Service Handbook PUHY-200TEM-A, 250TEM-A, 315TEM-A

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MITSUBISHI ELECTRIC

AIR CONDITIONERS CITY MULTI

Models **PUHY-200TEM-A, 250TEM-A, 315TEM-A**

Service Handbook

MITSUBISHI ELECTRIC CORPORATION
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CITY MULTI

Issued in May 2004 MEE03K196
Printed in Japan

New publication effective May 2004.
Specifications subject to change without notice.

Safety Precautions

Before installation and electric work

- **Before installing the unit, carefully read all the instructions in "Safety precautions" section.**
- **This section provides very important information regarding safety. Follow the instructions carefully to ensure safety.**
- **This equipment may not be applicable to EN61000-3-2: 1995 and EN61000-3-3: 1995.**
- **This equipment may have an adverse effect on equipment on the same electrical supply system.**
- **Please report to and seek approval from the local power company before connecting to the system.**

Symbols used in the text

⚠ Warning:
This sign is intended to alert the user to the presence of important instructions to prevent injury or death.

⚠ Caution:
This sign is intended to alert the user to the presence of important instructions to prevent damage to the unit.

Conventions

⃠ : Indicates an action that must be avoided.

: Indicates an action that must be taken.

: Indicates that the part marked with this symbol must be grounded.

⚠ : Indicates the presence of high voltage that may be of magnitude to constitute a risk of electric shock. (Yellow label affixed to the main unit)

⚠ Warning:
Carefully read the labels affixed to the main unit.

⚠ Warning:

- **Use only the specified cables for wiring, and make the connections securely so that the gravitational force of the cable is not applied to the terminals.**
  - Inadequate connection and fastening may cause the equipment to generate heat and result in a fire.
- **Have all electrical work done by a licensed electrician according to "Electric Facility Engineering Standard," "Interior Wire Regulations," and the instructions given in this manual. Always use a circuit designated exclusively to the unit.**
  - Insufficient power source capacity or inadequate electric work may present a risk of electric shock and fire.
- **Securely install the control box cover and the panel.**
  - Dust or water entering the outdoor unit due to improper installation of control box cover or panel may present a risk of fire or electric shock.
- **After completing service work, ensure that the system is free of refrigerant gas leak.**
  - Leaked refrigerant gas exposed to a heat source such as a fan heater, stove or oven, may produce harmful gases.
- **Do not attempt to defeat the protection devices.**
  - Defeating the safety features of pressure switch, thermal switch, or any other protection device or using parts other than those specified by Mitsubishi Electric may result in fire or explosion.

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V. CONTROL

VI. REFRIGERANT AMOUNT ADJUSTMENT

VII. TROUBLESHOOTING

VIII. MONITOR DISPLAY BY OUTDOOR BOARD LED

IX. TEST RUN

Read Before Servicing.

1 Items to be Checked

1. Verify the type of refrigerant used by the unit to be serviced.

Refrigerant type : R22

2. Check the symptoms exhibited by the unit to be serviced.

3. Be sure to carefully read the "Safety Precautions" at the beginning of this document.

4. Preparation of tools :

The tools required depends on the type of refrigerant used.

Do not use gauge manifolds and charge hoses that have been used with a different type of refrigerant. Prepare a separate set of tools for each of the refrigerants R22 and R407C. Using common tools for multiple units that use different refrigerant may cause mechanical problems.

Use a vacuum pump equipped with a reverse-flow check valve, or attach a reverse-flow prevention adapter to a pump not equipped with one.

5. Verification of connecting piping :

Verify the type of refrigerant used for the unit to be moved or replaced.

- Use phosphorous deoxidized copper pipe for piping. Keep the inner and outer surfaces of the piping clean and free of contaminants such as sulphur, oxides, dust, shaving particles, grease and moisture.
- Contaminants inside refrigerant piping may deteriorate the refrigerating machine oil.

6. Keep workspace well-ventilated. If exposed to an open flame, leaked refrigerant will produce fluoride, which is toxic.

⚠ CAUTION

1. **Install new pipes immediately after removing old ones to keep moisture out of the refrigerant circuit.**
2. **Please do not use refrigerants other than R22.**

2 Vacuum Drying

Photo 1 15010H

Photo 2 14010

Recommended vacuum gauge : ROBINAIR 14010 Thermistor Vacuum Gauge

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

To prevent vacuum pump oil from flowing back into the refrigerant circuit upon turning off the vacuum pump's power source, use a vacuum pump equipped with a reverse flow check valve.
A check valve may also be added to the vacuum pump currently in use.

2. Standard of vacuum degree (Photos 1 and 2)

Use a vacuum pump that shows a vacuum degree of 65Pa or less after 5 minutes of operation. Use a pump well-maintained with an appropriate lubricant.

3. Required precision of vacuum gauge

Use a vacuum gauge that registers a vacuum degree of 650Pa and measures at intervals of 130Pa. (A recommended vacuum gauge is shown in Photo 2.)
Do not use a vacuum gauge that does not register a vacuum degree of 650Pa.

4. Evacuation time

- After the vacuum gauge has registered the vacuum degree of 650Pa, evacuate for 1 hour. (A thorough vacuum drying removes moisture in the pipes.)
- Verify that the vacuum degree has not risen by more than 130Pa 1 hour after evacuation. A rise by less than 130Pa is acceptable.
- If it has exceeded by more than 130Pa, conduct vacuuming following the instructions in the "6. Special vacuum drying" section.

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 650Pa or lower degree of vacuum cannot be attained after 3 hours of evacuation, it is likely that water has penetrated the system or that there is a leak. When water infiltration is suspected, vacuum with nitrogen gas.
  After breaking the vacuum, pressurize the system with nitrogen gas to a degree of 0.05MPa, and conduct an evacuation again. Repeat it until 650Pa or lower degree of vacuum is attained or the vacuum pressure rise will be lost.
- Only use nitrogen gas for vacuum breaking. (Use of oxygen may cause an explosion.)

I. RESTRICTIONS

1 System Restrictions & Switch Setting Required for System Configuration

1. System configuration restrictions (Applicable to all units)

❊ For information on restrictions for individual unit connection, see the installation manual for each unit.

<table>
<tr><th colspan="2" rowspan="3">Set-up / Item</th><th rowspan="3">Automatic address set-up (Note 4)</th><th rowspan="3">Manual address set-up</th><th colspan="4">Set-up with connection to system controller (Note 5)</th></tr>
<tr><th rowspan="2">Connection to centralized control transmission line (Note 13)</th><th colspan="3">Connection to indoor/outdoor transmission line (TB3) (Note 10)</th></tr>
<tr><th>SC x 1 unit</th><th>SC x 2 units</th><th>SC x 3 units</th></tr>
<tr><td colspan="2">Number of connected remote controllers.</td><td colspan="6">Up to 2 units per group</td></tr>
<tr><td colspan="2">Number of indoor connected units per group.</td><td colspan="6">1 ~ 16 units</td></tr>
<tr><td colspan="2">Number of OA processing units connected to indoor unit.</td><td colspan="6">1 unit per indoor unit</td></tr>
<tr><td colspan="2">Number of indoor units connected to OA processing unit.</td><td>All indoor units in the same refrigerant system (Note 6)</td><td colspan="5">1 to 16 units per OA processing unit (Note 7)</td></tr>
<tr><td colspan="2">Number of connected OA processing units in the same refrigerant system (Note 1)</td><td>1 unit</td><td>–</td><td>–</td><td colspan="3">–</td></tr>
<tr><td colspan="2">Number of system controllers connected when indoor/outdoor transmission lines are connected.</td><td>–</td><td>–</td><td>–</td><td colspan="3">Max. 3 units in the same refrigerant system</td></tr>
<tr><td rowspan="2">Total number of units connected in the same refrigerant system
Number of <MA Remote Controller>
(Note 2)</td><td>All indoor units under Type 200</td><td colspan="3">Max. 32 units (excluding Lossnay)</td><td>Max 30 units</td><td>Max. 28 units</td><td>Max. 26 units</td></tr>
<tr><td>Including Type 200 or higher</td><td colspan="3">Max. 26 units (Note 8)</td><td colspan="3">Above numbers exclusive of LOSSNAY (Note 11, 12)
Max. 24 units / Max. 22 units / Max. 20 units
(Note 11, 12)</td></tr>
<tr><td rowspan="2">Total number of units connected in the same refrigerant system
Number of <M-NET Remote Controller>
(Note 2, 3)</td><td>All indoor units under Type 200</td><td colspan="3">Max. 20 units (40 units)
(Note 8, 9)</td><td colspan="3">Max. 18 units (38 units) / Max. 16 units (36 units) / Max. 14 units (34 units)
(Note 9, 11, 12)</td></tr>
<tr><td>Including Type 200 or higher</td><td colspan="3">Max. 16 units (32 units)
(Note 8, 9)</td><td colspan="3">Max. 14 units (30 units) / Max. 12 units (28 units) / Max. 10 units (26 units)
(Note 9, 11, 12)</td></tr>
</table>

Notes:

1. The "Automatic address set-up" is not available when more than 16 indoor units and OA processing units are linked within the same refrigerant system, or when 2 or more OA processing units are connected within the same refrigerant system.
   ❊ Select the “Manual address set-up” or “Set-up with the system controller.”
2. The number of connected units represents the total number of the indoor units and OA processing units (LOSSNAY with heater/ humidifier).
3. When both MA and M-NET remote controllers are used, the maximum number of units that can be connected is the same for M-NET - controller-only system.
4. The “Automatic address set-up” is not applicable when using the start/ stop input for group operation.
5. When MA and M-NET remote controllers are used in combination, the “Set-up with connection to system controller” is applied by connecting the system controller.
6. All indoor units within a refrigerant system are automatically linked and registered when OA processing units are connected by the “Automatic address set-up.”
7. Unless operating in the “Automatic address set-up mode,” the linking and registration of the indoor units and OA processing units are necessary.
8. When exceeding the maximum number of units, a transmission booster is required.
9. Figures in brackets represent the total number of indoor units and M-NET remote controllers.
10. The types of system controllers that can be connected to the indoor/outdoor transmission lines are G-50, PAC-YT44STA, PAC-SF44SRA, and PAC-SC30GRA.
    Note that, with outdoor units PUMY, the system controllers cannot be connected to the indoor/outdoor transmission line. Also note that if the power to the outdoor unit is cut off while the system controller is being connected to the indoor/outdoor transmission line, the controller will become inoperable.
    Please do not connect G-50 to the indoor/outdoor transmission line when using the optional “Power apportioned charging” function.
11. The number of connectable indoor units is reduced by 2 units per each system controller connected.
    Up to three system controllers can be connected in a refrigerant system.
    However in the case of G-50, only a single controller can be connected, while the number of the connectable indoor units is reduced by 4 units.
12. When the system controller is connected to the indoor/outdoor transmission line, a transmission booster must not be used.
    Connect the system controller to the “Centralized control transmission line” when the maximum number of units is exceeded.
13. Up to 5 system controllers can be connected. (excluding the system with G-50).

(1) Connecting the transmission booster

A transmission booster is required when the total number of units within the same refrigerant system exceeds the maximum number of units.

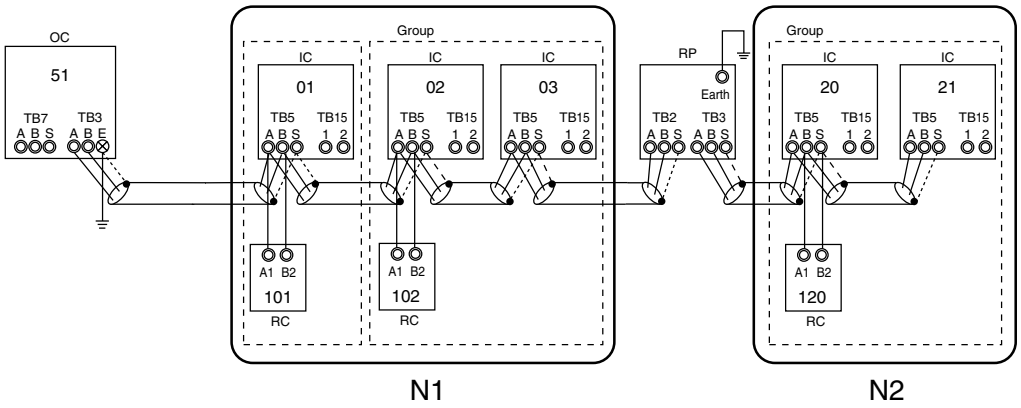
Make sure that the number of indoor units between the outdoor unit and the transmission booster (N1) and the number of indoor units after the transmission booster (N2) stay within the limits shown in the table below.

Type of remote controller	MA remote controller (Note 1)	M-NET remote controller (Note 2)
Number of indoor units (All units under Type 200)	32	20 (40)
Number of indoor units (including units above Type 200)	26	16 (32)

The figures in ( ) indicate the total number of indoor units and M-NET remote controllers.

(Note 1) "MA remote controller" indicates MA and wireless remote controllers.

(Note 2) "M-NET remote controller" indicates M-NET and compact remote controllers.



IC : Indoor unit
RC : M-NET remote controller
OC : Outdoor unit
RP : Transmission booster

2. Switch setting

Type and method of switch setting

Switch setting vary depending on the system configuration. Make sure to read "**VI. 5. System connection examples**" before conducting electrical work. Turn off the power before setting the switch. Operating the switch while the unit is being powered will not change the setting, and the unit will not properly function.

To set the switch for these units		Symbol	Cut off the power to the following
Outdoor unit		OC	Outdoor unit
Indoor unit	Main unit/Sub unit	IC	Outdoor unit & Indoor unit
LOSSNAY ❇1		LC	Outdoor unit & LOSSNAY
M-NET remote controller	Main/sub remote controllers	RC	Outdoor unit
MA remote controller	Main/sub remote controllers	MA	Indoor unit

❇1 LC is used only when connected to LC.

(1) Address setting

Address setting varies depending on the system configuration. See " **3. System connection examples**" section for details.

Unit or controller		Symbol	Address setting range	Setting method	Factory setting
Indoor unit	Main/sub units	IC	0, 01~50 (Note 1)	• Assign the lowest address number to the indoor unit to become the main unit of the group, and then set the indoor unit addresses in the same group in sequential numbers.	00
Lossnay		LC		Assign any unused address after setting all indoor units.	00
M-NET remote controller	Main remote controller	RC	101~150	Set to the lowest address of the indoor main unit within the same group + 100.	101
	Sub remote controller	RC	151~200 (Note 2)	Set to the lowest address of the indoor main unit within the same group + 150.	
MA remote controller		MA	No address setting required. (When operating with 2 remote controllers, the main/sub selector switch must be set.		Main
Outdoor unit		OC	0, 51~100 (Note 1, 3, 4)	Set to the lowest indoor unit address among the indoor units within the same refrigerant system + 50	00
System controller	Group remote controller	GR, SC	201~250	Set to the lowest No. of the group to be controlled + "200."	201
	System remote controller	SR, SC	201~250	Choose any number within the range of addresses shown left.	201
	ON/OFF remote controller	AN, SC	201~250	Set to the lowest No. of the group desired to be controlled + "200."	201
	Schedule timer (for M-NET)	ST, SC	201~250	Choose any number within the range of addresses shown left.	202
	Centralized controller (Note 5)	TR, SC	0, 201~250	Choose any number within the range of addresses shown left. However when using with the upper SC setting, or wishing to control the k-control units, set to "0."	000
	LM adapter	SC	201~250	Choose any number within the range of addresses shown left.	247

Notes:

1. Address setting is not required for a single refrigerant system (with a few exception).
2. When setting M-NET remote controller address to "200," make it "00."
3. When setting the outdoor unit and outdoor auxiliary unit address to "100," make it "50."
4. When an address in a system overlapped with the outdoor unit address of other refrigerant system, choose an another address within the set range that is not in use (with a few exceptions).
5. When controlling the K-control units;
   (1) A K-transmission converter (Model name: PAC-SC25KA) is required. To set the address for the K-transmission converter, set it to the lowest address of the K-control unit to be controlled + 200.
   (2) Set the address of the system controller (G-50A) to "0." The K-control unit can only be controlled by the system controller with the address "0."
   (3) To control both K-control unit and M-NET model unit, make the address of the K-control unit larger than that of the indoor unit of M-NET model.
   Group-register on the system controller so that the group No. and the lowest address of the K-controlled indoor units belonging to the group will be identical.

(2) Setting the main/sub selector switch on the MA remote controller

MA remote controller is provided with the main/sub selector switch. Set one of them to the sub remote controller for a 2-remote controller operation.

SW No.	Details of SW	SW setting		Description of setting	Factory setting
		ON	OFF		
1	Remote controller main/sub setting	Main	Sub	When connecting 2 remote controllers to a unit, set one of the units to "Sub."	ON
2	Turning on power to remote controller	Normal start-up	Timer mode start-up	When wishing to return to normal operation after power failure under timer mode while connected to the schedule timer, set the controller to "Timer mode start-up."	ON
	Cooling/heating display under an auto setting mode	Yes	None	When not wishing to display "Cool" or "HEAT" only during the automatic mode setting, set to "NONE."	ON
4	Inlet air temperature display	Yes	None	When not wishing to display the inlet temperature, set to "NONE."	ON

❇ Do not change the SW except for SW-1 remote controller main/sub setting.

(3) Setting the outdoor-unit power-supply switching connector (Factory setting : Connected to "CN41")

System configuration	Setting detail
Single-refrigerant system	Connected to CN41 (Factory setting)
Multiple-refrigerant system	Replace the power supply switching connector (CN41) with (CN40) only on 1 outdoor unit (OC).
Connection system with system controller	Connected to CN41 (Factory setting) ❇ When the system controller or group remote controller is connected to the indoor/outdoor transmission line without using transmission power supply unit in the multiple refrigerant system, replace the power supply switching connector (CN41) with (CN40).

(4) Setting the outdoor unit centralized control switch (Factory setting : SW2-1 "OFF")

System configuration		Setting of centralized control switch (SW2-1)
Connection system with system controller	Not provided	OFF (Factory setting)
Connection system with system controller	Provided (Note 1)	ON

(Note 1) Leave SW2-1 as "OFF" when connecting LM adaptor only.

(5) Setting the indoor unit room temperature detection point (Factory setting : SW1-1 "OFF")

(1) When the remote controller's built-in sensor is used, set SW1-1 to "ON."

❇ Some remote controllers are not equipped with a built-in sensor;
Use the built-in sensor of the indoor unit.

❇ When using the remote controller's built-in sensor, mount the remote controller where room temperature can be detected.

Note: The factory setting of SW1-1 on all fresh type indoor units is "ON."

(2) When using an optional temperature sensor, set SW1-1 to "OFF" and SW3-8 to "ON."

❇ When using the optional temperature sensor, mount where the room temperature can be detected.

(6) Setting the system controller switch

<table>
<tr><th>Model</th><th>Setting SW</th><th>Detail</th><th>Setting method</th><th>Factory setting</th></tr>
<tr><td>Group remote controller
PAC-SC30GRA</td><td>SW3
(Note 1)</td><td>Upper SC setting /lower SC setting</td><td>Upper SC setting : Upper side
Lower SC setting : Lower side</td><td>Upper
SC setting</td></tr>
<tr><td rowspan="6">System remote controller
PAC-SF44SRA</td><td>SW3-1
(Note 1)</td><td>Upper SC setting /lower SC setting</td><td>OFF : Setting system controller for upper class
ON : Setting system controller for lower class</td><td>OFF</td></tr>
<tr><td>SW3-2, 3</td><td colspan="2">External input function selection
<table>
<tr><th rowspan="2">No.</th><th colspan="2">Dip SW3</th><th rowspan="2">Function of external input signal</th><th rowspan="2">Input state</th></tr>
<tr><th>2</th><th>3</th></tr>
<tr><td>1</td><td>OFF</td><td>OFF</td><td>Not using external input</td><td>–</td></tr>
<tr><td>2</td><td>OFF</td><td>ON</td><td>Switching between emergency stop/normal</td><td>Level input</td></tr>
<tr><td>3</td><td>ON</td><td>OFF</td><td>Switching between start/stop</td><td>Level input</td></tr>
<tr><td>4</td><td>ON</td><td>ON</td><td>Switching between start/stop, prohibit/permit</td><td>Pulse input (over 0.5s)</td></tr>
</table></td><td>OFF</td></tr>
<tr><td>SW3-4
(Note 2,3)</td><td>Selecting operation restriction setting</td><td>Setting operation restriction function of local remote controller
OFF : Not using this function of the unit
ON : Using this function of the unit</td><td>OFF</td></tr>
<tr><td>SW3-5
(Note 4)</td><td>Selecting operation restriction range setting</td><td>Setting operation restriction range of the unit
OFF : Prohibiting local remote controller operation only
ON : Prohibiting the operation of local remote controller and other system controllers</td><td>OFF</td></tr>
<tr><td>SW3-6</td><td>Selecting set temperature display options</td><td>OFF : Displaying the target temperature in Celsius (˚C)
ON : Displaying the target temperature in Fahrenheit (˚F)</td><td>OFF</td></tr>
<tr><td rowspan="8">Schedule timer
(For M-NET)
PAC-YT34STA</td><td>SW3-1
(Note 1)</td><td>Upper SC setting /lower SC setting</td><td>OFF : Setting system controller as upper class
ON : Setting system controller as lower class</td><td>OFF</td></tr>
<tr><td>SW3-2, 3</td><td colspan="2">External input function selection
<table>
<tr><th rowspan="2">No.</th><th colspan="2">Dip SW3</th><th rowspan="2">Function of external input signal</th><th rowspan="2">Input state</th></tr>
<tr><th>2</th><th>3</th></tr>
<tr><td>1</td><td>OFF</td><td>OFF</td><td>Not using external input</td><td>–</td></tr>
<tr><td>2</td><td>OFF</td><td>ON</td><td>Switching between emergency stop/normal</td><td>Level input</td></tr>
<tr><td>3</td><td>ON</td><td>OFF</td><td>Switching between start/stop</td><td>Level input</td></tr>
<tr><td>4</td><td>ON</td><td>ON</td><td>Switching between start/stop, prohibit/permit</td><td>Pulse input (over 0.5s)</td></tr>
</table></td><td>OFF</td></tr>
<tr><td>SW3-4
(Note 2, 3)</td><td>Selecting operation restriction setting</td><td>Setting operation restriction function of local remote controller
OFF : Not using this function of the unit
ON : Using this function of the unit</td><td>OFF</td></tr>
<tr><td>SW3-5
(Note 4)</td><td>Selecting operation restriction range setting</td><td>Setting operation restriction range of the unit
OFF : Prohibiting local remote controller operation only
ON : Prohibiting the operation of local remote controller and other system controllers</td><td>OFF</td></tr>
<tr><td>SW3-6</td><td>Selecting set temperature display options</td><td>OFF : Displaying the target temperature in Celsius' (˚C)
ON : Displaying the target temperature in Fahrenheit' s (˚F)</td><td>OFF</td></tr>
<tr><td>SW3-7
(Note 5)</td><td>Selecting target temperature range</td><td>OFF : Setting range : 19˚C ~ 28˚C
ON : Setting range : 12˚C ~ 30˚C</td><td>OFF</td></tr>
<tr><td>SW3-8
(Note 6)</td><td>Enabling/disabling
Filter sign
Selecting switch restriction setting</td><td>OFF : Enabling filter sign reset switch of local remote controller
ON : Disabling filter sign reset switch of local remote controller</td><td>OFF</td></tr>
<tr><td rowspan="2">ON/OFF
remote controller
PAC-YT40ANRA</td><td>SW4-1
(Note 1)</td><td>Upper SC setting /lower SC setting</td><td>Upper SC setting : OFF
Lower SC setting : ON</td><td>OFF</td></tr>
<tr><td>SW4-2, 3</td><td colspan="2">External input function selection
<table>
<tr><th rowspan="2">No.</th><th colspan="2">Dip SW4</th><th rowspan="2">Function of external input signal</th><th rowspan="2">Input state</th></tr>
<tr><th>2</th><th>3</th></tr>
<tr><td>1</td><td>OFF</td><td>OFF</td><td>Not using external input</td><td>–</td></tr>
<tr><td>2</td><td>OFF</td><td>ON</td><td>Switching between emergency stop/normal</td><td>Level input</td></tr>
<tr><td>3</td><td>ON</td><td>OFF</td><td>Switching between start/stop</td><td>Level input</td></tr>
<tr><td>4</td><td>ON</td><td>ON</td><td>Switching between start/stop, prohibit/permit</td><td>Pulse input (over 0.5s)</td></tr>
</table></td><td>OFF</td></tr>
</table>

Notes :

1. Set the switch by referring to "3. (2) ❇ RE: Upper SC setting/Lower SC setting and group control."
2. The number of units that can use the operation prohibit function in a single system is limited to one unit. When multiple system controllers are installed, disable the operation of the system controllers not using the operation restriction function. The factory setting of the centralized controller is ON, while the other system controllers are set to OFF.
3. When set to OFF, the external input is valid only for emergency stopping.
4. Valid only when SW3-4 is set to ON.
5. Selects the range of target temperature used by the unit regardless of the operation mode. Actual available target temperature range varies depending on the models of indoor/outdoor unit.
6. When set to ON, the filter sign switch operation of the local remote controller is disabled.

<table>
<tr><th>Model</th><th>Setting SW</th><th>Detail</th><th>Setting method</th><th>Factory setting</th></tr>
<tr><td rowspan="8">Centralized controller</td><td>Function setting SW1</td><td>Spare</td><td>(Fixed to OFF)</td><td>OFF</td></tr>
<tr><td>Function setting SW2</td><td>Spare</td><td>(Fixed to OFF)</td><td>OFF</td></tr>
<tr><td>Function setting SW3</td><td>K-control unit control
Provided/Not provided</td><td>No K-control unit control: OFF
K-control unit control: ON (Note 7)</td><td>OFF</td></tr>
<tr><td>Function setting SW4</td><td>Enabling/disabling operation restriction for the local remote controller
Provided/Not provided</td><td>Disabling the operation remote controller/other system controllers from the unit: OFF
Enabling the operation of local remote controller /other system controllers from the unit: ON (Note 8)</td><td>OFF</td></tr>
<tr><td>Function setting SW6, 7</td><td colspan="2">External input function selection
<table>
<tr><th rowspan="2">No.</th><th colspan="2">Function setting SW</th><th rowspan="2">Function of external input signal</th><th rowspan="2">Input state</th></tr>
<tr><th>6</th><th>7</th></tr>
<tr><td>1</td><td>OFF</td><td>OFF</td><td>Not using external input</td><td>–</td></tr>
<tr><td>2</td><td>OFF</td><td>ON</td><td>Switching between emergency stop/normal</td><td>Level input</td></tr>
<tr><td>3</td><td>ON</td><td>OFF</td><td>Switching between start/stop</td><td>Level input</td></tr>
<tr><td>4</td><td>ON</td><td>ON</td><td>Switching between start/stop, prohibit/permit</td><td>Pulse input (over 0.5s~1.0s)</td></tr>
</table></td><td>OFF</td></tr>
<tr><td>Function setting SW8</td><td>Range at operation prohibit
Local remote controller only/Including system controllers</td><td>At operation prohibition set;
Prohibiting the operation of local remote controller and other system controllers : OFF
Prohibiting the operation of local remote controller only : ON</td><td>OFF</td></tr>
<tr><td rowspan="4">LM adaptor LMAP02-E</td><td>SW1-1 (Note 9)</td><td>Selecting the operation prohibit setting of local remote controller</td><td>Not using operation prohibit nv (input/output): OFF
Using operation prohibit nv (input/output): ON</td><td>OFF</td></tr>
<tr><td>SW1-2</td><td>Selecting the common use setting of system controller</td><td>Not using system controller: OFF
Using system controller : ON</td><td>OFF</td></tr>
<tr><td>SW1-5</td><td>Selecting M-NET LOSSNAY setting
❇ Effective only SW1-2 is set to OFF</td><td>Interlocking LOSSNAY and indoor unit at air conditioner side: OFF
Operating LOSSNAY directly from LONWORKS® without interlocking: ON</td><td>OFF</td></tr>
<tr><td>CN41</td><td colspan="2">When only LM adaptor is connected, replace the power selecting connector (CN41) of LM adaptor with (CN40).</td><td>CN41</td></tr>
<tr><td colspan="5">❇ The switch setting on the LM adaptor differs depending on the control detail of equipment connected to LONWORKS® .</td></tr>
</table>

Notes : 7. The only system controller that can control K-control units is the one with the address “0.” Do not set the function setting SW3 of to the system controllers with the address other than “0” to “ON.”

8. When multiple system controllers are installed in single system, there is only one system controller that can disable the operation of the local remote controller (including system controllers) per system. When the operation of the local remote controller (including system controllers) is disabled by other system controllers than the one for set the function setting SW4 of this unit to “ON.” In this case, the operation of the local remote controller cannot be disabled by this unit.
9. LM adaptor cannot disable the operation of other system controllers.

(7) Others

(1) Setting of cooling-only indoor unit [Cooling-only models (Factory setting : SW3-1 “OFF”)]

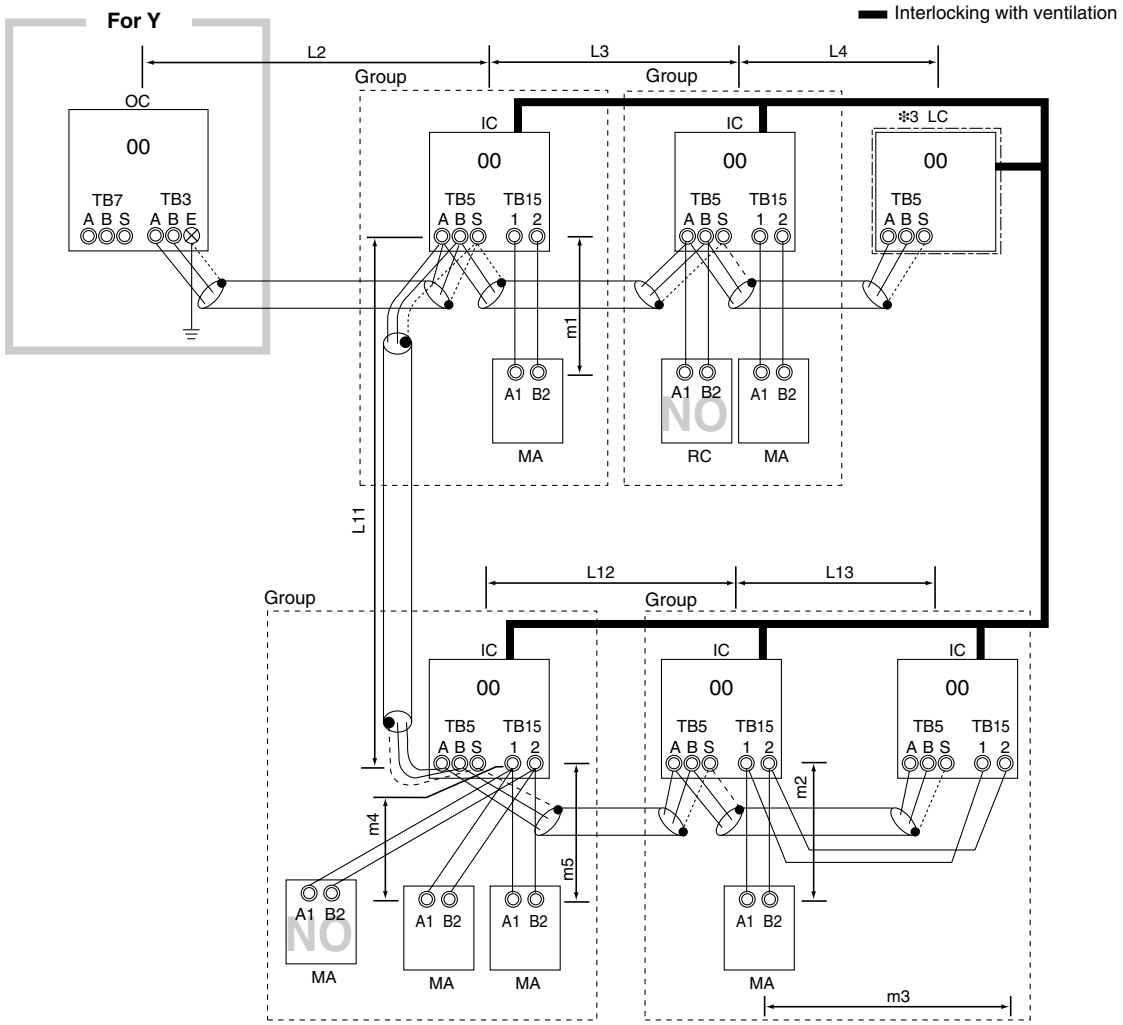
When indoor units are used exclusively for cooling, set SW3-1 to “ON.”

3. Examples of system connection

(1) System using MA remote controller

① In the case of single refrigerant system (Automatic address set-up)

Control wiring example



※3. LC for LC connection.

– Example to use shielded wire –

Prohibited items	Allowable length
1. M-NET and MA remote controllers can not be connected together to the indoor unit within the same group. 2. MA remote controller of 3 units or more can not be connected to the indoor unit within the same group. 3. When the total number of indoor units exceeds 26 units Including that above Type 200, a transmission booster is required. 4. In the case when start/stop input (CN32, CN51, CN41) is used by indoor group operation, the "Automatic address set-up" can not be employed. Please refer to (1) ② "Manual address set-up." 5. For the connection of LOSSNAY with more than 2 units in a single refrigerant system, refer to the following "Connection of 2 LOSSNAY units in refrigerant system."	**a. Indoor/outdoor transmission line** Farthest length (1.25mm² or more) L2 + L3 + L4 ≦ 200m L2 + L11 + L12 + L13 ≦ 200m **b. Centralized control transmission line** No connection is required. **c. MA remote controller wiring** Total length (0.3 ~ 1.25mm²) m1 ≦ 200m m2 + m3 ≦ 200m m4 + m5 ≦ 200m Note 1. For the connection to the terminal block of compact remote controller, employ wire with a diameter of 0.75 ~ 1.25mm²

Wiring method • Address setting method

a. Indoor/outdoor transmission line

Apply jumper wiring connection between A, B terminals of the indoor/outdoor transmission line terminal block (TB3) on the outdoor unit (OC) and that of indoor/outdoor transmission line terminal block (TB5) on each indoor unit (IC). (with non-polarity two wires)

❇ When the transmission line is long or noise sources are located near the unit, recommend to use shielded wire.

Connection of shielded wire:

For the earth of shielded wire, apply jumper wiring connection between the earth screw of OC and the S-terminal of IC terminal block (TB5).

b. Centralized control transmission line

Connection is not required.

c. MA remote controller wiring

Connect the 1, 2 terminals of MA remote controller wiring terminal block (TB15) on IC to the terminal block of MA remote controller (MA). (with non-polarity two wires)

❇ MA remote controller can be connected to A-type indoor unit or later.

For 2-remote controller operation:

To employ 2-remote controller operation, connect 1, 2 terminals of the terminal block (TB15) on IC to the terminal block of two MA remote controllers.

❇ Set the main/sub selector switch of one MA remote controller to the sub remote controller. (For the setting method, see the installation manual of MA remote controller.)

For indoor group operation:

For the group operation of IC, connect 1, 2 terminals of the terminal block (TB15) on all ICs within the same group, and connect 1, 2 terminals of the terminal block (TB15) on another IC to the terminals of MA remote controller. (with non-polarity two wires)

❇ To operate the indoor units with different function in the same group, refer to (1)②.

d. LOSSNAY connection

Apply jumper wiring to connect A, B terminals of the terminal block (TB5) on IC to the indoor/outdoor transmission terminal block (TB5) on LOSSNAY (LC). (with non-polarity two wires)

❇ Linked and registered automatically with all indoor units within a refrigerant system.

❇ Please refer to the (1) ② "Manual address set-up," when interlocking partial indoor units with Lossnay, using Lossnay alone without interlocking, interlocking indoor units and Lossnay for over 16 units within a refrigerant system, or connecting LOSSNAY for over 2 units in a refrigerant system.

e. Switch setting

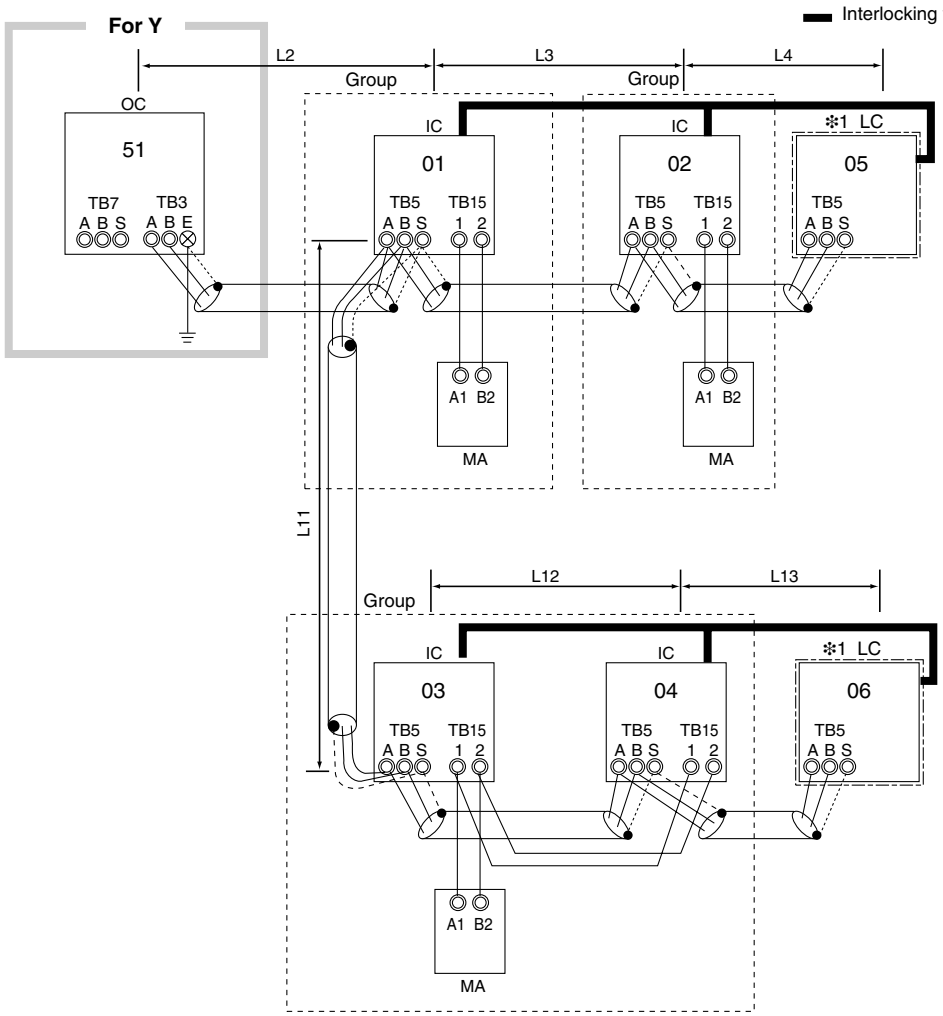
Address setting is not required.

