N	SC-L1	SC-L2	SC-L3L
Red (-)	SC-P	-	-	5-200 Ω	5-200 Ω	5-200 Ω
	CN-N	-	-	∞	∞	∞
	SC-L1	∞	5-200 Ω	-	-	-
	SC-L2	∞	5-200 Ω	-	-	-
	SC-L3	∞	5-200 Ω	-	-	-

		Black (+)				
		SC-P1	CN-N	SC-U	SC-V	SC-W
Red (-)	SC-P1	-	-	5-200 Ω	5-200 Ω	5-200 Ω
	CN-N	-	-	∞	∞	∞
	SC-U	∞	5-200 Ω	-	-	-
	SC-V	∞	5-200 Ω	-	-	-
	SC-W	∞	5-200 Ω	-	-	-

INV board outline drawing



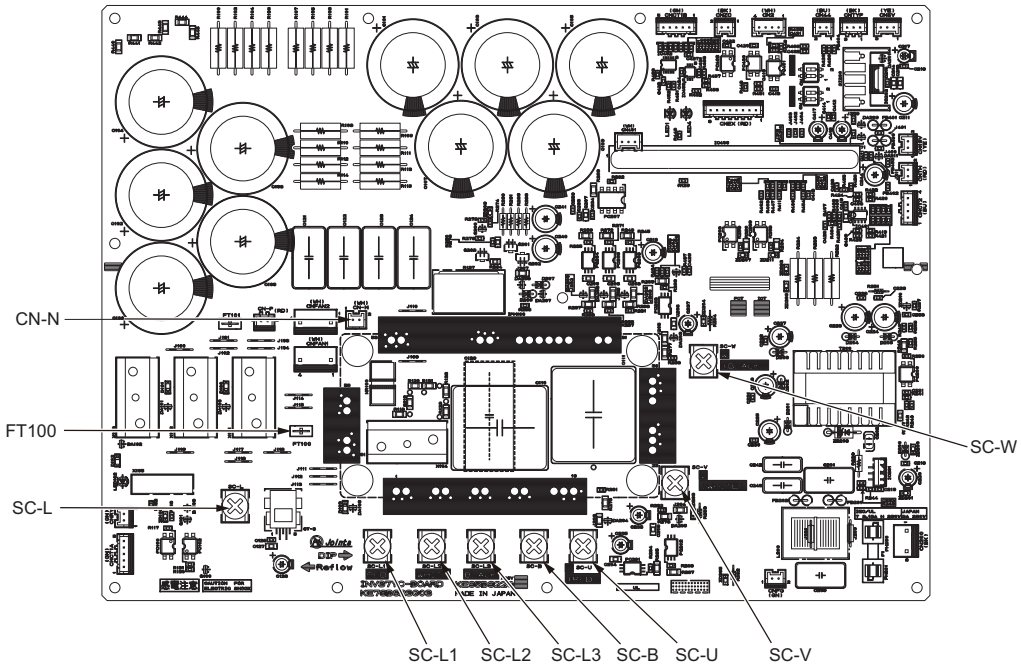
<INV37YC>

Reference resistance value

		Black (+)						
		SC-L1	SC-L2	SC-L3	SC-B	SC-L	FT100	CN-N
Red (-)	SC-L1	-	-	-	-	∞	-	5-200 Ω
	SC-L2	-	-	-	-	∞	-	5-200 Ω
	SC-L3	-	-	-	-	∞	-	5-200 Ω
	SC-B	-	-	-	-	-	∞	-
	SC-L	5-200 Ω	5-200 Ω	5-200 Ω	-	-	-	-
	FT100	-	-	-	5-200 Ω	-	-	-
	CN-N	∞	∞	∞	-	-	-	-

		Black (+)				
		FT100	CN-N	SC-U	SC-V	SC-W
Red (-)	FT100	-	-	5-200 Ω	5-200 Ω	5-200 Ω
	CN-N	-	-	∞	∞	∞
	SC-U	∞	5-200 Ω	-	-	-
	SC-V	∞	5-200 Ω	-	-	-
	SC-W	∞	5-200 Ω	-	-	-

INV board outline drawing



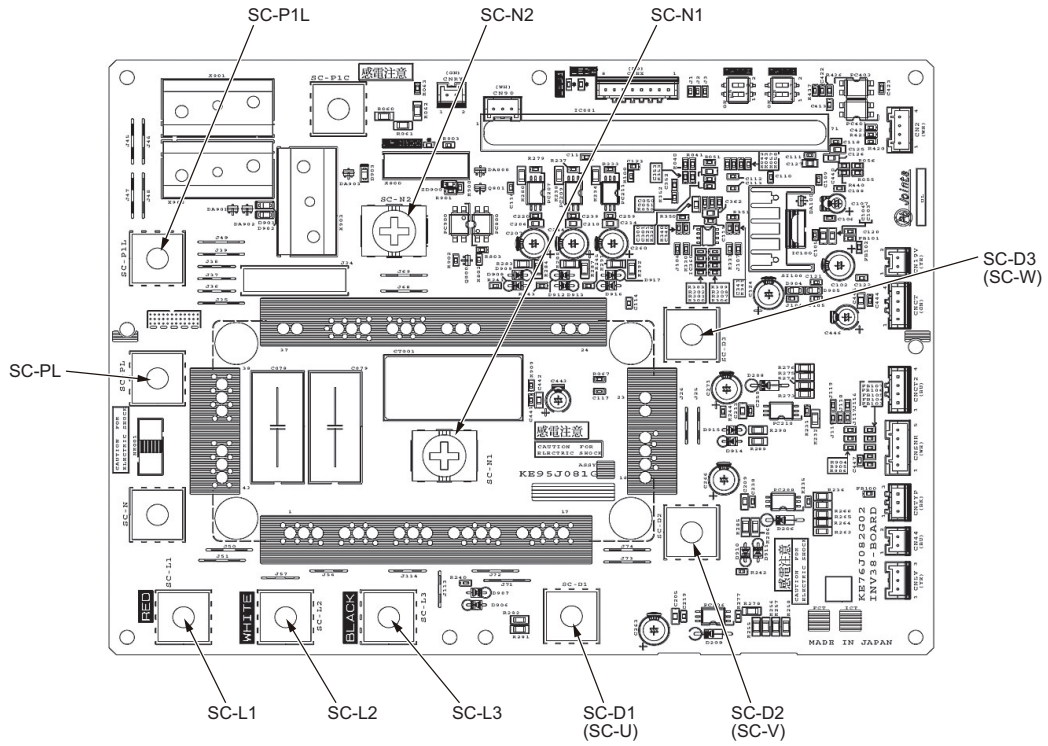
<INV38>

Reference resistance value

		Black (+)				
		SC-L1	SC-L2	SC-L3L	SC-PL	SC-N1
Red (-)	SC-L1	-	-	-	∞	5-200 Ω
	SC-L2	-	-	-	∞	5-200 Ω
	SC-L3	-	-	-	∞	5-200 Ω
	SC-PL	5-200 Ω	5-200 Ω	5-200 Ω	-	-
	SC-N1	∞	∞	∞	-	-

		Black (+)				
		SC-P1L	SC-N2	SC-D1	SC-D2	SC-D3
Red (-)	SC-P1L	-	-	5-200 Ω	5-200 Ω	5-200 Ω
	SC-N2	-	-	∞	∞	∞
	SC-D1	∞	5-200 Ω	-	-	-
	SC-D2	∞	5-200 Ω	-	-	-
	SC-D3	∞	5-200 Ω	-	-	-

INV board outline drawing



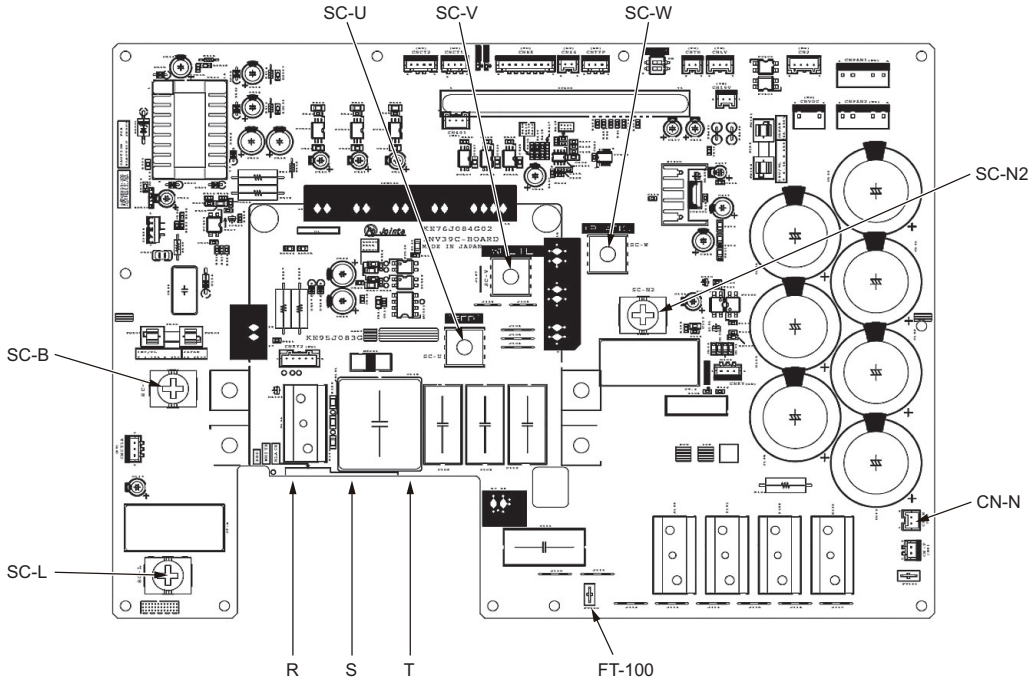
<INV39C>

Reference resistance value

		Black (+)						
		R	S	T	SC-B	SC-L	FT100	CN-N
Red (-)	R	-	-	-	-	∞	-	5-200 Ω
	S	-	-	-	-	∞	-	5-200 Ω
	T	-	-	-	-	∞	-	5-200 Ω
	SC-B	-	-	-	-	-	∞	-
	SC-L	5-200 Ω	5-200 Ω	5-200 Ω	-	-	-	-
	FT100	-	-	-	5-200 Ω	-	-	-
	CN-N	∞	∞	∞	-	-	-	-

		Black (+)				
		FT100	CN-N2	SC-U	SC-V	SC-W
Red (-)	FT100	-	-	5-200 Ω	5-200 Ω	5-200 Ω
	CN-N2	-	-	∞	∞	∞
	SC-U	∞	5-200 Ω	-	-	-
	SC-V	∞	5-200 Ω	-	-	-
	SC-W	∞	5-200 Ω	-	-	-

INV board outline drawing

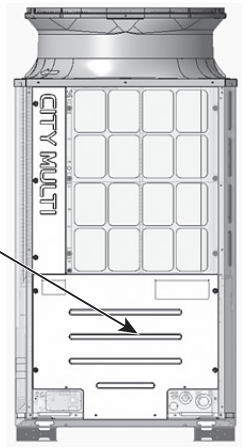


8-9-16 Checking the Fan Inverter Heatsink for Clogging

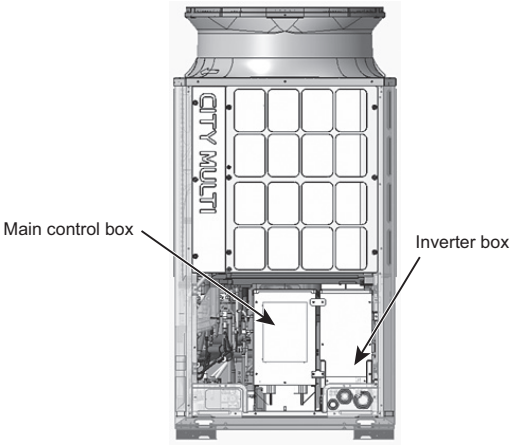
Check the fan inverter heatsink for clogging by removing part of the duct and checking inside the duct.

To remove the duct, follow the procedures 1) through 3) below.
Reassemble the components in the reverse order as they were removed.

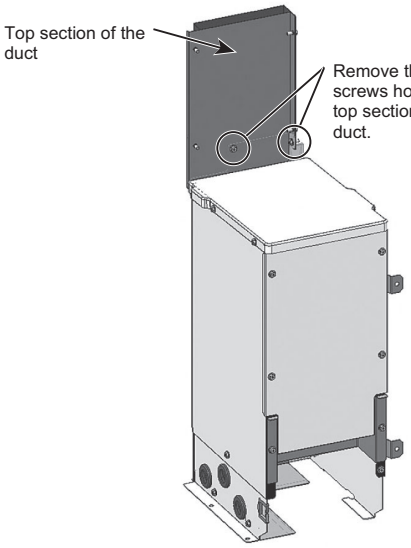
1) Remove the front service panel.



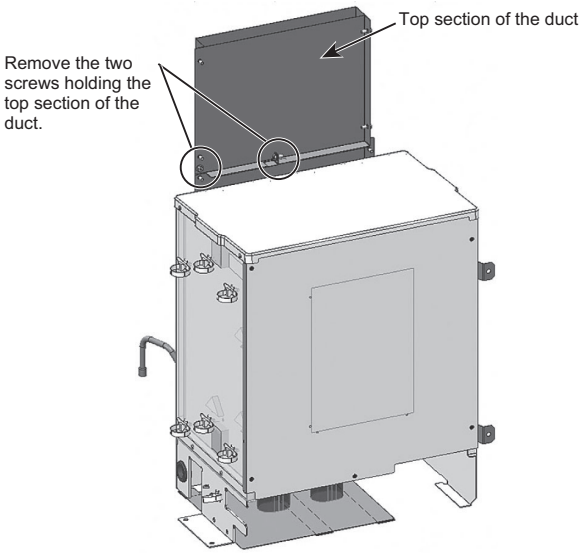
2) Remove the main control box (applicable to the (E)P72 models only).
On the (E)P96-240 models, it is not necessary to remove the control box.



3) Remove the upper section of the duct by unscrewing the screws on the control box (on the inverter box on the (E)P72 models) shown in the figure below.
Check inside the duct for clogging, and remove any foreign objects found.



(E)P72

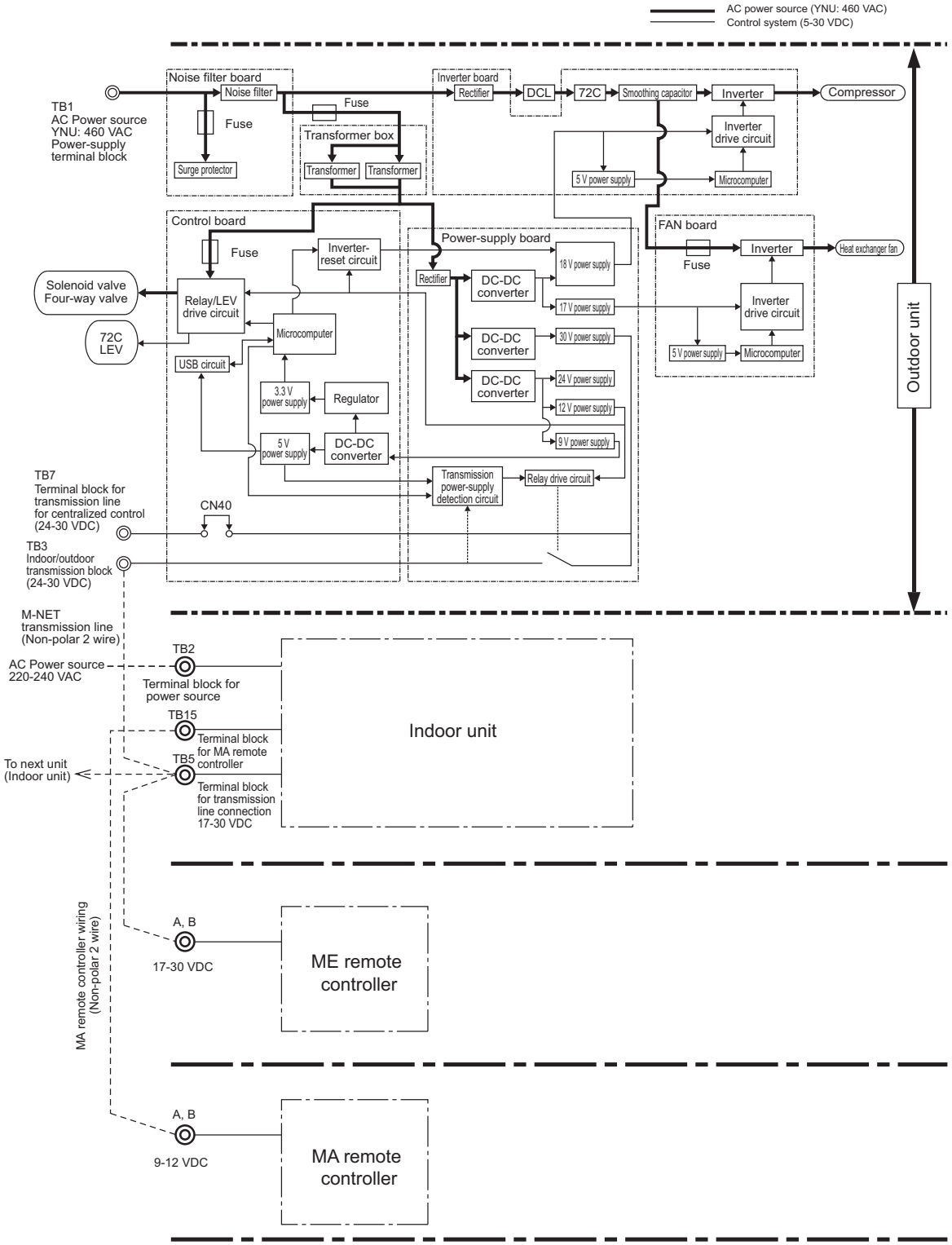


(E)P96 - 240

8-10 Control Circuit

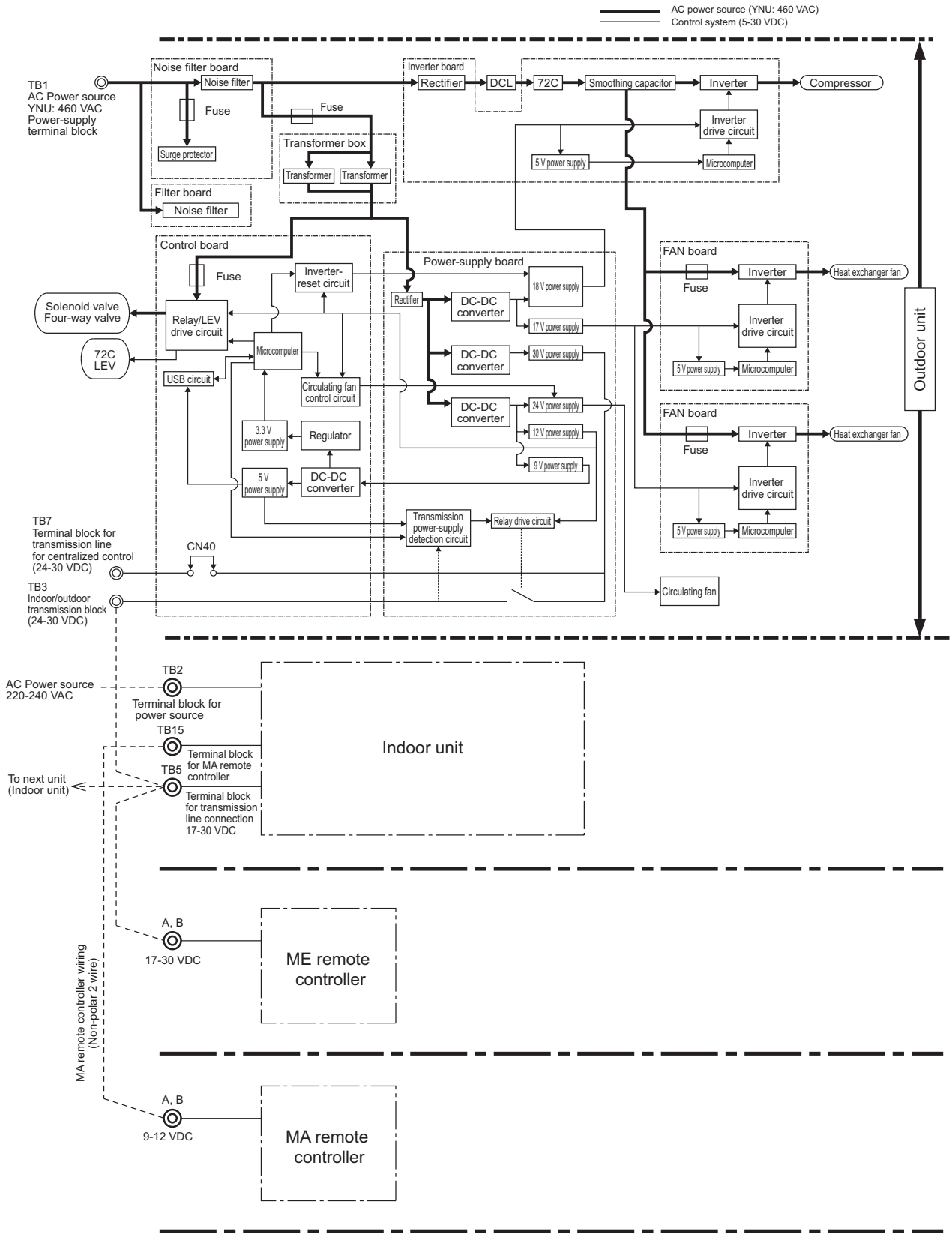
8-10-1 Control Power Supply Function Block

1) PUHY-(E)P72YNU-A



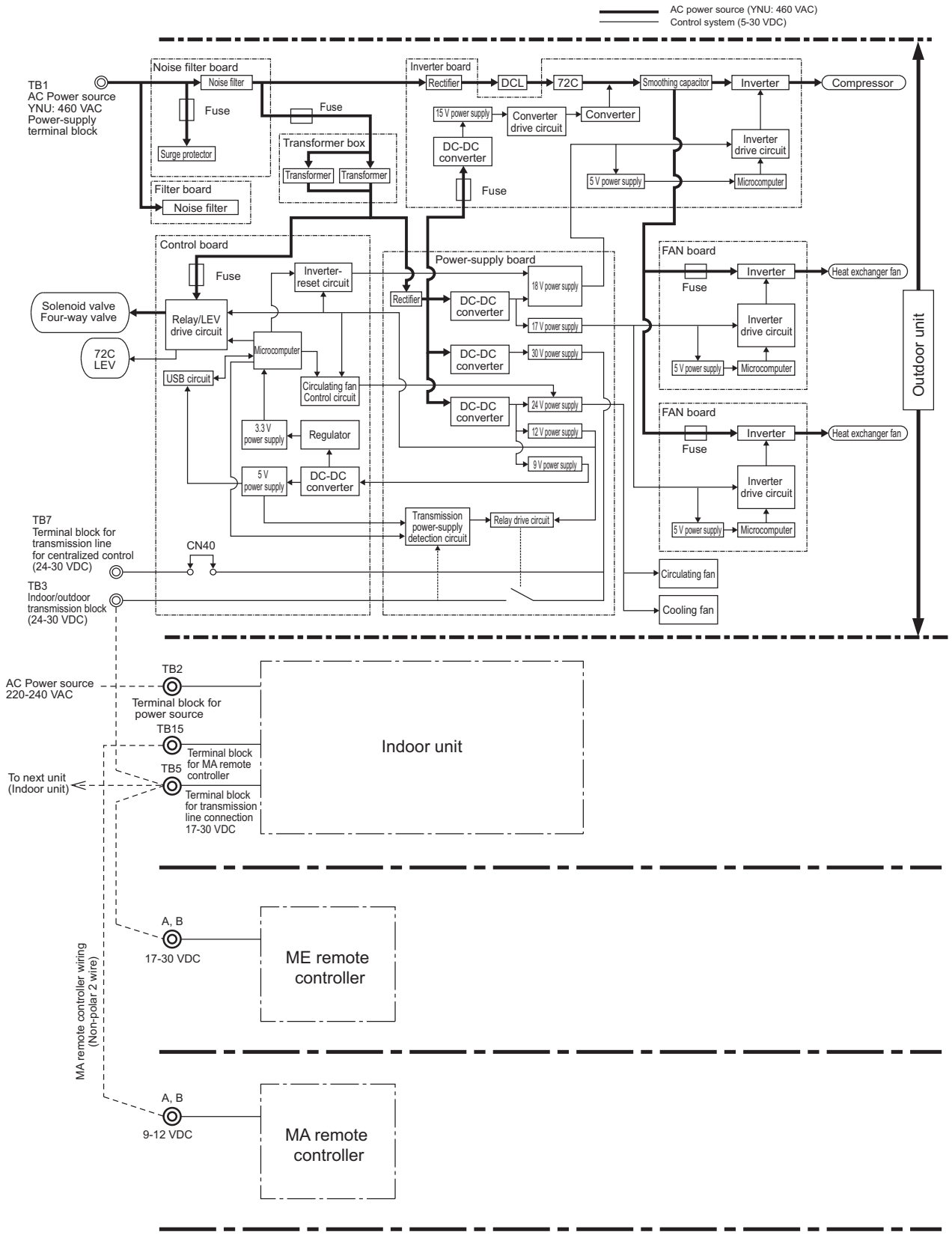
* MA remote controllers and ME remote controllers cannot be used together.
(Both the ME and MA remote controller can be connected to a system with a system controller.)

2) PUHY-(E)P96 - P168YNU-A



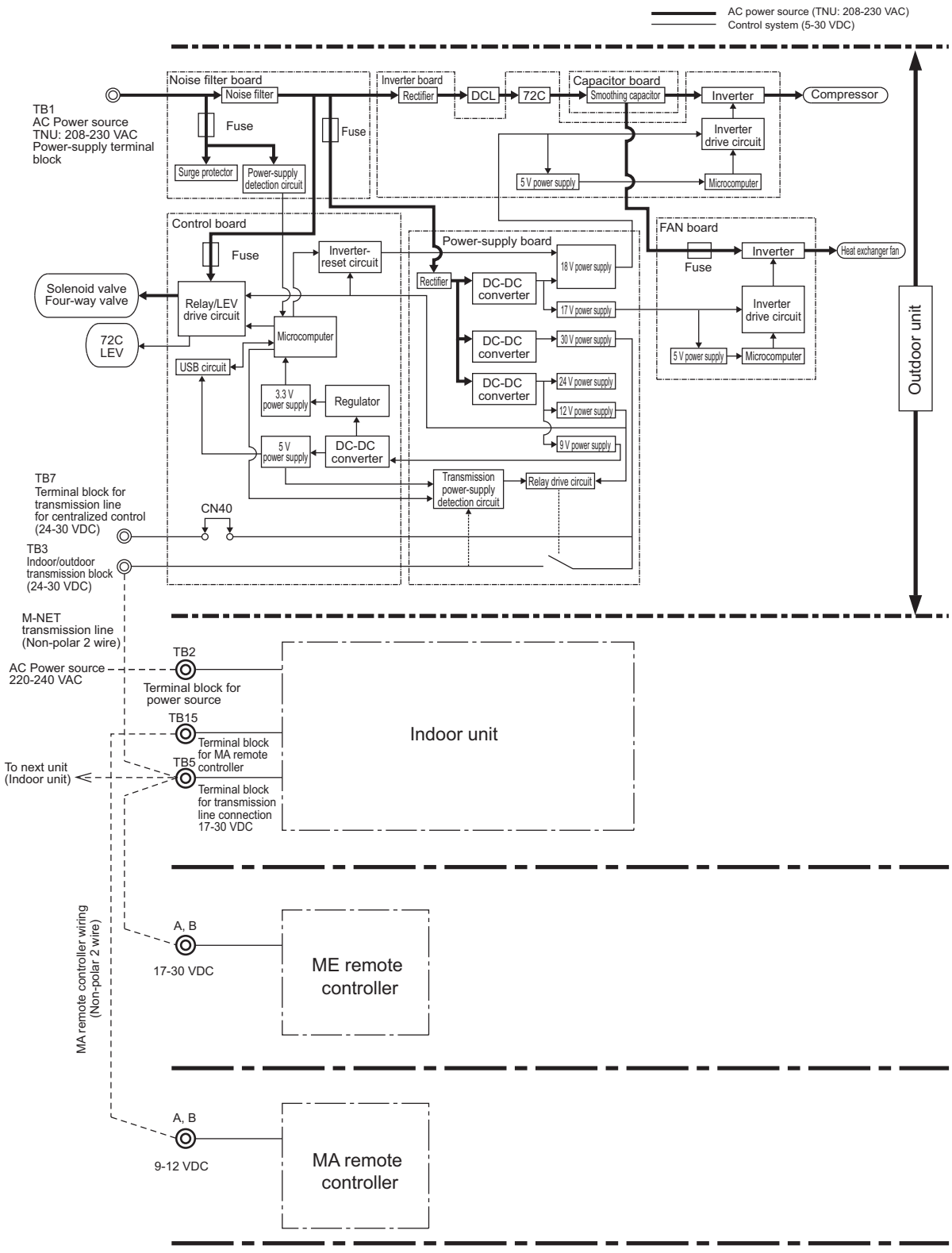
* MA remote controllers and ME remote controllers cannot be used together.
(Both the ME and MA remote controller can be connected to a system with a system controller.)

3) PUHY-EP168, EP192, EP216, EP240YNU-A



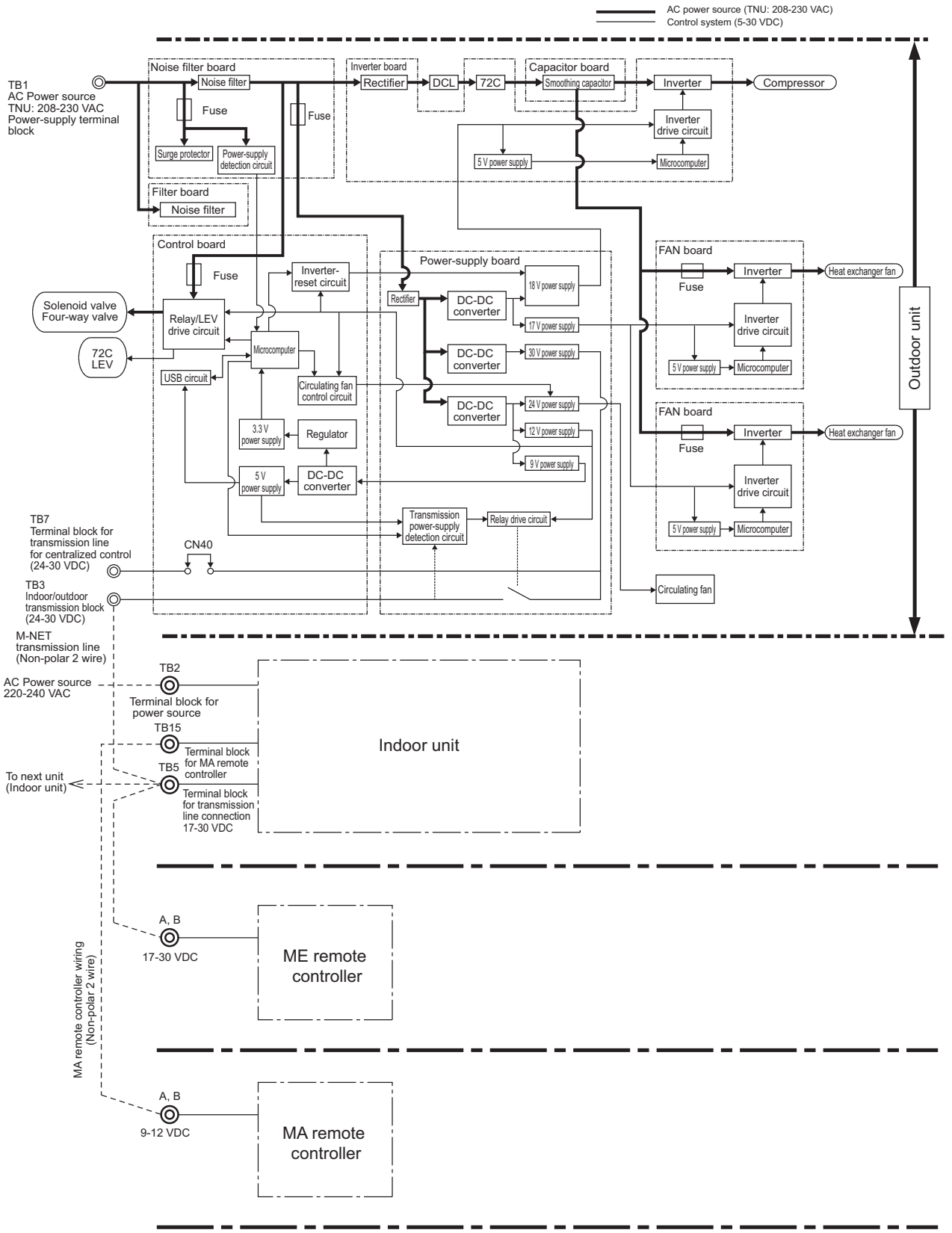
* MA remote controllers and ME remote controllers cannot be used together.
(Both the ME and MA remote controller can be connected to a system with a system controller.)

4) PUHY-(E)P72TNU-A



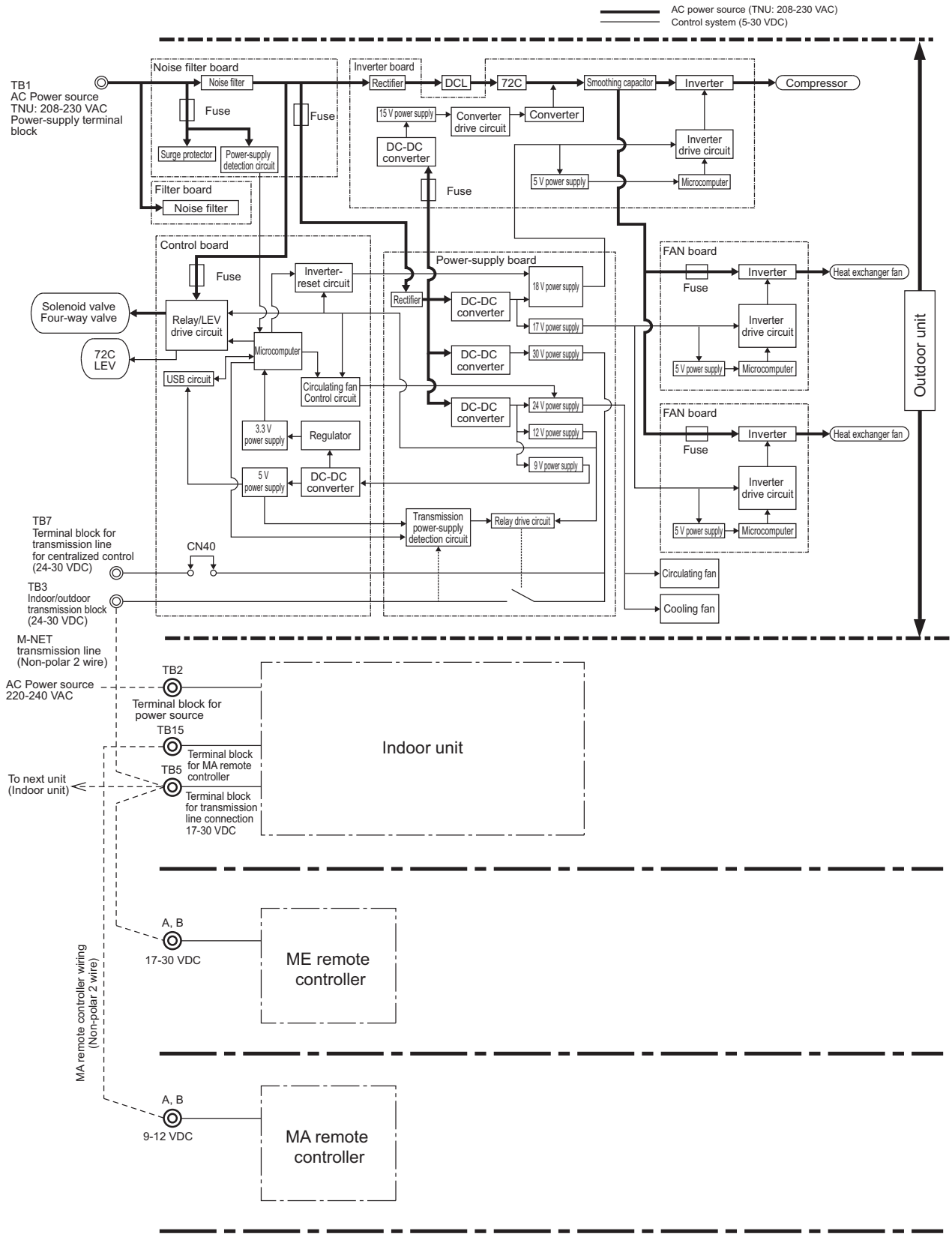
* MA remote controllers and ME remote controllers cannot be used together.
(Both the ME and MA remote controller can be connected to a system with a system controller.)

5) PUHY-(E)P96 - P168TNU-A



* MA remote controllers and ME remote controllers cannot be used together.
(Both the ME and MA remote controller can be connected to a system with a system controller.)

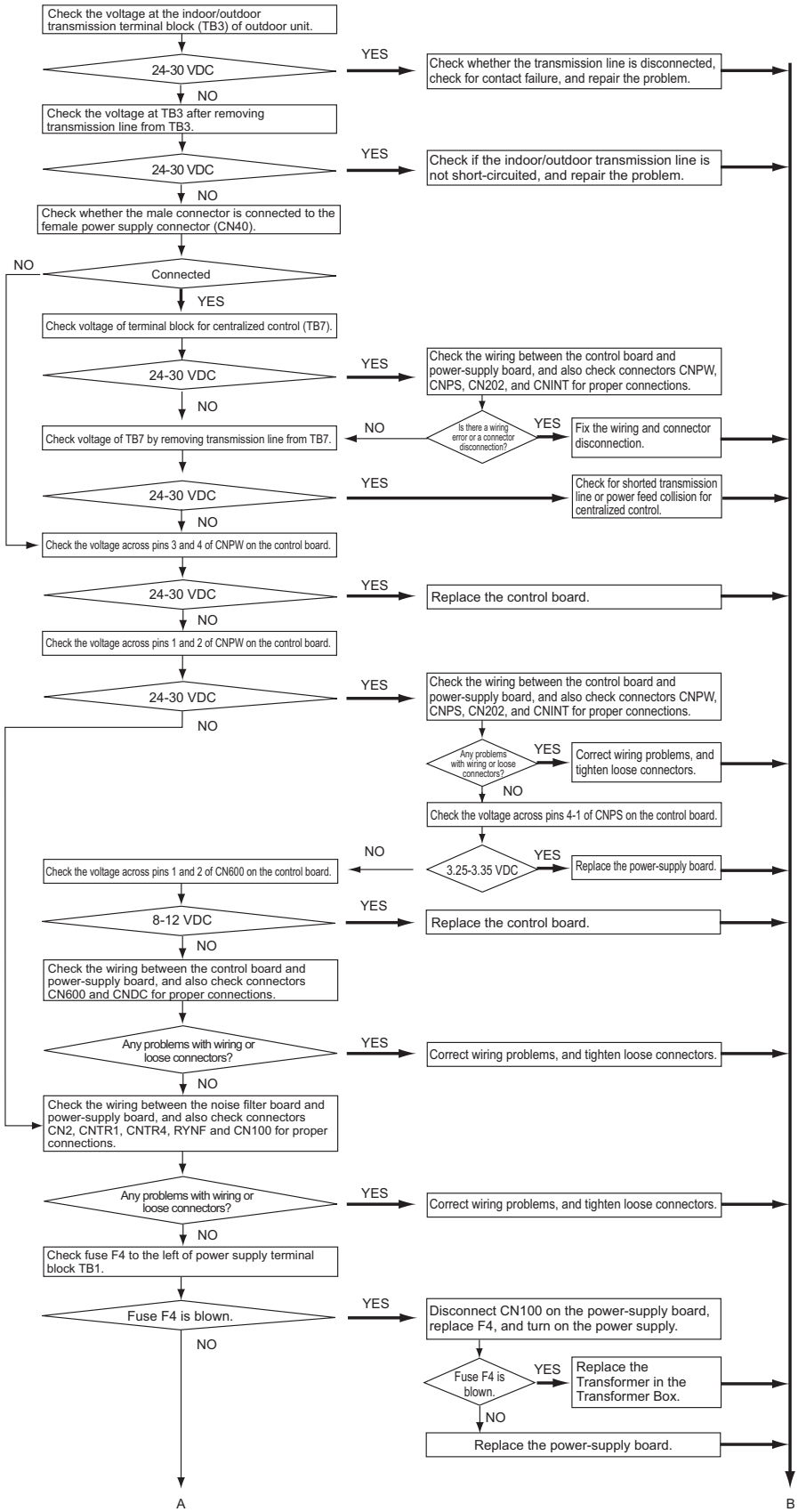
6) PUHY-EP168, EP192, EP216, EP240TNU-A

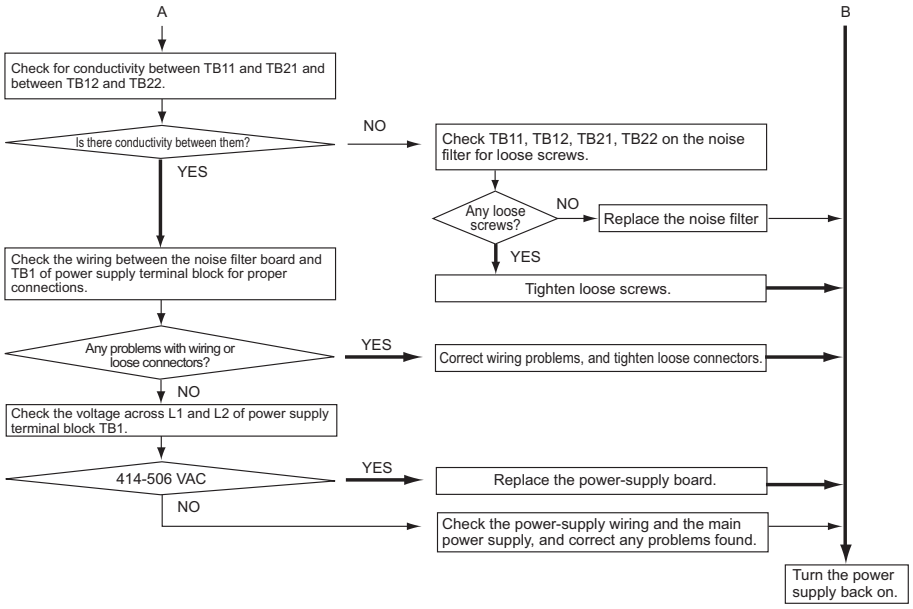


* MA remote controllers and ME remote controllers cannot be used together.
(Both the ME and MA remote controller can be connected to a system with a system controller.)

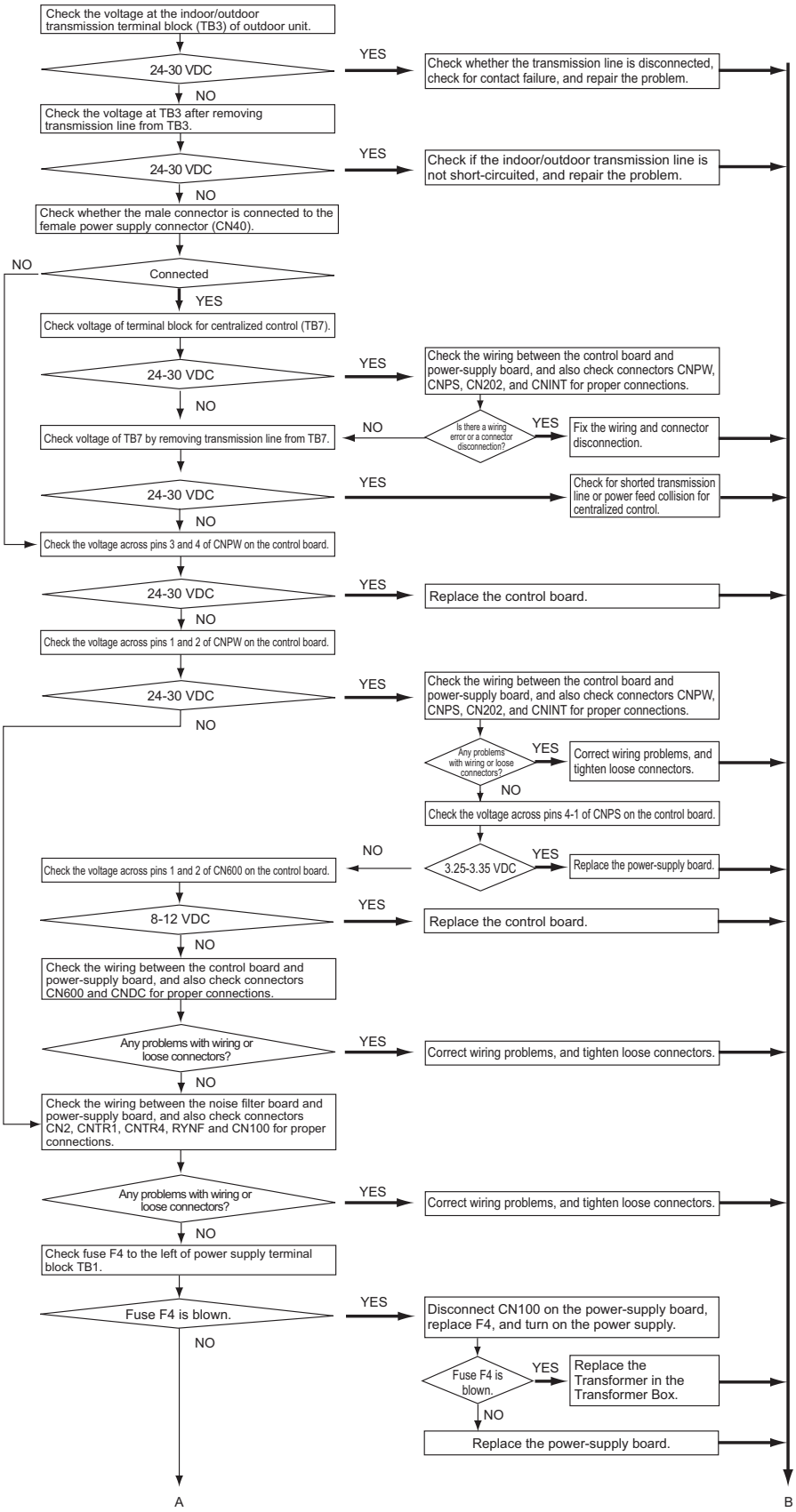
8-10-2 Troubleshooting Problems with Outdoor Unit Transmission Power Supply Circuit

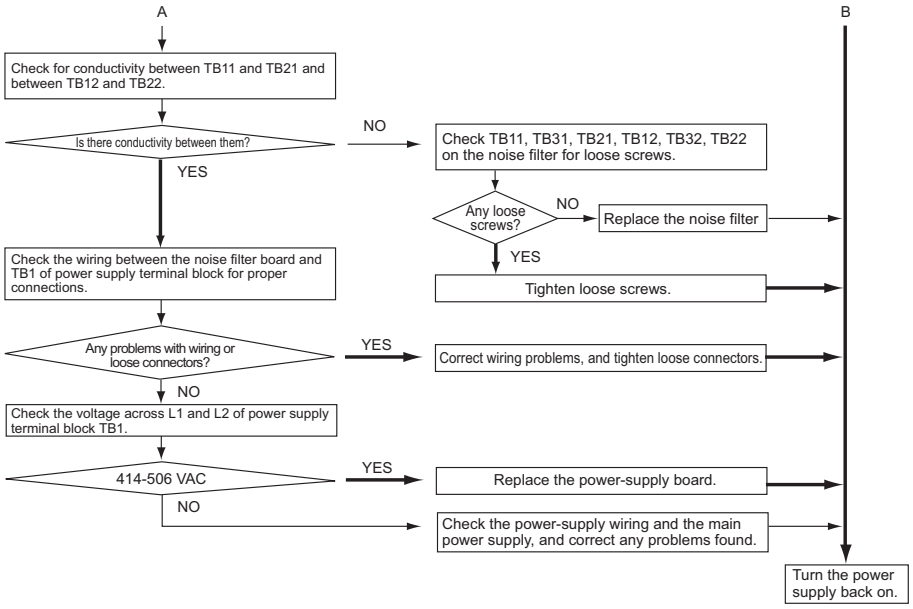
1) PUHY-(E)P72/(E)P96/(E)P120/(E)P144/P168YNU-A



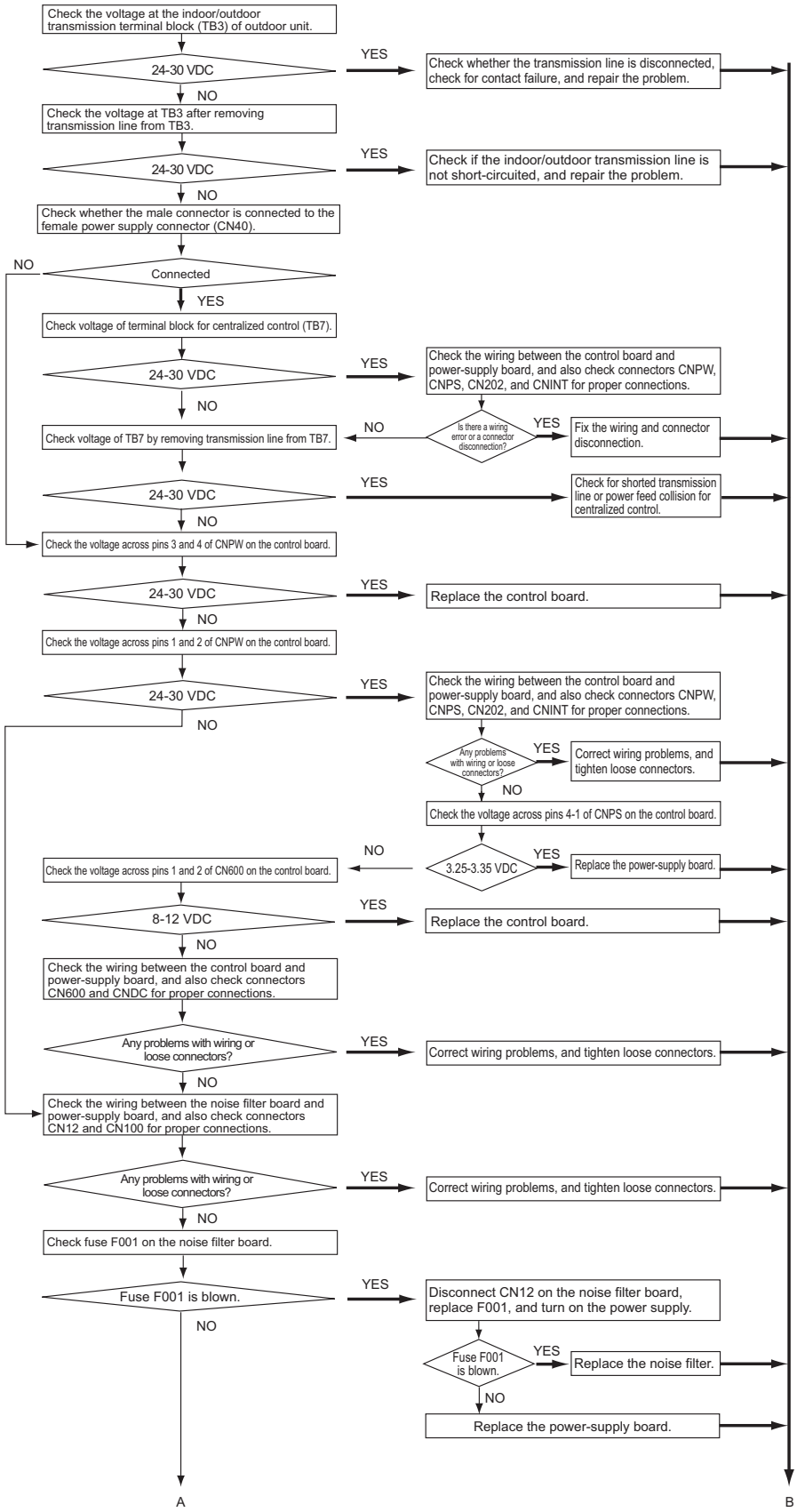

A
B
Check for conductivity between TB11 and TB21 and between TB12 and TB22.
Is there conductivity between them?
NO
YES
Check TB11, TB12, TB21, TB22 on the noise filter for loose screws.
Any loose screws?
NO
Replace the noise filter
YES
Tighten loose screws.
Check the wiring between the noise filter board and TB1 of power supply terminal block for proper connections.
Any problems with wiring or loose connectors?
YES
Correct wiring problems, and tighten loose connectors.
NO
Check the voltage across L1 and L2 of 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 correct any problems found.
Turn the power supply back on.

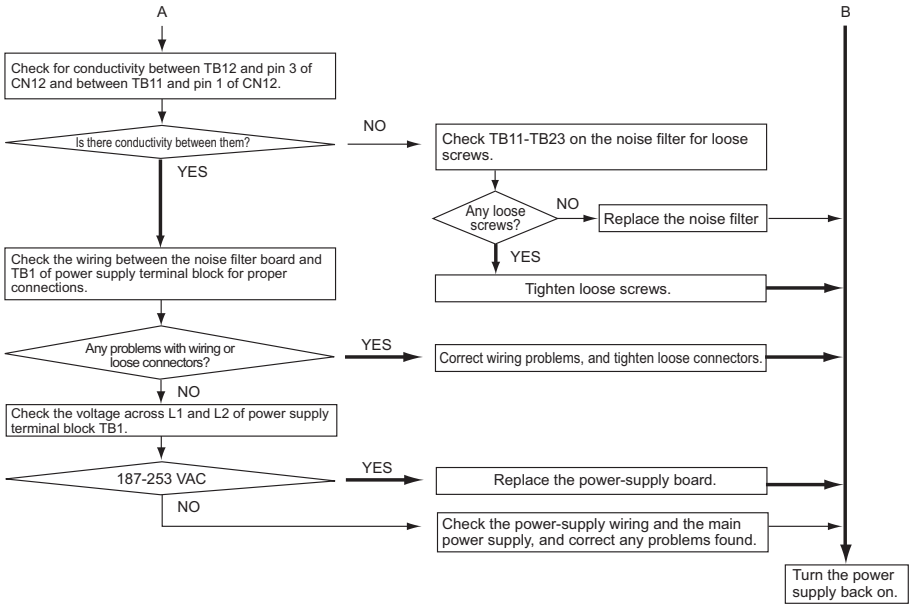
2) PUHY-EP168/EP192/EP216/EP240YNU-A




A
B
Check for conductivity between TB11 and TB21 and between TB12 and TB22.
Is there conductivity between them?
NO
YES
Check TB11, TB31, TB21, TB12, TB32, TB22 on the noise filter for loose screws.
Any loose screws?
NO
Replace the noise filter
YES
Tighten loose screws.
Check the wiring between the noise filter board and TB1 of power supply terminal block for proper connections.
Any problems with wiring or loose connectors?
YES
Correct wiring problems, and tighten loose connectors.
NO
Check the voltage across L1 and L2 of 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 correct any problems found.
Turn the power supply back on.

3) PUHY-(E)P72/(E)P96/(E)P120/(E)P144/(E)P168/EP192/EP216/EP240TNU-A




A
B
Check for conductivity between TB12 and pin 3 of CN12 and between TB11 and pin 1 of CN12.
Is there conductivity between them?
NO
YES
Check TB11-TB23 on the noise filter for loose screws.
Any loose screws?
NO
Replace the noise filter
YES
Tighten loose screws.
Check the wiring between the noise filter board and TB1 of power supply terminal block for proper connections.
Any problems with wiring or loose connectors?
YES
Correct wiring problems, and tighten loose connectors.
NO
Check the voltage across L1 and L2 of power supply terminal block TB1.
187-253 VAC
YES
Replace the power-supply board.
NO
Check the power-supply wiring and the main power supply, and correct any problems found.
Turn the power supply back on.

8-11 Measures for Refrigerant Leakage

1. Leak spot: In the case of extension pipe for indoor unit or optional unit (Cooling season)

1) Mount a pressure gauge on the service check joint (CJ2) on the low-pressure side.
2) Stop all the indoor units, and close the liquid service valve (BV2) inside the outdoor unit while the compressor is stopped.
3) Stop all the indoor units; turn on SW4 (912) on the outdoor unit control board while the compressor is being stopped.(Pump down mode will start, and all the indoor units will run in cooling test run mode.)
4) In the pump down mode (SW4 (912) is ON), all the indoor units will automatically stop when the low pressure (63LS) reaches 0.383MPa [55psi] or less or 15 minutes have passed after the pump mode started. Stop all the indoor units and compressors when the pressure indicated by the pressure gauge, which is on the check joint (CJ2) for low-pressure service, reaches 0.383MPa [55psi] or 20 minutes pass after the pump down operation is started.
5) Close the gas service valve (BV1) inside the outdoor unit.
6) Collect the refrigerant that remains in the extended pipe for the indoor unit or optional unit. Do not discharge refrigerant into the atmosphere when it is collected.
7) Repair the leak.
8) After repairing the leak, vacuum the extension pipe and the indoor unit or optional unit.
9) To adjust refrigerant amount, open the service valves (BV1 and BV2) inside the outdoor unit and turn off SW4 (912).

2. Leak spot: In the case of outdoor unit (Cooling season)

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

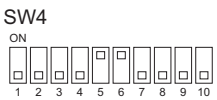
1) To run the indoor unit in test run mode, turn SW4 (769) from ON to OFF when SW3-1 on the outdoor control board is ON.
2) Change the setting of the remote controller for all the indoor units to the cooling mode.
3) Check that all the indoor units are performing a cooling operation.

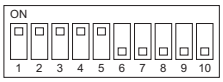
(2) Check the values of Tc and TH6.
(To display the values on the LED screen, use the self-diagnosis switch (SW4 (when SW6-10 is set to OFF)) on the outdoor unit control board.)

1) When Tc-TH6 is 10°C [18°F] or more : See the next item (3).
2) When Tc-TH6 is less than 10°C [18°F] : After the compressor stops, collect the refrigerant inside the system, repair the leak, perform evacuation, and recharge new refrigerant. (Leak spot: 4. In the case of outdoor unit, handle in the same way as heating season.)

Tc self-diagnosis switch

TH6 self-diagnosis switch





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

(3) Stop all the indoor units, and stop the compressor.

1) To stop all the indoor units and the compressors, turn SW4 (769) from ON to OFF when SW3-1 on the outdoor control board is ON.
2) Check that all the indoor units are being stopped.

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

(5) To prevent the liquid seal, extract small amount of refrigerant from the check joint of the liquid service valve (BV2), as the liquid seal may cause a malfunction of the unit.
In the cooling cycle, the section between check valve CV1 and LEV2 will form a closed circuit. Before recovering the refrigerant or evacuating the system, leave the unit in a stopped state for at least 30 minutes and then open LEV2 and switch SW4 (988) from OFF to ON so that LEV1 and LEV2 are in an open state. If this work is not performed, recovering the refrigerant or evacuating the system may not be possible. (After completion of work, set SW4 (988) from ON to OFF.)

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

(7) Repair the leak.

(8) After repairing the leak, replace the dryer with the new one, and perform evacuation inside the outdoor unit and optional unit.

(9) To adjust refrigerant amount, open the service valves (BV1 and BV2 when optional unit is installed) inside the outdoor unit.

Note

When the power to the outdoor/indoor unit must be turned off to repair the leak after closing the service valves specified in **(4)**, turn the power off in approximately one hour after the outdoor/indoor units stop.

1) When 30 minutes have passed after **(4)** on the previous page, the indoor unit lev turns from fully closed to slightly open to prevent the refrigerant seal.
   LEV2 open when the outdoor unit remains stopped for 15 minutes to allow for the collection of refrigerant in the outdoor unit heat exchanger and to enable the evacuation of the outdoor unit heat exchanger.
   If the power is turned of in less than 5 minutes, LEV2 may close, trapping high-pressure refrigerant in the outdoor unit heat exchanger and creating a highly dangerous situation.
2) Therefore, if the power source is turned off within 30 minutes, the lev remains fully closed and the refrigerant remains sealed. When only the power for the indoor unit is turned off, the indoor unit LEV turns from faintly open to fully closed.

3. Leak spot: In the case of extension pipe for indoor unit or optional unit (Heating season)

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

1) To run the indoor unit in test run mode, turn SW4 (769) from ON to OFF when SW3-1 on the outdoor control board is ON.
2) Change the setting of the remote controller for all the indoor units to the heating mode.
3) Check that all the indoor units are performing a heating operation.

(2) Stop all the indoor units, and stop the compressor.

1) To stop all the indoor units and the compressors, turn SW4 (769) from ON to OFF when SW3-1 on the outdoor control board is ON.
2) Check that all the indoor units are stopped.

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

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

(5) Repair the leak.

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

4. Leak spot: In the case of outdoor unit (Heating season)

1) Collect the refrigerant in the entire system (outdoor unit, extended pipe and indoor unit).Do not discharge refrigerant into the atmosphere when it is collected. **In the cooling cycle, the section between check valve CV1 and LEV2 will form a closed circuit. Before recovering the refrigerant or evacuating the system, leave the unit in a stopped state for at least 15 minutes and then open LEV2 and switch SW4 (988) from OFF to ON so that LEV1 and LEV2 are in an open state. If this work is not performed, recovering the refrigerant or evacuating the system may not be possible. (After completion of work, set SW4 (988) from ON to OFF.)**
2) Repair the leak.
3) After repairing the leak, perform evacuation of the entire system, and calculate the standard amount of refrigerant to be added (for the outdoor unit, extension pipe, and indoor unit), and charge the refrigerant. For details, refer to the following page(s).
   [6-3-3 Maximum refrigerant charge]

Note

If the indoor or outdoor units need to be turned off for repairing leaks during Step 1) above, turn off the power approximately 1 hour after the units came to a stop.
If the power is turned off in less than 15 minutes, LEV2 may close, trapping high-pressure refrigerant in the outdoor unit heat exchanger and creating a highly dangerous situation.

8-12 Parts Replacement Instructions

8-12-1 Ensuring Maintenance Space (Preparation for the Maintenance of Refrigerant Circuit Parts)

1. S-module

Take the following procedures to ensure sufficient maintenance space and good visibility.

(1) Remove the front panel from the unit by unscrewing the eight screws. (See Figure 1.) *Figure 1 shows the unit without the front panel.
(2) Remove the drain pan cover by unscrewing the screw and cutting the cable tie. (See Figures 2 and 3.)
When re-placing the drain pan cover after the completion of maintenance work, make sure that the silicon tube is properly placed on the defrost pipe, and then fix the drain pan cover in place with a cable tie. (Figures 2 and 3 show the cable ties to be cut.)
(3) Remove the drain pan by unscrewing the two screws. (See Figure 2.)
Be sure to remove the two rod holders holding the check joints to the drain pan. (See Figure 3.)

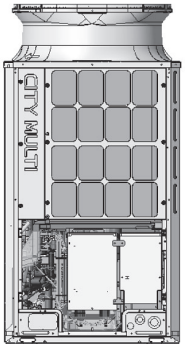


Figure 1

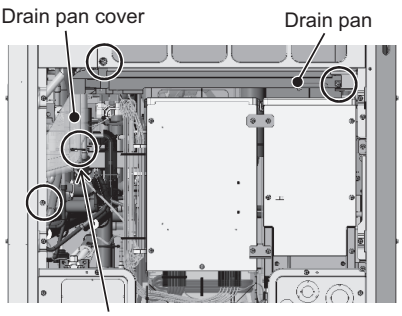


Figure 2

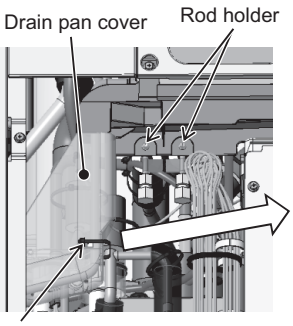
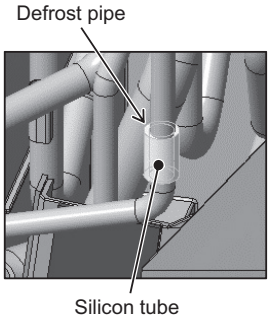


Figure 3



(4) Remove the top attachment connecting the main control box and the inverter control box by unscrewing the two screws. (See Figure 4.)
(5) Remove the bottom attachment connecting the main control box and the inverter control box by unscrewing the two screws. (See Figure 4.)
(6) Remove the cover from the main control box by unscrewing the three screws. (See Figure 5.)
(7) Cut the two cable ties holding the weak electrical wiring inside the main control box in place, and loosen the four cable straps holding the weak and strong electrical wirings. (See Figure 6.)
(8) Cut the two cable ties holding the rubber bush at the bottom of the main control box. (See Figure 6.)
(9) Cut the three cable ties and loosen the two cable straps holding the weak electrical wiring outside the main control box. (See Figure 7.)

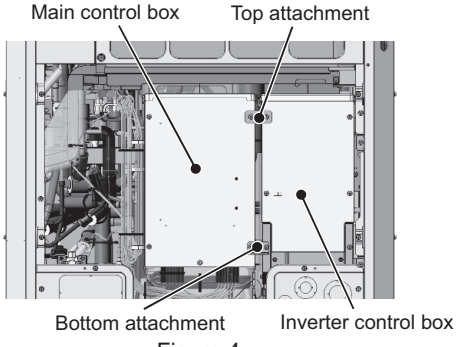


Figure 4

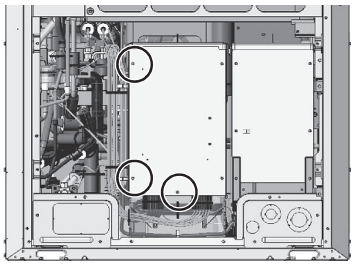


Figure 5

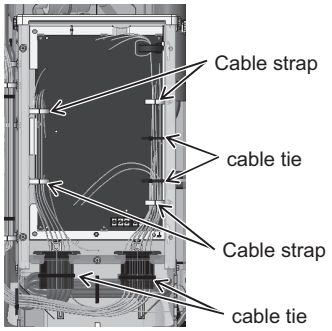


Figure 6

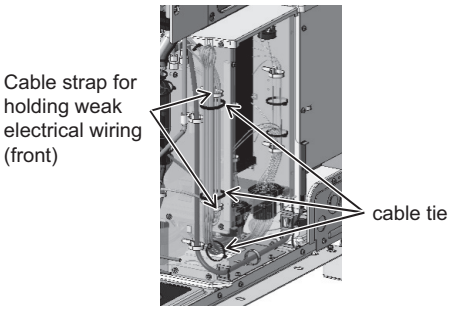


Figure 7

(10) Loosen the three cable straps holding the wiring outside and at the bottom of the main control box, and remove the wire from the two wire saddles. (See Figure 8.)
(11) Loosen the two cable straps holding the strong electrical wiring outside the main control box. (See Figure 9.)
(12) Cut the cable tie and loosen the two welding clamps holding the strong electrical wiring at the bottom of the main control box. (See Figure 10.)
(13) Unscrew the two screws holding the main control box. (See Figure 11.)

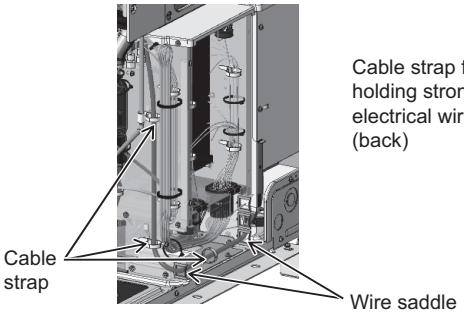


Figure 8

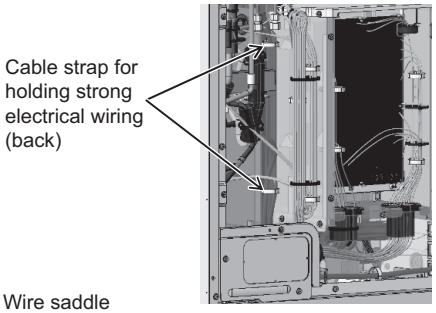


Figure 9

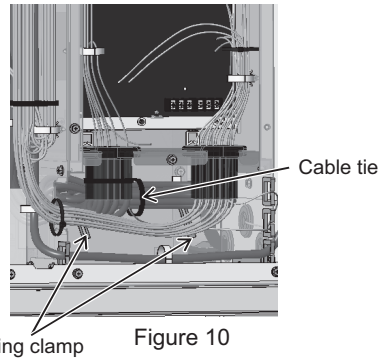


Figure 10

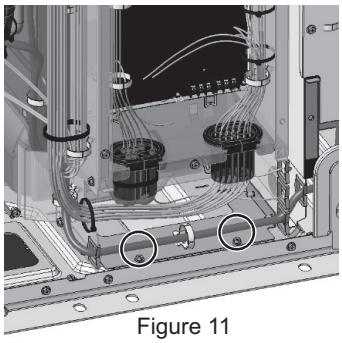


Figure 11

(14) Make sure that no undue force is applied to the wires from which cable straps were removed in steps (7) through (12). Position the bottom attachment that was removed in step (5) above on the fin guard as shown in Figure 13, and then hook the main control box on the attachment as shown in Figure 12.

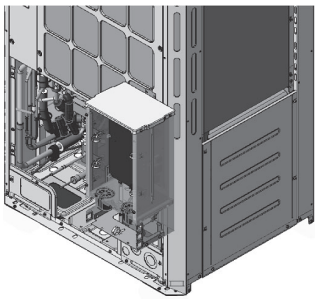
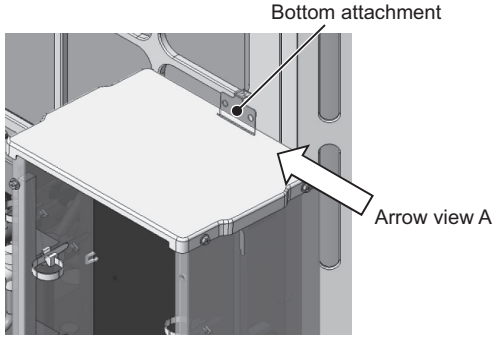


Figure 12



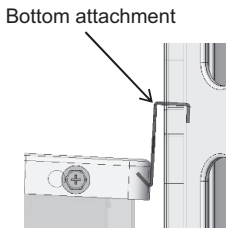


Figure 13

(15) Place the excess weak and strong electrical wirings in the space at the base legs as shown in Figure 14 to keep them from being caught during maintenance work.

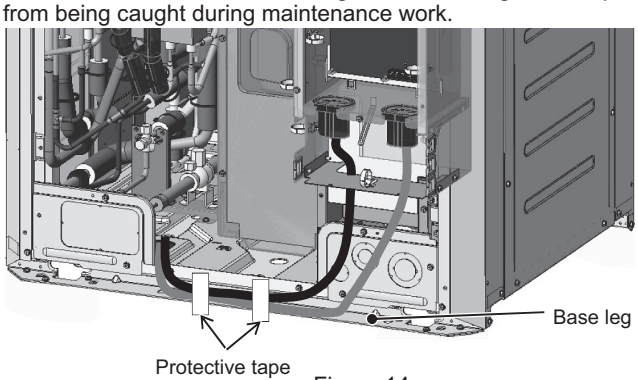


Figure 14

This step completes the procedure for ensuring maintenance space.

2. L-module

(1) Remove the front panel from the unit by unscrewing the 14 screws. (See Figure 1.) *Figure 1 shows the unit without the front panel.
(2) Remove the fin guard by unscrewing the 12 screws. (See Figure 1.)
(3) Remove the cable straps holding the weak and strong electrical wirings. (See Figure 2.)
(4) Remove the center pillar by unscrewing the five screws. (See Figure 1.)
(5) Remove the drain pan cover by unscrewing the screw and cutting the cable tie. (See Figures 2 and 3.)
When re-placing the drain pan cover, make sure that the silicon tube is properly placed on the defrost pipe, and then fix the drain pan cover in place with a cable tie.
(6) Remove the drain pan by unscrewing the two screws. (See Figure 2.)
Be sure to remove the two rod holders holding the check joints to the drain pan. (Figures 2 and 3 show the cable ties to be cut.)
(7) Remove the two cable straps holding the weak electrical wiring and the two cable straps holding the strong electrical wiring from the control box. (See Figure 4.)
(8) Place the excess weak and strong electrical wirings in the space at the base legs as shown in Figure 5 to keep them from being caught during maintenance work.

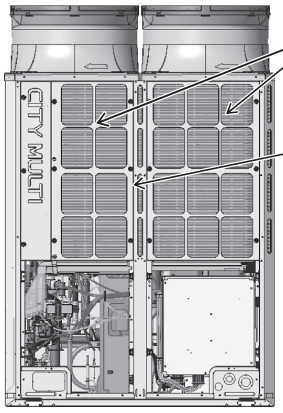


Figure 1

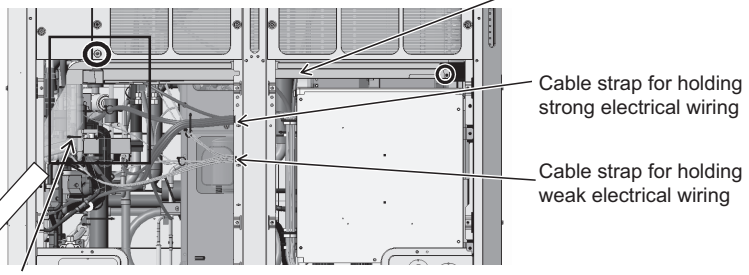


Figure 2

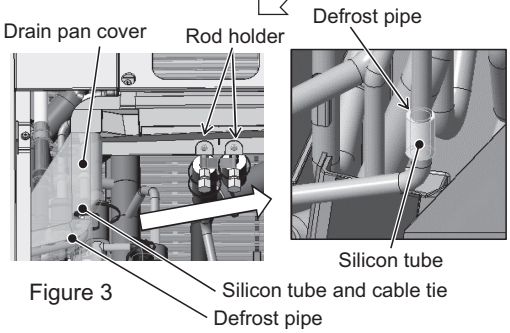


Figure 3

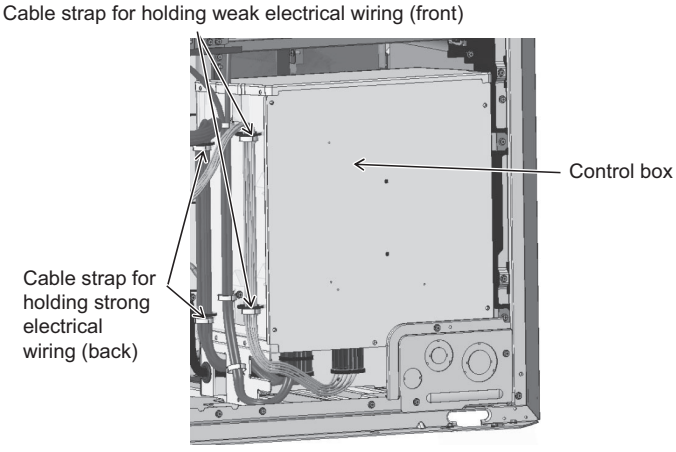


Figure 4

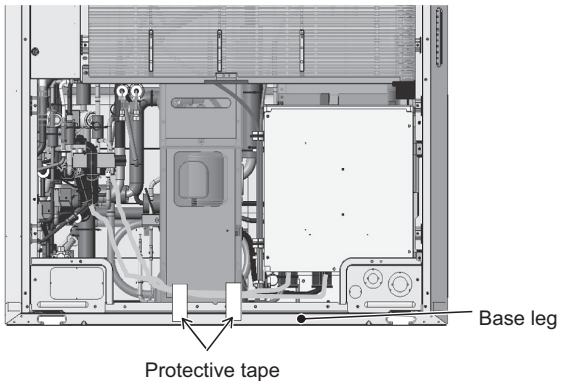


Figure 5

This step completes the procedure for ensuring maintenance space.

3. XL, EXL-module

Take the following procedures to ensure sufficient maintenance space and good visibility.
(1) Remove the front panel from the unit by unscrewing the 14 screws. (See Figure 1.)
(2) Remove the external temperature sensor wiring from the left drain pan by cutting the two cable ties.
Unhook the pipe cover from the left drain pan. (See Figure 3.)
(3) Remove the left drain pan by unscrewing the two screws. (See Figure 4.)
(4) Remove the right drain pan by unscrewing the two screws. (See Figure 5.)
(5) Remove the three cable straps from the center pillar. (See Figure 6.)
(6) Remove the right and left fin guards and the center pillar by unscrewing the 18 screws. (See Figure 7.)

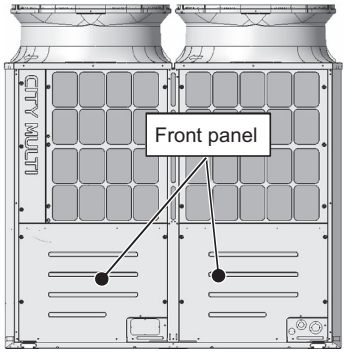


Figure 1

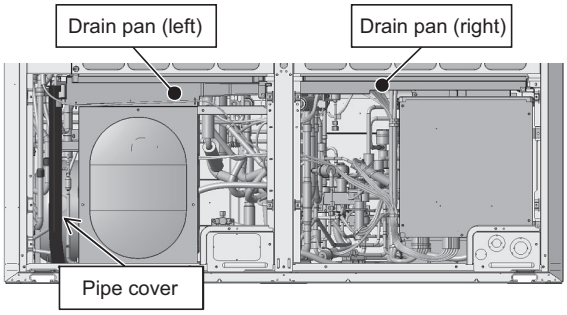


Figure 2

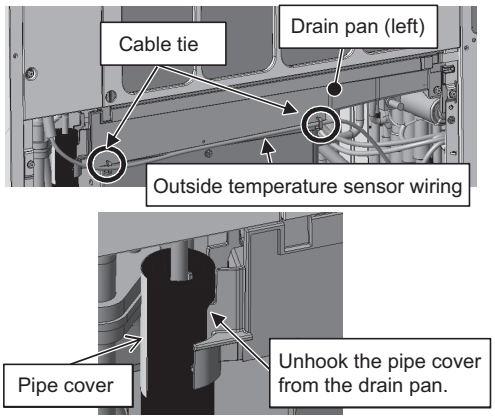


Figure 3

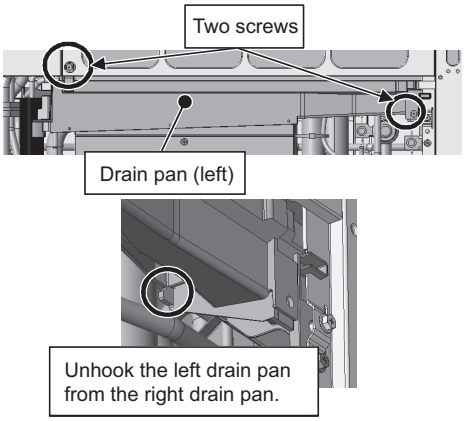


Figure 4

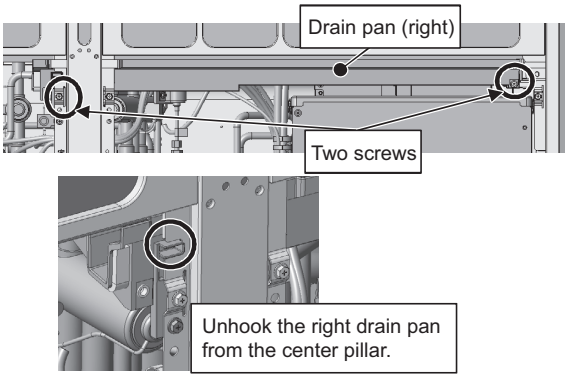


Figure 5

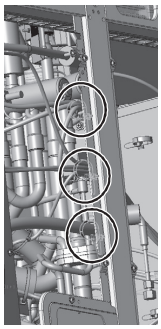


Figure 6

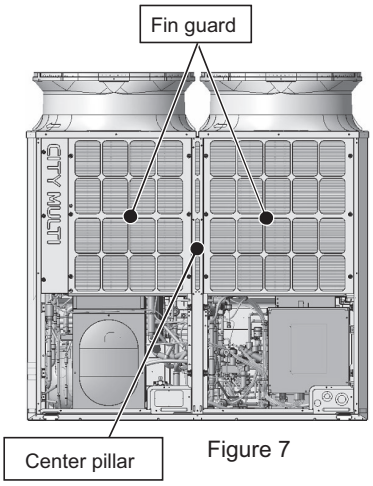


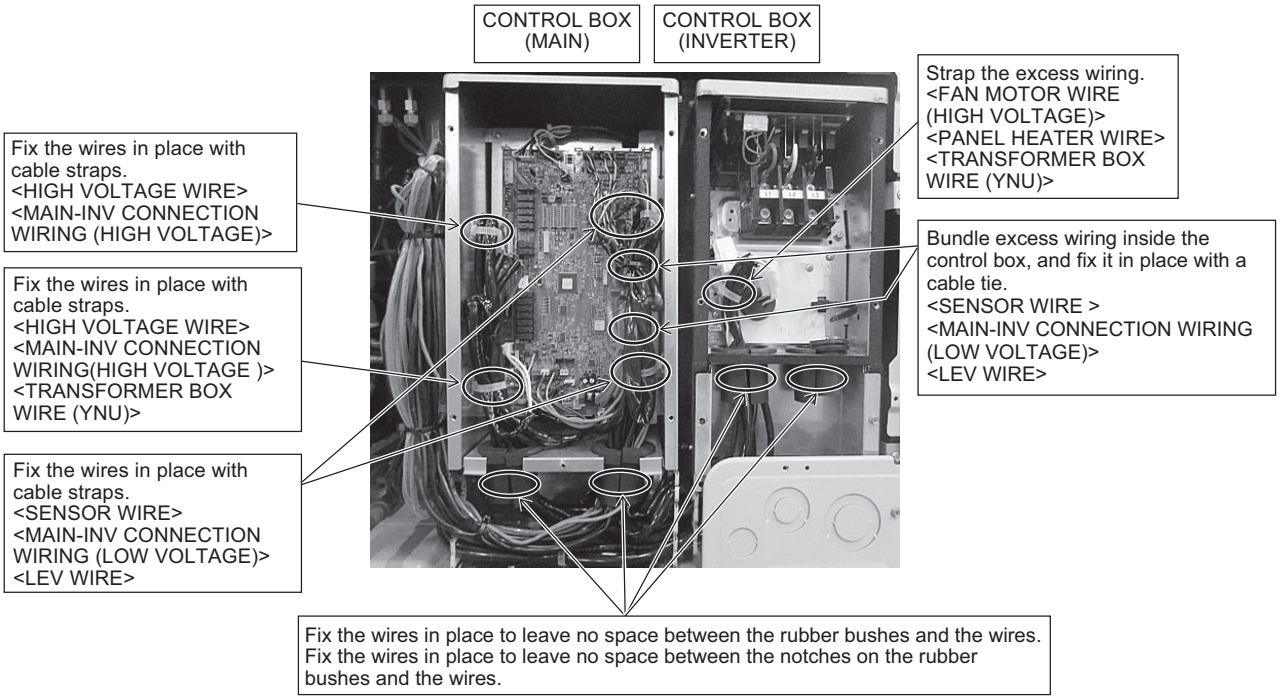
Figure 7

8-12-2 Notes on Wiring Installation

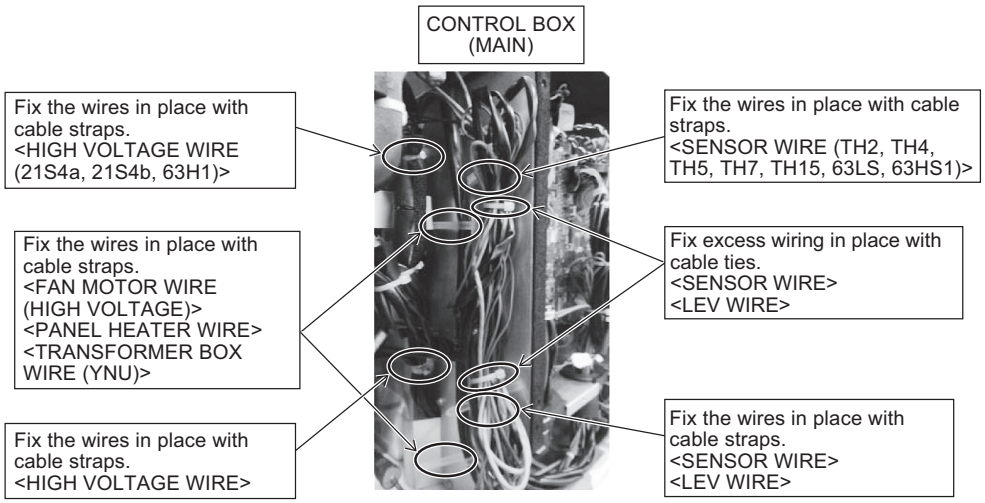
- If wiring was disconnected during maintenance, reconnect the wiring as follows.
- Isolate the strong and the weak electrical wiring to avoid noise interference.

(1) S-module

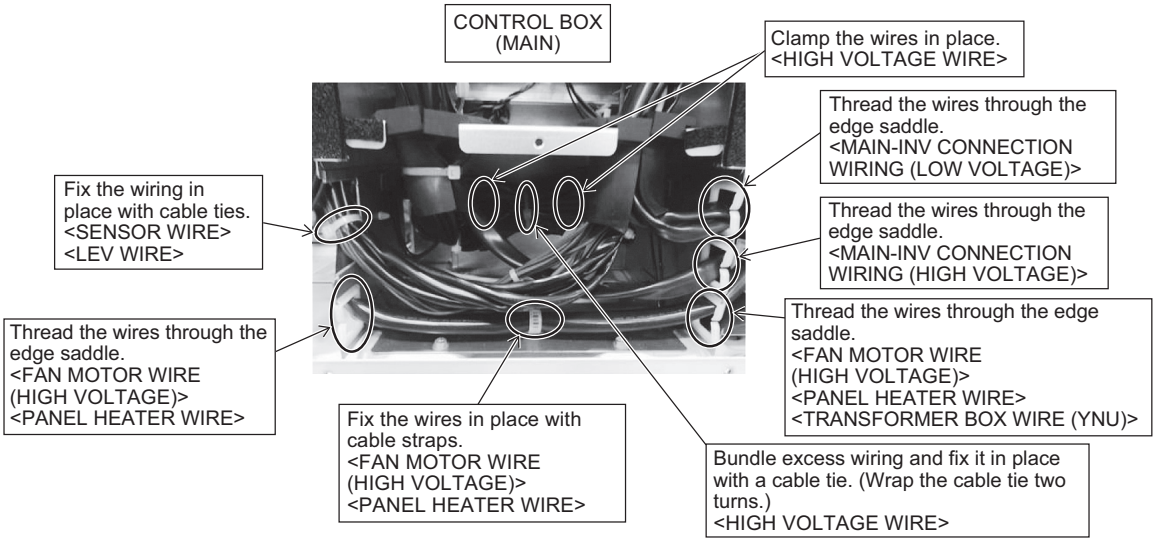
FRONT VIEW



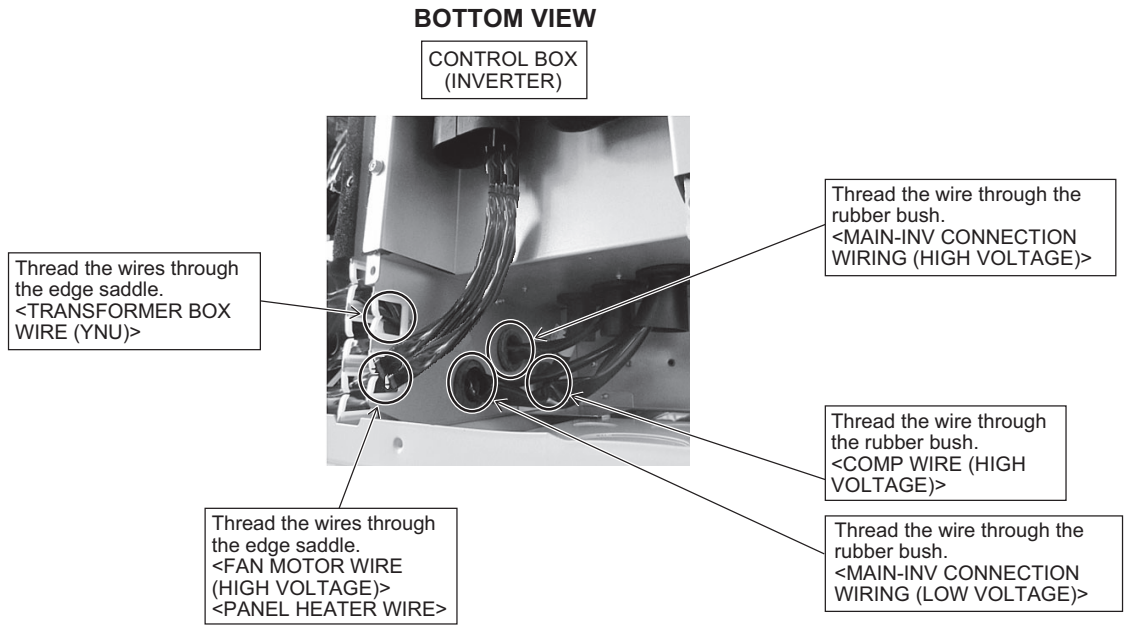
LEFT VIEW



BOTTOM VIEW

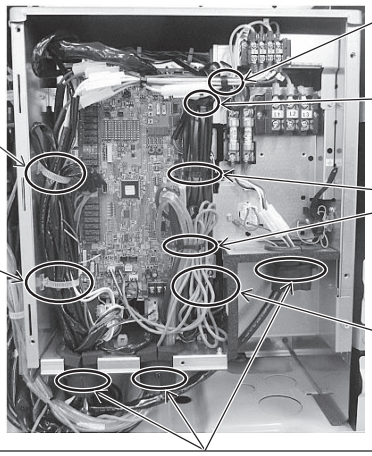


BOTTOM VIEW

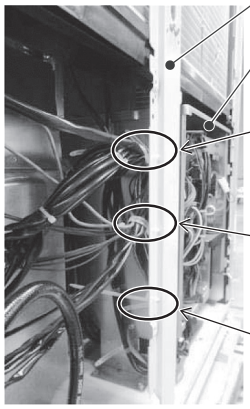


(2) L-module

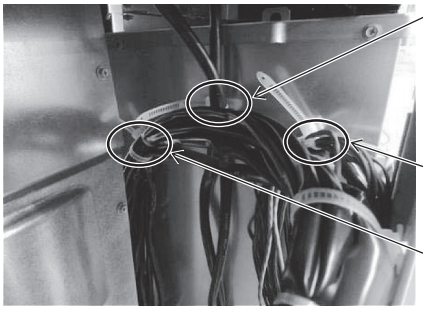
FRONT VIEW



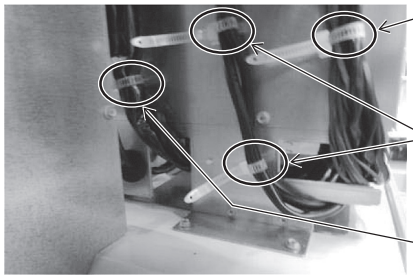
LEFT VIEW



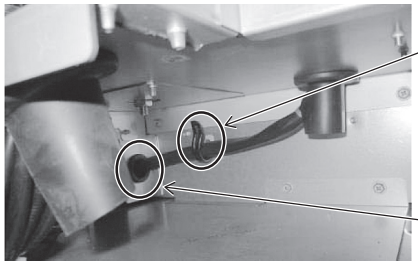
LEFT VIEW (TOP)



LEFT VIEW (BOTTOM)

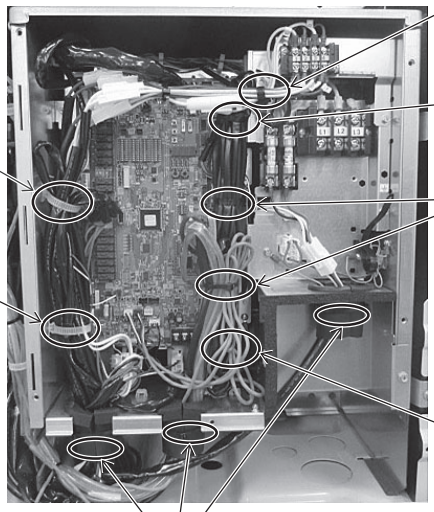


BOTTOM VIEW

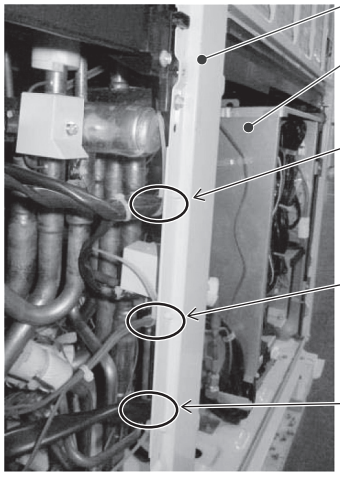


(3) XL-module

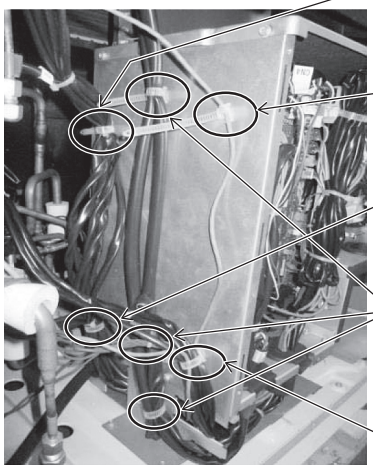
FRONT VIEW



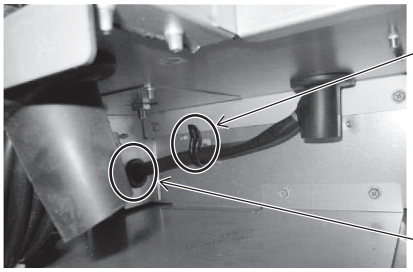
LEFT VIEW



LEFT VIEW

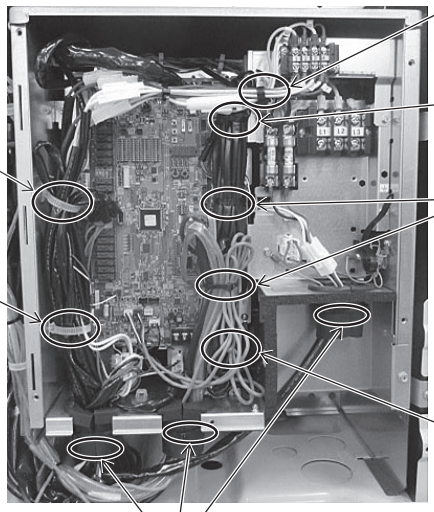


BOTTOM VIEW

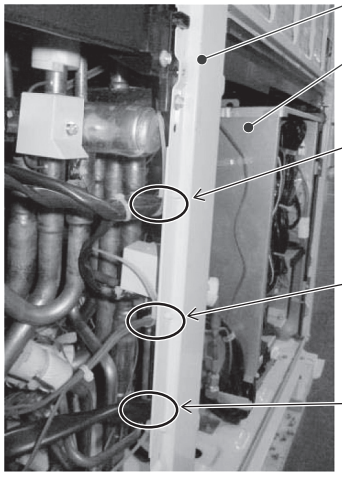


(4) EXL-module

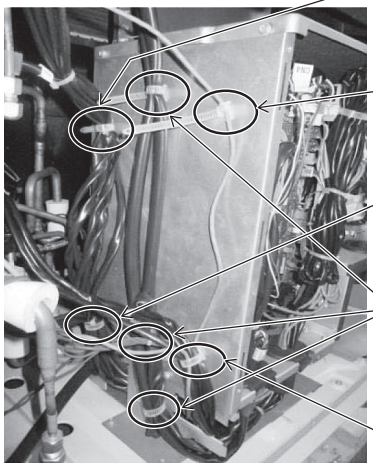
FRONT VIEW



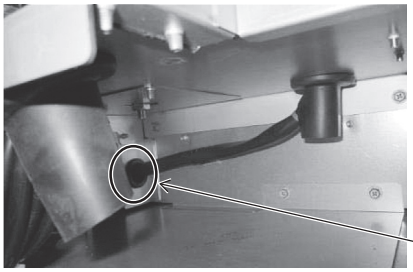
LEFT VIEW



LEFT VIEW



BOTTOM VIEW



8-12-3 Four-way Valve and Check Valve Replacement Procedure

1. S, L-module (four-way valve (21S4a))

Explained below is the procedure for replacing four-way valve (21S4a) (on the right when seen from the front of the unit). Secure sufficient work space before starting maintenance work. (See 8-12-1 Ensuring Maintenance Space (Preparation for the Maintenance of Refrigerant Circuit Parts).)

(1) Remove the top compressor cover by unscrewing the three screws. (See Figure 1.)
Remove the compressor cover by unhooking the hooks on the back.
(2) Remove the front compressor cover by unscrewing the four screws. (See Figure 2.)
(3) Cut the two cable ties holding TH4 and TH15, and remove the wiring from the rubber bush on the left compressor cover. (See Figure 3.)
(4) Remove the left compressor cover by unscrewing the two screws. (See Figure 4.)

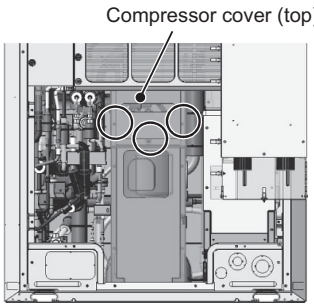


Figure 1

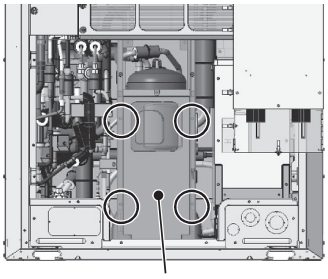


Figure 2

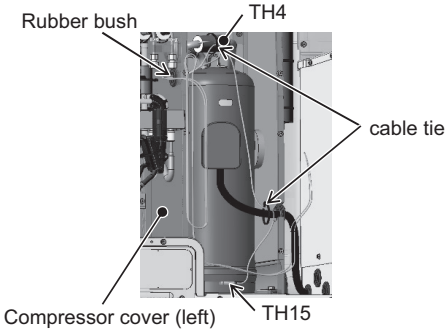


Figure 3

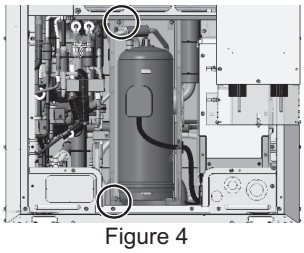


Figure 4

(5) Remove the plastic cover and the coil holding solenoid valves 2, 9, and 10 (SV2, 9, and10). Remove the thermal insulation shown in Figure 5. (See Figure 5.)

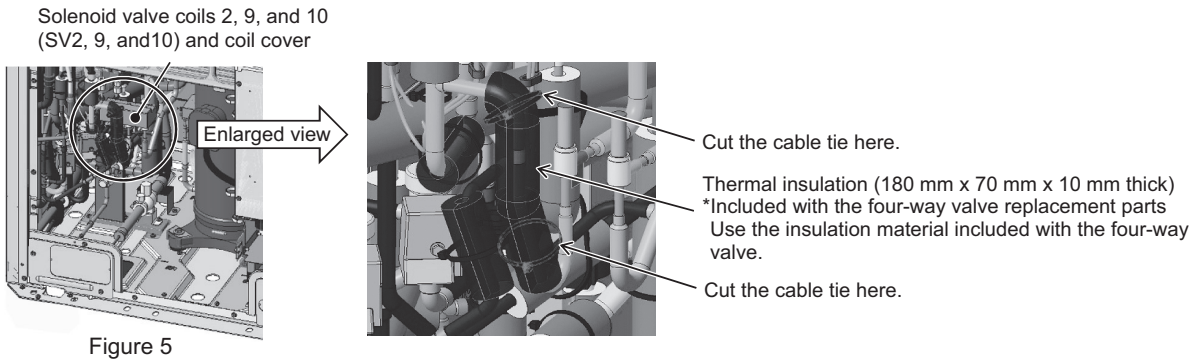


Figure 5

(6) Remove the plastic cover and the coil holding the four-way valve. (See Figure 6.)

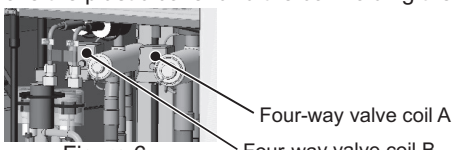


Figure 6

*Notes on replacing refrigerant circuit components (check valve, four-way valve, solenoid valve, and LEV)
- Be sure to perform non-oxidized brazing.
- Before heating the pipes, wrap the refrigerant circuit components with a wet towel to keep the temperature of the components from rising above 120°C.
- After brazing is done, check that the brazing is done properly and check for leaks before vacuum-drying the pipes.
- Direct the brazing torch flame away from the wiring and sheet metals inside the unit not to damage them.
- Wet felt sheets listed below (or its equivalent), and place them around the areas to be brazed to protect the heat exchanger, pipes, and pipe covers from being damaged from the brazing torch flame.
  Recommended felt sheets: Spatter felt 50CF-11 (5t x 1 m x 1 m) by TRUSCO Nakayama
  Felt sheets that meet the JIS standard (JIS A 1323 type A "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works")

(7) Remove the solenoid valve and the LEV assembly at the front of the four-way valve at the brazed sections to ensure good visibility of the four-way valve.
Either remove or protect the solenoid valve coil, TH and LEV wirings, pipe cover, and plastic components to keep them from being damaged by the torch flame. (Remove the components by removing the braze from the six areas shown in Figure 7.)

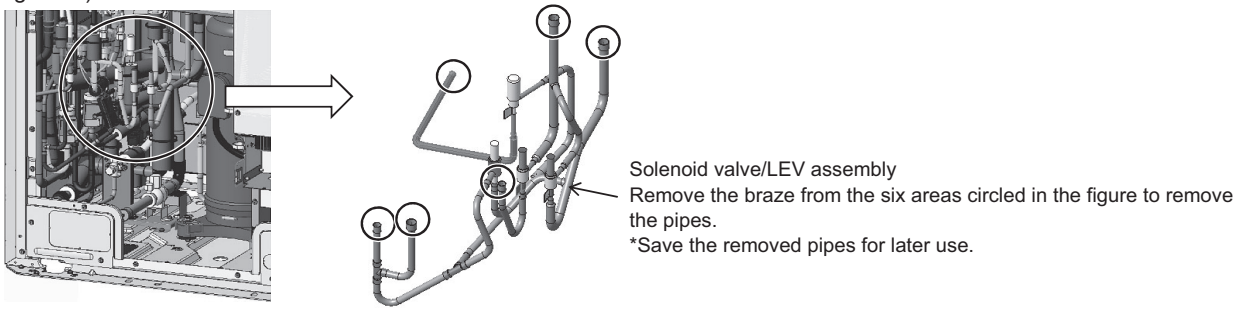


Figure 7

Replacement procedure for four-way valve (21S4a)
(8A) Remove the pipe covers adjacent to four-way valve (21S4a). (See Figure 8.)

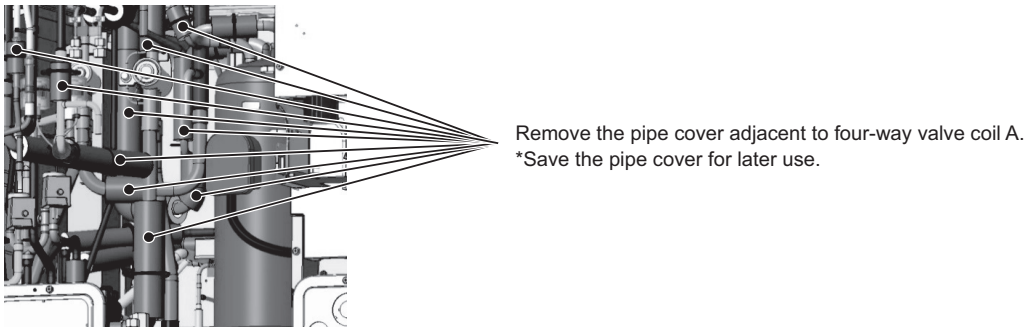


Figure 8

(9A) Remove the sheet metal screwed to the base below four-way valve (21S4a) by unscrewing the two screws. (See Figure 9.)

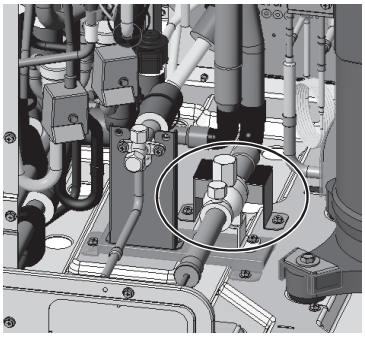


Figure 9

(10A) Remove the pipe below four-way valve (21S4a) and on the front by removing the braze at the four areas shown in Figure 10.

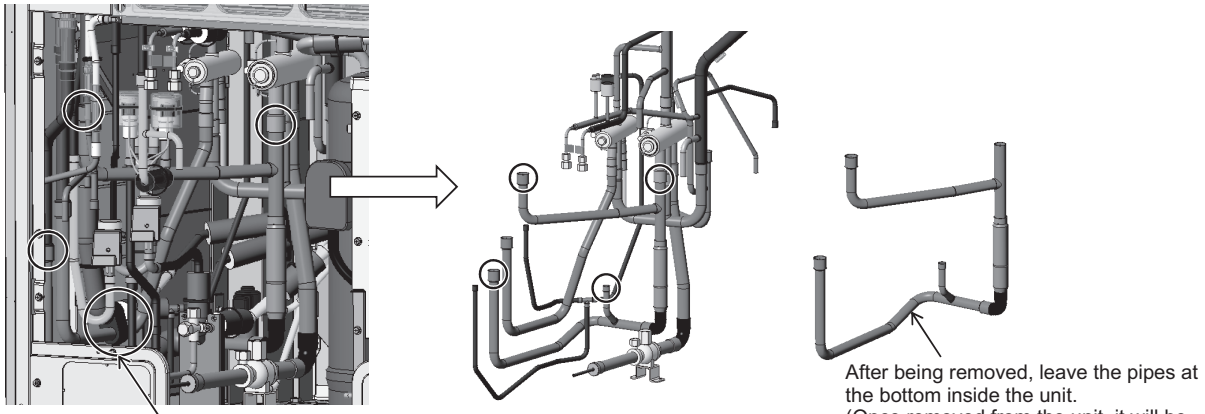


Figure 10

(11A) Cut the pipe below four-way valve (21S4a) and in the middle with a pipe cutter as shown in the figure.
After cutting the pipe where indicated in the figure, remove the braze at the three areas shown in Figure 11.

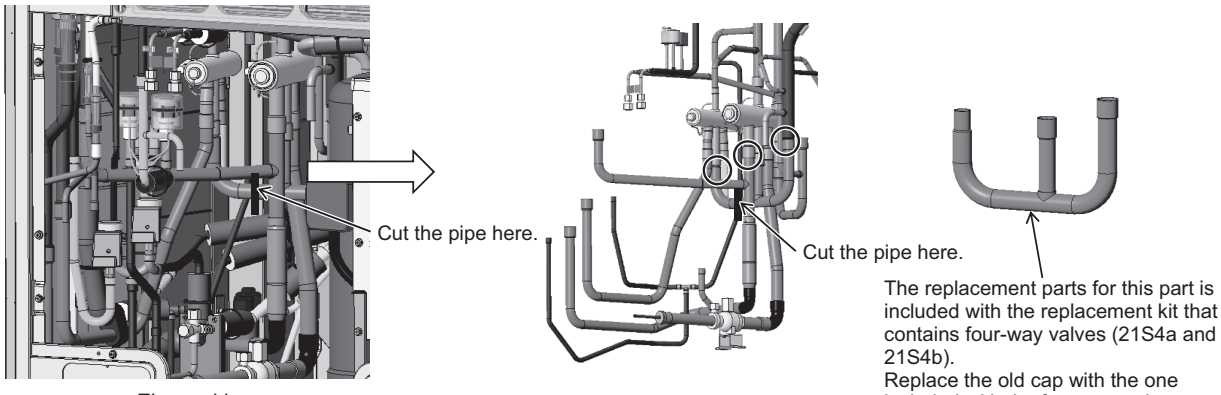


Figure 11

(12A) Remove the pipe below four-way valve (21S4a) and on the back by removing the braze at the two areas on the bottom of the pipe shown in Figure 12. Then, remove the braze at the areas on the top of the pipe.

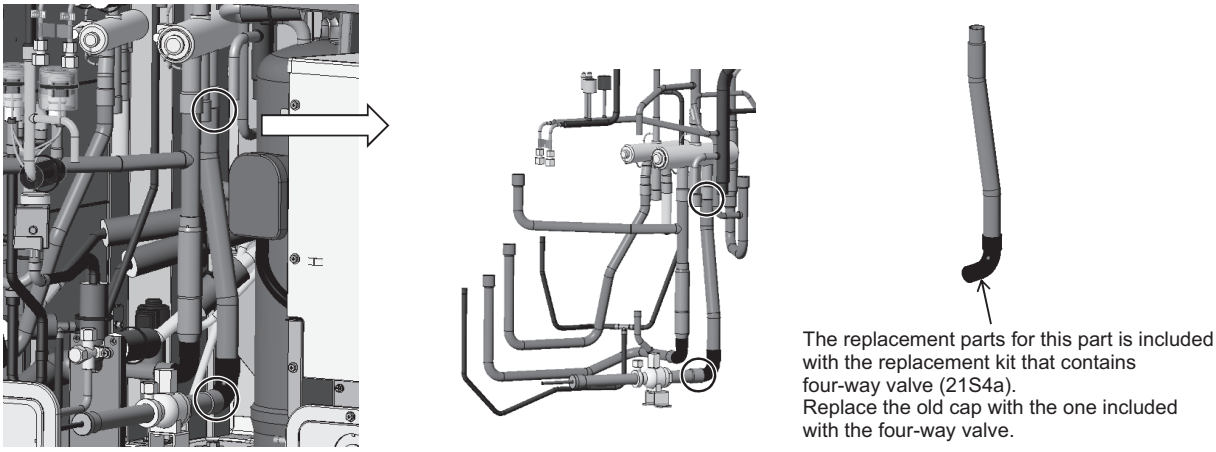


Figure 12

(13A) Remove four-way valve (21S4a) by removing the braze from the area above four-way valve (21S4a) as shown in Figure 13.

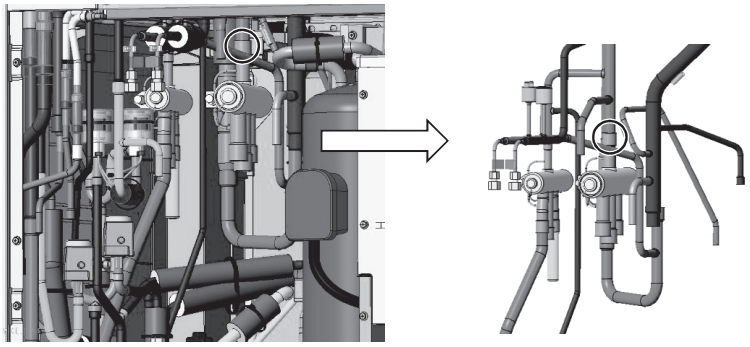
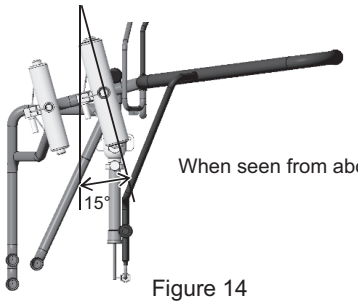


Figure 13

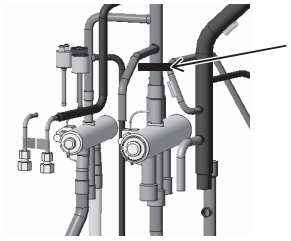
(14A) Mount a new four-way valve (21S4a). Figure 14 shows how to position a new four-way valve.



When seen from above, four-way valves (21S4a and 21S4b) are tilted by 15°.

Figure 14

(15A) To make it easier to connect four-way valve (21S4a), cut the pipe end below the raised hole (cut off the section covered with brazing filler) on the pipe with a pipe cutter. Cut the pipe with an expanded end that is included with four-way valve (21S4a) to the same length as the pipe that was removed from the on-site pipe. (See Figure 15.)



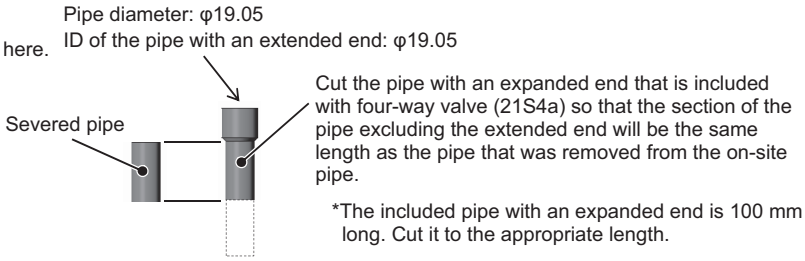


Figure 15

(16A) Mount four-way valve (21S4a) to the pipe below four-way valve (21S4a) and on the back. A total of four areas require brazing, including the area indicated in (15A) and the areas indicated in Figure 16.

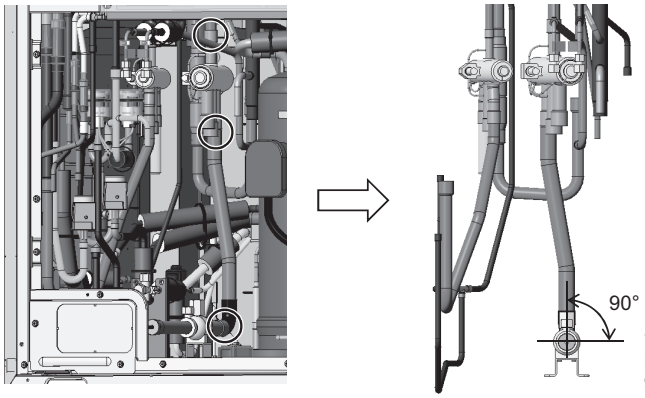
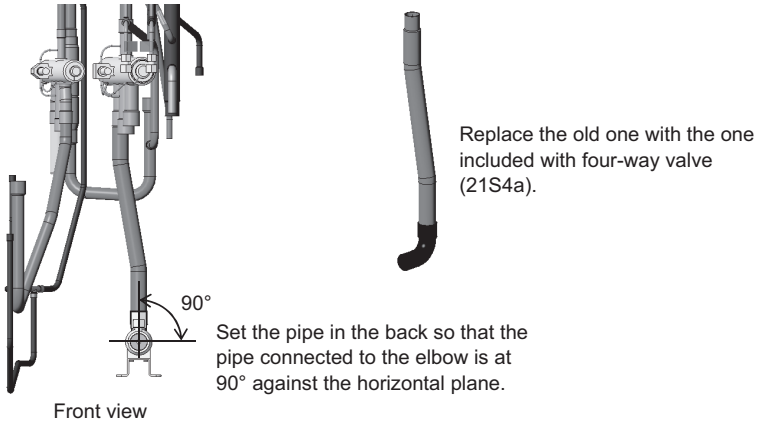


Figure 16



Front view

(17A) Mount four-way valve (21S4a) to the pipe below four-way valve A and in the middle by brazing at the three areas. (See Figure 17.)

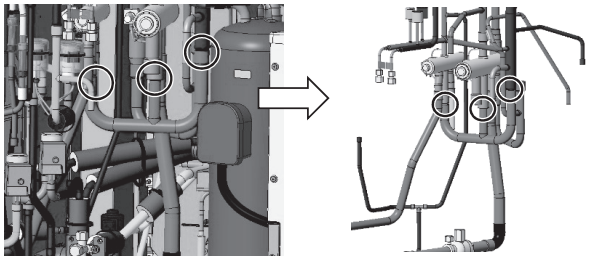


Figure 17

(18A) Mount four-way valve (21S4a) to the pipe below four-way valve (21S4a) and on the front by brazing at the four areas. (See Figure 18.)

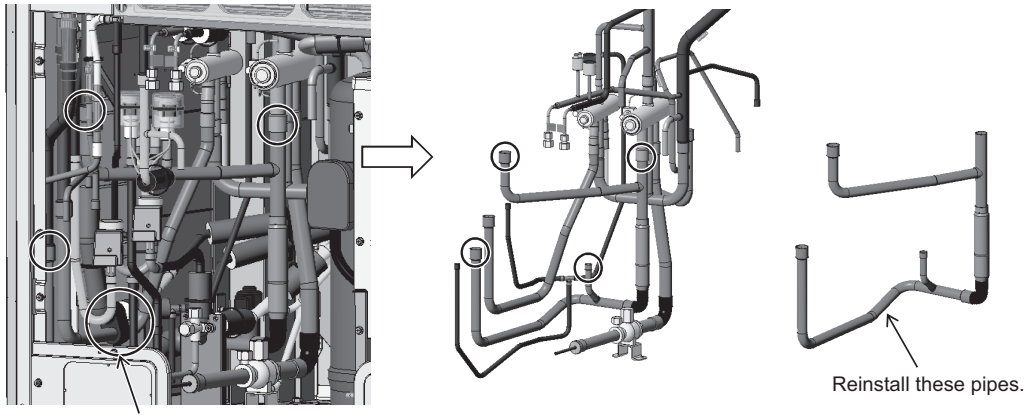


Figure 18

This step completes the replacement procedure for four-way valve (21S4a). Re-place the solenoid valve and LEV assembly that were removed in step (7) and all the pipe covers that were removed during the maintenance work as they were.

2. S, L-module (four-way valve (21S4b))

Explained below is the procedure for replacing four-way valve (21S4b) (on the left when seen from the front of the unit). Secure sufficient work space before starting maintenance work. (See 8-12-1 Ensuring Maintenance Space (Preparation for the Maintenance of Refrigerant Circuit Parts).)

(19B) Follow the same procedures ((1) through (7), (8A), and (11A)) for replacing four-way valve (21S4a).

(20B) Remove the pipe below four-way valve (21S4b) and on the front by removing the braze at the two areas shown in Figure 19.

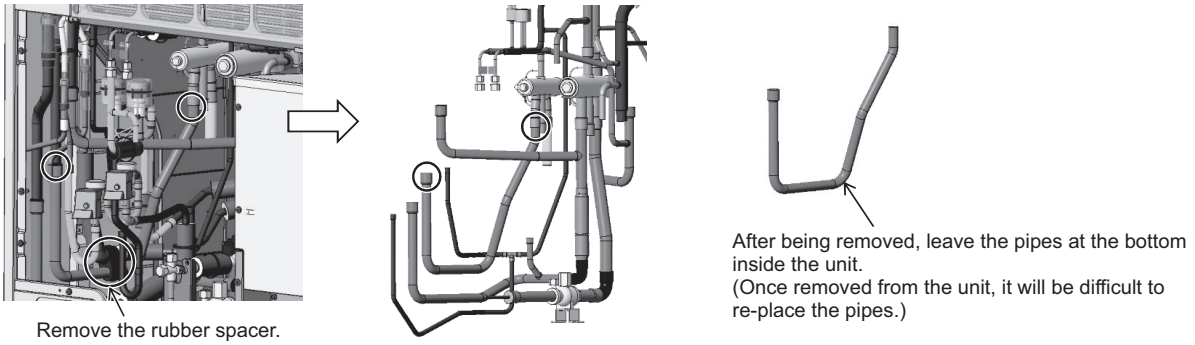


Figure 19

(21B) Remove four-way valve (21S4b) by removing the braze from the area above four-way valve (21S4b) as shown in Figure 20.