Order	Unit or controller			Address setting range	Setting method	Caution	Factory setting
1	Indoor unit	Main unit	IC	Not required	–	• Refer to (1) ② to operate indoor units with different function in the same group.	00
		Sub unit	IC				
2	LOSSNAY		LC	Not required	–		00
3	MA remote controller	Main unit	MA	Not required	–		Main
		Sub unit	MA	Sub unit	Set with main/sub selector switch.		
4	Outdoor unit		OC	Not required	–		00

(1) System using MA remote controller

② In the case of single refrigerant system connecting 2 or more LOSSNAY units (Manual address set-up)

Control wiring example



※1. LC for LC connection.

– Example to use shielded wire –

Prohibited items	Allowable length
1. M-NET and MA remote controllers can not be connected together to the indoor unit within the same group. 2. MA remote controller of 3 units or more can not be connected to the indoor unit within the same group. 3. When the total number of indoor units exceeds 26 units including that above Type 200, a transmission booster is required.	**a. Indoor/outdoor transmission line** The same as (1) ① **b. Centralized control transmission line** No connection is required. **c. MA remote controller wiring** The same as (1) ①

Wiring method • Address setting method

a. Indoor/outdoor transmission line

The same as (1) ①

Connection of shielded wire:

The same as (1) ①

b. Centralized control transmission line

No connection is required.

c. MA remote controller wiring

The same as (1) ①

For 2-remote controller operation:

The same as (1) ①

For indoor group operation:

The same as (1) ①

d. LOSSNAY connection

Apply jumper wiring to connect A, B terminals of the terminal block (TB5) on the indoor unit (IC) to the terminal block (TB5) on Lossnay (LC). (with non-polarity two wires)

❇ The interlocking registration of the indoor unit and Lossnay from the remote controller is required. (For the registration method, see the installation manual of remote controllers.)

e. Switch setting

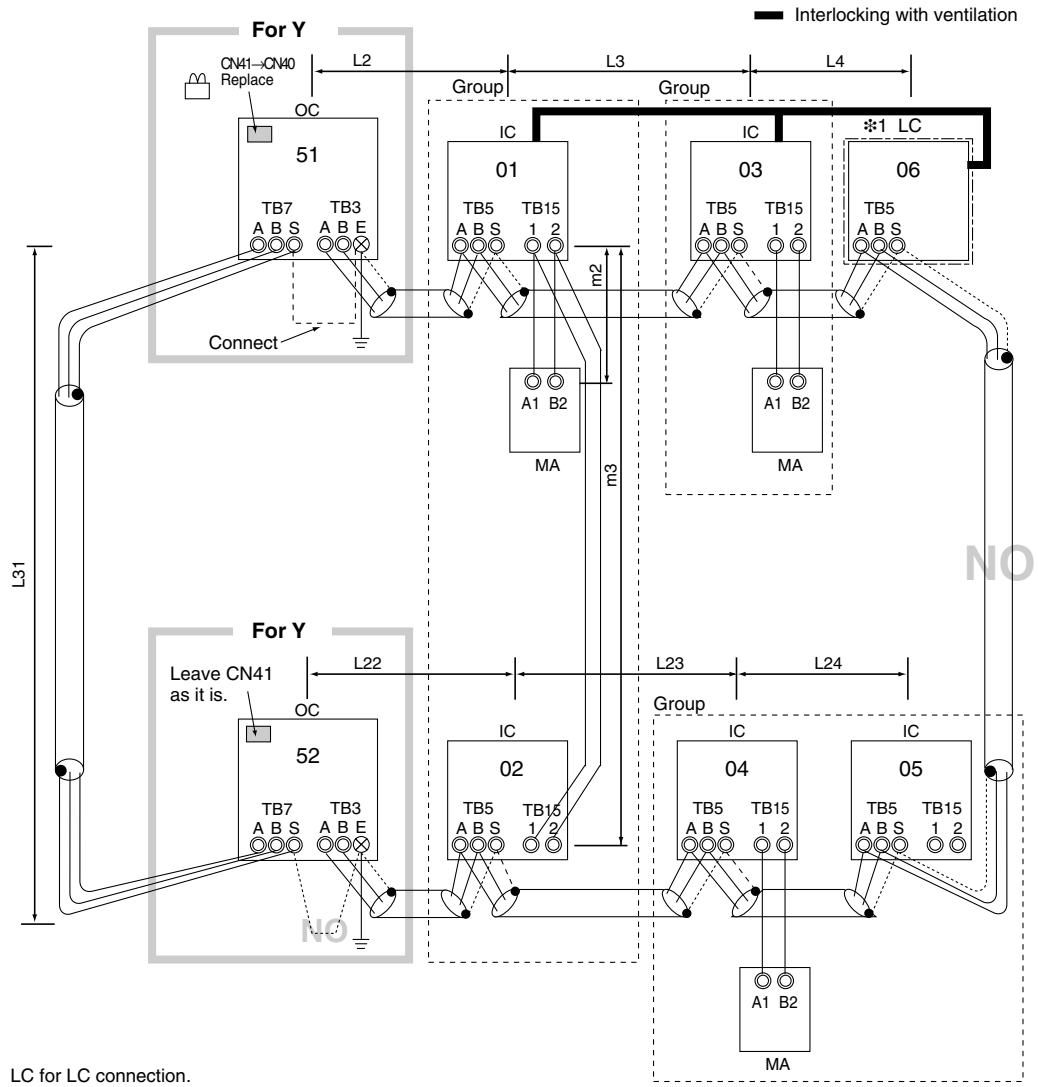
Address setting is required as listed below.

Order	Unit or controller			Address setting range	Setting method	Caution	Factory setting
1	Indoor unit	Main unit	IC	01 ~ 50	• Set the lowest address within a same group to the indoor unit desired to be the main unit.	• When operating indoor units with different function within a same group, assign the indoor unit with the most plenty of function to the main unit.	00
		Sub unit	IC	01 ~ 50	Set to the main unit address within a same group in serial order. [Main unit +1, +2, +3, ...]		
2	LOSSNAY		LC	01 ~ 50	Set any address after setting all indoor units.	• Set the address not to be overlapped with the indoor unit address.	00
3	MA remote controller	Main unit	MA	Not required	–		Main
		Sub unit	MA	Sub unit			
4	Outdoor unit		OC	51 ~ 100		• When setting address to "100," make it "50."	00

(1) System using MA remote controller

③ In the case of different refrigerant grouping operation

Control wiring example



❇1. LC for LC connection.

– Example to use shielded wire –

Prohibited items	Allowable length
1. M-NET and MA remote controllers can not be connected together to the indoor unit within the same group. 2. MA remote controller of 3 units or more can not be connected to the indoor unit within the same group. 3. Do not connect together the terminal blocks (TB5) of the indoor unit connected to different outdoor units. 4. Replacement of the power supply selecting connector (CN41) on the outdoor unit should be done only on one outdoor unit. 5. Grounding of S-terminal of the centralized control terminal block (TB7) on outdoor unit should be done only on one outdoor unit. 6. When the total number of indoor units exceeds 26 units including that above Type 200, a transmission booster is required.	**a. Indoor/outdoor transmission line** Farthest length (1.25mm² or more) L2 + L3 + L4 ≦ 200m L22 + L23 + L24 ≦ 200m **b. Centralized control transmission line** Farthest length via outdoor unit (1.25mm² or more) L2 + L3 + L4 + L31 + L22 + L23 + L24 ≦ 500m **c. MA remote controller wiring** The same as (1) ①

Wiring method • Address setting method

a. Indoor/outdoor transmission line

Apply jumper wiring connection between A, B terminals of the indoor/outdoor transmission line terminal block (TB3) on the outdoor unit (OC) and that of indoor/outdoor transmission line terminal block (TB5) on each indoor unit (IC). (with non-polarity two wires)

❇ Make sure to use shielded wire.

Connecting of shielded wire:

The same as (1) ①

b. Centralized control transmission line

Apply jumper wiring between A, B terminals of centralized control transmission line terminal blocks (TB7) on each OC. For one OC only, replace the power selecting connector (CN41) with (CN40).

❇ Make sure to use shielded wire.

Connecting of shielded wire:

Apply jumper wiring to connect the shielded earth to S-terminal of the terminal block (TB7) on each OC. Connect S-terminal of the terminal block (TB7) on the one OC with (CN40) replaced to the earth screw (E) of the electrical parts box.

c. MA remote controller wiring

The same as (1) ①

For 2-remote controller operation:

The same as (1) ①

For indoor unit group operation:

The same as (1) ②

d. LOSSNAY connection

The same as (1) ②

e. Switch setting

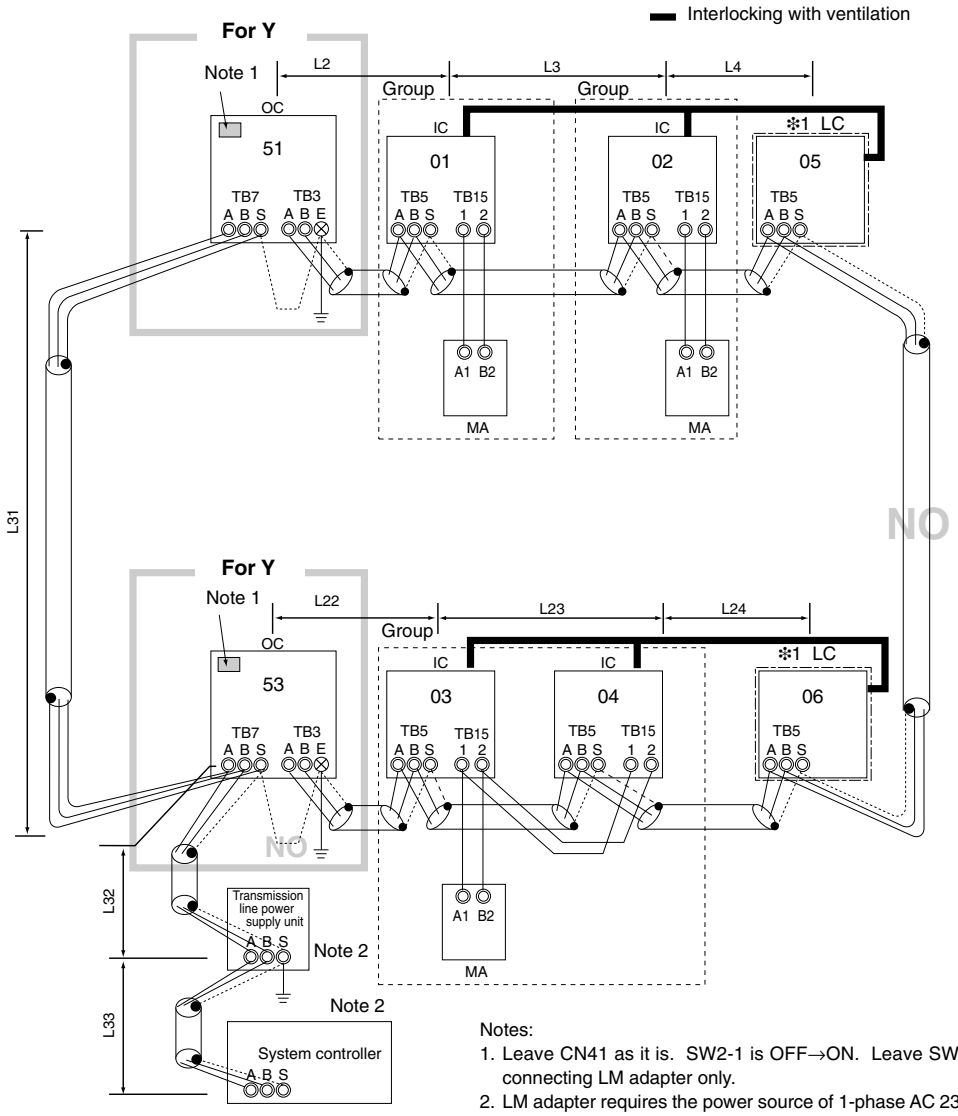
Address setting is required as follows.

Order	Unit or controller			Address setting range	Setting method	Caution	Factory setting
1	Indoor unit	Main unit	IC	01 ~ 50	• Set the lowest address within a same group to the indoor unit desired to be the main unit.		00
		Sub unit	IC	01 ~ 50	Set to the main unit address within a same group in serial order. [Main unit +1, +2, +3, ...]		
2	LOSSNAY		LC	01 ~ 50	Set any address after setting all indoor units.	• Set the address not to be overlapped with the indoor unit address.	00
3	MA remote controller	Main unit	MA	Not required	–		Main
		Sub unit	MA	Sub unit	Set by the main/sub selector switch.		
4	Outdoor unit		OC	51 ~ 100	The lowest address of indoor unit within refrigerant system + 50	• When setting address to "100," make it "50."	00

(1) System using MA remote controller

④ In the case of connecting system controller to centralized control transmission line

Control wiring example



❇1. LC for LC connection.

Notes:

1. Leave CN41 as it is. SW2-1 is OFF→ON. Leave SW2-1 as "OFF" when connecting LM adapter only.
2. LM adapter requires the power source of 1-phase AC 230V. When connecting LM adapter only, the transmission line power supply unit is not necessary but requiring to replace the power switching connector (CN41) with (CN40).

– Example to use shielded wire –

Prohibited items	Allowable length
1. M-NET and MA remote controllers can not be connected together to the indoor unit within the same group. 2. MA remote controller of 3 units or more can not be connected to the indoor unit within the same group. 3. Do not connect together the terminal blocks (TB5) of the indoor unit connected to different outdoor units. 4. Leave the power switching connector (CN41) of the outdoor unit as it is. 5. Grounding work is not required for S-terminal of the centralized control transmission block (TB7) on the outdoor unit. 6. When the total number of indoor units exceeds 26 units Including that above Type 200, a transmission booster is required.	**a. Indoor/outdoor transmission line** The same as (1) ③ **b. Centralized control transmission line** Farthest length via outdoor unit (1.25mm^2 or more) L33 + L32 + L31 + L2 + L3 + L4 ≦ 500m L33 + L32 + L21 + L22 + L23 + L24 ≦ 500m L2 + L3 + L4 + L31 + L22 + L23 + L24 ≦ 500m **c. MA remote controller wiring** The same as (1) ①

Wiring method • Address setting method

a. Indoor/outdoor transmission line

The same as (1) ③

Connection of shielded wire:

The same as (1) ①

b. Centralized control transmission line

Apply jumper wiring to A, B terminals of the centralized control transmission line terminal block (TB7) on each outdoor (OC) unit. Set the centralized control switch (SW2-1) on the control circuit board of all OC to ON.

Connection of shielded wire:

For the grounding of shielded wire, apply jumper wiring to S-terminal on the terminal block (TB7) of each OC.

Ground S-terminal of the power supply device of the system controller.

❇ When grounding from the power supply device can not be done, connect S-terminal of the terminal block (TB7) on one outdoor unit to the grounding screw (E) of the electrical parts box.

c. MA remote controller wiring

The same as (1) ①

For 2-remote controller operation:

The same as (1) ①

For indoor group operation:

The same as (1) ①

d. LOSSNAY connection

Apply jumper wiring to connect A/B terminals of the terminal block (TB5) on (IC) to the terminal block (TB5) on the indoor/outdoor transmission line terminal block (TB5) on Lossnay (LC). (with non-polarity two wires)

❇ The interlocking registration of the indoor unit and LOSSNAY from the system controller is required. (For the registration method, see the installation manual of the system remote controllers.)

When connecting ON/OFF remote controller and LM adaptor only, the interlocking registration from the remote controller is required.

e. Switch setting

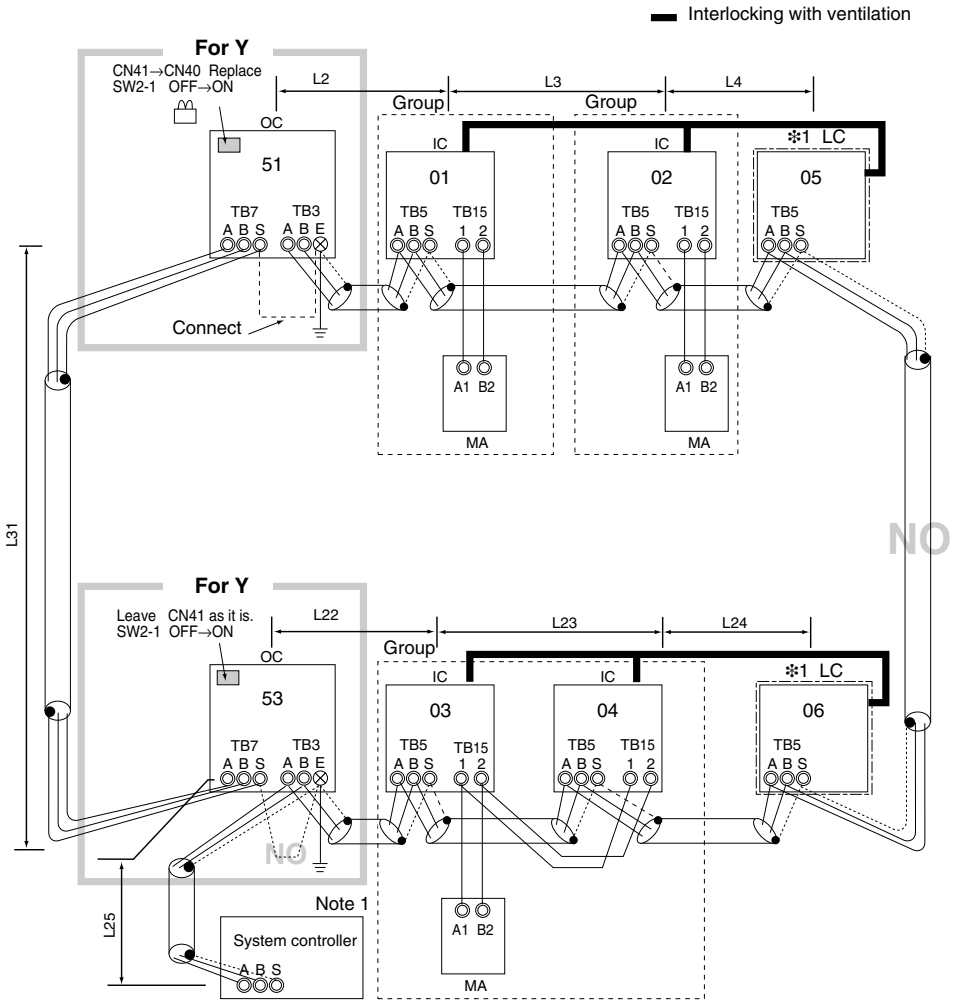
Address setting is required as listed below.

Order	Unit or controller			Address setting range	Setting method	Caution	Factory setting
1	Indoor unit	Main unit	IC	01 ~ 50	• Set the lowest address within a same group to the indoor unit desired to be the main unit.		00
		Sub unit	IC	01 ~ 50	Set to the main unit address within a same group in serial order. [Main unit +1, +2, +3, ...]		
2	LOSSNAY		LC	01 ~ 50	Set any address after setting all indoor units.	• Set the address not to be overlapped with the indoor unit address.	00
3	MA remote controller	Main unit	MA	Not required	–	• Conduct initial setting by the system controller with the same setting detail of indoor unit applied in MA remote controller wiring.	Main
		Sub unit	MA	Sub unit	Set by the main/sub selector switch.		
4	Outdoor unit		OC	51 ~ 100	The lowest address of indoor unit within refrigerant system + 50	• When setting address to "100," make it "50."	00

(1) System using MA remote controller

⑤ In the case of connecting system controller to indoor/outdoor transmission line (excluding LM adaptor)

Control wiring example



※1. LC for LC connection.

Note 1. LM adaptor may not be connected to indoor/outdoor transmission line.

– Example to use shielded wire –

Prohibited items	Allowable length
1. M-NET and MA remote controllers can not be connected together to the indoor unit within the same group. 2. MA remote controller of 3 units or more can not be connected to the indoor unit within the same group. 3. Do not connect together the terminal blocks (TB5) of the indoor unit connected to different outdoor units. 4. Replacement of the power supply selecting connector (CN41) on the outdoor unit should be done only on one outdoor unit. 5. Grounding work is required for S-terminal of the centralized control transmission block (TB7) on one outdoor unit only. 6. The system controller connectable to the indoor/outdoor transmission line counts for 3 sets maximum. While G-50 counts for only 1 set 7. When the total number of indoor units exceeds 26 sets, the system controller may not be connected to the indoor/outdoor transmission line. 8. When the total number indoor units exceed 18 sets and they includes Type 200 or above, the system controller may not be connected to the indoor/outdoor transmission line.	**a. Indoor/outdoor transmission line** Farthest length (1.25mm² or more) L2 + L3 + L4 ≦ 200m L22 + L23 + L24 ≦ 200m L25 ≦ 200m **b. Centralized control transmission line** Farthest length via outdoor unit (1.25mm² or more) L25 + L31 + L2 + L3 + L4 ≦ 500m L2 + L3 + L4 + L31 + L22 + L23 + L24 ≦ 500m **c. MA remote controller wiring** The same as (1) ①

Wiring method • Address setting method

a. Indoor/outdoor transmission line

Apply jumper wiring connection between A, B terminals of the indoor/outdoor transmission line terminal block (TB3) on the outdoor unit (OC) and that of indoor/outdoor transmission line terminal block (TB5) on each indoor unit (IC). (with non-polarity two wires)

❇ Make sure to use shielded wire.

Connection of shielded wire:

For the grounding of shielded wire, apply jumper wiring between the grounding screw of OC, S-terminal of the terminal block (TB3), and S-terminal of the system controller.

b. Centralized control transmission line

Apply jumper wiring between A, B terminals of centralized control transmission line terminal blocks (TB7) on each OC. On one OC only, replace the power selecting connector (CN41) with (CN40). Set the centralized control switch (SW2-1) on the main board of all outdoor units to "ON."

❇ Make sure to use shielded wire.

Connection of shielded wire:

Apply jumper wiring to connect the shielded earth to S-terminal of the terminal block (TB7) on each OC. Connect S-terminal of the terminal block (TB7) on one OC with (CN40) connected to the earth screw (E) of the electrical parts box.

c. MA remote controller wiring

The same as (1) ①

For 2-remote controller operation:

The same as (1) ①

For indoor unit group operation:

The same as (1) ②

d. LOSSNAY connection

Apply jumper wiring to connect A, B terminals of the terminal block (TB5) on (IC) to the terminal block (TB5) on the indoor/outdoor transmission line terminal block (TB5) on Lossnay (LC). (with non-polarity two wires)

❇The interlocking registration of the indoor unit and Lossnay is required from the system controller. (For the registration method, see the instruction manual of system controller.)

To connect ON/OFF remote controller only, interlocking registration from the remote controller is required.

e. Switch setting

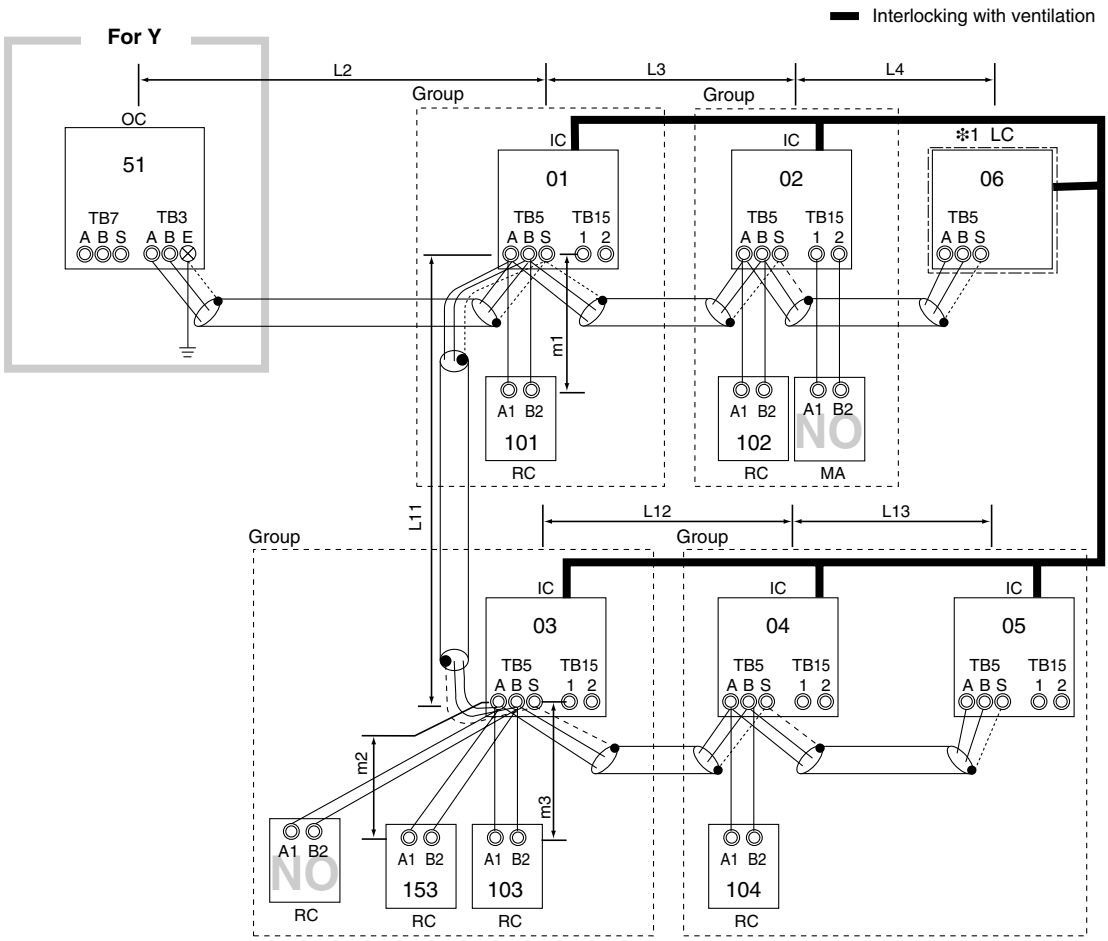
Address setting is required as follows.

Order	Unit or controller			Address setting range	Setting method	Caution	Factory setting
1	Indoor unit	Main unit	IC	01 ~ 50	• Set the lowest address within a same group to the indoor unit desired to be the main unit.		00
		Sub unit	IC	01 ~ 50	Set to the main unit address within a same group in serial order. [Main unit +1, +2, +3,]		
2	LOSSNAY		LC	01 ~ 50	Set any address after setting all indoor units.	• Set the address not to be overlapped with the indoor unit address.	00
3	MA remote controller	Main unit	MA	Not required	–	• Conduct initial setting by the system controller with the same setting detail of indoor unit applied in MA remote controller wiring.	Main
		Sub unit	MA	Sub unit	Set by the main/sub selector switch.		
4	Outdoor unit			51 ~ 100	The lowest address of indoor unit within refrigerant system + 50	• When setting address to "100," make it "50."	00

(2) System using M-NET remote controller

① In the case of single refrigerant system

Control wiring example



※1. LC for LC connection.

– Example to use shielded wire –

Prohibited items	Allowable length
1. M-NET and MA remote controllers can not be connected together to the indoor unit within the same group. 2. M-NET remote controller of 3 units or more can not be connected to the indoor unit within the same group. 3. When the total number of indoor units exceeds 20 sets, a transmission line booster is required. 4. When the total number of indoor units exceeds 16 sets, and they contain Type 200 or above, a transmission line booster is required.	**a. Indoor/outdoor transmission line** The same as (1) ① **b. Centralized control transmission line** No connection is required. **c. M-NET remote controller wiring** Total length (0.3 ~ 1.25mm²) m1 ≦ 10m m2 + m3 ≦ 10m Notes: 1. For the connection to the terminal block of compact remote controller, employ wire with a diameter of 0.75 ~ 1.25mm² 2. When the length exceeds 10m, use a wire diameter of 1.25mm² and add it to the value of "a. Indoor/outdoor transmission line."

Wiring method · Address setting method

a. Indoor/outdoor transmission line

The same as (1) ①

Connection of shielded wire:

The same as (1) ①

b. Centralized control transmission line

No connection is required.

c. M-NET remote controller wiring

Apply jumper wiring between A, B terminals of the Indoor/outdoor transmission line terminal block (TB5) on the indoor unit (IC) connecting to the terminal block of M-NET remote controller (RC) respectively. (with non-polarity two wires)

For 2-remote controller operation:

For 2-remote controller operation, connect A, B terminals of the IC terminal block (TB5) to the two RC terminal blocks respectively.

For indoor unit group operation:

For operating ICs in group, connect A/B terminals of the IC main unit terminal of the IC to be grouped to the RC terminal block. (with non-polarity two wires)

❇ M-NET remote controller is connectable at any points of the indoor/outdoor transmission line.

❇ To group the indoor units with different function, assign the indoor unit with the most functions the main unit within the groups.

d. LOSSNAY connection

The same as (1) ②

e. Switch setting

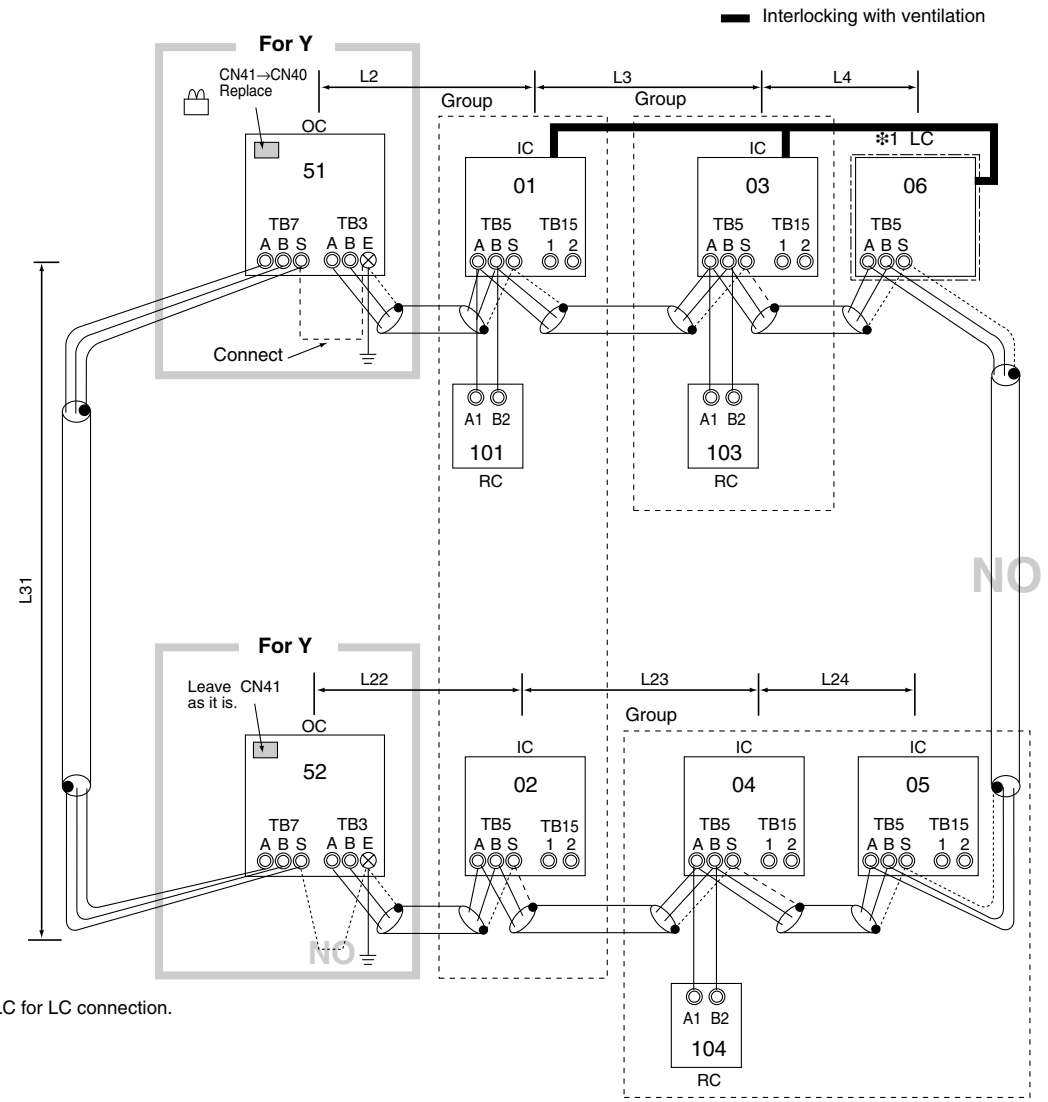
Address setting is required as follows.

Order	Unit or controller			Address setting range	Setting method	Caution	Factory setting
1	Indoor unit	Main unit	IC	01 ~ 50	• Set the lowest address within a same group to the indoor unit desired to be the main unit.	• Initially set the setting of indoor unit group to the system controller.	00
		Sub unit	IC	01 ~ 50	Set to the main unit address within a same group in serial order. [Main unit +1, +2, +3,]		
2	LOSSNAY		LC	01 ~ 50	Set any address after setting all indoor units.	• Set the address not to be overlapped with the indoor unit address.	00
3	M-NET remote controller	Main unit	RC	101 ~ 150	Main unit address inside a same group + 100	• 100 digits are not required to set. • When setting the address as "200," make it "00."	101
		Sub unit	RC	151 ~ 200	Main unit address inside a same group + 150		
4	Outdoor unit		OC	51 ~ 100	The lowest address of indoor unit within refrigerant system + 50	• When setting address to "100," make it "50."	00

(2) System using M-NET remote controller

② In the case of grouping with different refrigerant

Control wiring example



※1. LC for LC connection.

– Example to use shielded wire –

Prohibited items	Allowable length
1. M-NET and MA remote controllers can not be connected together to the indoor unit within a same group. 2. MA-NET remote controller of 3 units or more can not be connected to the indoor unit within a same group. 3. Do not connect together the terminal blocks (TB5) of the indoor unit connected to different outdoor units. 4. Replacement of the power supply selecting connector (CN41) on the outdoor unit should be done only on the one outdoor unit. 5. Grounding of S-terminal of the centralized control terminal block (TB7) on outdoor unit should be done only on the one outdoor unit. 6. When the total number of indoor units exceeds 20 sets, a transmission line booster is required. 7. When the total number of indoor units exceeds 16 sets, and they include Type 200 or above, a transmission line booster is required.	**a. Indoor/outdoor transmission line** The same as (1) ③ **b. Centralized control transmission line** The same as (1) ③ **c. M-NET remote controller wiring** The same as (2) ①

Wiring method · Address setting method

a. Indoor/outdoor transmission line

The same as (1) ③

Connection of shielded wire:

The same as (1) ①

b. Centralized control transmission line

The same as (1) ③

Connection of shielded wire:

The same as (1) ③

c. M-NET remote controller wiring

The same as (2) ①

For 2-remote controller operation:

The same as (2) ①

For indoor unit group operation:

The same as (2) ①

❇ Connect M-NET remote controller of the indoor unit group with different refrigerant to the indoor/outdoor transmission line in the same system with the indoor main unit.

d. LOSSNAY connection

The same as (1) ②

e. Switch setting

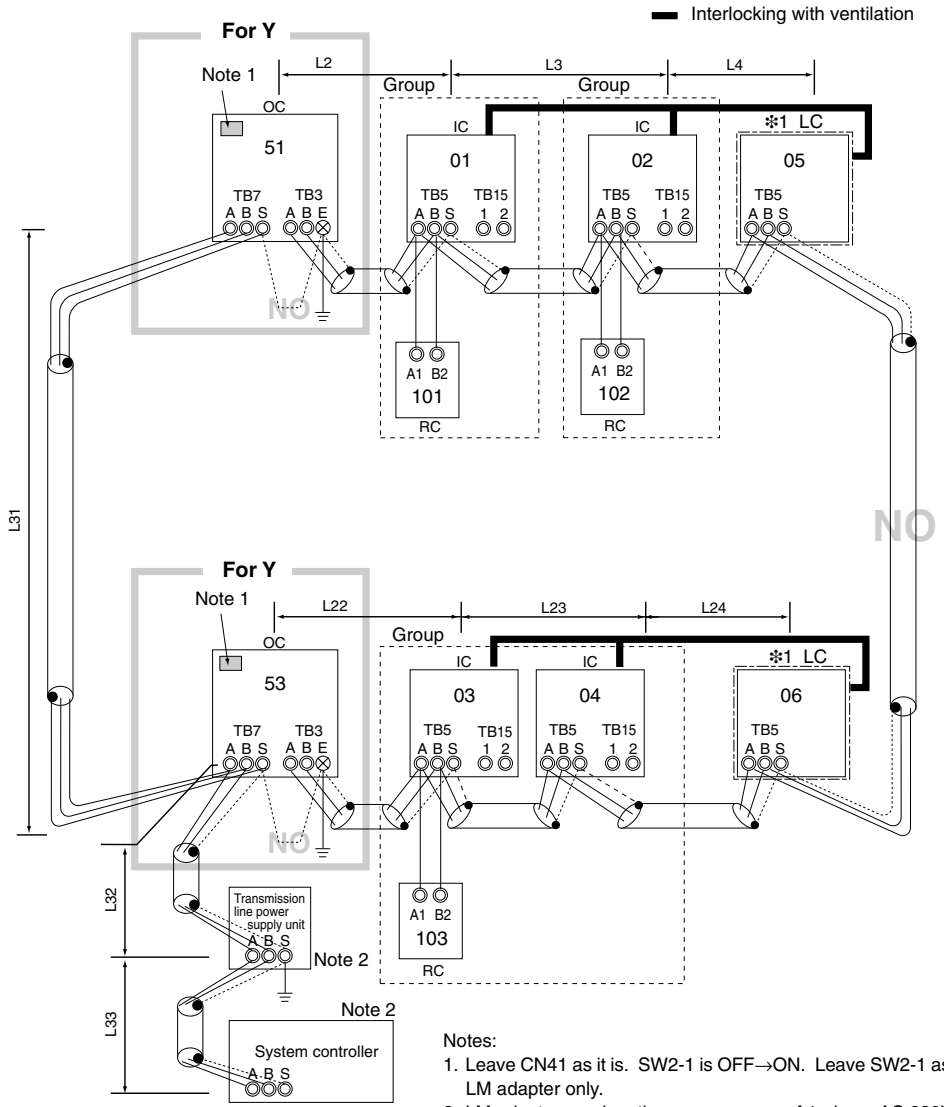
Address setting is required as follows.

Order	Unit or controller			Address setting range	Setting method	Caution	Factory setting
1	Indoor unit	Main unit	IC	01 ~ 50	• Set the lowest address within a same group to the indoor unit desired to be the main unit.	• Address of the indoor unit to operate different refrigerant operation. • The registration of the contents of different refrigerant grouping form the remote controller is required.	00
		Sub unit	IC	01 ~ 50	Set to the main unit address within a same group in serial order. [Main unit +1, +2, +3,]		
2	LOSSNAY		LC	01 ~ 50	Set any address after setting all indoor units.	• Set the address not to be overlapped with the indoor unit address.	00
3	M-NET remote controller	Main unit	RC	101 ~ 150	Main unit address inside a same group + 100	• 100 digits are not required to set. • When setting the address as "200," make it "00."	101
		Sub unit	RC	151 ~ 200	Main unit address inside a same group + 150		
4	Outdoor unit		OC	51 ~ 100	The lowest address of indoor unit within refrigerant system + 50	• When setting address to "100," make it "50."	00

(2) System using M-NET remote controller

③ In the case of connecting system controller to centralized control transmission line

Control wiring example



❇1. LC for LC connection.