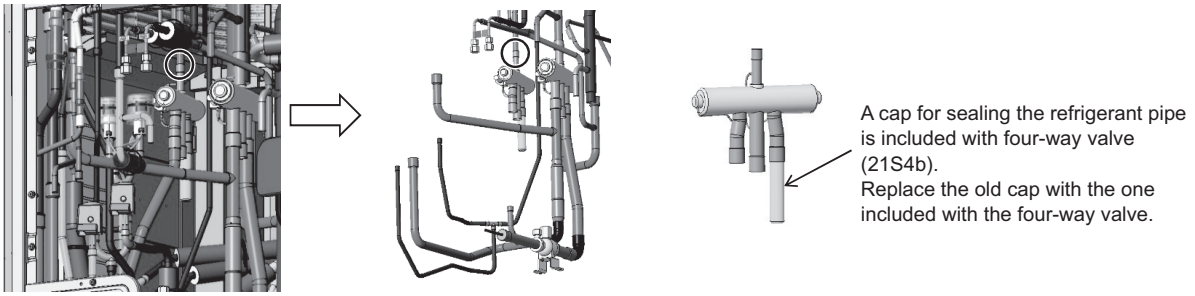


Figure 20

(22B) To make it easier to connect four-way valve (21S4b), cut the pipe end below the raised hole (cut off the section covered with brazing filler) on the pipe with a pipe cutter. Cut the pipe with an expanded or narrowed end that is included with four-way valve (21S4b) to the same length as the pipe that was removed from the on-site pipe. (See Figure 21.)

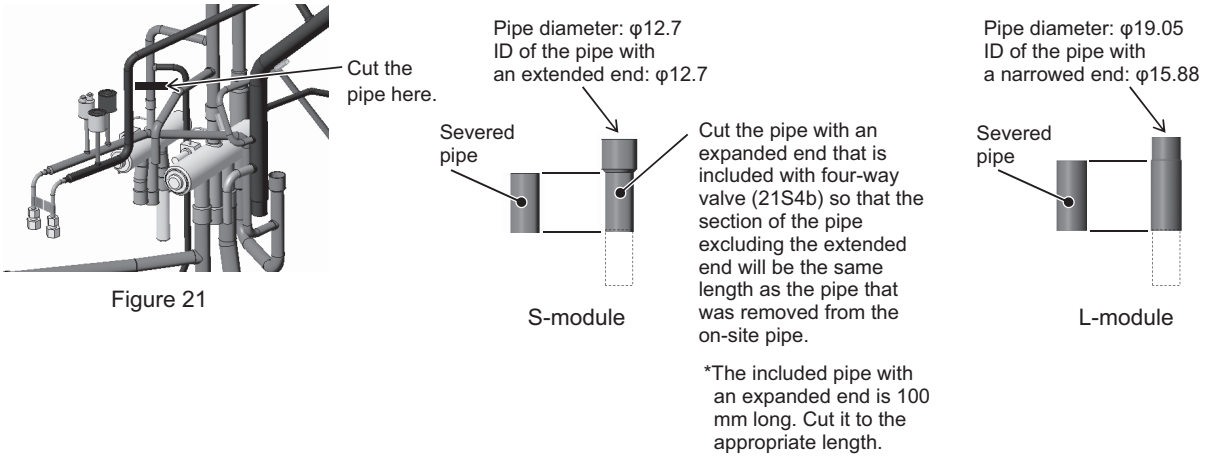


Figure 21

*The included pipe with an expanded end is 100 mm long. Cut it to the appropriate length.

(23B) Mount four-way valve (21S4b) to the pipe below four-way valve (21S4b) and in the middle. A total of five areas require brazing, including the area indicated in (22B) and the areas indicated in Figure 22.
Mount four-way valve (21S4b) horizontal to four-way valve (21S4a) as shown in (14A).

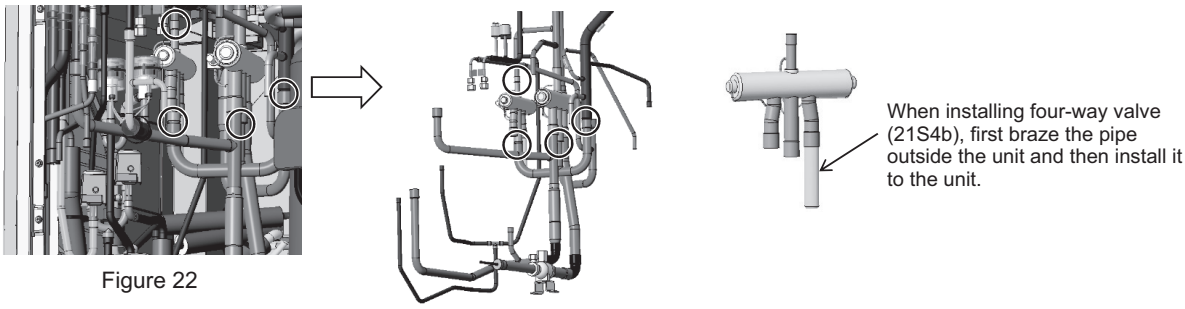


Figure 22

(24B) Install the pipe below four-way valve (21S4b) and on the front by brazing at the two areas shown in Figure 23.

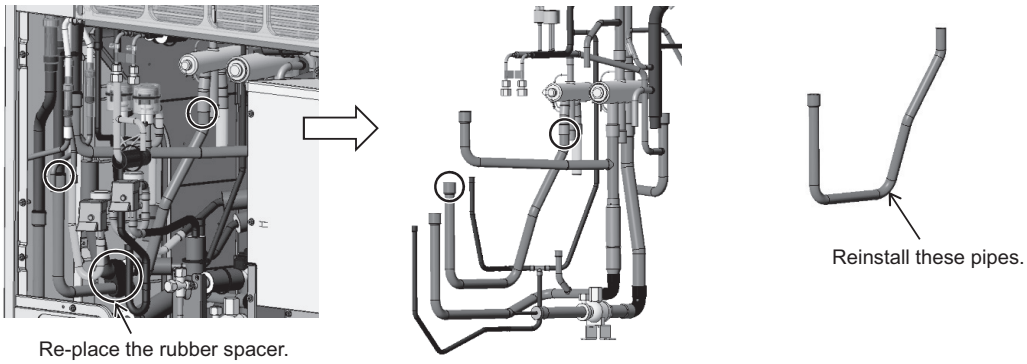


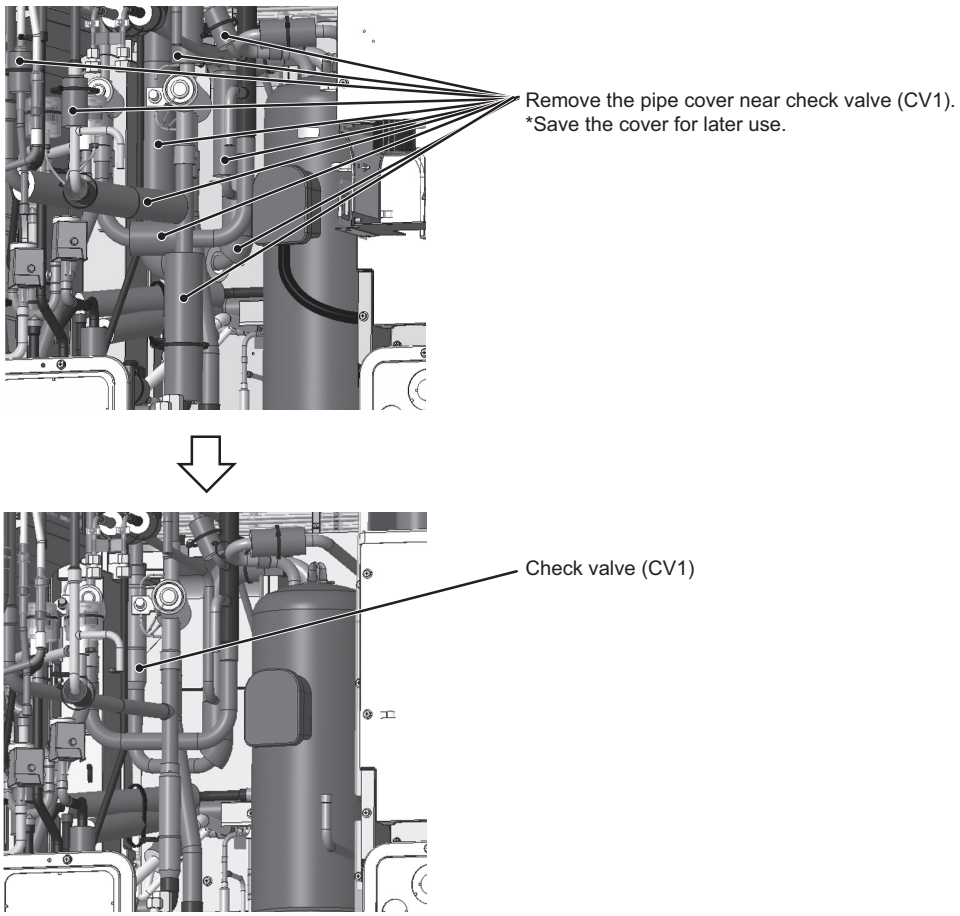
Figure 23

This step completes the replacement procedure for four-way valve (21S4b). Re-place the solenoid valve and LEV assembly that were removed in step (7) and all the pipe covers that were removed during the maintenance work as they were.

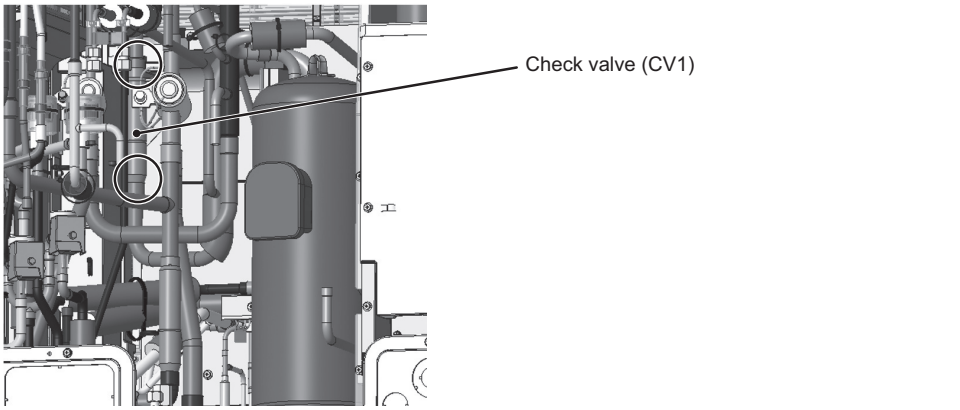
3. Replacing check valve (CV1) (S and L modules)

Follow the procedures below to remove check valve (CV1) located in the back of the four-way valve.

(1) Follow the steps (1) through (9A) under item 1. S, L-module under 8-12-3 Four-way Valve and Check Valve Replacement Procedure to Create Access to Check Valve (CV1).



(2) Remove the braze from two areas on check valve (CV1).



The above step completes the check valve (CV1) replacement procedure. Re-place the solenoid valve, LEV assemby, and pipe cover that were removed during maintenance work as they were.

4. XL-module (four-way valve (21S4a, 21S4b, and 21S4c))

* Products manufactured in July 2020 and earlier

Explained below is the procedure for replacing four-way valve (21S4a) (in the center when seen from the front of the unit), four-way valve (21S4b) (on the right when seen from the front of the unit), and four-way valve (21S4c) (on the left when seen from the front of the unit). (See Figure 1.)

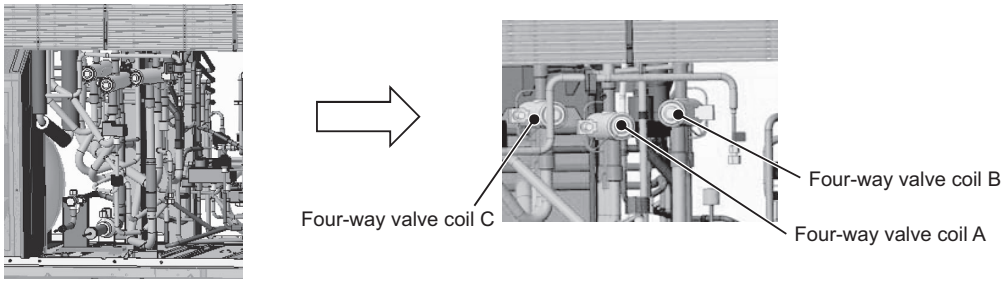


Figure 1

(1) Remove the wiring and sheet metal. (Screwed down with four screws) (See Figure 2.)

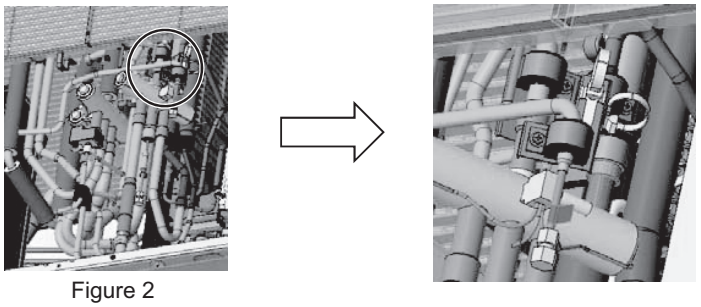


Figure 2

(2) Remove the coil (four-way valves (21S4a, 21S4b, and 21S4c), and solenoid valve (SV2)), coil cover, and wiring. (See Figure 3.)

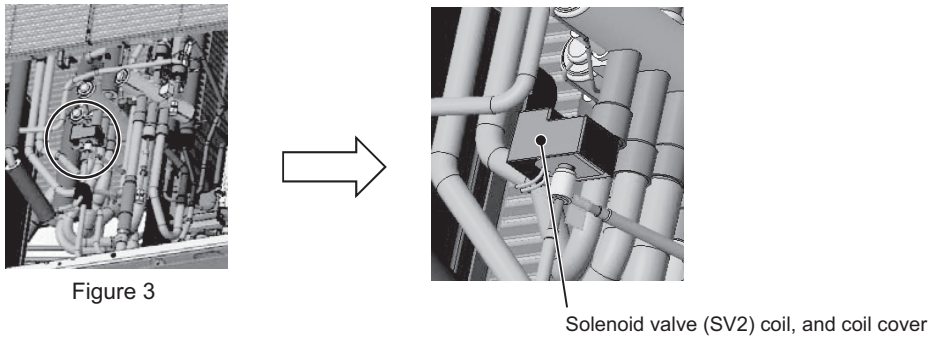


Figure 3

(3) Remove the pipe cover and thermal insulation adjacent to the four-way valves. (See Figure 4.)

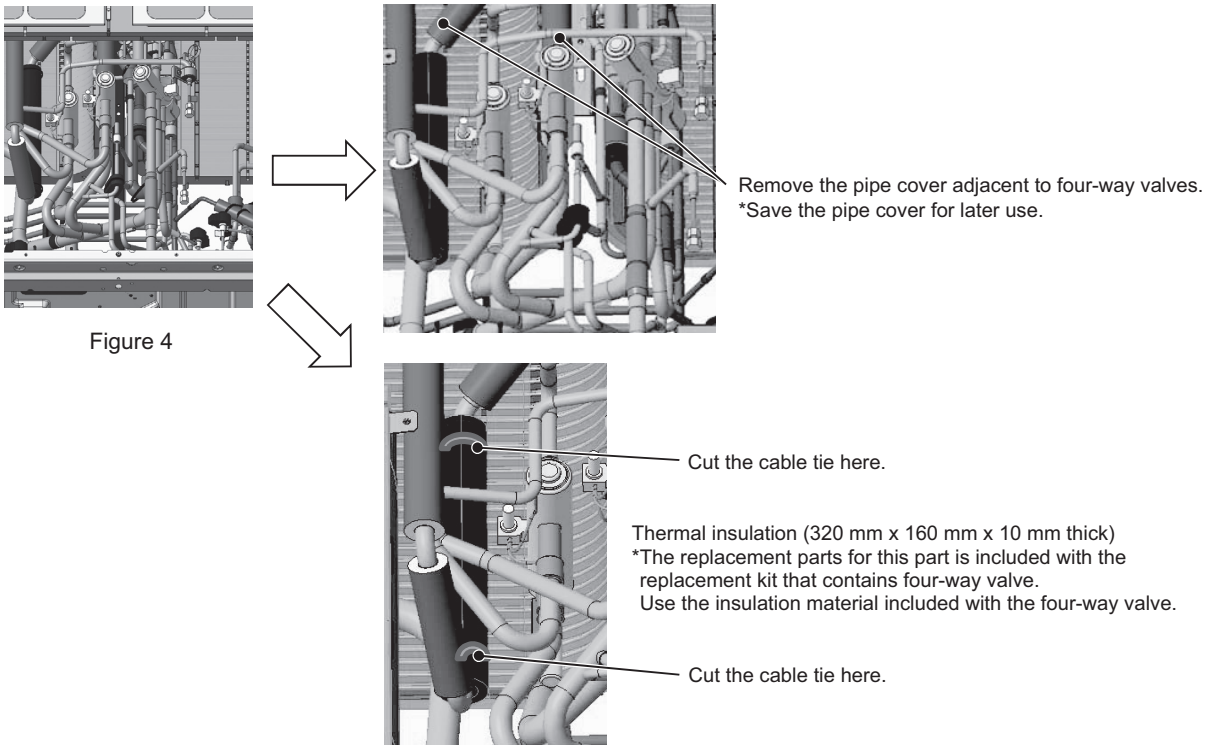


Figure 4

*Notes on replacing refrigerant circuit components (check valve, four-way valve, solenoid valve, and LEV)
- Be sure to perform non-oxidized brazing.
- Before heating the pipes, wrap the refrigerant circuit components with a wet towel to keep the temperature of the components from rising above 120°C.
- After brazing is done, check that the brazing is done properly and check for leaks before vacuum-drying the pipes.
- Direct the brazing torch flame away from the wiring and sheet metals inside the unit not to damage them.
- Wet felt sheets listed below (or its equivalent), and place them around the areas to be brazed to protect the heat exchanger, pipes, and pipe covers from being damaged from the brazing torch flame.
  Recommended felt sheets: Spatter felt 50CF-11 (5t x 1 m x 1 m) by TRUSCO Nakayama
  Felt sheets that meet the JIS standard (JIS A 1323 type A "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works")

(4) Remove the braze from the pipe between four-way valves (21S4a and 21S4b). (See Figure 5.)

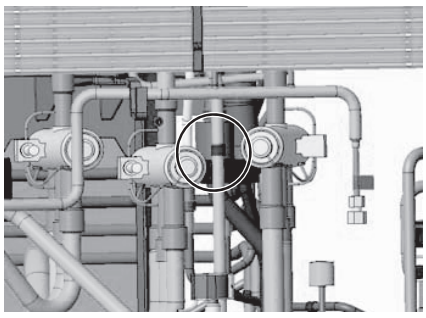


Figure 5

Replacement procedure for four-way valve (21S4a)
(5A) Remove the braze from the area above four-way valve (21S4a) as shown in Figure 6.

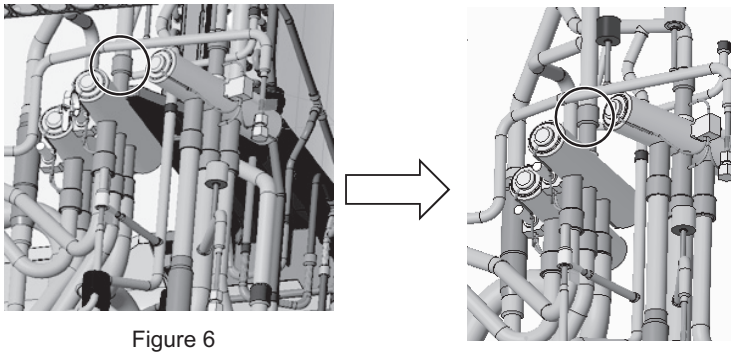


Figure 6

(6A) Remove the braze from the three areas below four-way valve (21S4a) as shown in Figure 7.

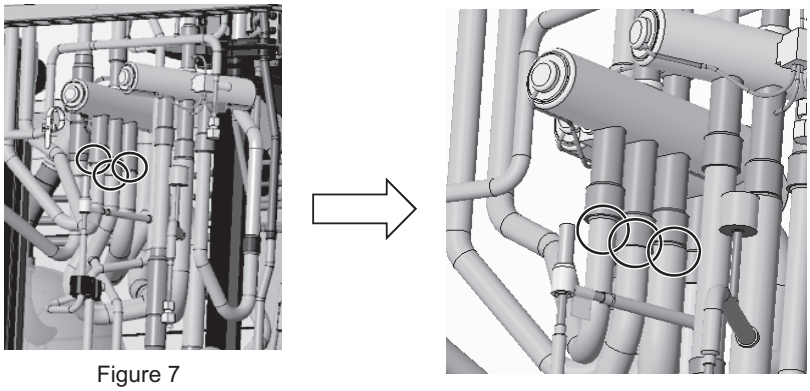


Figure 7

(7A) Mount a new four-way valve (21S4a).

Replacement procedure for four-way valve (21S4b)
(8B) Follow the same procedures as (5A) through (6A).

(9B) Mount a new four-way valve (21S4b). Figure 8 shows how to position a new four-way valve.

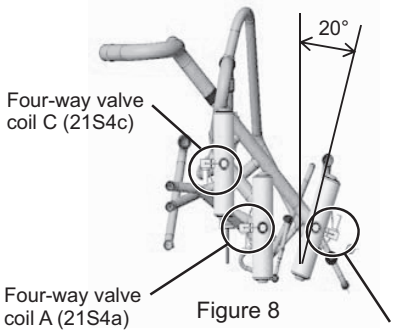


Figure 8

When seen from above, four-way valve (21S4b) is tilted by 20°. The coil of four-way valve (21S4b) is tilted 20 degrees to the opposite direction compared to the other four-way valves.

Replacement procedure for four-way valve (21S4c)
(10C) Install a flame-protection plate. (See Figure 9.)

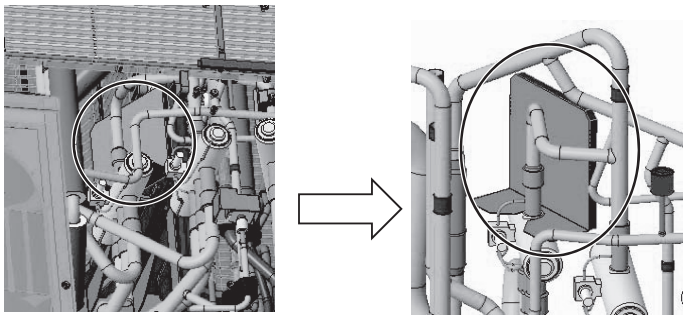


Figure 9

Flame-protection plate
*Included with the replacement kit that contains four-way valve (21S4c)
Remove the plate after replacing four-way valve (21S4c).

(11C) Remove the braze from the area above four-way valve (21S4c) as shown in Figure 10.

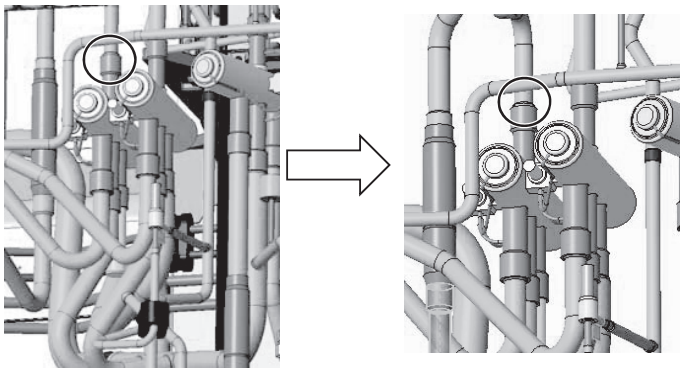
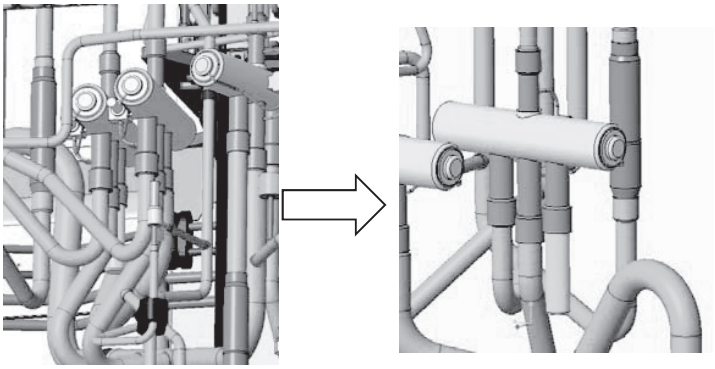
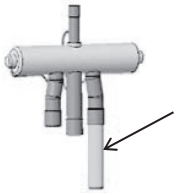


Figure 10

(12C) Remove the braze from the two areas below four-way valve (21S4c) as shown in Figure 11.

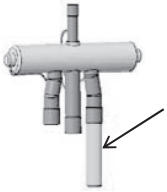




A cap for sealing the refrigerant pipe is included with the replacement kit that contains four-way valve (21S4c).
Replace the old cap with the one included with the four-way valve.

Figure 11

(13C) Mount a new four-way valve (21S4c).



When installing four-way valve (21S4c), first braze the pipe outside the unit and then install it to the unit.

Figure 12

5. EXL-module (four-way valve (21S4a and 21S4b))

The procedure for replacing the four-way valve 21S4a (on the left when viewed from the front of the unit) and the four-way valve 21S4b (on the right when viewed from the front of the unit) is shown below. (Figure 1)

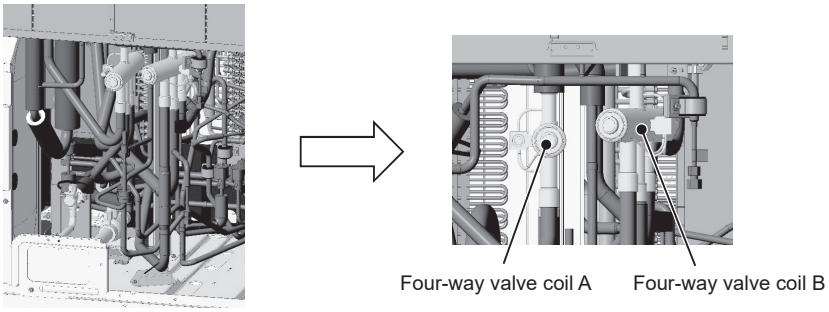


Figure 1

(1) Remove the pipe cover, wiring, and sheet metal parts. (4 screws, Figure 2)
*Save the removed pipe cover for later use.

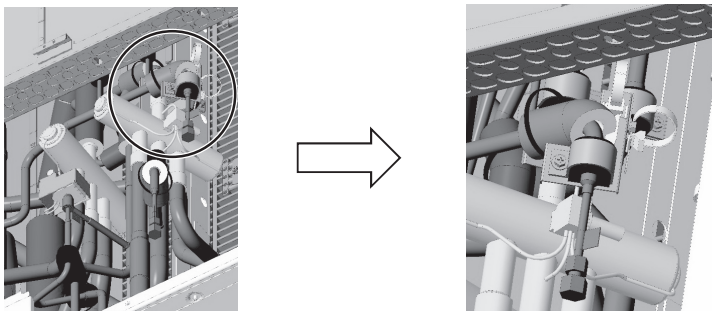


Figure 2

(2) Remove the coil (four-way valves (21S4a, 21S4b), solenoid valve (SV2)), coil covers, and wires. (Figure 3)

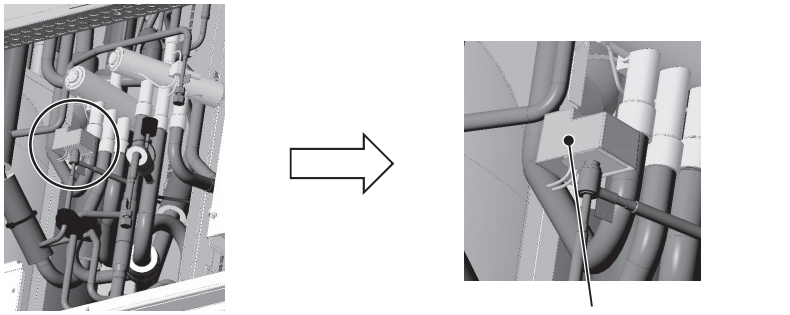


Figure 3

(3) Remove the pipe covers adjacent to the four-way valve. (Figure 4)
*Save the pipe cover for later use.

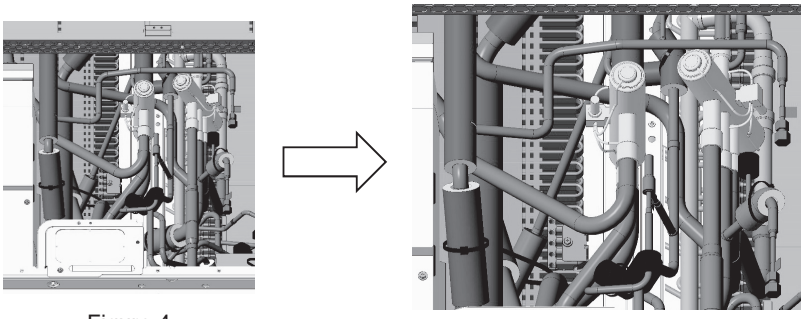


Figure 4

Precautions for replacing refrigerant circuit components (four-way valves, solenoid valves, and LEV)
- Be sure to perform oxidation-free brazing.
- When heating the piping, wrap a wet towel around the refrigerant circuit parts so that the temperature of the refrigerant circuit parts does not exceed 120°C.
- After brazing, check the condition around the braze, and check for refrigerant leakage before vacuuming the pipes.
- Direct the brazing torch flame away from the wiring and sheet metal of the unit.
- To prevent the flame from adversely affecting the heat exchanger, piping on the unit, or pipe covers during brazing, place the following type of felt or its equivalent soaked with water around the areas to be brazed.
  Recommended felt: Sputter felt 50CF-11 (5 t × 1 m × 1 m) of Trusco Nakayama Co., Ltd.
  Compliant with the Flame Retardancy Test (JIS A 1323) Class A of "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works."

(4) Remove the braze from the area between four-way valves 21S4a and 21S4b. (Figure 5)

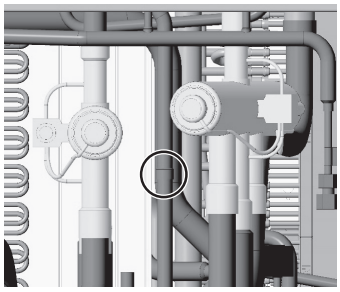


Figure 5

Replacement of the four-way valve (21S4a)
(5) Remove the braze from above the four-way valve (21S4a). (Debrazing: 1 place, Figure 6)

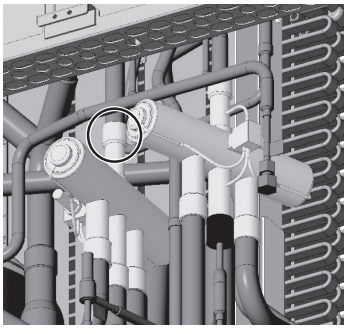


Figure 6

(6) Remove the braze from below the four-way valve (21S4a). (Debrazing: 3 places, Figure 7)

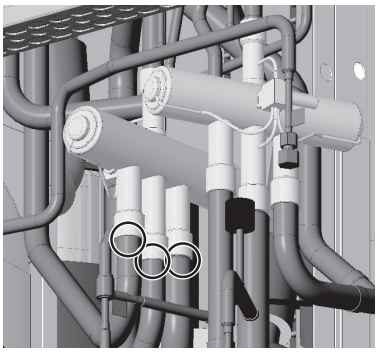


Figure 7

(7) Mount a new four-way valve (21S4a).

Replacement of the four-way valve (21S4b)
(8) Follow the steps (5) and (6).

(9) Mount a new four-way valve (21S4b). Figure 8 shows the reference installation position of the four-way valve.
When viewed from the top of the unit, the four-way valve (21S4b) is tilted by 20° with respect to the vertical plane.
The coils on four-way valve 21S4b and 21S4a face different directions.

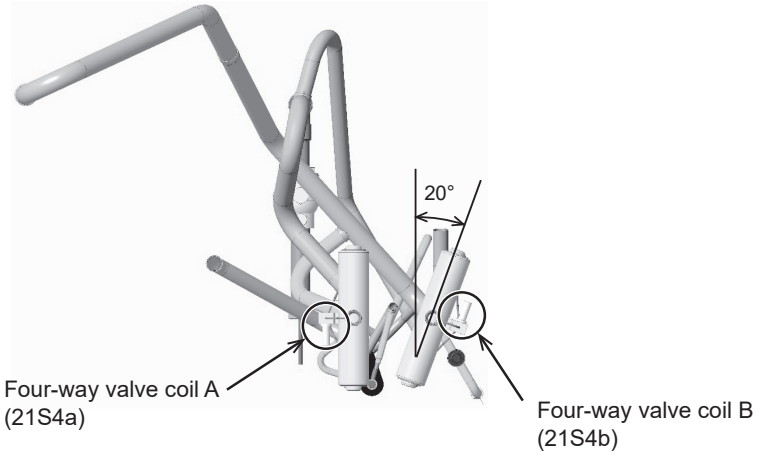


Figure 8

6. XL-module (four-way valve (21S4a, 21S4b, and 21S4c))

* Products manufactured in August 2020 and later

Explained below is the procedure for replacing four-way valve (21S4a) (in the center when seen from the front of the unit), four-way valve (21S4b) (on the right when seen from the front of the unit), and four-way valve (21S4c) (on the left when seen from the front of the unit). (See Figure 1.)

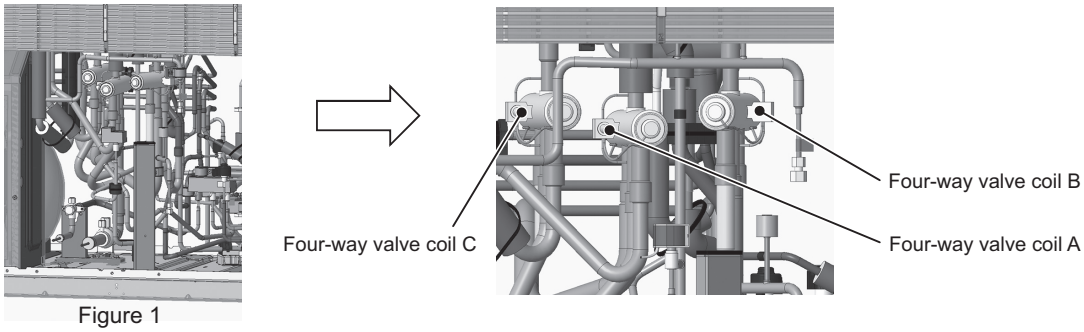


Figure 1

(1) Remove the wiring and sheet metal. (Screwed down with four screws) (See Figure 2.)

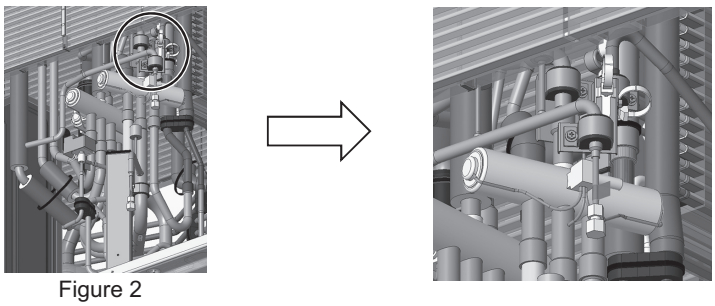


Figure 2

(2) Remove the coil (four-way valves (21S4a, 21S4b, and 21S4c), and solenoid valve (SV2)), coil cover, and wiring. (See Figure 3.)

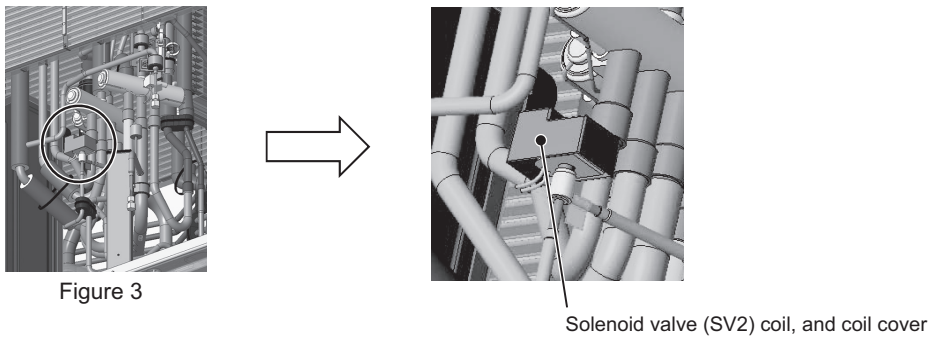


Figure 3

(3) Remove the pipe cover and thermal insulation adjacent to the four-way valves. (See Figure 4.)

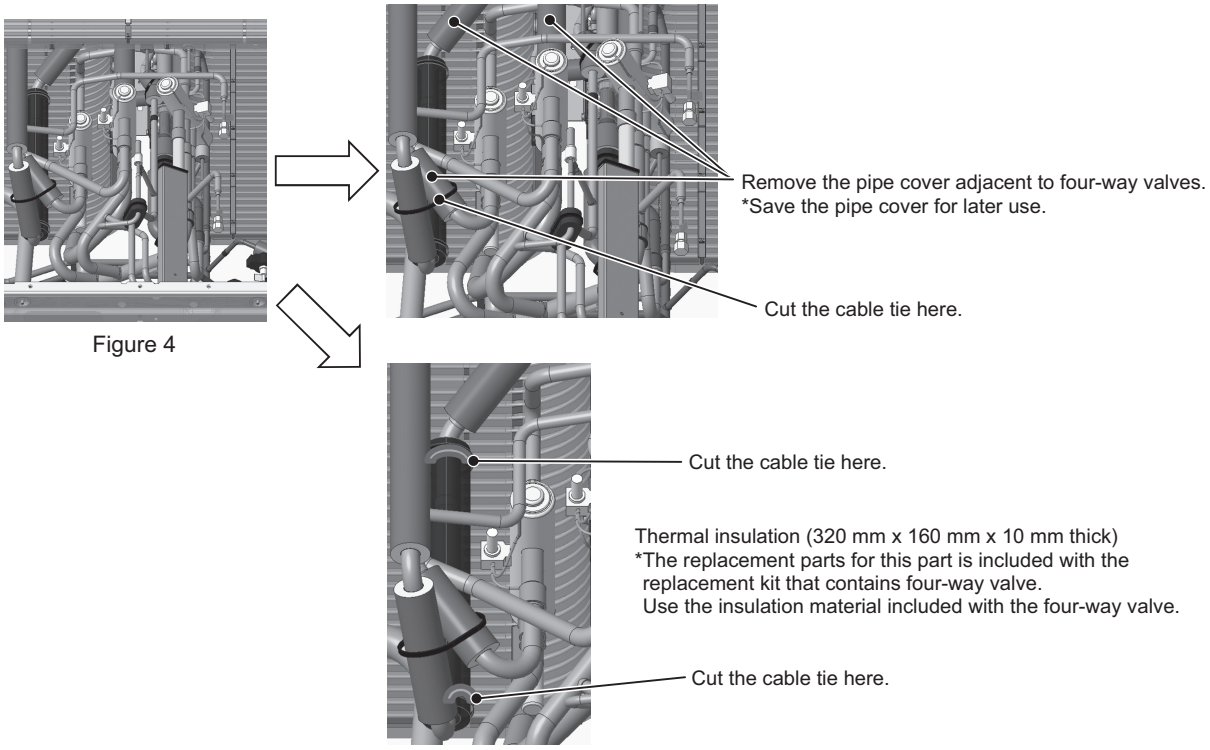


Figure 4

*Notes on replacing refrigerant circuit components (check valve, four-way valve, solenoid valve, and LEV)
- Be sure to perform non-oxidized brazing.
- Before heating the pipes, wrap the refrigerant circuit components with a wet towel to keep the temperature of the components from rising above 120°C.
- After brazing is done, check that the brazing is done properly and check for leaks before vacuum-drying the pipes.
- Direct the brazing torch flame away from the wiring and sheet metals inside the unit not to damage them.
- Wet felt sheets listed below (or its equivalent), and place them around the areas to be brazed to protect the heat exchanger, pipes, and pipe covers from being damaged from the brazing torch flame.
  Recommended felt sheets: Spatter felt 50CF-11 (5t x 1 m x 1 m) by TRUSCO Nakayama
  Felt sheets that meet the JIS standard (JIS A 1323 type A "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works")

(4) Remove the braze from the pipe between four-way valves (21S4a and 21S4b). (See Figure 5.)

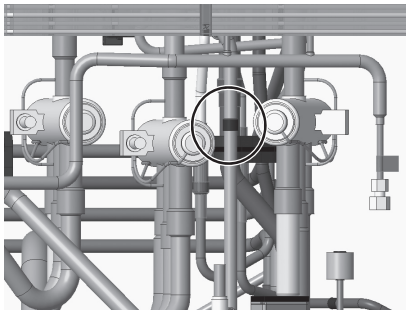


Figure 5

Replacement procedure for four-way valve (21S4a)
(5A) Remove the braze from the area above four-way valve (21S4a) as shown in Figure 6.

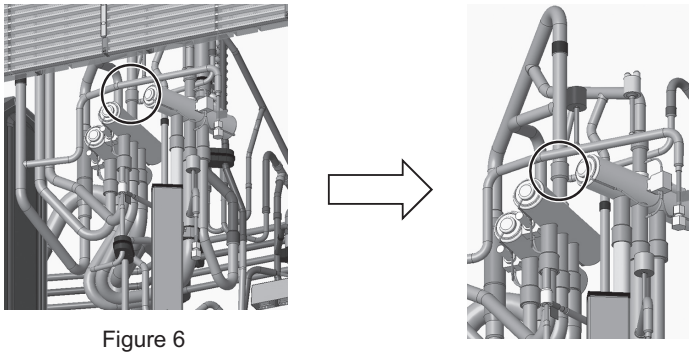


Figure 6

(6A) Remove the braze from the three areas below four-way valve (21S4a) as shown in Figure 7.

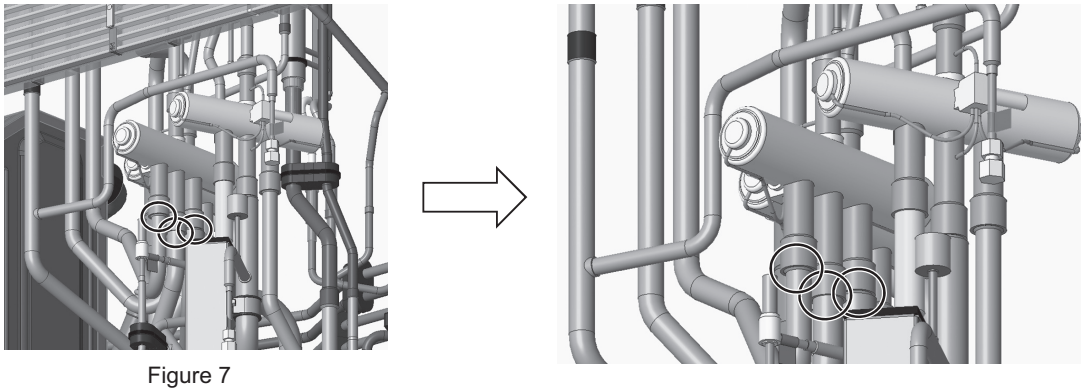


Figure 7

(7A) Mount a new four-way valve (21S4a).

Replacement procedure for four-way valve (21S4b)
(8B) Follow the same procedures as (5A) through (6A).

(9B) Mount a new four-way valve (21S4b). Figure 8 shows how to position a new four-way valve.

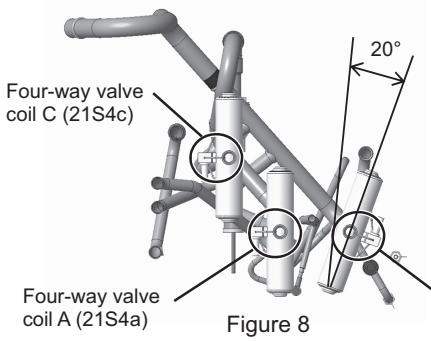


Figure 8

When seen from above, four-way valve (21S4b) is tilted by 20°. The coil of four-way valve (21S4b) is tilted 20 degrees to the opposite direction compared to the other four-way valves.

Replacement procedure for four-way valve (21S4c)
(10C) Install a flame-protection plate. (See Figure 9.)

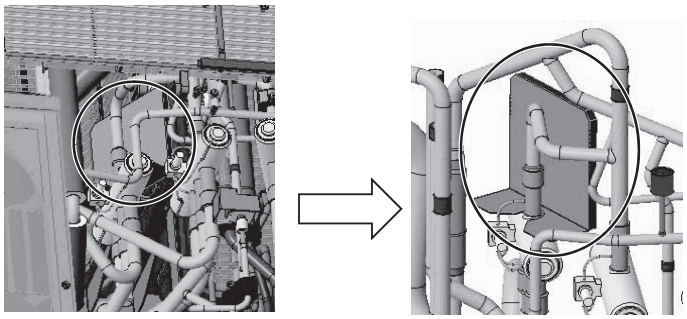


Figure 9

Flame-protection plate
*Included with the replacement kit that contains four-way valve (21S4c)
Remove the plate after replacing four-way valve (21S4c).

(11C) Remove the braze from the area above four-way valve (21S4c) as shown in Figure 10.

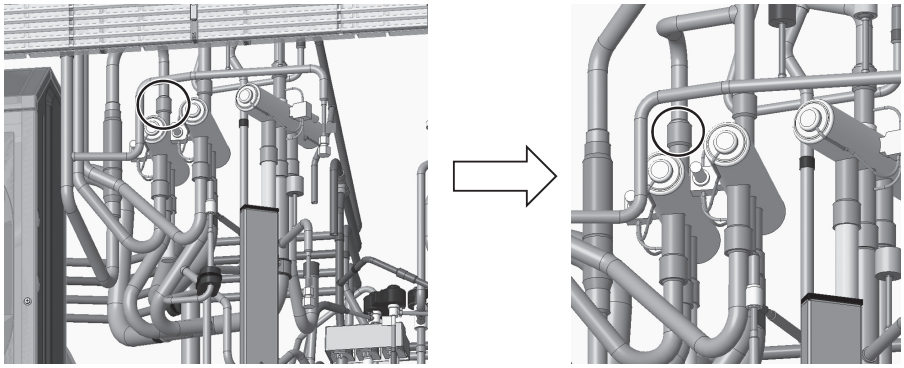
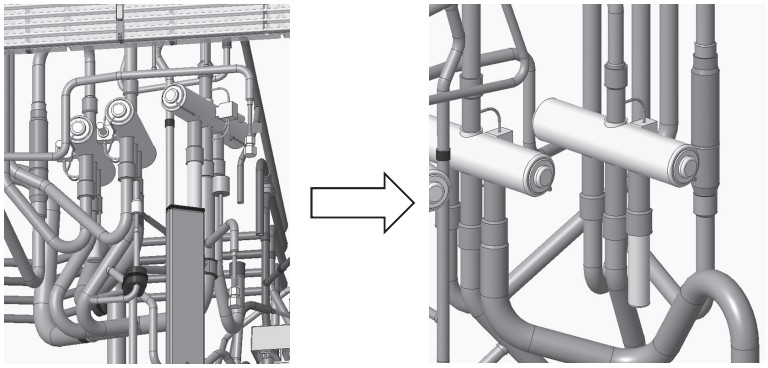


Figure 10

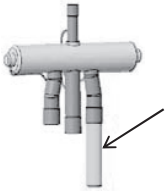
(12C) Remove the braze from the two areas below four-way valve (21S4c) as shown in Figure 11.



A cap for sealing the refrigerant pipe is included with the replacement kit that contains four-way valve (21S4c). Replace the old cap with the one included with the four-way valve.

Figure 11

(13C) Mount a new four-way valve (21S4c).



When installing four-way valve (21S4c), first braze the pipe outside the unit and then install it to the unit.

Figure 12

8-12-4 Compressor Replacement Procedure

1. P72, P96T/YNU-A

Explained below are the procedures for replacing the compressor. Secure sufficient work space before starting replacement work. (See 8-12-1 Ensuring maintenance space (Preparation for the Maintenance of Refrigerant Circuit Parts).)

(1) Remove the top compressor cover by unscrewing the three screws. (See Figure 1.)
Remove the compressor cover by unhooking the hooks on the back.
(2) Remove the front compressor cover by unscrewing the four screws. (See Figure 2.)
(3) Cut the two cable ties holding TH4 and TH15, and remove the wiring from the rubber bush on the left compressor cover. (See Figure 3.)
(4) Remove the right and left compressor covers by unscrewing the four screws. (See Figure 4.)

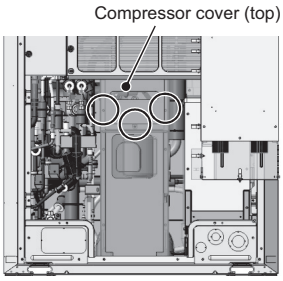


Figure 1

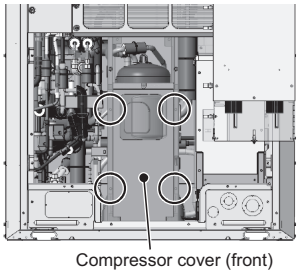


Figure 2

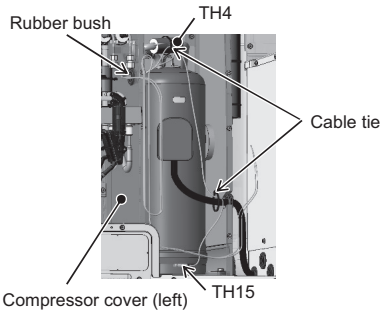


Figure 3

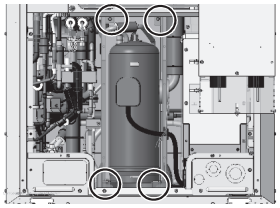


Figure 4

(5) Remove thermal insulation 1 and thermal insulation 2. (See Figure 5.)
(6) Remove the duct by unscrewing the screw. (See Figure 6. Applicable to the S-module only)
(7) Remove the pipe cover and the damper, and cut the suction pipe where indicated in Figure 7.
*When re-placing the pipe cover and the dumper, use the ones with the sizes shown in Figure 7, which are supplied with the replacement compressor.
(8) Remove the compressor discharge pipe by cutting the pipe where indicated in Figure 8 or by removing the braze.

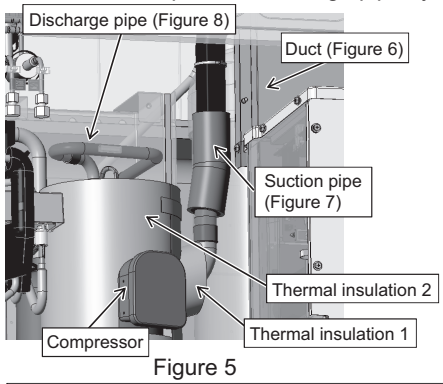


Figure 5

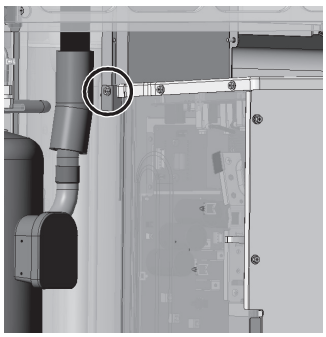


Figure 6

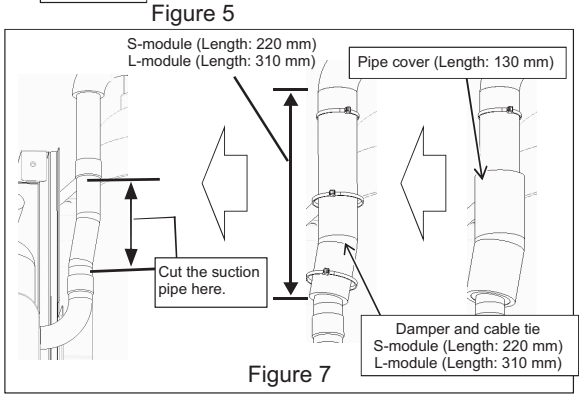


Figure 7

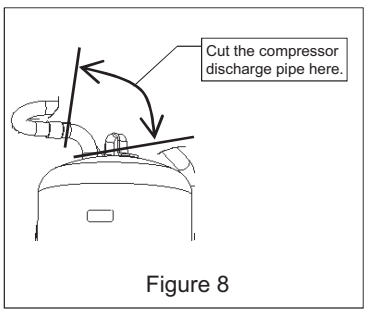


Figure 8

(9) Remove the four bolts holding the compressor down. (See Figure 9.)
The two bolts in the front are also holding down the metal sheets.

(10) Tilting the compressor will cause the refrigerant oil to leak. Seal the pipe where it was cut or removed at the brazed section.

(11) After replacing the compressor, perform brazing using a wet recommended felt sheet. Use caution not to damage the control box, ACC, compressor cover, or damper. (See Figure 10.)

*Precautions for replacing the compressor
- Be sure to perform non-oxidized brazing.
- Before heating the pipes, wrap the refrigerant circuit components with a wet towel to keep the temperature of the components from rising above 120°C.
- After brazing is done, check that the brazing is done properly and check for leaks before vacuum-drying the pipes.
- Direct the brazing torch flame away from the wiring and sheet metals inside the unit not to damage them.
- Wet felt sheets listed below (or its equivalent), and place them around the areas to be brazed to protect the heat exchanger, pipes, and pipe covers from being damaged from the brazing torch flame.
  Recommended felt sheets: Spatter felt 50CF-11 (5t x 1 m x 1 m) by TRUSCO Nakayama
  Felt sheets that meet the JIS standard (JIS A 1323 type A "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works")

(12) The recommended tightening torque for the compressor fixing bolts is 3.0 N·m. Tighten the bolts using a torque-adjustable tool.

(13) Re-place the compressor covers in the reverse order as they were removed.
* Hold the TH15 wiring using cable ties so that it does not come into contact with thermal insulation 2. (See Figures 3 and 5.)

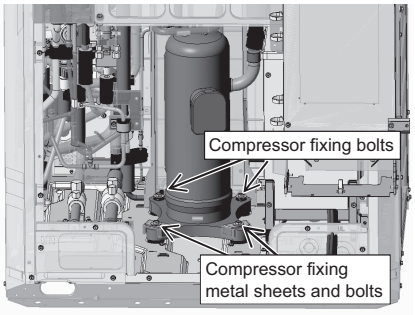


Figure 9

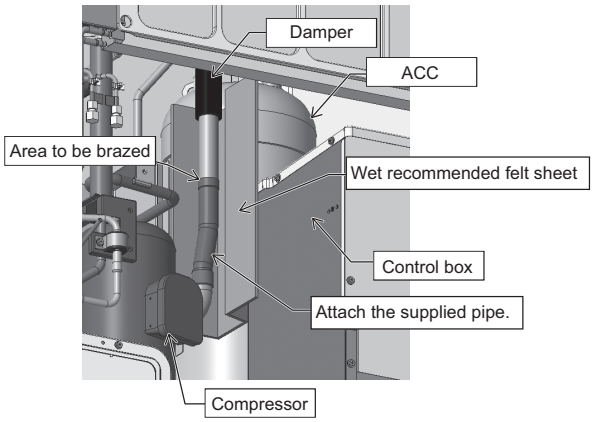


Figure 10

2. P120, P144T/YNU-A

Explained below are the procedures for replacing the compressor. Secure sufficient work space before starting replacement work. (See 8-12-1 Ensuring maintenance space (Preparation for the Maintenance of Refrigerant Circuit Parts).)

(1) Remove the top compressor cover by unscrewing the three screws. (See Figure 1.)
Remove the compressor cover by unhooking the hooks on the back.
(2) Remove the front compressor cover by unscrewing the four screws. (See Figure 2.)
(3) Cut the two cable ties holding TH4 and TH15, and remove the wiring from the rubber bush on the left compressor cover. (See Figure 3.)
(4) Remove the right and left compressor covers by unscrewing the four screws. (See Figure 4.)

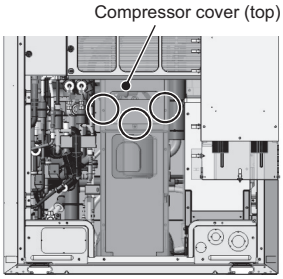


Figure 1

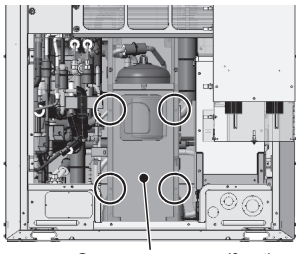


Figure 2

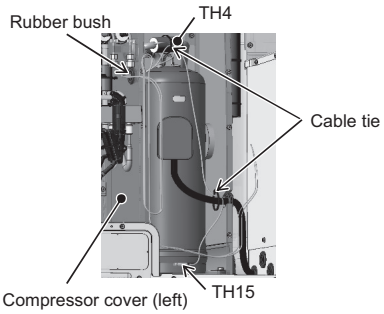


Figure 3

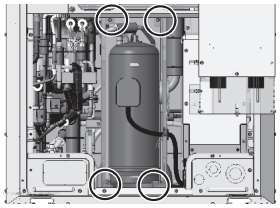


Figure 4

(5) Remove thermal insulation 1 and thermal insulation 2. (See Figure 5.)
(6) Remove the pipe cover and the damper, and cut the suction pipe where indicated in Figure 6.
*When re-placing the pipe cover and the dumper, use the ones with the sizes shown in Figure 6, which are supplied with the replacement compressor.
(7) Remove the compressor discharge pipe by cutting the pipe where indicated in Figure 7 or by removing the braze.

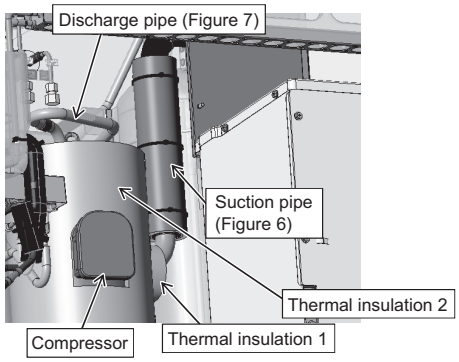


Figure 5

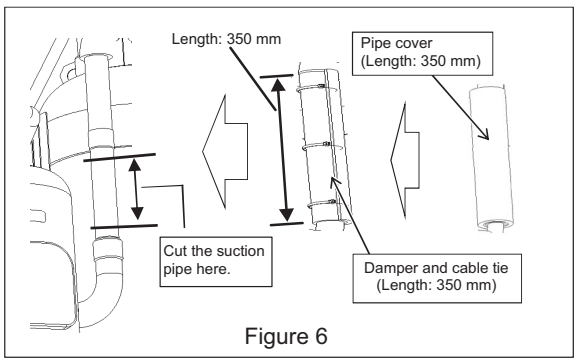


Figure 6

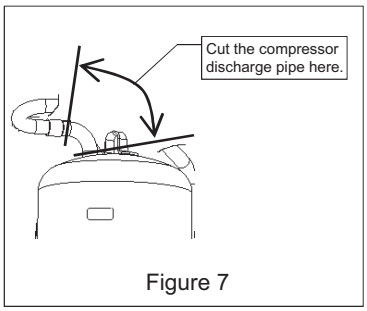


Figure 7

(8) Remove the four bolts holding the compressor down. (See Figure 8.)
The two bolts in the front are also holding down the metal sheets.
(9) Tilting the compressor will cause the refrigerant oil to leak. Seal the pipe where it was cut or removed at the brazed section.
(10) After replacing the compressor, perform brazing using a wet recommended felt sheet. Use caution not to damage the control box, ACC, compressor cover, or damper. (See Figure 9.)