Notes:

1. Leave CN41 as it is. SW2-1 is OFF→ON. Leave SW2-1 as "OFF" when connecting LM adapter only.
2. LM adapter requires the power source of 1-phase AC 230V. When connecting LM adapter only, the transmission line power supply unit is not necessary but requiring to replace the power switching connector (CN41) with (CN40).

– Example to use shielded wire –

Prohibited items	Allowable length
1. M-NET and MA remote controllers can not be connected together to the indoor unit within a same group. 2. M-NET remote controller of 3 units or more can not be connected to the indoor unit within a same group. 3. Do not connect together the terminal blocks (TB5) of the indoor unit connected to different outdoor units. 4. Leave the power switching connector (CN41) of the outdoor unit as it is. 5. Grounding work is not required for S-terminal of the centralized control transmission block (TB7) on the outdoor unit. 6. When the total number of indoor units exceeds 20 sets, a transmission line booster is required. 7. When the total number of of indoor units exceeds 16 sets, and they includes Type 200 or above, a transmission line booster is required.	**a. Indoor/outdoor transmission line** The same as (1) ③ **b. Centralized control transmission line** The same as (1) ④ **c. M-NET remote controller wiring** The same as (2) ①

a. Indoor/outdoor transmission line

The same as (1) ③

Connection of shielded wire:

The same as (1) ①

b. Centralized control transmission line

The same as (1) ④

Connection of shielded wire:

The same as (1) ④

c. M-NET remote controller wiring

The same as (2) ①

For 2-remote controller operation:

The same as (2) ①

For indoor unit group operation:

The same as (2) ①

d. Lossnay connection

The same as (1) ④

e. Switch setting

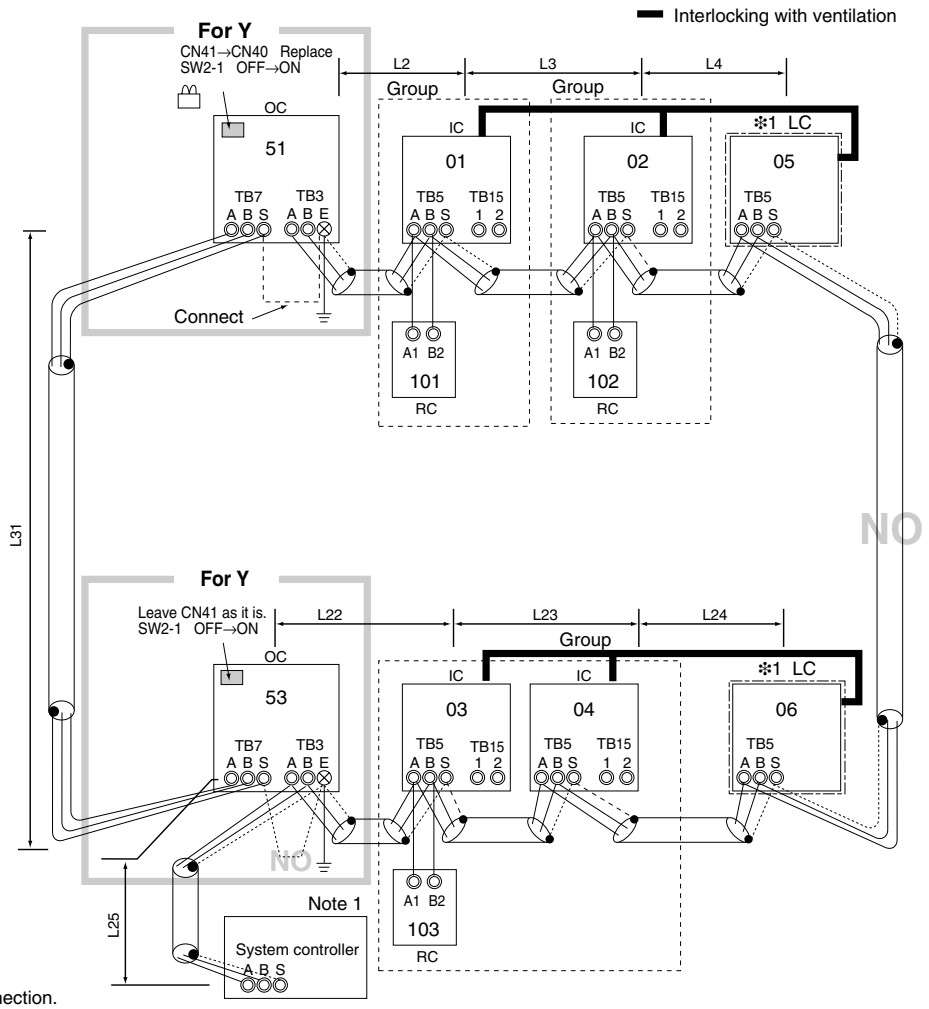
Address setting is required as follows.

Order	Unit or controller			Address setting range	Setting method	Caution	Factory setting
1	Indoor unit	Main unit	IC	01 ~ 50	• Set the lowest address within a same group to the indoor unit desired to be the main unit.	• Initially set the setting of indoor unit group with the system controller (MELANS).	00
		Sub unit	IC	01 ~ 50	Set to the main unit address within a same group in serial order. [Main unit +1, +2, +3,]		
2	LOSSNAY		LC	01 ~ 50	Set any address after setting all indoor units.	• Set the address not to be overlapped with the indoor unit address.	00
3	M-NET remote controller	Main unit	RC	101 ~ 150	Main unit address inside a same group + 100	• 100 digits are not required to set. • When setting the address as "200," make it "00."	101
		Sub unit	RC	151 ~ 200	Main unit address inside a same group + 150		
4	Outdoor unit		OC	51 ~ 100	The lowest address of indoor unit within refrigerant system + 50	• When setting address to "100," make it "50."	00

(2) System using M-NET remote controller

④ In the case of connecting system controller to indoor/outdoor transmission line (excluding LM adaptor)

Control wiring example



※1. LC for LC connection.

Note 1. LM adaptor can not be connected to the indoor/outdoor transmission line.

– Example to use shielded wire –

Prohibited items	Allowable length
1. M-NET and MA remote controllers can not be connected together to the indoor unit within a same group. 2. M-NET remote controller of 3 units or more can not be connected to the indoor unit within a same group. 3. Do not connect together the terminal blocks (TB5) of the indoor unit connected to different outdoor units. 4. Replacement of the power supply selecting connector (CN41) on the outdoor unit should be done only on the one outdoor unit. 5. Grounding of S-terminal of the centralized control terminal block (TB7) on outdoor unit should be done only on the one outdoor unit. 6. The maximum number of the system controller connectable to the indoor/outdoor transmission line counts for 3 sets. However G-50 for 1 set only. 7. When the total number of indoor units exceeds 14 sets, the system controller may not be connected to the indoor/outdoor transmission line. 8. When the total number of indoor units exceeds 10 sets, and they include Type 200 or above, the system controller may not be connected to the indoor/outdoor transmission line.	**a. Indoor/outdoor transmission line** The same as (1) ⑤ **b. Centralized control transmission line** The same as (1) ⑤ **c. M-NET remote controller wiring** The same as (2) ①

a. Indoor/outdoor transmission line

The same as (1) ⑤

Connection of shielded wire:

The same as (1) ⑤

b. Centralized control transmission line

The same as (1) ⑤

Connection of shielded wire:

The same as (1) ⑤

c. M-NET remote controller wiring

The same as (2) ①

For 2-remote controller operation:

The same as (2) ①

For indoor unit group operation:

The same as (2) ①

d. Lossnay connection

The same as (1) ④

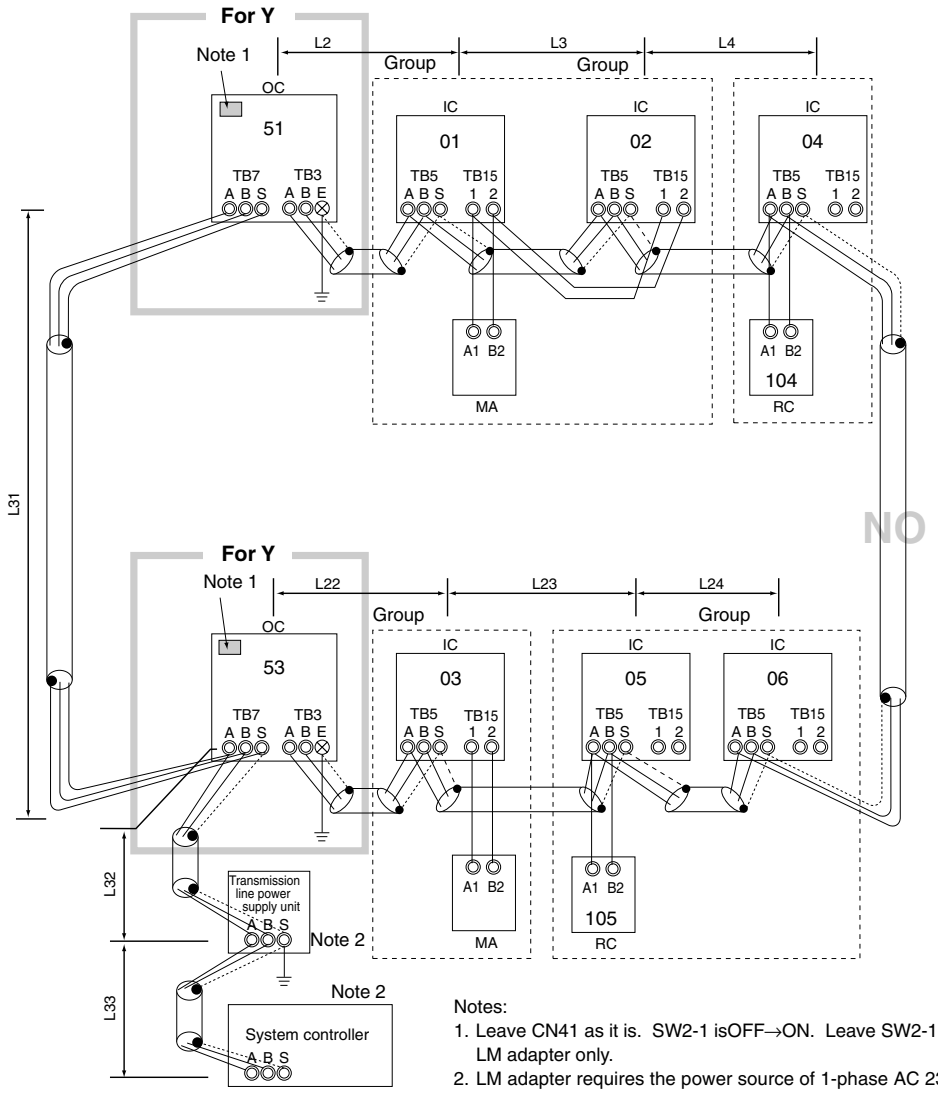
e. Switch setting

Address setting is required as follows.

Order	Unit or controller			Address setting range	Setting method	Caution	Factory setting
1	Indoor unit	Main unit	IC	01 ~ 50	• Set the lowest address within a same group to the indoor unit desired to be the main unit.	• Initially set the setting of indoor unit group with the system controller (MELANS).	00
		Sub unit	IC	01 ~ 50	Set to the main unit address within a same group in serial order. [Main unit +1, +2, +3,]		
2	LOSSNAY		LC	01 ~ 50	Set any address after setting all indoor units.	• Set the address not to be overlapped with the indoor unit address.	00
3	M-NET remote controller	Main unit	RC	101 ~ 150	Main unit address inside a same group + 100	• 100 digits are not required to set. • When setting the address as "200," make it "00."	101
		Sub unit	RC	151 ~ 200	Main unit address inside a same group + 150		
4	Outdoor unit		OC	51 ~ 100	The lowest address of indoor unit within refrigerant system + 50	• When setting address to "100," make it "50."	00

(3) System where MA remote controller and M-NET remote controller coexist

Control wiring example



Notes:
1. Leave CN41 as it is. SW2-1 isOFF→ON. Leave SW2-1 as "OFF" when connecting LM adapter only.
2. LM adapter requires the power source of 1-phase AC 230V. When connecting LM adapter only, the transmission line power supply unit is not necessary but requiring to replace the power switching connector (CN41) with (CN40).

– Example to use shielded wire –

Prohibited items	Allowable length
1. Make sure to connect the system controller. 2. M-NET and MA remote controllers can not be connected together to the indoor unit within a same group. 3. M-NET remote controller of 3 units or more can not be connected to the indoor unit within a same group. 4. MA remote controller of 3 units or more can not be connected to the indoor unit within a same group. 5. Do not connect together the terminal blocks (TB5) of the indoor unit connected to different outdoor units. 6. Leave the power switching connector (CN41) of outdoor unit as it is. 7. Grounding work is not required for S-terminal of the centralized control transmission block (TB7) on the outdoor unit. 8. When the total number of indoor units exceeds 20 sets, transmission line booster is required. 9. When the total number of indoor units exceed 16 sets and they include Type 200 or above, the transmission line booster is required.	**a. Indoor/outdoor transmission line** The same as (1) ③ **b. Centralized control transmission line** The same as (1) ④ **c-1. MA remote controller wiring** The same as (1) ① **c-2. M-net remote controller wiring** The same as (2) ①

Wiring method • Address setting method

a. Indoor/outdoor transmission line

The same as (1) ③

Connection of shielded wire:

The same as (1) ①

b. Centralized control transmission line

The same as (1) ④

Connection of shielded wire:

The same as (1) ④

c-1. MA remote controller wiring, For 2-remote controller operation: , For indoor unit group operation:

The same as (1) ①

c-2. M-NET remote controller, For 2-remote controller operation: , For indoor unit group operation:

The same as (2) ①

d. Lossnay connection

The same as (1) ④

e. Switch setting

Address setting is required as follows.

Order	Unit or controller				Address setting range	Setting method	Caution	Factory setting
1	Operation with MA remote controller	Indoor unit	Main unit	IC	01 ~ 50	• Set the lowest address within a same group to the indoor unit desired to be the main unit.	• Set lower address than that of the indoor unit connected to M-NET remote controller. • Initially set the same setting detail as that of indoor unit group executed in the wiring of MA remote controller with system controller.	00
			ub unit	IC	01 ~ 50	Set to the main unit address within a same group in serial order. [Main unit +1, +2, +3,]		
		MA remote controller	Main unit	MA	Not required	–		Main
			Sub unit	MA	Sub remote controller	Set by using the main/sub selector switch		
2	Operation with M-NET remote ontroller	Indoor unit	Main unit	IC	01 ~ 50	• After setting the address of the indoor unit to be operated with MA controller, set the lowest address among the same group to the indoor unit desired to be the main unit.	• Initially set the same setting detail as that of indoor unit group with system controller.	00
			Sub unit	IC	01 ~ 50	Set to the main unit address within a same group in serial order. [Main unit +1, +2, +3,]		
		M-NET remote controller	Main unit	RC	101 ~ 150	Main unit address inside a same group + 100	• 100 digits are not required to set. • When setting the address as "200," make it "00."	101
			Sub unit	RC	151 ~ 200	Main unit address inside a same group + 150		
3	Lossnay			LC	01 ~ 50	After setting all indoor units, set any address.	• Set so that not duplicating with the indoor unit addresses.	00
4	Outdoor unit			OC	51 ~ 100	The lowest address of indoor unit within refrigerant system + 50	• When setting address to "100," make it "50."	00

2 Restrictions on Transmission Line Wiring

Control wiring

The control wiring differs depending on the system configuration.
Make sure to see **"3. System connection examples**" before wiring work.

• Types of control wiring and allowable length:

The control wiring contains "Transmission line" and "Remote controller line," and the type and allowable length differ depending on the system configuration. When the length of the transmission line is long or the unit is located near noise source, recommend to locate the unit body apart from the noise source to prevent noise hazard and use shielded wire as shown below.

(1) Transmission line (M-NET transmission line)

<table>
<tr><td colspan="2">System configuration</td><td colspan="2">In case of single refrigerant system</td><td>In case of plural refrigerants system</td></tr>
<tr><td rowspan="4">Type of wire</td><td>Transmission line length</td><td colspan="2">Less than 120m</td><td>More than 120m</td><td>No relation with length</td></tr>
<tr><td>Objective facility (For noise judgment)</td><td>Residence & detached shop not generating noise</td><td>Building, clinic, hospital, communication equipment plant, etc. where noise may generate from inverter equipment, independent power generation plant, high frequency medical instrument, wireless communication device, etc.</td><td colspan="2">All facilities</td></tr>
<tr><td>Type of wiring</td><td>VCTF, VCTEK, CVV, CVS, VVR, VVF, VCT or shielded CVVS, CPEVS</td><td colspan="3">Shielded wire
CVVS, CPEVS</td></tr>
<tr><td>Number of wiring</td><td colspan="4">2-core cable</td></tr>
<tr><td colspan="2">Wire diameter</td><td colspan="4">1. 25mm² or more</td></tr>
<tr><td colspan="2">Indoor/outdoor transmission line farthest length</td><td colspan="2">Maximum 120m</td><td colspan="2">Maximum 200m</td></tr>
<tr><td colspan="2">Farthest length of centralized control transmission line and indoor/outdoor transmission
(Farthest length via outdoor unit)</td><td colspan="3">–</td><td>Maximum 500m
❇ The wiring length from the transmission line power supply unit installed on the centralized control transmission line to each outdoor unit and system controller is 200m maximum.</td></tr>
</table>

(2) Remote controller line

<table>
<tr><td colspan="2"></td><td>MA remote controller
(Note: 1)</td><td colspan="2">M-NET remote controller
(Note: 2)</td></tr>
<tr><td rowspan="4">Type of wire</td><td rowspan="2">Type of wiring</td><td rowspan="2">VCTF, VCTFK, CVV, CVS, VVR, VVF, VCT</td><td>Less than 10m</td><td>More than 10m</td></tr>
<tr><td>VCTF, VCTFK, CVV, CVS, VVR, VVF, VCT</td><td rowspan="3">Same specification as (1) Transmission line</td></tr>
<tr><td>Number of wiring</td><td colspan="2">2-core cable</td></tr>
<tr><td>Wire diameter</td><td>0.3 ~ 1.25mm² (Note: 3)
(0.75 ~ 1.25mm²) (Note: 4)</td><td>0.3 ~ 1.25mm² (Note: 3)
(0.75 ~ 1.25mm²) (Note: 4)</td></tr>
<tr><td colspan="2">Total length</td><td>Maximum 200m</td><td>Maximum 10m</td><td>Count a portion exceeding 10m as a figure contained in the farthest length of the indoor/outdoor transmission line.</td></tr>
</table>

Notes: 1. MA remote controller indicates MA remote controller, MA compact remote controller and wireless remote controller. MA remote controller is connectable to the indoor unit C-type or later.
2. M-NET remote controller indicates ME remote controller and M-NET compact remote controller.
3. For a convenience in wiring work, recommend to use a wire size below 0.75mm².
4. To connect to the terminal block of the compact remote controller, employ the wire size in ( ).

3 Restrictions on Refrigerant Piping Length

For the piping connection, the end branching system is applied where the end of refrigerant piping from the outdoor unit is branched and connected to each indoor unit. As the piping connection method, the indoor unit is applied with flare connection, outdoor unit gas piping is flange connection, and liquid piping is flare connection. For the branching, brazed connection is applied.

⚠ Warning

Be careful not to leak refrigerant gas (R22) near a fire. Refrigerant gas if touched a fire of gas oven and the like will be decomposed to generate poisonous gas leading to gas-poisoning. Do not conduct welding work in a closed room. Run a gas leak test after completing refrigerant piping work.

⚠ Warning

Do not use a refrigerant other than that indicated on the equipment at installation or movement.

- Mixing of different refrigerant or air makes the refrigeration cycle abnormal causing breakage and the like.

⚠ Caution

Use refrigerant piping phosphorus deoxidized copper. In addition, be sure that the inner and outer surface of the pipes are clean and free of hazardous sulphur, oxides, dust/dirt, shaving particles, oils, moisture, or any other contaminant.

- Contaminants on the inside of the refrigerant piping may cause the refrigerant residual oil to deteriorate.

⚠ Caution

Use ester oil, ether oil or alkylbenzene (small amount) as the refrigerator oil to coat flares and flange connections.

- The refrigerator oil will degrade if it is mixed with a large amount of mineral oil.

⚠ Caution

Be especially careful when managing the tools.

- If dust, dirt, or water gets in the refrigerant cycle, the refrigerant may deteriorate.

⚠ Caution

Store the piping to be used during installation indoors and keep both ends of the piping sealed until just before brazing.
(Store elbows and other joints in a plastic bag.)

- If dust, dirt, or water enters the refrigerant cycle, deterioration of the oil and compressor trouble may result.

⚠ Caution

Use a vacuum pump with reverse flow protection.

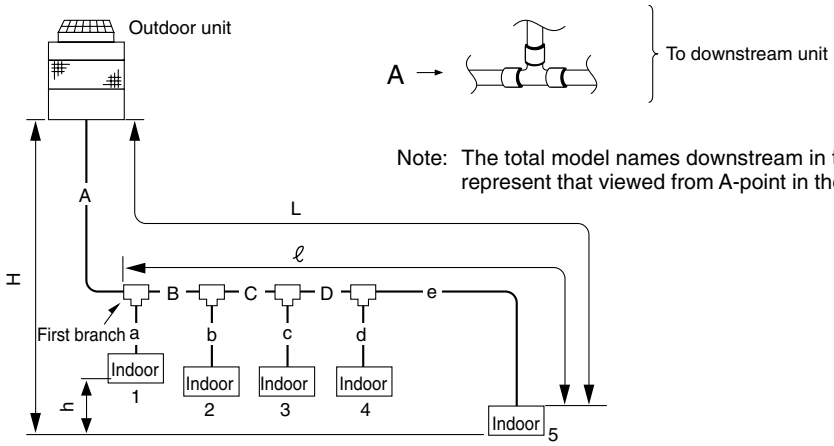
- Otherwise the vacuum pump oil will reversely flow into the refrigerant circuit causing the possible deterioration of the refrigerating machine.

⚠ Caution

Do not use the following tools used for the conventional refrigerant. (Gauge manifold, Charging hose, Gas leak detector, Reverse flow protector, Cap for refrigerant charge, Refrigerant recovery device)

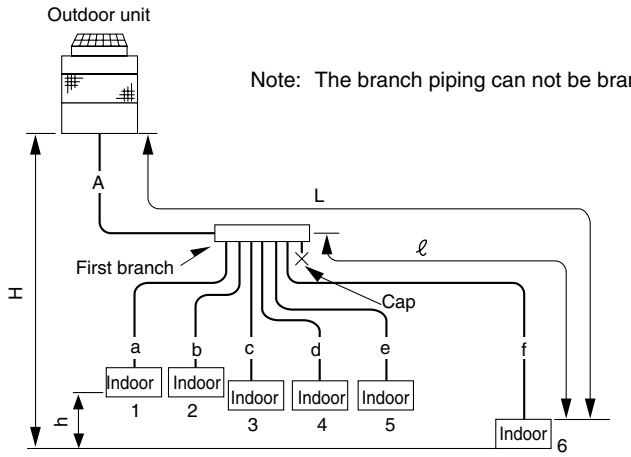
- Mixing of conventional refrigerant /refrigerating machine oil may cause to deteriorate the refrigerating machine oil.
- Mixing of water content may cause to deteriorate the refrigerating machine oil.
- As this refrigerant does not contain chloride, the gas leak detector for conventional refrigerant gas can not be used

1. Line branching system



Item			Piping section	Allowable value
Length	Total piping length		A + B + C + D + a + b + c + d +e	Less than 240m
	Farthest piping length (L)		A + B + C + D + e	Less than 120m
	Farthest piping length after first branch (ℓ)		B + C + D + e	Less than 40m
Height difference	Indoor – Outdoor	Upper outdoor unit	H	Less than 50m
		Lower outdoor unit	H'	Less than 40m
	Indoor – Indoor		h	Less than 15m

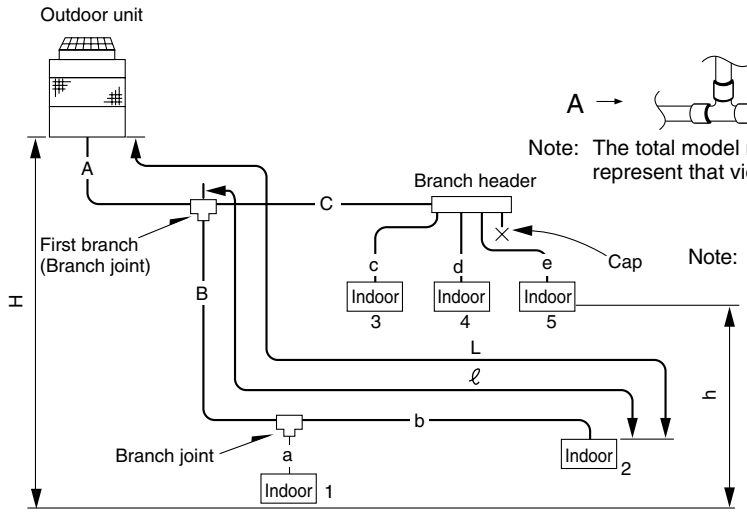
2. Header branching system



Note: The branch piping can not be branched again after header branching.

Item			Piping section	Allowable value
Length	Total piping length		A + a + b + c + d + e + f	Less than 240m
	Farthest piping length (L)		A + f	Less than 120m
	Farthest piping length after first branch (ℓ)		f	Less than 40m
Height difference	Indoor – Outdoor	Upper outdoor unit	H	Less than 50m
		Lower outdoor unit	H'	Less than 40m
	Indoor – Indoor		h	Less than 15m

3. Mixed line and header branching system



Note: The total model names downstream in the table below represent that viewed from A-point in the above figure.

Note: The branch piping can not be branched again after header branching.

Item			Piping section	Allowable value
Length	Total piping length		A + B + C + a + b + c + d + e	Less than 240m
	Farthest piping length (L)		A + B + b	Less than 120m
	Farthest piping length after first branch (ℓ)		B + b	Less than 40m
Height difference	Indoor – Outdoor	Upper outdoor unit	H	Less than 50m
		Lower outdoor unit	H'	Less than 40m
	Indoor – Indoor		h	Less than 15m

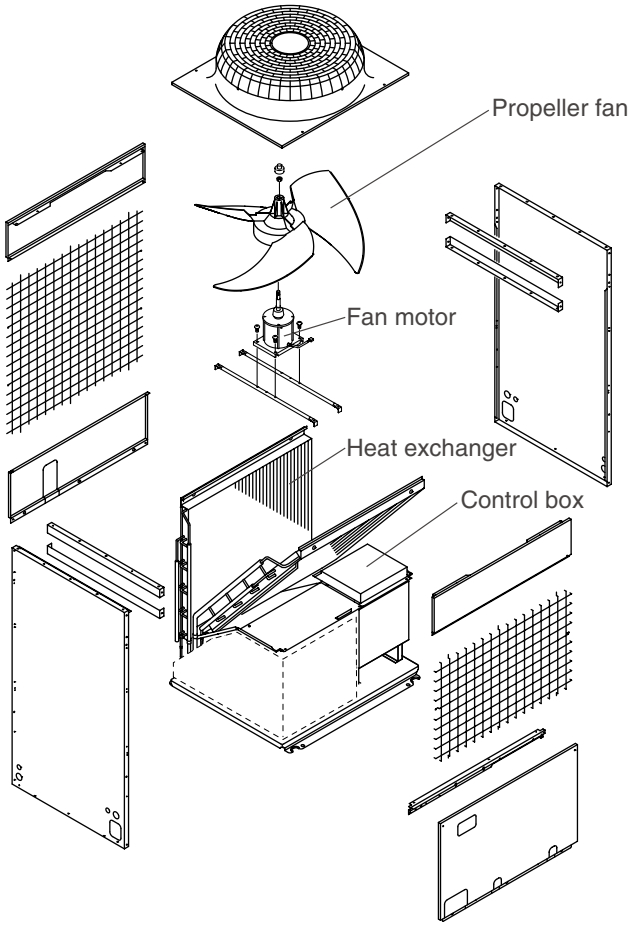
II. COMPONENTS OF OUTDOOR UNIT

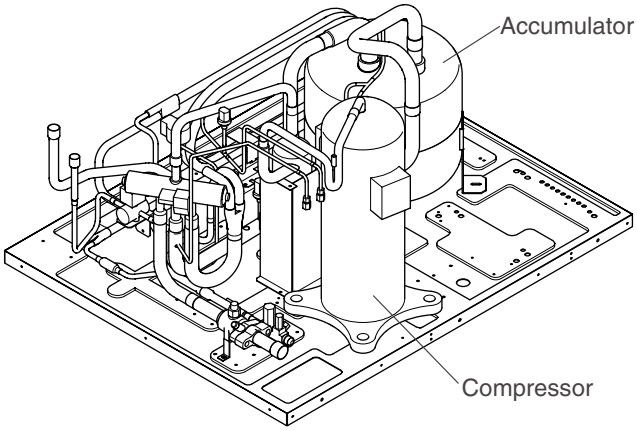
1 Component of Equipment

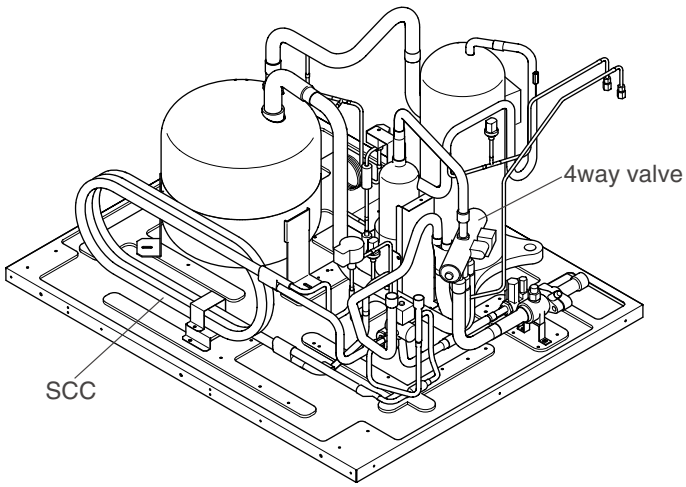
1. Appearance of component

Outdoor unit

PUHY-200・250・315TEM-A

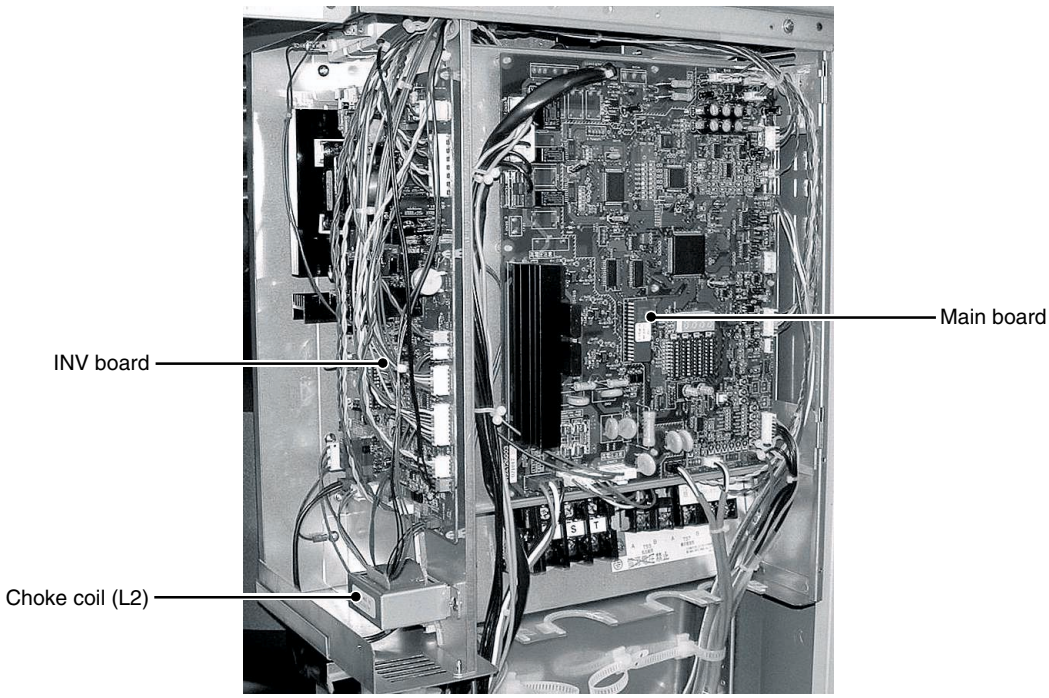




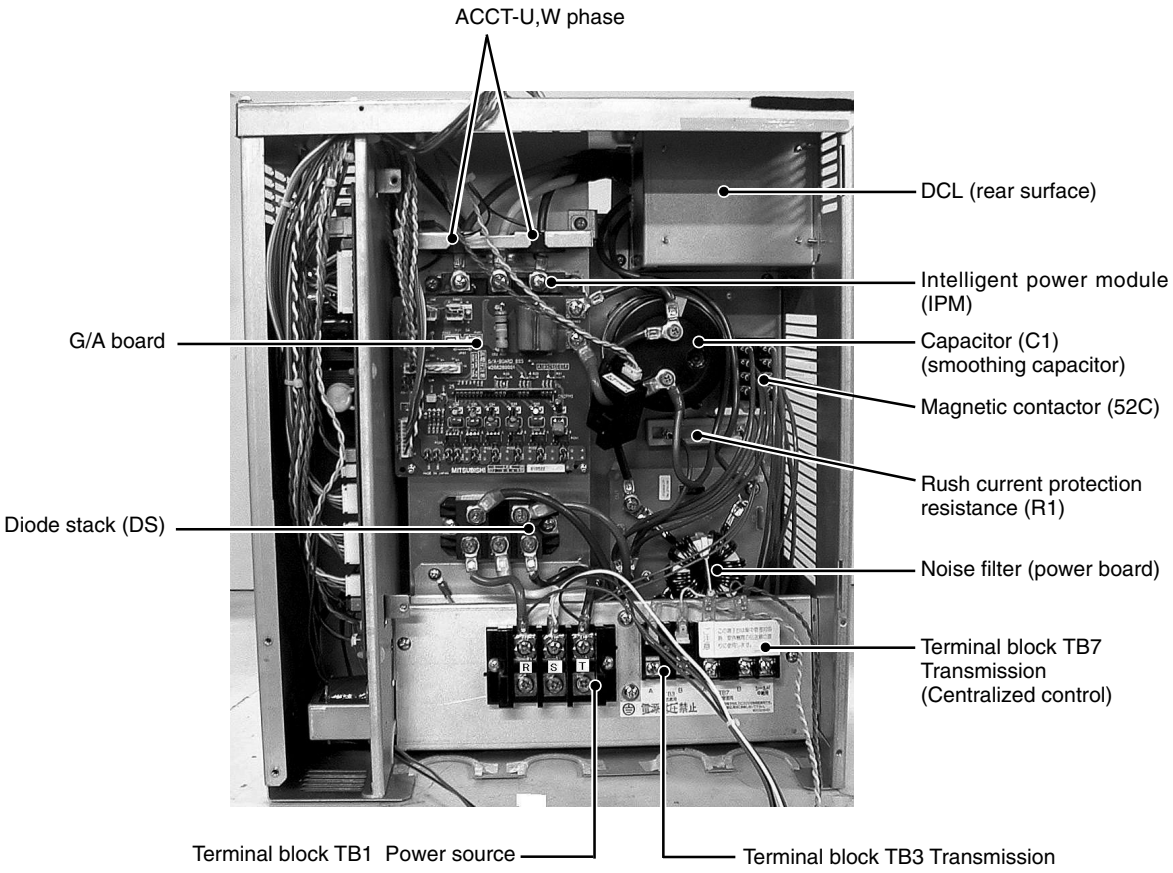


2 Control Box

1. INV box (Appearance)

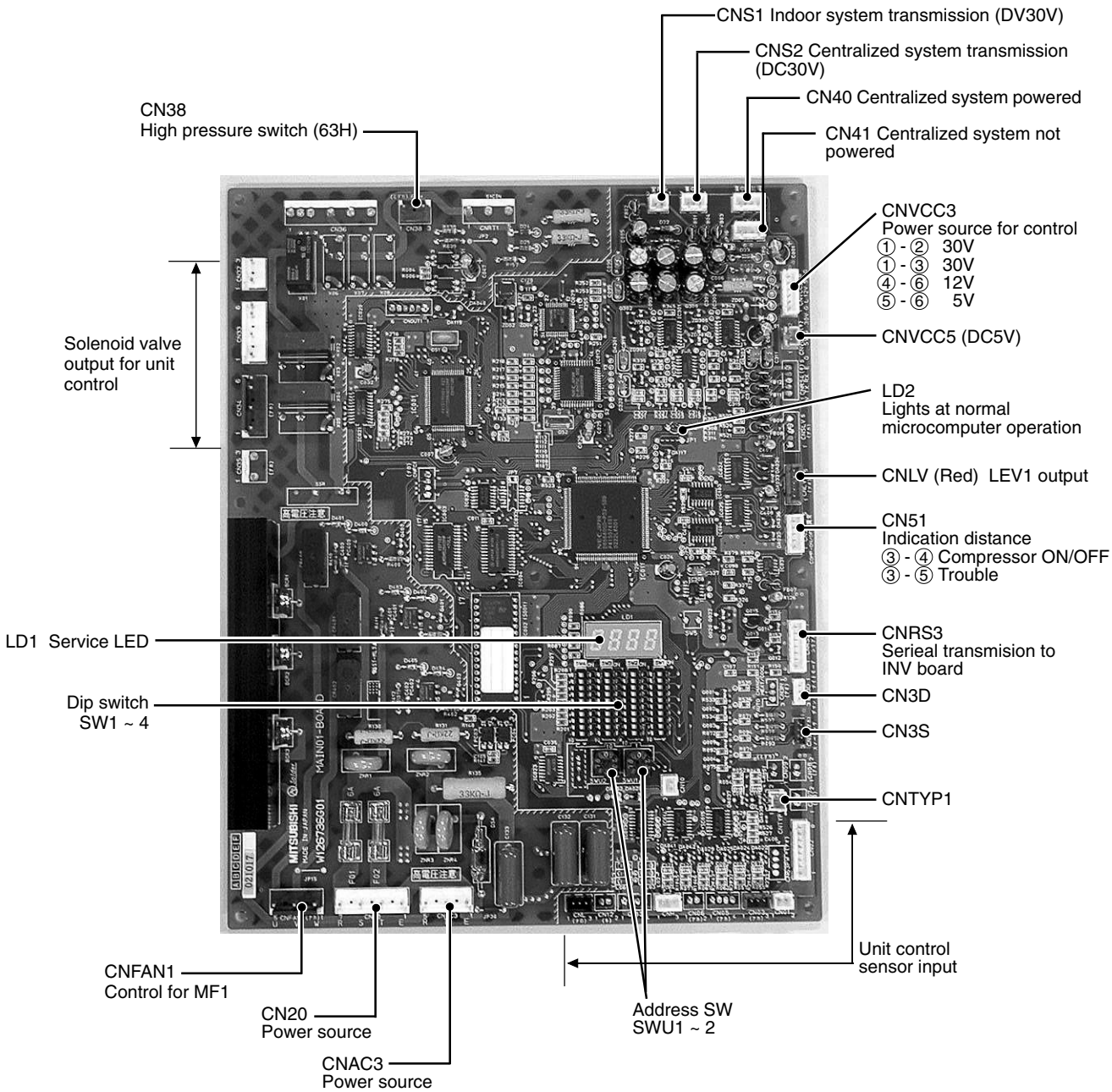


2. INV box (with board mounting plate opened)



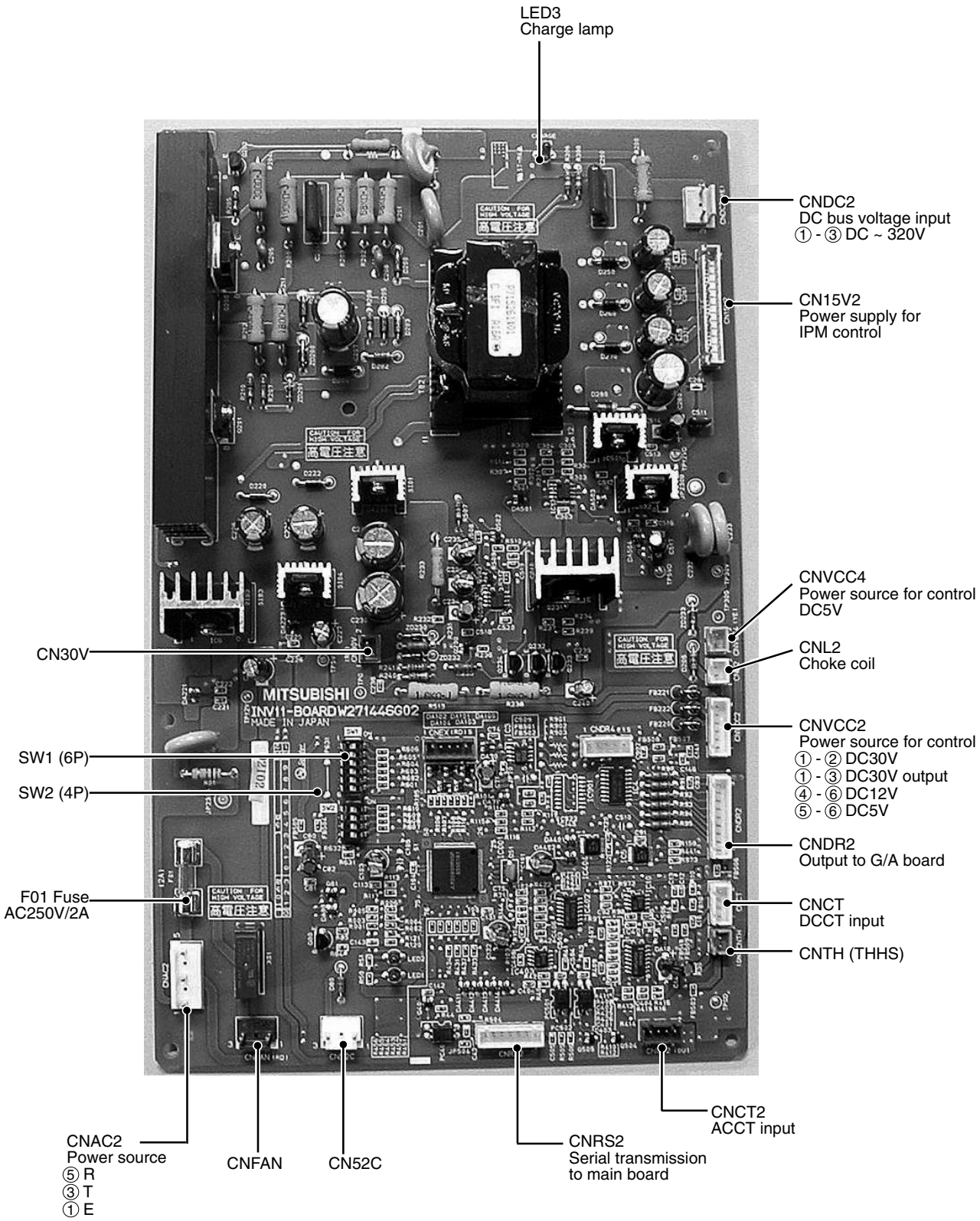
3 Circuit Board

1. Main board inside outdoor unit

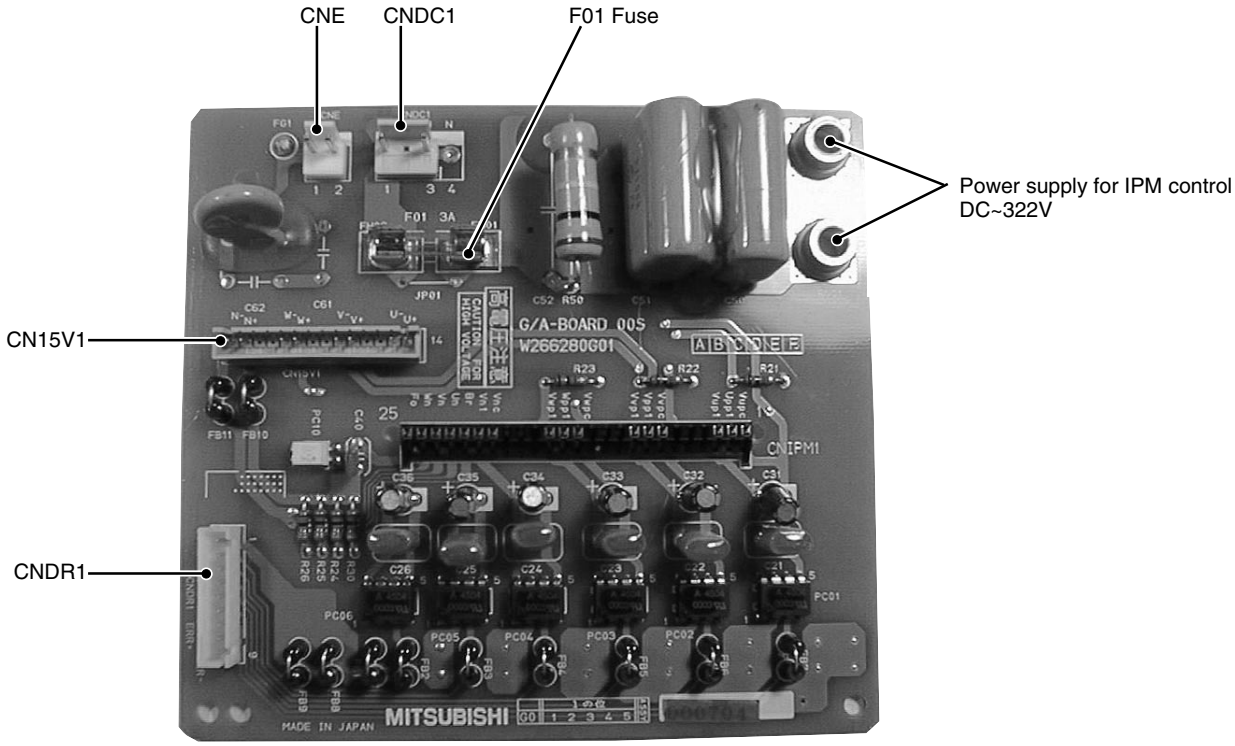


2. Inverter board inside outdoor unit

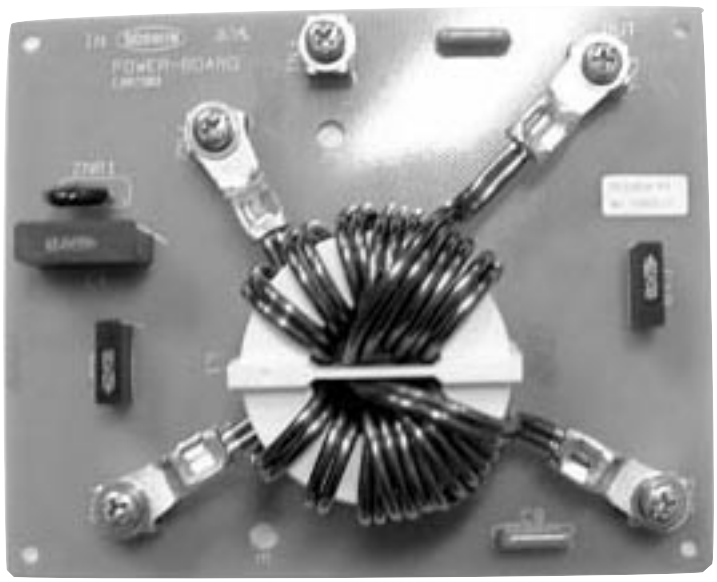
(1) INV board for PUHY-200・250・315TEM-A



3. Gate amplifier board (G/A board) inside outdoor unit



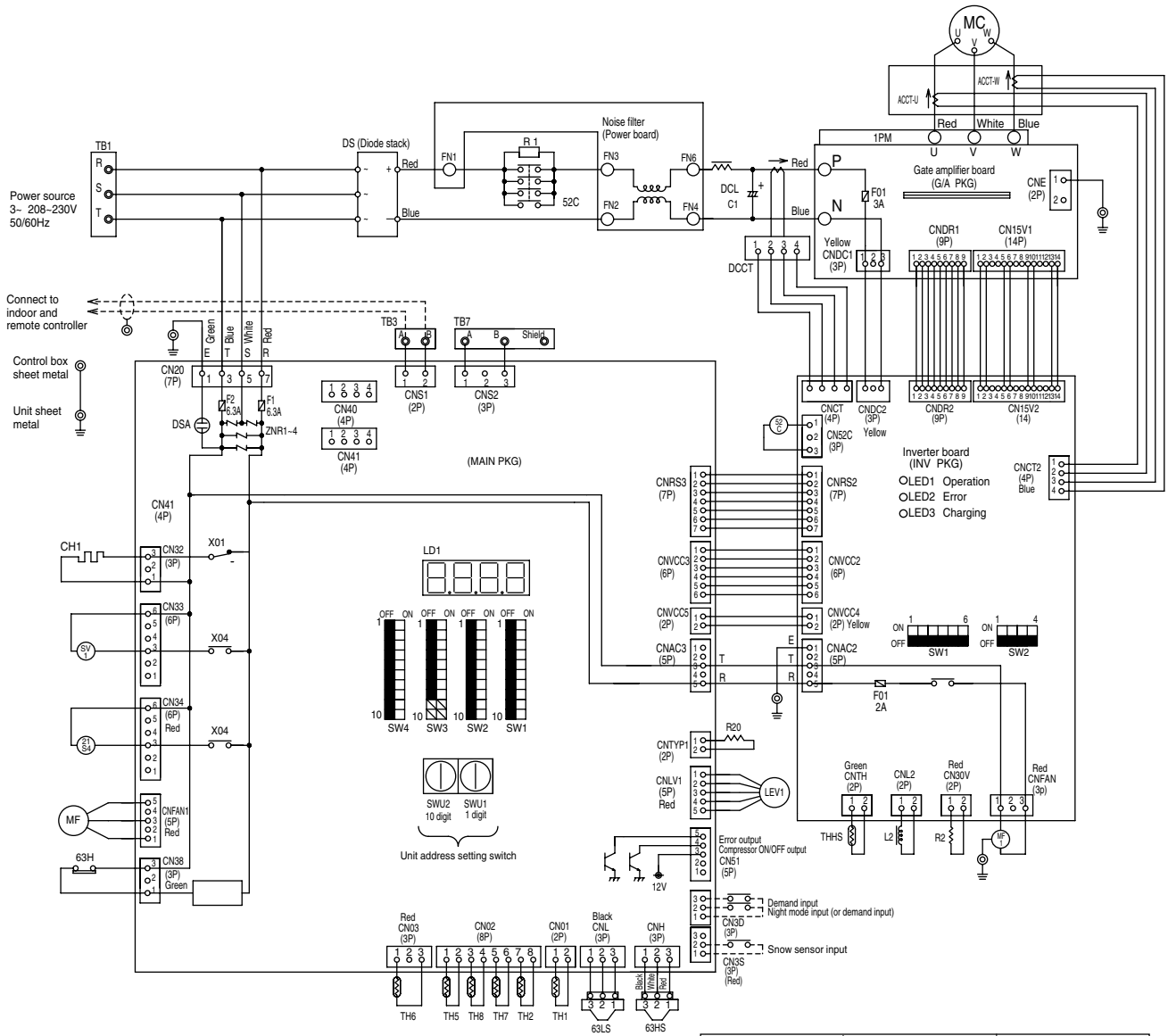
4. Large current board inside outdoor unit



III. ELECTRICAL WIRING DIAGRAM – OUTDOOR UNIT

1 Electrical Wiring Diagram

1. Outdoor unit



Model	SW3-9	SW3-10
200	OFF	OFF
250	OFF	ON
315	ON	OFF

Note: Switch setting by models are given above.

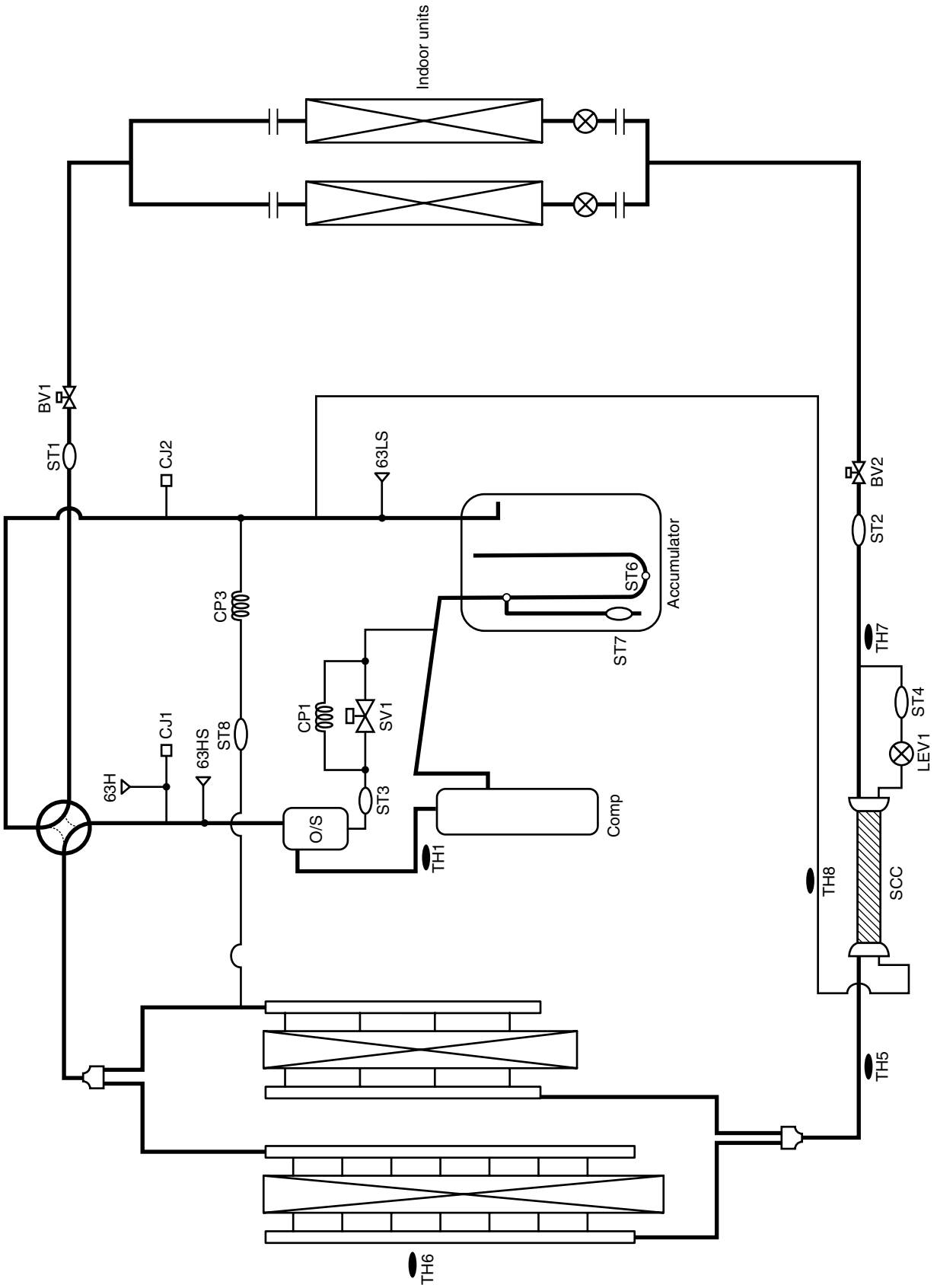
Symbol	Name
TB1	Terminal board for power source
TB3	Terminal board for transmission line (for indoor)
TB7	Terminal board for transmission line (for centralized control)
E	Grounding terminal
ACCT	Current sensor (AC)
DCCT	Current sensor (DC)
R1	Rush current protection resistance
R2	Bleeder resistance
R20	Resistance
C1	Main condenser (smoothing)
C2 ~ C4	Condenser
52C	Magnetic contactor (inverter main circuit)
MC	Compressor motor
MF	Fan motor (heat exchanger)
MF1	Fan motor (radiator panel)

Symbol	Name
CH1	Crankcase heater (compressor)
21S4	4-way valve
SV1	Solenoid valve (discharge–suction bypass)
TH1	Thermistor (discharge pipe temp. detect)
TH2	Thermistor (saturation evaporator temp. detect)
TH5	Thermistor (Pipe temp. detect)
TH6	Thermistor (OA temp. detect)
TH7	Thermistor (liquid outlet temp. detect at sub-cool coil)
TH8	Thermistor (bypass outlet temp. detect at sub-cool coil)
THHS	Thermistor (radiation panel temp. detect)
63H	High pressure switch
63HS	High pressure sensor
63LS	Low pressure sensor
LEV1	Electronic expansion valve (sub-cool coil bypass)
L2	Choke coil (transmission)

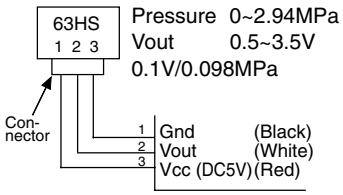
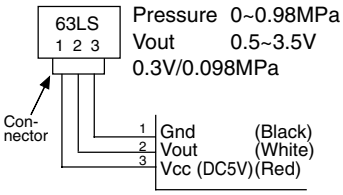
IV. REFRIGERANT CIRCUIT

1 Refrigerant Circuit Diagram and Thermal Sensor

PUHY-200・250・315TEM-A



2 Functions of Principal Parts

	Name	Symbol (Function)	Application	Speciification	Check method
Outdoor unit	Compressor	MC	Adjust refrigerant circulation by controlling operating frequency and capacity control valve with operating pressure.	Low pressure shell scroll type with capacity control mechanism Winding resistance: Each phase 0.161 (20°C)	
	High pressure sensor	63HS	1) High pressure detection. 2) Frequency control and high pressure protection		
	Low pressure sensor	63LS	1) Detects low pressure 2) Calculates the refrigerant circulation configuration 3) Protects the low pressure		
	Pressure switch	63H	1) High pressure detection 2) High pressure protection	Setting 2.94MPa OFF	Continuity check
	Thermistor	TH1 (discharge)	1) Discharge temperature detection 2) High pressure protection	R_{120} = 7.465kΩ $R_{25/120}$ = 4057	Resistance value check
			20˚C : 250kΩ 70˚C : 34kΩ 30˚C : 160kΩ 80˚C : 24kΩ 40˚C : 104kΩ 90˚C : 17.5kΩ 50˚C : 70kΩ 100˚C : 13.0kΩ 60˚C : 48kΩ 110˚C : 9.8kΩ	$R_t = 7.465\exp\{4057\,(\frac{1}{273+t} - \frac{1}{273+120})\}$	
		TH2 (low pressure saturation temperature)	1) Detects the saturated vapor temperature. 2) Calculates the refrigerant circulation configuration. 3) Controls the compressor frequency. 4) Controls the outdoor unit's fan air volume.	R_0 = 33kΩ $B_{0/100}$ = 3965 $R_t = 33\exp\{3965\,(\frac{1}{273+t} - \frac{1}{273+0})\}$ –20˚C : 92kΩ –10˚C : 55kΩ 0˚C : 33kΩ 10˚C : 20kΩ 20˚C : 13kΩ 30˚C : 8.2kΩ	Resistance value check
		TH5 (piping temperature)	1) Frequency control 2) Defrost control and liquid level detection at heating	R_0 = 15kΩ $B_{0/100}$ = 3460 $R_t = 15\exp\{3460\,(\frac{1}{273+t} - \frac{1}{273+0})\}$ 0˚C : 15kΩ 10˚C : 9.7kΩ 20˚C : 6.4kΩ 25˚C : 5.3kΩ 30˚C : 4.3kΩ 40˚C : 3.1kΩ	
		TH6 (outdoor air temperature)	1) Outdoor air temperature detection 2) Fan control, liquid level heater, and opening setting for oil return		
		TH7	Subcool coil bypass LEV (LEV1) control (subcool coil outlet temperature)		
		TH8 (subcool coil bypass outlet temperature)	Subcool coil bypass LEV (LEV1) control		

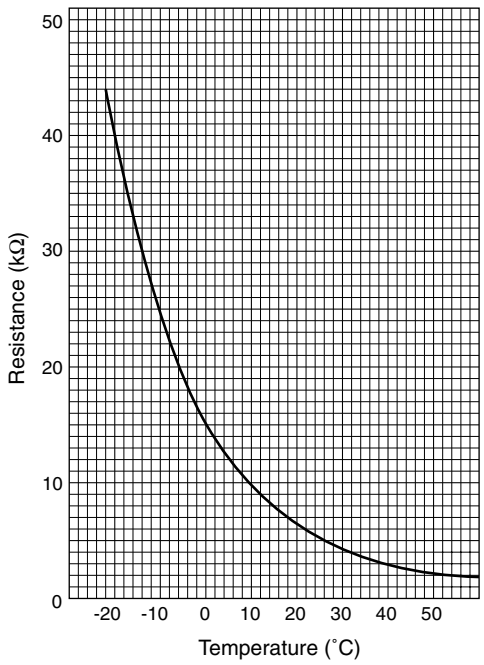
	Name	Symbol (Function)	Application	Speciification	Check method
Outdoor unit	Thermistor	THHS	1) Detects the inverter cooling fin temperature. 2) Provides inverter overheating protection. 3) Controls the control box cooling fan.	R_{50} = 17kΩ $B_{25/50}$ = 4170 R_t = $17\exp\{4170\ (\frac{1}{273+t} - \frac{1}{273+50})\}$ –20˚C : 605.0kΩ 50˚C : 17.0kΩ –10˚C : 323.3kΩ 60˚C : 11.5kΩ 0˚C : 180.9kΩ 70˚C : 8.0kΩ 10˚C : 105.4kΩ 80˚C : 5.7kΩ 20˚C : 63.8kΩ 90˚C : 4.1kΩ 30˚C : 39.9kΩ 100˚C : 3.0kΩ 40˚C : 25.7kΩ	
	Solenoid valve	SV1 (discharge-suction bypass)	1) High/low press. bypass at starting/stopping and capacity control at low load 2) Discharge press. rise suppression 3) Capacity control and high press . rise suppression (backup for frequency control)	AC 220V Open at energizing and close at deenergizing	• Continuity check by tester • Temperature of inlet and outlet
	Linear expansion valve	LEV1 (SC coil)	Adjust bypass flow rate from outdoor unit liquid line at cooling.	0~480 pulses	
	21S4a	4-way valve	Changes for cooling and heating	AC220V on cooling off heating	Continuity check with tester
	CH1	Crank case heater	Heating of compressor refrigerant	Cord heater AC220V MC .... 1280Ω 45W	
Indoor unit	Linear expansion valve	LEV	1) Adjust superheat of outdoor unit heat exchanger outlet at cooling. 2) Adjust subcool of indoor unit heat exchanger at heating.	DC12V Opening of stepping motor driving valve 0~2,000 pulses	Continuity check with tester for white-red-orange yellow-brown-blue
	Thermistor	TH21 (inlet air temperature)	Indoor unit control (thermostat)	R_0 = 15kΩ $B_{0/100}$ = 3460 R_t = $15\exp\{3460\ (\frac{1}{273+t} - \frac{1}{273+0})\}$ 0˚C : 15kΩ 10˚C : 9.7kΩ 20˚C : 6.4kΩ 25˚C : 5.3kΩ 30˚C : 4.3kΩ 40˚C : 3.1kΩ	Resistance value check
		TH22 (piping temperature)	1) Indoor unit control (freeze prevention, hot adjust, etc.) 2) LEV control in heating operation (Subcool detection)		
		TH23 (gas side piping temperature)	LEV control in cooling operation (Superheat detector)		

3 Resistance of Temperature Sensor

Thermistor for low temperature:

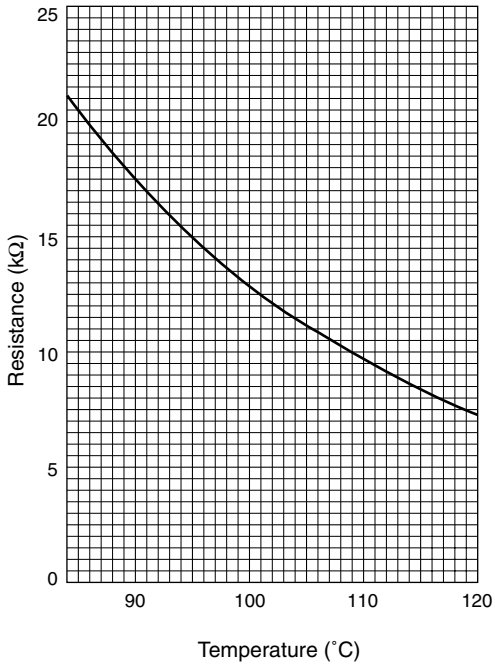
Thermistor $R_0 = 15k\Omega \pm 3\%$ (TH3 ~ 9)

$$R_t = 15\exp\{3460\left(\frac{1}{273+t} - \frac{1}{273+0}\right)\}$$



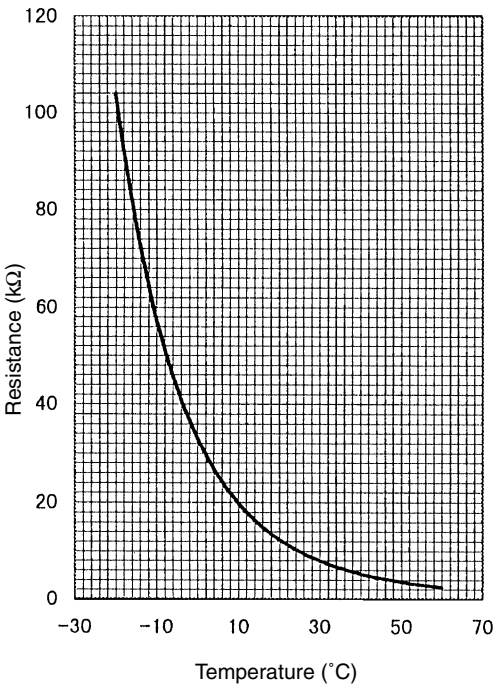
Thermistor $R_{120} = 7.465k\Omega \pm 2\%$ (TH1, 10)

$$R_t = 7.465\exp\{4057\left(\frac{1}{273+t} - \frac{1}{273+120}\right)\}$$



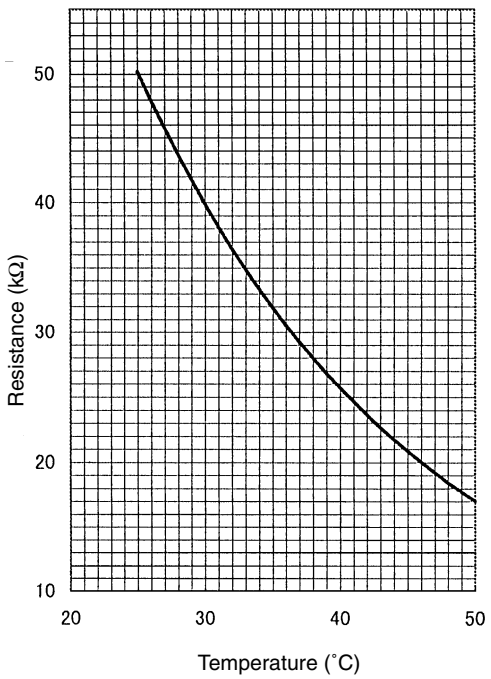
Thermistor $R_0 = 33k\Omega \pm 1\%$ (TH2)

$$R_t = 33\exp\{3965\left(\frac{1}{273+t} - \frac{1}{273+0}\right)\}$$



Thermistor $R_{50} = 17k\Omega \pm 2\%$ (THHS)

$$R_t = 17\exp\{4170\left(\frac{1}{273+t} - \frac{1}{273+50}\right)\}$$



V. CONTROL

1 Functions of Dip SW and Rotary SW

1. Outdoor unit

(1) Main board

Switch		Function	Function according to switch operation		Switch set timing	
			OFF	ON	OFF	ON
SWU	1~2	Unit address setting	Set on 51~100 with the dial switch.		Before power is turned on.	
	3	Refrigerant model	 R407C	 R22	Before power is turned on.	
SW1	1~8	For self diagnosis/ operation monitoring	LED Monitering Display		During normal operation when power is on.	
	9~10	–	–	–	Should be set on OFF.	
SW2	1	Centralized control switch	Centralized control not connected.	Centralized control connected.	Before power is turned on.	
	2	Deletion of connection information.	Storing of refrigeration system connection information.	Deletion of refrigeration system connection information.	Before power is turned on.	
	3	Deletion of error history.	–	Deletion	During normal operation when power is on.	
	4	Refrigerant amount adjustments	Ordinary control	Adjustment operation	During normal operation when power is on (only when switching from OFF/ON)	
	5	–	–	–	–	
	6	Disregard ambient air sensor errors, liquid overflow errors.	Errors valid.	Disregard errors.	During normal operation when power is on.	
	7	Forced defrosting	Ordinary control	Start forced defrosting.	During normal operation when power is on.	10 minutes or more after compressor starts.
	8	Defrost prohibited timer	39 minutes	90 minutes	During normal operation when power is on. (Except during defrosting)	
	9	–	–	–	–	
	10	–	–	–	–	
SW3	1	SW3-2 Function valid/ invalid	SW3-2 Function invalid	SW3-2 Function valid	During normal operation when power is on.	
	2	Indoor unit test operation	Stop all indoor units.	All indoor units test operation ON.	When SW3-1 is ON after power is turned on.	
	3	Defrosting start temperature of TH	– 6˚C	–3˚C	During normal operation when power is on.	
	4	Defrosting end temperature of TH5	10˚C For 2 minutes	15˚C For 2 minutes	During normal operation when power is on. (Except during defrosting)	
		Opening angle of IC except when heater thermostat is ON during defrosting.	(no operation)	2000		
	5	–	–	–	–	
	6	Pump down	Ordinary control	Pump down	During normal operation (only when switching from OFF/ON)	
	7	Target Tc (High pressure) in heating	49°C	53°C	During normal operation when power is on.	
	8	–	–	–	–	
	9	Models	SW3-10-(1)	SW3-10-(2)	–	
	10	Models	(1) Model 200 (2) Model 315	(1) Model 250	Before power is turned on.	
SW4	1	SW4-2 Function valid/invalid	Invalid	Valid	During normal operation when power is on.	
	2	–	–	–	–	
	3	–	–	–	–	
	4	–	–	–	–	
	5	–	–	–	–	
	6	Night mode/Step demand	Night mode	Step demand	During normal operation when power is on.	
	7	–	–	–	–	
	8	Models	–	–	. –	
	9	–	–	–	–	

Note:
- SWU1~2=00 when shipped from the factory.
  Other factory settings are indicated by shaded portions.
- If the address is set from 01 to 50, it automatically becomes 100.
- The refrigerant model is recognized with SW3 and TH2.

SWU3 \ TH2	Exist	Not exist
R407C	R407C	Different unit model error (7130)
R22	Different unit model error (7130)	R22

(2) Inverter board

Switch		Function	Function according to switch operation		Switch set timing	
			OFF	ON	OFF	ON
SW1	1	Switching of following error detection ACCT, DCCT sensor circuit error (5301 Detail No.115, 116) ACCT, DCCT sensor circuit error (5301 Detail No.117, 118) IPM open/CNCT2 pulling-off error (5301 Detail No. 119) Erroneous wiring detection error (5301 Detail No.120)	Error detection effective	Error detection ineffective	Always after powering	
	2	–	–	–	–	
	3	–	–	–	–	
	4	Serial communication	With communication	Without communication	Always after powering	
SW2	1	–	–	–	–	
	2	–	–	–	–	
	3	–	–	–	–	
	4	–	–	–	–	

Note: 1. At factory shipment, all settings are for OFF. As "–" indicates special setting sometimes, fix it to OFF unless specified.

2. Indoor unit

DIP SW1, 3

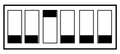
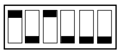
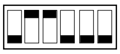
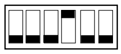
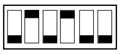
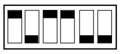
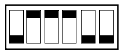
Switch		Function	Function according to switch operation		Switch set timing		Remarks
			OFF	ON	OFF	ON	
SW1	1	Room temp. sensor position	Indoor unit inlet	Built in remote controller	At unit stopping (at remote controller OFF)		
	2	Clogged filter detect.	None	Provided			
	3	Filter duration	100h	2500h			
	4	OA intake	Ineffective	Effective			Always ineffective for PKFY-P.VAM
	5	Remote display select.	Fan output display	Thermo. ON signal display			
	6	Humidifier control	At stationary heating	Always at heat.			
	7	Heating thermo. OFF airflow	Very low speed	Low speed			
	8	Heating thermo. OFF airflow	SW1-7 setting	Set airflow			
	9	Power failure automatic return	Ineffective	Effective			
	10	Power source start/stop	Ineffective	Effective			
SW3	1	Model selection	Heat pump	Cooling only			
	2	Louver (Cooling capacity saving for PKFY-P. VAM, effective/ineffective)	None	Provided			
	3	Vane	None	Provided			
	4	Vane swing function	None	Provided			Not provided for PKFY-P.VAM Provided for PLFY-P.VGM (ON) setting
	5	Vane horizontal angle	1st setting	2nd setting			
	6	Vane angle set for cooling	Down blow B, C	Horizontal			Always down blow B,C for PKFY-P.VAM Horizontal (ON) setting for PLFY-P. VLMD-A
		Vane first angle	Effective	Ineffective			PLFY-VLMD-B only
	7	–	–	–			
	8	Heating 4deg up	Effective	Ineffective			Ineffective (ON) setting for floorstanding
	9	–	–	–			
	10	–	–	–			

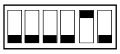
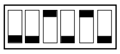
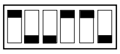
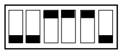
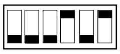
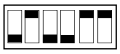
Notes: 1. The shaded part [ ] indicates the setting at factory shipment. (For the SW not being shaded, refer to the table below.)
2. When both SW1-7 and SW1-8 are being set to ON, the fan stops at the heating thermostat of OFF.

Switch \ Model		PLFY-P			PEFY-P				PDFY-P	PFFY-P	PCFY-P	PKFY-P		PMFY-P
		VAM-A(2)	VLMD-B	VKM-A	VML-A	VMH-A	20~80VMM-A	100~140VMM-A	VM-A	VLRM-A, VLEM-A	VGM-A	VAM-A	VGM-A	VBM-A
SW1	3	OFF	ON		OFF	ON	OFF		ON	OFF	ON	OFF		OFF
	6	OFF	ON								OFF			OFF
	7	OFF			ON		OFF	ON	OFF					OFF
SW3	3	ON			OFF						ON			ON
	4	ON	ON	ON	OFF						ON	OFF	ON	ON
	6	OFF	ON	OFF										OFF
	8	OFF								ON	OFF			OFF

3. The DIP switch setting is only effective during unit stopping (remote controller OFF) for SW1. 2. 3 and 4 commonly and the power source is not required to reset.

Setting of DIP SW2

Model	P20	P25	P32	P40	P50	P63	P71
Capacity code (model name)	4	5	6	8	10	13	14
SW2 setting	ON OFF 	ON OFF 	ON OFF 	ON OFF 	ON OFF 	ON OFF 	ON OFF 

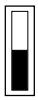
Model	P80	P100	P125	P140	P200	P250
Capacity code (model name	16	20	25	28	40	50
SW2 setting	ON OFF 	ON OFF 	ON OFF 	ON OFF 	ON OFF 	ON OFF 

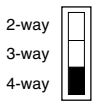
Setting of DIP SW4

Model	Circuit board used	SW4				
		1	2	3	4	5
PMFY-P-VBM-A	Phase control	ON	OFF	ON	OFF	–
PLFY-P-125VLMD-B		OFF	ON	OFF	ON	OFF
PDFY-P20 ~ 80VM-A		ON	OFF	ON	OFF	–
PLFY-P40 ~ 63VKM-A		OFF	OFF	OFF	ON	–
PLFY-P80 ~ 125VAM-A(2)		ON	OFF	OFF	ON	–
PCFY-P-VGM-A		OFF	ON	OFF	ON	–
PKFY-P-VGM-A		OFF	OFF	ON	ON	–
PKFY-P-VAM-A		–	–	–	–	–
PEFY-P20 ~ 80VMM-A		ON	ON	OFF	OFF	–
PLFY-P20 ~ 100VLMD-B	Relay section	OFF	ON	OFF	ON	OFF
PFFY-P-VLEM-A, P-VLRM-A		OFF	OFF	OFF	–	–
PEFY-P20 ~ 32VML-A		ON	ON	ON	–	–
PEFY-P40 ~ 140VMH-A		OFF	OFF	OFF	–	–
PEHY-P200, 250VMH-A		ON	OFF	OFF	–	–
PDFY-P100, 125VM-A		OFF	OFF	ON	–	–
PEFY-P100 ~ 140VMM-A		ON	ON	ON	OFF	–

Setting of DIP SW5

220V
240V



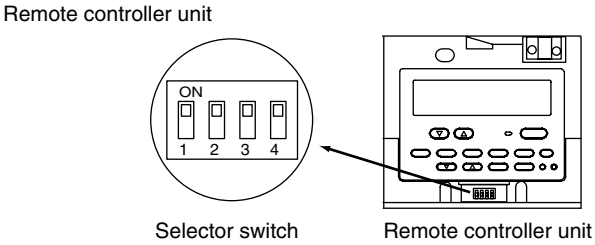
Switch	Function	Operation by switch	Switch set timing
SWA	Ceiling height setting	(PLFY-P-VKM-A)  The ceiling height is changed by SWB setting (PCFY-P-VGM-A)  Ceiling height: 3 → 3.5m; 2 → 2.8m; 1 → 2.3m	Always after powering
SWA	External static pressure setting	(PDFY-P20 ~ 80VM-A, PEFY-P20 ~ 80VMM-A)  3: 100Pa 2: 50Pa 1: 30Pa For other models, change the setting of static pressure by replacing the connector.	Always after powering
SWA	For operation	(PLFY-P125VLMD-B)  As this switch is used by interlocking with SWC, refer to the item of SWC for detail.	Always after powering
SWB	Setting of air outlet opening	(PLFY-P-VKM-A)  SWA \ SWB: 1 / 2 / 3 2-way: 3.5m / 3.8m / 3.8m 3-way: 3.0m / 3.3m / 3.5m 4-way: 2.7m / 3.0m / 3.5m	Always after powering
SWC	Airflow control	(PLFY-P-VKM-A, PCFY-P-VGM-A, PKFY-P-VGM-A, PDFY-P-VM-A)  Option Standard Set to the option to install the high efficiency filter.	Always after powering

3. Remote controller

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

Removing the cover shows switches at the lower part of the remote controller unit. By operating these switches, the remote controller main/sub, and other function will be set.