*Precautions for replacing the compressor
· Be sure to perform non-oxidized brazing.
· Before heating the pipes, wrap the refrigerant circuit components with a wet towel to keep the temperature of the components from rising above 120°C.
· After brazing is done, check that the brazing is done properly and check for leaks before vacuum-drying the pipes.
· Direct the brazing torch flame away from the wiring and sheet metals inside the unit not to damage them.
· Wet felt sheets listed below (or its equivalent), and place them around the areas to be brazed to protect the heat exchanger, pipes, and pipe covers from being damaged from the brazing torch flame.
Recommended felt sheets: Spatter felt 50CF-11 (5t x 1 m x 1 m) by TRUSCO Nakayama
Felt sheets that meet the JIS standard (JIS A 1323 type A "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works")

(11) The recommended tightening torque for the compressor fixing bolts is 3.0 N·m. Tighten the bolts using a torque-adjustable tool.
(12) Re-place the compressor covers in the reverse order as they were removed.
* Hold the TH15 wiring using cable ties so that it does not come into contact with thermal insulation 2.
(See Figures 3 and 5.)

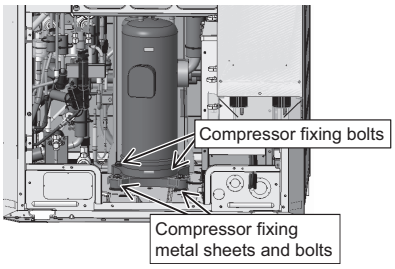


Figure 8

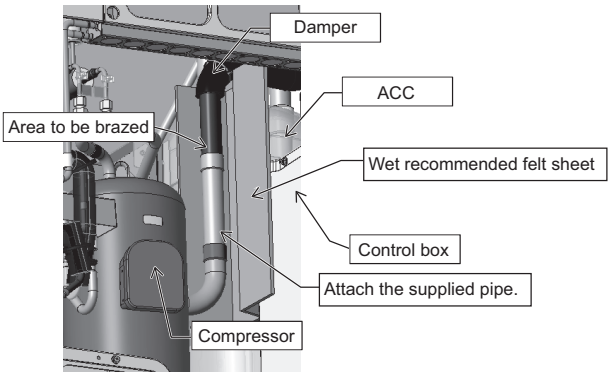


Figure 9

3. EP72, EP96, EP120, EP144T/YNU-A

Explained below are the procedures for replacing the compressor. Secure sufficient work space before starting replacement work. (See 8-12-1 Ensuring maintenance space (Preparation for the Maintenance of Refrigerant Circuit Parts).)

(1) Remove the top compressor cover by unscrewing the three screws. (See Figure 1.)
Remove the compressor cover by unhooking the hooks on the back.
(2) Remove the front compressor cover by unscrewing the four screws. (See Figure 2.)
(3) Cut the two cable ties holding TH4 and TH15, and remove the wiring from the rubber bush on the left compressor cover. (See Figure 3.)
(4) Remove the right and left compressor covers by unscrewing the four screws. (See Figure 4.)
(5) Remove the saddle and the rubber spacers on the compressor by unscrewing the screw. (See Figure 5.)
(6) Remove the cover of the compressor terminal block box, mounting support metal, and the mounting plate by unscrewing the two screws. (See Figure 6.)

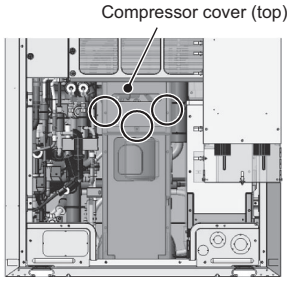


Figure 1

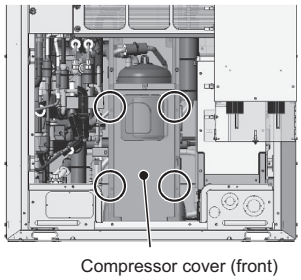


Figure 2

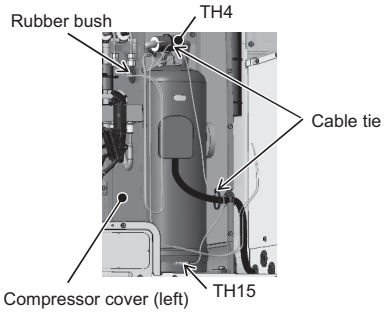


Figure 3

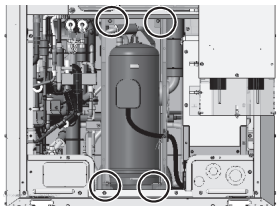


Figure 4

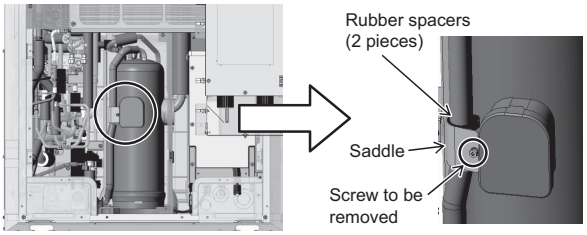


Figure 5

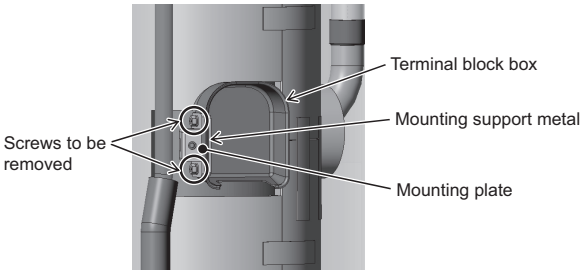


Figure 6

(7) Remove thermal insulation 1 and thermal insulation 2. (See Figure 7.)
(8) Remove the duct from the S module by unscrewing one screw. (See Figure 8.)

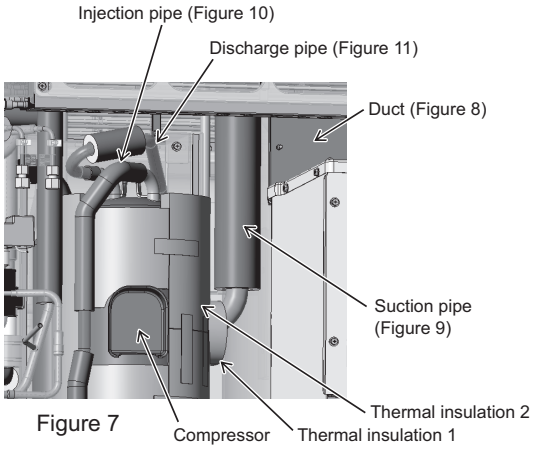


Figure 7

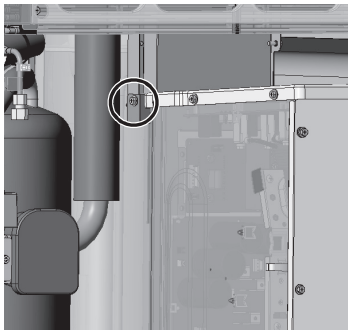


Figure 8

(9) Remove the pipe cover and the damper, and cut the suction pipe where indicated in Figure 9.
(10) Remove the pipe covers, and then remove the braze. (See Figure 10.)
* Do not force the injection pipe to deform.
(11) Remove the compressor discharge pipe by cutting the pipe where indicated in Figure 11 or by removing the braze.

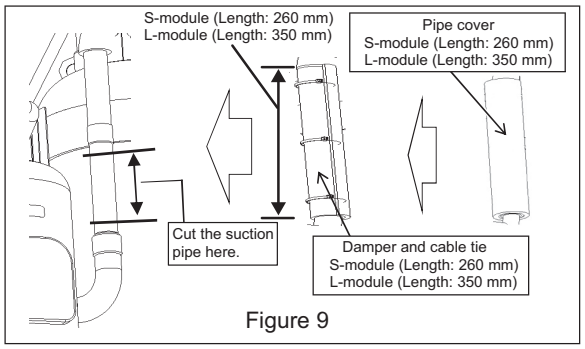


Figure 9

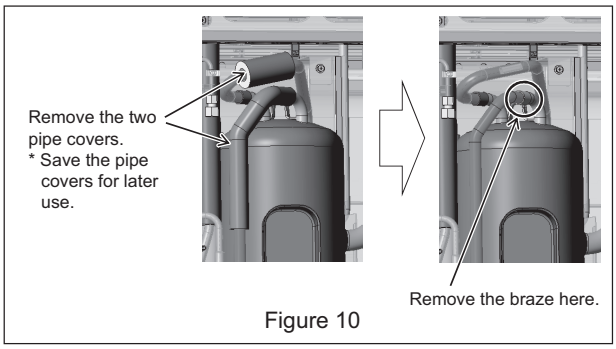


Figure 10

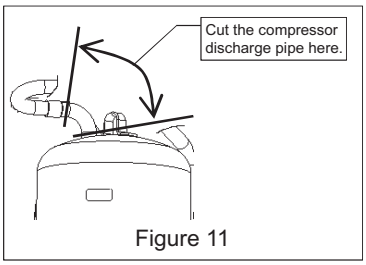


Figure 11

(12) Remove the four bolts holding the compressor down. (See Figure 12.)
The two bolts in the front are also holding down the metal sheets.
(13) Tilting the compressor will cause the refrigerant oil to leak. Seal the pipe where it was cut or removed at the brazed section.
(14) After replacing the compressor, braze the pipes that were removed as they were.
Braze the suction pipe using a wet recommended felt sheet. Use caution not to damage the control box, ACC, compressor cover, or dumper during brazing. (See Figure 13.)

*Precautions for replacing the compressor
· Be sure to perform non-oxidized brazing.
· Before heating the pipes, wrap the refrigerant circuit components with a wet towel to keep the temperature of the components from rising above 120°C.
· After brazing is done, check that the brazing is done properly and check for leaks before vacuum-drying the pipes.
· Direct the brazing torch flame away from the wiring and sheet metals inside the unit not to damage them.
· Wet felt sheets listed below (or its equivalent), and place them around the areas to be brazed to protect the heat exchanger, pipes, and pipe covers from being damaged from the brazing torch flame.
Recommended felt sheets: Spatter felt 50CF-11 (5t x 1 m x 1 m) by TRUSCO Nakayama
Felt sheets that meet the JIS standard (JIS A 1323 type A "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works")

(15) The recommended tightening torque for the compressor fixing bolts is 3.0 N·m. Fasten the bolts using a torque wrench or other tool that can apply the specified torque.
(16) Re-place the compressor covers in the reverse order as they were removed.
*Hold the TH15 wiring in place with the bands to keep the wiring from coming in contact with insulation 2. (See Figures 3 and 7.)

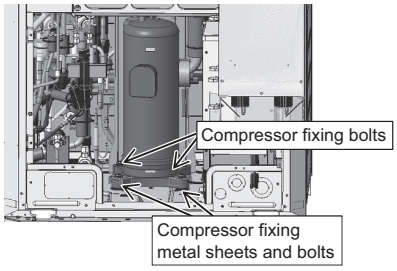


Figure 12

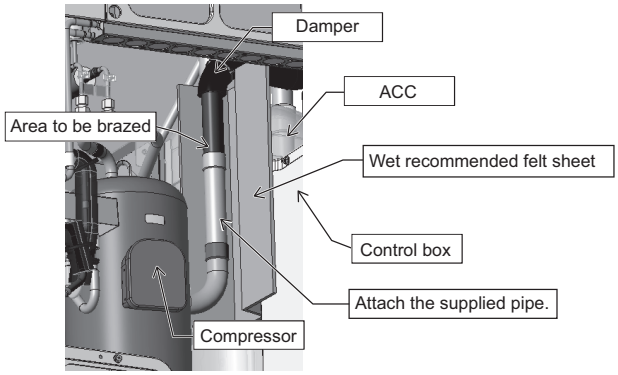


Figure 13

4. P168, EP168, EP192, EP216, EP240T/YNU-A

Compressor replacement procedure is shown below. Follow the instructions in 8-12-1 "Ensuring Maintenance Space (Preparation for the Maintenance of Refrigerant Circuit Parts)" before replacing the compressor.

(1) Remove the compressor cover (front). (3 screws, Figure 1)
(2) Remove the compressor cover (top). (3 screws, Figure 2)
(3) Cut the cable ties holding TH4 and TH15, and remove the wires from the rubber bushing on the compressor cover (right). (2 cable ties, Figure 3)
(4) Remove the compressor cover (right). (1 screw, Figure 4)
(5) Remove the saddle and the rubber spacers from the compressor. (1 screw, Figure 5) (applicable to EP only)
(6) Remove the cover from the terminal block box, and then remove the mounting plate and the mounting support metal. (2 screws, Figure 6) (applicable to EP only)

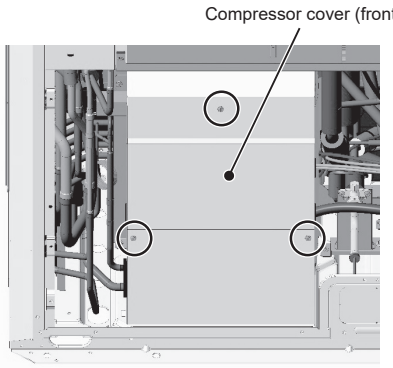


Figure 1

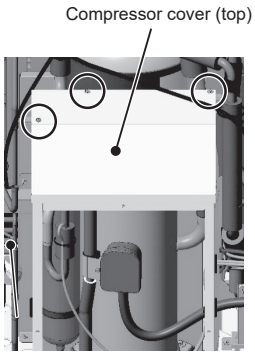


Figure 2

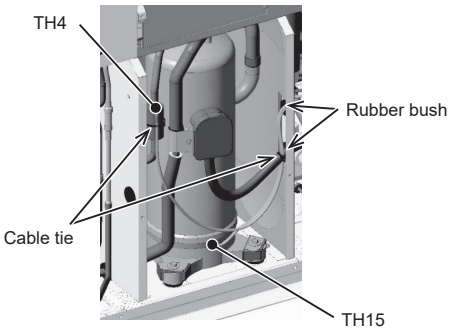


Figure 3

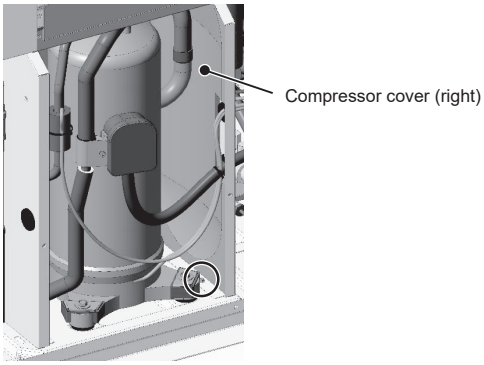


Figure 4

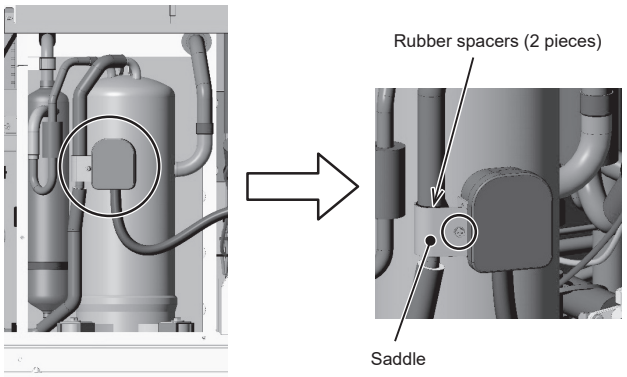


Figure 5

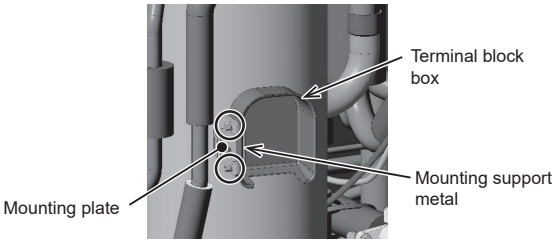


Figure 6

(7) Remove the braze from the suction pipe of the compressor. (Debrazing: 1 place, Figure 7)
Remove the braze by using the recommended felt wet with water, using caution not to damage the compressor cover (rear) or the damper.
(8) Remove the pipe cover, and remove the braze at the position shown. (Debrazing: 1 place, Figure 8) (applicable to EP only)
*Do not force the injection pipe to change its shape.
(9) Cut the discharge pipe of the compressor at the specified location or disconnect the pipe by removing the braze. (Figure 9)

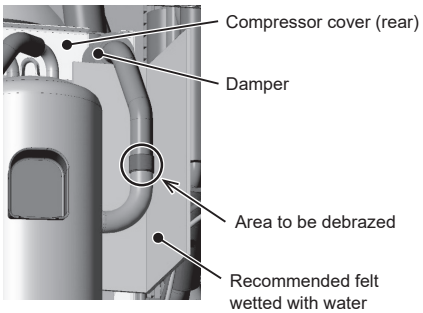


Figure 7

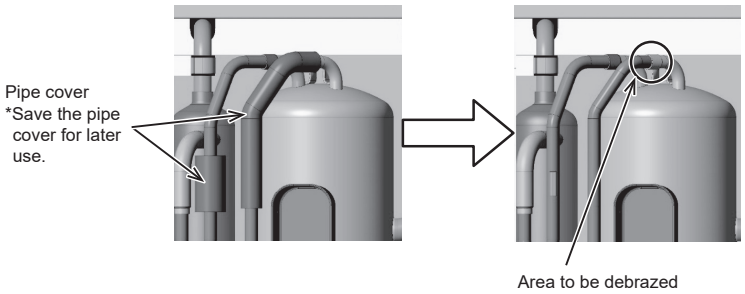


Figure 8

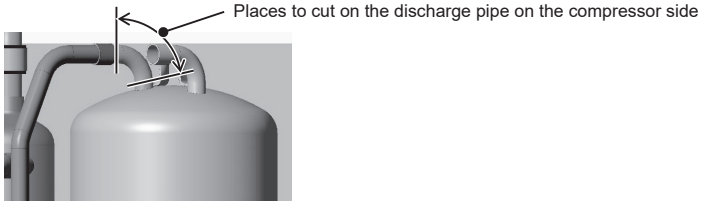


Figure 9

(10) Remove the compressor fixing bolts. (4 bolts, Figure 10)
Compressor fixing sheet metal will be attached to all four bolts.
(11) If the compressor is tilted, refrigerant oil may leak out. Cover the pipe end to keep the refrigerant oil from leaking out.
(12) After replacing the compressor, restore the removed pipes to their original positions.
Remove the braze by using the recommended felt wet with water, using caution not to damage the compressor cover (rear) or the damper.

Precautions for replacing the compressor
- Be sure to perform oxidation-free brazing.
- When heating the piping, wrap a wet towel around the refrigerant circuit parts so that the temperature of the refrigerant circuit parts does not exceed 120°C.
- After brazing, check the condition around the braze, and check that there is no leakage before vacuum drying the pipes.
- Direct the brazing torch flame away from the wiring and sheet metal of the unit.
- To prevent the flame from adversely affecting the heat exchanger, piping on the unit, or pipe covers during brazing, place the following type of felt or its equivalent soaked with water around the areas to be brazed.
  Recommended felt: Sputter Felt 50CF-11 (5 t × 1 m × 1 m) of Trusco Nakayama Co., Ltd.
  Compliant with the Flame Retardancy Test (JIS A 1323) Class A of "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works."

(13) The recommended tightening torque of the compressor fixing bolts is 3.0 N·m. Tighten the bolts with a tool with a torque adjustment function.
(14) Restore the rest of the removed parts to their original positions.

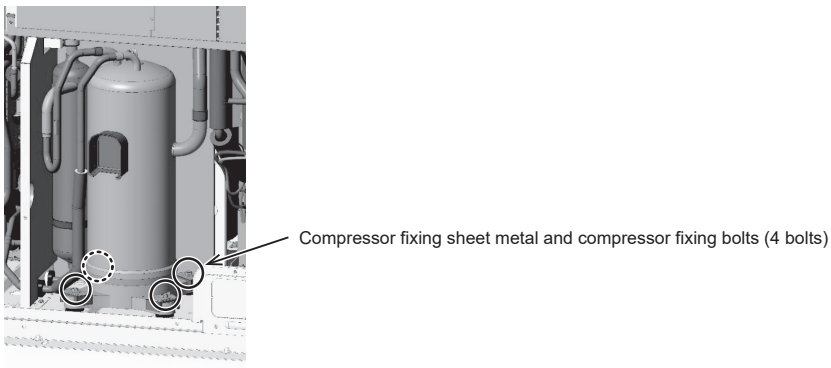
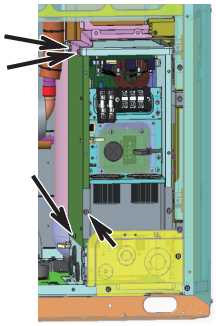


Figure 10

8-12-5 Removal Instructions for the Control Box

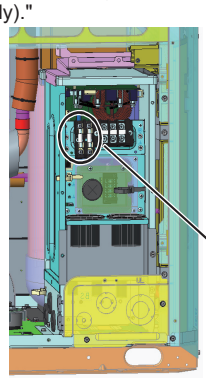
1. S module (INV box)
(1) YNU

Explained below are the procedures for replacing the S module INV BOX. Before replacement, perform the procedures described in "8-12-6 Transformer box replacement instructions 1. S module (YNU models only)."

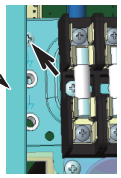


[Figure 1]

[Removing the left outside panel]
Unscrew the four screws indicated with arrows in Figure 1 to remove the left outside panel.



[Figure 2]

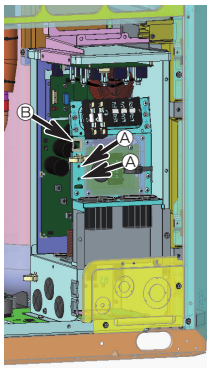


[Figure 2-a]

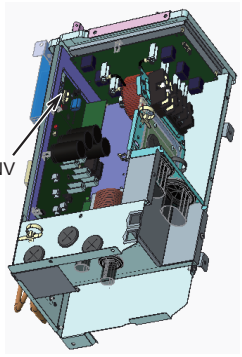
[Removing the left inside panel]
Unscrew the screw indicated with an arrow in Figure 2-a (located to the left of the terminal board) to remove the left panel.

[Removing the ground wire]
Remove the two ground wires (screwed on) indicated by Arrow Ⓐ in Figure 3-a, and unsaddle them from the saddle indicated by Arrow Ⓑ.

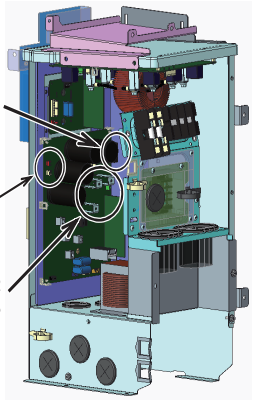
[Removing the wiring]
Remove the following connectors and the screw terminals.
(See Figures 3-b and 3-c.)
CNINV on the FAN INV board
CN-P, CN-N, FT-P1, FT-P2, SC-L1, SC-L2, and SC-L3 on the INV35 board



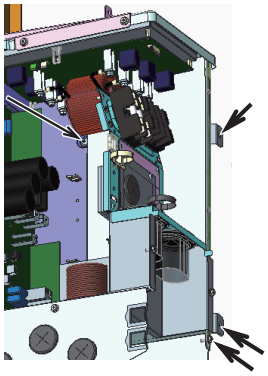
[Figure 3-a]



[Figure 3-b]

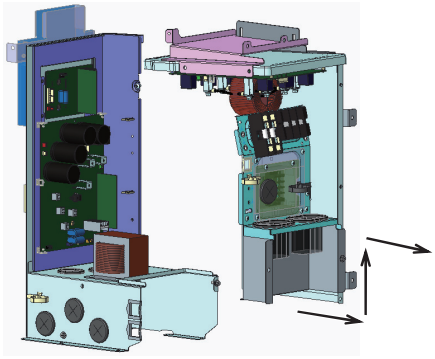


[Figure 3-c]

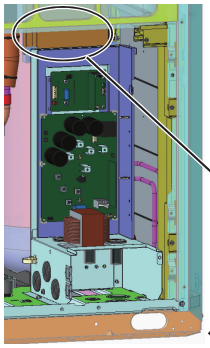


[Figure 4-a]

[Removing the terminal board and top panel (Noise Filter board)]
Unscrew the four screws indicated with arrows in Figure 4-a. Pull the right panel and top panel forward. Lift the back end of the top panel and pull the terminal board and top panel (Noise Filter board) together to remove them.
(See Figure 4-b.)



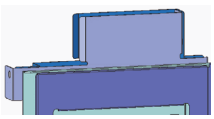
[Figure 4-b]



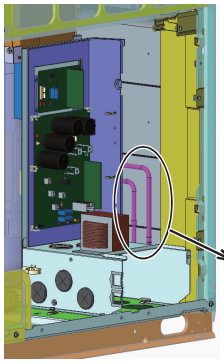
[Figure 5]

[Removing the duct]
Unscrew the screw indicated with arrows in Figure 5-a, and pull up the duct to remove it.
(Figure 5-b shows the unit after the duct was removed.)

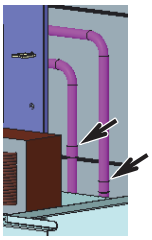
[Figure 5-a]



[Figure 5-b]



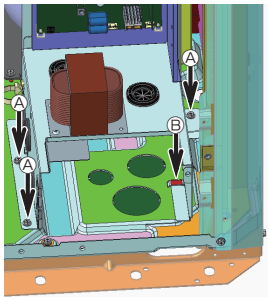
[Figure 6]



[Figure 6-a]

[Removing refrigerant cooling pipes]
Remove the braze from the two areas indicated by the arrows in Figure 6-a.
Before removing the pipes, collect the refrigerant.
Protect the surrounding components from the brazing torch flame as necessary.

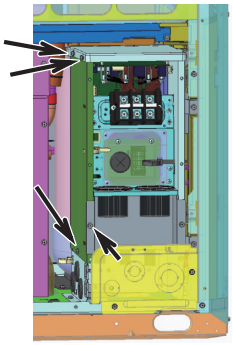
[Removing the remaining relevant components]
Unscrew the three screws indicated with arrows Ⓐ in Figure 7.
Pull the unscrewed part forward, and unhook the part indicated with Arrow Ⓑ to remove the part from the base of the unit.



[Figure 7]

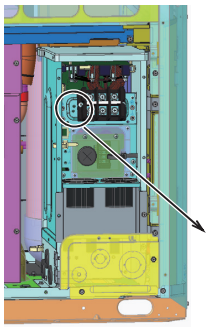
*Notes on replacing the control box (when replacing the refrigerant cooling pipes)
- Be sure to perform non-oxidized brazing.
- Before heating the pipes, wrap the refrigerant circuit components with a wet towel to keep the temperature of the components from rising above 120°C.
- After brazing is done, check that the brazing is done properly and check for leaks before vacuum-drying the pipes.
- Direct the brazing torch flame away from the wiring and sheet metals inside the unit not to damage them.
- Wet felt sheets listed below (or its equivalent), and place them around the areas to be brazed to protect the heat exchanger, pipes, and pipe covers from being damaged from the brazing torch flame.
  Recommended felt sheets: Spatter felt 50CF-11 (5t x 1 m x 1 m) by TRUSCO Nakayama
  Felt sheets that meet the JIS standard (JIS A 1323 type A "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works")

(2) TNU

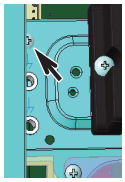


[Figure 1]

[Removing the left outside panel]
Unscrew the four screws indicated with arrows in Figure 1 to remove the left outside panel.



[Figure 2]

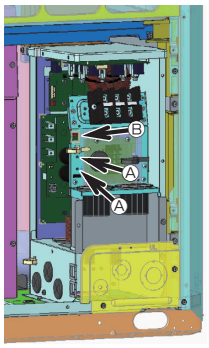


[Figure 2-a]

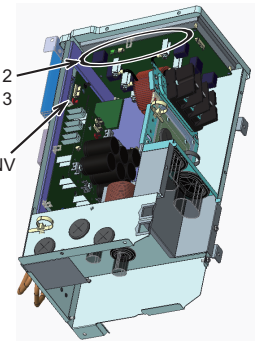
[Removing the left inside panel]
Unscrew the screw indicated with an arrow in Figure 2-a (located to the left of the terminal board) to remove the left panel.

[Removing the ground wire]
Remove the two ground wires (screwed on) indicated by Arrow Ⓐ in Figure 3-a, and unsaddle them from the saddle indicated by Arrow Ⓑ.

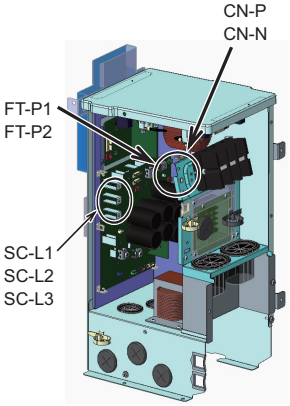
[Removing the wiring]
Remove the following connectors and the screw terminals.
(See Figures 3-b and 3-c.)
CN012, CN013, and CN11 on the Noise Filter board
CNINV on the FAN INV board
SC-L1, SC-L2, and SC-L3 on the INV38 board
CN-P, CN-N, FT-P1, and FT-P2 on the CAP07 board



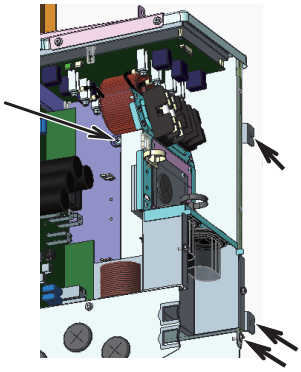
[Figure 3-a]



[Figure 3-b]

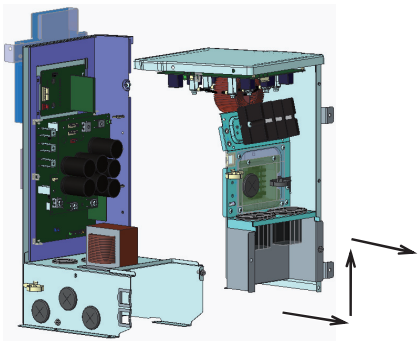


[Figure 3-c]

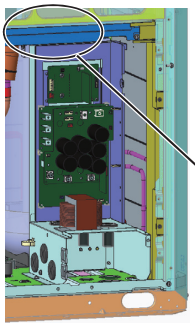


[Figure 4-a]

[Removing the terminal board and top panel (Noise Filter board)]
Unscrew the four screws indicated with arrows in Figure 4-a. Pull the right panel and top panel forward. Lift the back end of the top panel and pull the terminal board and top panel (Noise Filter board) together to remove them.
(See Figure 4-b.)



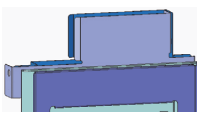
[Figure 4-b]



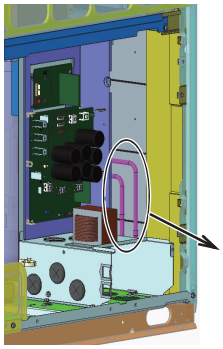
[Figure 5]

[Removing the duct]
Unscrew the screw indicated with arrows in Figure 5-a, and pull up the duct to remove it.
(Figure 5-b shows the unit after the duct was removed.)

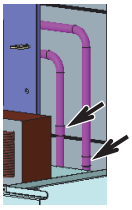
[Figure 5-a]



[Figure 5-b]



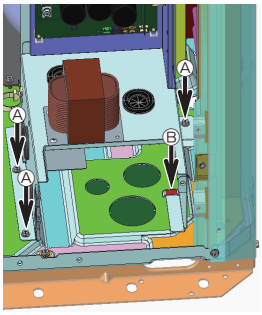
[Figure 6]



[Figure 6-a]

[Removing refrigerant cooling pipes]
Remove the braze from the two areas indicated by the arrows in Figure 6-a.
Before removing the pipes, collect the refrigerant.
Protect the surrounding components from the brazing torch flame as necessary.

[Removing the remaining relevant components]
Unscrew the three screws indicated with arrows Ⓐ in Figure 7.
Pull the unscrewed part forward, and unhook the part indicated with Arrow Ⓑ to remove the part from the base of the unit.



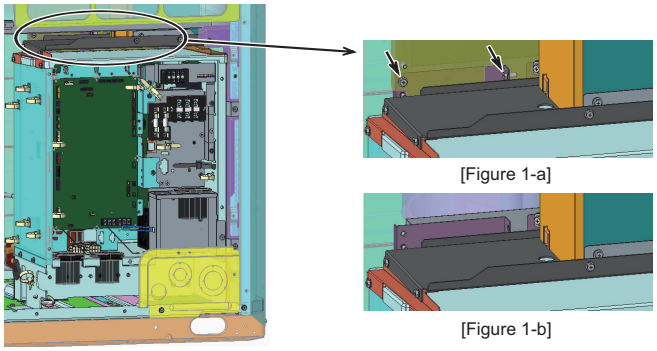
[Figure 7]

*Notes on replacing the control box (when replacing the refrigerant cooling pipes)
- Be sure to perform non-oxidized brazing.
- Before heating the pipes, wrap the refrigerant circuit components with a wet towel to keep the temperature of the components from rising above 120°C.
- After brazing is done, check that the brazing is done properly and check for leaks before vacuum-drying the pipes.
- Direct the brazing torch flame away from the wiring and sheet metals inside the unit not to damage them.
- Wet felt sheets listed below (or its equivalent), and place them around the areas to be brazed to protect the heat exchanger, pipes, and pipe covers from being damaged from the brazing torch flame.
  Recommended felt sheets: Spatter felt 50CF-11 (5t x 1 m x 1 m) by TRUSCO Nakayama
  Felt sheets that meet the JIS standard (JIS A 1323 type A "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works")

2. L/XL/EXL module
(1) YNU

Explained below are the procedures for replacing the L, XL, and EXL modules control boxes. Before replacement, perform the procedures described in "8-12-6 Transformer box replacement instructions 2. L/XL/EXL module (YNU models only)."

[Removing the duct]
Unscrew the two screws indicated with arrows in Figure 1-a, and pull up the duct to remove it.
(Figure 1-b shows the unit after the duct was removed.)
*The same procedures apply to the L, XL and EXL modules.

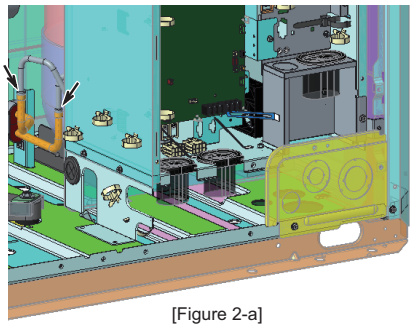


[Figure 1-a]

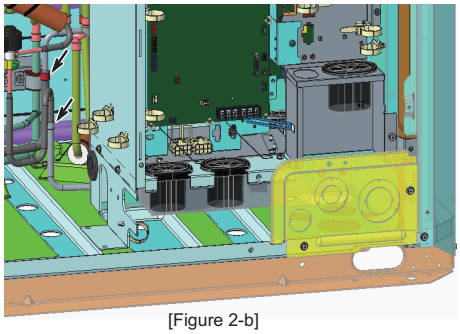
[Figure 1-b]

[Figure 1]

[Removing the refrigerant cooling pipes]
Remove the braze at the two areas indicated with arrows in Figure 2-a(L module), Figure 2-b (XL and EXL modules).
Before removing the pipes, collect the refrigerant.
Refer to "Notes on replacing refrigerant circuit components."

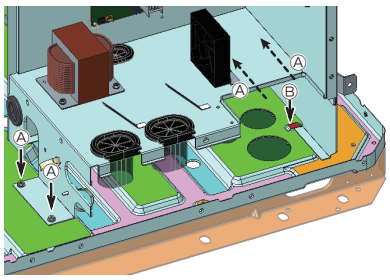


[Figure 2-a]

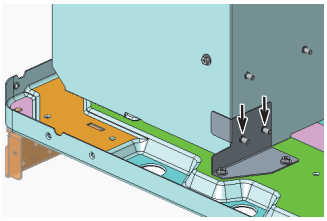


[Figure 2-b]

[Removing the remaining relevant components]
Unscrew the four screws indicated with arrows Ⓐ in Figure 3.
The arrow indicated with dotted lines is located where indicated in Figure 3-a.
Pull the unscrewed part forward, and unhook the part indicated with Arrow Ⓑ to remove the part from the base of the unit.

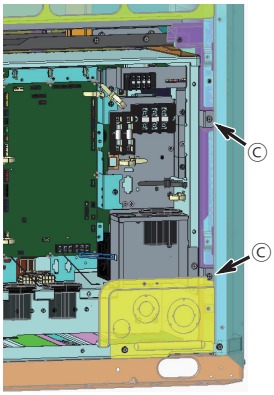


[Figure 3]



[Figure 3-a]

To remove the rest of the components from the pillar, unscrew the two screws indicated with Arrow Ⓒ in Figure 4.
*The same procedures apply to the L, XL and EXL modules.

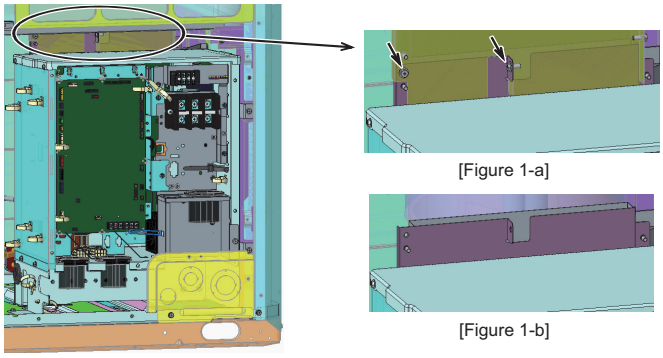


[Figure 4]

*Notes on replacing the control box (when replacing the refrigerant cooling pipes)
- Be sure to perform non-oxidized brazing.
- Before heating the pipes, wrap the refrigerant circuit components with a wet towel to keep the temperature of the components from rising above 120°C.
- After brazing is done, check that the brazing is done properly and check for leaks before vacuum-drying the pipes.
- Direct the brazing torch flame away from the wiring and sheet metals inside the unit not to damage them.
- Wet felt sheets listed below (or its equivalent), and place them around the areas to be brazed to protect the heat exchanger, pipes, and pipe covers from being damaged from the brazing torch flame.
  Recommended felt sheets: Spatter felt 50CF-11 (5t x 1 m x 1 m) by TRUSCO Nakayama
  Felt sheets that meet the JIS standard (JIS A 1323 type A "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works")

(2) TNU

[Removing the duct]
Unscrew the two screws indicated with arrows in Figure 1-a, and pull up the duct to remove it.
(Figure 1-b shows the unit after the duct was removed.)
*The same procedures apply to the L, XL, and EXL modules.

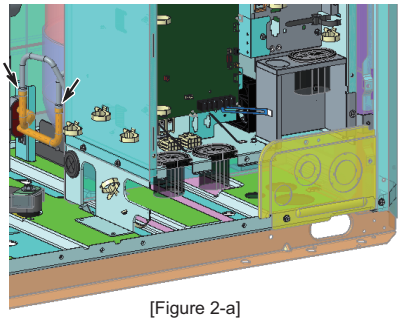


[Figure 1]

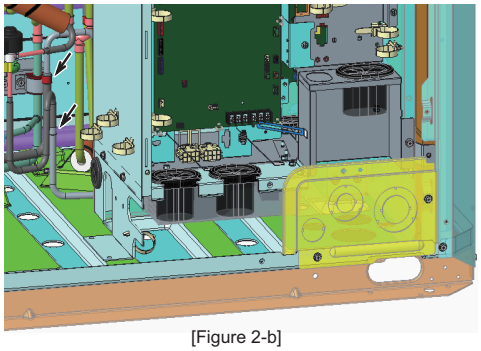
[Figure 1-a]

[Figure 1-b]

[Removing the refrigerant cooling pipes]
Remove the braze at the two areas indicated with arrows in Figure 2-a(L module), Figure 2-b (XL and EXL modules).
Before removing the pipes, collect the refrigerant.
Refer to "Notes on replacing refrigerant circuit components."

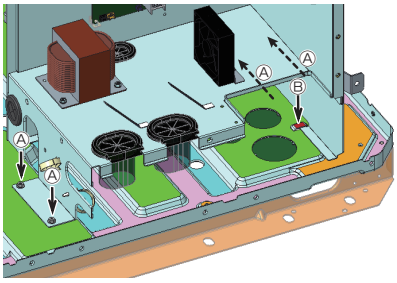


[Figure 2-a]

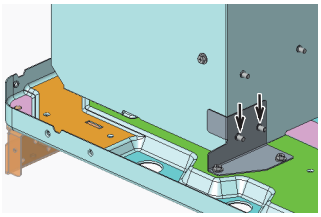


[Figure 2-b]

[Removing the remaining relevant components]
Unscrew the four screws indicated with arrows Ⓐ in Figure 3.
The arrow indicated with dotted lines is located where indicated in Figure 3-a.
Pull the unscrewed part forward, and unhook the part indicated with Arrow Ⓑ to remove the part from the base of the unit.

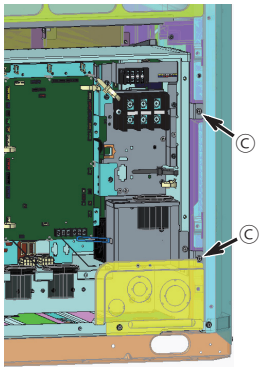


[Figure 3]



[Figure 3-a]

To remove the rest of the components from the pillar, unscrew the two screws indicated with Arrow Ⓒ in Figure 4.
*The same procedures apply to the L, XL, and EXL modules.



[Figure 4]

*Notes on replacing the control box (when replacing the refrigerant cooling pipes)
- Be sure to perform non-oxidized brazing.
- Before heating the pipes, wrap the refrigerant circuit components with a wet towel to keep the temperature of the components from rising above 120°C.
- After brazing is done, check that the brazing is done properly and check for leaks before vacuum-drying the pipes.
- Direct the brazing torch flame away from the wiring and sheet metals inside the unit not to damage them.
- Wet felt sheets listed below (or its equivalent), and place them around the areas to be brazed to protect the heat exchanger, pipes, and pipe covers from being damaged from the brazing torch flame.
  Recommended felt sheets: Spatter felt 50CF-11 (5t x 1 m x 1 m) by TRUSCO Nakayama
  Felt sheets that meet the JIS standard (JIS A 1323 type A "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works")

8-12-6 Transformer box replacement instructions

1. S module (YNU models only)

(1) Ensure there is adequate work space. (See 8-12-1.)
(2) Unscrew the screw on the near side of the transformer box. (2 screws as shown in Figure 1.)
(3) Remove the inverter control box cover. (2 screws as shown in Figure 1.)
(4) Disconnect the transformer box wiring connectors and the grounding wire.
(2 main control box connectors, 1 inverter control box connector, and 1 grounding screw as shown in Figure 2.)
(5) Hook the main control box on the fin guard, and then remove the top compressor cover. (3 screws as shown in Figure 3.)
(6) Remove the compressor cover (front). (4 screws as shown in Figure 4.)

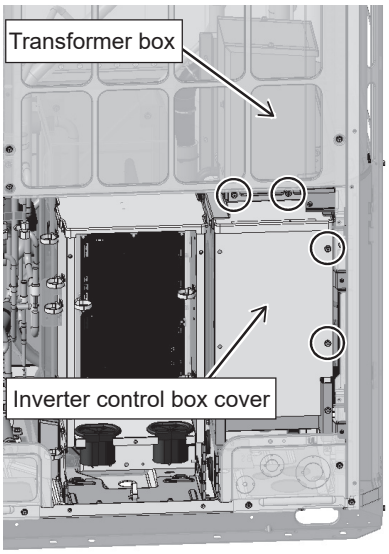
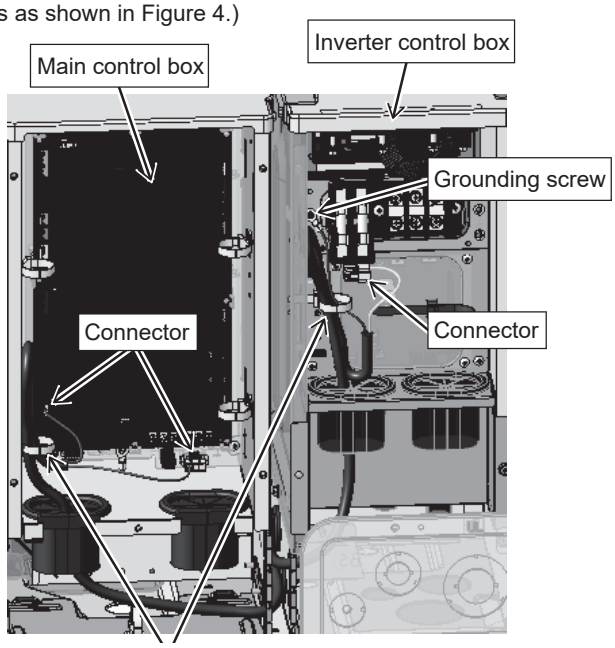


Figure 1



Unstrap the cable strap.

Figure 2

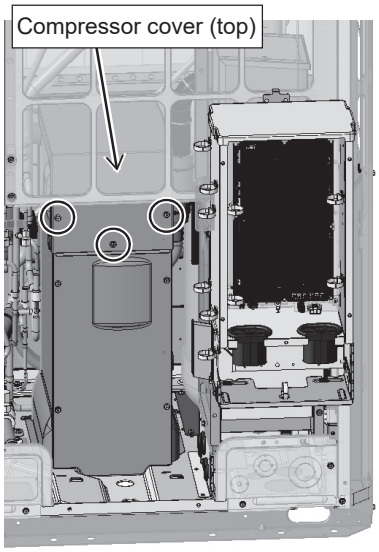


Figure 3

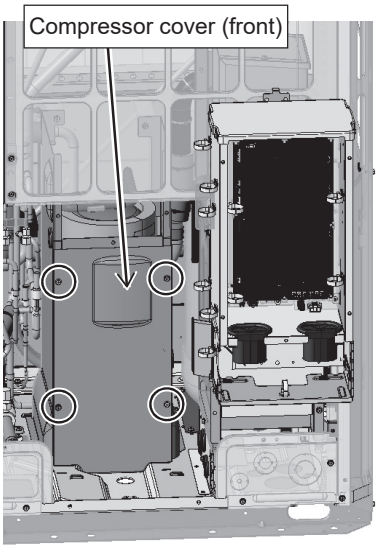


Figure 4

(7) Remove the compressor cover (right). (2 screws and 1 tab as shown in Figure 5.)
(8) Unscrew the screw on the far side of the transformer box. (1 screw as shown in Figure 6.)
(9) Remove the transformer box as shown in the figure. (Figure 7)
*Use caution not to damage the heat exchanger fins or pipes and wires in the adjacent areas. (The transformer box weighs approximately 14 kg (494 oz).)

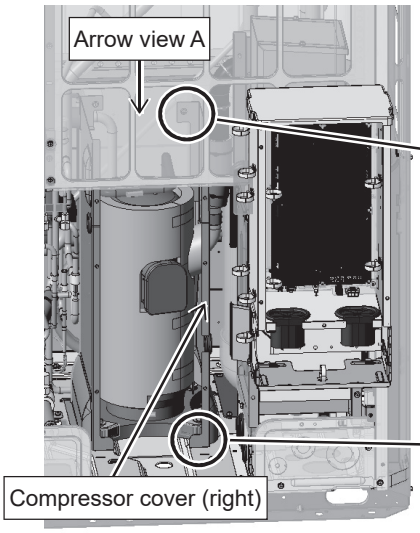
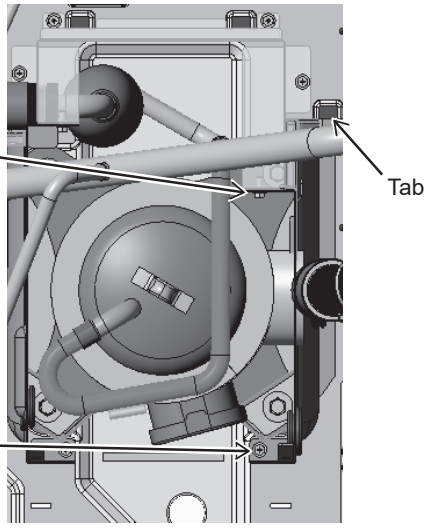


Figure 5



Arrow view A

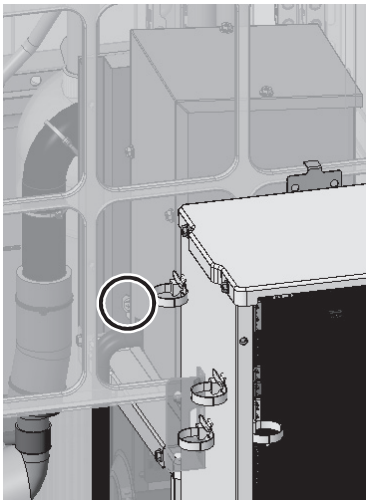


Figure 6

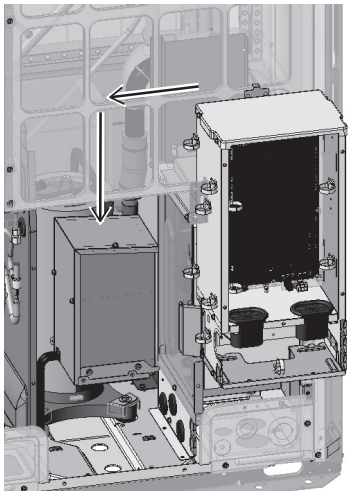


Figure 7

2. L/XL/EXL module (YNU models only)

(1) Ensure there is adequate work space. (See 8-12-1.)
(2) Remove the control box cover. (5 screws as shown in Figure 1.)
(3) Unstrap the cable straps holding the transformer box wiring, and disconnect the wiring connectors and the grounding wire. (5 cable straps, 3 connectors, and 1 grounding screw as shown in Figure 2.)

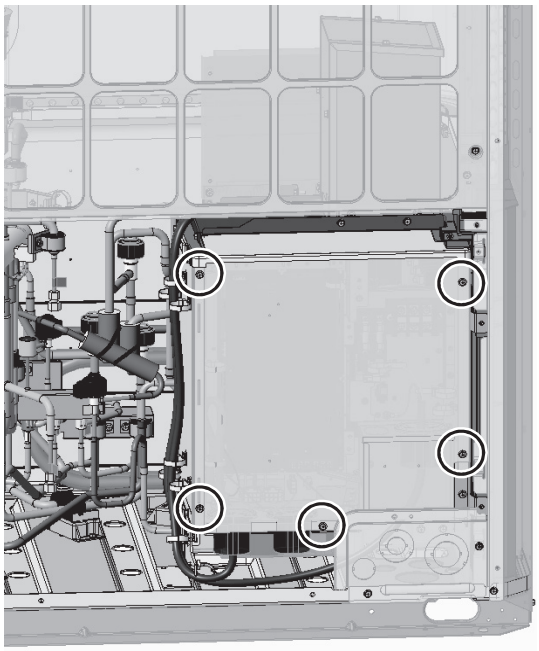


Figure 1

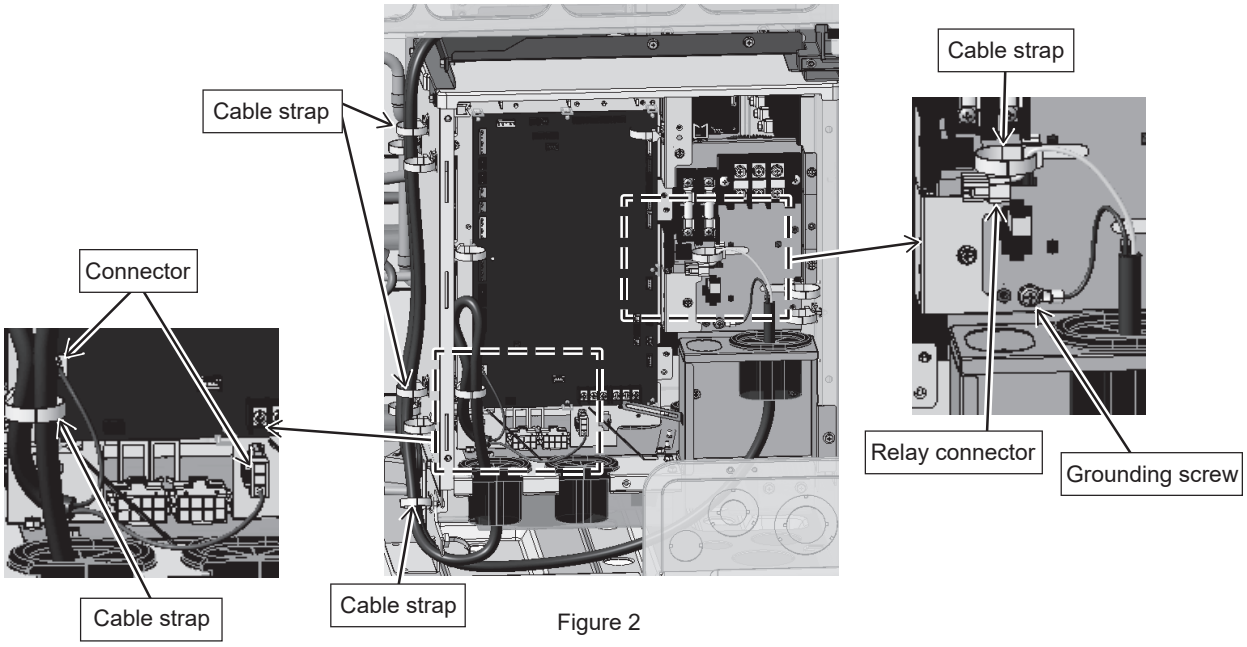


Figure 2

(4) Remove the left control box panel (*applicable to the XL and EXL modules only). (4 screws as shown in Figure 3.)
(5) Unscrew the screw holding the transformer box, and move the box as shown in the figure. (3 screws as shown in Figure 4.)
(6) Rotate the transformer box 90 degrees to remove it (*applicable to the XL and EXL modules only). (Figure 5)

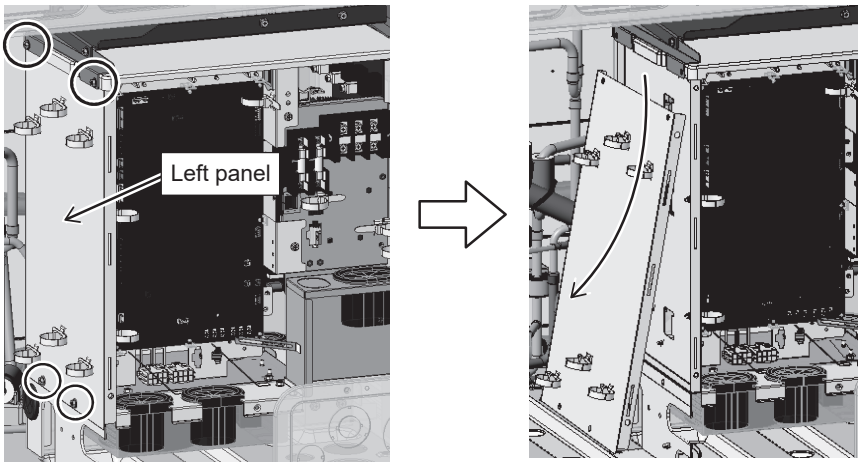


Figure 3

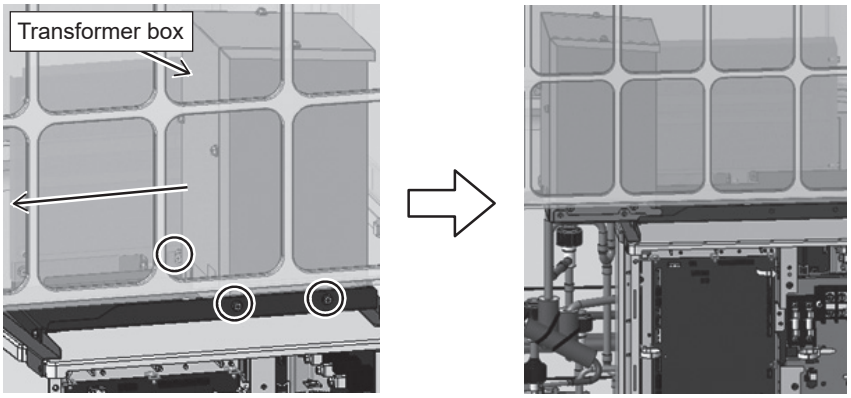


Figure 4

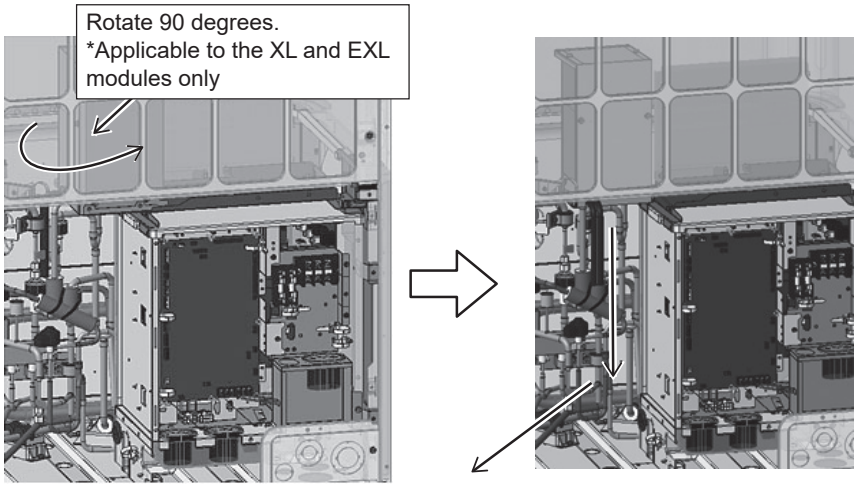


Figure 5

(7) Before placing the transformer box, set the cardboard support (*applicable to the XL and EXL modules only). (Figure 6)
(8) Temporarily place the transformer box on the cardboard support (*applicable to the XL and EXL modules only). (Figure 7)
(9) Lift the transformer box to the position as shown in the figure, rotate the transformer box 90 degrees (*applicable to the XL and EXL modules only), move the box to the designated position, and screw it down. (3 screw as shown in Figure 8.)
*Use caution not to damage the heat exchanger fins or pipes and wires in the adjacent areas when replacing the transformer box. (The transformer box weighs approximately 14 kg (494 oz).)