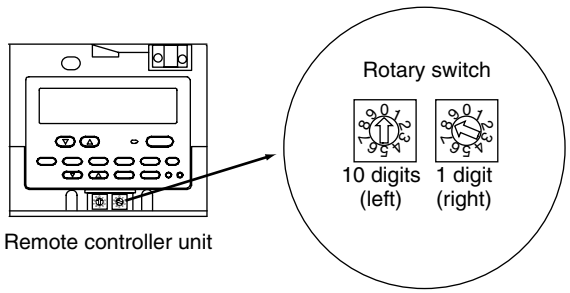
In normal case, do not change the setting except No.1 switch used to set the main/sub. (All setting at factory shipment are "ON."



Switch	Function	ON	OFF	Action by switching	Switch set timing
1	Remote controller main/sub	Main	Sub	Sets one to "Sub" when connecting 2 sets in 1 group.	Before powering
2	At powering of remote controller	Normal start up	Timer mode start up	Sets to "Timer mode start up" so desired at power failure return when the schedule timer is connected.	Before powering
3	Cooling/heating display at automatic setting	Yes	No	Sets to "No" when not desiring to display "Cooling" or "Heating."	Before powering
4	Inlet temperature display	Yes	No	Sets to "No" when not desiring to display inlet temperature.	Before powering

(2) ME remote controller (PAR-F27MEA)

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



Example: In case of address 108

	Address setting range	Setting method
Main remote controller	101 ~ 150	Set to the lowest indoor main unit address + 100.
Sub remote contgroller	151 ~ 200	Set to the lowest indoor main unit address + 150.

Setting of rotary switch	Address No.
01 ~ 99	101 ~ 199 being added with 100
00	200

Note : To set addresses, use a precision screwdriver [(–), 20mm (w)], and apply load less than 19.6N.
Operating with a method other than above may damage the rotary switch.

❇ The address No. that can be set with ME remote controller is limited to 101 ~ 200.
The position of 100 will automatically be fixed to [1] when setting to "01 ~ 99", while it will automatically be fixed to [2] when setting to "00."

❇ At factory shipment, the rotary switch was set to 01.

2 Controlling the Outdoor Unit

1. Initial processing

- When turning on power source, initial processing of microcomputer is given top priority.
- During initial processing, control processing corresponding to operation signal is suspended. The control processing is resumed after initial processing is completed. (Initial processing : Data processing in microcomputer and initial setting of each LEV opening, requiring approx. 2 minutes at the maximum.)

2. Control at start-up

- For 3 minutes after starting, 60Hz is the upper frequency limit.
- Normal operation will be commenced after the initial starting mode (later) is completed when the power source is being turned "ON" (with upper limit restriction on frequency).

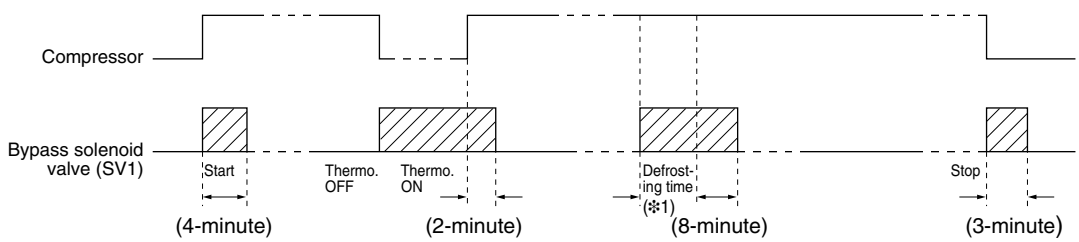
3. Bypass control

- Solenoid valve consists of bypass solenoid valve (SV1) bypassing between high pressure side and low pressure side. The following operation will be provided.

(1) Bypass solenoid valves SV1 ("open" when turned on).

Item	SV1	
	ON (Open)	OFF (Close)
When starting No.1 compressor	Turned on for 4 minutes	
After thermost "ON is returned and after 3 minutes restart	Turned on for 2 minutes	
When compressor stops in cooling or heating mode	Always turned on. Off at HPS-LPS ≤ 0.2MPa.	
After operation stops	Turned on for 3 minutes. Off at HPS-LPS ≤ 0.2MPa.	
During defrosting operations (Figure below ❊1)	Always turned on	
During oil recovery operations	Cooling operation normally OFF and heating operation normally ON when performing oil recovery after continuous operation at low frequency.	
During 30Hz operations, at fall in low pressure or low pressure saturation temperature. (3minutes or more after starting)	(LPS) is 0.098 MPa or less	(LPS) is 0.196 MPa or more
When high pressure rises (Pd)	When (Pd) reaches 2.7MPa or more	When (Pd) is 2.35MPa or less after 30 seconds
When high pressure rises (Pd) during 30Hz operations (3 minutes after starting)	When (Pd) exceed pressure limit	When (Pd) is less than 1.96 MPa.

Example of SV1 action



4. Frequency control

- Depending on capacity required, capacity control change and frequency change are performed to keep constant evaporation temperature (˚C) in cooling operations, and condensing temperature (49˚C) in heating operation.
- Frequency change is as follows.

Model	Frequency	Speed
200 type	20 ~ 74Hz	3Hz/sec.
250 type	20 ~ 100Hz	3Hz/sec.
315 type	20 ~ 120Hz	3Hz/sec.

(1) Pressure control

The upper limit value for the high pressure (Pd) has been set for each frequency, when this value is exceeded, the frequency is reduced every 30 seconds.

(2) Discharge temperature control

Discharge temperature (Td) of compressor is detected during operation. If the upper limit is exceeded, the frequency is reduced. (Change rate : 5Hz of the present value)

- 30 seconds after starting compressor, control is performed every minute.
- Operation temperature is 100˚C (200 type), 110˚C (250, 315 types).

(3) Periodical frequency control

Frequency control (focusing control) is periodically performed as follows except for the frequency controls at operation start, status change, and protection.

(1) Cycle of periodical frequency control

Periodical frequency control is performed every minute after the time specified below has passed.

- 60 sec after starting compressor or 30 seconds after completing defrost operation.
- 30 sec after frequency control by discharge temperature or pressure limit

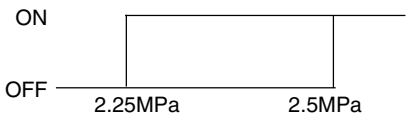
(2) Amount of frequency change

The amount of frequency change is controlled to close near the target value corresponding to the evaporating temperature (Te) and condensing temperature (Tc).

(3) Back up of frequency control by bypass valve

During operating No.1compressor only under the lowest frequency, the frequency control is backed up by turning the bypass valve (SV1) on.

- 3 minutes after starting compressor, bypass valve is turned on when high pressure (Pd) is higher than 2.5 MPa, and turned off when (Pd) is less than 2.25MPa.



5. Defrosting operation control

(1) Starting of defrost operations

- After integrated 39 minutes of compressor operations, defrosting operations start when –6°C piping temperature (TH5) is detected for 3 consecutive minutes.
- Forcible defrosting operations start by turning on forcible defrost switch (SW2-7) if 10 minutes have already elapsed after compressor start or completion of defrosting operations and will last for 10 minutes.
- Even at setting of the defrost prohibit timer for 90 minutes, the next prohibit time will be 37 minutes when the defrost time took 15 minutes.

(2) Completion of defrosting operations

- Defrosting operations stop when 10 minutes have passed (15 minutes when setting defrosting prohibition for 90 minutes) or when piping temperature (TH5) exceeding 25˚C is detected for 2 minutes continually.
  (Defrosting operations do not stop for 2 minutes after starting, except when piping temperature exceeds 25°C.)

(3) Defrosting prohibition

- Defrosting operations do not start during oil recovery, and for 10 minutes after starting compressor.

(4) Trouble during defrosting operations

- When trouble is detected during defrosting operations, the defrosting operations stop, and defrosting prohibition time decided by integrated operation time of compressor is set to be 20 minutes.

(5) Change in number of operating indoor units during defrosting operations

- In case number of operating indoor units changes during defrosting operations, the defrosting operations continue, and control of unit number change is performed after the defrosting operations are finished.
- Even in case all indoor units stop or thermostat is turned off during defrosting operations, the defrosting operations do not stop until expected defrosting activities are completed.

6. Refrigerant recovery control

- Refrigerant recovery is performed to prevent refrigerant from accumulating in the stopping unit (unit under fan mode), the unit under cooling mode and that with heating thermostat being turned off. Under cooling mode, it prevents refrigerant from accumulating in the outdoor heat exchanger.

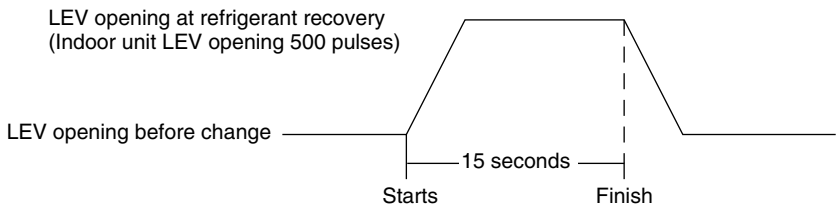
At heating:

(1) Start of refrigerant recovery

- Refrigerant recovery is started when the 2 items below are satisfied.
  (1) 30 minutes has passed after finishing previous refrigerant recovery.
  (2) When Td > 95˚C (for 200 type) or 105˚C (for 250, 315 types) is detected for 3 minutes continually.

(2) Refrigerant recovery operation

- Refrigerant is recovered by opening LEV of the objective indoor units (indoor units under stop, fan, and cooling modes, and that with heating thermostat being turned off) for 15 seconds.



- The regular capacity control of the outdoor unit and the regular LEV control of the indoor unit are not applied during refrigerant recovery operation, but are fixed with the value before the recovery operation.
- Defrosting operation is prohibited during the recovery operation, and it will be conducted after finishing the recovery operation.

At cooling:

(1) Start of refrigerant recovery

- Refrigerant recovery is started when the 2 items below are satisfied.
  (1) 30 minutes has passed after finishing previous refrigerant recovery.
  (2) AL = 0 (judged by the super heat of discharge temp.) for 3 minutes continually.
  (3) When Td > 95˚C (for 200 type), 105˚C (for 250, 315 types) or Pd > 2.45Mpa and SCO >10deg.

(2) Refrigerant recovery operation

- Open further the opening of LEV1. (Periodic control after 30 seconds elapsed)

7. Outdoor unit fan

(1) Control system

- Depending on capacity required, the outdoor fan flow rate is controlled with phase control, for maintaining evaporation temperature (0°C) in cooling operations, and condensing temperature (49°C) in heating operations.

(2) Control

- Outdoor unit fan stops when compressor stops. (Except at snow sensor input.)
- Fan is in full operation for 5 seconds after starting.
- Outdoor unit fan stops during defrosting operations.
- Lowers the fan strength upper limit to approximately 50% when performing night mode settings.

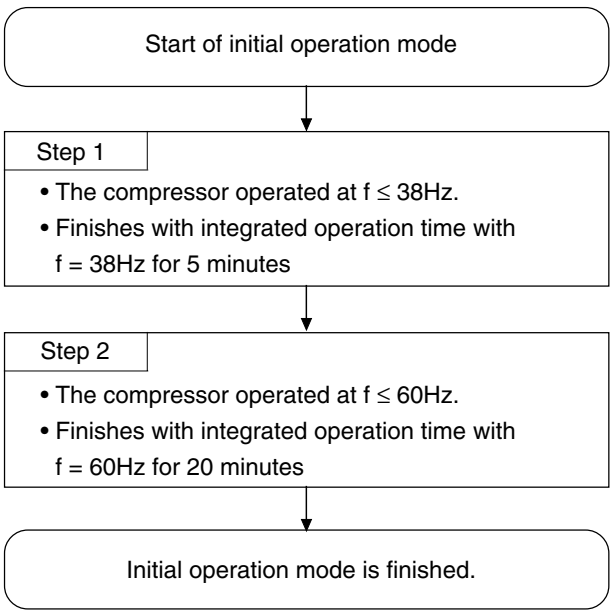
8. Sub-cooling coil control (Electronic expansion valve <LEV 1>)

- The super heat amount from the sub-cooling coil bypass outlet temperature (TH8) is controlled to be constant for every 30 seconds.
- Control is performed by correcting the opening depending on the sub-cooling coil outlet/inlet temperature (TH5, TH7), high pressure (Pd) and discharge temperature.
  It will be closed at heating and compressor stopping, however, it opens to the rated at cooling thermostat OFF.
- A constant opening will be provided at defrosting.

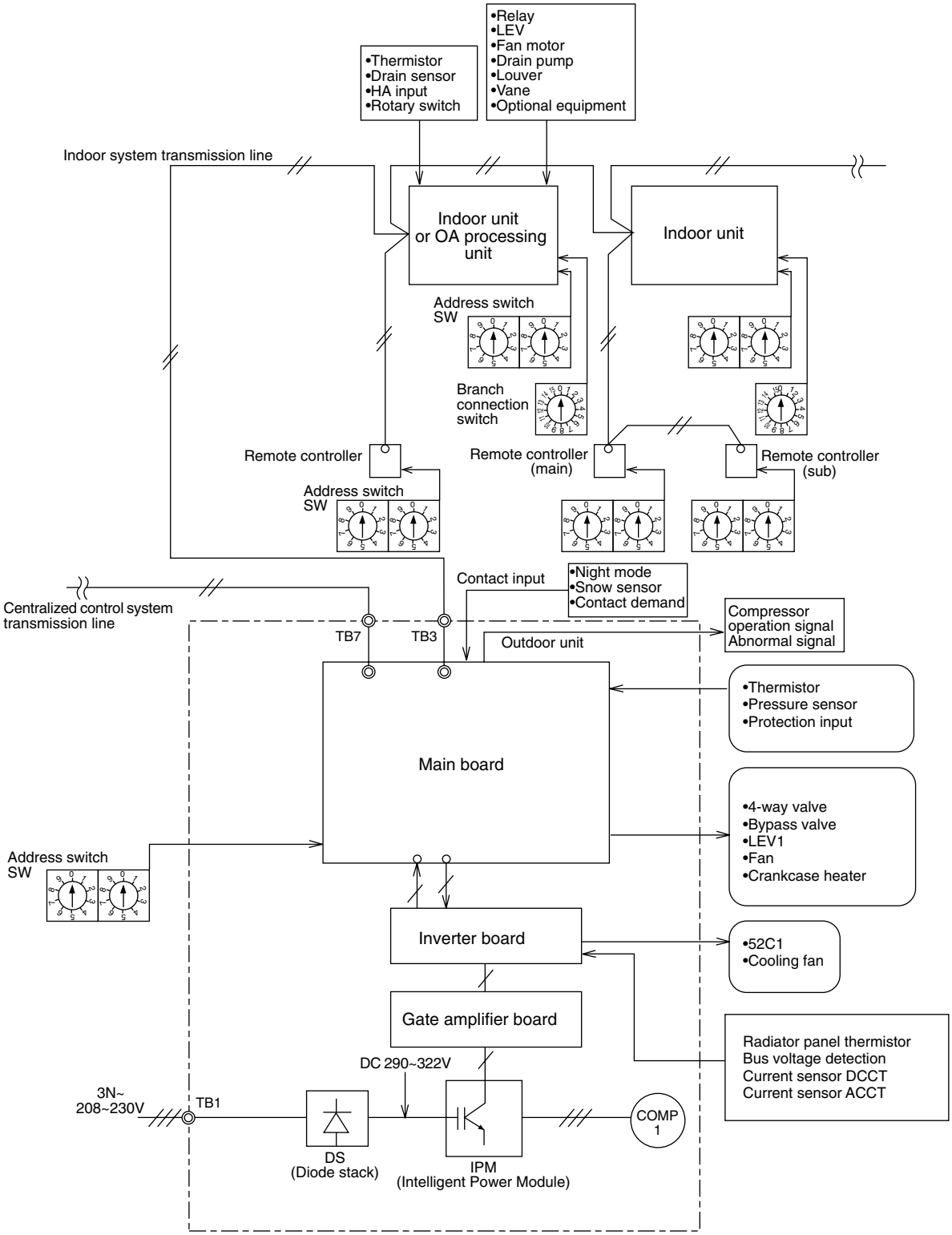
9. Control at initial start-up

- The following initial start mode will be performed when the unit is started for the first time after the power has been turned on.

Flow chart of initial start mode:



10. Control block diagram



11. Operation mode

(1) Operation mode of indoor unit

The following 5 modes can be set with the remote controller.

(1)	Cooling mode
(2)	Heating mode
(3)	Dry mode
(4)	Fan mode
(5)	Stopping mode

(2) Operation mode of outdoor unit

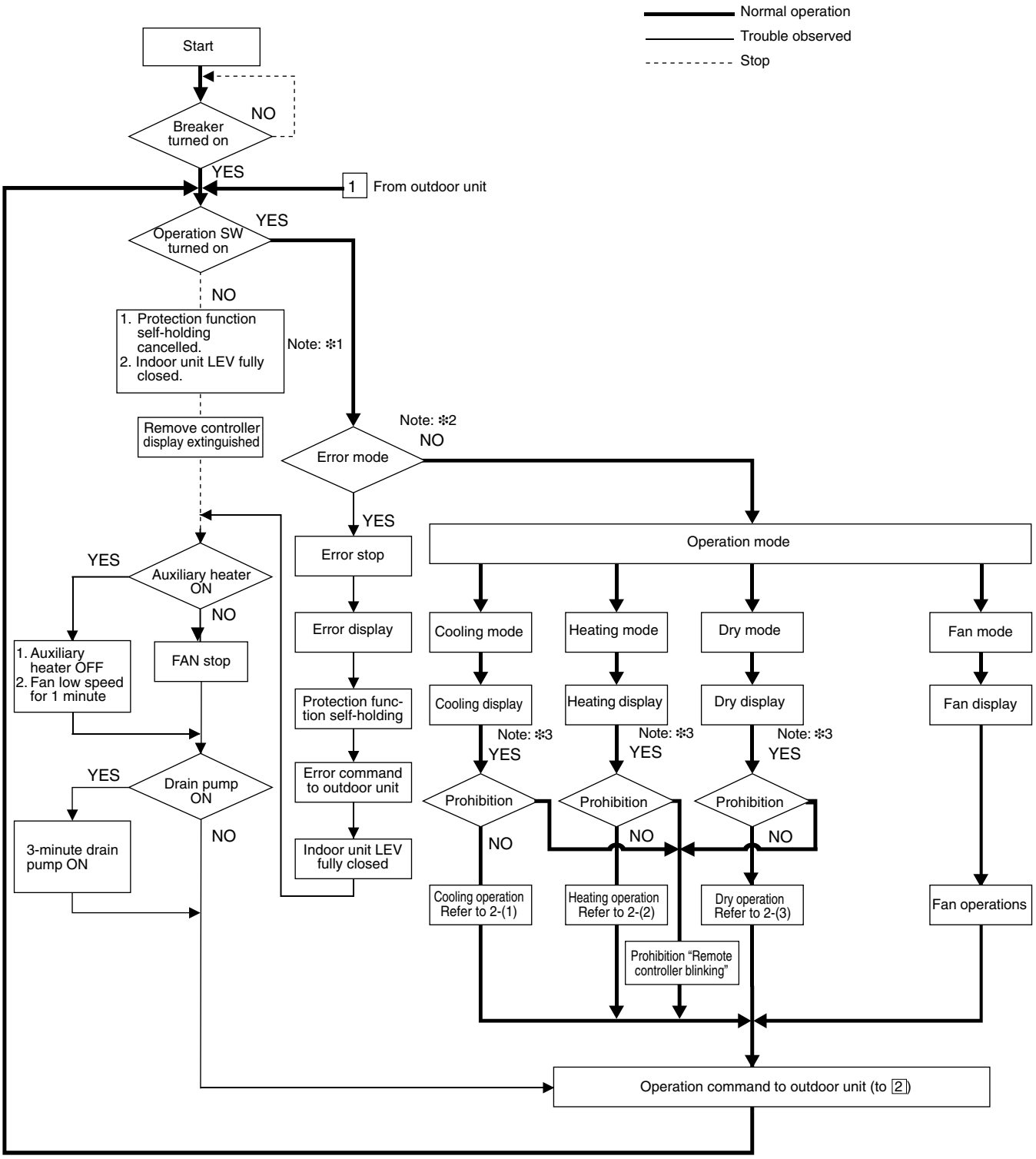
(1)	Cooling mode	All operating indoor units are under cooling mode
(2)	Heating mode	All operating indoor units are under heating mode
(3)	Stopping mode	All indoor units are under fan/stopping mode

Note: When the outdoor unit is being under cooling mode, the heating display will blink without operation of other indoor units (stopping, fan, thermostat off) even if the indoor unit is set to heating mode. When the outdoor unit is being under heating mode in reverse, the cooling display only blinks. (Priority is given to the former pressing of the remote controller.)

3 Operation Flow Chart

1. Flow to determine the mode

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

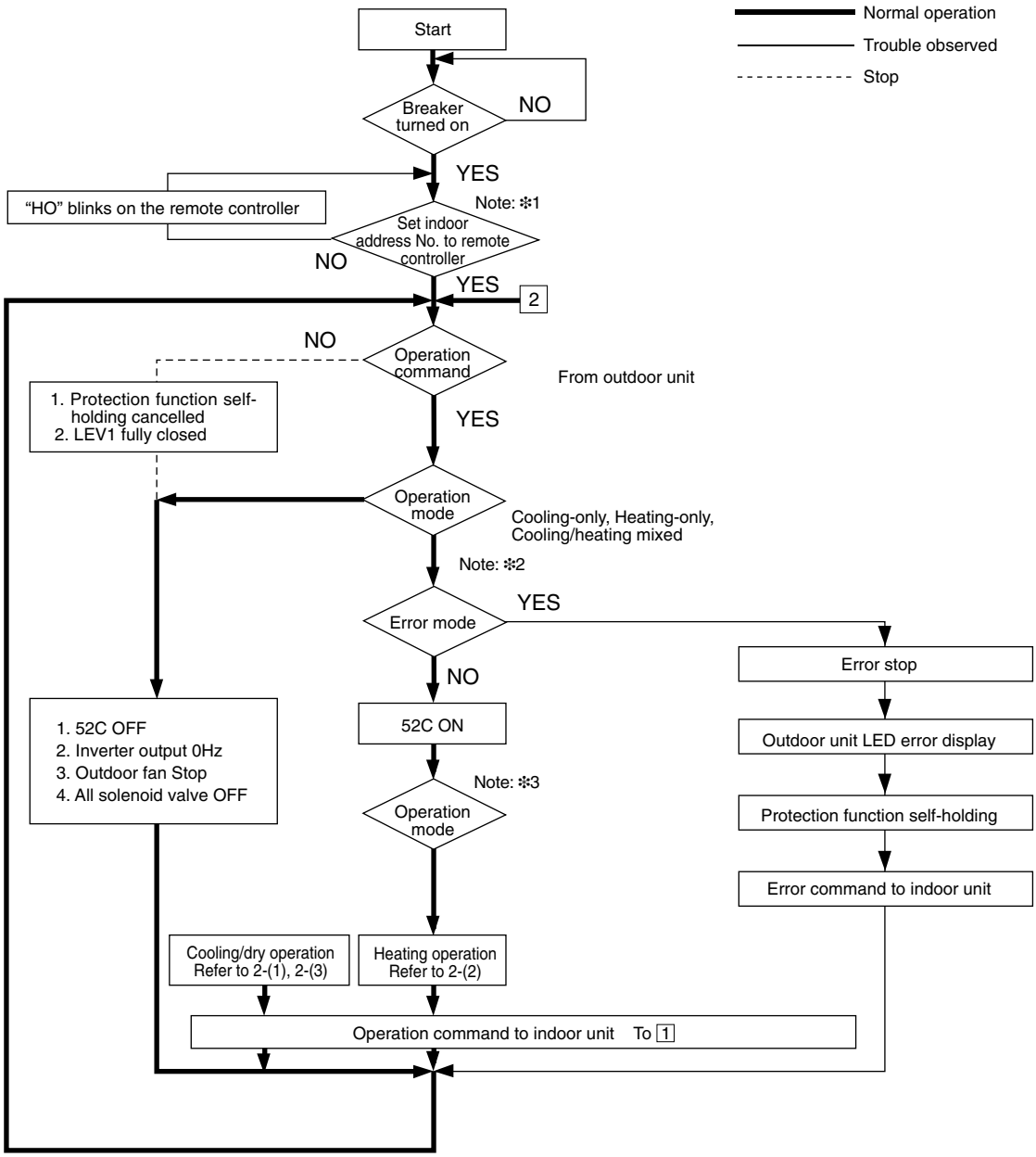


Notes : ✻1 Indoor unit LEV fully closed : Opening 41 (60 with some old models)

✻2 The error mode includes that of indoor units and outdoor units. At indoor side error (excluding water leak), the indoor unit in trouble only will be stopped in emergency, while at outdoor side error, all indoor units connected will be stopped.

✻3 Prohibition status is observed when the set cooling/heating mode is different from that of the outdoor unit.

(2) Outdoor unit (cooling, heating mode)



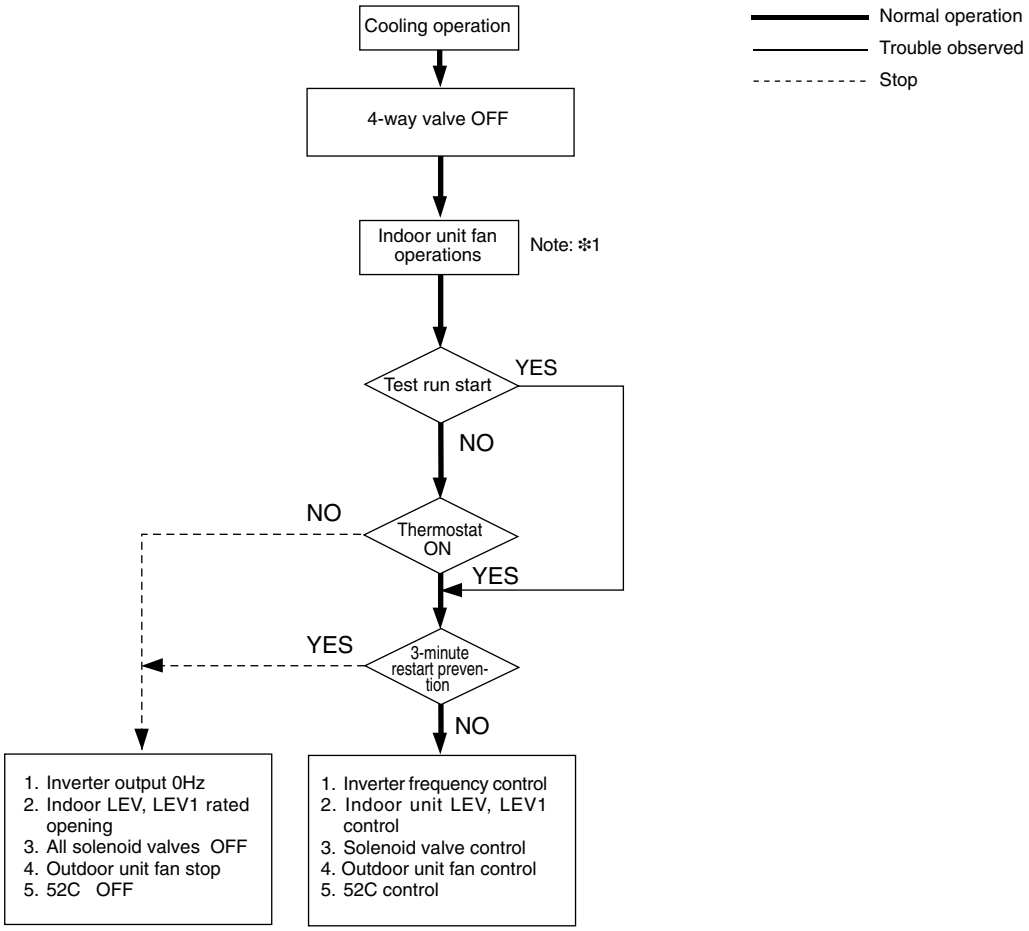
Notes : ❇1 For about 3 minutes after turning on power source, address and group information of outdoor unit, indoor unit, and remote controller are retrieved by remote controller, during which "HO" blinks on and off on remote controller. In case indoor unit is not grouped to remote controller, "HO" display on remote controller continues blinking even after 3 minutes after turning on power source.

❇2 Two trouble modes include indoor unit side trouble, and outdoor unit side trouble. In the case of indoor unit side trouble, error stop is observed in outdoor unit only when all the indoor units are in trouble. However, if one or more indoor units are operating normally, outdoor unit shows only LED display without undergoing stop.

❇3 The operation mode conforms to mode command by indoor unit. However, when outdoor unit is under cooling operation, the operation of indoor unit will be prohibited even by setting indoor units under operation, or indoor unit under stopping or fan mode to heating mode. Reversely when outdoor unit is being under heating operation, the same condition will be commenced.

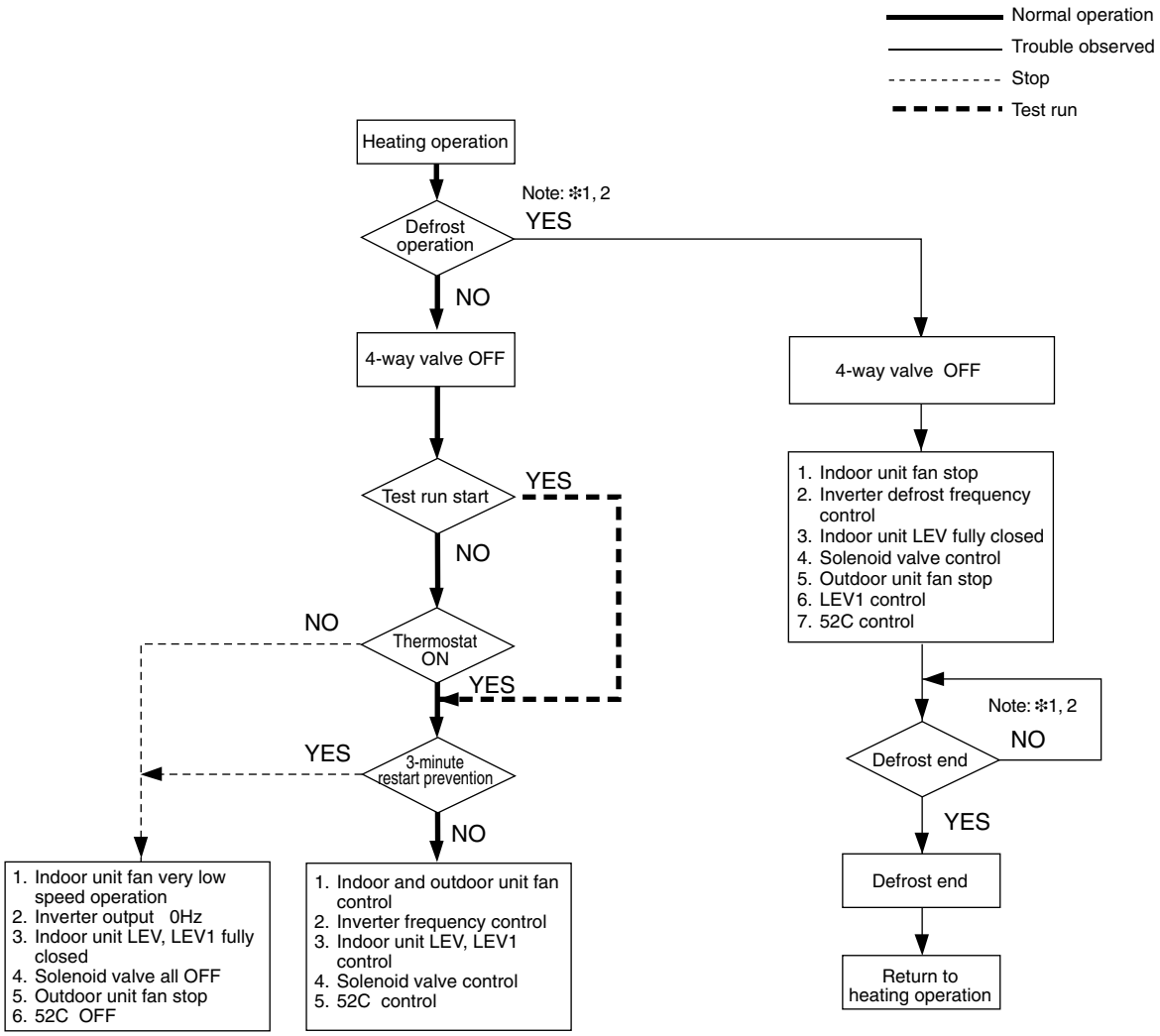
2. Operation under each mode

(1) Cooling operation



Note : ❇1 The indoor fan operates at the set notch under cooling regardless of thermostat ON/OFF.

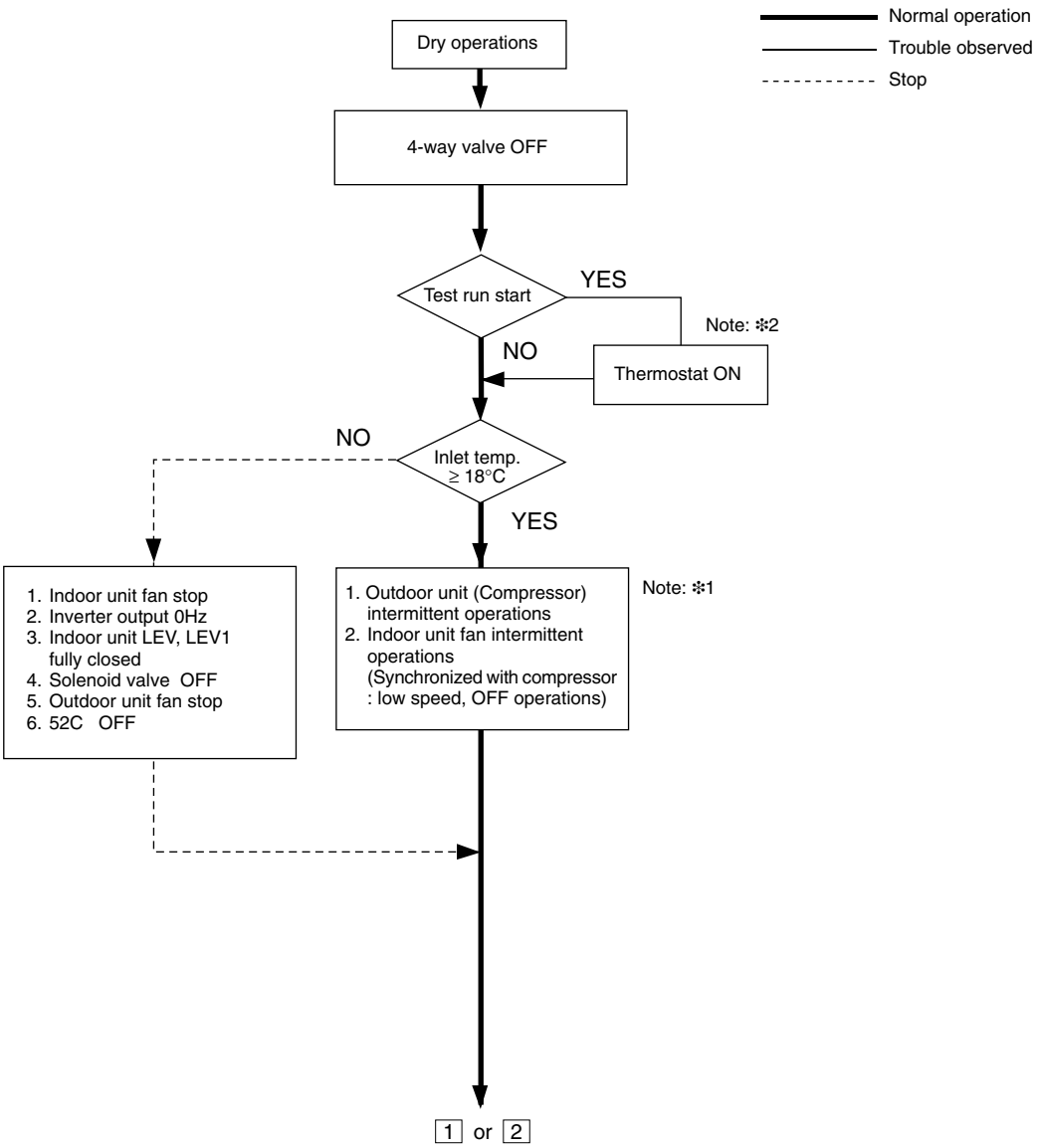
(2) Heating operation



Notes : ❇1 When outdoor unit starts defrosting, it transmits defrost operations command to indoor unit, and the indoor unit starts defrosting operations.
Similarly when defrosting operation stops, indoor unit returns to heating operation after receiving defrost end command of outdoor unit.

❇2 Defrost ending condition : Defrost operation for 10 minutes or more, or outdoor piping temperature : refer to "6. Defrost operation control" of [2] Outdoor unit control for the temperature.

(3) Dry operation



Notes : ❇1 When indoor unit inlet temperature exceeds 18°C, outdoor unit (compressor) and indoor unit fan start intermittent operations synchronously. The fan always operates (at low spped) when it decreases below 18˚C. Operations of outdoor unit, indoor unit LEV and solenoid valve accompanying compressor ON are the same as those in cooling operations.

❇2 Thermostat is always kept on in test run, and indoor and outdoor unit intermittent operation (ON) time is a little longer than normal operations.

VI. REFRIGERANT AMOUNT ADJUSTMENT

1 Operating Characteristics and Refrigerant Amount

Clarify relationship between the refrigerant amount and operating characteristics of CITY MULTI new refrigerant series, and perform service activities such as decision and adjustment of refrigerant amount on the market.

1. Operating characteristics and refrigerant amount

The followings are operating characteristics and refrigerant amount which draw special attention.

1	During cooling operations, required refrigerant amount tends to increase (refrigerant in accumulator decreases) in proportion to increase in the number of operating indoor units. However, the change of increase rate is small.		
2	During heating operations, liquid level of accumulator is the highest when all the indoor units are operating.		
3	Discharge temperature hardly changes when increasing or decreasing refrigerant amount with accumulator filled with refrigerant.		
4	Tendency of discharge temperature	During cooling operation at high ambient temperature, the discharge temperature may rise.	Comparison including control system
		During heating operation at low ambient, the discharge temperature may rise.	
		The lower operating frequency is, the higher discharge temperature tends to become of deteriorated compressor efficiency.	
5	Compressor shell temperature is 10~60K higher than low pressure saturation temperature (Tc) when refrigerant amount is appropriate. → Judged as over replenishment when temperature difference from low pressure saturation temperature (Te) is 5K or less.		

2 Adjustment and Judgment of Refrigerant Amount

1. Symptom

The symptoms shown in the table below are the signs of excess or lack of refrigerant amount. Be sure to adjust refrigerant amount in the refrigerant amount adjustment mode, by checking operation status, judging refrigerant amount, and performing selfdiagnosis with LED, for overall judgement of excess or lack of refrigerant amount.

1	Emergency stop at 1500 remote controller display (excessive refrigerant replenishment)	Excessive refrigerant replenishment
2	Operating frequency does not fully increase, thus resulting in insufficient capacity	Insufficient refrigerant replenishment
3	Emergency stop at 1102 remote controller display (discharge temperature trouble)	

2. Refrigerant volume

(1) Checking the operating condition

Operate all the indoor units on cooling or on heating, checking the discharge temperature, sub-cooling, low pressure saturation temperature, inlet temperature, shell bottom temperature, liquid level, liquid step, etc. and rendering an overall judgment.

	Condition	Judgement
1	Discharge temperature is high. (100˚C or higher)	Refrigerant volume tends toward insufficient.
2	Low pressure saturation temperature is extremely low.	
3	Inlet superheating is high (if normal, SH = 20K or lower).	
4	Shell bottom temperature is high (the difference with the low pressure saturation temperature ❄1 is 60K or greater)	
5	Shell temperature is low (the difference with the low pressure saturation temperature ❄1 is 5K or higher.)	Rifrigerant volume tends toward overcharge.
6	Liquid level AL = 2 (Determined based on the extent of super heat of discharged refrigerant)	

❄1 Low pressure saturation temperature (Low pressure shell compressor)

(2) Check the refrigerant volume by self-diagnosis using the LED

Set the self-diagnosis switch (SW1) as shown below and check the past information (history) concerning the refrigerant volume.

Set SW1 as shown in the figure at right.

↓

If LED1 lights up, it indicates the delay in judging abnormal refrigerant charge just before emergency stop due to refrigerant overcharge (1500).

3. Additional refrigerant charge volume

At the time of shipping from the factory, the outdoor unit is charged with the amount of refrigerant shown in the following table, but since no extension piping is included, please carry out additional charging on-site.

Outdoor unit model name	PUHY-200	PUHY-250	PUHY-315
Refrigerant charge volume	7.0kg	7.0kg	9.0kg

Calculation formula:

Calculate the additional refrigerant volume by calculating the size of the extension liquid piping and its length (unit : m).

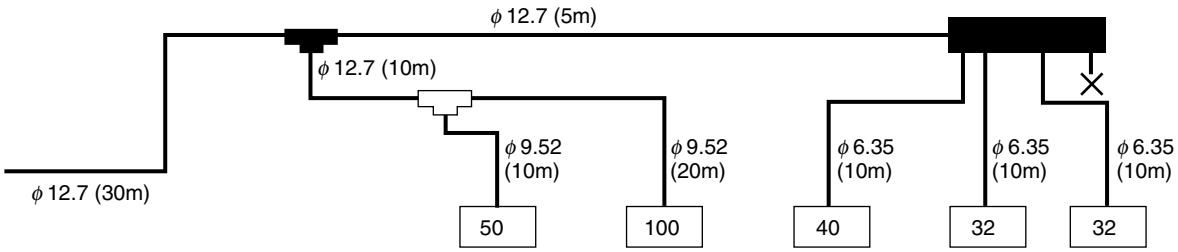
Additional refrigerant volume (kg) = (0.12 x L_1) + (0.06 x L_2) + (0.024 x L_3) + α

L_1 : Length of ϕ 12.7 liquid pipe (m)
L_2 : Length of ϕ 9.52 liquid pipe (m)
L_3 : Length of ϕ 6.35 liquid pipe (m)
α : Refer to the right table.

Total capacity of connected indoor unit	α
~ 80	1.0kg
81 ~ 160	1.5kg
161 ~ 330	2.0kg
331 ~ 480	2.5kg

❇ In the calculation results, round up fractions smaller than 0.01kg. (Example: 18.54kg → 18.6kg)
❇ The liquid pipe size of the main piping (outdoor unit ~ first branch) of Model 315TEM-A in this series is ϕ12.7.

Example: PUHY-250



Each pipe is of liquid piping.

ϕ 12.7 : 30m + 10m + 15m = 55m
ϕ 9.52 : 10m + 20m = 30m
ϕ 6.35 : 10m + 10m + 10m = 30m

From the above calculation formula,

Additional charge volume = (0.12 x 55) + (0.06 x 30) + (0.024 x 30) + 2 = 11.12kg

11.12kg obtained is converted in a unit of 0.1kg.

Therefore,

Additional charge volume = 11.2kg

3 Refrigerant Volume Adjustment Mode Operation

Since the refrigerant volume adjustment introduced in this chapter is just for emergency need, correct adjustment to meet the rated refrigerant volume is difficult. Please judge for adequate volume by following the flow chart later under normal operation mode.

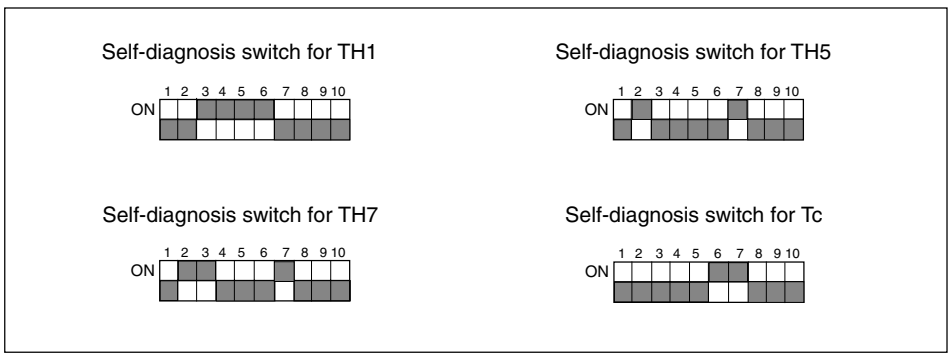
1. Procedure

Depending on the operating conditions, it may be necessary either to charge with supplementary refrigerant, or to drain out some, but if such a case arises, please follow the procedure given below.

(1) Switching the function select switch (SW2-4), located on the outdoor unit's control board, ON starts refrigerant volume adjustment mode operation and the following operation occurs

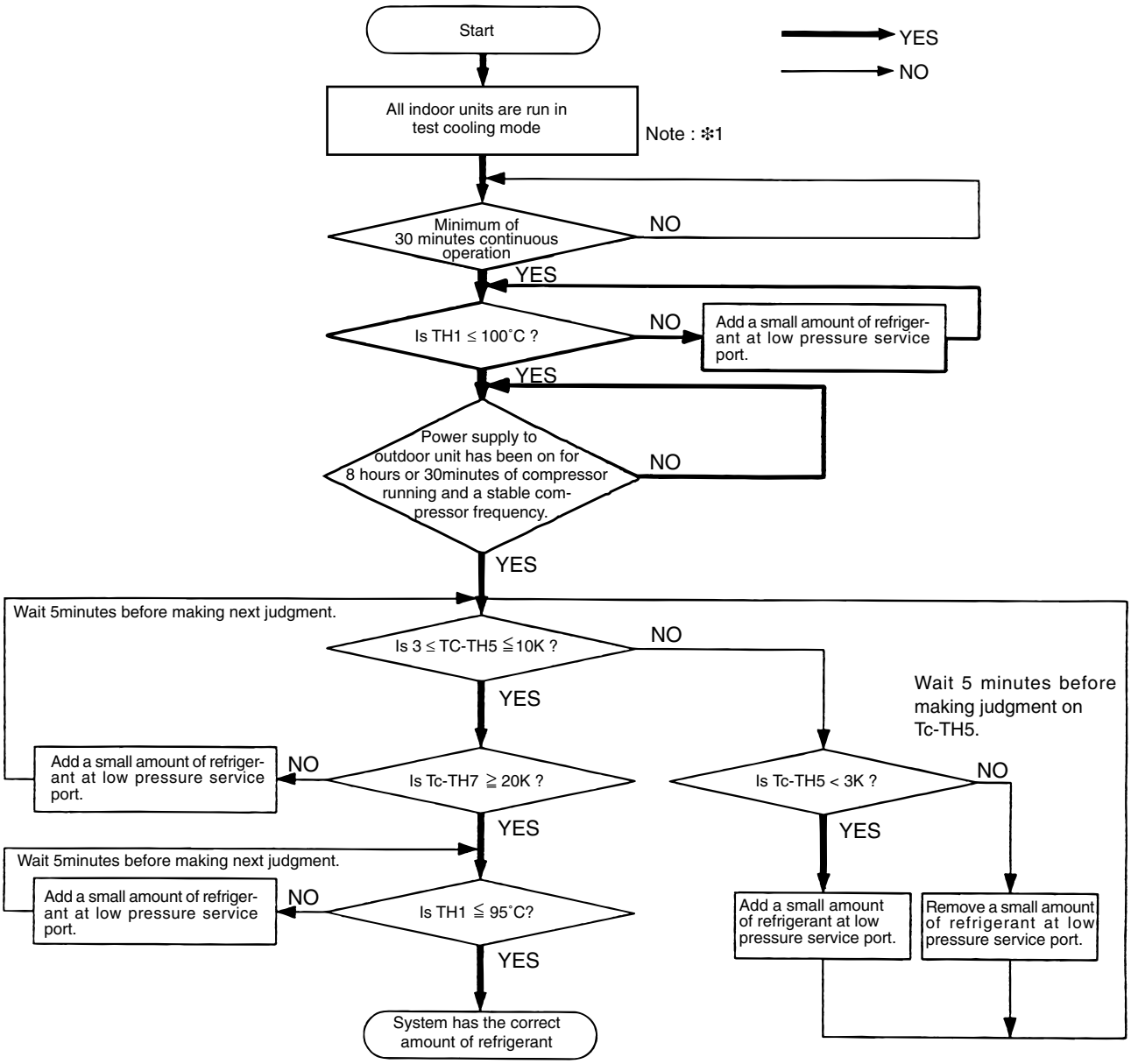
Operation	The outdoor unit LEV1 diverges more than usual during cooling operation.

Notes: 1. Even if the refrigerant volume has reached a suitable level shortly after starting refrigerant volume adjustment mode, if left for a sufficient length of time (once the refrigeration system has stabilized), there are times when this level may become unsuitable.
1) The refrigerant volume is suitable;
When the refrigerant volume for TH5 ~ TH7 is more than 5K at the outdoor unit, and 6 to 13K for SH at the indoor unit.
2) The current volume is suitable, however, may become unsuitable after a certain length of time;
When the refrigerant volume for TH5 ~ TH7 is less than 5K at the outdoor unit, or less than 6K for SH at the indoor unit.
2. There are times when it becomes difficult to determine the volume when performing refrigerant adjustments if the high pressure exceeds 1.37MPa.
3. Based on the following flowchart, use TH1, TH5, TH7 and Tc to adjust the refrigerant volume. Use the self-diagnosis switch (SW1) on the outdoor unit main PCB to display TH1, TH5, TH7 and Tc.



Using these, judge TH1, Tc ~ TH5 and Tc ~ TH7.

Measure	A	When running refrigerant volume adjustment mode in the cooling operation, if note 2 above applies, determine the suitable refrigerant volume after waiting until outdoor units TH5 ~ TH7 reach more than 5K, and the indoor unit SH is in the range of 6 to 9K.
	C	Turn on the outdoor unit self-diagnosis switch and then monitor the LED for the indoor unit SH.



Note : ❄1. Operated using outdoor unit DIP SW3-1 and 3-2.

⚠ Caution

Ensure that no refrigerant is released into the atmosphere.

VII. TROUBLESHOOTING

1 Check Code List

1. Check code list

Check code		Check content	
0403		Serial transmission abnormality	
0900		Test run (ventilation)	
1102		Discharge temperature abnormality	
1111		Low pressure saturation temperature sensor abnormality (TH2)	
1301		Low pressure abnormality (OC)	
1302		High pressure abnormality (OC)	
1500		Overcharged refrigerant abnormality	
2500		Leakage (water) abnormality	
2502		Drain pump abnormality	
2503		Drain sensor abnormality	
4103		Reverse phase abnormality	
4115		Power supply sync signal abnormality	
4116		Fan speed abnormality (motor abnormality)	
4220	[108]	Bus Voltage drop abnormality (S/W detect)	
	[109]	Bus Voltage rise abnormality (S/W detect)	
	[110]	Vdc abnormality (H/W detect)	
	[111]	Logic circuit for H/W error detect abnormality	
4230		Heat sink overheating abnormality	
4240		Overload abnormality	
4250	[101]	IPM abnormality	
	[102]	ACCT overcurrent abnormality (H/W peak detect)	
	[103]	DCCT overcurrent abnormality (H/W peak detect)	
	[104]	IPM short/grounding abnormality	
	[105]	Load short abnormality	
	[106]	ACCT overcurrent abnormality (S/W detect peak current)	
	[107]	ACCT overcurrent abnormality (S/W detect effective current)	
4260		Cooling fan abnormality	
5301	[115]	ACCT sensor abnormality	
	[116]	DCCT sensor abnormality	
	[117]	ACCT sensor/circuit abnormality	
	[118]	DCCT sensor/circuit abnormality	
	[119]	IPM-open/ACCT connection abnormality	
	[120]	ACCT miss-wiring abnormality	
5101		Thermal sensor abnormality	Air inlet (TH21:IC)
			Discharge (TH1:OC)
5102			Liquid pipe (TH22:IC)
5103			Gas pipe (TH23:IC)
5105			Liquid pipe (TH5)
5106			Ambient temperature (TH6)
5107			SC coil outlet (TH7)
5108			SC coil bypass outlet (TH8)
5110			Heat sink (THHS)
5201		Pressure sensor abnormality (OC)	
6600		Multiple address abnormality	
6602		Transmission processor hardware abnormality	
6603		Transmission circuit bus-busy abnormality	

[ ] : Error detail No.

Check code	Check content
6606	Communications with transmission processor abnormality
6607	No ACK abnormality
6608	No response abnormality
6831	MA Communication no reception error
6832	MA Communication synchronization recovery error
6833	MA Communication transmission/reception hardware error
6834	MA Communication start bit error
7100	Total capacity abnormality
7101	Capacity code abnormality
7102	Connected unit count over
7105	Address setting abnormality
7106	Characteristics setting abnormality
7110	Connection number setting abnormality
7111	Remote control sensor abnormality
7113	Functional restriction error
7130	Different unit model error

2. Intermittent fault check code (only for outdoor unit)

Preliminary error code		Preliminary error content
1202 (1102)		Preliminary discharge temperature abnormality or preliminary discharge thermal sensor abnormality (TH1)
1205 (5105)		Preliminary liquid pipe temperature sensor abnormality (TH5)
1214 (5110)		Preliminary THHS sensor/circuit abnormality
1216 (5107)		Preliminary sub-cool coil outlet thermal sensor abnormality (TH7)
1217 (5108)		Preliminary sub-cool coil bypass outlet thermal sensor abnormality (TH8)
1221 (5106)		Preliminary ambient temperature thermal sensor abnormality (TH6)
1402 (1302)		Preliminary high pressure abnormality or preliminary pressure sensor abnormality
1600 (1500)		Preliminary overcharged refrigerant abnormality
1601 (1501)		Preliminary lacked refrigerant abnormality
1605 (1505)		Preliminary suction pressure abnormality
4300 (0403)	[121]	Preliminary serial transmission abnormality
4300 (5301)	[115]	Preliminary ACCT sensor abnormality
	[116]	Preliminary DCCT sensor abnormality
	[117]	Preliminary ACCT sensor/circuit abnormality
	[118]	Preliminary DCCT sensor/circuit abnormality
	[119]	Preliminary IPM-open/ACCT connection abnormality
	[120]	Preliminary ACCT miss-wiring abnormality
4320 (4220)	[108]	Preliminary bus voltage drop abnormality (S/W detect)
	[109]	Preliminary bus voltage rise abnormality (S/W detect)
	[110]	Preliminary Vdc abnormality (H/W detect)
	[111]	Preliminary logic circuit for H/W error detect abnormality
4330 (4230)		Preliminary heat sink overheating abnormality
4340 (4240)		Preliminary overload abnormality
4350 (4250)	[101]	Preliminary IPM abnormality
	[102]	Preliminary ACCT overcurrent abnormality (H/W peak detect)
	[103]	Preliminary DCCT overcurrent abnormality (H/W peak detect)
	[104]	Preliminary IPM short/grounding abnormality
	[105]	Preliminary load short abnormality
	[106]	Preliminary ACCT overcurrent abnormality (S/W detect peak current)
	[107]	Preliminary ACCT overcurrent abnormality (S/W detect effective current)
4360 (4260)		Preliminary cooling fan abnormality

❇ Please refer to ( ) check code. [ ] : Error code No.

2 Responding to Error Display on the Remote Controller

1. Mechanical problems

Checking code		Meaning, detecting method	Cause	Checking method & Countermeasure
0403	Serial transmission abnormality	If serial transmission cannot be established between the MAIN and INV boards.	(1) Wiring is defective.	Check 1, the connections, 2, contact at the connectors and 3, for broken wires in the following wiring. CNRS2 - CNRS3 CN20 - TB1
			(2) Switches are set wrong on the INV board.	SW1-4 on the INV board should be OFF.
			(3) The circuit board is defective.	If none of the items in (1) to (2) is applicable, and if the trouble reappears even after the power is switched on again, replace the circuit board by the following procedure (when replacing the circuit board, be sure to connect all the connectors, ground wires, etc. securely). 1) If serial transmission is restored after the INV board is replaced, then the INV board is defective. 2) If serial transmission is not restored, reinstall the INV board and replace the MAIN board. If serial transmission is restored, the MAIN board is defective. 3) If serial transmission is not restored by 1) and 2) above, replace both boards.
1102	Discharge temperature abnormality (Outdoor unit)	1. When 110˚C for 8HP and 120˚C for 10HP or more discharge temperature is detected during operations (the first time), outdoor unit stops once, mode is changed to restart mode after 3 minutes, then the outdoor unit restarts. 2. When 110°C for 8HP and 120 °C for 10HP or higher discharge is detected again (the second time) within 30 minutes after the first stop of outdoor unit, mode is changed to restart mode after 3 minutes, then the outdoor unit restarts. 3. When 110˚C for 8Hp and 120˚C for 10HP or more discharge is detected. again (the third time) within 30 minutes after previous stop of outdoor unit, emergency stop is observed with code No. “1102” displayed. 4. When 110˚C for 8Hp and 120˚C for 10HP or more discharge is detected 30 or more minutes after previous stop of outdoor unit, the stop is regarded as the first time and the process shown in 1. is observed. 5. 30 minutes after stop of outdoor unit is intermittent fault check period with LED displayed (1202).	(1) Gas leak, gas shortage.	See **Refrigerant amount check.**
			(2) Overload operations.	Check operating conditions and operation status of indoor/outdoor units.
			(3) Poor operations of indoor LEV. (4) Poor operations of OC controller LEV: Cooling : LEV1	Check operation status by actually performing cooling or heating operations. Cooling : Indoor LEV (Cooling-only) LEV1 Heating : Indoor LEV (Heating-only) See **Trouble check of LEV and solenoid valve.**
			(5) Poor operations of ball valve.	Confirm that ball valve is fully opened.
			(6) Outdoor unit fan block, motor trouble, poor operations of fan controller Heating (Heating-only, Heating-main). {(3) ~ (6) : Rise in discharge temp. by low pressure drawing.}	Check outdoor fan. See **Trouble check of outdoor fan.**
			(7) Gas leak between low and high pressures. {4-way valve trouble, compressortrouble, solenoid valve SV1 trouble.}	Check operation status of cooling-only or heating-only.
			(8) Poor operation of solenoid valve SV1. {Bypass valve SV1 can not control rise in discharge temp.}	See **Trouble check of solenoid valve.**
			(9) Thermistor trouble. (TH1)	Check resistance of thermistor.
			(10) Thermistor input circuit trouble on control circuit board.	Check inlet temperature of sensor with LED monitor.

Checking code		Meaning, detecting method	Cause	Checking method & Countermeasure
1301	Low pressure abnoramlity	When starting from the stop mode for the first time, (if at the start of bind power transmission, the end of bind power transmission, and in the mode when the thermostat goes OFF immediately after the remote control goes ON, the following compressor start time is included), if the low pressure sensor before starting is at 0.098MPa, operation stops immediately.	(1) Internal pressure is dropping due to a gas leak. (2) The low pressure pressure sensor is defective. (3) Insulation is torn. (4) A pin is missing in the connector, or there is faulty contact. (5) A wire is disconnected. (6) The control board's low pressure pressure sensor input circuit is defective.	Refer to the item on judging low pressure pressure sensor failure.
1302	High pressure abnoramlity 1 (Outdoor unit)	1. When pressure sensor detects 2.74MPa or more during operations (the first time), outdoor unit stops once, mode is changed to restart mode after 3 minutes, then the outdoor unit restarts. 2. When a pressure of 2.74MPa or more is detected again (the second time) within 30 minutes after first stop of outdoor unit, mode is changed to restart mode after 3 minutes, then the outdoor unit restarts. 3. When 2.94MPa or more pressure is detected again (the third time) within 30 minutes after stop of outdoor unit, error stop is observed with code No. "1302" displayed. 4. When 2.74MPa or more pressure is detected 30 or more minutes after stop of outdoor unit, the detection is regarded as the first time and the process shown in 1. is observed. 5. 30 minutes after stop of outdoor unit is intermittent fault check period with LED displayed. 6. Error stop is observed immediately when pressure switch ($2.94^{+0}_{-1.5}$ MPa) operates in addition to pressure sensor.	(1) Poor operations of indoor LEV. (2) Poor operations of outdoor LEV1.	Check operations status by actually performing cooling or heating operations. Cooling : Indoor LEV LEV1 Heating : Indoor LEV See **Trouble check of LEV and solenoid valve.**
			(3) Setting error of connection address.	Check address setting of indoor unit connector.
			(4) Poor operations of ball valve.	Confirm that ball valve is fully opened.
			(5) Short cycle of indoor unit. (6) Clogging of indoor unit filter. (7) Fall in air volume caused by dust on indoor unit fan. (8) Dust on indoor unit heat exchanger. (9) Indoor unit fan block, motor trouble. [(4)~9) : Rise in high pressure caused by lowered condensing capacity in heating-only and heating-principal operation.]	Check indoor unit and take measures to trouble.
			(10) Short cycle of outdoor unit. (11) Dust on outdoor unit heat exchanger.	Check outdoor unit and take measures to trouble.
			(12) Outdoor unit fan block, motor trouble, poor operations of fan controller. [(10)~12): Rise in high pressure caused by lowered condensing capacity in cooling-only and cooling-pincipal operation.]	Check outdoor unit fan See **Trouble check of outdoor unit fan.**
			(13) Poor operations of solenoid valves SV1 (Bypass valves (SV1) can not control rise in high pressure).	See **Trouble check of solenoid valve.**
			(14) Thermistor trouble (TH2, TH5, TH6).	Check resistance of thermistor.
			(15) Pressure sensor trouble.	Check **Trouble check of pressure sensor.**
			(16) Control circuit board thermistor trouble, pressure sensor input circuit trouble.	Check inlet temperature and press. of sensor with LED monitor.

Checking code		Meaning, detecting method	Cause	Checking method & Countermeasure
1302	High pressure abnoramlity 2 (Outdoor unit)	When pressure sensor detects 0.098MPa or less just before starting of operation, error stop is observed with code No.“1302” displayed.	(1) Fall in internal pressure caused by gas leak. (2) Pressure sensor trouble. (3) Film breakage. (4) Coming off of pin in connector portion, poor contact. (5) Broken wire. (6) Press. sensor input circuit trouble on control circuit board.	See **Trouble check of pressure sensor.**
1500	Overcharged refrigerant abnormality	1. If the discharge SH 10K is detected during operation (at first detection), the outdoor unit stops at once. The 3 minutes restart prevention mode is entered. After three minutes, the outdoor unit starts up again. 2. If the discharge SH 10K is detected again within 30 minutes after the outdoor unit stops (second detection), an abnormal stop is applied, and "1500" is displayed. 3. If discharge SH 10K is detected more than 30 minutes after the outdoor unit stops, the state is the same as the first detection and the same operation as 1. above takes place. 4. The abnormal stop delay period is in effect for 30 minutes after the outdoor unit stops. The abnormal stop delay period LED turns ON during this time. 5. If the abnormality detection prohibit switch (SW2-4) is ON, the same operation as the first detection will apply for the second and following detections.	(1) Excessive refrigerant charge	Refer to the section on judging the refrigerant volume.
			(2) Main circuit board thermistor input circuit trouble (3) Thermistor mounting trouble (TH1, TH2)	Check the sensor detection temperature and pressure with the LED monitor.
2500	Leakage (water) abnormality	When drain sensor detects flooding during drain pump OFF.	(1) Water leak due to humidifier or the like in trouble.	Check water leaking of humidifier and clogging of drain pan.
2502	Drain pump abnormality	When indirect heater of drain sensor is turned on, rise in temperture is 20 deg. or less (in water) for 40 seconds, compared with the temperature detected before turn-ing on the indirect heater.	(1) Drain sensor sinks in water because drain water level rises due to drain water lifting-up mechanism trouble.	Check operations of drain pump.
			(2) Broken wire of indirect heater of drain sensor.	Measure resistance of indirect heater of drain sensor. (Normal: Approx. 82Ω between 1-3 of CN50)
			(3) Detecting circuit (circuit board) trouble.	Indoor board trouble if no other problems is detected.
2503	Drain sensor abnormality	Short/open is detected during drain pump operations. (Not detected when drain pump is not operating.) Short : 90°C or more detected Open : -40°C or less detected	(1) Thermistor trouble. (2) Poor contact of connector. (insufficient insertion) (3) Full-broken of half-broken thermistor wire.	Check resistance of thermistor. 0˚C : 15kΩ 10˚C : 9.7kΩ 20˚C : 6.4kΩ 30˚C : 4.3kΩ 40˚C : 3.1kΩ
			(4) Indoor unit circuit board (detecting circuit) trouble.	Check contact of connector. Indoor port trouble if no other problem is detected.
	Operation of float switch	When float switch operates (point of contact : OFF), error stop is observed with code No. “2503” displayed.	(1) Drain up input trouble.	Check drain pump operations.
			(2) Poor contact of float switch circuit.	Check connect contact.
			(3) Float switch trouble.	Check float switch operations.

Checking code		Meaning, detecting method	Cause	Checking method & Countermeasure
4103	Reverse phase abnormality	Reverse phase (or open phase) in the power system is being detected, so operation cannot be started.	(1) The phases of the power supply have been reversed.	If there is reverse phase before the breaker, after the breaker or at the power supply terminal blocks TB1, reconnect the wiring.
			(2) Open phase has occurred in the power supply.	Check before the breaker, after the breaker or at the power supply terminal blocks TB1, and if there is an open phase, correct the connections. a) Check if a wire is disconnected. b) Check the voltage between each of the wires.
			(3) The wiring is faulty.	Check 1 the connections, 2, the contact at the connector, 3, the tightening torque at screw tightening locations and 4 for wiring disconnections. TB1~CN20, CN38~63H Refer to the circuit number and the wiring diagram plate.
			(4) The fuse is faulty.	If F1 or F2 on the MAIN board is melted, (Resistance between both ends of the fuse is ∞), replace the fuses.
			(5) The circuit board is faulty.	If none of the items in (1) to (4) is applicable, and if the trouble reappears even after the power is switched on again, replace the MAIN board (when replacing the circuit board, be sure to connect all the connectors, etc. securely).
4115	Power supply sync signal abnormality	The frequency cannot be determined when the power is switched on. (The power supply's frequency cannot be detected. The outdoor fan cannot be controlled by phase control.)	(1) There is an open phase in the power supply.	Check before the breaker, after the breaker or at the power supply terminal blocks TB1, and if there is an open phase, correct the connections.
			(2) The power supply voltage is distorted.	If the power supply voltage waveform is distorted from a sine wave, improve the power supply environment.
			(3) A fuse is defective.	If F1 or F2 on the MAIN board is melted, (Resistance between both ends of the fuse is ∞), replace the fuses.
			(4) The circuit board is defective.	If none of the items in (1) to (3) is applicable, and if the trouble reappears even after the power is switched on again, replace the MAIN board (when replacing the circuit board, be sure to connect all the connectors, ground wires, etc. securely).
4116	Fan speed abnormality (motor abnormality)	(Detects only for PKFY-VAM) 1. Detecting fan speed below 180rpm or over 2000rpm during fan operation at indoor unit (first detection) enters into the 3 minutes restart prevention mode to stop fan for 30 seconds. 2. When detecting fan speed below 180rpm or over 2000rpm again at fan returning after 30 seconds from fan stopping, error stop (fan also stops) will be commenced displaying "4116."	(1) Disconnection of fan speed detecting connector (CN33) of indoor controller board.	• Confirm disconnection of connector (CN33) on indoor controller board.
			(2) Disconnection of fan output connector (FAN1) of indoor power board.	• Confirm disconnection of connector (FAN1) on indoor power board.
			(3) Disconnection of fan speed detecting connector (CN33) of indoor controller board, or that of fan output connector (FAN1) of indoor power board.	• Check wiring for disconnection.
			(4) Filter cologging.	• Check filter.
			(5) Trouble of indoor fan motor.	• Check indoor fan motor.
			(6) Faulty fan speed detecting circuit of indoor controller board, or faulty fan output circuit of indoor power board.	• When aboves have no trouble. 1) For trouble after operating fan. Replace indoor controller board. If not remedied, replace indoor power board. 2) For trouble without operating fan. Replace indoor power board.

Checking code		Meaning, detecting method	Cause	Checking method & Countermeasure
4220	Bus voltage drop protection (Error details No. 108.)	If Vdc ≦ 150V is detected during inverter operation.	(1) Power environment	Check if an instantaneous stop or power failure, etc. has occurred. Check if the power supply voltage ≧ 180V across all phases.
			(2) Voltage drop detected	Check the voltage between the G/A board P-N. →Go to (3) if there is no voltage drop. →Check the G/A board CNDC1 voltage. Replace the G/A board if a voltage drop is detected. Check the INV board connector CNDC2 voltage. →If there is a voltage drop, the wiring connection is defective. Check the INV board connector CNDC2 solder joints.
			(3) INV board failure	Check that DC12V is being applied to the INV board connector CN52C during inverter operation.
			(4) 52C failure	Refer to VII.[4] 5 (4) "52C coil resistance check" Check the voltage across the 52C points during inverter operation .
			(5) Diode stack failure	Refer to VII.[4] 5 (6). Check the diode stack resistance.
	Bus voltage rise protection (Error details No. 109.)	If Vdc ≧ 425V is detected during inverter operation.	(1) Abnormal voltage connection	Check the voltage at the power terminal board (TB1).
			(2) INV board failure	Replace the INV board if there is no problem with the power supply.
	VDC error (Error details No. 110.)	Bus voltage error If Vdc ≧ 400V or Vdc ≦ 160V is detected.	(1) Same as error details No.108 and 109 for 4220 error.	Same as error details No.108 and 109 for 4220 error.
	Logic error (Error details No. 111.)	If only the H/W error logic circuit operates, and no identifiable error is detected.	(1) External noise	Refer to VII.[4] 5 (1) [7] "Malfunction due to external noise."
			(2) INV board failure	Replace the INV board if the error detects even after turning on again.

Checking code		Meaning, detecting method	Cause	Checking method & Countermeasure
4230	Heat sink overheat protection	If the cooling fan stays ON for 5 minutes or longer during inverter operation, and if THHS ≧ 95˚C is detected.	(1) Power supply environment	Check the power supply voltage. Ensure that the power supply voltage ≧ 180V across all phases.
			(2) Air passage blockage	Check to make sure the air passage of the heat sink cooling is not blocked.
			(3) Wiring defect	Check the cooling fan wiring.
			(4) THHS failure	Check the THHS sensor resistance.
			(5) INV board fan output failure	Ensure that the heat sink temperature is 55˚C or more and that 208~230V is applied to the inverter PCB connector CNFAN when the inverter is on.
			(6) Cooling fan failure	Check the cooling fan operation under the above operating conditions.
			(7) IPM failure	Refer to VII. 4 5 (2) [2] "Check for compressor ground fault or coil error" [5] "Check for inverter circuit trouble"
4240	Overload protection	The output current (Iac) > Imax (Arms) or THHS > 85˚C is detected continuously for 10 minutes during operation of the inverter. Type 200; Imax = 35 Amps Type 250; Imax = 41 Amps Type 315; Imax = 50 Amps	(1) Air passage short cycle	Ensure that a short cycle has not occurred at the unit fan exhaust.
			(2) Air passage blockage	Check to make sure the air passage of the heat sink cooling is not blocked.
			(3) Power supply	Check if the power supply voltage ≧ 180V.
			(4) Wiring defect	Check the cooling fan wiring.
			(5) THHS failure	Check the THHS sensor resistance.
			(6) INV board fan output failure	Ensure that the heat sink temperature is 55˚C or more and that 208~230V is applied to the inverter PCB connector CNFAN when the inverter is on.
			(7) Cooling fan failure	Check the cooling fan operation under the above operating conditions.
			(8) Current sensor (ACCT) failure	Refer to VII. 4 5 (4) "Current sensor ACCT"
			(9) Inverter circuit failure	Refer to VII. 4 5 (2) [4] "Inverter damage check"
			(10)Compressor failure	Check that the compressor has not overheated during operation. → Check the refrigerant circuit (oil return section). Replace the compressor if there are no problems with the refrigerant circuit.

Checking code		Meaning, detecting method	Cause	Checking method & Countermeasure
4250	IPM error (Error details No.101)	IPM error signal detected	(1) Inverter output related	VII. [4] 5 (2) inverter output related trouble processing Refer to [1] - [5].
			(2) Same as 4230 error	Same as 4230 error
	ACCT overcurrent break (Error details No.102) DCCT overcurrent break error (Error details No.103) Overcurrent break error (Error details No.106, 107)	Overcurrent break (150Apeak or 60Amps) detected by the current sensor.	(1) Inverter output related	VII. [4] 5 (2) inverter output related trouble processing Refer to [1] - [5].
	IPM short/grounding fault (Error details No.104)	IPM short damage or grounding at the load side detected just before starting the inverter.	(1) Compressor grounded	Refer to VII. [4] 5 (2) [2] "Check for compressor ground fault or coil error".
			(2) Inverter output related	Refer to VII. [4] 5 (2) [5] "Check for inverter circuit trouble".
	Load short error (Error details No.105)	Shorting at the load (compressor) side detected just before starting the inverter.	(1) Compressor grounded	Refer to VII. [4] 5 (2) [2] "Check for compressor ground fault or coil error".
			(2) Output wiring	Short circuit check
			(3) Power supply	Check if the power supply voltage ≧ 180V.
4260	Cooling fan error	If the heat sink temperature (THHS) ≧ 95˚C for 10 minutes or over when the inverter starts.	(1) Same as 4230 error	Same as 4230 error

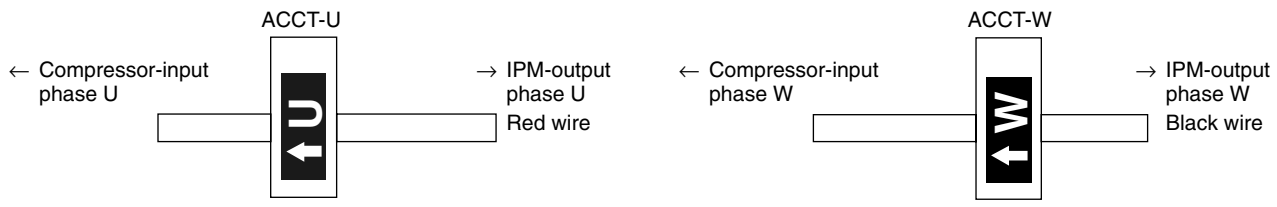
<table>
<tr><th colspan="3">Checking code</th><th>Meaning, detecting method</th><th>Cause</th><th>Checking method & Countermeasure</th></tr>
<tr><td rowspan="9">5101
5102
5105
5106
5107
5108
5110</td><td rowspan="9">Thermal sensor abnormality (Outdoor unit)</td><td>Discharge (TH1)
Low pressure saturation (TH2)
Heat exchanger inlet pipe (TH5)
Ambient temperature (TH6)
Heat exchanger outlet pipe (TH7)
SC coil bypass outlet (TH8)
Radiator panel (TH HS)</td><td rowspan="9"><Other than THHS>
1. A short in the thermistor or an open circuit was sensed. The outdoor unit switches to the temporary stop mode with restarting after 3 minutes, then if the temperature detected by the thermistor just before restarting is in the normal range, restarting takes place.
2. If a short or open circuit in the thermistor is detected just before restarting, error code “5101”, “5102”, “5103”, “5104”, “5105”, “5106”, “5108”, “5109” or “5112” is displayed.
3. In the 3 minutes restart mode, the abnormal stop delay LED is displayed.
4. The above short or open circuit is not detected for 10 minutes after the compressor starts, or for 3 minutes during defrosting or after recovery following defrosting.