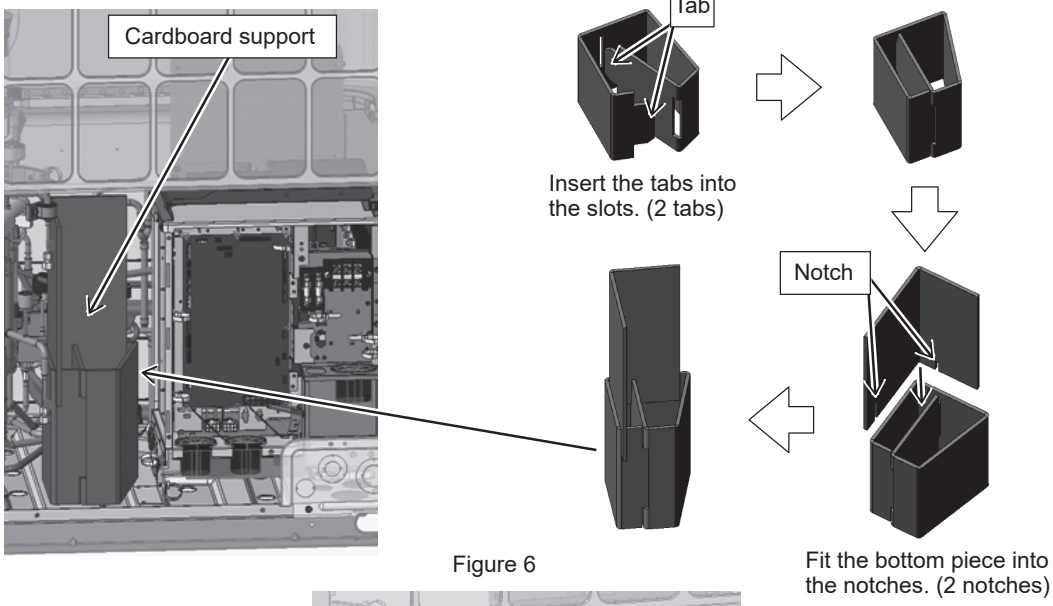


Figure 6

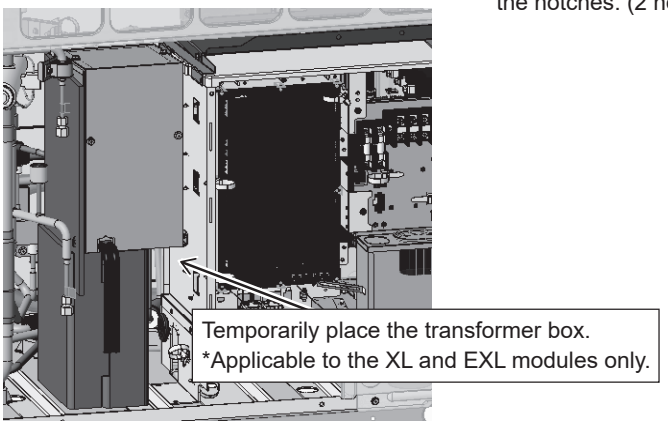


Figure 7

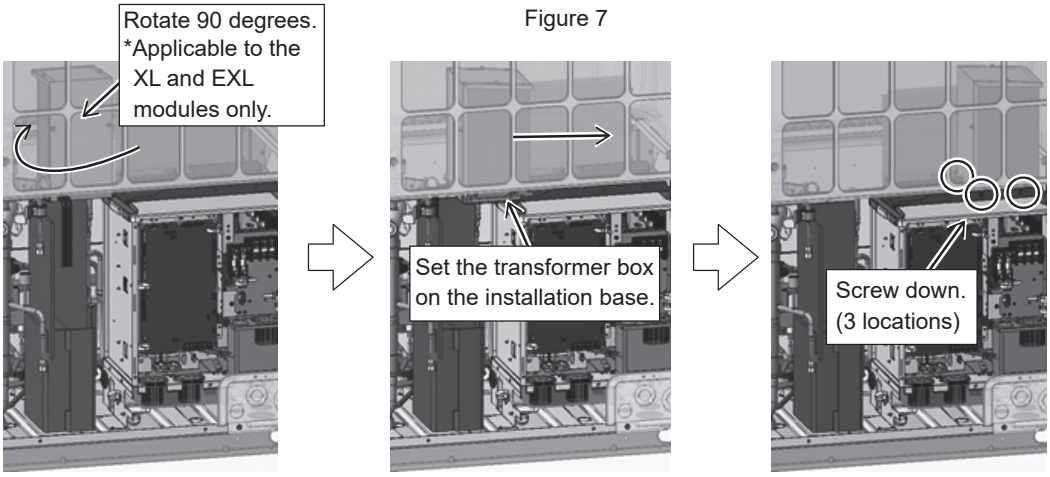


Figure 8

8-12-7 Maintenance Procedure for the Drain Pan

1. S-module

[Drain pan removal procedure]
(1) Remove the front panel from the unit by unscrewing the eight screws. (See Figure 1.)
(2) Cut the cable tie, unscrew the screw, and pull out the drain pan cover toward the right. (See Figure 3.)
(3) Remove the two rod holders holding the check joints in place, using a wrench. (See Figure 4.)
(4) Remove the drain pan by unscrewing the two screws. (See Figure 5.)
(5) Clean the drain pan and the drain pan cover. (See Figure 6.)
Remove dust and dirt from the drain groove.

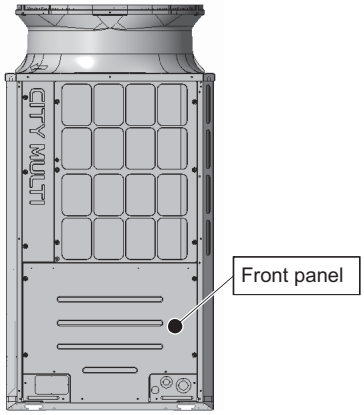


Figure 1

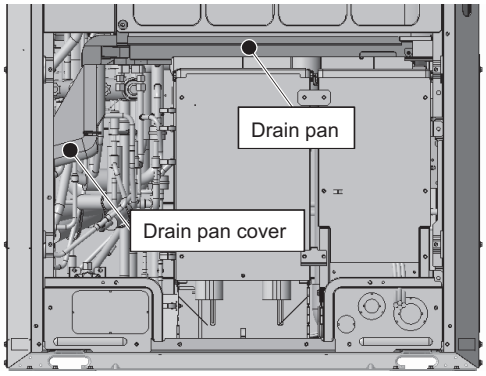


Figure 2

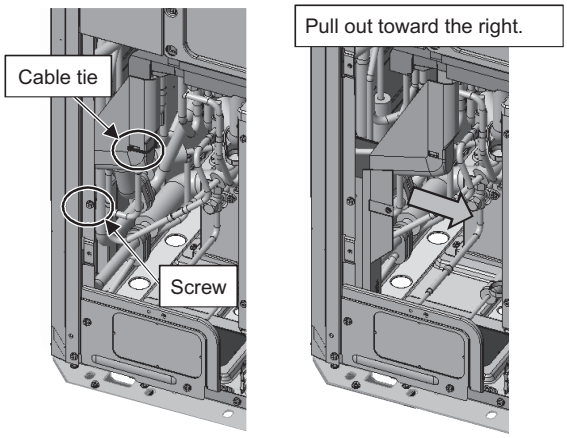


Figure 3

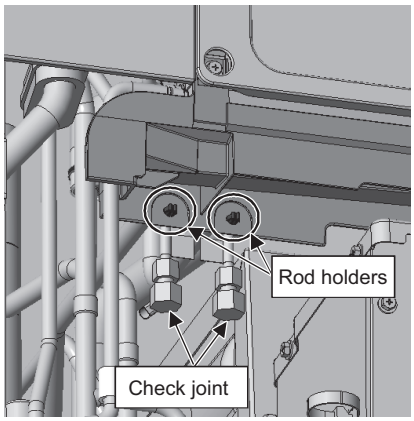


Figure 4

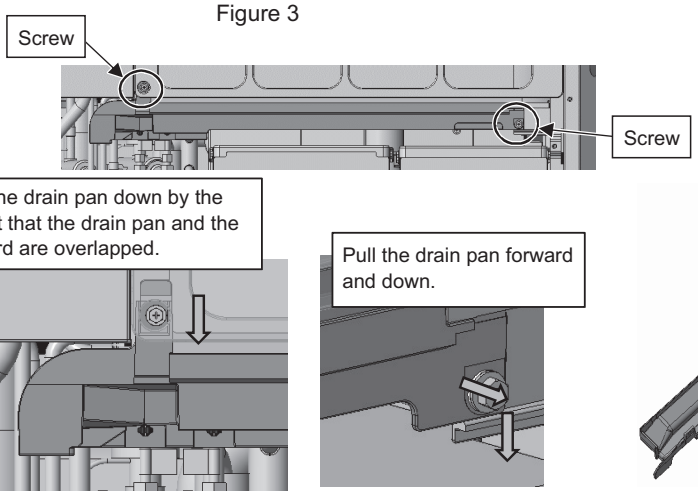


Figure 5

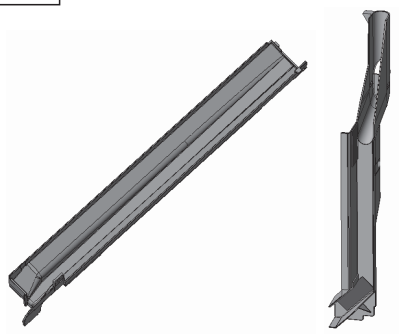


Figure 6

[Drain pan mounting procedure]

*Reuse the drain pan mounting screws that were removed from the replaced drain pan. (M5 x 16 mm with a nylon washer)

(1) Screw down the drain pan with two screws. (See Figure 7.)

(2) Hold the check joints to the drain pan with two rod holders. (See Figure 8.)

(3) Make sure that the silicon tube is properly placed on the defrost pipe, and then place the drain pan cover. Place the drain pan cover along the defrost pipe, and fit it to the drain pan. (See Figures 9 and 10.)

(4) Thread a cable tie through the rectangle hole on the screwed-down drain cover, and hold the silicon tube and the defrost pipe together in place. (See Figure 11.)

(5) Screw down the front panel with eight screws. (See Figure 12.)

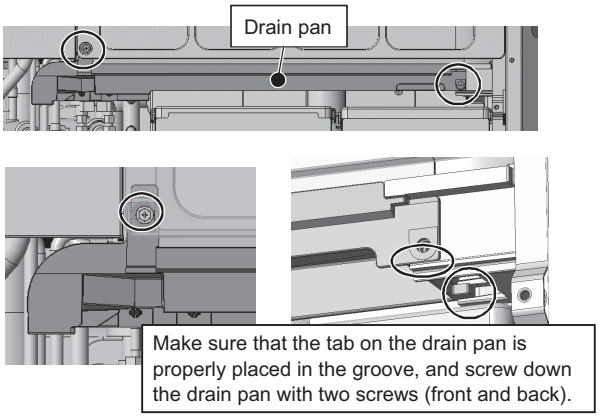


Figure 7

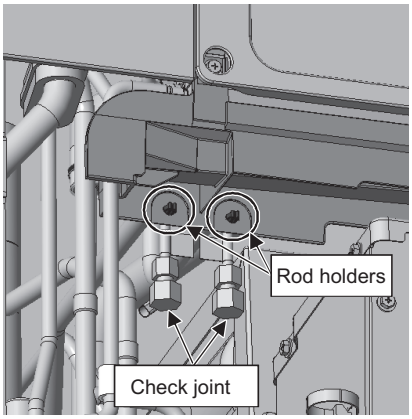


Figure 8

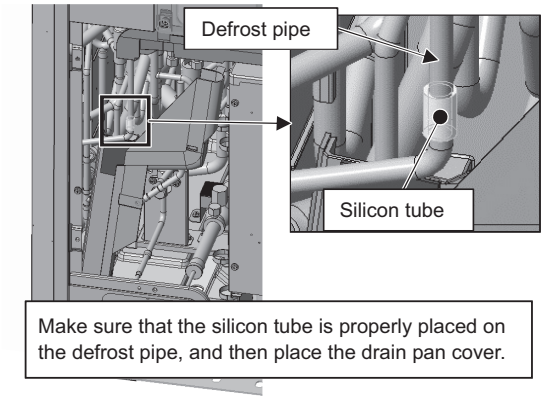


Figure 9

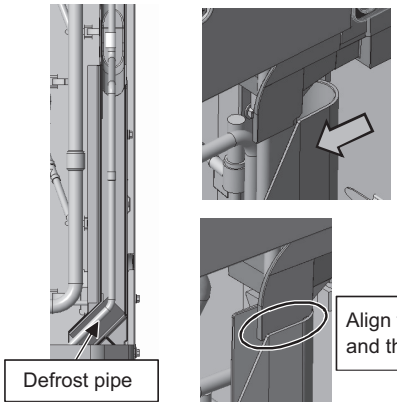


Figure 10

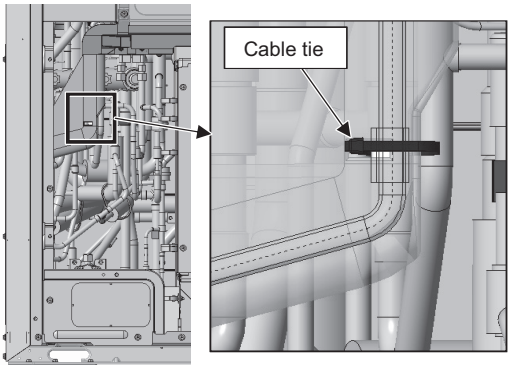


Figure 11

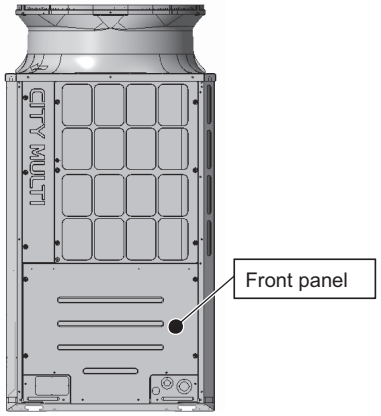


Figure 12

2. L-module

[Drain pan removal procedure]
(1) Remove the front panel from the unit by unscrewing the 14 screws. (See Figure 1.)
(2) Remove the fin guard and the center pillar by unscrewing the 11 screws shown in Figure 2.
Remove the cable straps from the center pillar. (See Figure 2.)
(3) Cut the cable tie, unscrew the screw, and pull the drain cover out to the right. (See Figure 3.)
(4) Remove the two rod holders holding the check joints in place, using a wrench. (See Figure 4.)
(5) Remove the drain pan by unscrewing the two screws. (See Figure 5.)
(6) Clean the drain pan and the drain pan cover. (See Figure 6.)
Remove dust and dirt from the drain groove.

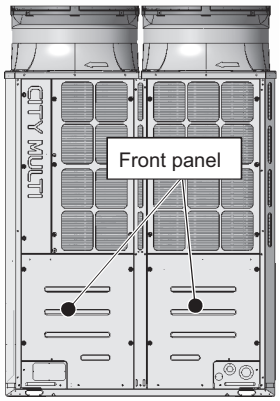


Figure 1

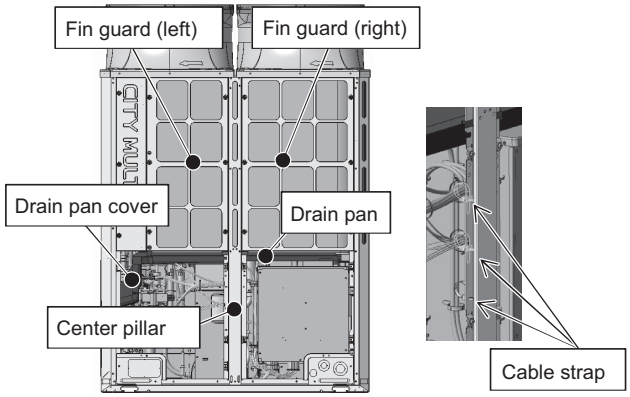
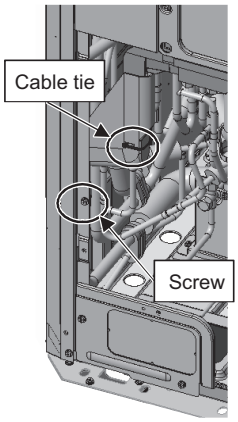


Figure 2



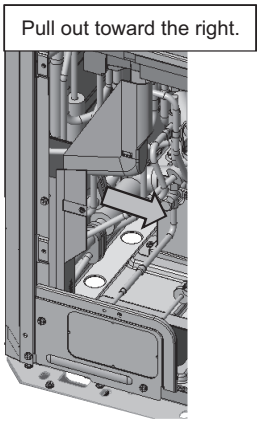


Figure 3

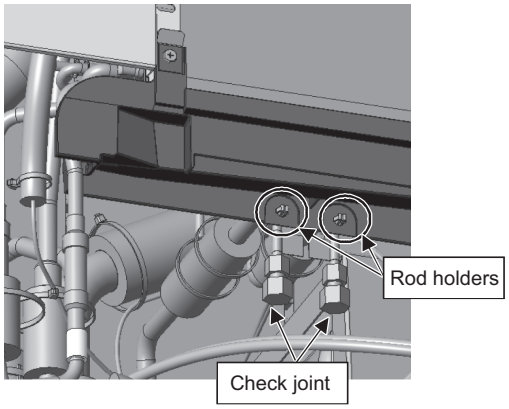
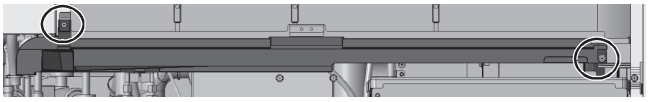


Figure 4



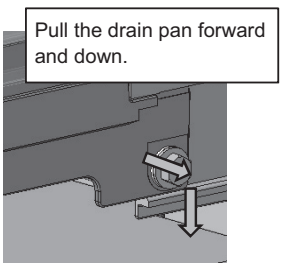


Figure 5

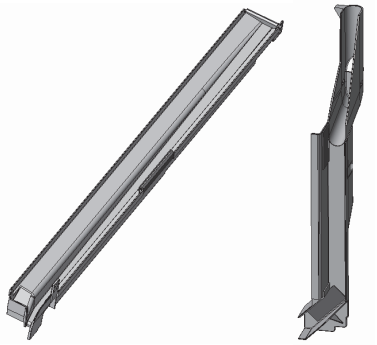


Figure 6

[Drain pan mounting procedure]

*Reuse the drain pan mounting screws from the replaced drain pan. (M5 x 16 mm with a nylon washer)

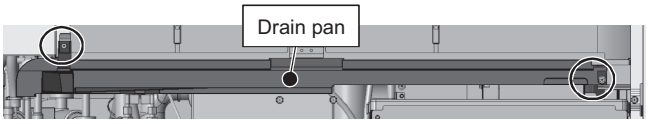
(1) Screw down the drain pan with two screws. (See Figure 7.)

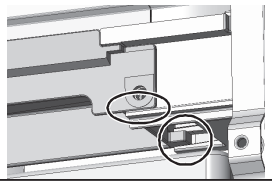
(2) Hold the check joints to the drain pan with two rod holders. (See Figure 8.)

(3) Make sure that the silicon tube is properly placed on the defrost pipe, and then place the drain pan cover. Place the drain pan cover along the defrost pipe, and fit it to the drain pan. (See Figures 9 and 10.)

(4) Thread a cable tie through the rectangle hole on the screwed-down drain cover, and hold the silicon tube and the defrost pipe together in place. (See Figure 11.)

(5) Screw down the fin guards, center pillar, and front panel with 14 screws. (See Figure 12.)





Make sure that the tab on the drain pan is properly placed in the groove, and screw down the drain pan with two screws (front and back).

Figure 7

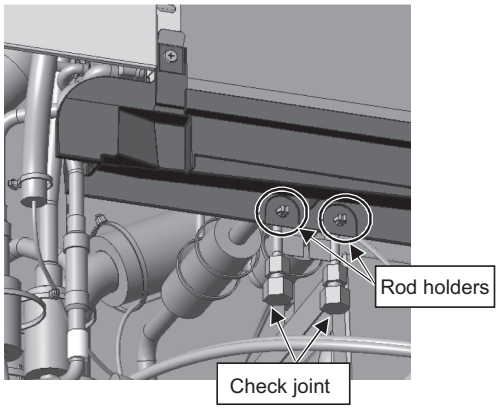
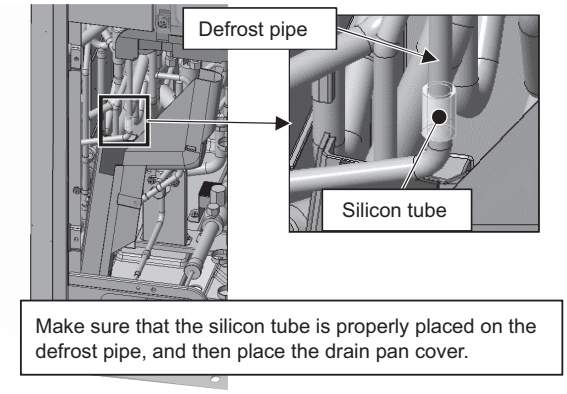


Figure 8



Make sure that the silicon tube is properly placed on the defrost pipe, and then place the drain pan cover.

Figure 9

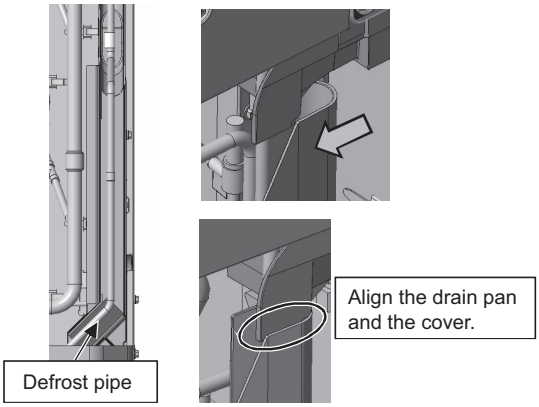


Figure 10

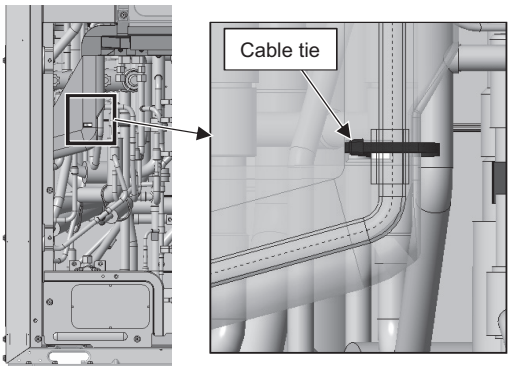


Figure 11

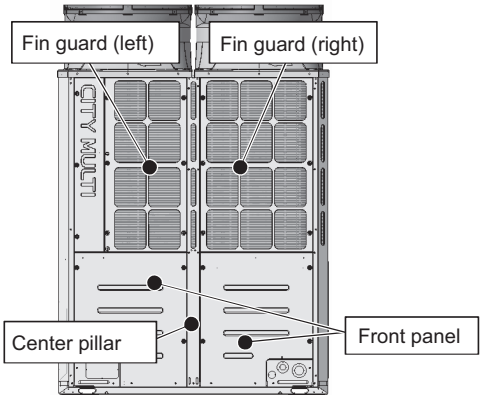


Figure 12

3. XL/EXL-module

[Drain pan removal procedure]
(1) Remove the front panel from the unit by unscrewing the 14 screws. (See Figure 1.)
(2) Remove the external temperature sensor wiring from the left drain pan by cutting the two cable ties.
Unhook the pipe cover from the left drain pan. (See Figure 3.)
(3) Remove the left drain pan by unscrewing the two screws. (See Figure 4.)
(4) Remove the right drain pan by unscrewing the two screws. (See Figure 5.)
(5) Clean inside the right and left drain pans. (See Figure 6.)
Remove dust and dirt from the drain groove.

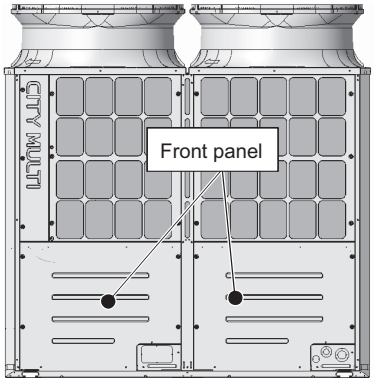


Figure 1

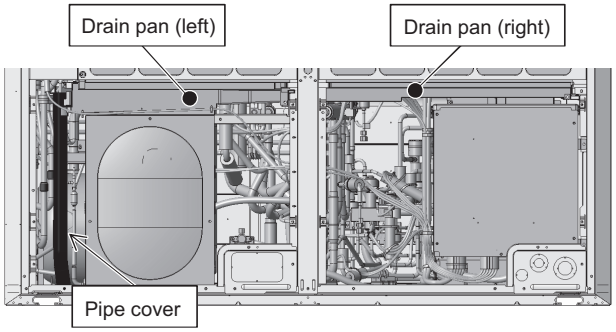
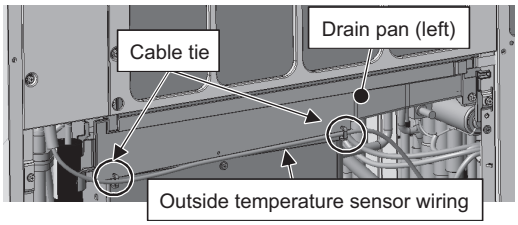


Figure 2



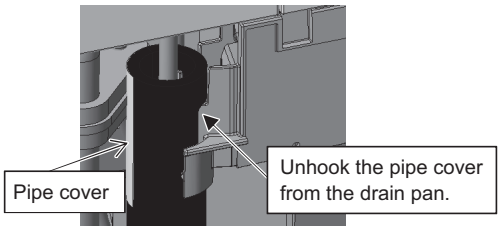
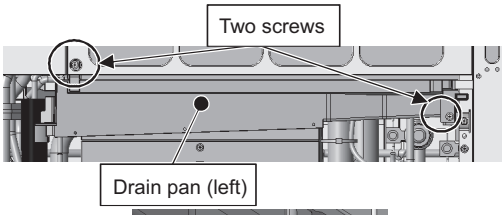


Figure 3



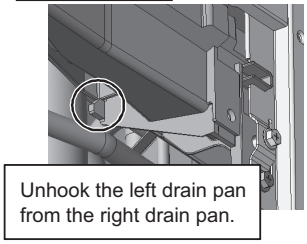
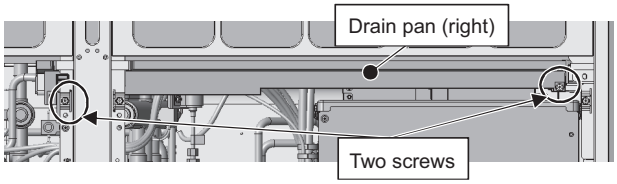


Figure 4



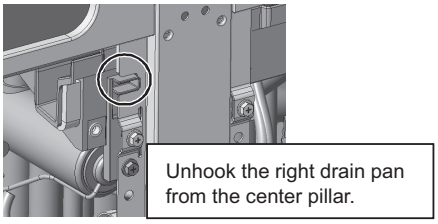


Figure 5

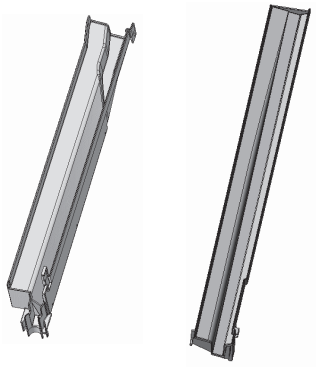


Figure 6

[Drain pan mounting procedure]

*Reuse the drain pan mounting screws that were removed from the replaced drain pan. (M5 x 16 mm with a nylon washer)

(1) Screw down the right drain pan with two screws. (See Figure 7.)

(2) Screw down the left drain pan with two screws. (See Figure 8.)

(3) Hook the pipe cover on the left drain pan. (See Figure 9.)

(4) Hold the external temperature sensor wiring to the left drain pan with two cable ties. (See Figure 10.)

(5) Screw down the front panel. (See Figure 11.)

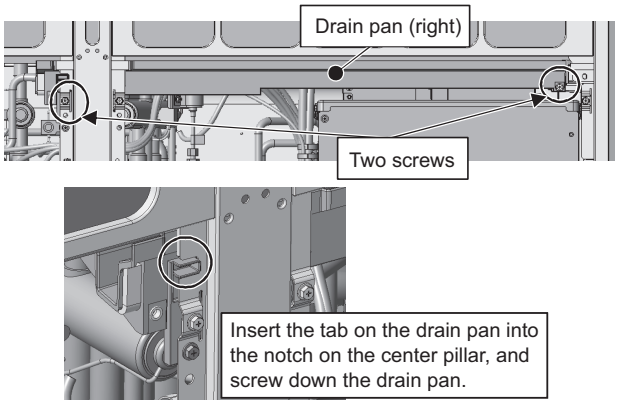


Figure 7

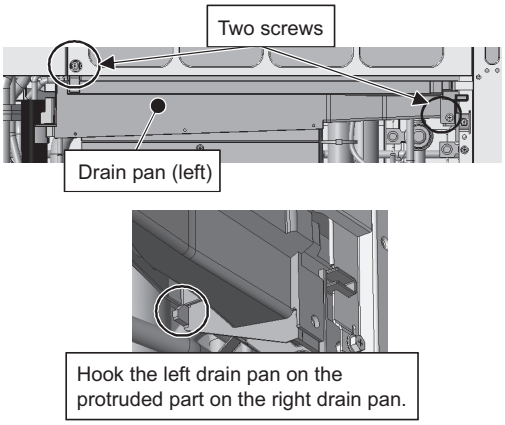


Figure 8

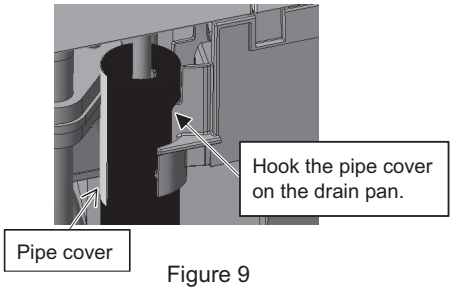


Figure 9

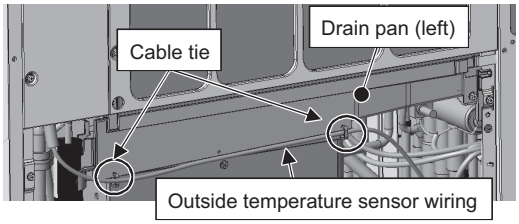


Figure 10

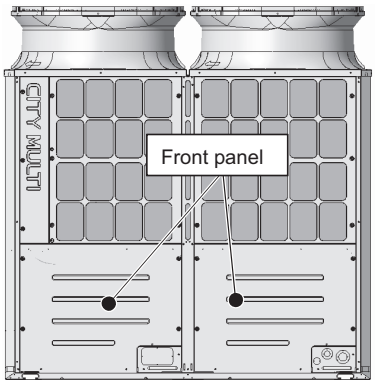


Figure 11

8-12-8 Maintenance Procedures for the Heat Exchanger

1. S-module

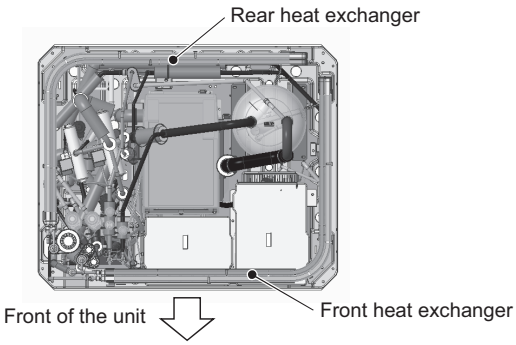


Figure 1

(1) Remove the front panel from the unit by unscrewing the 8 screws. (See Figure 2.)
(2) Remove the fin guard by unscrewing the 6 screws. (See Figure 2.)
(3) Remove the drain cover by unscrewing the screw and cutting the cable tie. (See Figures 3 and 4.)
When re-placing the drain pan cover, make sure that the silicon tube is properly placed on the defrost pipe, and then fix the drain pan cover in place with a cable tie.
(4) Remove the drain pan by unscrewing the 2 screws. (See Figure 2.)
Be sure to remove the two rod holders holding the check joints to the drain pan. (See Figure 4.)

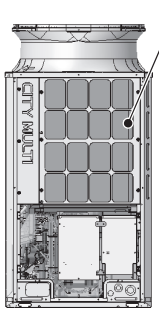


Figure 2

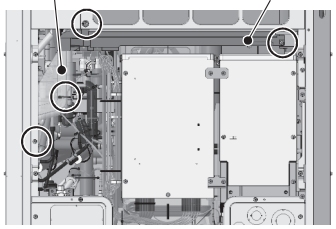
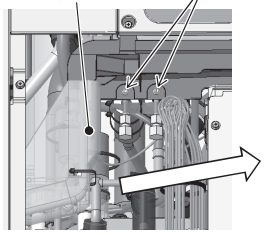


Figure 3



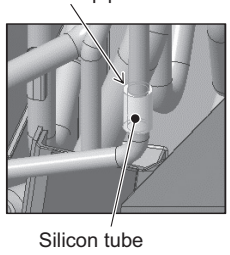


Figure 4

(5) Remove the top attachment that connects the main control box to the inverter control box by unscrewing the 2 screws. (See Figure 5.)
(6) Remove the cover from the inverter control box by unscrewing the 3 screws. (See Figure 5.)
(7) Remove the cable straps to disconnect the wiring. (See Figure 6.)

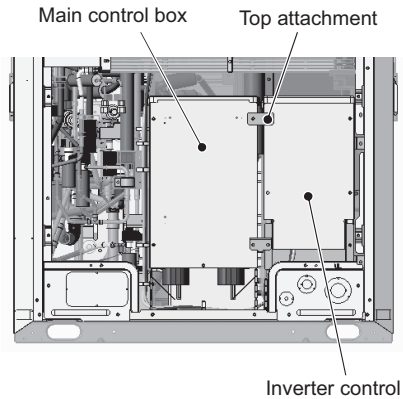


Figure 5

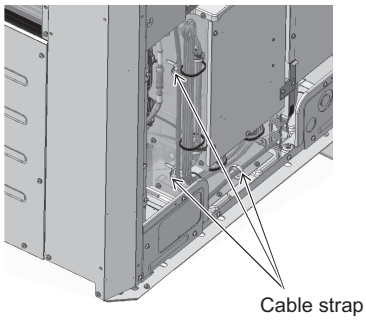


Figure 6

(8) Remove the fin guards and wiring covers from the right, left, and rear of the unit casing. (18 screws as shown in Figure 7.)

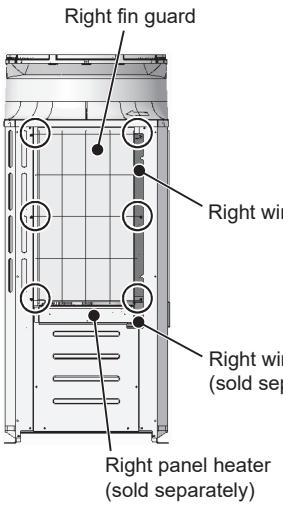


Figure 7 Right

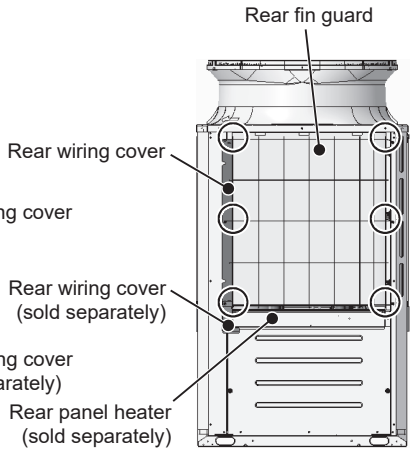


Figure 7 Rear

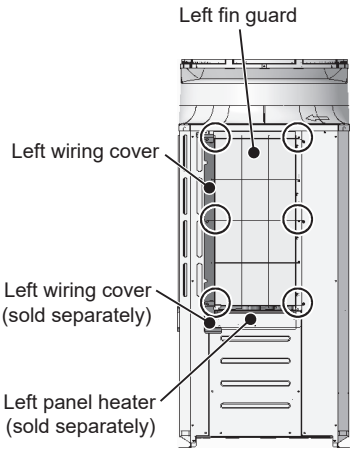


Figure 7 Left

(9) If a separately sold panel heater is installed, disconnect the connectors of the panel heater wiring. Bundle the excessive disconnected panel heater wiring with adhesive tape or other materials. (3 locations as shown in Figure 8.)

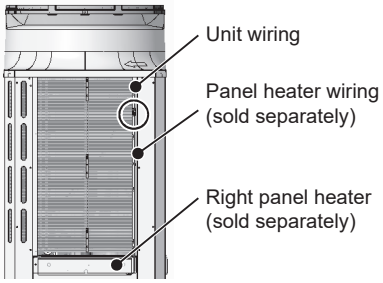


Figure 8 Right

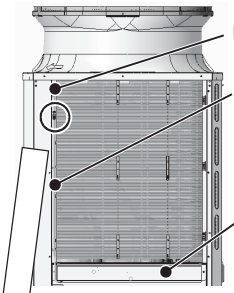


Figure 8 Rear

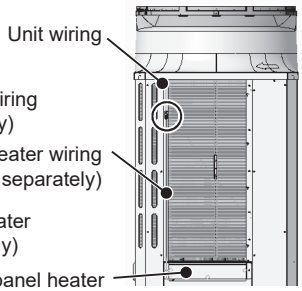
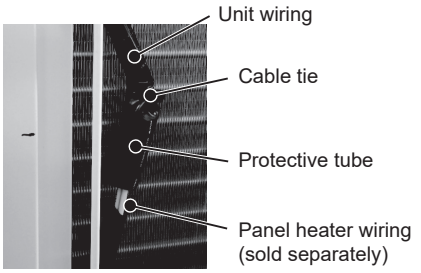
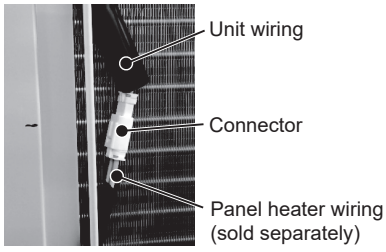


Figure 8 Left



Before removing the protective tube



After removing the protective tube

(10) Remove the fan guard by unscrewing the 6 screws. (See Figure 9.)
(11) Insert a spacer between the main control box and the heat exchanger.
(12) Remove the cable tie that is holding the motor ASSY and the unit wiring.
Remove the motor ASSY by unscrewing the four screws, using caution not to disconnect the motor wiring or not to damage the fan. (See Figure 10.)

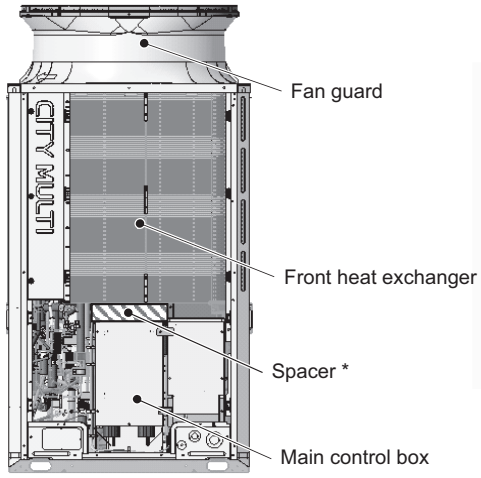


Figure 9

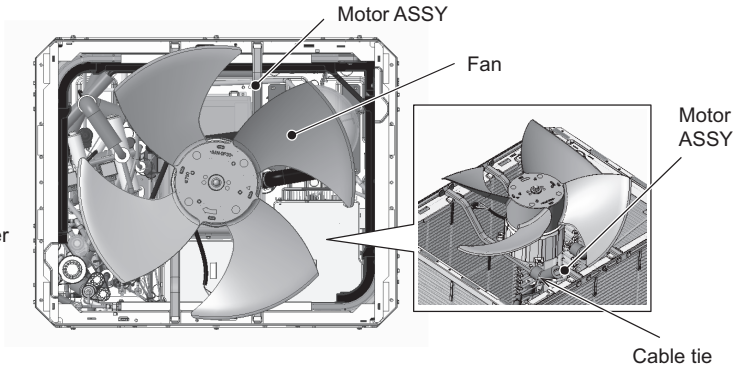


Figure 10

*Use the supplied spacers.
Use the spacers 60 (D) X 250 (W) X 60 (H) when replacing the heat exchangers for the maintenance of the accumulator and the pipes.

(13) Remove the unit wiring from the left frame (See Figure 11).
Bundle all excess unit wirings including those that have been removed so that they do not interfere with the replacement of the heat exchanger.

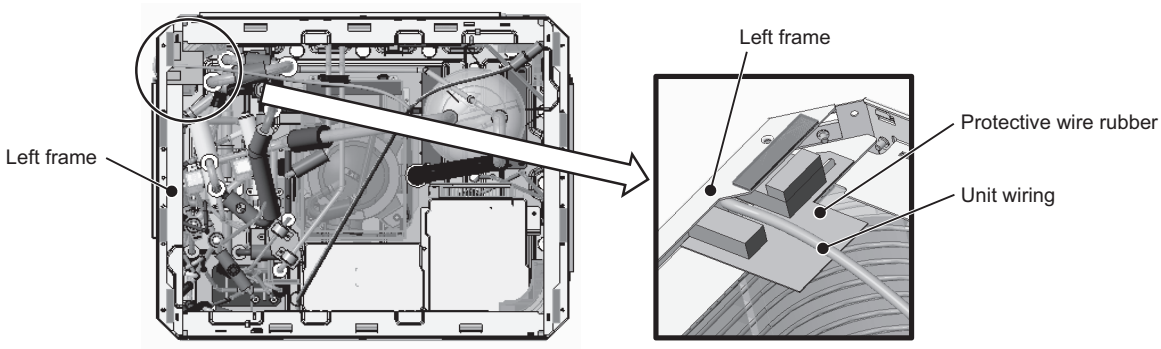


Figure 11

(14) Remove the front pillar by unscrewing the 7 screws. (See Figure 12.)
(15) Disconnect the TH7 sensor holder from the front pillar. (See Figure 12 Rear.)
(16) Remove the TH7 wiring from the front heat exchanger by cutting the cable tie. (See Figure 13.)

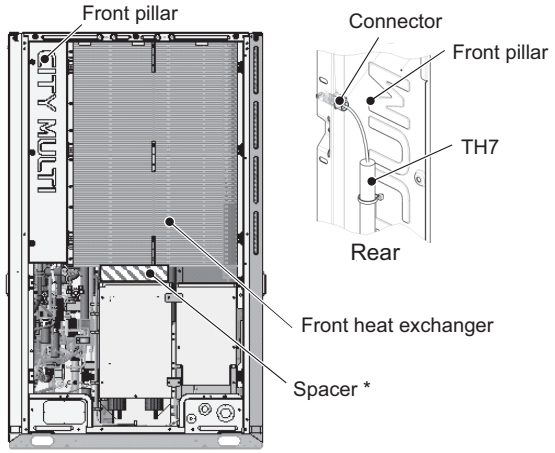


Figure 12

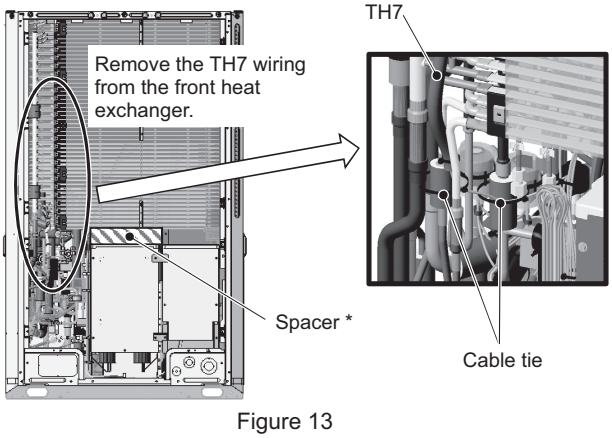


Figure 13

(17) To remove the front heat exchanger, first remove the front, left, and right frames by unscrewing the 10 screws. (See Figure 14.)
To remove the rear heat exchanger, remove the rear frame in addition to the front, left, and the right frames by unscrewing the 12 screws. (See Figure 14.)
(18) Unscrew the two screws each on the right and left panels. (See Figure 15 Right and Left.)
(19) Remove the left front pillar by unscrewing the 9 screws on a standard model or 10 screws on a high-efficiency model. (See Figure 15 Front and Left.)
(20) Remove the right front pillar by unscrewing the 5 screws. (See Figure 15 Front and Right.)

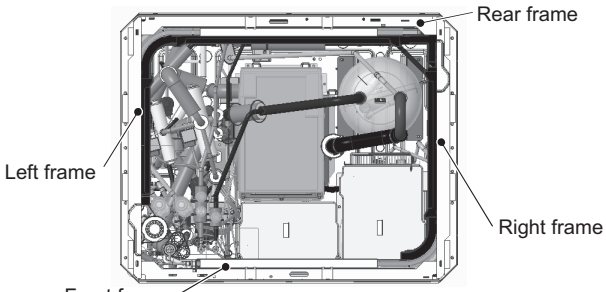


Figure 14

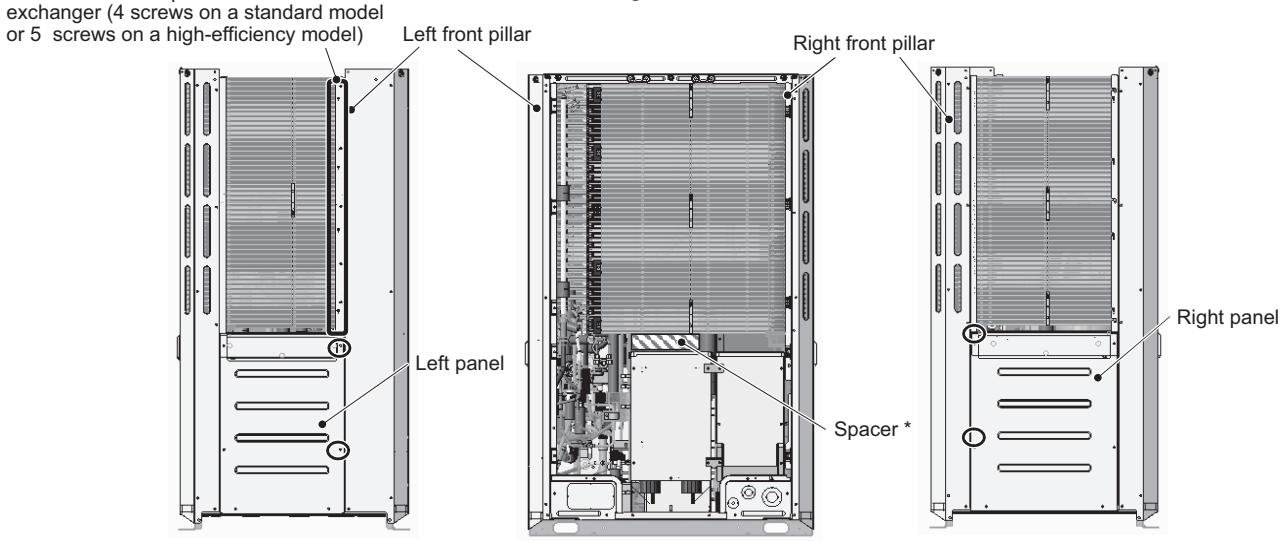
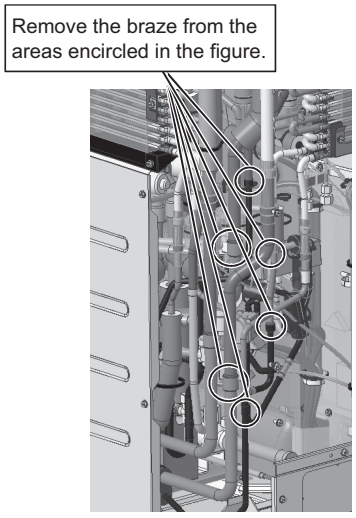


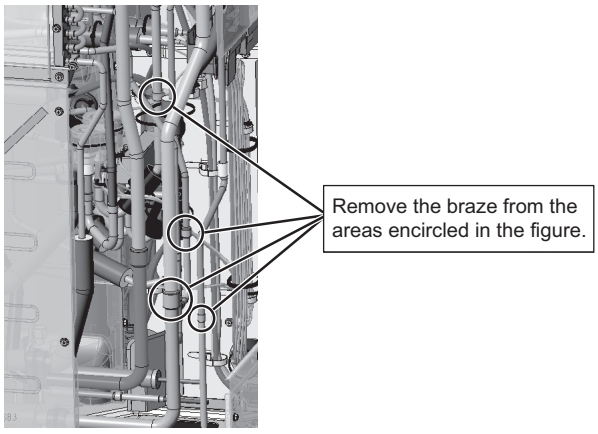
Figure 15 Left　Figure 15 Front　Figure 15 Right

*Use the supplied spacers. Use the spacers 60 (D) X 250 (W) X 60 (H) when replacing the heat exchangers for the maintenance of the accumulator and the pipes.

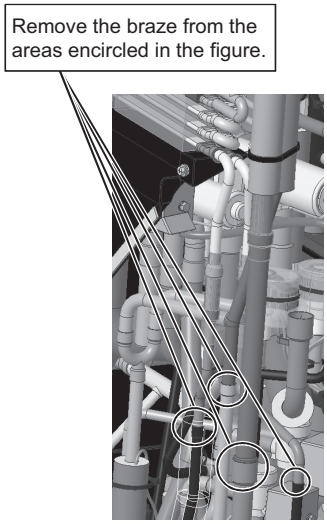
(21) Before removing the front heat exchanger, protect the adjacent electrical components and the pipe covers with the recommended felt that is soaked in water, and then remove the braze from the areas shown in Figures 16 and 17. (High-efficiency front heat exchanger: 6 areas; Standard front heat exchanger: 4 areas)
To remove the rear heat exchanger, remove the braze from four areas. (See Figures 18 and 19.)



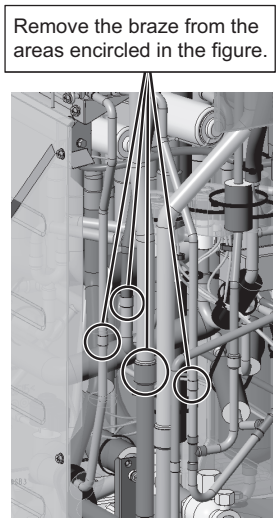
Removing the high-efficiency front heat exchanger (Figure 16)



Removing the standard front heat exchanger (Figure 17)



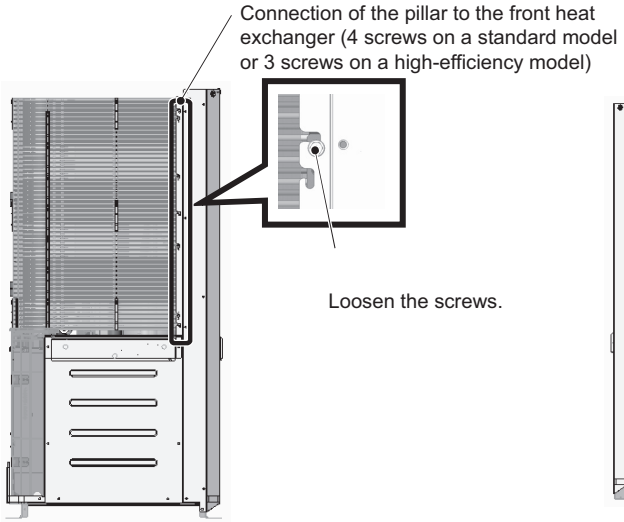
Removing the high-efficiency rear heat exchanger (Figure 18)



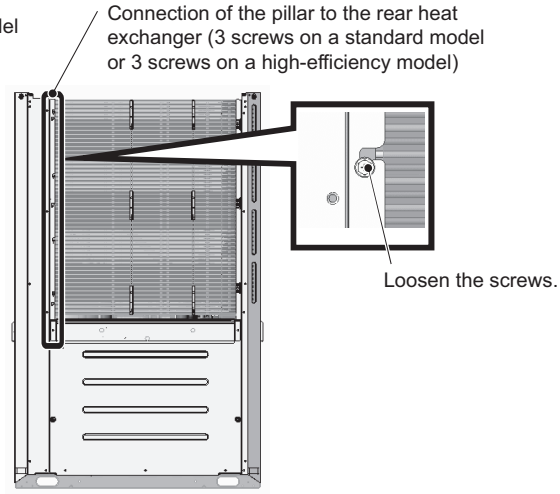
Removing the standard rear heat exchanger (Figure 19)

Notes for replacing refrigerant circuit components (heat exchanger)
- Be sure to perform non-oxidized brazing.
- After brazing is done, check that the brazing is done properly and check for leaks before vacuum-drying the pipes.
- Direct the brazing torch flame away from the wiring and sheet metals inside the unit not to damage them.
- Place the wet felt sheets listed below (or their equivalents) around the areas to be brazed to protect the heat exchanger, pipes, and pipe covers from being damaged from the brazing torch flame.
  Recommended felt sheets: Spatter felt 50CF-11 (5t x 1 m x 1 m) by TRUSCO Nakayama
  Felt sheets that meet the JIS standard (JIS A 1323 type A "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works")

(22) To remove the front heat exchanger, loosen the screws on the right side of the right rear pillar. (4 screws on a standard model or 3 screws on a high-efficiency model) (See Figure 20.)
To remove the rear heat exchanger, loosen the screws on the back of the right rear pillar. (3 screws on a standard model or 3 screws on a high-efficiency model) (See Figure 21.)

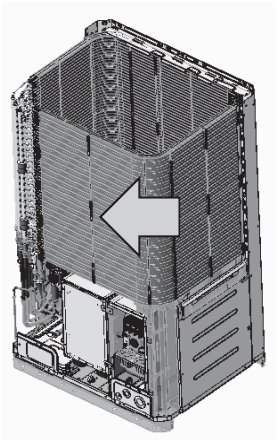


Removing the front heat exchanger (Figure 20)

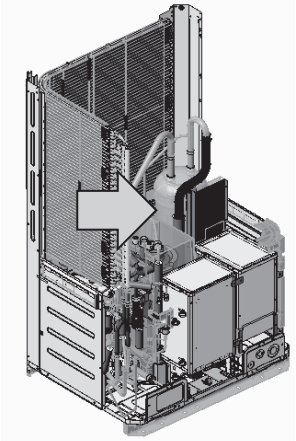


Removing the rear heat exchanger (Figure 21)

(23) Remove the heat exchanger by diagonally lifting it up, using caution not to damage the fins or the pipes.

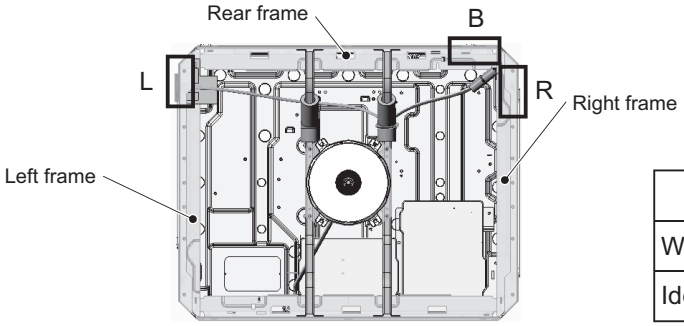


Removing the front heat exchanger (Figure 22)



Removing the rear heat exchanger (Figure 23)

(24) Re-place the front and the rear heat exchangers in the reverse order as they were removed.
Re-place the components that were removed as they were.
Re-place each unit wiring according to the wiring color and identification label (attached to the wiring protective tube) shown in the table below.



(Figure 24)

Unit wiring specification

	L	R	B
Wiring color	Yellow	Blue	White
Identification label	S-L	S-R	S-B

2. L-module

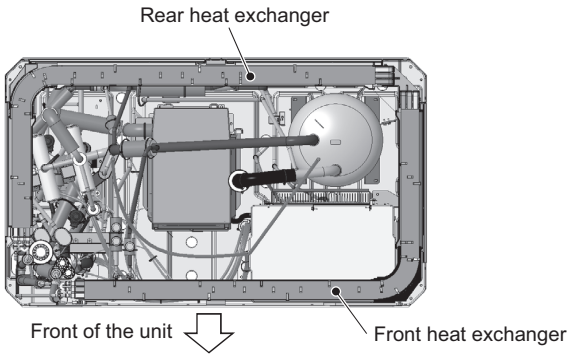


Figure 1

(1) Remove the two front panels from the unit by unscrewing the 14 screws. (See Figure 2.)
(2) Remove the fin guard by unscrewing the 12 screws. (See Figure 2.)
(3) Remove the cable straps holding the weak and strong electrical wirings. (See Figure 3.)
(4) Remove the center pillar by unscrewing the 5 screws. (See Figure 2.)
(5) Remove the drain cover by unscrewing the screw and cutting the cable tie. (See Figures 3 and 4.)
When re-placing the drain pan cover, make sure that the silicon tube is properly placed on the defrost pipe, and then fix the drain pan cover in place with a cable tie.
(6) Remove the drain pan by unscrewing the 2 screws. (See Figure 3.)
Be sure to remove the two rod holders holding the check joints to the drain pan. (See Figure 4.)

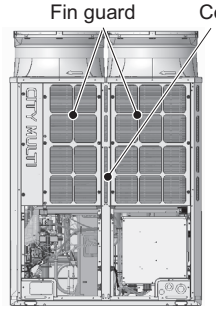


Figure 2

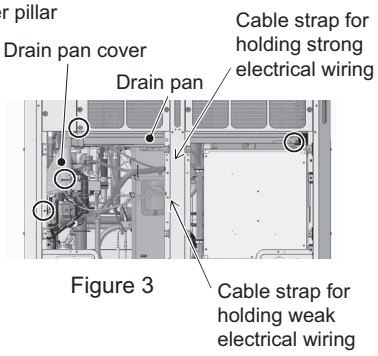


Figure 3

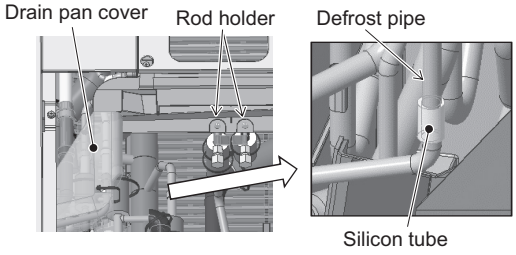


Figure 4

(7) Remove the cover from the control box by unscrewing the 5 screws. (See Figure 5.)
(8) Remove the cable straps to disconnect the wiring. (See Figure 6.)

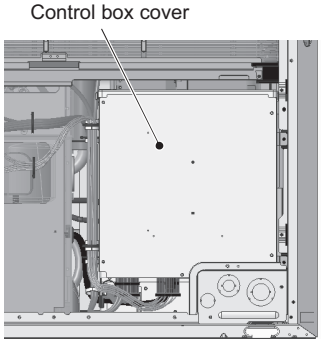


Figure 5

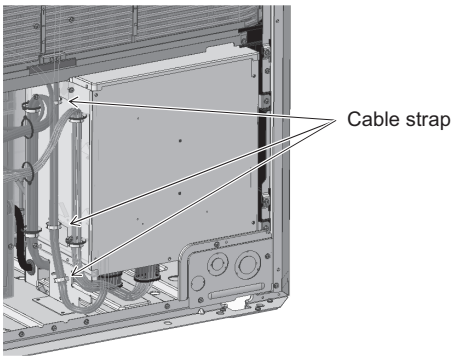


Figure 6

(9) Remove the fin guards and wiring covers from the right, left, and rear of the unit casing. (24 screws as shown in Figure 7.)

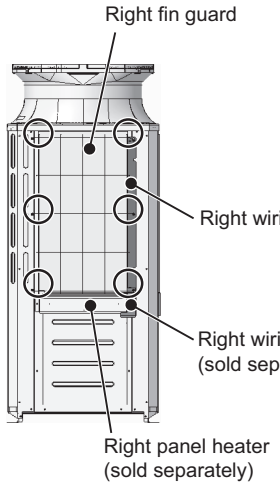


Figure 7 Right

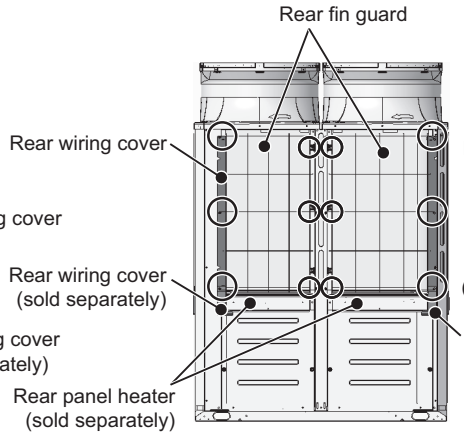


Figure 7 Rear

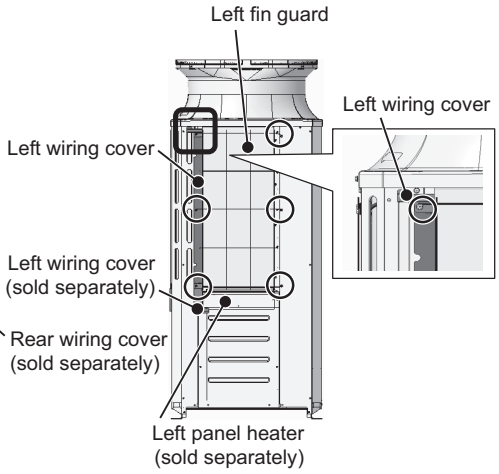


Figure 7 Left

(10) If a separately sold panel heater is installed, disconnect the connectors of the panel heater wiring. Bundle the excessive disconnected panel heater wiring with adhesive tape or other materials. (4 locations as shown in Figure 8.)

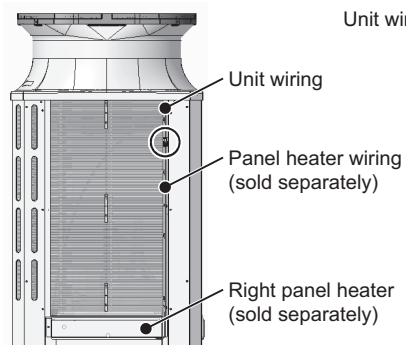


Figure 8 Right

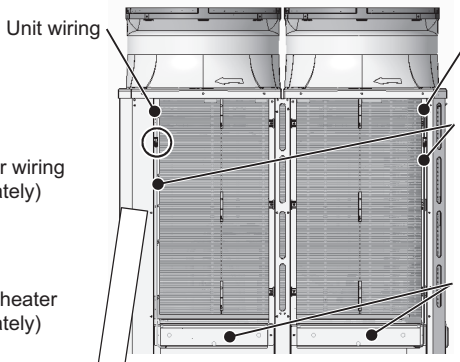


Figure 8 Rear

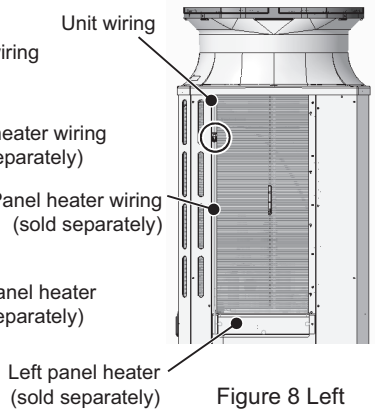
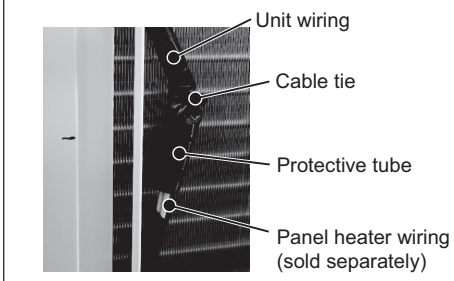
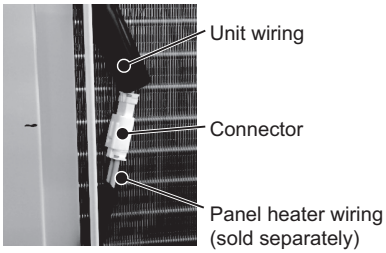


Figure 8 Left



Before removing the protective tube



After removing the protective tube

(11) Remove the fan guard by unscrewing the 12 screws. (See Figure 9.)
(12) Insert a spacer between the control box and the heat exchanger.
(13) Remove the cable tie that is holding the motor ASSY and the unit wiring.
Remove the motor ASSY by unscrewing the eight screws, using caution not to disconnect the motor wiring or not to damage the fan. (See Figure 10.)

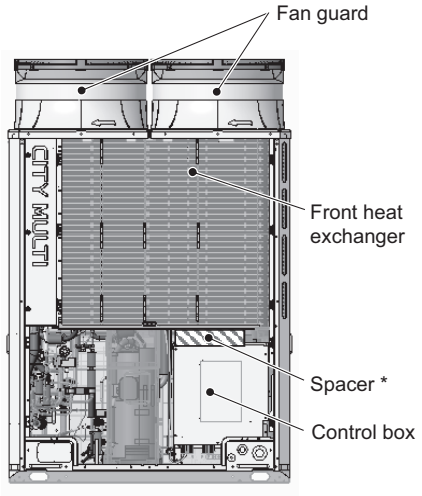


Figure 9

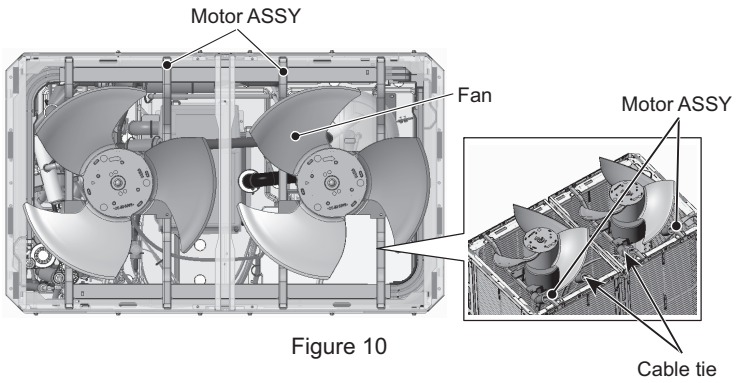


Figure 10

(14) Remove the unit wiring from the left frame (See Figure 11).
Bundle all excess unit wirings including those that have been removed so that they do not interfere with the replacement of the heat exchanger.

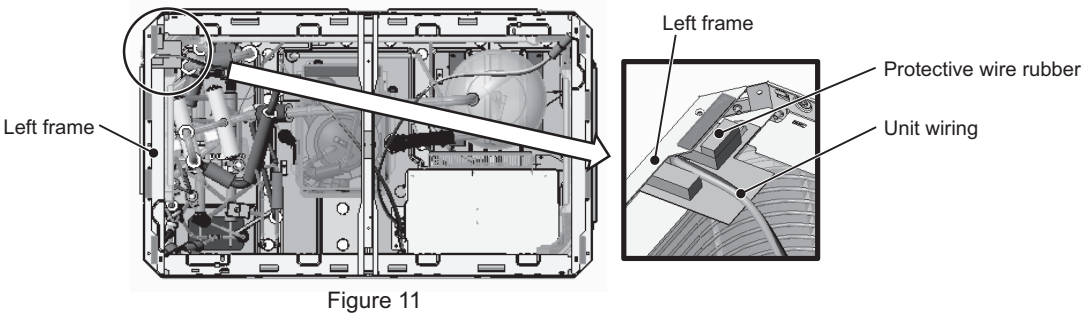


Figure 11

(15) Remove the front pillar by unscrewing the 7 screws. (See Figure 12.)
(16) Disconnect the TH7 sensor holder from the front pillar. (See Figure 12 Rear.)
(17) Remove the TH7 wiring from the heat exchanger by cutting the cable tie. (See Figure 13.)

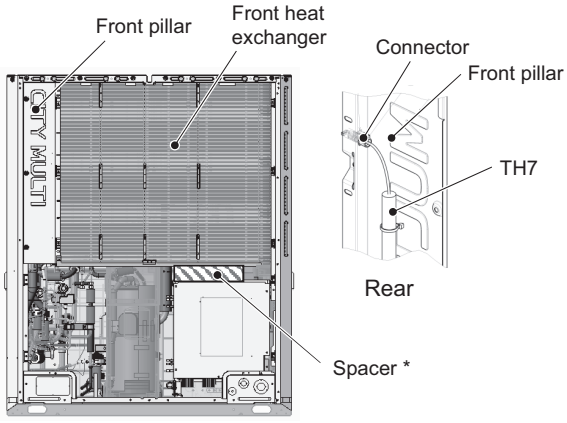


Figure 12

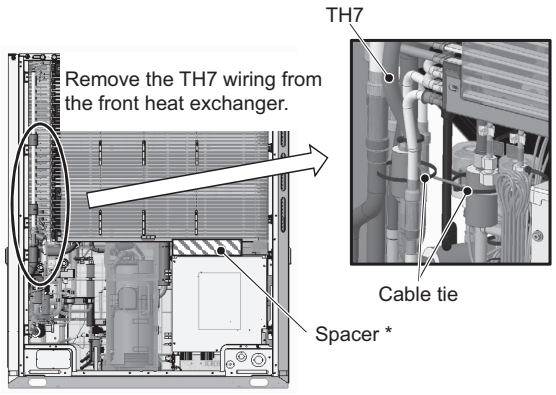


Figure 13

*Use the supplied spacers.
Use the spacers 60 (D) x 250 (W) x 60 (H) when replacing the heat exchangers for the maintenance of the accumulator and the pipes.

(18) To remove the front heat exchanger, first remove the front, left, right, and center frames by unscrewing the 14 screws. (See Figure 14.)
To remove the rear heat exchanger, remove the rear frame in addition to the front, left, right, and center frames by unscrewing the 16 screws. (See Figure 14.)
(19) Unscrew the two screws each on the right and left panels. (See Figure 15 Right and Left.)
(20) Remove the left front pillar by unscrewing the 9 screws on a standard model or 10 screws on a high-efficiency model. (See Figure 15 Front and Left.)
(21) Remove the right front pillar by unscrewing the 5 screws. (See Figure 15 Front and Right)

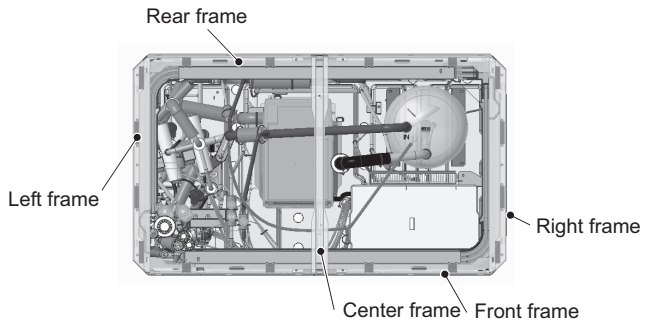


Figure 14

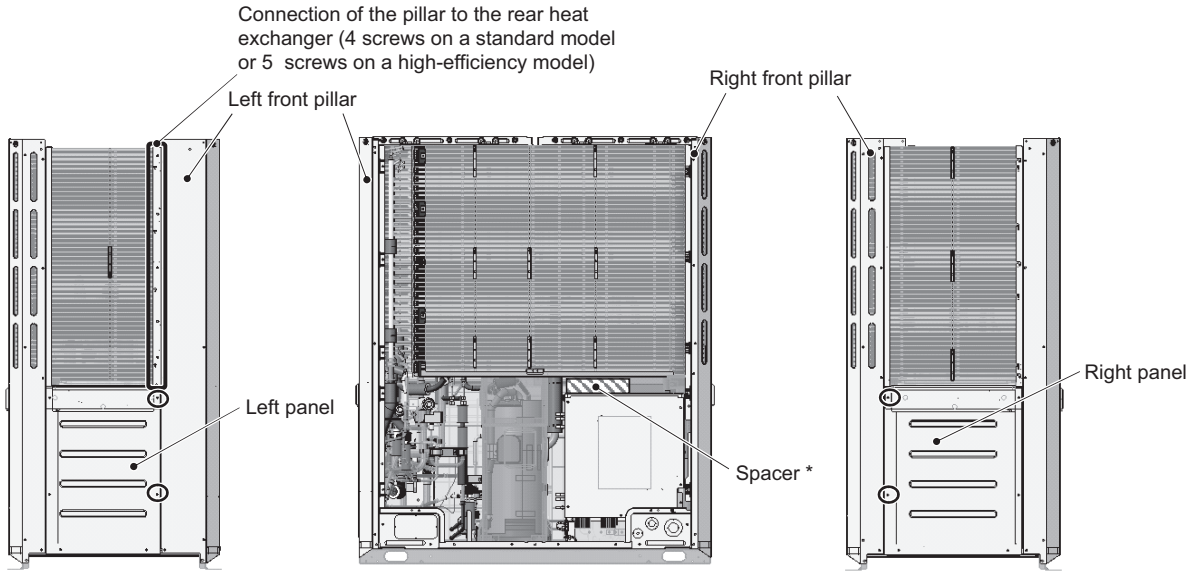


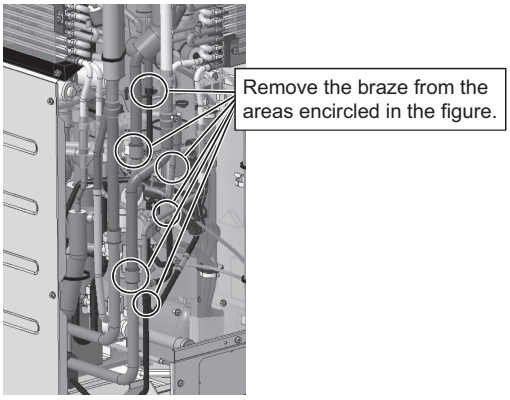
Figure 15 Left

Figure 15 Front

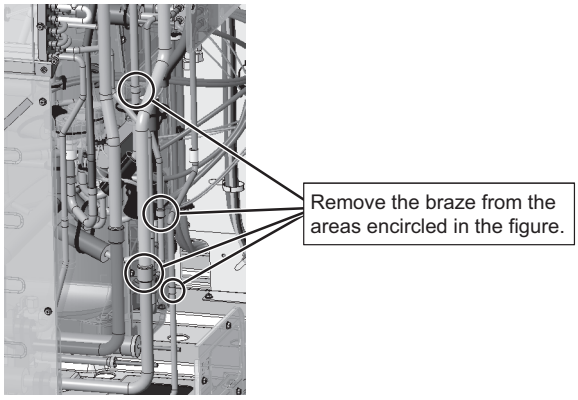
Figure 15 Right

*Use the supplied spacers. Use the spacers 60 (D) X 250 (W) X 60 (H) when replacing the heat exchangers for the maintenance of the accumulator and the pipes.

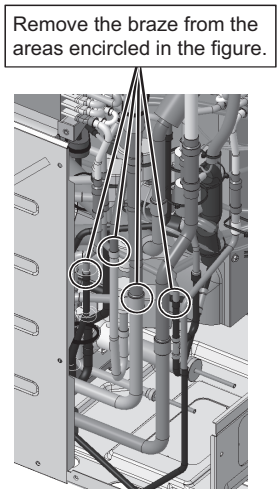
(22) Before removing the front heat exchanger, protect the adjacent electrical components and the pipe covers with the recommended felt that is soaked in water, and then remove the braze from the areas shown in Figures 16 and 17. (High-efficiency front heat exchanger: 6 areas; Standard front heat exchanger: 4 areas)
To remove the rear heat exchanger, remove the braze from four areas. (See Figures 18 and 19.)



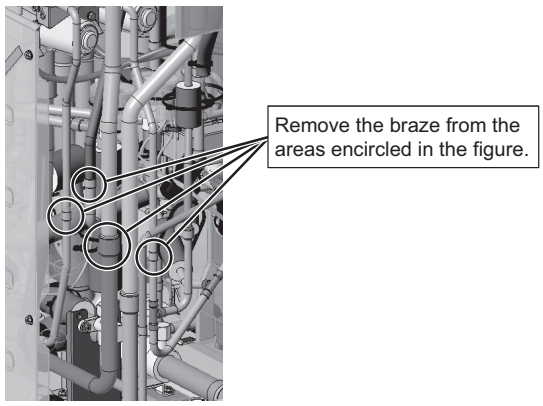
Removing the high-efficiency front heat exchanger (Figure 16)



Removing the standard front heat exchanger (Figure 17)



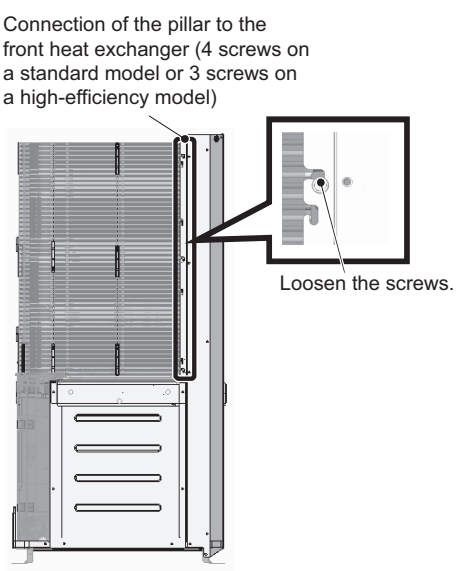
Removing the high-efficiency rear heat exchanger (Figure 18)



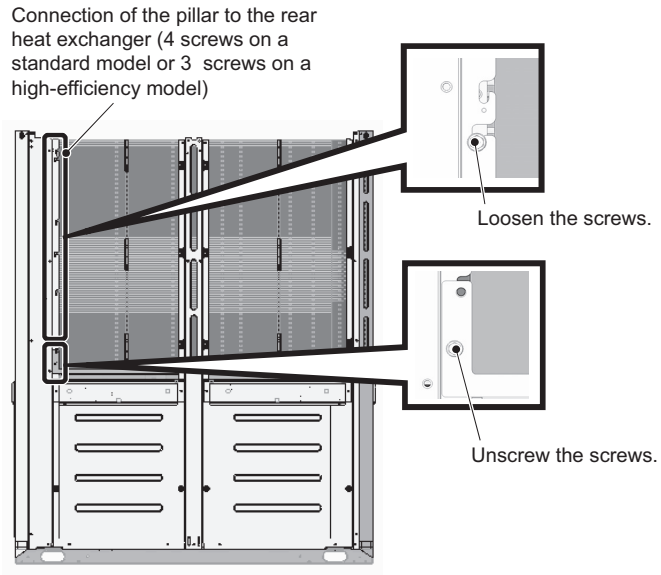
Removing the standard rear heat exchanger (Figure 19)

Notes for replacing refrigerant circuit components (heat exchanger)
- Be sure to perform non-oxidized brazing.
- After brazing is done, check that the brazing is done properly and check for leaks before vacuum-drying the pipes.
- Direct the brazing torch flame away from the wiring and sheet metals inside the unit not to damage them.
- Place the wet felt sheets listed below (or their equivalents) around the areas to be brazed to protect the heat exchanger, pipes, and pipe covers from being damaged from the brazing torch flame.
  Recommended felt sheets: Spatter felt 50CF-11 (5t x 1 m x 1 m) by TRUSCO Nakayama
  Felt sheets that meet the JIS standard (JIS A 1323 type A "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works")

(23) To remove the front heat exchanger, loosen the screws on the right side of the right rear pillar. (4 screws on a standard model or 3 screws on a high-efficiency model) (See Figure 20.)
To remove the rear heat exchanger, loosen the screws on the back of the right rear pillar. (4 screws on a standard model or 3 screws on a high-efficiency model) (See Figure 21.)
Remove the screw holding the pillar to the rear heat exchanger support.

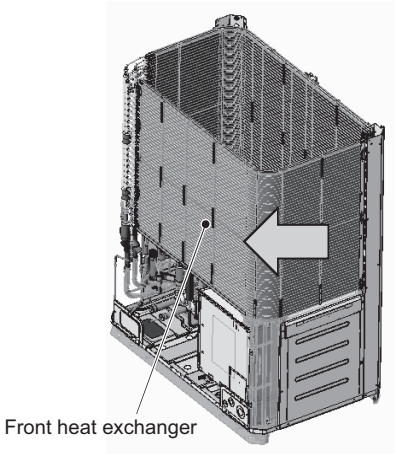


Removing the front heat exchanger
(Figure 20)

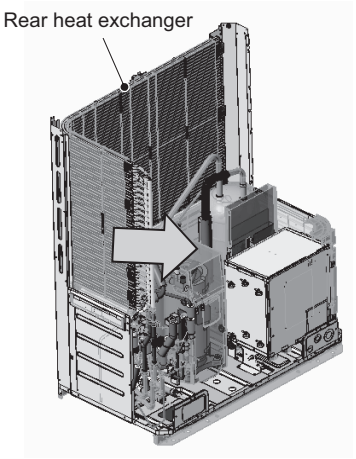


Removing the rear heat exchanger
(Figure 21)

(24) Remove the heat exchanger by diagonally lifting it up, using caution not to damage the fins or the pipes.



Removing the front heat exchanger
(Figure 22)



Removing the rear heat exchanger
(Figure 23)

(25) After removing the heat exchangers, dispose of the front and the rear heat exchanger supports. (See Figures 24 and 25.)
The front and the rear heat exchanger supports do not need to be installed. (The front and the rear heat exchanger supports are for suppressing vibration during transportation.)

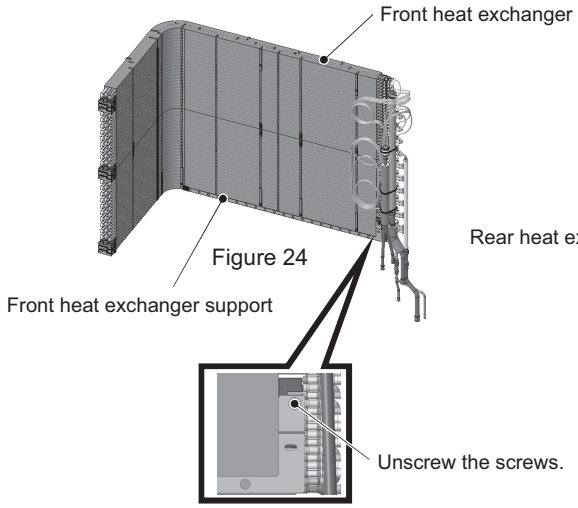


Figure 24

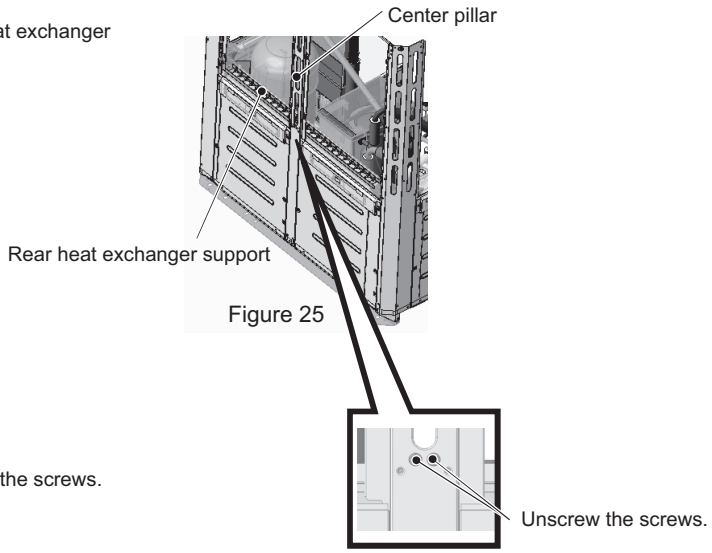
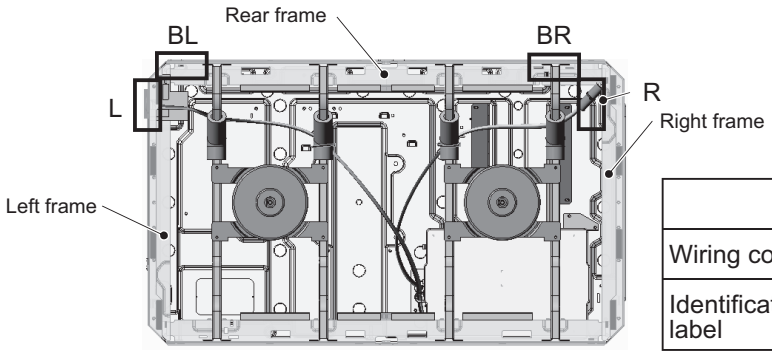


Figure 25

(26) Re-place the front and the rear heat exchangers in the reverse order as they were removed.
Re-place the components that were removed as they were.
Re-place each unit wiring according to the wiring color and identification label (attached to the wiring protective tube) shown in the table below.



(Figure 26)

Unit wiring specification

	L	R	BL	BR
Wiring color	Yellow	Blue	Red	White
Identification label	L-L	L-R	L-BL	L-BR

3. XL-module

(1) Remove the two front panels from the unit by unscrewing the 14 screws. (See Figure 2.)
(2) Remove the fin guard by unscrewing the 12 screws. (See Figure 2.)
(3) Remove pipe cover. (See Figure 3.)
(4) Remove the left drain pan by unscrewing the two screws and cutting the two cable ties. (See Figure 3.)
(5) Remove the right drain pan by unscrewing the 2 screws. (See Figure 3.)

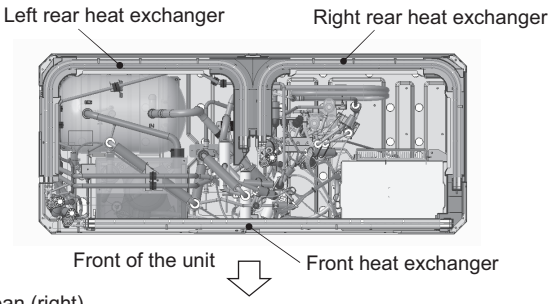


Figure 1

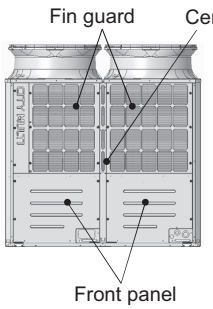


Figure 2

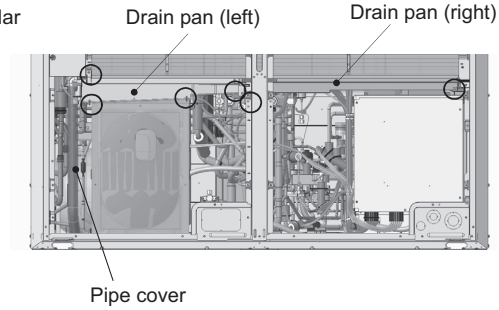


Figure 3

(6) Remove the 3 cable straps from the center pillar. (See Figure 4.)
(7) Remove the 3 cable straps holding motor wiring from the control box. (See Figure 5.)

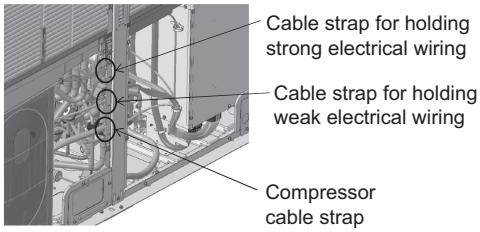


Figure 4

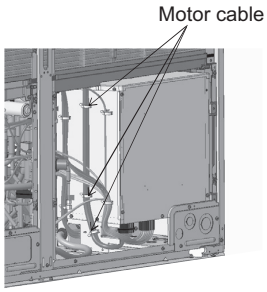


Figure 5

(8) Remove the fin guards and wiring covers from the right, left, and rear of the unit casing. (24 screws as shown in Figure 6.)

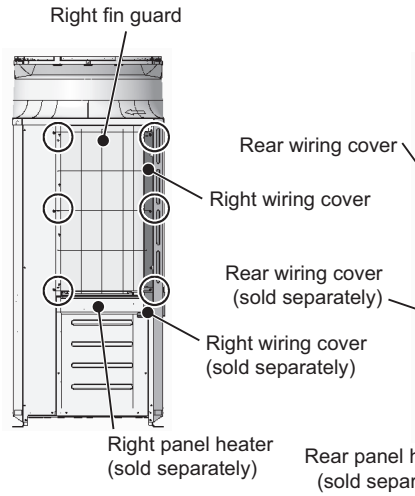


Figure 6 Right

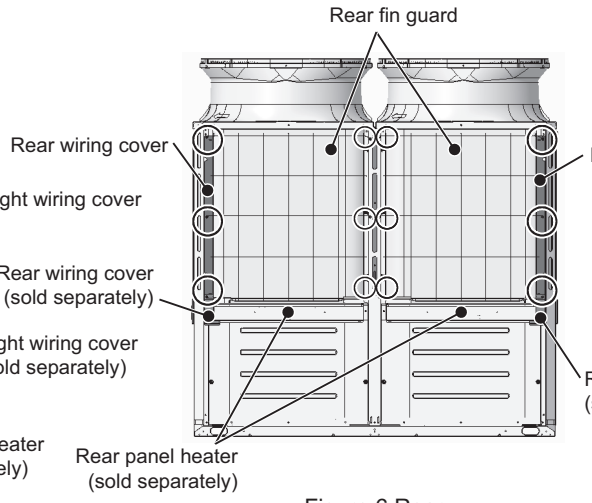


Figure 6 Rear

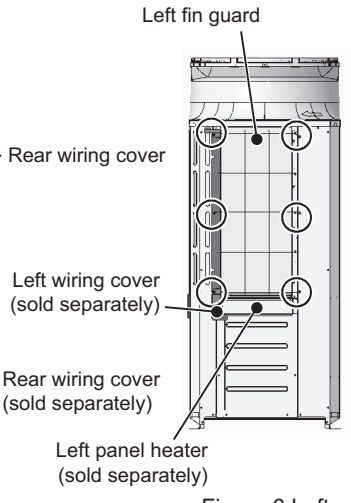


Figure 6 Left

(9) If a separately sold panel heater is installed, disconnect the connectors of the panel heater wiring. Bundle the excessive disconnected panel heater wiring with adhesive tape or other materials. (4 locations as shown in Figure 7.)

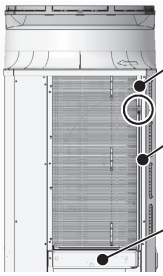


Figure 7 Right

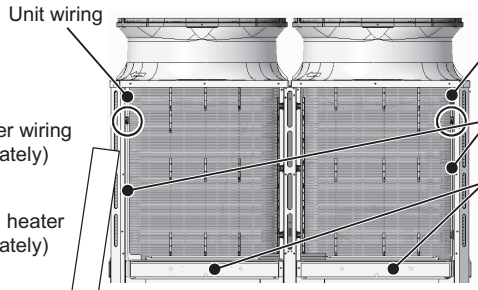


Figure 7 Rear

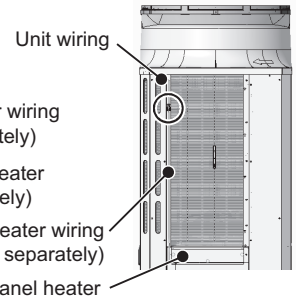
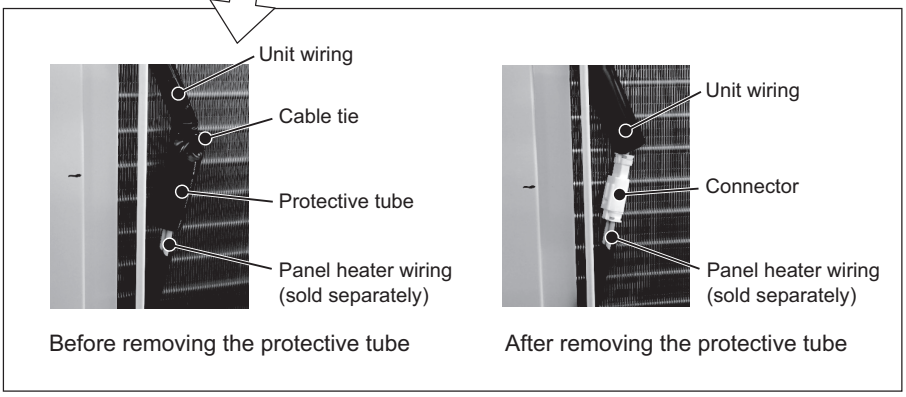


Figure 7 Left



Before removing the protective tube

After removing the protective tube

(10) Remove the fan guard by unscrewing the 12 screws. (See Figure 8.)
(11) Unstrap the cable from the cable strap on the middle frame. (See Figure 9.)
(12) Remove the cable tie that is holding the motor ASSY and the unit wiring.
Remove the motor ASSY by unscrewing the eight screws, using caution not to disconnect the motor wiring or not to damage the fan. (See Figure 9.)

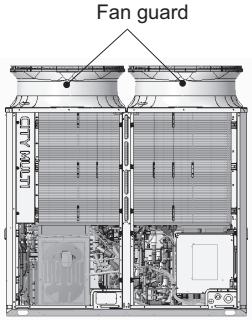


Figure 8

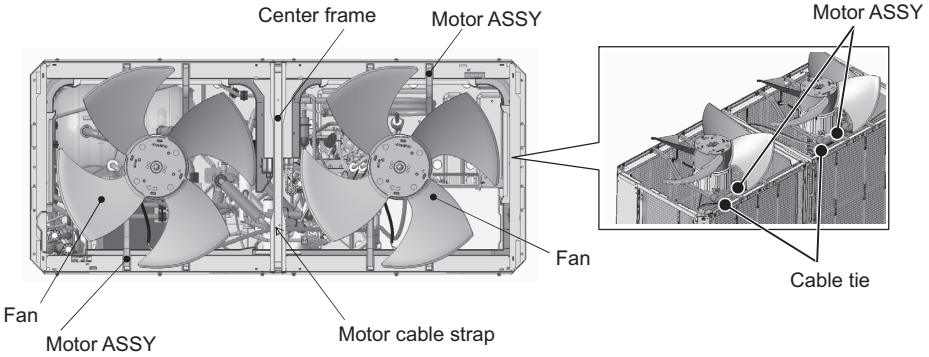


Figure 9

(13) Disconnect the unit wirings from the right and left frames. (Figure 10)
Keep all excessive wirings, including the ones disconnected from the frames, out of the way of removing the heat exchanger.

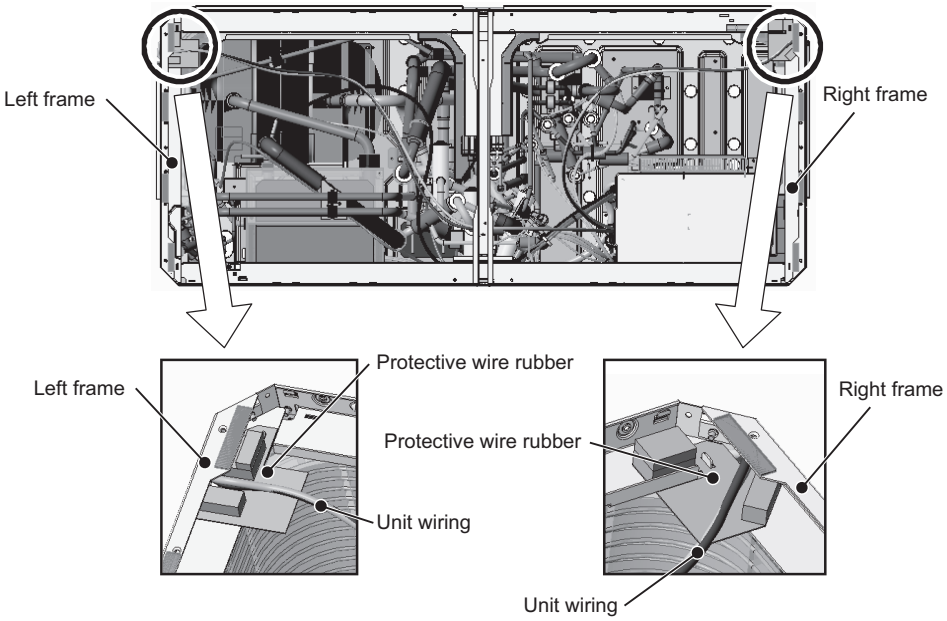
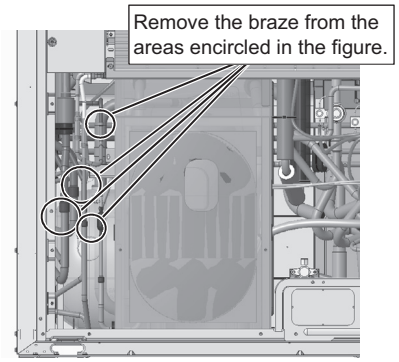
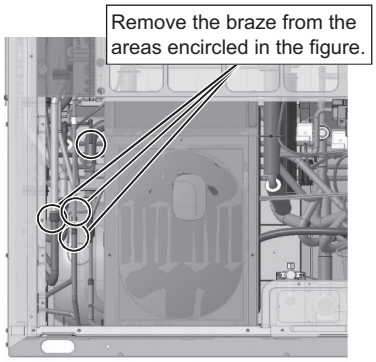


Figure 10

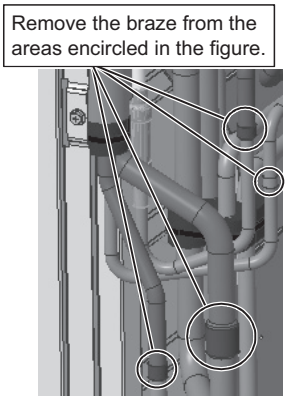
(14) Before removing the front heat exchanger, protect the surrounding electrical components and the pipe cover with a recommended felt soaked in water, and then remove the braze from four areas. (See Figures 11 and 12.)
To remove the right and left rear heat exchangers, remove the braze from four areas. (See Figures 13 - 16.)



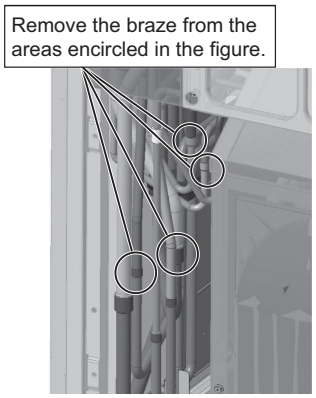
Removing the high-efficiency front heat exchanger (Figure 11)



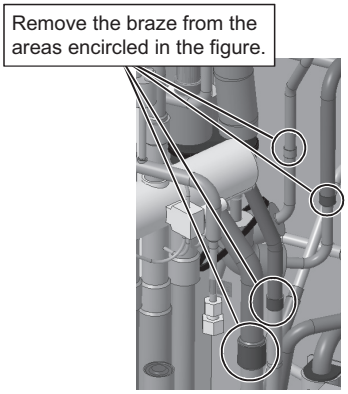
Removing the standard front heat exchanger (Figure 12)



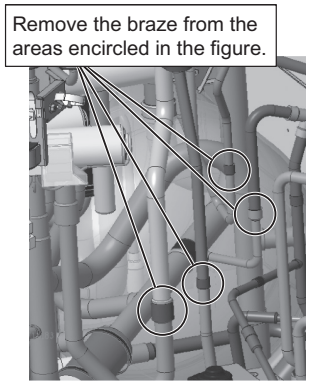
Removing the high-efficiency rear left heat exchanger (Figure 13)



Removing the standard rear left heat exchanger (Figure 14)



Removing the high-efficiency rear right heat exchanger (Figure 15)



Removing the standard rear right heat exchanger (Figure 16)

Notes for replacing refrigerant circuit components (heat exchanger)
- Be sure to perform non-oxidized brazing.
- After brazing is done, check that the brazing is done properly and check for leaks before vacuum-drying the pipes.
- Direct the brazing torch flame away from the wiring and sheet metals inside the unit not to damage them.
- Place the wet felt sheets listed below (or their equivalents) around the areas to be brazed to protect the heat exchanger, pipes, and pipe covers from being damaged from the brazing torch flame.
  Recommended felt sheets: Spatter felt 50CF-11 (5t x 1 m x 1 m) by TRUSCO Nakayama
  Felt sheets that meet the JIS standard (JIS A 1323 type A "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works")

(15) Remove the front pillar by unscrewing the 7 screws. (See Figure 17.)
(16) Disconnect the TH7 sensor holder from the front pillar. (See Figure 17 Rear.)

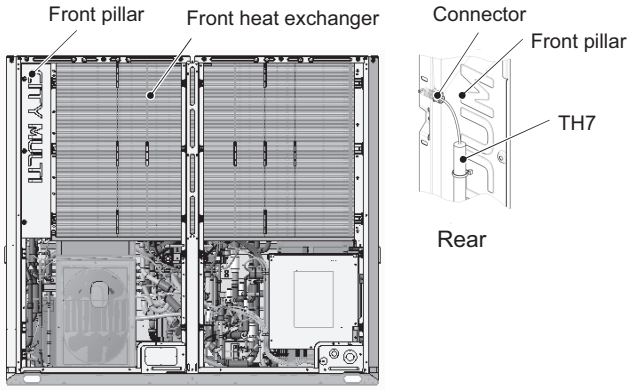


Figure 17

(17) To remove the front heat exchanger, first remove the front, left, right, and center frames by unscrewing the 16 screws. (See Figure 18.)
To remove the right and left rear heat exchangers, remove the top and the rear frames in addition to the front, left, right, and center frames by unscrewing the 21 screws. (See Figure 18.)
(18) Remove the center front pillar by unscrewing the 4 screws. (See Figure 19.)

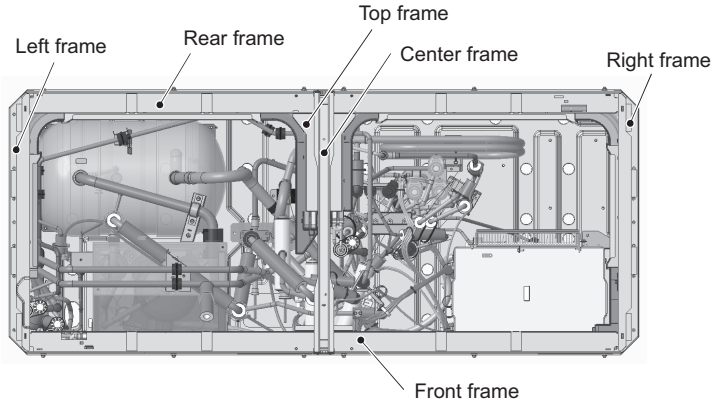


Figure 18

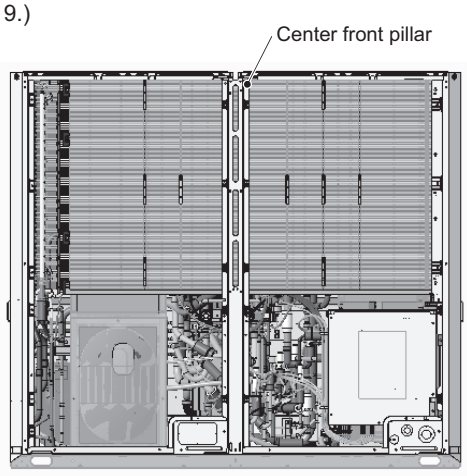
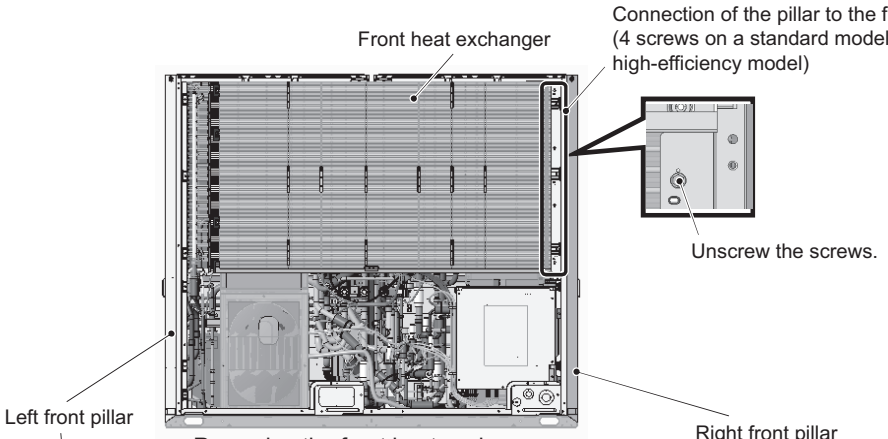
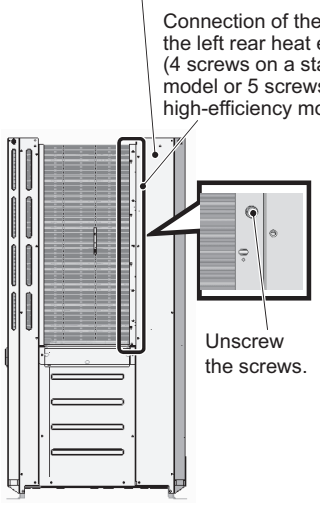


Figure 19

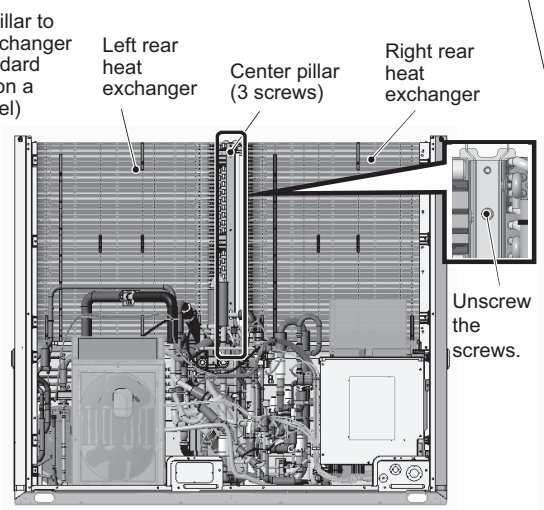
(19) To remove the front heat exchanger, unscrew the screws on the front of the right front pillar. (4 screws on a standard model or 3 screws on a high-efficiency model) (See Figure 20.)
To remove the left rear heat exchanger, unscrew the screws on the left side of the left front pillar and the screws on the front of the center pillar (7 screws on a standard model or 8 screws on a high-efficiency model. (See Figures 21 and 22.)
To remove the right rear heat exchanger, unscrew the screws on the right side of the right front pillar and the screws on the front of the center pillar (7 screws on a standard model or 6 screws on a high-efficiency model. (See Figures 22 and 23.)



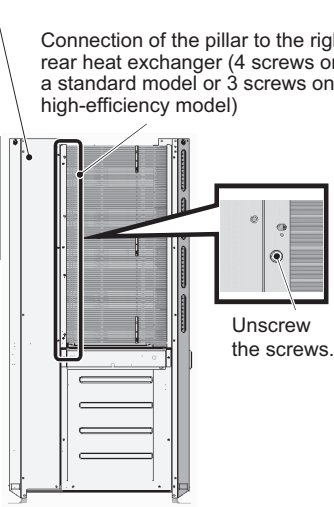
Removing the front heat exchanger (Figure 20)



Removing the left rear heat exchanger (Figure 21)

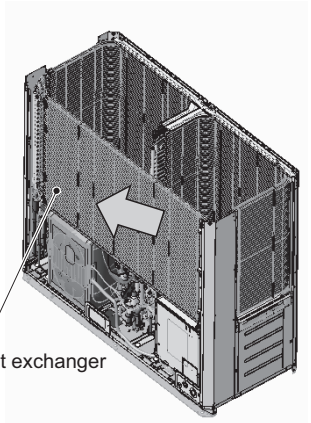


Removing the right and left rear heat exchangers (Figure 22)

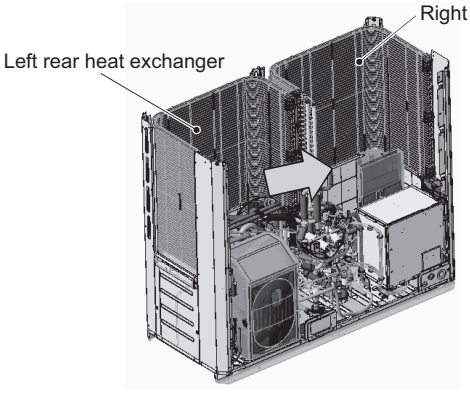


Removing the right rear heat exchanger (Figure 23)

(20) Remove the heat exchanger by diagonally lifting it up, using caution not to damage the fins or the pipes.

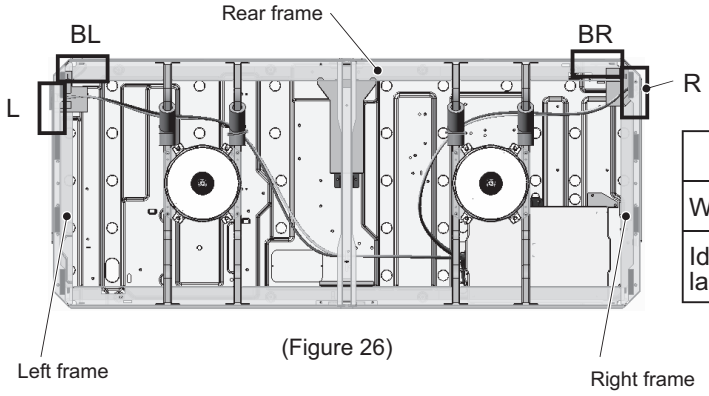


Removing the front heat exchanger
(Figure 24)



Removing the rear heat exchanger
(Figure 25)

(21) Re-place the front and the rear heat exchangers in the reverse order as they were removed.
Re-place the components, except the rear heat exchanger support, that were removed as they were.
Re-place each unit wiring according to the wiring color and identification label (attached to the wiring protective tube) shown in the table below.



(Figure 26)

	L	R	BL	BR
Wiring color	Yellow	Blue	Red	White
Identification label	XL-L	XL-R	XL-BL	XL-BR

4. EXL-module

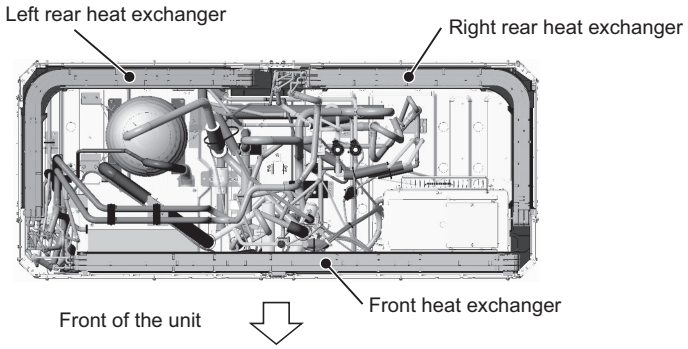


Figure 1

(1) Remove the two front panels from the unit. (14 screws, Figure 2)
(2) Remove the fin guard. (12 screws, Figure 2)
(3) Remove the pipe cover. (Figure 3)
(4) Remove the two screws from the front center pillar. (2 screws, Figure 3)
Remove the left drain pan. (2 screws; 2 tie bands to be cut, Figure 3)
(5) Remove the right drain pan. (2 screws, Figure 3)

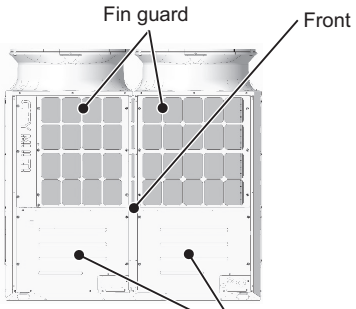


Figure 2

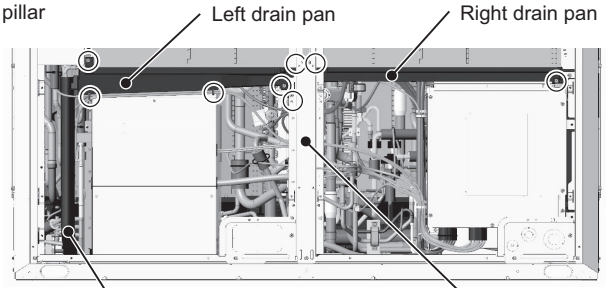


Figure 3

(6) Remove the cable straps from the front center pillar. (3 straps, Figure 4)
(7) Remove the cable straps holding the motor wiring in the control box. (3 straps, Figure 5)

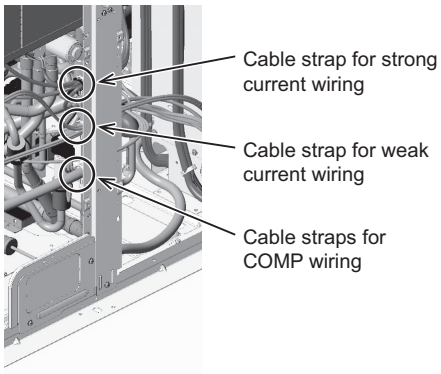


Figure 4

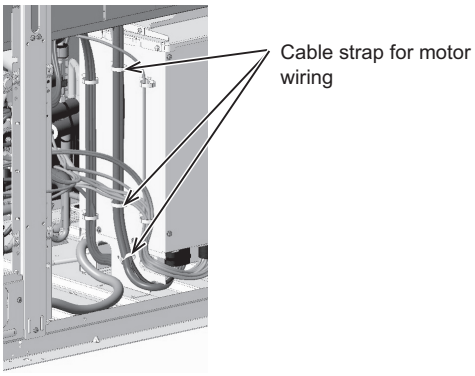
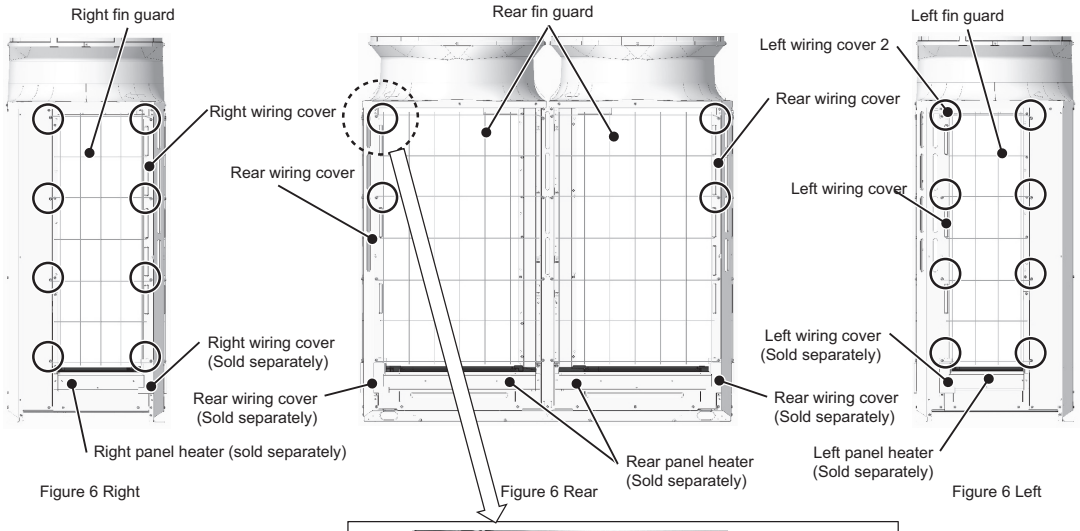
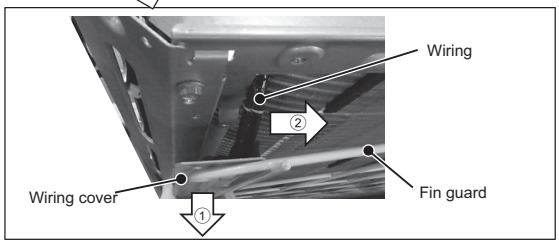


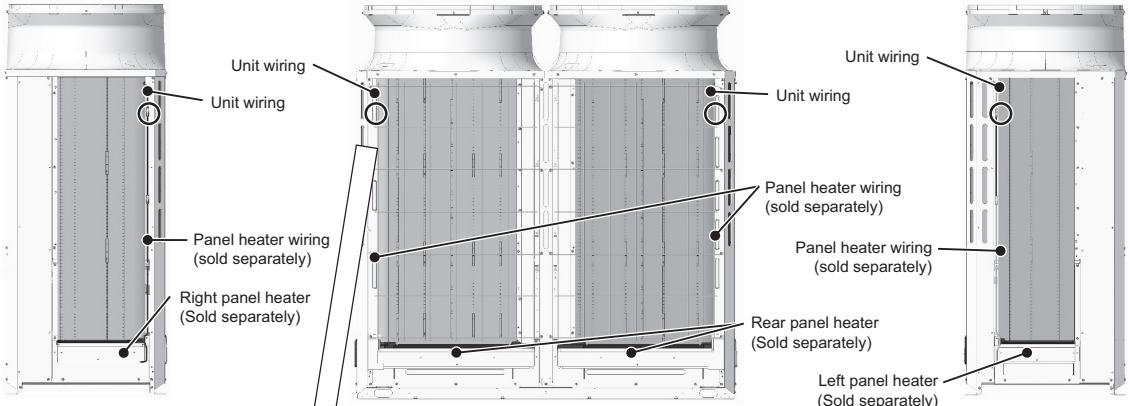
Figure 5

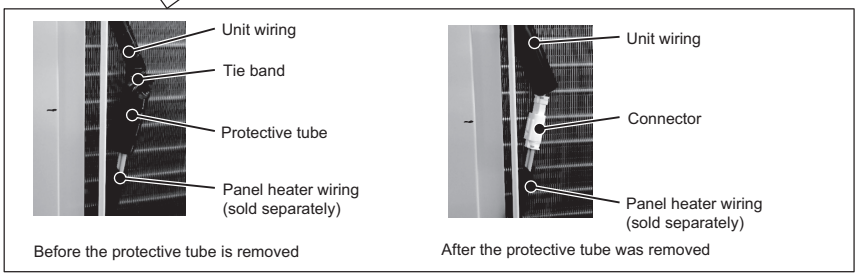
(8) Remove the fin guards and wiring covers from both sides of the unit. (18 screws, Figure 6 right and left)
Remove the following screws from the rear fin guard, lift the wiring cover toward the outside of the unit (in the direction of arrow ①), and remove the wiring from the wiring cover. (4 screws, Figure 6 rear)





(9) Remove the panel heater wiring if a separately sold panel heater is installed. Hold the excess wiring on the panel heater side together with tape. (4 places, Figure 7)





(10) Remove the fan guard. (12 screws, Figure 8)
(11) Remove the wiring from the middle frame. (Figure 9)
(12) Remove the tie bands holding the motor ASSY and the unit wiring.
Remove the motor ASSY, using caution not to damage the motor wires or the fans. (16 screws, Figure 9)

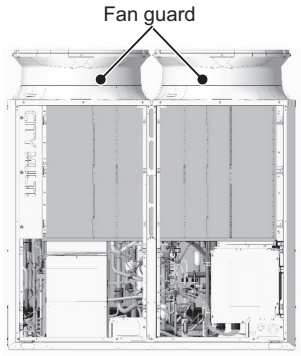


Figure 8

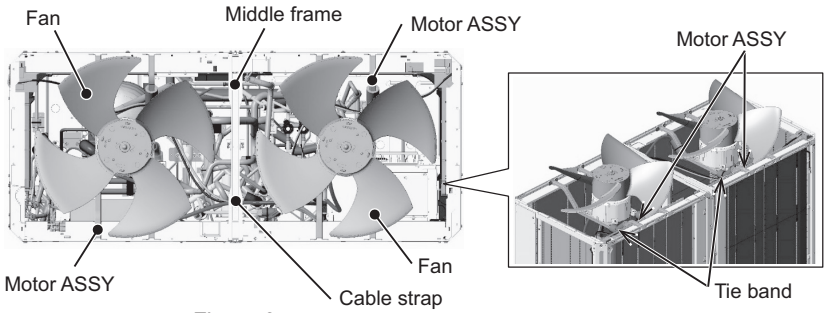


Figure 9

(13) Remove the wiring of the main unit from the left and right frames. (Figure 10)
Hold excess wiring (including the disconnected unit wiring) out of the way before removing the heat exchanger.