<THHS>
If a heat sink (THHS) temperature of ≦ -40˚C is detected just after the inverter starts or during inverter operation.</td><td>(1) Thermistor</td><td>Check the thermistor’s resistance.</td></tr>
<tr><td>(2) Lead wires are being pinched.</td><td>Check if the lead wires are pinched.</td></tr>
<tr><td>(3) Insulation is torn.</td><td>Check for tearing of the insulation.</td></tr>
<tr><td>(4) A connector pin is missing, or there is faulty contact.</td><td>Check if a pin is missing on the connector.</td></tr>
<tr><td>(5) A wire is disconnected.</td><td>Check if a wire is disconnected.</td></tr>
<tr><td>(6) The thermistor input circuit on the MAIN circuit board is faulty.
(In the case of the THHS, replace the INV board.)</td><td>Check the temperature picked up by the sensor using the LED monitor.
If the deviation from the actual temperature is great, replace the MAIN circuit board.
(In the case of the THHS, replace the INV board.)</td></tr>
<tr><td colspan="2">Short circuit detection

TH1 240˚C or higher (0.57kΩ)
TH2 70˚C or higher (1.71kΩ)
TH5 110˚C or higher (0.4kΩ)
TH6 110˚C or higher (0.4kΩ)
TH7 110˚C or higher (1.14kΩ)
TH8 110˚C or higher (1.14kΩ)
THHS –</td><td>Open circuit detection

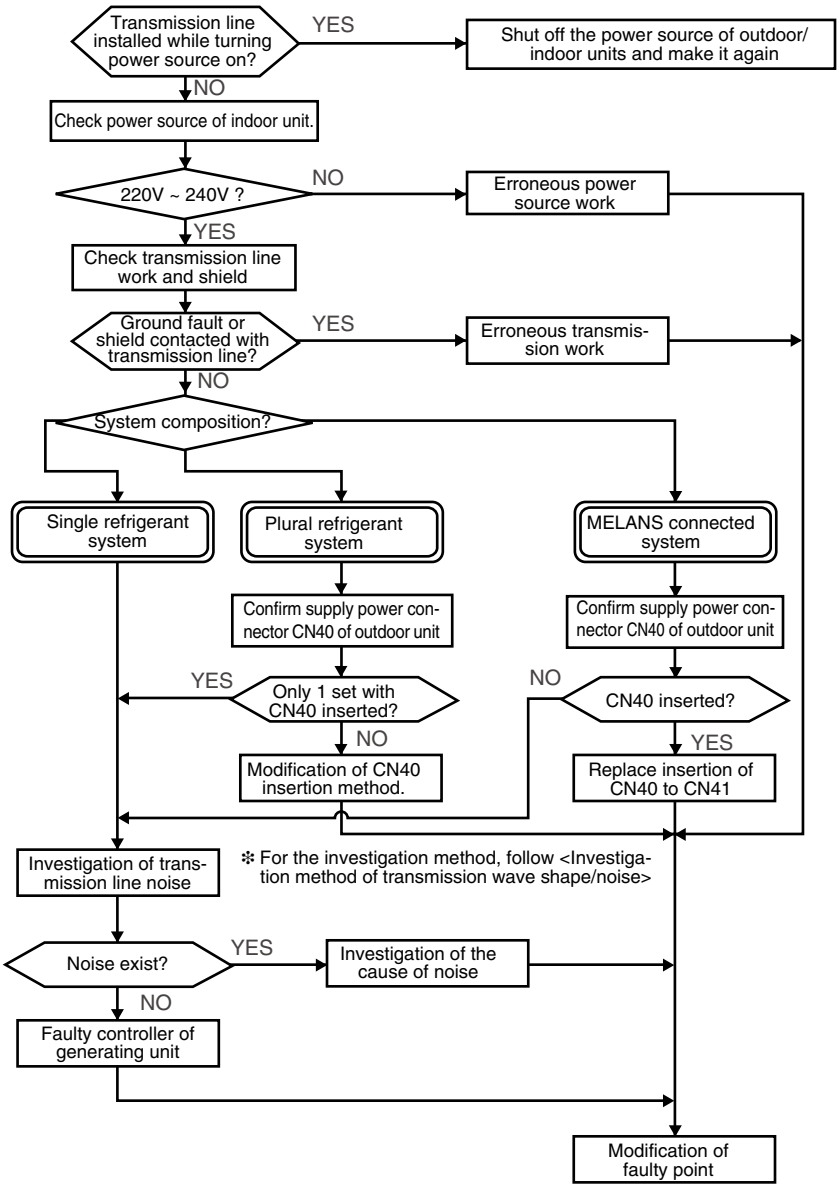
15˚C or lower (321kΩ)
-40˚C or lower (130kΩ)
-40˚C or lower (130kΩ)
-40˚C or lower (130kΩ)
-40˚C or lower (130kΩ)
-40˚C or lower (130kΩ)
-40˚C or lower (2.5MΩ)</td></tr>
<tr><td>5201</td><td colspan="2">Pressure sensor abnormality (outdoor unit)</td><td>1. When pressue sensor detects 1kg/cm²G (0.098MPa) or less during operation, outdoor unit once stops with 3 minutes restarting mode, and restarts if the detected pressure of pressure sensor exceeds 1kg/cm²G (0.098MPa) imediately before restarting.
2. If the detected pressure of sensor is less than 1kg/cm²G (0.098MPa) immediately before restarting, error stop is commenced displaying 5201.
3. Under 3 minutes restarting mode, LED displays intermittent fault check.
4. During 3 minutes after compressor start, defrosting and 3 minutes after defrosting operations, trouble detection is ignored.</td><td>(1) Pressure sensor trouble.</td><td>See Troubleshooting of pressure sensor.</td></tr>
<tr><td colspan="3"></td><td>(2) Inner pressure drop due to a leakage.
(3) Broken cover.
(4) Coming off of pin at connector portion, poor contact.
(5) Broken wire.
(6) Faulty thermistor input circuit of MAIN board.</td><td></td></tr>
</table>

Checking code		Meaning, detecting method	Cause	Checking method & Countermeasure
5301	ACCT sensor error (Error details No.115)	-3Amps < output current's effective value < 3Amps was detected during inverter operation.	(1) Contact is faulty.	Check the INV board CNCT2 (ACCT) contact, CNDR2 and G/A Board CNDR1.
			(2) ACCT sensor is faulty.	Replace the ACCT sensor
	DCCT sensor error (Error details No.116)	The start current detected by DCCT is too low.	(1) Contact is faulty.	Check the connector connection on the INV board CNCT (DCCT), DCCT side.
			(2) DCCT sensor incorrectly installed.	Check DCCT installation direction
			(3) DCCT sensor is faulty.	Replace the DCCT sensor
			(4) INV board fault.	Replace the INV board
	ACCT sensor circuit error (Error details No.117)	An abnormal value was detected with the ACCT detection circuit just before the INV started.	(1) INV board fault.	Refer to VII. 4 5 (2) [1]. "Check INV board error detection circuit"
			(2) Compressor ground fault and IMP fault.	Refer to VII. 4 5 (2) [2]. "Check compressor ground fault and winding error" Refer to VII. 4 5 (2) [5]. "Check inverter circuit trouble".
	DCCT sensor circuit error (Error details No.118)	An abnormal value was detected with the DCCT detection circuit just before the INV started.	(1) Contact is faulty.	Check the contacts around the INV board connector CNCT and DCCT side connector
			(2) INV board fault.	Refer to VII. 4 5 (2) [1]. "Check INV board error detection circuit".
			(3) DCCT is faulty.	If there is no problem up to step 2), replace DCCT and check the DCCT polarity.
			(4) Compressor is faulty. Inverter circuit is fault.	Refer to VII. 4 5 (2) [2]. "Check compressor ground fault and winding error". Refer to VII. 4 5 (2) [5]. "Check inverter circuit trouble".
			(5) Compressor ground fault and IMP fault.	Refer to VII. 4 5 (2) [2]. "Check compressor ground fault and winding error". Refer to VII. 4 5 (2) [5]. "Check inverter circuit trouble".
	IPM open/ CNCT2 dislocation error (Error details No.119)	IPM open damage or CNCT2 dislocation was detected just before INV started. (Sufficient current was not detected during self-diagnosis just before starting.)	(1) ACCT sensor is dislocated	Check CNCT2 sensor connection (Check ACCT installation state)
			(2) Wire connection is faulty.	Check CNDR2 connection on INV board, or CNDR1 connection on G/A board
			(3) ACCT is faulty.	Refer to VII. 4 5 (4). "Current sensor ACCT" resistance value
			(4) Compressor is disconnected	Refer to VII. 4 5 (2) [2]. "Check compressor ground fault and winding error".
			(5) Inverter circuit is faulty.	Refer to VII. 4 5 (2) [5]. "Check inverter circuit trouble".
	Incorrect wiring detection error (Error details No.120)	Improper installation of the ACCT sensor was detected.	(1) ACCT sensor incorrectly installed.	Refer to VII. 4 5 (4). "Current sensor ACCT",



2. Communication/system errors

Checking code	Meaning, detecting method	Cause	Checking method & Countermeasure
6600	Multiple address error Transmission from units with the same address is detected. Note: The address/attribute shown on remote controller indicates the controller which has detected error.	(1) Two or more controllers of outdoor unit, indoor unit, remote controller, etc. have the same address. (2) In the case that signal has changed due to noise entered into the transmission signal.	At the generation of 6600 error, release the error by remote controller (with stop key) and start again. a) If the error occurs again within 5 minutes. →Search for the unit which has the same address with that of the source of the trouble. When the same address is found, turn off the power source of outdoor unit, and indoor unit for 5 minutes or more after modifying the address, and then turn on it again. b) When no trouble is generated even continuing operation over 5 minutes. →The transmission wave shape/noise on the transmission line should be investigated in accordance with <Investigation method of transmission wave shape/noise>.
6602	Transmission processor hardware error Though transmission processor intends to transmit “0”, “1” is displayed on transmission line. Note: The address/attribute shown on remote controller indicates the controller which has detected error.	(1) At the collision of mutual transmission data generated during the wiring work or polarity change of the transmission line of indoor or outdoor unit while turning the power source on, the wave shape is changed and the error is detected. (2) Ground fault of transmission line. (3) Insertion of power supply connector (CN40) of plural outdoor units at the grouping of plural refrigerant systems. (4) Insertion of power supply connector (CN40) of plural outdoor units in the connection system with MELANS. (5) Faulty controller of unit in trouble. (6) Change of transmission data due to the noise in transmission. (7) Connection system with plural refrigerant systems or MELANS for which voltage is not applied on the transmission line for central control.	

<table>
<tr><th>Checking code</th><th>Meaning, detecting method</th><th>Cause</th><th>Checking method & Countermeasure</th></tr>
<tr><td>6602</td><td>Transmission processor hardware error</td><td colspan="2">Checking method and processing
 
</td></tr>
<tr><td>6603</td><td>Transmission circuit bus-busy error
1. Collision of data transmission: Transmission can not be performed for 4~10 consecutive minutes due to collision of data transmission.

2. Data can not be transmitted on transmission line due to noise for 4~10 consecutive minutes.

Note:
The address/attribute shown on remote controller indicates the controller which has detected error.</td><td>(1) As the voltage of short frequency like noise is mixed in transmission line continuously, transmission processor can not transmit.

(2) Faulty controller of generating unit.</td><td>a) Check transmission wave shape/noise on transmission line by following <Investigation method of transmission wave shape/noise>.
→No noise indicates faulty controller of generating unit.
→Noise if existed, check the noise.</td></tr>
</table>

Checking code	Meaning, detecting method	Cause	Checking method & Countermeasure
6606	Communications with transmission processor error Communication trouble between apparatus processor and transmission processor. Note: The address/attribute shown on remote controller indicates the controller which has detected error.	(1) Data is not properly transmitted due to casual erroneous operation of the generating controller. (2) Faulty generating controller.	Turn off power sources of indoor unit, and outdoor unit. { When power sources are turned off separately, microcomputer is not reset and normal operations can not be restored. } → Controller trouble is the source of the trouble when the same trouble is observed again.

Checking code	Meaning, detecting method
6607	No ACK error When no ACK signal is detected in 6 continuous times with 30 seconds interval by transmission side controller, the transmission side detects error. Note: The address/attribute shown on remote controller indicates the controller not providing the answer (ACK).

System composition	Generating unit address	Display of trouble	Detecting method	Cause	Cause checking method & Countermeasure
(1) Single refrigerant system	1. Outdoor unit (OC)	Remote controller (RC)	No reply (ACK) at BC transmission to OC	(1) Poor contact of transmission line of OC or BC. (2) Damping of transmission line voltage/signal by acceptable range of transmission wiring exceeded. { Farthest : Less than 200m Remote controller wiring : Less than 10m } (3) Erroneous sizing of transmission line (Not within the range below). Wire diameter : 1.25mm^2 or more (4) Faulty control circuit board of OC.	Shut down OC unit power source, and make it again. It will return to normal state at an accidental case. When normal state can not be recovered, check for the (1) ~ (4) of the cause.
	2. Indoor unit (IC)	Remote controller (RC)	No reply (ACK) at RC transmission to IC	(1) When IC unit address is changed or modified during operation. (2) Faulty or disconnection of transmission wiring of IC. (3) Disconnection of IC unit connector (CN2M). (4) Faulty IC unit controller. (5) Faulty remote controller.	Shut down both OC power source for 5 minutes or more, and make them again. It will return to normal state at an accidental case. When normal state can not be recovered, check for the (1) ~ (4) of the cause.
	3. Remote controller (RC)	Remote controller (RC)	No reply (ACK) at IC transmission to RC	(1) Faulty transmission wiring at IC unit side. (2) Faulty transmission wiring of RC. (3) When remote controller address is changed or modified during operation. (4) Faulty remote controller.	Shut down OC power sources for 5 minutes or more, and make it again. It will return to normal state at an accidental case. When normal state can not be recovered, check for the (1) ~ (4) of the cause.

Checking code	Meaning, detecting method	
6607 (continued)	No ACK error	When no ACK signal is detected in 6 continuous times with 30 seconds interval by transmission side controller, the transmission side detects error. Note: The address/attribute shown on remote controller indicates the controller not providing the answer (ACK).

System composition	Generating unit address	Display of trouble	Detecting method	Cause	Cause checking method & Countermeasure
(2) Group operation system using plural refrigerants	1. Outdoor unit (OC)	Remote controller (RC)	No reply (ACK) at BC transmission to OC	As same that for single refrigerant system.	Same as measure for single refrigerant system.
	2. Indoor unit (IC)	Remote controller (RC)	No reply (ACK) at RC transmission to IC	(1) Cause of (1) ~ (5) of "Cause for single refrigerant system". (2) Disconnection or short circuit of transmission line of OC terminal block for centralized control (TB7). (3) Shut down of OC unit power source of one refrigerant system. (4) Neglecting insertion of OC unit power supply connector (CN40). (5) Inserting more than 2 sets of power supply connector (CN40) for centralized control use. For generation after normal operation conducted once, the following causes can be considered. • Total capacity error (7100) • Capacity code setting error (7101) • Connecting set number error (7102) • Address setting error (7105)	a) Shut down the power source of both IC and OC for over 5 minutes simultaneously, and make them again. Normal state will be returned in case of accidental trouble. b) Check for (1) ~ (5) of causes. If cause is found, remedy it. c) Check other remote controller or OC unit LED for troubleshooting for trouble. Trouble → Modify the trouble according to the content of check code. No trouble → Faulty indoor controller
	3. Remote controller (RC)	Remote controller (RC)	No reply (ACK) at IC transmission to RC	(1) Cause of (1) ~ (3) of "Cause for single refrigerant system". (2) Disconnection or short circuit of transmission line of OC terminal block for centralized control (TB7). (3) Shut down of OC unit power source of one refrigerant system. (4) Neglecting insertion of OC unit power supply connector (CN40). (5) Inserting more than 2 sets of power supply connector (CN40) for centralized control use. At generation after normal operation conducted once, the following causes can be considered. •Total capacity error (7100) •Capacity code setting error (7101) •Connecting set number error (7102) •Address setting error (7105)	a) Shut down the power source of OC for over 5 minute, and make it again. Normal state will be returned in case of accidental trouble. b) Check for (1) ~ (5) of causes. If cause is found, remedy it. When normal state can not be obtained, check (1) ~ (5) of causes.

Checking code	Meaning, detecting method	
6607 (continued)	No ACK error	When no ACK signal is detected in 6 continuous times with 30 second interval by transmission side controller, the transmission side detects error. Note: The address/attribute shown on remote controller indicates the controller not providing the answer (ACK).

System composition	Generating unit address	Display of trouble	Detecting method	Cause	Cause checking method & Countermeasure
(3) Connecting system with controller (MELANS)	1. Outdoor unit (OC)	Remote controller (RC)	No reply (ACK) at BC transmission to OC	As same that for single refrigerant system.	Same countermeasure as that for single refrigerant system.
	2. Indoor unit (IC)	Remote controller (RC)	No reply (ACK) at transmission of SC to IC	Trouble of partial IC units : (1) Same cause as that for single refrigerant system.	→Same countermeasure as that for single refrigerant system.
				Trouble of all IC in one refrigerant system: (1) Cause of total capacity error. (7100) (2) Cause of capacity code setting error. (7101) (3) Cause of connecting number error. (7102) (4) Cause of address setting error. (7105) (5) Disconnection or short circuit of transmission line of OC unit terminal block for central control (TB7). (6) Power source shut down of OC unit. (7) Trouble of OC unit electrical system.	Confirm OC trouble diagnosis LED. → At trouble generation, check for the content according to check code. Check the content of (5) ~ (7) shown left.
				Trouble of all IC: (1) As same that for single refrigerant system. (2) Insertion of power supply connector (CN40) into OC unit transmission line for centralized control. (3) Disconnection or power source shut down of power supply unit for transmission line. (4) Faulty system controller (MELANS).	Confirm voltage of transmission line for centralized control. • More than 20V → Confirm (1) (2) left. • Less than 20V → Confirm (3) left.
	3. Remote controller (RC)	Remote controller (RC)	No reply (ACK) at transmission of IC to RC	Same cause as that for plural refrigerant system.	Same countermeasure as that for plural refrigerant system.
			No reply (ACK) at transmission of MELANS to RC	Trouble of partial IC units: (1) Same cause of that for single refrigerant system.	→Same countermeasure as that for single refrigerant system.
				Trouble of all IC in one refrigerant system: (1) Error detected by OC unit. Total capacity error. (7100) Capacity code setting error. (7101) Connecting number error. (7102) Address setting error. (7105) (2) Disconnection or short circuit of transmission line of OC unit terminal block for central control (TB7). (3) Power source shut down of OC unit. (4) Trouble of OC unit electrical system.	Confirm OC trouble diagnosis LED. →At trouble generation, check for the content according to check code. Check the content of (2) ~ (4) shown left.
				Trouble of all IC: (1) As same that for single refrigerant system. (2) Insertion of power supply connector (CN40) into OC unit transmission line for centralized control. (3) Disconnection or power shutdown of power supply unit for transmission line. (4) Faulty MELANS.	Check the causes of (1) ~ (4) left.

Checking code	Meaning, detecting method	
6607 (continued)	No ACK error	When no ACK signal is detected in 6 continuous times with 30 seconds interval by transmission side controller, the transmission side detects error. Note: The address/attribute shown on remote controller indicates the controller not providing the answer (ACK).

System composition	Generating unit address	Display of trouble	Detecting method	Cause	Cause checking method & Countermeasure
(3) Connecting system with controller (MELANS)	5. System controller (SC)	Remote controller (RC)	No reply (ACK) at transmission of IC to SC	Trouble of partial remote controller: (1) Faulty wiring of RC transmission line. (2) Disconnection or poor contact of RC transmission connector. (3) Faulty RC.	Check (1) ~ (3) left.
				Trouble of all IC in one refrigerant system. (1) Error detected by OC unit. Total capacity error (7100) Capacity code setting error (7101) Connecting number error (7102) Address setting error (7105) (2) Disconnection or short circuit of transmission line of OC unit terminal block for central control (TB7). (3) Power source shut down of OC unit. (4) Trouble of OC unit electrical system.	Confirm OC trouble diagnosis LED. →At trouble generation, check for the content according to check code. Check the content of (2) ~ (4) shown left.
				Trouble of all RC: (1) As same that for single refrigerant system. (2) Inserting supply power connector (CN40) to OC transmission line for centralized control. (3) Disconnection or power shutdown of power supply unit for transmission line. (4) Faulty MELANS.	Check the causes (1) ~ (4) left.
No relation with system	Address which should not be existed	–	–	(1) IC unit is keeping the memory of the original group setting with RC although the RC address was changed later. The same symptom will appear for the registration with SC. 2) IC unit is keeping the memory of the original interlocking registration with Fresh Master with RC although the Fresh Master address was changed later.	As some IC units are keeping the memory of the address not existing, delete the information. Employ one of the deleting method among two below. 1) Deletion by remote controller. Delete unnecessary information by the manual setting function of remote controller. 2) Deletion by connecting information deleting switch of OC unit. Be careful that the use of this method will delete all the group information set with RC and all the interlocking information of Fresh Master and IC unit. a) Shut down OC unit power source, and wait for 5 minutes. b) Turn on the dip switch SW2-2 provided on OC unit control circuit board. c) Make OC unit power source, and wait for 5 minutes. d) Shut down OC unit power source, and wait for 5 minutes. e) Turn off the dip switch SW2-2 provided on OC unit control circuit board. f) Make OC unit power source.

Checking code	Meaning, detecting method	Cause	Checking method & Countermeasure
6608	No response error Though acknowledgment of receipt (ACK) is received after transmission, no response command is returned. Detected as error by transmission side when the same symptom is repeated 10 times with an interval of 3 seconds. Note: The address/attribute shown on remote controller indicates the controller which has detected error.	(1) At the collision of mutual transmission data when transmission wiring is modified or the polarity is changed while turning the power source on, the wave shape changes detecting error. (2) Repeating of transmission error due to noise. (3) Damping of transmission line voltage/ signal due to exceeding of the acceptable range for transmission wiring. • Farthest Less than 200m • RC wiring Less than 12m (4) Damping of transmission voltage/ signal due to improper type of transmission line. • Wire size More than 1.25mm^2	a) Generation at test run. Turn off the power sources of OC unit, IC unit and Fresh Master for more than 5 minutes simultaneously, and make them again. → Returning to normal state means the trouble detection due to transmission line work while powering. b) Check (3) and (4) of the causes left. c) Investigate the transmission wave shape/noise on transmission line according to <Investigation method of transmission wave shape/noise>. Much possibility if 6602 is generated.

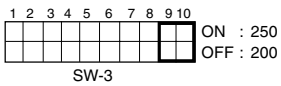
Checking code		Meaning, detecting method	Factor	Checking method & Remedy
6831	MA communication, No-reception error	1. Communication between the MA remote controller and the indoor unit is not done properly. 2. No proper data has been received for 3 minutes.	(1) The remote control line of the MA remote controller or the indoor unit has a poor contact. (2) All remote controllers are slaves. (3) The wiring specifications are not observed. 1. Wire length 2. Wire thickness 3. Number of remote controllers 4. Number of indoor units (4) After the remote controller is connected, disconnection of the remote controller without resetting the power. (5) Noise enters the transfer path of the remote controller. (6) The transmission/reception circuit of the remote controller of the indoor unit is poor. (7) The transmission/reception circuit of the remote controller is defective.	1) Check the transmission lines of the indoor unit and MA remote controller for disconnection and looseness. 2) Check the power supply to the main power and remote controller lines. 3) Check whether the tolerable range of the MA remote controller line is exceeded or not. 4) Check the main/slave setting of the MA remote controller. 5) Diagnose the remote controller. (Remote controller IM description) Result: [OK]: No problem in the remote controller (wiring specifications check) [NG]: Replace the remote controller [6832, 6833, ERC]: Noise is the cause. < To 6) > 6) Check the transmission waveform and noise on the transmission signal of MA remote controller line. 7) If no problem is present in items. 1) to 6) above, replace the indoor controller board or MA remote controller. The following states can be checked from LED1 and LED2 on the indoor controller board. • LED1 is lit at the same time. The main power is supplied to the indoor unit. • LED2 alone is lit. Power is supplied to the MA remote controller line.
6834	MA communication, Start bit error	1. Communication between the MA remote controller and the indoor unit is not done properly. 2. No proper data has been received for 2 minutes.		
6832	MA communication, Synchronization recovery error	1. Communication between the MA remote controller and the indoor unit is not done properly. 2. When transmission is impossible because the emptiness of the transfer path cannot be checked. Indoor unit: 3 minutes Remote controller: 6 seconds	(1) The remote control line of the MA remote controller or the indoor unit is in poor contact. (2) It is set on two or more main remote controllers. (3) The indoor unit address is set twice. (4) Noise enters the remote controller line. (5) The wiring specifications are not observed. 1. Wire length 2. Wire thickness 3. Number of remote controllers 4. Number of indoor units 6) The transmission/reception circuit of the remote controller is defective.	
6833	MA communication, Transmission /reception hardware error	1. Communication between the MA remote controller and the indoor unit is not done properly. 2. When the transmitted data is received at the same time and compared, the different state continues 30 times.		

3. System error

<table>
<tr><th>Checking code</th><th>Meaning, detecting method</th><th>Cause</th><th>Checking method & Countermeasure</th></tr>
<tr><td rowspan="2">7100</td><td rowspan="2">Total capacity error

Total capacity of indoor units in the same refrigerant system exceeds limitations.

Trouble source :
Outdoor unit</td><td>(1) Total capacity of indoor units in the same refrigerant system exceeds the following:
<table><tr><th>Model</th><th>Total capacity</th><th>Total capacity code</th></tr><tr><td>PUHY-200</td><td>260</td><td>52</td></tr><tr><td>PUHY-250</td><td>325</td><td>65</td></tr><tr><td>PUHY-315</td><td>435</td><td>87</td></tr></table></td><td>a) Check for the model total (capacity cord total) of indoor units connected.
b) Check whether indoor unit capacity code (SW2) is wrongly set.

For erroneous switch setting, modify it, turn off power source of outdoor unit, and indoor unit simultaneously for 5 minutes or more to modify the switch for setting the model name (capacity code).</td></tr>
<tr><td>(2) Erroneous setting of OC model selector switch (SW3-9, 3-10).
  </td><td>Check for the model selector switch (Dip switches SW3-9, 3-10 on outdoor unit control circuit) of OC.
<table><tr><th>Model</th><th>SW3-9</th><th>SW3-10</th></tr><tr><td>PUHY-200</td><td>OFF</td><td>OFF</td></tr><tr><td>PUHY-250</td><td>OFF</td><td>ON</td></tr><tr><td>PUHY-315</td><td>ON</td><td>OFF</td></tr></table></td></tr>
<tr><td>7101</td><td>Capacity code error

Error display at erroneous connection of Indoor unit of which model name can not be connected.

Trouble source :
Outdoor unit
Indoor unit</td><td>(1) The Indoor unit model name (model code) connected is not connectable.
Connectable range : 20 ~ 250

(2) Erroneous setting of the switch (SW2) for setting of model name of indoor unit connected.</td><td>a) Check for the model name of the Indoor unit connected.
b) Check for the switch (SW2 if indoor controller for setting of Indoor unit model name of generating address. When it is not agreed to the model name, modify the capacity code while shutting off the power source of Indoor unit.
❇ The capacity of Indoor unit can be confirmed by the self-diagnosis function (SW1 operation) of indoor unit.</td></tr>
<tr><td>7102</td><td>Connected unit count over

Number of units connected in the same refrigerant system exceeds limitations.

Trouble source:
Outdoor unit</td><td>(1) Number of unit connected to terminal block (TB3) for outdoor/indoor transmission line exceeds limitations given below:
<table><tr><th>Item</th><th>Limitation</th></tr><tr><td>Total of indoor unit</td><td>1~13 (PUHY-200)
1~16 (PUHY-250, 315)</td></tr><tr><td>Total of indoor unit and RC</td><td>1~35</td></tr></table>(2) The outdoor unit address is being set to 51 ~ 100 under automatic address mode (Remote controller displays “HO”).
(3) Slipping off of transmission wiring at outdoor unit.
(4) Short circuit of transmission line in case of (3) and (4), remote controller displays “HO”.</td><td>a) Check whether the connection of units to the terminal block for indoor/outdoor transmission wiring (TB3) of outdoor unit is not exceeding the limitation.
(See (1) ~ (2) left.)
b) Check for (2), (3), and (4).
c) Check for the connection of transmission wiring to the terminal block for centralized control is erroneously connected to the indoor/outdoor transmission wiring terminal block (TB3).
d) Check for the model total (capacity code total) of indoor units connected.</td></tr>
<tr><td>7105</td><td>Address setting error

• Erroneous setting of OC unit address

Trouble source:
Outdoor unit</td><td>(1) Setting error of outdoor unit address.
The address of outdoor unit is not being set to 51 ~ 100.</td><td>Check that the address of OC unit is being set to 51 ~ 100.
Reset the address if it stays out of the range, while shutting the power source off.</td></tr>
</table>

<table>
<tr><th>Checking code</th><th>Meaning, detecting method</th><th>Cause</th><th colspan="2">Checking method & Countermeasure</th></tr>
<tr><td>7110</td><td>Transmission line power failure.</td><td>(1) Transmission booster is faulty.
(2) Power supply of transmission booster has been cut.</td><td colspan="2">Check transmission booster and power supply.</td></tr>
<tr><td>7111</td><td>Remote control sensor error

Error not providing the temperature designed to remote controller sensor.

Trouble source :
Indoor unit</td><td>(1) In case when the old type remote controller for M-NET is used and the remote controller sensor is designed on indoor unit. (SW1-1 turned ON)</td><td colspan="2">a) Replace the old remote controller by the new remote controller.</td></tr>
<tr><td>7113</td><td>Main board connection failure.</td><td>Disconnection of plug on main board.</td><td colspan="2">Check all main board connectors and rectify faulty connection.</td></tr>
<tr><td rowspan="4">7130</td><td rowspan="4">Different unit model error</td><td rowspan="3">An exclusive R22 refrigerant indoor unit was connected to a R407C refrigerant outdoor unit.</td><td>1) An error was made in the MAIN board of the outdoor unit (replaced with the wrong circuit board).</td><td>If the model name plate on the outdoor unit says that it is an exclusive R22 model, and if error “7130” has occurred, the MAIN board for the outdoor unit is a R407C model circuit board, so replace it with the MAIN board for the R22 model.</td></tr>
<tr><td>2) An error was made in selecting the indoor unit (installation error).</td><td>If the model name plate for the indoor unit is an exclusive R22 model, install a unit which can also operate with R407C.</td></tr>
<tr><td>3) An error was made in the indoor unit’s circuit board (replaced with the wrong circuit board).</td><td>If the model name plate on the indoor unit indicates that it is also capable of operating with R407C, and error “7130” occurs, the indoor unit’s circuit board is for an exclusive R22 model, so replace it with the circuit board for a unit which is also capable of using R407C.</td></tr>
<tr><td>The relation of the SWU3 and TH2 settings on the outdoor unit's main board establish the following errors.

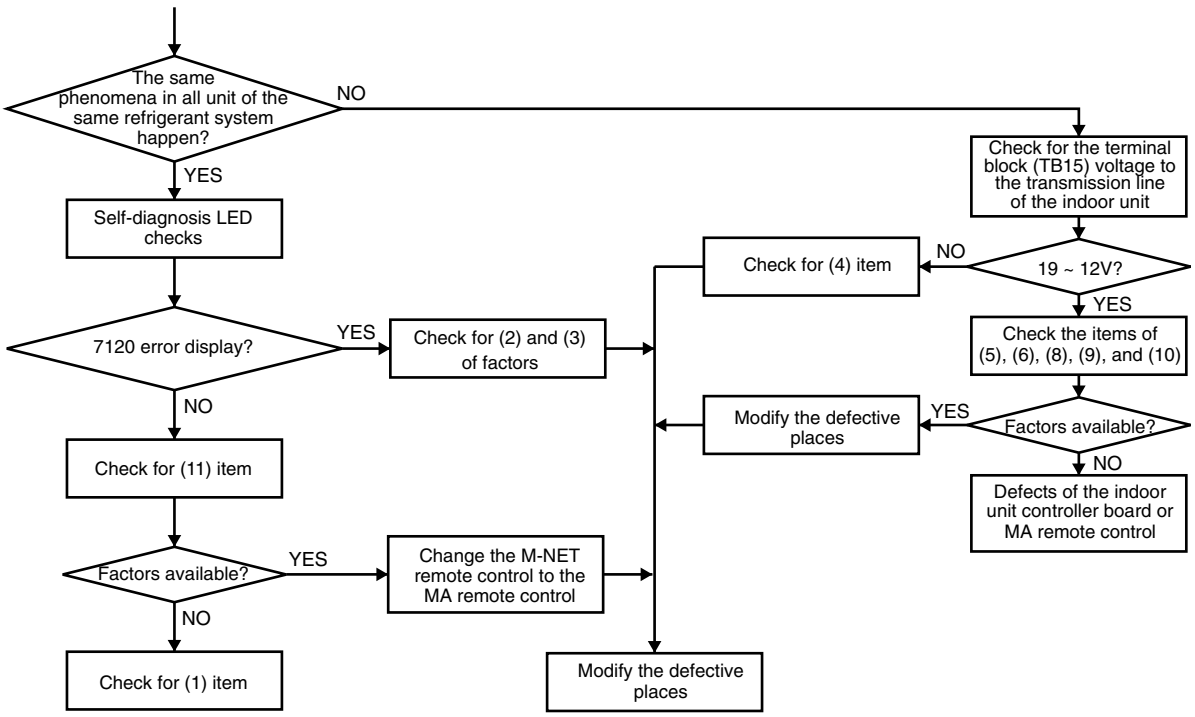
Refrigerant model recognition table
<table>
<tr><th>TH2 / SWU3</th><th>Exist</th><th>Not exist</th></tr>
<tr><td> 
R407C</td><td>R407C</td><td>Different unit model error (7130)</td></tr>
<tr><td> 
R22</td><td>Different unit model error (7130)</td><td>R22</td></tr>
</table>
</td><td colspan="2">If the refrigerant type shown on the model name plate on the outdoor unit and the settings shown in the refrigerant model recognition table do not match, change the settings so that they match.</td></tr>
</table>

4. Troubleshooting using information on the controller

(1) In the case of MA remote controller

	Phenomena	Factors	Checke method & Handling
1	If pushing the remote control operation SW does not make a sound such as peep with the crystal display lamp out, and no operate is possible. (An appropriate display ◎ on the remote control is not on.)	(1) Power supply from transformers is not turned on in indoor unit. 1) The original power supply of indoor unit is not turned on. 2) The connector (CND. CNT, CN3T) on the controller board in the room has come off. 3) Fuse on the control board in indoor unit has melting down. Transformer defects or damage to unit. (2) MA remote controller has been wired incorrectly. 1) Break of the MA remote controller line and the connection to the terminals has come off. 2) Short circuit of the MA remote control wiring 3) Reversed connections of the wiring on remote controller. 4) Incorrect connection of the MA remote control wiring to the transmission line terminal block (TB 5). 5) Reversed connections between the MA remote control wiring in the indoor unit and AC 200V power supply wiring. 6) Reversed connection between the MA remote control wiring in the indoor unit and M-NET transmission wiring. (3) The maximum number of MA remote controllers connected to one is unit exceeded (two units). (4) The wiring length of the MA remote line and the used electric wire diameter is out of specifications. (5) The wiring of the remote display output to the outdoor unit is short circuited, or the relay is connected with reversed polarity. (6) Defective of the controller board in the room (7) Defects of MA remote control	a) Check the MA remote control terminal voltage (between A and B). i) In the case of voltage DC8.5 ~ 12V, the remote controller is defective. ii) In the case of voltage not available: • Check the left described (1) and (3), after checking, if these are factors, then modifications should be performed. • If there are no factors of the left described (1) and (3), move to b). b) Remove the remote control wiring from the terminal block TB13 for the MA remote control in the indoor unit, and check voltage between A and B. i) In the case of voltage DC9 ~ 12V Check the left described (2) and (4), if these are factors, then modifications should be performed. ii) In the case of voltage not available: • Recheck the left described (1) once again, if this is a factor, them modifications should be performed. • If there are no factors in the left described (1), check the wiring for the remote display (the relay polarity, etc.) • If there are no factors, replace the controller board in the indoor unit. In the case of item (1), the LED1 on the controller board in the unit is off.
2	When turning on the remote control operation SW, a temporary operation display is indicated, and the display lights out immediately, the unit stops.	(1) M-NET transmission power supply from the outdoor unit is not supplied. 1) The original power supply of the outdoor unit is not turned on. 2) Disconnection of connectors on the board of the outdoor unit. Main board : CNS1, CNVCC3 INV board : CNAC2, CNVCC1, CNL2 3) Power supply circuit defects of the outdoor unit. • INV board defects • Blown fuse (F1 on INV Board) • Diode stack destruction • Prevention resistance of rush current (R1) damage (2) Transmission line short (3) Wiring mistakes of the M-NET transmission line on the side of the outdoor unit 1) Break of transmission line, and removal of terminal block 2) The room transmission line is wired to the transmission line terminal block (TB7) for the central control by mistakes. (4) M-NET transmission line break on the side of the room unit (5) Disconnection off wiring between the M-NET transmission terminal block (TB 5) and the room controller board CN2M and pulls off of connectors	In the case of factors (2) and (3) Indicated by 7102 error code on the self-diagnosis LED of the outdoor unit.