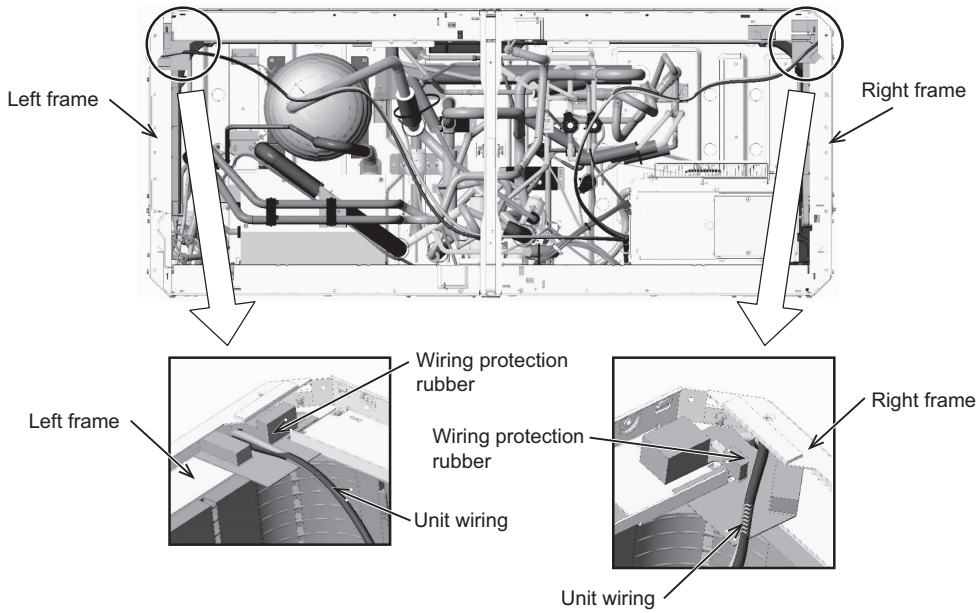
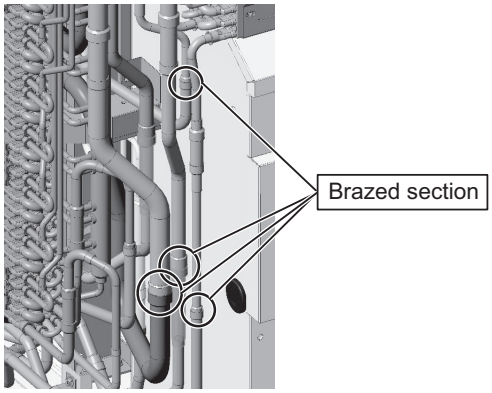
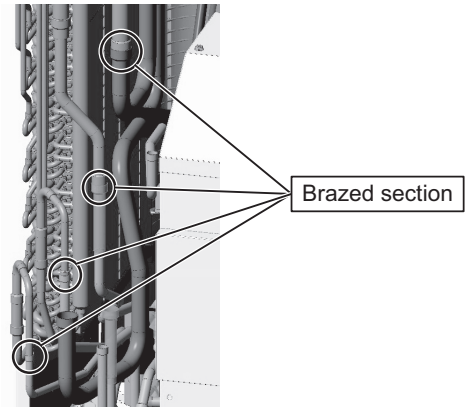


Figure 10

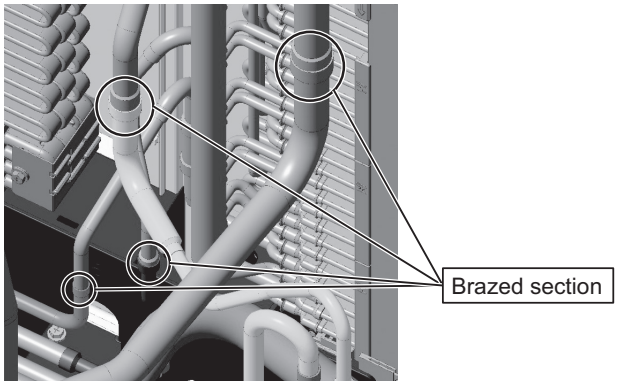
(14) To remove the front heat exchanger, protect the surrounding with the recommended felt that is wet with water, and remove the braze from four areas, using caution not to damage the electrical parts and the pipe covers. (Figure 11)
Remove the braze from four areas to remove the right and left heat exchangers in the back. (Figures 12 and 13)



Removing the front heat exchanger (Figure 11)



Removing the left rear heat exchanger (Figure 12)



Removing the right rear heat exchanger (Figure 13)

Precautions for replacing refrigerant circuit components (heat exchanger)
- Be sure to perform oxidation-free brazing.
- After brazing, check the condition around the braze, and check for refrigerant leakage before vacuuming the pipes.
- Direct the brazing torch flame away from the wiring and sheet metal of the unit.
- To prevent the flame from adversely affecting the heat exchanger, piping on the unit, or pipe covers during brazing, place the following type of felt or its equivalent soaked with water around the areas to be brazed.
  Recommended felt: Sputter Felt 50CF-11 (5 t × 1 m × 1 m) of Trusco Nakayama Co., Ltd.
  Compliant with the Flame Retardancy Test (JIS A 1323) Class A of "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works."

(15) Remove the front pillar. (7 screws, Figure 14)
(16) Remove the TH7 through the hole on the front pillar. (Figure 14 Rear)

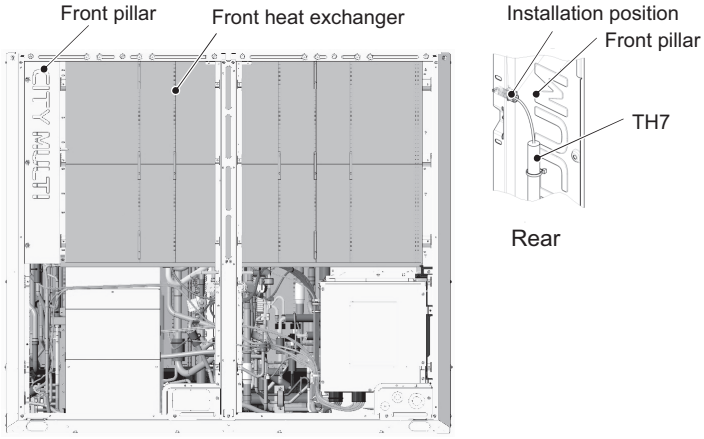


Figure 14

(17) To remove the front heat exchanger, remove the front, right, left, and center frames. (16 screws, Figure 15)
To remove the right and left heat exchangers in the back, remove the rear frame. (18 screws, Figure 15)
(18) Remove the front center pillar. (2 screws, Figure 16)

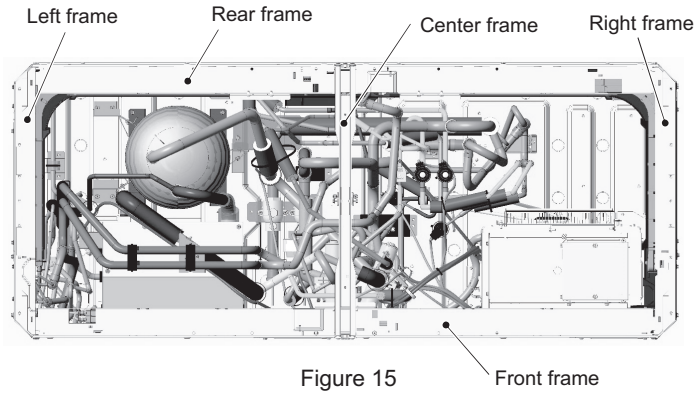


Figure 15

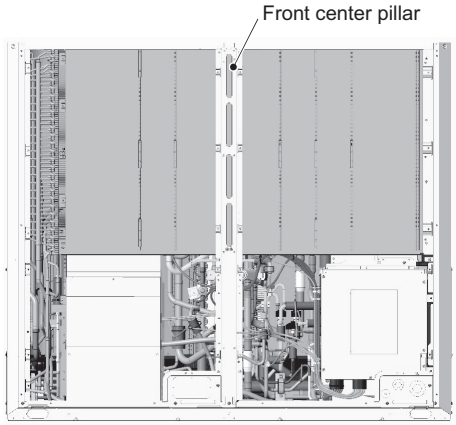
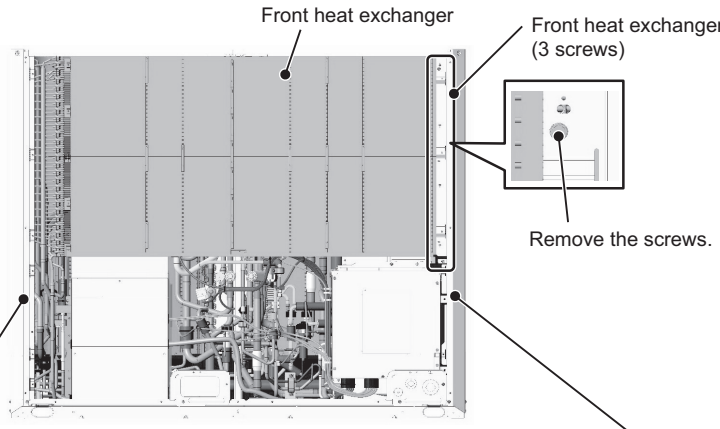
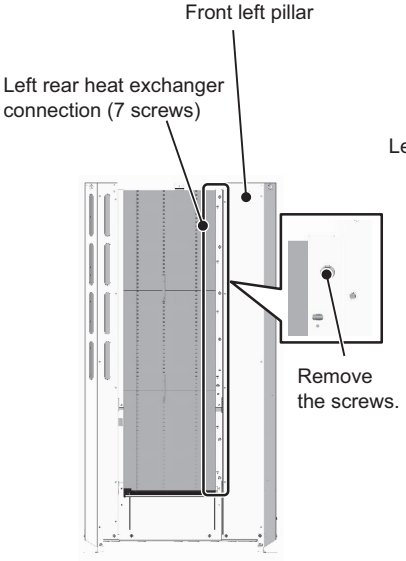


Figure 16

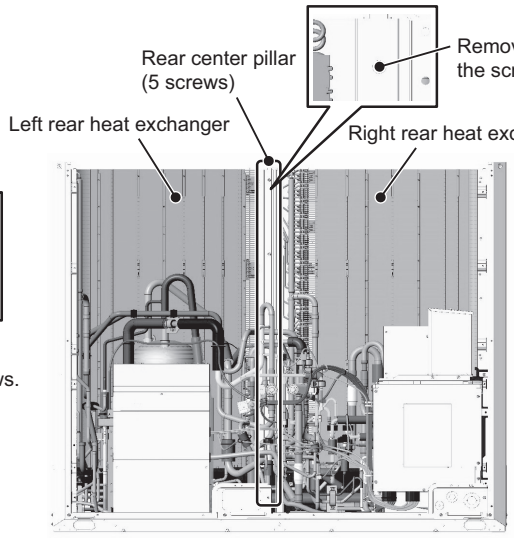
(19) To remove the front heat exchanger, remove the screws on the front right pillar. (3 screws, Figure 17)
To remove the left rear heat exchanger, unscrew the following screws: The screws on the left side of the left pillar in the front, and the screws on the center pillar in the back. (12 screws, Figures 18 and 19)
To remove the right rear heat exchanger, unscrew the following screws: The screws on the right side of the right pillar in the front, and the screws on the center pillar in the back. (9 screws, Figures 19 and 20)



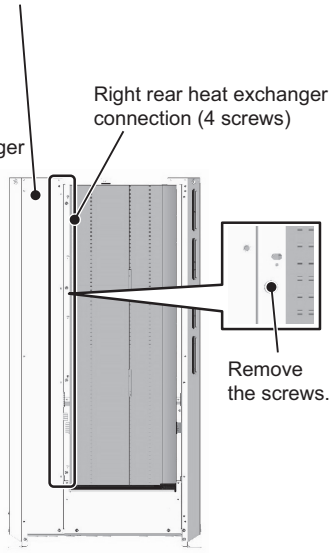
Removing the front heat exchanger (Figure 17)



Removing the left rear heat exchanger (Figure 18)

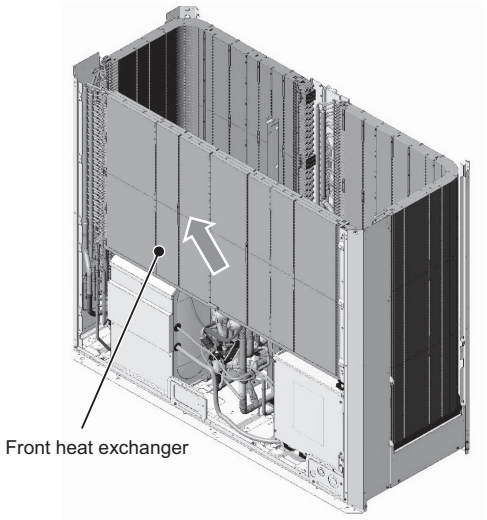


Removing the left and right heat exchangers in the back (Figure 19)

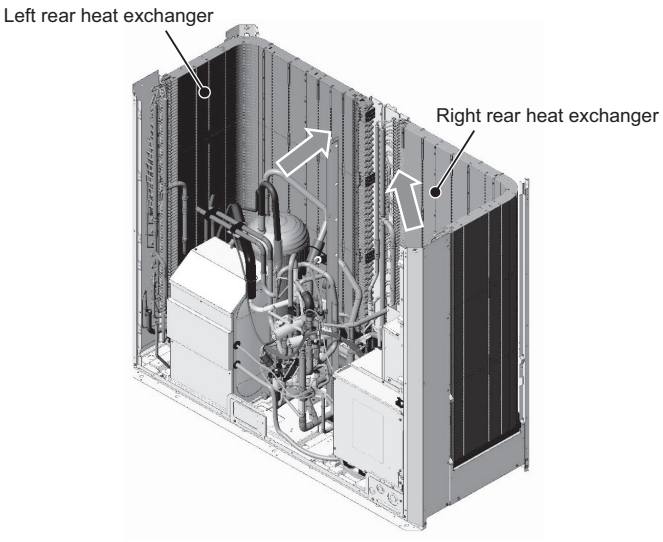


Removing the right rear heat exchanger (Figure 20)

(20) Lift the heat exchanger diagonally upwards, and remove it, exercising caution not to damage the fins and piping.



Removing the front heat exchanger (Figure 21)



Removing the right and left heat exchangers in the back (Figure 22)

(21) After replacing the front and the back heat exchangers, reinstall them in the reverse order.
Restore the removed parts to their original positions.
Reconnect the unit wiring to the original condition, referring to the wire color and identification label (attached to the wire protection tube) shown in the table below.

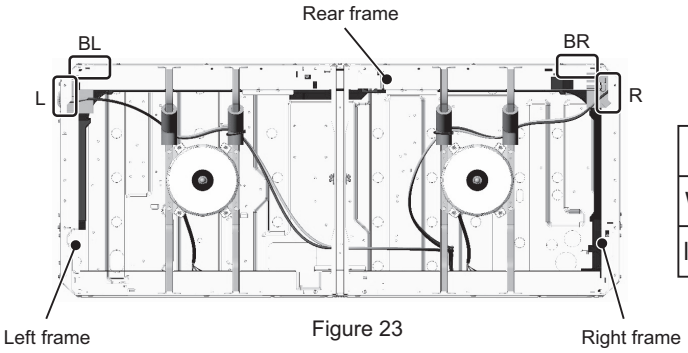


Figure 23

	L	R	BL	BR
Wiring color	Yellow	Blue	Red	White
Identification label	XL-L	XL-R	XL-BL	XL-BR

8-12-9 Accumulator Replacement Procedure

1. S, L-module

(1) Remove the front heat exchanger. Refer to 8-12-8 Maintenance Procedures for the Heat Exchanger for details.
(2) Remove the top, front, and right compressor covers. Refer to 8-12-4 Compressor Replacement Procedure for details.
(3) Remove the duct from the control box. Refer to the control box replacement procedure for details.
(4) Remove the right and inside (right) compressor panels by unscrewing the four screws. (Applicable only to the S-module. See Figures 1 and 2.)

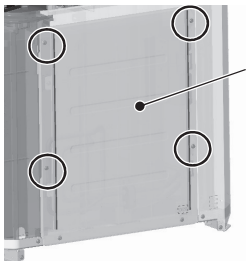


Figure 1

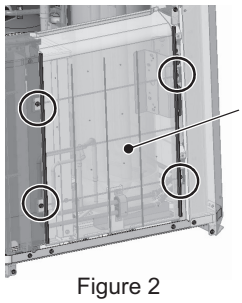


Figure 2

(5) Unscrew the four screws from the right accumulator fixing plate. (See Figures 3 and 5.)
(6) Unscrew the four screws from the rear accumulator fixing plate. (See Figures 3 and 4.)
(7) Remove the four screws from the accumulator fixing base legs. (See Figure 6.)

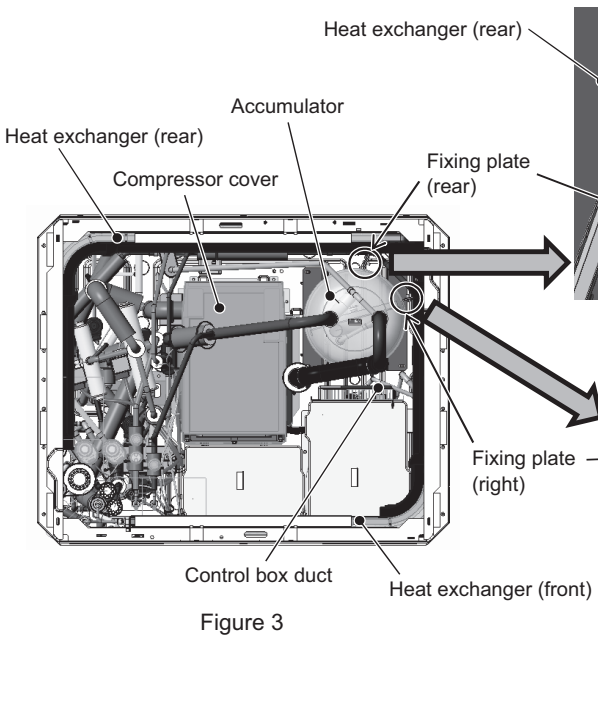


Figure 3

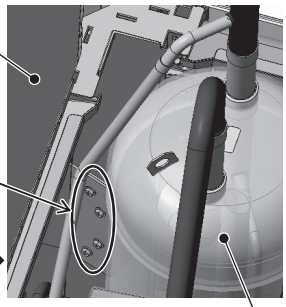


Figure 4

Figure 5

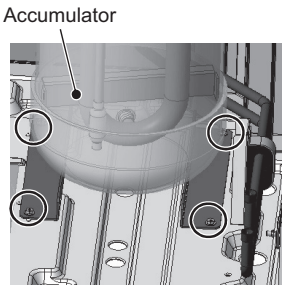


Figure 6

(8) Remove the braze at the four areas on the accumulator inlet and outlet pipes shown in Figure 7.

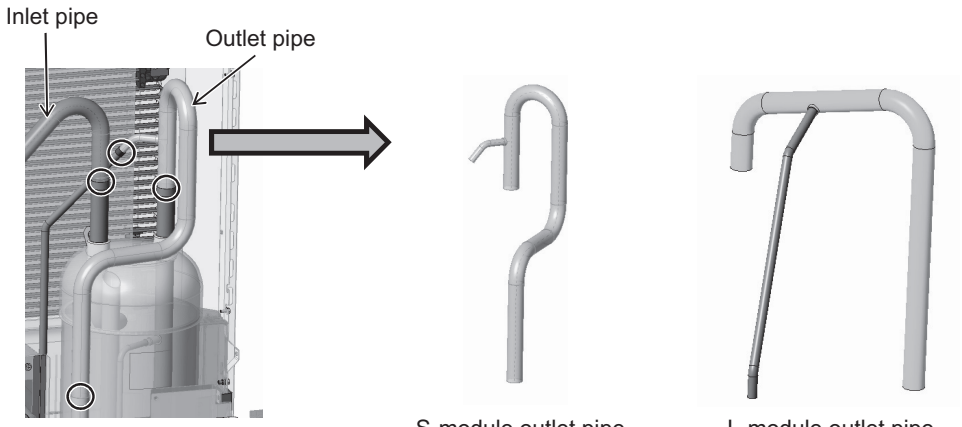


Figure 7

(9) Re-place the accumulator in the reverse order as it was removed.
Re-place the components that were removed as they were.

*Notes on replacing refrigerant circuit components (accumulator)
- Be sure to perform non-oxidized brazing.
- Before heating the pipes, wrap the refrigerant circuit components with a wet towel to keep the temperature of the components from rising above 120°C.
- After brazing is done, check that the brazing is done properly and check for leaks before vacuum-drying the pipes.
- Direct the brazing torch flame away from the wiring and sheet metals inside the unit not to damage them.
- Wet felt sheets listed below (or its equivalent), and place them around the areas to be brazed to protect the heat exchanger, pipes, and pipe covers from being damaged from the brazing torch flame.
  Recommended felt sheets: Spatter felt 50CF-11 (5t x 1 m x 1 m) by TRUSCO Nakayama
  Felt sheets that meet the JIS standard (JIS A 1323 type A "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works")

2. XL-module

(1) Remove the front heat exchanger. Refer to 8-12-8 Maintenance Procedures for the Heat Exchanger for details.
(2) Remove the top, front, and right compressor covers. Refer to 8-12-4 Compressor Replacement Procedure for details.
(3) Remove the fixing plate 1 above four-way valve (21S4b), saddle, and rubber spacer by unscrewing the three screws shown in Figure 8.
Either remove or protect the wiring, pipe cover, and plastic components to keep them from being damaged by the torch flame.

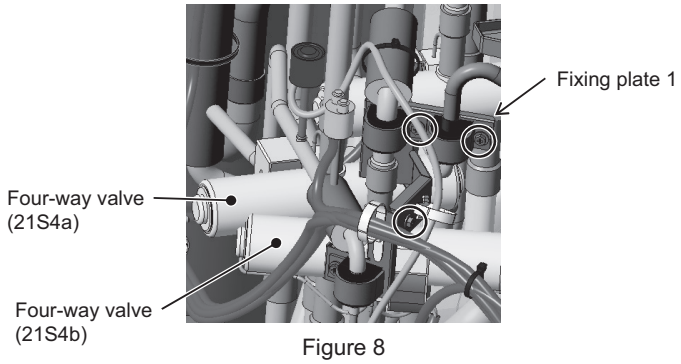


Figure 8

(4) Remove the sheet metal, cable ties, and rubber spacers from the accumulator mounting plate by unscrewing the screw. (See Figure 9.)

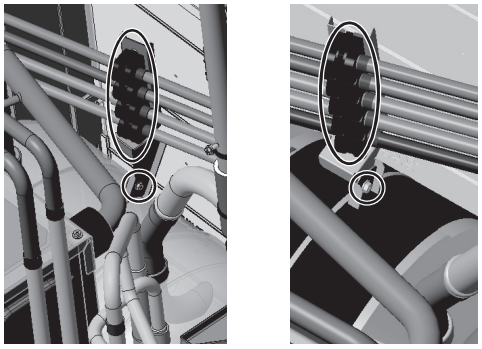


Figure 9

(5) Remove the braze at the two areas on the accumulator outlet (suction) pipe. (See Figure 10.)
(6) Remove the braze at the two areas on the accumulator inlet pipe. (See Figure 11.)

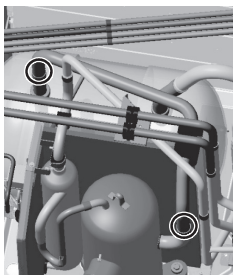


Figure 10

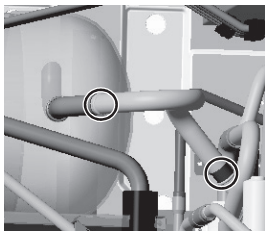


Figure 11

(7) For the four-pipe piping on the back of the accumulator, follow the procedures below.
Remove the braze at the four areas on the four pipes on the back of the accumulator. (See Figure 12.)
Remove the braze at the six areas that are located on the right side of the four pipes on the back of the accumulator. (See Figure 13.)

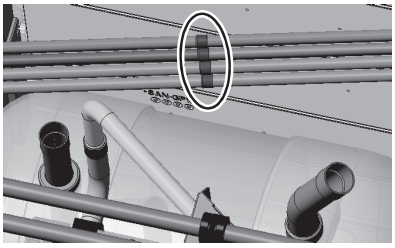


Figure 12

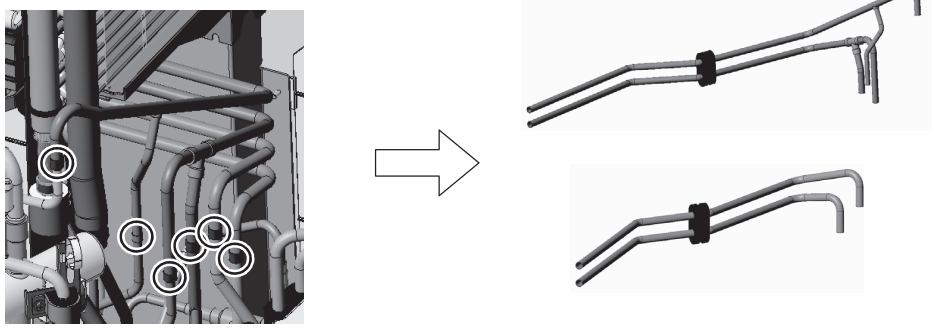


Figure 13

(8) For the five-pipe piping on the back of the accumulator, follow the procedures below.
Remove the braze at the five areas on the five pipes on the back of the accumulator. (See Figure 14.)
Remove the braze at the seven areas that are located on the right side of the five pipes on the back of the accumulator. (See Figure 15.)

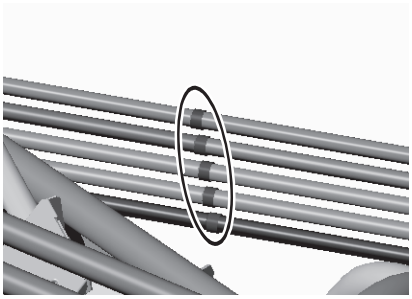


Figure 14

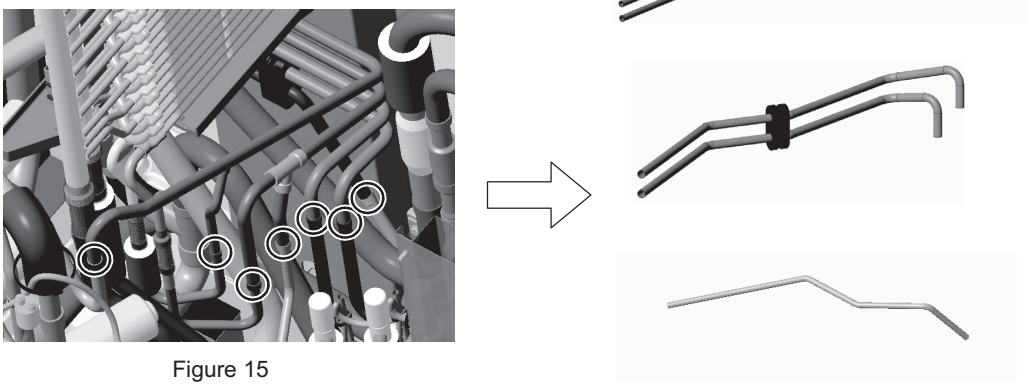


Figure 15

(9) Re-place the accumulator in the reverse order as it was removed.
Re-place the components that were removed as they were.

3. EXL-module

(1) Remove the front heat exchanger. Refer to "8-12-8 Maintenance Procedures for the Heat Exchanger" for details.
(2) Remove the top and the front compressor covers. (6 screws, Figure 2)
(3) Cut the tie bands holding TH4 and TH15, and remove the wires through the rubber bushes on the right compressor cover. (2 tie bands, Figure 3)
(4) Remove the right compressor cover. (1 screw, Figure 3)

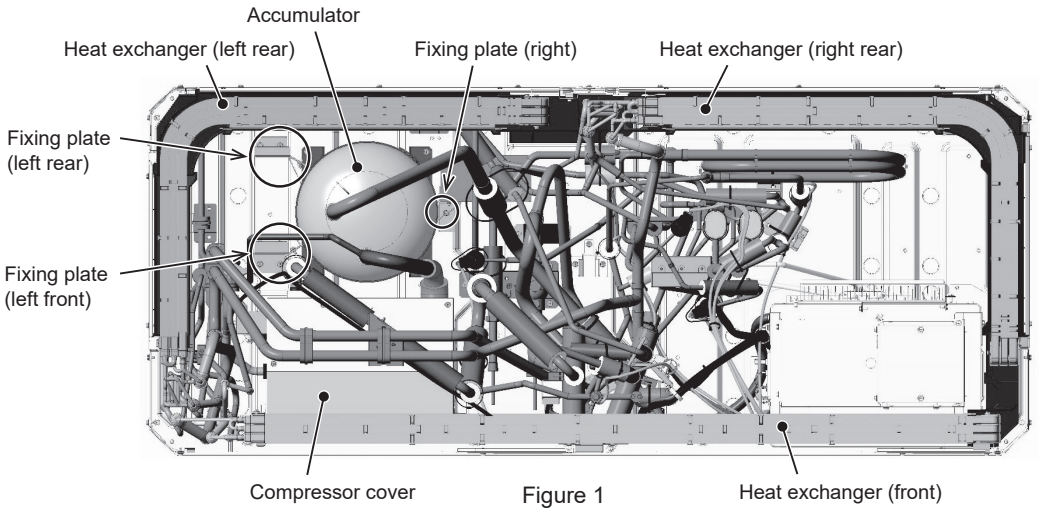


Figure 1

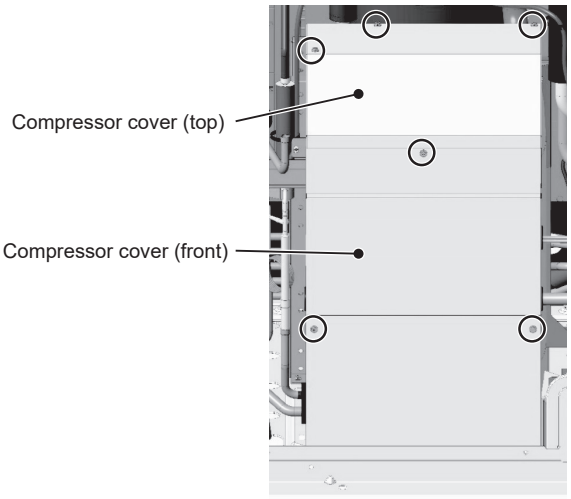


Figure 2

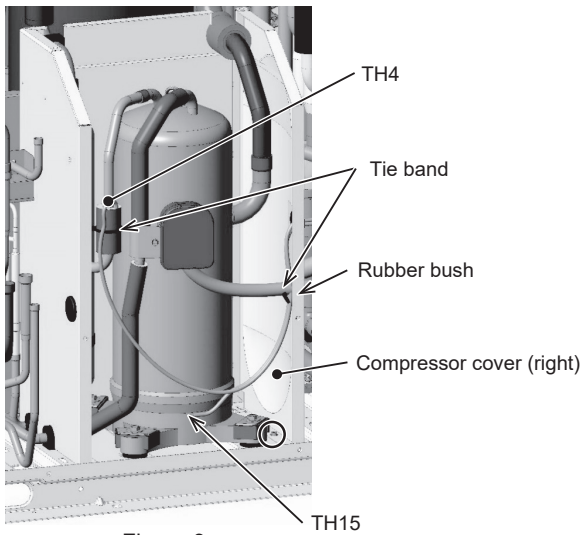


Figure 3

(5) Remove the screws from the fixing plates (left front and left rear) holding the accumulator. (4 screws, Figures 4 and 5)
(6) Remove the screws from the legs of the fixing plates (left front and left rear) holding the accumulator in place. (4 screws, Figures 4 and 6)
(7) Remove the screws from the right fixing plate holding the accumulator. (2 screws, Figures 4 and 7)
(8) Remove the screws from the leg of the fixing plate holding the accumulator. (4 screws, Figure 8)

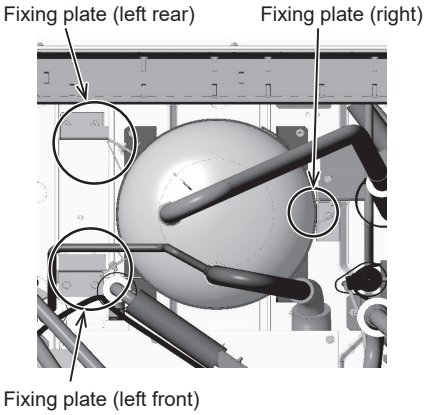


Figure 4

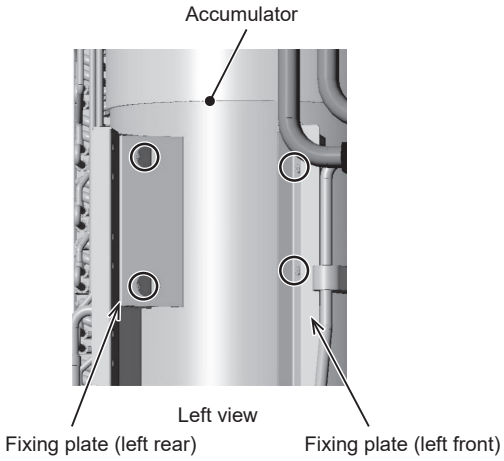


Figure 5

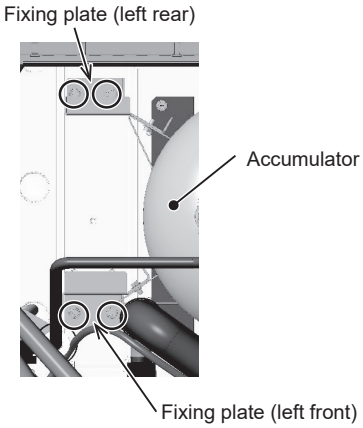


Figure 6

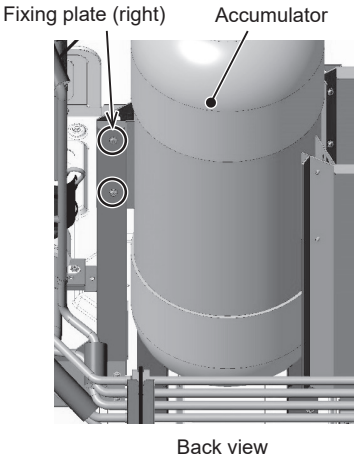


Figure 7

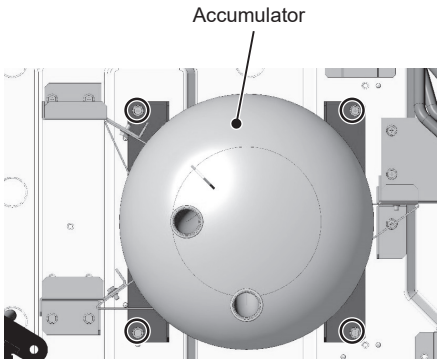


Figure 8

(9) Remove the pipe cover. (2 covers, Figure 9)
*Save the cover for later use.

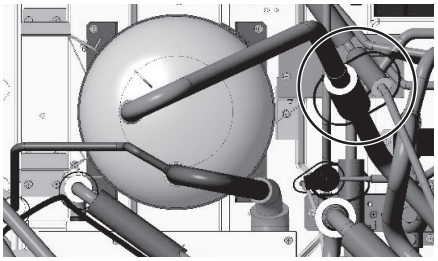


Figure 9

(10) Remove the braze from the inflow and outflow pipings on the accumulator. (Debrazing: 5 places, Figure 10)

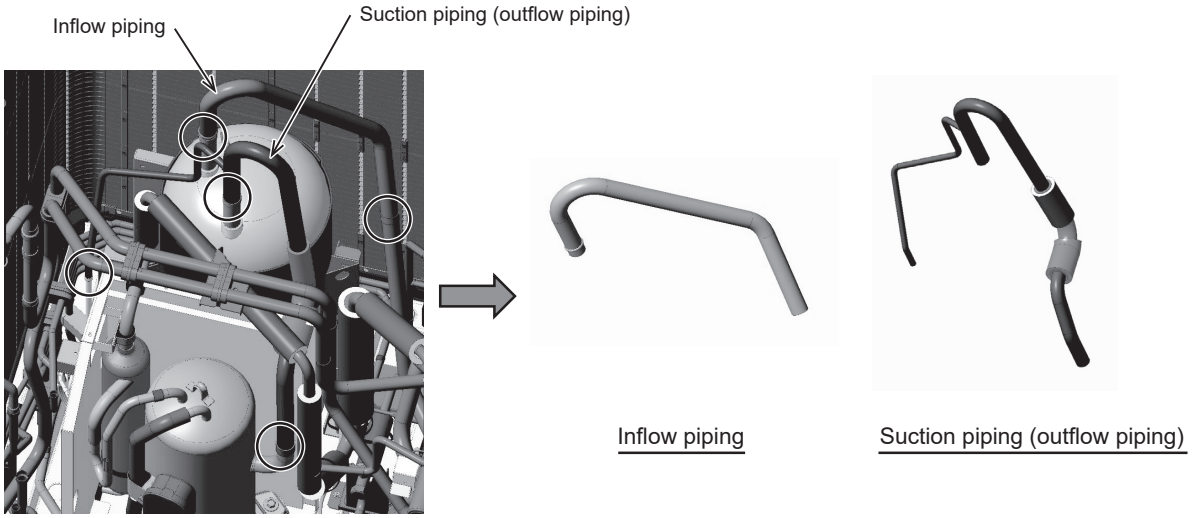


Figure 10

(11) After replacing the accumulator, reinstall the accumulator in the reverse order.
Install the removed parts to their original positions.

Precautions for replacing refrigerant circuit components (accumulator)
- Be sure to perform oxidation-free brazing.
- When heating the piping, wrap a wet towel around the refrigerant circuit parts so that the temperature of the refrigerant circuit parts does not exceed 120°C.
- After brazing, check the condition around the braze, and check for refrigerant leakage before vacuuming the pipes.
- Direct the brazing torch flame away from the wiring and sheet metal of the unit.
- To prevent the flame from adversely affecting the heat exchanger, piping on the unit, or pipe covers during brazing, place the following type of felt or its equivalent soaked with water around the areas to be brazed.
  Recommended felt: Sputter Felt 50CF-11 (5 t × 1 m × 1 m) of Trusco Nakayama Co., Ltd.
  Compliant with the Flame Retardancy Test (JIS A 1323) Class A of "Flame retardant testing method for spark droplets of welding and gas cutting on fabric sheets in construction works."

8-13 Troubleshooting Problems Using the LED Status Indicators on the Outdoor Unit

If the LED error display appear as follows while all the SW4 switches and SW6-10 are set to OFF, check the items under the applicable item numbers below.

1. Error code appears on the LED display.

Refer to the following page(s). [7-1 Error Code and Preliminary Error Code Lists]

2. LED is blank.

Take the following troubleshooting steps.

(1) Refer to the section on troubleshooting the transmission power supply circuit, if the voltage across pins 1 through 3 of CNDC on the control panel is outside the range between 220 VDC and 380 VDC. [8-10-2 Troubleshooting Problems with Outdoor Unit Transmission Power Supply Circuit]

(2) If the LED error display becomes lit when the power is turned on with all the connectors on the control board except CNDC disconnected, there is a problem with the wiring to those connectors or with the connectors themselves.

(3) If nothing appears on the display under item (2) above AND the voltage between pins 1 and 3 of CNDC is within the range between 220 VDC and 380 VDC, control board failure is suspected.

3. Only the software version appears on the LED display.

(1) Only the software version appears while the transmission cables to TB3 and TB7 are disconnected.

1) Wiring failure between the control board and PS board. (CN62, CNPS, CNIT, CNS2, CN102)
2) If item 1) checks out OK, the transmission line power supply board failure is suspected.
3) If items 1) and 2) check out OK, control board failure is suspected.

(2) If the LED shows the same display as the initial display upon disconnection of transmission lines (TB3, TB7), there is a problem with the transmission lines or with the connected devices. [10-1-2 Initial LED Display]

Chapter 9 USB Function

9-1 Service Overview

9-1-1 Function Overview

The control board has a USB port that allows the use of the following two functions.

1. Collection and storage of operation data

Operation information from indoor units, outdoor units, and other equipment and devices in the system are collected andstored in the flash memory in the control board of the outdoor unit (OC).
The data can be transferred and stored in a USB memory stick.

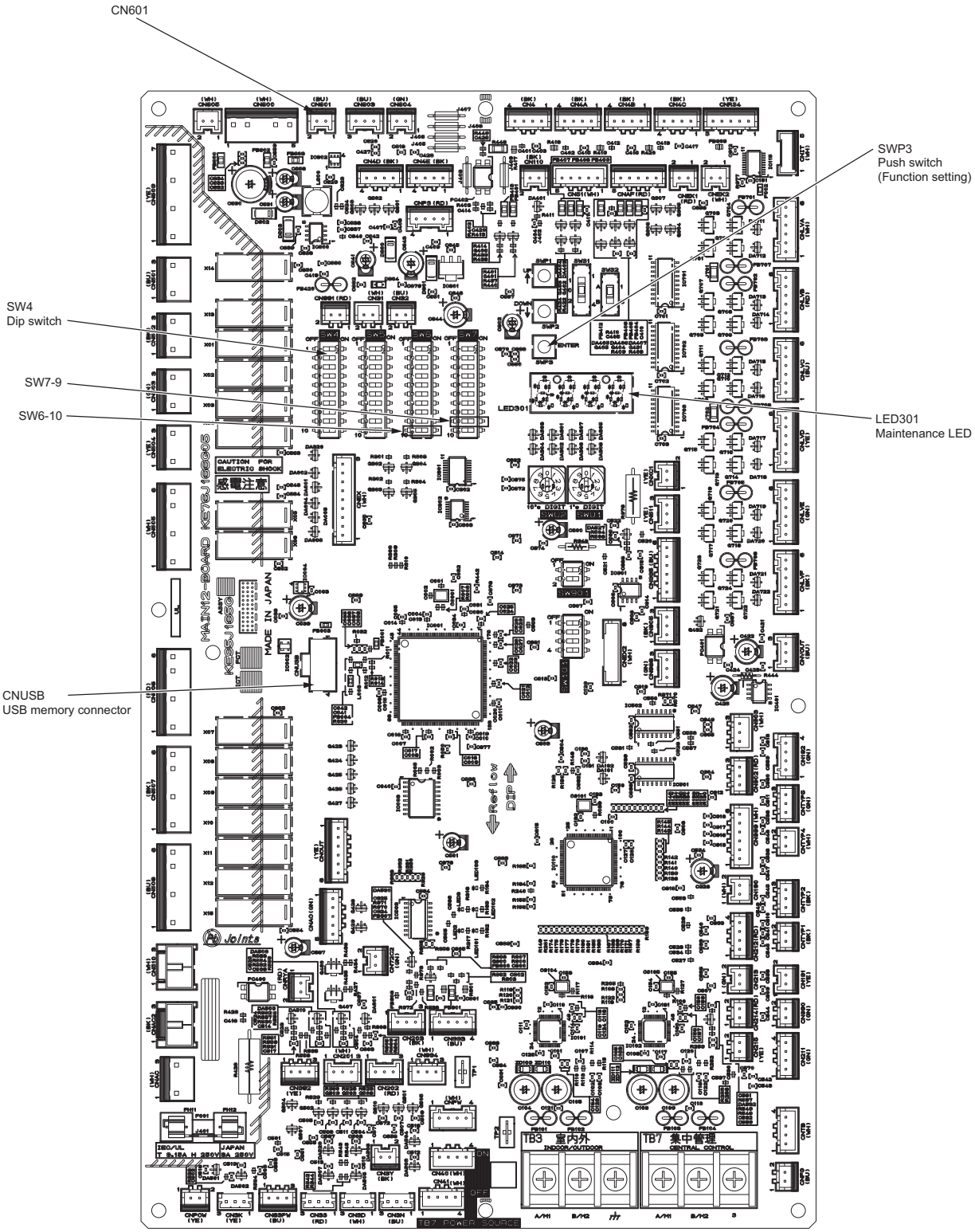
2. Software rewrite function

The software on outdoor units can be rewritten using a USB memory stick.

For detailed information about each function, refer to Section [9-2 Operation Data Collection and Storage Functions] and Section [9-3 Software Rewrite Function on the USB].
For information regarding the maintenance LED display content and regarding troubleshooting, refer to Section [9-4 Maintenance LED Display and Troubleshooting].

9-1-2 System Structure

(1) Control board on the outdoor unit



9-1-3 Necessary Materials

The use of the USB function requires a USB memory stick and a portable battery charger.
See below for the types of USB memory stick and portable charger that can be used.

(1) USB memory stick

Use a USB memory stick that meets the following specifications.

- USB 2.0 compatible
- Formatted in FAT 32
- Without a security function

(2) Portable battery charger

Use a portable battery charger that meets the following specifications for rewriting the software.

- USB 2.0 compatible
- Voltage and amperage rating of 5 V and 2.1 A (MAX)

A LEAD WIRE ASSY USB is required to connect the control board and the portable charger.
Use a cable that meets the following specifications.

- [Type A male] - [Male XA connector for the PCB] USB cable. For details of “LEAD WIRE ASSY USB”, please contact the sales office.

The connector on the control board side is a female XA connector for the PCB.

9-2 Operation Data Collection and Storage Functions

Operation data of the units collected on the outdoor unit can be recorded in the flash memory of the control board. These data can also be exported to and recorded in a USB memory stick.
See Section [9-2-2 Storing Data on a USB Memory Stick] for information on storing data on a USB memory stick.
See Section [9-2-3 Collecting Operation Data] for information on the collection of operation data.

9-2-1 Preparation

A USB memory stick and a portable battery charger are required to store data on a USB memory stick (not supplied).
Prepare a USB memory stick and a portable battery charger as described in Section [9-1-3 Necessary Materials].

9-2-2 Storing Data on a USB Memory Stick

Store operation data recorded in the flash memory on the control board in a USB memory stick.
The content of the stored file can be confirmed using the maintenance tool.
Operation data should be stored in a dedicated mode (Store Mode).

1. Procedure

(1) Preparation of a USB memory stick

1) Since the size of the saved file containing operation data is 50 MB, prepare a USB memory stick with 50 MB or more available memory. A USB memory stick which has other data in it may also be used. However, it is recommended to clear the remaining data in advance to prevent any malfunctions.The saved file is named "MNTXXX.MT." XXX represents a serial number from 000 to 100. Since files named "MNT101.MT" or more cannot be created, unnecessary folders and files should be deleted.

(2) Storing data on a USB memory stick

Data can be stored to a USB memory stick either with the main power to the outdoor unit turned on (Method 2) or off (Method 1). For safety reasons, it is recommended to store the data on a USB memory stick with the main power to the outdoor unit turned off (Method 1). If turning off the power is not feasible, take appropriate measures to ensure safety.

[Method 1 (recommended)] Storing data on a USB memory stick with the main power to the outdoor unit turned off

<Starting up the unit in the data storage mode>

- Turn off the main power to the outdoor unit.
- Connect a USB memory stick to the USB port (CNUSB) on the control board.
- With SWP3 (ENTER) being held down, connect the portable battery charger to the XA connector (CN601) for the PCB, and supply power to the control board. Wait for five seconds until the USB memory stick is recognized.
- [USB] will appear on the monitoring LED301. If "USB" does not appear, refer to Section 1.(1) in [9-4-2 Troubleshooting].

- When [USB] has appeared on the LED, lift the finger off SWP3 (ENTER).
  The unit is now in the data storage mode.

<Storing data>

- Press SWP3 (ENTER). If the data storage process has properly started, the progress (0-99) will be shown on the monitoring LED 301.
- [End] on the LED indicates successful completion of the data storage process.
  *It takes approximately five minutes for the data storage process to be completed.

<Ending the data storage mode>

- When done storing data, disconnect the portable battery charger from the control board.
- Then disconnect the USB memory stick from the control board.
- Turn the main power to the outdoor unit back on.
- If the data collection process needs to be started, check the operation data collection status by following the procedures explained in [9-2-3 Collecting Operation Data]and making the necessary settings.

[Method 2] Storing data on a USB memory stick with the main power to the outdoor unit turned on

<Starting up the unit in the data storage mode>

- Stop the operation of all indoor units.
  *Although operation data can be collected without stopping all indoor units, doing so may be detected as a communication error.
- Connect a USB memory stick to the USB port (CNUSB) on the control board. Wait for five seconds until the USB memory stick is recognized.
- Press and hold SWP3 (ENTER) for approximately 10 seconds until [USB] appears on the monitoring LED 301.

- When [USB] has appeared on the LED, lift the finger off SWP3 (ENTER).
  The unit is now in the data storage mode.

<Storing data>

- Press SWP3 (ENTER). If the data storage process has properly started, the progress (0-99) will be shown on the monitoring LED 301.
- [End] on the LED indicates successful completion of the data storage process.
  *It takes approximately five minutes for the data storage process to be completed.

<Ending the data storage mode>

- When done storing data, disconnect the USB memory stick from the control board.
- Press and hold SWP3 (ENTER) for approximately 10 seconds until [End] disappears from the monitoring LED 301.
- Restart the indoor and outdoor units that were stopped to perform data storage.
- If the data collection process needs to be started, check the operation data collection status by following the procedures explained in [9-2-3 Collecting Operation Data]and making the necessary settings.

(3) Confirmation of stored file

Confirm that the operation data is stored in the USB memory stick. Insert the USB memory stick into a computer, and check the contents in the memory stick.

Check that there is the following file in the memory stick.
File: MNTXXX.MT
“XXX” represents serial numbers from “000” to “100.”

9-2-3 Collecting Operation Data

This function is used to collect the operation data of the outdoor and indoor units via M-NET, and record the data in the flash memory on the control board. When the memory is full, it is overwritten from the first segment.
The settings for checking the status of operation data collection, for starting/ending data collection, and for continuing/stopping error-data collection are made, using the switches on the control board. The items to be set are shown in the table below.
The data collection setting is enabled by default, and the setting for error data collection during an error is disabled by default.

Switch			Function	Operation set by the switch		Timing for switch operation	Unit for setting
SW6-10	SW4 (0: OFF, 1: ON)			OFF (LED3 OFF)	ON (LED3 ON)		
OFF	NO.28	00111000000	Data being collected	-	-	Anytime after power-on	OC setting necessary
ON	NO.817	10001100110	Data collection enabled	Enabled	Disabled	Anytime after power-on	OC setting necessary
ON	NO.818	01001100110	Data collection during an error	Disabled	Enabled	Anytime after power-on	OC setting necessary

*When setting the switch SW4 on the control board, make sure the outdoor unit is energized.
Also use Section [5-1 Dipswitch Functions and Factory Settings] as a reference.

The procedure for making the operation data settings is shown below.

1. Operation procedure

(1) Status Confirmation

1) Confirm the current status of operation data collection by setting the switches on the control board following the table shown above.
Switch setting: SW6-10: OFF
SW4: 28
Check the status on the maintenance LED display (LED301).
* For details, refer to Section [9-4-1 Maintenance LED Display Content List]
- When “ON” or “OFF” is displayed, go to step (2) and the later steps.
- When “Err” is displayed, go to step (3) and the later steps.
- When “F-Er” is displayed, it indicates an error in the flash memory on the control board.
Refer to Section [9-4-2 Troubleshooting]

(2) Setting Start and End of data collection

1) Set the switches on the control board by following the table shown above.
Switch setting: SW6-10: ON
SW4: 817
2) Press SWP3 (ENTER).With each switch operation, the setting can be alternately switched ON and OFF.
3) After conducting step (1), check that the operating condition is stable.
Data collection start: OFF (Enabled)
Data collection end: ON (Disabled)
Setting procedure is now complete.

(3) Settings for error-data collection during an error

Stops or continues error-data collection when an error occurs.
1) Referring to the table above, set the control switches.
Switch setting: SW6-10: ON
SW4: 818
Stop collecting error-data when an error occurs: OFF
Continue collecting error-data when an error occurs: ON
2) To set the switches, press SWP3 (ENTER). Each pressing of SWP3 (ENTER) toggles between ON and OFF. Error data in the 6000's and the 7000's will be collected, regardless of the SW4 (818) settings.

(4) Restarting data collection

1) If “Err” is shown, it indicates that data collection is being suspended for some reason, even though data collection is enabled. To restart, it is necessary to set the switches on the control board. Referring to (2)-1) and (2)-2), set the switches on the control board from OFF (original setting) to ON, and then to OFF again, and make sure the switches settings are indicated as being ON, following the instructions in (1)-1).

9-2-4 Precautions

For dealing with display on the maintenance LED and other problems, refer to Section [9-4 Maintenance LED Display and Troubleshooting].

1. Storage of data in a USB memory stick

- Take extra care regarding electric shock during the work on the control board, such as the insertion of the USB memory stick.
- Before starting in Normal Mode, remove the USB memory stick from the control board.
- Storing data in the USB memory stick may take a long time resulting in OS and communication errors. These errors affect neither storing process nor unit operation. If an error occurs, refer to [9-4-2 Troubleshooting].
- After normal startup, set the operation status of the air-conditioning units to the original status.
- USB memory sticks may become unusable due to unexpected damage or memory shortage. It is recommended to take extra USB memory sticks to the site.
- If only the OS is operated due to problems with the OC, collect data also from the OS by following the same operation procedure as for OC. Refer to Section [9-2-2 Storing Data on a USB Memory Stick].

2. Collection of operation data

- The collection of operation data does not start immediately after power-on, but does after ten minutes.
- When the operation data are being collected from AE-200 or the Maintenance Tool, the function to collect outdoor unit (OC) data with a USB memory stick will not be available for use.

9-3 Software Rewrite Function on the USB

The USB memory stick may be used to rewrite the software of the outdoor unit in the same way as using a ROM writer.

9-3-1 Preparation

- Prepare a USB memory stick and a portable battery charger.
  A LEAD WIRE ASSY USB for connecting the control board and the charger is also necessary.
  Make sure the portable battery charger is sufficiently charged.
- Prepare a countermeasure program file "******.mot" for the intended model.
- Copy the software rewrite program file "******.mot" onto the root folder of the USB memory stick.
  Install only one program and only in the root folder of the USB memory stick.

9-3-2 Rewriting Software

The procedure is shown below.

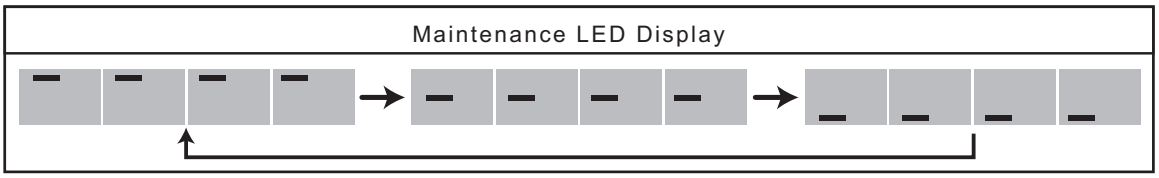
1. Operation procedure

(1) Starting software rewrite mode

1) Shut down the power for the outdoor unit. Make sure the power for the control board is off.
   This is done by confirming LED2 is off.
2) Turn on switches SW7-9 of the control board.
3) Insert the USB memory stick into the USB port (CNUSB) on the control board.
4) Connect the portable battery charger to the XA connector (CN601) for the PCB.
   The power of the control board will turn on. Wait for five seconds until the USB memory stick is recognized.
5) Make sure the display “Pro” is shown on the maintenance LED (LED301)
   This shows that Software Rewrite Mode has been started.

(2) Performing software rewriting

1) Wait for 5 seconds after “Pro” appeared on the LED, and press SWP3 (ENTER) to start software rewrite.
   When the rewrite process is in progress, progress bars move as shown below.



2) If "End" is displayed on the LED, the rewrite process has been completed correctly. * Generally, this process takes about five minutes.

(3) Confirmation of operation

1) Disconnect the portable battery charger from the XA connector (CN601) for the PCB. The control board will be turned off.
2) Remove the USB memory stick from the USB port (CNUSB) on the control board.
3) Turn off the switches SW7-9 on the control board.
4) Turn on the outdoor unit, and check that the versions of the outdoor unit and the software are the same.
   The version of the software may be found using the maintenance tool or other means.
   Perform a test run, and check for normal operation.

9-3-3 Precautions

For dealing with the displays shown on the maintenance LED and other problems, refer to Section [9-4 Maintenance LED Display and Troubleshooting]

- Take care to choose the correct countermeasure program for the intended model and version.
  Store only one software rewrite program on the USB memory stick.
  If this requirement is not met, software rewrite may not start.
- Be cautious of electric shock when connecting an USB memory stick or a portable battery charger to the control board.
- Connect the portable battery charger to the LEAD WIRE ASSY USB and then to the control board.
- Make sure the portable battery charger is sufficiently charged. Rewrite error may occur if battery charge is insufficient.
- Take care not to forget to remove the USB memory stick in step (3) - 2) or forget to turn off SW7-9 in step (3) - 3). [9-3-2 Rewriting Software] If these precautions are not taken, the system may not start normally.
- When rewriting ended unsuccessfully, redo the procedure from step (1) - 3). [9-3-2 Rewriting Software]When rewriting ended unsuccessfully, the system may be started in Software Rewrite Mode instead of using the switches on the control board.
  Also refer to Section [9-4-2 Troubleshooting].
- If software cannot be successfully rewritten using an USB memory stick, use a ROM writer to rewrite the software.

9-4 Maintenance LED Display and Troubleshooting

9-4-1 Maintenance LED Display Content List

The following table shows the maintenance LED displays for each function.
When dealing with the errors shown on the display, refer to Section [9-4-2 Troubleshooting]

1. Storing data on a USB memory stick

No.	Switch	Meaning	Maintenance LED Display	Description
1	Not applicable	Storage Mode activated		“USB” Storage Mode to USB memory stick is active. Storage is enabled. See Section [9-4-2 Troubleshooting]1-(1) and 1- (2).
2		Storage in progress		0 to 99 is displayed. Status of the data storage to the USB memory stick is shown by the progress rate.
3		Storage completed		“END” The storage process has been completed successfully.
4		Error (USB memory side)		“Er01” The storage process cannot be started due to failure of the USB memory stick. See Section [9-4-2 Troubleshooting]1- (3).
				“Er02” The storage process was stopped due to failure of the USB memory stick during processing. See Section [9-4-2 Troubleshooting]1- (4).
5		Error (control board side)		“Er10” The storage process cannot be started due to failure of the control board. See Section [9-4-2 Troubleshooting]1- (5).

2. Collecting operation data

No.	Switch	Meaning	Maintenance LED Display	Description
6	SW6-10: OFF SW4: No.28	Collection in progress		“ON” OC is collecting operation data. A blinking display indicates that data collection is temporarily suspended. No switch setting is necessary. Data collection will be resumed automatically. See Section [9-4-2 Troubleshooting]2-(1).
7		Collection suspended		“OFF” Collection of operation data is suspended.
8		Flash memory error		“F-Er” Collection of operation data is suspended due to failure in the flash memory used to store operation data. It may be necessary to change the board. See Section [9-4-2 Troubleshooting]2-(2).
9		Error		“Err” Error was found due to the failure in units. After addressing the cause, data collection needs to be restated. See Section [9-4-2 Troubleshooting]2- (3).

3. Rewriting software

No.	Switch	Meaning	Maintenance LED Display	Description
10	SW7-9: ON	Rewrite Mode activated		“PRO” Software rewrite mode is active. Software rewrite is enabled. See Section [9-4-2 Troubleshooting]3-(1), 3-(2) and 3- (3).
11		Rewrite in progress		Software rewrite is in progress. Bars are displayed in turn.
				
				
12		Software rewrite has been completed.		“END” Software rewrite has been completed successfully.
13		Error (USB memory side)		“Er01” Software rewrite process cannot be started due to failure of the USB memory stick. See Section [9-4-2 Troubleshooting]3- (4).
				“Er02” Software rewrite was stopped due to failure of the USB memory stick during the software rewrite process. See Section [9-4-2 Troubleshooting]3- (5).
14		Error (control board side)		“Er10” Software rewrite was not completed due to failure in deleting the existing software. See Section [9-4-2 Troubleshooting]3- (6).
				“Er11” Software rewrite has not been completed due to failure in writing new software. See Section [9-4-2 Troubleshooting]3- (6).

9-4-2 Troubleshooting

Troubleshooting of USB functions are shown below.
The displays on the maintenance LED described in Section [9-4-1 Maintenance LED Display Content List]may also be used as a reference.

1. Storing on a USB memory stick

(1) Maintenance LED does not display "USB."

(Meaning or Cause)

The system was not started in Storage Mode.
The USB memory stick is not connected. Or, switch SWP3 may not be pressed deeply enough.

(Solution)

Check the connection of the USB memory stick, and try again using Section [9-2-2 Storing Data on a USB Memory Stick]as a reference.
Hold down the switch SWP3 until "USB" is displayed on the maintenance LED.
If the problem persists, there may be a problem with the USB memory stick.
Check if the USB memory stick meets the specification described in Section [9-1-3 Necessary Materials](1) USB memory stick.
If compliance is confirmed, the USB memory stick may be broken. Replace it with a new one.

(2) Pressing the switch SWP3 does not start data storage, and the maintenance LED continues to display "USB."

(Meaning or Cause)

There may be a problem with the USB memory stick.

(Solution)

Check the connection of the USB memory stick.
If no problem is found, the USB memory stick may be at fault.
Check that the USB memory stick meets the specification described in Section [9-1-3 Necessary Materials](1) USB memory stick.
If compliance is confirmed, the USB memory stick may be broken. Replace it with a new one.

(3) Maintenance LED displays "Er01."

(Meaning or Cause)

- Because there was a problem regarding the USB memory before the start of data storage, data storage has not been completed.
- Error Er01 occurs when SWP3 on the control board is pressed to rewrite the software immediately after power is supplied to the USB-connected control board.
(When the software rewriting is started before the control board recognizes the USB memory stick.)

(Solution)

Check the connection of the USB memory stick.
If no problem is found, the USB memory stick may be at fault.
Check the following four items.

- After supplying power to the USB-connected control board, wait at least five seconds before pressing SWP3 on the control board to rewrite software because it takes approximately five seconds for the control board to recognize the USB memory stick.
- Compliance of the USB memory stick to the specification described in Section [9-1-3 Necessary Materials](1) USB memory stick.
- Available free space of the USB memory stick exceeding 50 MB.
- The maximum number of folders or files is not exceeded. When files are created in the USB memory stick, the upper limit of files is 101, including those files from "MNT000.MT" to "MNT100.MT."
Delete unnecessary folders or files.

When there is no problem in the four items above, the USB memory stick may be broken. Replace it with a new one.

(4) Maintenance LED displays "Er02."

(Meaning or Cause)

Because there was a problem regarding the USB memory during data storage, data storage is unfinished.
For example, if the USB memory stick is disconnected during data storage, this display appears on the maintenance LED.

(Solution)

Check the connection of the USB memory stick.
If no problem was found, remove the USB memory stick from the control board and insert it again. Then conduct data storage referring to Section [9-2-2 Storing Data on a USB Memory Stick].

(5) Maintenance LED displays "Er10."

(Meaning or Cause)

Because there was a problem regarding the control board during data storage, data storage is unfinished.

(Solution)

Perform data storage again.
Remove the USB memory stick from the control board and insert it again. Then conduct data storage using Section [9-2-2 Storing Data on a USB Memory Stick]as a reference.

If this still does not correct the problem, there may be a problem with the control board.

(6) System does not start in Normal Mode.

(Meaning or Cause)

The USB memory stick may be left connected.

(Solution)

Remove the USB memory stick from the control board by referring to <Ending the data storage mode> under Section [9-2-2 Storing Data on a USB Memory Stick]. Then press SWP3 (ENTER). If the problem is not resolved, turn off the power to the outdoor unit, and restart the unit.

(7) Unit cannot be started in the data storage mode.

(Meaning or Cause)

There may be problems with the control board.

(Solution)

Take the two measures 1 and 2 explained in (2) Storing data on a USB memory stick in 1 Procedure under [9-2-2 Storing Data on a USB Memory Stick].
If the unit cannot be started up in the data storage mode by following either of the two methods 1 or 2, the control board may be malfunctioning.

2. Collecting operation data

(1) Maintenance LED displays blinking "ON."

(Meaning or Cause)

Despite data collection function being enabled, it is not started yet.
There may be two causes.
Firstly, the initialization process immediately after the system startup may have inhibited the start of data collection.
Secondly, M-NET communication may be underway to enable maintenance tools or collect AE-200 logs.

(Solution)

After a certain time, the problem will resolve itself, requiring no corrective actions.

(2) Maintenance LED displays "F-Er."

(Meaning or Cause)

Because there was a problem with the flash memory used to store operation data, the collection of operation data is unfinished.

(Solution)

Restart the outdoor unit, check the status of data collection.
If the LED displays "F-Er," the flash memory may be broken.
Depending on the local conditions, replace the control board.
When the flash memory is not working correctly, data collection and storage to a memory stick cannot be performed, but the outdoor unit itself functions normally.

(3) Maintenance LED displays blinking "Err."

(Meaning or Cause)

An error occurred in the unit, suspending data collection.

(Solution)

After resolving the error, resume data collection, referring to 1. Operation procedure (4) Restarting data collection under Section [9-2-3 Collecting Operation Data].

3. Rewriting software

(1) Maintenance LED does not display "Pro."

(Meaning or Cause)

The system is not started in Software Rewrite Mode.
Switches SW7-9 on the control board may not be in the ON position, or the portable charger may not be charged sufficiently.

(Solution)

Make sure switches SW7-9 are ON using Section [9-3-2 Rewriting Software]as a reference.
Restart using a fully charged portable charger or a different charger.

(2) Pressing the switch for starting the storage process does not start the process, and Maintenance LED continues to display "Pro."

(Meaning or Cause)

There may be a problem with the USB memory stick.

(Solution)

Check the connection of the USB memory stick.
If no problem is found, the USB memory stick may be at fault.
Check if the USB memory stick meets the specification described in Section [9-1-3 Necessary Materials](1) USB memory stick.
If compliance is confirmed, the USB memory stick may be broken. Replace it with a new one.

(3) At the time of the system start after "END" was displayed, Maintenance LED displays "Pro."

(Meaning or Cause)

The system was started in Software Rewrite Mode.
Switches SW7-9 on the control board may not be in the OFF position.
If the switches are in the OFF position, it means the software rewrite process has failed.

(Solution)

After turning off control board switches SW7-9, turn on the system again.
If the switches are in the OFF position, it means the software rewrite process has failed.
Try rewriting the software again by following the procedure detailed in 1 (1) Starting software rewrite mode under Section [9-3-2 Rewriting Software]. If the problem persists, rewrite the software, using a ROM writer.

(4) Maintenance LED displays "Er01."

(Meaning or Cause)

- Because an error occurred in the USB memory stick before the start of software rewrite, software rewrite has not been completed.
- Error Er01 occurs when SWP3 on the control board is pressed to rewrite the software immediately after power is supplied to the USB-connected control board.
  (When the software rewriting is started before the control board recognizes the USB memory stick.)

(Solution)

Check the connection of the USB memory stick.
If no problem is found, the USB memory stick may be at fault.
Check the following five items.

- After supplying power to the USB-connected control board, wait at least five seconds before pressing SWP3 on the control board to rewrite software because it takes approximately five seconds for the control board to recognize the USB memory stick.
- Compliance of the USB memory stick to the specification of Section [9-1-3 Necessary Materials](1) USB memory stick.
- The countermeasure program file "******.mot" for the intended model is used.
  The countermeasure program is not for a different model or version.
- The countermeasure program file "******.mot" is stored in the root folder. It is not stored in another folder.
- Make sure that the program file "******.mot" is stored in the root folder of the USB memory and not in any folder created on the USB memory stick.

When there is no problem in the five items above, the USB memory stick may be broken. Replace it with a new one. After the check is completed, follow the procedure starting with the step explained in 1. Operation procedure (1) Starting software rewrite mode under [9-3-2 Rewriting Software].

(5) Maintenance LED displays "Er02."

(Meaning or Cause)

Software rewrite is suspended due to a problem with the USB memory stick during the software rewrite process.
For example, if the USB memory stick is disconnected during data storage, this display appears on the maintenance LED.

(Solution)

Check the connection of the USB memory stick.
If no problems are found, follow the procedure starting with the step explained in 1. Operation procedure (1) Starting software rewrite mode under [9-3-2 Rewriting Software].

(6) Maintenance LED displays "Er10" or "Er11."

(Meaning or Cause)

Because there was a problem in the control board during the software rewrite process, software rewrite has not been completed.

(Solution)

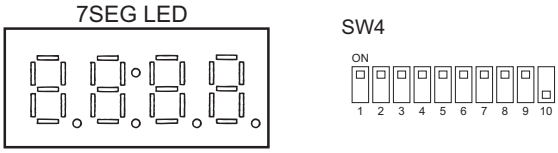
Try rewriting the software again by following the procedure detailed in 1. Operation procedure (1) Starting software rewrite mode under Section [9-3-2 Rewriting Software]. If the problem persists, rewrite the software, using a ROM writer.

Chapter 10 LED Status Indicators on the Outdoor Unit Circuit Board

10-1 LED Status Indicators

10-1-1 How to Read the LED

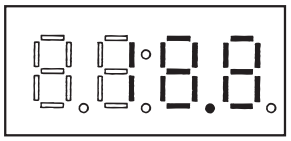
By setting the DIP SW 4-1 through 4-10 (Set SW6-10 to OFF.)(Switch number 10 is represented by 0), the operating condition of the unit can be monitored on the service monitor. (Refer to the table on the following pages for DIP SW settings.)
The service monitor uses 4-digit 7-segment LED to display numerical values and other types of information.



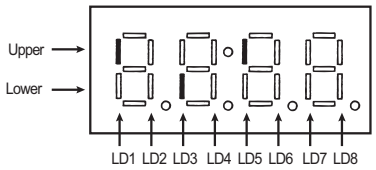
♦In the example above, 1 through 9 are set to ON, and 10 is set to OFF.

Pressure and temperature are examples of numerical values, and operating conditions and the on-off status of solenoid valve are examples of flag display.

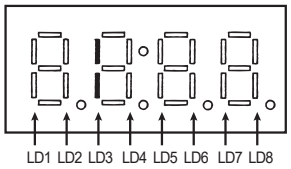
1) Display of numerical values
   Example: When the pressure data sensor reads 18.8kg/cm^2 (Item No. 58)
   ♦The unit of pressure is in kg/cm^2
   ♦ Use the following conversion formula to convert the displayed value into a value in SI unit.
   Value in SI unit (MPa) = Displayed value (kg/cm^2) x 0.098



2) Flag display
   Example: When 21S4a, 21S4b, SV1a are ON. (Item No. 3)

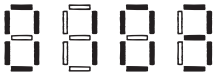
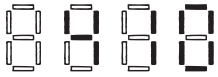
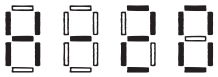
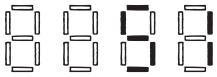


   Example: 3-minutes restart mode (Item No. 14)



10-1-2 Initial LED Display

From power on until the completion of initial settings, the following information will be displayed on the monitor screen. (Displays No. 1 through No. 4 in order repeatedly.)

No	Item	Display	Remarks
1	Software version		[0103] : Version 1.03
2	Refrigerant type		[410] : R410A
3	Model and capacity		[H-20] : 20 HP For the first few minutes after power on, the capacity of each outdoor unit is displayed. Thereafter, the combined capacity is displayed.
4	Communication address		[51] : Address 51

After the initial settings have been completed, the information on these items can be checked by making the switch setting that corresponds to No. 517 in the LED display table.

Note

Only item No. 1 "Software Version" appears on the display if there is a wiring failure between the control board and the transmission line power supply board or if the circuit board has failed.

♦How to convert HP capacity to Model name

HP capacity is the capacity of outdoor unit that is shown on LED display at initial setting.
Please refer to the following table to covert from HP capacity to Model name.

HP	Model	HP	Model
8	(E)P72	32	(E)P312
10	(E)P96	34	(E)P336
12	(E)P120	36	(E)P360
14	-	38	-
16	(E)P144	40	(E)P384
18	(E)P168	42	(E)P408
20	(E)P192	44	(E)P432
22	(E)P216	46	-
24	(E)P240	48	-
26	-	50	-
28	(E)P264	52	-
30	(E)P288	54	-

10-1-3 Clock Memory Function

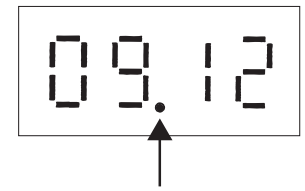
The outdoor unit has a simple clock function that enables the unit to calculate the current time with an internal timer by receiving the time set by the system controller, such as AG-150A.
If an error (including a preliminary error) occurs, the error history data and the error detection time are stored into the service memory.
The error detection time stored in the service memory and the current time can be seen on the service LED.

Note

1) Use the time displayed on the service LED as a reference.
2) The date and the time are set to "00" by default. If a system controller that sets the time, such as AG-150A is not connected, the elapsed time and days since the first power on will be displayed.
   If the time set on a system controller is received, the count will start from the set date and the time.
3) The time is not updated while the power of the indoor unit is turned off. When the power is turned off and then on again, the count will resume from the time before the power was turned off. Thus, the time that differs the actual time will be displayed. (This also applies when a power failure occurs.)
   The system controller, such as AG-150A, adjusts the time once a day. When the system controller is connected, the time will be automatically updated to the correct current time after the time set by the system controller is received. (The data stored into the memory before the set time is received will not be updated.)

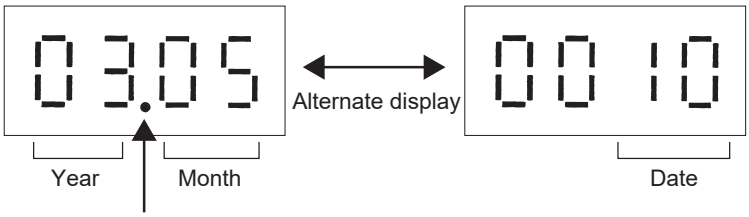
(1) Reading the time data:

1) Time display
   Example: 12 past 9



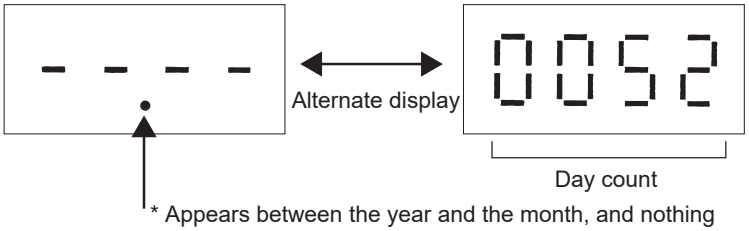
* Disappears if the time data is deviated due to a power failure, or if a system controller that sets the time is not connected.

2) Date display
   ♦When the main controller that can set the time is connected
   Example: May 10, 2003



* Appears between the year and the month, and nothing appears when the date is displayed.

♦When the main controller that can set the time is not connected
Example: 52 days after power was turned on



* Appears between the year and the month, and nothing appears when the date is displayed.

10-2 LED Status Indicators Table

Current data

No.	SW4 (When SW6 - 10 is set to OFF)	Item		Display								Unit (A, B) *1		Remarks
	1234567890			LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
0	0000000000	Relay output display 1 Lighting		Comp in operation				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	SV10	CH11		SV1a		SV2	SV11	A	A	
			Bottom			21S4b	SV5b							
4	0010000000	Relay output display 3	Top					21S4c		SV9	Power supply for indoor transmission line	A	A	
			Bottom			SV14		SV15						
5	1010000000	Relay output display 4	Top	Optional 200 V output								A	A	
			Bottom											
7	1110000000	Special control		Retry operation	Emergency operation					Communication error between the OC and OS	Communication error 3-minute restart delay mode	B	B	
9	1001000000	Communication demand capacity		0000 to 9999								B	B	If not demanded controlled, "----" [%] appears on the display.
10	0101000000	Contact point demand capacity		0000 to 9999								B		If not demanded controlled, "----" [%] appears on the display.
11	1101000000	External signal (Open input contact point)		Contact point demand	Low-noise mode (Capacity priority)	Snow sensor	Cooling-heating changeover (Cooling)	Cooling-heating changeover (Heating)				A	A	
12	0011000000	External signal (Open input contact point)								Circulation fan is locked.	Low-noise mode (Quiet priority)	A	A	
13	1011000000	External signal									Circulation fan output	A	A	
14	0111000000	Outdoor unit operation status			Warm-up mode	3-minutes restart mode	Compressor in operation	Preliminary error	Error	3-minutes restart after instantaneous power failure	Preliminary low pressure error	A	A	
15	1111000000	OC/OS identification		OC/OS-1/OS-2								A	A	

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Current data

No.	SW4 (When SW6 - 10 is set to OFF)	Item		Display								Unit (A, B) *1		Remarks
	1234567890			LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
16	0000100000	Indoor unit check	Top	Unit No. 1	Unit No. 2	Unit No. 3	Unit No. 4	Unit No. 5	Unit No. 6	Unit No. 7	Unit No. 8	B		The lamp that corresponds to the unit that came to an abnormal stop lights. The lamp goes off when the error is reset. Each unit that comes to an abnormal unit will be given a sequential number in ascending order starting with 1.
			Bottom	Unit No. 9	Unit No. 10	Unit No. 11	Unit No. 12	Unit No. 13	Unit No. 14	Unit No. 15	Unit No. 16			
17	1000100000		Top	Unit No. 17	Unit No. 18	Unit No. 19	Unit No. 20	Unit No. 21	Unit No. 22	Unit No. 23	Unit No. 24			
			Bottom	Unit No. 25	Unit No. 26	Unit No. 27	Unit No. 28	Unit No. 29	Unit No. 30	Unit No. 31	Unit No. 32			
18	0100100000		Top	Unit No. 33	Unit No. 34	Unit No. 35	Unit No. 36	Unit No. 37	Unit No. 38	Unit No. 39	Unit No. 40			
			Bottom	Unit No. 41	Unit No. 42	Unit No.43	Unit No. 44	Unit No. 45	Unit No. 46	Unit No. 47	Unit No. 48			
19	1100100000		Top	Unit No. 49	Unit No. 50									
			Bottom											
20	0010100000	Indoor unit Operation mode	Top	Unit No. 1	Unit No. 2	Unit No. 3	Unit No. 4	Unit No. 5	Unit No. 6	Unit No. 7	Unit No. 8	B		Lit during cooling Blinking during heating Unlit while the unit is stopped or in the fan mode
			Bottom	Unit No. 9	Unit No. 10	Unit No. 11	Unit No. 12	Unit No. 13	Unit No. 14	Unit No. 15	Unit No. 16			
21	1010100000		Top	Unit No. 17	Unit No. 18	Unit No. 19	Unit No. 20	Unit No. 21	Unit No. 22	Unit No. 23	Unit No. 24			
			Bottom	Unit No. 25	Unit No. 26	Unit No. 27	Unit No. 28	Unit No. 29	Unit No. 30	Unit No. 31	Unit No. 32			
22	0110100000		Top	Unit No. 33	Unit No. 34	Unit No. 35	Unit No. 36	Unit No. 37	Unit No. 38	Unit No. 39	Unit No. 40			
			Bottom	Unit No. 41	Unit No. 42	Unit No.43	Unit No. 44	Unit No. 45	Unit No. 46	Unit No. 47	Unit No. 48			
23	1110100000		Top	Unit No. 49	Unit No. 50									
			Bottom											
24	0001100000	Indoor unit thermostat	Top	Unit No. 1	Unit No. 2	Unit No. 3	Unit No. 4	Unit No. 5	Unit No. 6	Unit No. 7	Unit No. 8	B		Lit when thermostat is on Unlit when thermostat is off
			Bottom	Unit No. 9	Unit No. 10	Unit No. 11	Unit No. 12	Unit No. 13	Unit No. 14	Unit No. 15	Unit No. 16			
25	1001100000		Top	Unit No. 17	Unit No. 18	Unit No. 19	Unit No. 20	Unit No. 21	Unit No. 22	Unit No. 23	Unit No. 24			
			Bottom	Unit No. 25	Unit No. 26	Unit No. 27	Unit No. 28	Unit No. 29	Unit No. 30	Unit No. 31	Unit No. 32			
26	0101100000		Top	Unit No. 33	Unit No. 34	Unit No. 35	Unit No. 36	Unit No. 37	Unit No. 38	Unit No. 39	Unit No. 40			
			Bottom	Unit No. 41	Unit No. 42	Unit No.43	Unit No. 44	Unit No. 45	Unit No. 46	Unit No. 47	Unit No. 48			
27	1101100000		Top	Unit No. 49	Unit No. 50									
			Bottom											
28	0011100000	Drive recorder status		Drive recorder is stopped (OFF).: "OFF" Drive recorder is in operation (ON).: "ON" Drive recorder is in operation, but unable to start for a certain reason. *1: "ON" flashes. On-board flash error *2: "F-Er" Drive recorder has automatically stopped due to a serious error in the system. "Err"								B		
39	1110010000	Outdoor unit Operation mode		Permissible stop	Standby	Cooling		Heating				B		
42	0101010000	Outdoor unit control mode		Stop	Thermo OFF	Abnormal stop	Scheduled control	Initial start up	Defrost	Oil balance	Low frequency oil recovery	A	A	
43	1101010000			Warm-up mode	Refrigerant recovery			Continuous heating 2	Continuous heating 1			A	A	
45	1011010000	TH4		-99.9 to 999.9								A	A	The unit is [°C]
46	0111010000	TH3		-99.9 to 999.9								A	A	
47	1111010000	TH7		-99.9 to 999.9								A	A	
48	0000110000	TH6		-99.9 to 999.9								A	A	
49	1000110000	TH2		-99.9 to 999.9								A	A	
50	0100110000	TH5		-99.9 to 999.9								A	A	
54	0110110000	TH9		-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]

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

10 LED Status Indicators on the Outdoor Unit Circuit Board

10 LED Status Indicators on the Outdoor Unit Circuit Board

Current data

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
63	1111110000	TH11	-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	
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 IH crankcase heating by compressor motor	0000 to 9999								A	A	Number of times INV error occurred during IH crankcase heating by compressor motor
93	1011101000	All AK (OC+OS)	0000 to 9999								B		
94	0111101000	AK	0000 to 9999								A	A	
95	1111101000	FAN1	0000 to 9999								A	A	Fan output [%]
96	0000011000	Fan inverter output rpm (FAN1)	0000 to 9999								A	A	[rpm]
97	1000011000	FAN2	0000 to 9999								A	A	Fan output [%]
98	0100011000	Fan inverter output rpm (FAN2)	0000 to 9999								A	A	[rpm]
103	1110011000	LEV1	0000 to 9999								A	A	Outdoor LEV opening (Fully open: 480)
104	0001011000	LEV2a	0000 to 9999								A	A	Outdoor LEV opening (Fully open: 3000)
105	1001011000	LEV4	0000 to 9999								A	A	
108	0011011000	COMP operating current (DC)	00.0 to 999.9								A	A	Peak value [A]
109	1011011000	LEV2b	0000 to 9999								A	A	Outdoor LEV opening (Fully open: 3000)
110	0111011000	LEV2c	0000 to 9999								A	A	Outdoor LEV opening (Fully open: 3000)
111	1111011000	COMP bus voltage	00.0 to 999.9								A	A	The unit is [V]
113	1000111000	LEV9	0000 to 9999								A	A	Outdoor LEV opening (Fully open: 480)
116	0010111000	Number of times the unit went into the mode to remedy wet vapor suction	0000 to 9999								B		
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	

*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 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
121	1001111000	Backup mode	Abnormal pressure rise	High-pressure drop	Low-pressure drop	Abnormal Td rise					A	A	Stays lit for 90 seconds after the completion of backup control
123	1101111000	COMP number of start-stop events Upper 4 digits	0000 to 9999								A	A	Count-up at start-up The unit is [Time]
124	0011111000	COMP number of start-stop events Lower 4 digits	0000 to 9999								A	A	
129	1000000100	Integrated operation time of compressor (for rotation purpose)	0000 to 9999								B		The unit is [h]
178	0100110100	Error history 1	0000 to 9999								B	B	Address and error codes highlighted If no errors are detected, "---- " appears on the display. Preliminary error information of the OS does not appear on the OC. Neither preliminary error information of the OC nor error information of the IC appears on the OS.
179	1100110100	Error details of inverter	Error details of inverter (0001-0120)								A	A	
180	0010110100	Error history 2	0000 to 9999								B	B	
181	1010110100	Error details of inverter	Error details of inverter (0001-0120)								A	A	
182	0110110100	Error history 3	0000 to 9999								B	B	
183	1110110100	Error details of inverter	Error details of inverter (0001-0120)								A	A	
184	0001110100	Error history 4	0000 to 9999								B	B	
185	1001110100	Error details of inverter	Error details of inverter (0001-0120)								A	A	
186	0101110100	Error history 5	0000 to 9999								B	B	
187	1101110100	Error details of inverter	Error details of inverter (0001-0120)								A	A	
188	0011110100	Error history 6	0000 to 9999								B	B	
189	1011110100	Error details of inverter	Error details of inverter (0001-0120)								A	A	
190	0111110100	Error history 7	0000 to 9999								B	B	
191	1111110100	Error details of inverter	Error details of inverter (0001-0120)								A	A	
192	0000001100	Error history 8	0000 to 9999								B	B	
193	1000001100	Error details of inverter	Error details of inverter (0001-0120)								A	A	
194	0100001100	Error history 9	0000 to 9999								B	B	
195	1100001100	Error details of inverter	Error details of inverter (0001-0120)								A	A	
196	0010001100	Error history 10	0000 to 9999								B	B	
197	1010001100	Error details of inverter	Error details of inverter (0001-0120)								A	A	
198	0110001100	Error history of inverter (At the time of last data back-up before error)	0000 to 9999								B	B	
199	1110001100	Error details of inverter	Error details of inverter (0001-0120)								A	A	

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10 LED Status Indicators on the Outdoor Unit Circuit Board

Error history

No.	SW4 (When SW6 - 10 is set to OFF)	Item		Display								Unit (A, B) *1		Remarks
	1234567890			LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
201	1001001100	Outdoor unit operation status			Warm-up mode	3-minutes restart mode	Compressor in operation	Preliminary error	Error	3-minutes restart after instantaneous power failure	Preliminary low pressure error	A	A	
202	0101001100	OC/OS identification		OC/OS-1/OS-2								A	A	
205	1011001100	Outdoor unit Operation mode		Permissible stop	Standby	Cooling		Heating				A	A	
208	0000101100	Outdoor unit control mode		Stop	Thermo OFF	Abnormal stop	Scheduled control	Initial start up	Defrost	Oil balance	Low frequency oil recovery	A	A	
209	1000101100			Warm-up mode	Refrigerant recovery			Continuous heating 2	Continuous heating 1			A	A	
211	1100101100	Relay output display 1 Lighting		COMP in operation				72C		OC	Always lit	A	A	
212	0010101100	Relay output display 2 Lighting	Top	21S4a	SV10	CH11		SV1a		SV2	SV11	A	A	
			Bottom			21S4b	SV5b							
213	1010101100	Relay output display 3 Lighting	Top					21S4c		SV9	Lit while power to the indoor units is being supplied	A	A	
			Bottom			SV14		SV15						
214	0110101100	Relay output display 4	Top	Optional 200 V output								A	A	
			Bottom											
216	0001101100	TH4		-99.9 to 999.9								A	A	The unit is [°C]
217	1001101100	TH3		-99.9 to 999.9								A	A	
218	0101101100	TH7		-99.9 to 999.9								A	A	
219	1101101100	TH6		-99.9 to 999.9								A	A	
220	0011101100	TH2		-99.9 to 999.9								A	A	
221	1011101100	TH5		-99.9 to 999.9								A	A	
227	1100011100	THHS1		-99.9 to 999.9								A	A	The unit is [°C]
229	1010011100	High-pressure sensor data		-99.9 to 999.9								A	A	The unit is [kgf/cm^2]
230	0110011100	Low-pressure sensor data		-99.9 to 999.9								A	A	
233	1001011100	TH15		-99.9 to 999.9								A	A	The unit is [°C]
249	1001111100	∑ Qj		0000 to 9999								B	B	
250	0101111100	∑ Qjc		0000 to 9999								B	B	
251	1101111100	∑ Qjh		0000 to 9999								B	B	
252	0011111100	Target Tc		-99.9 to 999.9								B		The unit is [°C]
253	1011111100	Target Te		-99.9 to 999.9								B		
254	0111111100	Tc		-99.9 to 999.9								A	A	The unit is [°C]
255	1111111100	Te		-99.9 to 999.9								A	A	
257	1000000010	Total frequencies (OC+OS)		0000 to 9999								B		Control data [Hz]
258	0100000010	Total frequency of each unit		0000 to 9999								A	A	
259	1100000010	COMP frequency		0000 to 9999								A	A	
262	0110000010	COMP operating frequency		0000 to 9999								A	A	The unit is [rps]
264	0001000010	All AK (OC+OS)		0000 to 9999								B		
265	1001000010	AK		0000 to 9999								A	A	

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Error history

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
266	0101000010	FAN1	0000 to 9999								A	A	Fan inverter output [%]
267	1101000010	Fan inverter output rpm (FAN1)	0000 to 9999								A	A	[rpm]
268	0011000010	FAN2	0000 to 9999								A	A	Fan inverter output [%]
269	1011000010	Fan inverter output rpm (FAN2)	0000 to 9999								A	A	[rpm]
274	0100100010	LEV1	0000 to 9999								A	A	Outdoor LEV opening (Fully open: 480)
275	1100100010	LEV2a	0000 to 9999								A	A	Outdoor LEV opening (Fully open: 3000)
276	0010100010	LEV4	0000 to 9999								A	A	
279	1110100010	COMP operating current (DC)	00.0 to 999.9								A	A	
282	0101100010	COMP bus voltage	00.0 to 999.9								A	A	The unit is [V]
283	1101100010	LEV2b	0000 to 9999								A	A	Outdoor LEV opening (Fully open: 3000)
284	0011100010	LEV2c	0000 to 9999								A	A	Outdoor LEV opening (Fully open: 3000)
286	0111100010	LEV9	0000 to 9999								A	A	Outdoor LEV opening (Fully open: 480)
288	0000010010	COMP Operation time Upper 4 digits	0000 to 9999								A	A	The unit is [h]
289	1000010010	COMP Operation time Lower 4 digits	0000 to 9999								A	A	
294	0110010010	COMP number of start-stop events Upper 4 digits	0000 to 9999								A	A	Count-up at start-up The unit is [Time]
295	1110010010	COMP number of start-stop events Lower 4 digits	0000 to 9999								A	A	
300	0011010010	Integrated operation time of compressor (for rotation purpose)	0000 to 9999								B		The unit is [h]

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10 LED Status Indicators on the Outdoor Unit Circuit Board

10 LED Status Indicators on the Outdoor Unit Circuit Board

Current data

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B)*1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
301	1011010010	Power supply unit	OC/OS-1/OS-2 ↔ Address								B		
302	0111010010	Start-up unit	OC/OS-1/OS-2 ↔ Address								B		

*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 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
351	1111101010	IC1 Address/capacity code	0000 to 9999				0000 to 9999				B		Displayed alternately every 5 seconds
352	0000011010	IC2 Address/capacity code	0000 to 9999				0000 to 9999						
353	1000011010	IC3 Address/capacity code	0000 to 9999				0000 to 9999						
354	0100011010	IC4 Address/capacity code	0000 to 9999				0000 to 9999						
355	1100011010	IC5 Address/capacity code	0000 to 9999				0000 to 9999						
356	0010011010	IC6 Address/capacity code	0000 to 9999				0000 to 9999						
357	1010011010	IC7 Address/capacity code	0000 to 9999				0000 to 9999						
358	0110011010	IC8 Address/capacity code	0000 to 9999				0000 to 9999						
359	1110011010	IC9 Address/capacity code	0000 to 9999				0000 to 9999						
360	0001011010	IC10 Address/capacity code	0000 to 9999				0000 to 9999						
361	1001011010	IC11 Address/capacity code	0000 to 9999				0000 to 9999						
362	0101011010	IC12 Address/capacity code	0000 to 9999				0000 to 9999						
363	1101011010	IC13 Address/capacity code	0000 to 9999				0000 to 9999						
364	0011011010	IC14 Address/capacity code	0000 to 9999				0000 to 9999						
365	1011011010	IC15 Address/capacity code	0000 to 9999				0000 to 9999						
366	0111011010	IC16 Address/capacity code	0000 to 9999				0000 to 9999						
367	1111011010	IC17 Address/capacity code	0000 to 9999				0000 to 9999						
368	0000111010	IC18 Address/capacity code	0000 to 9999				0000 to 9999						
369	1000111010	IC19 Address/capacity code	0000 to 9999				0000 to 9999						
370	0100111010	IC20 Address/capacity code	0000 to 9999				0000 to 9999						
371	1100111010	IC21 Address/capacity code	0000 to 9999				0000 to 9999						
372	0010111010	IC22 Address/capacity code	0000 to 9999				0000 to 9999						
373	1010111010	IC23 Address/capacity code	0000 to 9999				0000 to 9999						
374	0110111010	IC24 Address/capacity code	0000 to 9999				0000 to 9999						
375	1110111010	IC25 Address/capacity code	0000 to 9999				0000 to 9999						
376	0001111010	IC26 Address/capacity code	0000 to 9999				0000 to 9999						
377	1001111010	IC27 Address/capacity code	0000 to 9999				0000 to 9999						
378	0101111010	IC28 Address/capacity code	0000 to 9999				0000 to 9999						
379	1101111010	IC29 Address/capacity code	0000 to 9999				0000 to 9999						
380	0011111010	IC30 Address/capacity code	0000 to 9999				0000 to 9999						
381	1011111010	IC31 Address/capacity code	0000 to 9999				0000 to 9999						
382	0111111010	IC32 Address/capacity code	0000 to 9999				0000 to 9999						
383	1111111010	IC33 Address/capacity code	0000 to 9999				0000 to 9999						
384	0000000110	IC34 Address/capacity code	0000 to 9999				0000 to 9999						
385	1000000110	IC35 Address/capacity code	0000 to 9999				0000 to 9999						
386	0100000110	IC36 Address/capacity code	0000 to 9999				0000 to 9999						
387	1100000110	IC37 Address/capacity code	0000 to 9999				0000 to 9999						
388	0010000110	IC38 Address/capacity code	0000 to 9999				0000 to 9999						
389	1010000110	IC39 Address/capacity code	0000 to 9999				0000 to 9999						
390	0110000110	IC40 Address/capacity code	0000 to 9999				0000 to 9999						
391	1110000110	IC41 Address/capacity code	0000 to 9999				0000 to 9999						
392	0001000110	IC42 Address/capacity code	0000 to 9999				0000 to 9999						

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10 LED Status Indicators on the Outdoor Unit Circuit Board

Data on indoor unit system

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
393	1001000110	IC43 Address/capacity code	0000 to 9999				0000 to 9999				B		Displayed alternately every 5 seconds
394	0101000110	IC44 Address/capacity code	0000 to 9999				0000 to 9999						
395	1101000110	IC45 Address/capacity code	0000 to 9999				0000 to 9999						
396	0011000110	IC46 Address/capacity code	0000 to 9999				0000 to 9999						
397	1011000110	IC47 Address/capacity code	0000 to 9999				0000 to 9999						
398	0111000110	IC48 Address/capacity code	0000 to 9999				0000 to 9999						
399	1111000110	IC49 Address/capacity code	0000 to 9999				0000 to 9999						
400	0000100110	IC50 Address/capacity code	0000 to 9999				0000 to 9999						
408	0001100110	IC1 Suction temperature	-99.9 to 999.9								B		The unit is [°C]
409	1001100110	IC2 Suction temperature	-99.9 to 999.9										
410	0101100110	IC3 Suction temperature	-99.9 to 999.9										
411	1101100110	IC4 Suction temperature	-99.9 to 999.9										
412	0011100110	IC5 Suction temperature	-99.9 to 999.9										
413	1011100110	IC6 Suction temperature	-99.9 to 999.9										
414	0111100110	IC7 Suction temperature	-99.9 to 999.9										
415	1111100110	IC8 Suction temperature	-99.9 to 999.9										
416	0000010110	IC9 Suction temperature	-99.9 to 999.9										
417	1000010110	IC10 Suction temperature	-99.9 to 999.9										
418	0100010110	IC11 Suction temperature	-99.9 to 999.9										
419	1100010110	IC12 Suction temperature	-99.9 to 999.9										
420	0010010110	IC13 Suction temperature	-99.9 to 999.9										
421	1010010110	IC14 Suction temperature	-99.9 to 999.9										
422	0110010110	IC15 Suction temperature	-99.9 to 999.9										
423	1110010110	IC16 Suction temperature	-99.9 to 999.9										
424	0001010110	IC17 Suction temperature	-99.9 to 999.9										
425	1001010110	IC18 Suction temperature	-99.9 to 999.9										
426	0101010110	IC19 Suction temperature	-99.9 to 999.9										
427	1101010110	IC20 Suction temperature	-99.9 to 999.9										
428	0011010110	IC21 Suction temperature	-99.9 to 999.9										
429	1011010110	IC22 Suction temperature	-99.9 to 999.9										
430	0111010110	IC23 Suction temperature	-99.9 to 999.9										
431	1111010110	IC24 Suction temperature	-99.9 to 999.9										
432	0000110110	IC25 Suction temperature	-99.9 to 999.9										
433	1000110110	IC26 Suction temperature	-99.9 to 999.9										
434	0100110110	IC27 Suction temperature	-99.9 to 999.9										
435	1100110110	IC28 Suction temperature	-99.9 to 999.9										
436	0010110110	IC29 Suction temperature	-99.9 to 999.9										
437	1010110110	IC30 Suction temperature	-99.9 to 999.9										
438	0110110110	IC31 Suction temperature	-99.9 to 999.9										
439	1110110110	IC32 Suction temperature	-99.9 to 999.9										
440	0001110110	IC33 Suction temperature	-99.9 to 999.9										
441	1001110110	IC34 Suction temperature	-99.9 to 999.9										
442	0101110110	IC35 Suction 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 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
443	1101110110	IC36 Suction temperature	-99.9 to 999.9								B		The unit is [°C]
444	0011110110	IC37 Suction temperature	-99.9 to 999.9										
445	1011110110	IC38 Suction temperature	-99.9 to 999.9										
446	0111110110	IC39 Suction temperature	-99.9 to 999.9										
447	1111110110	IC40 Suction temperature	-99.9 to 999.9										
448	0000001110	IC41 Suction temperature	-99.9 to 999.9										
449	1000001110	IC42 Suction temperature	-99.9 to 999.9										
450	0100001110	IC43 Suction temperature	-99.9 to 999.9										
451	1100001110	IC44 Suction temperature	-99.9 to 999.9										
452	0010001110	IC45 Suction temperature	-99.9 to 999.9										
453	1010001110	IC46 Suction temperature	-99.9 to 999.9										
454	0110001110	IC47 Suction temperature	-99.9 to 999.9										
455	1110001110	IC48 Suction temperature	-99.9 to 999.9										
456	0001001110	IC49Suction temperature	-99.9 to 999.9										
457	1001001110	IC50 Suction temperature	-99.9 to 999.9										
458	0101001110	IC1 Liquid pipe temperature	-99.9 to 999.9								B		The unit is [°C]
459	1101001110	IC2 Liquid pipe temperature	-99.9 to 999.9										
460	0011001110	IC3 Liquid pipe temperature	-99.9 to 999.9										
461	1011001110	IC4 Liquid pipe temperature	-99.9 to 999.9										
462	0111001110	IC5 Liquid pipe temperature	-99.9 to 999.9										
463	1111001110	IC6 Liquid pipe temperature	-99.9 to 999.9										
464	0000101110	IC7 Liquid pipe temperature	-99.9 to 999.9										
465	1000101110	IC8 Liquid pipe temperature	-99.9 to 999.9										
466	0100101110	IC9 Liquid pipe temperature	-99.9 to 999.9										
467	1100101110	IC10 Liquid pipe temperature	-99.9 to 999.9										
468	0010101110	IC11 Liquid pipe temperature	-99.9 to 999.9										
469	1010101110	IC12 Liquid pipe temperature	-99.9 to 999.9										
470	0110101110	IC13 Liquid pipe temperature	-99.9 to 999.9										
471	1110101110	IC14 Liquid pipe temperature	-99.9 to 999.9										
472	0001101110	IC15 Liquid pipe temperature	-99.9 to 999.9										
473	1001101110	IC16 Liquid pipe temperature	-99.9 to 999.9										
474	0101101110	IC17 Liquid pipe temperature	-99.9 to 999.9										
475	1101101110	IC18 Liquid pipe temperature	-99.9 to 999.9										
476	0011101110	IC19 Liquid pipe temperature	-99.9 to 999.9										
477	1011101110	IC20 Liquid pipe temperature	-99.9 to 999.9										
478	0111101110	IC21 Liquid pipe temperature	-99.9 to 999.9										
479	1111101110	IC22 Liquid pipe temperature	-99.9 to 999.9										
480	0000011110	IC23 Liquid pipe temperature	-99.9 to 999.9										
481	1000011110	IC24 Liquid pipe temperature	-99.9 to 999.9										
482	0100011110	IC25 Liquid pipe temperature	-99.9 to 999.9										
483	1100011110	IC26 Liquid pipe temperature	-99.9 to 999.9										
484	0010011110	IC27 Liquid pipe temperature	-99.9 to 999.9										
485	1010011110	IC28 Liquid 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.

10 LED Status Indicators on the Outdoor Unit Circuit Board

10 LED Status Indicators on the Outdoor Unit Circuit Board

Data on indoor unit system

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
486	0110011110	IC29 Liquid pipe temperature	-99.9 to 999.9								B		The unit is [°C]
487	1110011110	IC30 Liquid pipe temperature	-99.9 to 999.9										
488	0001011110	IC31 Liquid pipe temperature	-99.9 to 999.9										
489	1001011110	IC32 Liquid pipe temperature	-99.9 to 999.9										
490	0101011110	IC33 Liquid pipe temperature	-99.9 to 999.9										
491	1101011110	IC34 Liquid pipe temperature	-99.9 to 999.9										
492	0011011110	IC35 Liquid pipe temperature	-99.9 to 999.9										
493	1011011110	IC36 Liquid pipe temperature	-99.9 to 999.9										
494	0111011110	IC37 Liquid pipe temperature	-99.9 to 999.9										
495	1111011110	IC38 Liquid pipe temperature	-99.9 to 999.9										
496	0000111110	IC39 Liquid pipe temperature	-99.9 to 999.9										
497	1000111110	IC40 Liquid pipe temperature	-99.9 to 999.9										
498	0100111110	IC41 Liquid pipe temperature	-99.9 to 999.9										
499	1100111110	IC42 Liquid pipe temperature	-99.9 to 999.9										
500	0010111110	IC43 Liquid pipe temperature	-99.9 to 999.9										
501	1010111110	IC44 Liquid pipe temperature	-99.9 to 999.9										
502	0110111110	IC45 Liquid pipe temperature	-99.9 to 999.9										
503	1110111110	IC46 Liquid pipe temperature	-99.9 to 999.9										
504	0001111110	IC47 Liquid pipe temperature	-99.9 to 999.9										
505	1001111110	IC48 Liquid pipe temperature	-99.9 to 999.9										
506	0101111110	IC49 Liquid pipe temperature	-99.9 to 999.9										
507	1101111110	IC50 Liquid 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.

Setting data

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B)*1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
512	0000000001	Self-address	Alternate display of self address and unit model								A	A	
513	1000000001	IC/FU address	Count-up display of number of connected units								B		
514	0100000001	RC address	Count-up display of number of connected units								B		
516	0010000001	OS address	Count-up display of number of connected units								B		
517	1010000001	Version/Capacity	S/W version → Refrigerant type → Model and capacity → Communication address								A	A	
518	0110000001	OC address	OC address display									B	

*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 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
523	1101000001	IC1 Gas pipe temperature	-99.9 to 999.9								B		The unit is [°C]
524	0011000001	IC2 Gas pipe temperature	-99.9 to 999.9										
525	1011000001	IC3 Gas pipe temperature	-99.9 to 999.9										
526	0111000001	IC4 Gas pipe temperature	-99.9 to 999.9										
527	1111000001	IC5 Gas pipe temperature	-99.9 to 999.9										
528	0000100001	IC6 Gas pipe temperature	-99.9 to 999.9										
529	1000100001	IC7 Gas pipe temperature	-99.9 to 999.9										
530	0100100001	IC8 Gas pipe temperature	-99.9 to 999.9										
531	1100100001	IC9 Gas pipe temperature	-99.9 to 999.9										
532	0010100001	IC10 Gas pipe temperature	-99.9 to 999.9										
533	1010100001	IC11 Gas pipe temperature	-99.9 to 999.9										
534	0110100001	IC12 Gas pipe temperature	-99.9 to 999.9										
535	1110100001	IC13 Gas pipe temperature	-99.9 to 999.9										
536	0001100001	IC14 Gas pipe temperature	-99.9 to 999.9										
537	1001100001	IC15 Gas pipe temperature	-99.9 to 999.9										
538	0101100001	IC16 Gas pipe temperature	-99.9 to 999.9										
539	1101100001	IC17 Gas pipe temperature	-99.9 to 999.9										
540	0011100001	IC18 Gas pipe temperature	-99.9 to 999.9										
541	1011100001	IC19 Gas pipe temperature	-99.9 to 999.9										
542	0111100001	IC20 Gas pipe temperature	-99.9 to 999.9										
543	1111100001	IC21 Gas pipe temperature	-99.9 to 999.9										
544	0000010001	IC22 Gas pipe temperature	-99.9 to 999.9										
545	1000010001	IC23 Gas pipe temperature	-99.9 to 999.9										
546	0100010001	IC24 Gas pipe temperature	-99.9 to 999.9										
547	1100010001	IC25 Gas pipe temperature	-99.9 to 999.9										
548	0010010001	IC26 Gas pipe temperature	-99.9 to 999.9										
549	1010010001	IC27 Gas pipe temperature	-99.9 to 999.9										
550	0110010001	IC28Gas pipe temperature	-99.9 to 999.9										
551	1110010001	IC29 Gas pipe temperature	-99.9 to 999.9										
552	0001010001	IC30 Gas pipe temperature	-99.9 to 999.9										
553	1001010001	IC31 Gas pipe temperature	-99.9 to 999.9										
554	0101010001	IC32 Gas pipe temperature	-99.9 to 999.9										
555	1101010001	IC33 Gas pipe temperature	-99.9 to 999.9										
556	0011010001	IC34 Gas pipe temperature	-99.9 to 999.9										
557	1011010001	IC35 Gas pipe temperature	-99.9 to 999.9										
558	0111010001	IC36 Gas pipe temperature	-99.9 to 999.9										
559	1111010001	IC37 Gas pipe temperature	-99.9 to 999.9										
560	0000110001	IC38 Gas pipe temperature	-99.9 to 999.9										
561	1000110001	IC39 Gas pipe temperature	-99.9 to 999.9										
562	0100110001	IC40 Gas pipe temperature	-99.9 to 999.9										
563	1100110001	IC41 Gas pipe temperature	-99.9 to 999.9										
564	0010110001	IC42 Gas pipe temperature	-99.9 to 999.9										

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Data on indoor unit system

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
565	1010110001	IC43 Gas pipe temperature	-99.9 to 999.9								B		The unit is [°C]
566	0110110001	IC44 Gas pipe temperature	-99.9 to 999.9										
567	1110110001	IC45 Gas pipe temperature	-99.9 to 999.9										
568	0001110001	IC46 Gas pipe temperature	-99.9 to 999.9										
569	1001110001	IC47 Gas pipe temperature	-99.9 to 999.9										
570	0101110001	IC48 Gas pipe temperature	-99.9 to 999.9										
571	1101110001	IC49 Gas pipe temperature	-99.9 to 999.9										
572	0011110001	IC50 Gas pipe temperature	-99.9 to 999.9										
573	1011110001	IC1SH	-99.9 to 999.9								B		The unit is [°C]
574	0111110001	IC2SH	-99.9 to 999.9										
575	1111110001	IC3SH	-99.9 to 999.9										
576	0000001001	IC4SH	-99.9 to 999.9										
577	1000001001	IC5SH	-99.9 to 999.9										
578	0100001001	IC6SH	-99.9 to 999.9										
579	1100001001	IC7SH	-99.9 to 999.9										
580	0010001001	IC8SH	-99.9 to 999.9										
581	1010001001	IC9SH	-99.9 to 999.9										
582	0110001001	IC10SH	-99.9 to 999.9										
583	1110001001	IC11SH	-99.9 to 999.9										
584	0001001001	IC12SH	-99.9 to 999.9										
585	1001001001	IC13SH	-99.9 to 999.9										
586	0101001001	IC14SH	-99.9 to 999.9										
587	1101001001	IC15SH	-99.9 to 999.9										
588	0011001001	IC16SH	-99.9 to 999.9										
589	1011001001	IC17SH	-99.9 to 999.9										
590	0111001001	IC18SH	-99.9 to 999.9										
591	1111001001	IC19SH	-99.9 to 999.9										
592	0000101001	IC20SH	-99.9 to 999.9										
593	1000101001	IC21SH	-99.9 to 999.9										
594	0100101001	IC22SH	-99.9 to 999.9										
595	1100101001	IC23SH	-99.9 to 999.9										
596	0010101001	IC24SH	-99.9 to 999.9										
597	1010101001	IC25SH	-99.9 to 999.9										
598	0110101001	IC26SH	-99.9 to 999.9										
599	1110101001	IC27SH	-99.9 to 999.9										
600	0001101001	IC28SH	-99.9 to 999.9										
601	1001101001	IC29SH	-99.9 to 999.9										
602	0101101001	IC30SH	-99.9 to 999.9										
603	1101101001	IC31SH	-99.9 to 999.9										
604	0011101001	IC32SH	-99.9 to 999.9										
605	1011101001	IC33SH	-99.9 to 999.9										
606	0111101001	IC34SH	-99.9 to 999.9										
607	1111101001	IC35SH	-99.9 to 999.9										

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10 LED Status Indicators on the Outdoor Unit Circuit Board

Data on indoor unit system

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
608	0000011001	IC36SH	-99.9 to 999.9								B		The unit is [°C]
609	1000011001	IC37SH	-99.9 to 999.9										
610	0100011001	IC38SH	-99.9 to 999.9										
611	1100011001	IC39SH	-99.9 to 999.9										
612	0010011001	IC40SH	-99.9 to 999.9										
613	1010011001	IC41SH	-99.9 to 999.9										
614	0110011001	IC42SH	-99.9 to 999.9										
615	1110011001	IC43SH	-99.9 to 999.9										
616	0001011001	IC44SH	-99.9 to 999.9										
617	1001011001	IC45SH	-99.9 to 999.9										
618	0101011001	IC46SH	-99.9 to 999.9										
619	1101011001	IC47SH	-99.9 to 999.9										
620	0011011001	IC48SH	-99.9 to 999.9										
621	1011011001	IC49SH	-99.9 to 999.9										
622	0111011001	IC50SH	-99.9 to 999.9										
623	1111011001	IC1SC	-99.9 to 999.9								B		The unit is [°C]
624	0000111001	IC2SC	-99.9 to 999.9										
625	1000111001	IC3SC	-99.9 to 999.9										
626	0100111001	IC4SC	-99.9 to 999.9										
627	1100111001	IC5SC	-99.9 to 999.9										
628	0010111001	IC6SC	-99.9 to 999.9										
629	1010111001	IC7SC	-99.9 to 999.9										
630	0110111001	IC8SC	-99.9 to 999.9										
631	1110111001	IC9SC	-99.9 to 999.9										
632	0001111001	IC10SC	-99.9 to 999.9										
633	1001111001	IC11SC	-99.9 to 999.9										
634	0101111001	IC12SC	-99.9 to 999.9										
635	1101111001	IC13SC	-99.9 to 999.9										
636	0011111001	IC14SC	-99.9 to 999.9										
637	1011111001	IC15SC	-99.9 to 999.9										
638	0111111001	IC16SC	-99.9 to 999.9										
639	1111111001	IC17SC	-99.9 to 999.9										
640	0000000101	IC18SC	-99.9 to 999.9										
641	1000000101	IC19SC	-99.9 to 999.9										
642	0100000101	IC20SC	-99.9 to 999.9										
643	1100000101	IC21SC	-99.9 to 999.9										
644	0010000101	IC22SC	-99.9 to 999.9										
645	1010000101	IC23SC	-99.9 to 999.9										
646	0110000101	IC24SC	-99.9 to 999.9										
647	1110000101	IC25SC	-99.9 to 999.9										
648	0001000101	IC26SC	-99.9 to 999.9										
649	1001000101	IC27SC	-99.9 to 999.9										
650	0101000101	IC28SC	-99.9 to 999.9										

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Data on indoor unit system

No.	SW4 (When SW6 - 10 is set to 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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10 LED Status Indicators on the Outdoor Unit Circuit Board

Setting data

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B)*1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
676	0010010101	INV board S/W version	0.00 to 99.99								A	A	
679	1110010101	Fan board (address 5) S/W version	0.00 to 99.99								A	A	
680	0001010101	Fan board (address 6) S/W version	0.00 to 99.99								A	A	
688	0000110101	Current time	00:00 to 23:59								A	A	Hour: minute
689	1000110101	Current time -2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
690	0100110101	Time of error detection 1	00:00 to 23:59										Hour: minute
691	1100110101	Time of error detection 1-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
692	0010110101	Time of error detection 2	00:00 to 23:59										Hour: minute
693	1010110101	Time of error detection 2-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
694	0110110101	Time of error detection 3	00:00 to 23:59										Hour: minute
695	1110110101	Time of error detection 3-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
696	0001110101	Time of error detection 4	00:00 to 23:59										Hour: minute
697	1001110101	Time of error detection 4-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
698	0101110101	Time of error detection 5	00:00 to 23:59										Hour: minute
699	1101110101	Time of error detection 5-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
700	0011110101	Time of error detection 6	00:00 to 23:59										Hour: minute
701	1011110101	Time of error detection 6-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
702	0111110101	Time of error detection 7	00:00 to 23:59								A	A	Hour: minute
703	1111110101	Time of error detection 7-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
704	0000001101	Time of error detection 8	00:00 to 23:59										Hour: minute
705	1000001101	Time of error detection 8-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
706	0100001101	Time of error detection 9	00:00 to 23:59										Hour: minute
707	1100001101	Time of error detection 9-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
708	0010001101	Time of error detection 10	00:00 to 23:59										Hour: minute
709	1010001101	Time of error detection 10-2	00.00 to 99.12/1 to 31										Year and month, and date alternate display
710	0110001101	Time of last data backup before error	00:00 to 23:59										Hour: minute
711	1110001101	Time of last data backup before error -2	00.00 to 99.12/1 to 31										Year and month, and date alternate display

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Data on indoor unit system

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B)*1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
714	0101001101	IC1 LEV opening	0000 to 9999								B		Fully open: 2000
715	1101001101	IC2 LEV opening	0000 to 9999										
716	0011001101	IC3 LEV opening	0000 to 9999										
717	1011001101	IC4 LEV opening	0000 to 9999										
718	0111001101	IC5 LEV opening	0000 to 9999										
719	1111001101	IC6 LEV opening	0000 to 9999										
720	0000101101	IC7 LEV opening	0000 to 9999										
721	1000101101	IC8 LEV opening	0000 to 9999										
722	0100101101	IC9 LEV opening	0000 to 9999										
723	1100101101	IC10 LEV opening	0000 to 9999										
724	0010101101	IC11 LEV opening	0000 to 9999										
725	1010101101	IC12 LEV opening	0000 to 9999										
726	0110101101	IC13 LEV opening	0000 to 9999										
727	1110101101	IC14 LEV opening	0000 to 9999										
728	0001101101	IC15 LEV opening	0000 to 9999										
729	1001101101	IC16 LEV opening	0000 to 9999										
730	0101101101	IC17 LEV opening	0000 to 9999										
731	1101101101	IC18 LEV opening	0000 to 9999										
732	0011101101	IC19 LEV opening	0000 to 9999										
733	1011101101	IC20 LEV opening	0000 to 9999										
734	0111101101	IC21 LEV opening	0000 to 9999										
735	1111101101	IC22 LEV opening	0000 to 9999										
736	0000011101	IC23 LEV opening	0000 to 9999										
737	1000011101	IC24 LEV opening	0000 to 9999										
738	0100011101	IC25 LEV opening	0000 to 9999										
739	1100011101	IC26 LEV opening	0000 to 9999										
740	0010011101	IC27 LEV opening	0000 to 9999										
741	1010011101	IC28 LEV opening	0000 to 9999										
742	0110011101	IC29 LEV opening	0000 to 9999										
743	1110011101	IC30 LEV opening	0000 to 9999										
744	0001011101	IC31 LEV opening	0000 to 9999										
745	1001011101	IC32 LEV opening	0000 to 9999										
746	0101011101	IC33 LEV opening	0000 to 9999										
747	1101011101	IC34 LEV opening	0000 to 9999										
748	0011011101	IC35 LEV opening	0000 to 9999										
749	1011011101	IC36 LEV opening	0000 to 9999										
750	0111011101	IC37 LEV opening	0000 to 9999										
751	1111011101	IC38 LEV opening	0000 to 9999										
752	0000111101	IC39 LEV opening	0000 to 9999										
753	1000111101	IC40 LEV opening	0000 to 9999										
754	0100111101	IC41 LEV opening	0000 to 9999										
755	1100111101	IC42 LEV opening	0000 to 9999										

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

10 LED Status Indicators on the Outdoor Unit Circuit Board

Data on indoor unit system

No.	SW4 (When SW6 - 10 is set to 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											

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Data on indoor unit system

No.	SW4 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B)*1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
797	1011100011	IC34 Operation mode	0000: Stop 0001: Ventilation 0002: Cooling 0003: Heating 0004: Dry								B		
798	0111100011	IC35 Operation mode											
799	1111100011	IC36 Operation mode											
800	0000010011	IC37 Operation mode											
801	1000010011	IC38 Operation mode											
802	0100010011	IC39 Operation mode											
803	1100010011	IC40 Operation mode											
804	0010010011	IC41 Operation mode											
805	1010010011	IC42 Operation mode											
806	0110010011	IC43 Operation mode											
807	1110010011	IC44 Operation mode											
808	0001010011	IC45 Operation mode											
809	1001010011	IC46 Operation mode											
810	0101010011	IC47 Operation mode											
811	1101010011	IC48 Operation mode											
812	0011010011	IC49 Operation mode											
813	1011010011	IC50 Operation mode											
814	0111010011	IC1 filter	0000 to 9999								B		Hours since last maintenance [h]
815	1111010011	IC2 filter	0000 to 9999										
816	0000110011	IC3 filter	0000 to 9999										
817	1000110011	IC4 filter	0000 to 9999										
818	0100110011	IC5 filter	0000 to 9999										
819	1100110011	IC6 filter	0000 to 9999										
820	0010110011	IC7 filter	0000 to 9999										
821	1010110011	IC8 filter	0000 to 9999										
822	0110110011	IC9 filter	0000 to 9999										
823	1110110011	IC10 filter	0000 to 9999										
824	0001110011	IC11 filter	0000 to 9999										
825	1001110011	IC12 filter	0000 to 9999										
826	0101110011	IC13 filter	0000 to 9999										
827	1101110011	IC14 filter	0000 to 9999										
828	0011110011	IC15 filter	0000 to 9999										
829	1011110011	IC16 filter	0000 to 9999										
830	0111110011	IC17 filter	0000 to 9999										
831	1111110011	IC18 filter	0000 to 9999										
832	0000001011	IC19 filter	0000 to 9999										
833	1000001011	IC20 filter	0000 to 9999										
834	0100001011	IC21 filter	0000 to 9999										
835	1100001011	IC22 filter	0000 to 9999										
836	0010001011	IC23 filter	0000 to 9999										
837	1010001011	IC24 filter	0000 to 9999										
838	0110001011	IC25 filter	0000 to 9999										
839	1110001011	IC26 filter	0000 to 9999										

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

10 LED Status Indicators on the Outdoor Unit Circuit Board

Data on indoor unit system

No.	SW4 (When SW6 - 10 is set to 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 (When SW6 - 10 is set to OFF)	Item	Display								Unit (A, B) *1		Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	OC	OS	
871	1110011011	U-phase current effective value 1	-99.9 to 999.9								A	A	The unit is [A]
872	0001011011	W-phase current effective value 1	-99.9 to 999.9								A	A	
873	1001011011	Power factor phase angle 1	-99.9 to 999.9								A	A	The unit is [deg]
880	0000111011	Control board Reset counter	0 to 254								A	A	The unit is [time]
881	1000111011	INV board Reset counter	0 to 254								A	A	
884	0010111011	Fan board (address 5) reset counter	0 to 254								A	A	The unit is [time]
885	1010111011	Fan board (address 6) reset counter	0 to 254								A	A	
980	0010101111	M-NET processor S/W version	0.00 to 99.99								A	A	

*1 A: The condition of either OC or OS is displayed individually. B: The condition of the entire refrigerant system is displayed.

Service Handbook

Model

PUHY-P72, P96, P120, P144, P168T(Y)NU-A
PUHY-P192, P216, P240, P264, P288, P312, P336, P360, P384, P408, P432T(Y)SNU-A

PUHY-EP72, EP96, EP120, EP144, EP168, EP192, EP216, EP240T(Y)NU-A
PUHY-EP192, EP216, EP240, EP264, EP288, EP312, EP336, EP360, EP384, EP408, EP432T(Y)SNU-A

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HWE1823C

New publication effective Oct. 2020
Specifications subject to change without notice