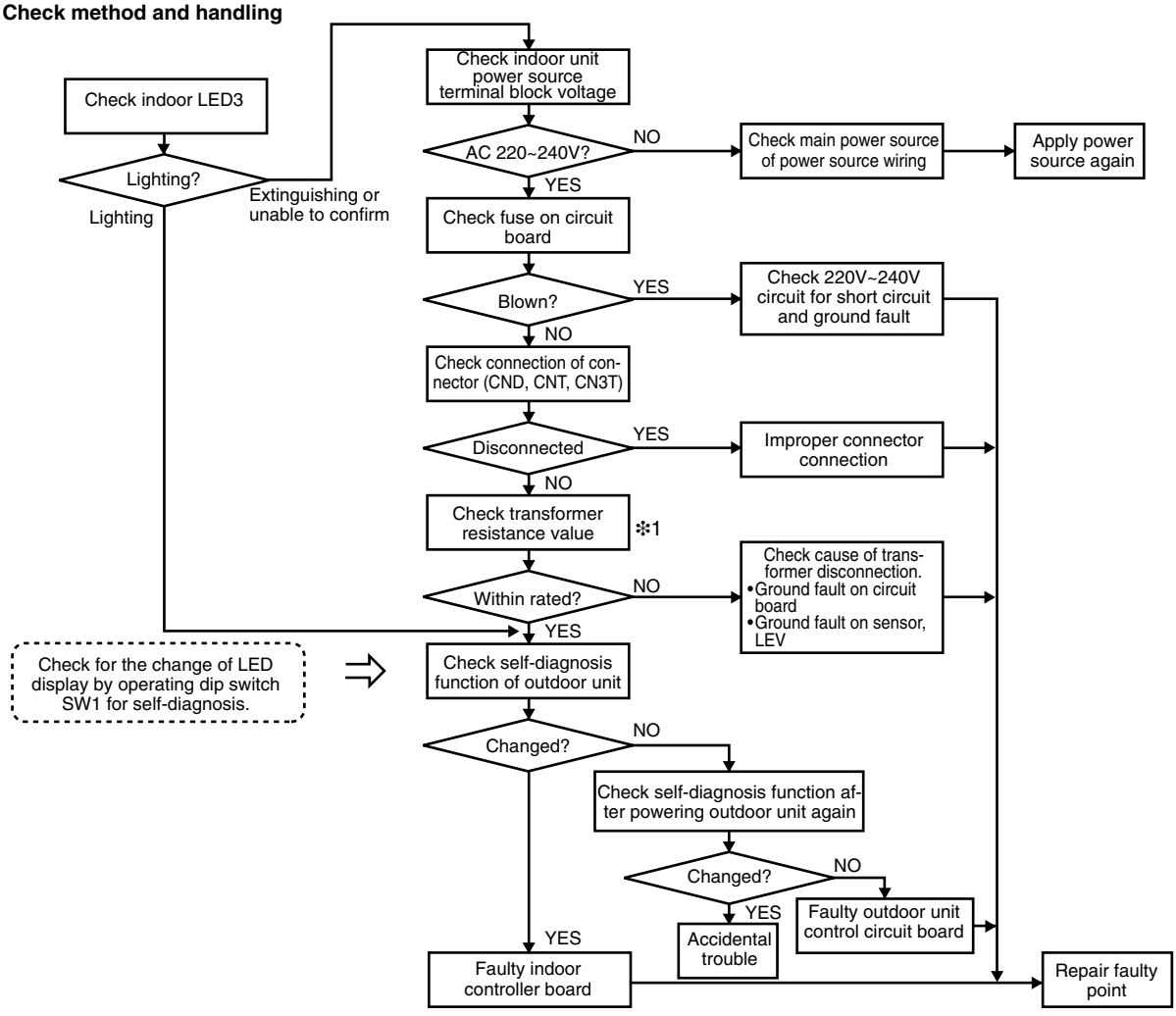
	Phenomena	Factors	
4	"HO" indication on the remote controller is not lit, and the ON/OFF switch does not work.	(1) The M-NET transmission power supply form the outdoor unit is not supplied. 1) The original power supply of indoor unit is not turned on. 2) The connector on the controller board in indoor unit is removed. Main board : CNS1, CNVCC3 INV board : CNAC2, CNVCC1, CNL2 3) Power supply circuit defects of the outdoor unit. • INV board defects • Diode stack defects • Prevention resistance of rush current (R1) damage. (2) Short circuit of the M-NET transmission line (3) Error wiring of the M-NET transmission line on the side of the outdoor unit 1) A break of the transmission line or terminal block removal 2) Indoor unit transmission line is wired to the transmission line terminal block (TB7) for the central control by mistake. (4) M-NET transmission line break on the side of indoor unit (Short/Open) (5) Loose or disconnection of wiring between the M-NET transmission terminal block (TB 5) of indoor unit and indoor unit controller board CN2M and disconnection of connectors (6) Error wiring of the MA remote control 1) Short circuit of the MA remote wiring 2) A break of the MA remote control line (No.2) and disconnection of the terminal block connection 3) Reversed wiring, crossover in the group control 4) Wire by mistakes the MA remote control to the terminal block (TB5) for the transmission line 5) Connect by mistakes the M-NET transmission line to the MA remote control terminal block (TB13) (7) The unit address is not "00" as it should be with automatic address setting. (8) The address of indoor unit becomes 51 or more. (9) The master and slave setting of the MA remote control becomes the slave setting. (10) Use the M-NET remote control in spite of the automatic address. (11) Defects for the room controller board (MA remote communication circuits) (12) Defects for the remote controller	In the case of (2), (3) and (7) factors, indicate 7102 errors by the self-diagnosis LED of the outdoor unit.
	Check method and handling		



(2) In the case of M-NET remote controller

	Phenomena	Factors	Checking method & Countermeasure
1	Despite pressing of remote controller ON/OFF switch, operation does not start and there is no electronic sound. (No powering signal ◎ appears.)	(1) M-NET transmission power source is not supplied from outdoor unit. 1) Main power source of outdoor unit is not connected. 2) Disconnection of connector on outdoor unit circuit board. Main board : CNS1, CNVCC3 INV board : CNAC2, CNVCC1, CNL2 3) Faulty power source circuit of outdoor unit. • Faulty INV board, • Blown fuse (F1 on INV board) • Broken diode stack • Broken resistor (R1) for rush current protection (2) Short circuit of transmission line. (3) Erroneous wiring of M-NET transmission line at outdoor unit. 1) Transmission line disconnection or slipping off from terminal block. 2) Erroneous connection of indoor/outdoor transmission line to TB7. (4) Disconnection of transmission wiring at remote controller. (5) Faulty remote controller.	a) Check transmission terminal block of remote controller for voltage. i) In case of 17 ~ 30V → Faulty network remote controller ii) In case of less than 17V → See “Transmission Power Circuit (30V) Check Procedure”. The cause of (2) and (3) is displayed with self-diagnosis LED for 7102 error.
2	At about 10 seconds after turning remote controller operation switch ON, the display distinguishes and the operation stops.	(1) Power source is not fed to indoor unit from transformer. 1) Main power source of indoor unit is not turned on. 2) Disconnection of connector (CND, CNT, CN3T) on indoor controller board. 3) Blown fuse on indoor controller board. 4) Faulty or disconnected transformer of indoor unit. 5) Faulty indoor controller board. (2) Faulty outdoor control circuit board uncontrolled. As normal transmission is fails between indoor and outdoor units, outdoor unit model can not be recognized.	

Check method and handling

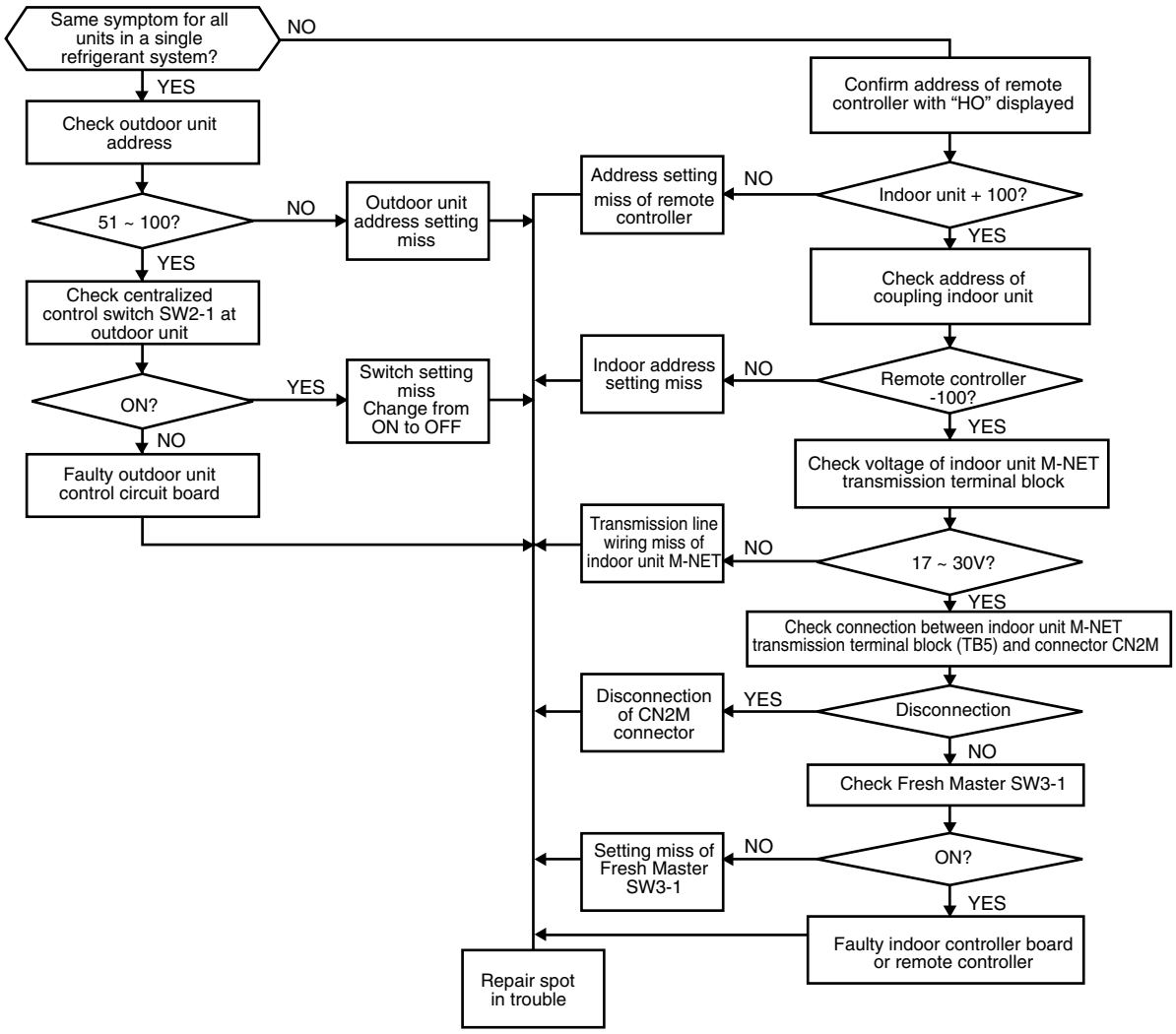


❇1 Check the transformer in accordance with the “TROUBLESHOOTING” in the indoor unit’s service handbook.

	Phenomena	Factors
3	"HO" display on remote controller does not disappear and ON/OFF switch is ineffective.	(Without using MELANS) (1) Outdoor unit address is set to "00" (2) Erroneous address. 1) Address setting of indoor unit to be coupled with remote controller incorrect. (Indoor unit = remote controller – 100.) 2) Address setting of remote controller incorrect. (Remote controller = indoor unit + 100.) (3) Faulty wiring of transmission terminal block TB5 of indoor unit in the same group with remote controller. (4) Centralized control SW2-1 of outdoor unit is turned ON. (5) Setting to interlocking system from indoor unit (Switch 3-1 = OFF), while Fresh Master is intended to be use by remote controller operation (indoor unit attribute). (6) Disconnection or faulty wiring of indoor unit transmission line. (7) Disconnection between indoor unit M-NET transmission line terminal block (TB5) and connector CN2M. (8) More than 2 sets of power supply connector (CN40) are inserted into centralized control transmission line of outdoor unit. (9) Faulty outdoor unit control circuit board. (10) Faulty indoor controller board. (11) Faulty remote controller. (Interlocking control with MELANS) (12) No grouping registration from MELANS (Neglecting to set the relation between indoor unit and network remote controller). (13) Disconnection of centralized control transmission line (TB7) at outdoor unit. (14) At system connected with MELANS, power supply connector (CN40) is inserted to centralized control transmission line of outdoor unit.

Check method and handling

In case MELANS is not used

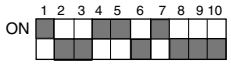
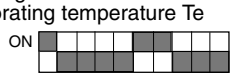


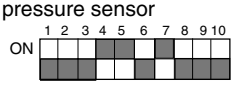
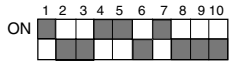
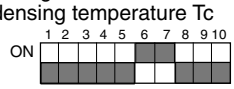
In case with MELANS used

When MELANS is used, "HO" display on the remote controller will disappear at the group registration of the indoor unit and local remote controller.
If "HO" does not disappear after the registration, check the items (12) ~ (14) in the Factors column.

	Phenomena	Factors	Checking method & Countermeasure
4	“88” appears on remote controller at registration and access remote controller	Generates at registration and confirmation (1) Erroneous address of unit to be coupled. (2) Disconnection of transmission line of unit to be coupled (No connection). (3) Faulty circuit board of unit to be coupled. (4) Installation miss of transmission line.	a) Confirm the address of unit to be coupled. b) Check the connection of transmission line. c) Check the transmission terminal block voltage of unit to be coupled. i) Normal if voltage is DC17 ~ 30V ii) Check the item d) in case other than i).
		Confirmation of different refrigerant system controller (5) Disconnection of power source of outdoor unit to be confirmed. (6) Disconnection of centralized control transmission line (TB7) of outdoor unit. (7) Power supply connector (CN40) is not inserted into centralized control transmission line in grouping with different refrigerant system without using MELANS. (8) More than 2 sets of power supply connector are inserted into the centralized control transmission line of outdoor unit. (9) In the system connected with MELANS, power supply connector (CN40) is inserted into the centralized control transmission line of outdoor unit. (10) Short circuit of centralized control transmission line.	d) Confirm the power source of outdoor unit to be coupled with the unit to be confirmed. e) Confirm that the centralized control transmission line (TB7) of outdoor unit is not disconnection. f) Confirm the voltage of centralized control transmission line. i) Normal in case of 10V ~ 30V ii) Check the items (7) ~ (10) left in case other than i).

(3) Commonly applicable to MA remote controller/M-NET remote controller

	Phenomena	Factors	Checke method & Countermeasure
1	Cooling with normal remote controller display but not providing capacity	(1) Insufficient frequency rise 1) Faulty detection of pressure sensor 2) Higher discharge temperature exceeding frequency limit 3) Higher high pressure exceeding frequency limit 4) Low pressure excessively lowered	a) Observe difference between sensor detected pressure and actual pressure by monitoring with LED. →At abnormal intake, check the pressure sensor. (Refer to Troubleshooting of Pressure Sensor (VII. [4] (1)). Note: Lower intake of low pressure sensor than actual pressure causes insufficient capacity. SW1 setting High pressure sensor  Low pressure sensor  b) Observe difference between evaporating temperature (Te) and target evaporating temperature (Tem) by monitoring with LED. Note: Higher Te than Tem causes insufficient capacity. SW1 setting Evaporating temperature Te  Target evaporating temperature Tem  Note. When frequency does not rise even at higher Te than Tem, frequency restriction by discharge temperature or high pressure may be affected. At high discharge temperature →Refer to 1102 (VII. [2] 1) At high pressure →Refer to 1302 (VII. [2] 1)
		(2) Faulty action of indoor unit LEV 1) Faulty action of indoor unit LEV does not allow sufficient flow rate. Frequency does not rise due to lowered low pressure. 2) Leaking LEV of stopping unit lowers flow rate of operating unit.	Refer to the page of LEV troubleshooting (VII. [5] 4)
		(3) Abnormal speed of outdoor unit fan 1) Faulty motor or board, or heat exchanger clogging lowers airflow rate. 2) Faulty temperature intake of OA sensor causes fan control malfunction. 3) Faulty intake of pressure sensor causes fan control malfunction.	Refer to the page of outdoor unit fan troubleshooting. (VII. [4] 3) Refer to the page of 5106. (VII. [2] 1) Refer to the page of 1302. (VII. [2] 1)
		(4) Long piping length Pressure loss degree at pressure side varies cooling capacity greatly.	Check the characteristic of capacity decrease by piping length. Piping pressure loss is assumable by temperature difference between heat exchanger outlet temperature of indoor unit and TH2 (Te). →Modify piping.
		(5) Piping size is not proper (slender)	
		(6) Insufficient refrigerant volume Discharge temperature rises while frequency does not rise.	Refer to Item 1-(1) (Frequency does not rise sufficiently.) Refer to Item Refrigerant volume adjustment (VI. [2] 2)
		(7) Clogging by foreign matter	Check temperature difference between before and after a portion (strainer, distributor) of low pressure piping where foreign matter may likely be clogged. Significant temperature drop may indicate clogging. →Remove foreign matter inside piping.

	Phenomena	Factors	Checke method & Countermeasure
1	Cooling with normal remote controller display but not providing capacity	(8) Indoor unit inlet temperature excessively low (15˚C wet bulb or less)	Check inlet temperature and short cycle at indoor unit side. To improve using manner
		(9) Faulty compressing Leaking inside compressor lowers refrigerant circulation volume.	As leaking if existed increases discharge temperature, judge by measuring the temperature.
		(10) Faulty action of LEV1 As sufficient sub-cooling can not be kept at outdoor unit outlet due to faulty LEV1 action, refrigerant is difficult to flow at indoor unit.	Refer to page of LEV troubleshooting (VII. [5] 4) High possibility at little or no difference between TH5 and TH7
		(11) Faulty TH5, TH7, HPS sensor, erroneous wiring. No normal control of LEV1	a) Check thermistor. b) Check wiring.
		(12) Trouble of composition detecting circuit or erroneous refrigerant charging	Refer to Chapter "XI Circulating composition judgment"
2	Heating with normal remote controller display but not providing capacity	(1) Insufficient frequency rise 1) Faulty detection of pressure sensor 2) Higher discharge temperature exceeding frequency limit 3) Higher high pressure exceeding frequency limit	a) Observe difference between sensor detected pressure and actual pressure by monitoring with LED. →At abnormal intake, check the pressure sensor. (Refer to Troubleshooting of Pressure Sensor (VII. [5] (1)). Note: Higher intake of high pressure sensor than actual pressure causes insufficient capacity. SW1 setting High pressure sensor  Low pressure sensor  b) Observe difference between condensing temperature (Tc) and target condensing temperature (Tcm) by monitoring with LED. Note: Higher Te than Tem causes insufficient capacity. SW1 setting Condensing temperature Tc  Target condensing temperature Tcm  Note: When frequency does not rise even at lower Tc than Tcm, frequency restriction by discharge temperature or high pressure may be affected. At high discharge temperature → Refer to 1102 (VII. [2] 1) At high pressure →Refer to 1302 (VII. [2] 1)
		(2) Faulty action of indoor unit LEV Faulty action of indoor unit LEV does not allow sufficient flow rate.	Refer to the page of LEV troubleshooting (VII. [4] 4)
		(3) When abnormal temperature of indoor unit piping temperature sensor is taken higher, LEV is throttled excessively due to apparent small sub-cooling.	Check piping thermistor.
		(4) Abnormal speed of outdoor unit fan 1) Faulty motor or board, or heat exchanger clogging lowers airflow rate. This lowers airflow rate and low pressure leading to increase discharge temperature. 2) Faulty temperature intake of piping sensor causes fan control malfunction.	Refer to the page of outdoor unit fan. (VII. [4] 3)
		(5) Faulty insulation of refrigerant piping	

	Phenomena	Factors	Checke method & Countermeasure
2	Heating with normal remote controller display but not providing capacity	(6) Long piping length Excessively long piping length at high pressure side causes high pressure loss leading to decrease in high pressure.	Check the characteristic of capacity decrease by piping length. →Modify piping
		(7) Piping size is not proper (slender)	
		(8) Clogging by foreign matter	Check pressure difference between before and after a portion (strainer, distributor) of high pressure (gas) piping where foreign matter may likely be clogged. Difficult to confirm clogging inside extended piping. Check clogging in the same manner in cooling by operating under cooling cycle. →Remove foreign matter
		(9) Indoor unit inlet temperature excessively high (exceeding 28˚C)	Check inlet temperature and short cycle at indoor unit side. To improve using manner
		(10) Insufficient refrigerant volume Discharge temperature drops while frequency does not rise. Likely to enter refrigerant recovery operation.	Refer to Item 2-(1) (Frequency does not rise sufficiently.) Refer to Item Refrigerant volume adjustment (VI. 2 2)
		(11) Faulty compressing (as same in case of cooling)	Check discharge temperature.
		(12) Trouble of composition detecting circuit or erroneous refrigerant charging	Refer to Chapter “XI. Circulating Composition Judgment”.
3	Outdoor unit stops occasionally during operation	As a previous step to apply emergency stop under error mode, the first detection will not be applied with emergency stop as it is stopping under the 3 minutes restart prevention mode as an intermittent fault checking. 1) High pressure error 2) Discharge temperature error 3) Radiator panel thermistor error 4) Thermistor error 5) Pressure sensor error 6) Overcurrent shutout 7) Refrigerant over charge error Notes: 1. Freeze protection tripping only under cooling mode may be considered in addition to the above. (Freeze protection is detected by one or all indoor units.) 2. With some error codes, emergency stop is not commenced even at the second stopping. (Example: For thermistor error, emergency stop will be executed at the third stopping.)	a) Check the mode operated in the past by displaying intermittent fault check history by LED display with SW1. b) Check the mode for stopping through the operation reproduced displaying intermittent fault checking by LED display with SW1. ↓ For each error mode, refer to the relating page. ❇ When checking freeze protection tripping, set SW1 to the status displaying indoor piping temperature table (Chapter VIII.) to confirm the temperature.

3 Investigation of Transmission Wave Shape/Noise

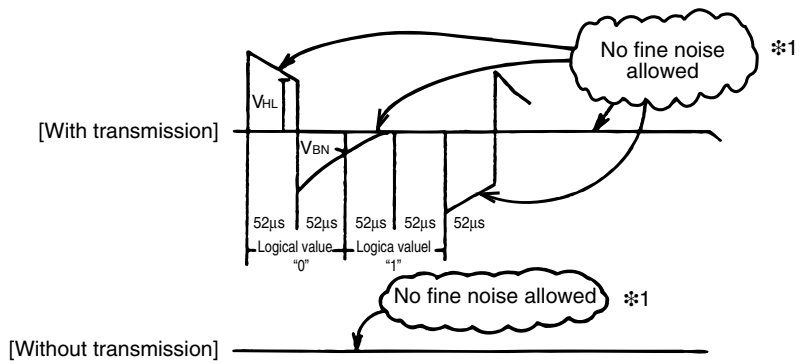
1. M-NET transmission

Control is performed by exchanging signals between outdoor unit, indoor unit and remote controller by M-NET transmission. If noise should enter into the transmission line, the normal transmission will be hindered causing erroneous operation.

(1) Symptom caused by the noise entered into transmission line

Cause	Erroneous operation	Error code
Noise entered into transmission line	Signal changes and is misjudged as the signal of other address.	6600
	Transmission wave shape changes to other signal due to noise.	6602
	Transmission wave shape changes due to noise, and can not be received normally thus providing no reply (ACK).	6607
	Transmission can not be made continuously due to the entry of fine noise.	6603
	Transmission can be made normally, but reply (ACK) or answer can not be issued normally due to noise.	6607 6608

(2) Method to confirm wave shape



Check the wave shape of transmission line with an oscilloscope to confirm that the following conditions are being satisfied.

1) The figure should be 104μs/bit ± 1%.
2) No finer wave shape (noise) than the transmission signal (52μs ± 1%) should be allowed. ※1
3) The sectional voltage level of transmission signal should be as follows.

Logic value	Transmission line voltage level
0	V_{HL} = 2.0V or more
1	V_{BN} = 1.3V or less

※1 However, minute noise from the DC-DC converter or inverter operation may be picked up.

(3) Checking and measures to be taken

(a) Measures against noise

Check the items below when noise can be confirmed on wave shape or the error code in the item (1) is generated.

	Items to be checked	Measures to be taken
Checking for wireing method	(1) Wiring of transmission and power lines in crossing.	Isolate transmission line from power line (5cm or more). Never put them in a same conduit.
	(2) Wiring of transmission line with that of other system in bundle.	Wire transmission line isolating from other transmission line. Wiring in bundle may cause erroneous operation like crosstalk.
	(3) Use of shield wire for transmission line (for both indoor unit control and centralized control).	Use specified transmission wire. Type : Shield line CVVS/CPEVS Wire diameter : 1.25mm^2 or more
	(4) Repeating of shield at the repeating of transmission line with indoor unit.	The transmission line is wired with 2-jumper system. Wire the shield with jumper system as same for transmission line. When the jumper wiring is not applied to the shield, the effect against noise will be reduced.
	(5) Are the unit and transmission lines grounded as instructed in the INSTALLATION MANUAL?	Connect to ground as shown in the INSTALLATION MANUAL.
Check for earthing	(6) Earthing of the shield of transmission line (for indoor unit control) to outdoor unit.	One point earthing should be made at outdoor unit. Without earthing, transmission signal may be changed as the noise on the transmission line has no way to escape.
	(7) Arrangement for the shield of transmission line (for centralized control).	For the shield earth of the transmission line for centralized control, the effect of noise can be minimized if it is from one of the outdoor units in case of the group operation with different refrigerant systems, and from the upper rank controller in case the upper rank controller is used. However, the environment against noise such as the distance of transmission line, the number of connecting sets, the type of connecting controller, and the place of installation, is different for the wiring for centralized control. Therefore, the state of the work should be checked as follows. a) No earthing • Group operation with different refrigerant systems One point earthing at outdoor unit • Upper rank controller is used Earthing at the upper rank controller b) Error is generated even though one point earth is being connected. Earth shield at all outdoor units. Connect to ground as shown in the user's manual.

(b) When the wave height value of transmission wave shape is low, 6607 error is generated, or remote controller is under the state of "HO."

Items to be checked		Measures to be taken
	(8) The farthest distance of transmission line is exceeding 200m.	Confirm that the farthest distance from outdoor unit to indoor unit/ remote controller is less than 200m.
	(9) The types of transmission lines are different.	Use the transmission wire specified. Type of transmission line : Shield wire CVVS/CPEVS Wire dia. of transmission line : 1.25mm^2 or more
	(10) No transmission power (30V) is being supplied to the indoor unit or the remote control.	a) Check 30V on CNS1, CNS2. b) Remove CNS1 and CNS2 and check resistance is 5-2, 6-2, if not this is a fault. Check main board R3 resistance is 1k±5%, if not this is a fault.
	(11) Faulty indoor unit/remote controller.	Replace outdoor unit circuit board or remote controller.

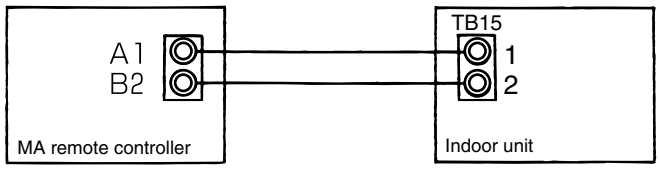
2. MA remote control transmission

The MA remote control and indoor unit communicate with the current tone burst method.

(1) Symptoms caused by infiltration of noise on transmission cable

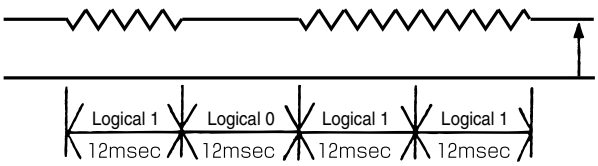
If noise, etc., infiltrates the transmission cable and the communication between the MA remote control and indoorunit is cut off for three consecutive minutes, a MA communication error (6831) will occur.

(2) Confirmation of transmission specifications and waveform



A1, B2: No polarity
Across terminal No. 1-2 :
Power supply (9V to 12VDC)

Transmission waveform (Across terminal No. 1-2)



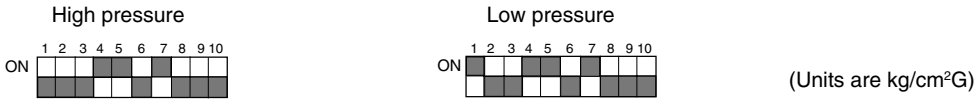
(1) 2msec/bit ± 5% must be satisfied
(2) Voltage across terminal No.1-2 must be within range shown on left.

4 Troubleshooting of Principal Parts

1. Pressure sensor

(1) Check for failure by comparing the sensing pressure according to the high pressure/low pressure pressure sensor and the pressure gauge pressure.

Set SW1 as shown below to display the high and low pressure sensor data displayed digitally by the light emitting diode LD1.



(1) In the stopped condition, compare the pressure readings from the gauge and from the LD1 display.
  (a) If the gauge pressure is 0 ~ 1kg/cm²G (0.0098MPa), the internal pressure is dropping due to gas leakage.
  (b) If the pressure according to the LD1 display is 0~1kg/cm²G (0.0098MPa), there is a faulty contact at the connector, or it is disconnected. Proceed to (4).
  (c) If the pressure according to the LD1 display is 32 kg/cm²G (3.14MPa) for high pressure or higher, proceed to (3).
  (d) If other than (a), (b) or (c), compare the pressure readings during operation. Proceed to (2).

(2) Compare the pressure readings from the gauge and from the LD1 display while in the running condition.
  (a) If the difference between the two pressures is within 1kg/cm²G ((0.098MPa), for high pressure and 0.03MPa for low pressure both the affected pressure sensor and the main MAIN board are nor mal.
  (b) If the difference between the two pressures exceeds 1kg/cm²G (0.098MPa), for high pressure and 0.03MPa for low pressure the affected pressure sensor is faulty (deteriorating performance).
  (c) If the pressure reading in the LD1 display does not change, the affected pressure sensor is faulty.

(3) Disconnect the pressure sensor from the MAIN board and check the pressure according to the LD1 display.
  (a) If the pressure is 0~1kg/cm²G (0.098MPa) for low pressure on the LD1 display, the affected pressure sensor is faulty.
  (b) If the pressure is 32kg/cm²G (3.14MPa) for high pressure or higher, the MAIN board is faulty.
  If ambient temperature is below 30˚C, main board is faulty.
  If ambient temperature is above 30˚C, proceed to (5).

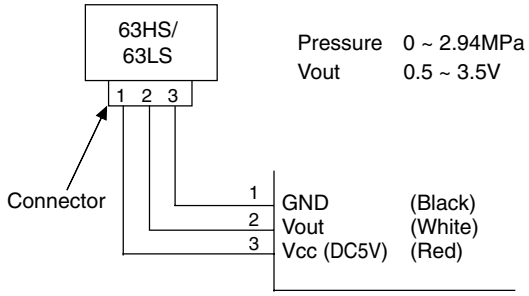
(4) Disconnect the pressure sensor from the MAIN board and short out the No. 2 and No. 3 pins of the connector (63HS, 63LS), then check the pressure by the LD1 display.
  (a) If the pressure according to the LD1 display is 32kg/cm²G (3.14MPa) for high pressure and 1.37MPa for low pressure, the affected pressure sensor is faulty.
  (b) If other than (a), the MAIN board is faulty.

(5) Disconnect the 63HS connector from the main board and replace it with the 63LS connector and check the LD1 display.
  (a) If data is 1.37MPa or above then main board is faulty.
  (b) If (a) is not the problem then the 63LS sensor is faulty.

(2) Pressure sensor configuration

The pressure sensors are configured in the circuit shown in the figure below. If DC 5V is applied between the red and black wires, a voltage corresponding to the voltage between the white and black wires is output and this voltage is picked up by the microcomputer. Output voltages are as shown below.

Output power voltage high pressure 0.1V per (0.098MPa)
Output power voltage low pressure 0.3V per (0.098MPa)



❇Connector connection specifications on the pressure sensor body side.

The connector's pin numbers on the pressure sensor body side differ from the pin numbers on the main circuit board side.

	Sensor body side	MAIN board side
Vcc	Pin 1	Pin 3
Vout	Pin 2	Pin 2
GND	Pin 3	Pin 1

2. Solenoid valve (SV1) (PUHY-200, 250, 315TEM-A)

Check if the control board's output signals and the operation of the solenoid valves match.

Setting the self-diagnosis switch (SW1) as shown in the figure below causes the ON signal of each relay to be output to the LED's.

Each LED shows whether the relays for the following parts are ON or OFF. When a LED lights up, it indicates that the relay is ON.

SW1	LED							
	1	2	3	4	5	6	7	8
ON 1 2 3 4 5 6 7 8 9 10	Comp. operation	Comp. operation			52C1			Lights for normal operation
ON 1 2 3 4 5 6 7 8 9 10	SV1							

(1) In the case of SV1 (Bypass valve)

(a) When the compressor starts, SV1 is ON for 4 minutes, check operation by whether the solenoid valve is emitting an operating noise.

(b) Changes in the operating condition by solenoid valve operation can be confirmed by the temperature of the bypass circuit and the sound of the refrigerant.

(c) SV1 goes on in accordance with the rise in high pressure in the cooling and heating mode, check operation by LED display and the operating noise emitted by the solenoid valve.

(2) In the case of 21S4 (4-way valve)

Multi-directional valve features:

When power is OFF : Used as a conductor for the cooling circuit between the oil separator outlet and heat exchanger, and the gas-ball valve (BV1) and accumulator.

When power is ON : Used as a conductor for the heating circuit between the oil separator and gas-ball valve, and the heat exchanger and accumulator.

It is possible to determine whether the unit is functioning properly by checking from which point to which point the current is flowing by monitoring the LED display, or by checking the temperature at the time at both the inlet and outlet of the multi-directional valve. Do not to check the temperature of the oil separator by direct contact due to the high temperature of the piping.

❇ Do not apply excessive external impact, as the valve will not function properly if the outer wall is deformed.

3. Outdoor unit fan

- The outdoor unit fan is phase control and controls the number of fan rotations. Confirm the number of rotations while monitoring the output status of the phase control output at the LED. The fan rotates at approximately 600rpm at full speed.
- Refer to the outdoor unit control section for details on fan control.
  The fan operates at 100% for 5 seconds and then alternates between high and low pressure control.
- Turn the self-diagnosis switch ON to ON 1 2 3 4 5 6 7 8 9 10, the phase control output status at the LED display.

❇ There are times when the AK does not go as high as 100 when in night mode etc.

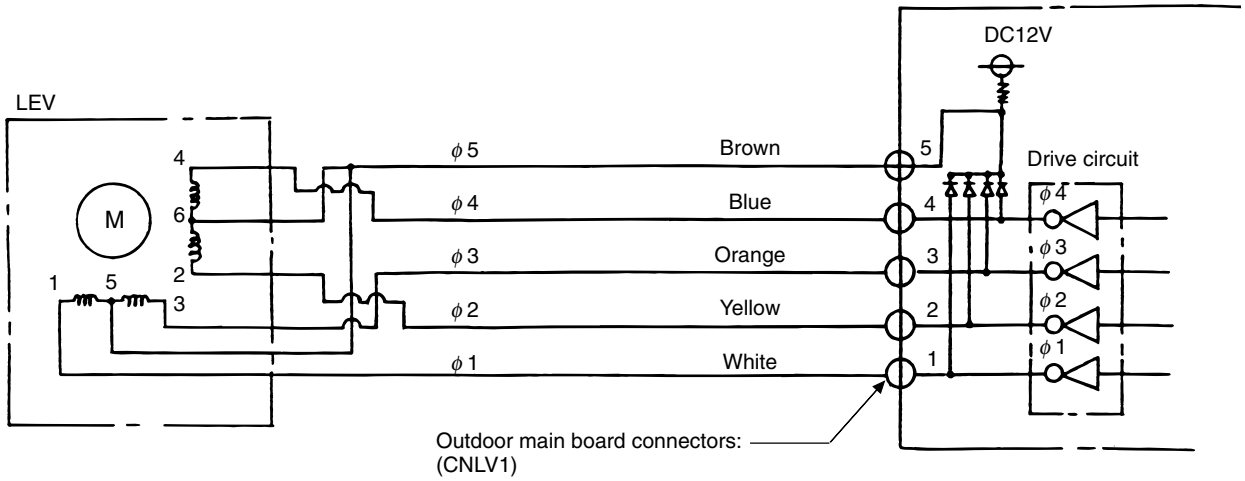
LED display	0 → 100
Fan	Stop Full speed

4. LEV

(1) Outdoor LEV

The valve opening angle changes in proportion to the number of pulses.

(Connections between the outdoor unit's MAIN board and LEV1 (PUHY-200, 250, 315TEM-A)



Pulse signal output and valve operation

Output (Phase)	Output states							
	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

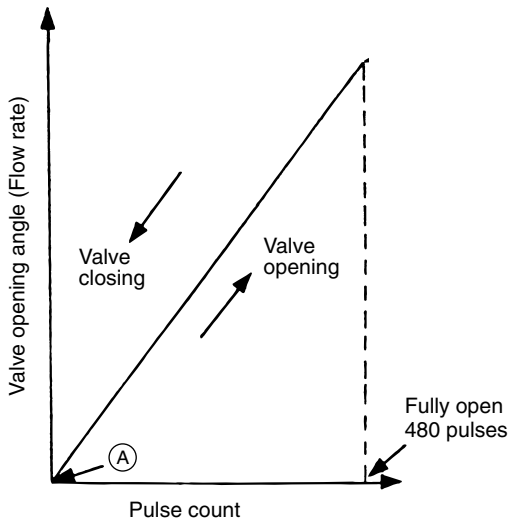
Valve is closed; $1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow 7 \rightarrow 8 \rightarrow 1$

Valve is open; $8 \rightarrow 7 \rightarrow 6 \rightarrow 5 \rightarrow 4 \rightarrow 3 \rightarrow 2 \rightarrow 1 \rightarrow 8$

❇ 1. When the LEV opening angle does not change, all the output phases are off.

2. When the output is out of phase or remains ON continuously, the motor cannot run smoothly, but move jerkily and vibrates.

LEV valve closing and valve opening operation



❇ When the power is switched ON, a 520 pulse valve opening signal is output to make sure the valve's position, so that it is definitely at point Ⓐ. Pulse signal is output for approximately 17 seconds.

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

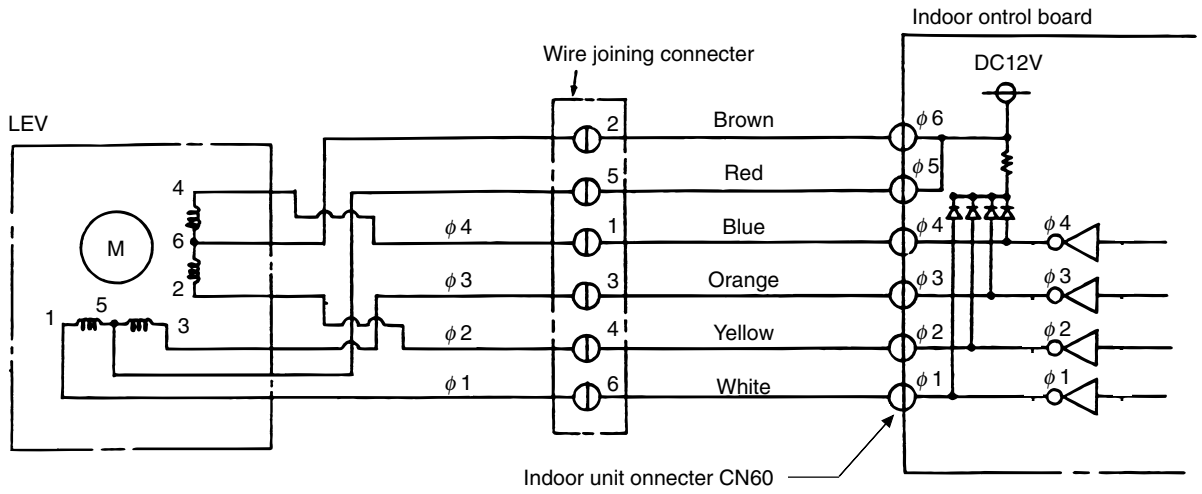
❇ Whether a sound is being emitted or not can be determined by holding a screwdriver, etc. against it, then placing your ear against the handle.

❇ If there is liquid refrigerant inside the LEV, the sound may become lower.

(2) Indoor LEV

The valve opening angle changes in proportion to the number of pulses.

(Connections between the indoor unit's MAIN board and indoor LEV (PUHY-200, 250, 315TEM-A)



Pulse signal output and valve operation

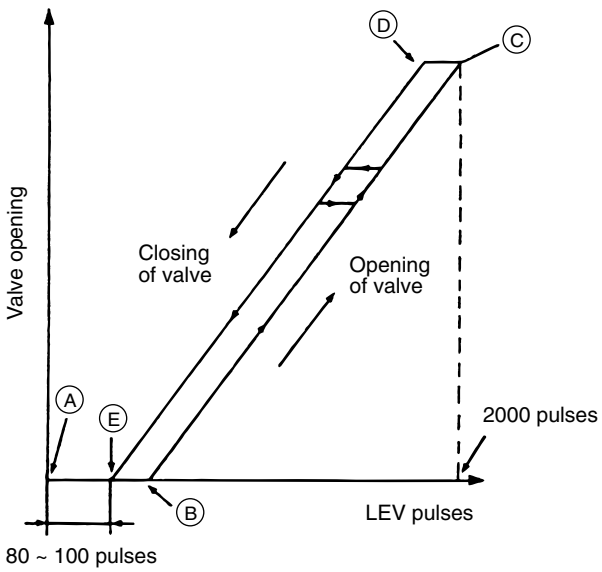
Output (Phase)	Output state			
	1	2	3	4
1	ON	OFF	OFF	ON
2	ON	ON	OFF	OFF
3	OFF	ON	ON	OFF
4	OFF	OFF	ON	ON

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 are off.

❇2. When the output is out of phase or remains ON continuously, the motor cannot run smoothly, but move jerkily and vibrates.

LEV valve closing and valve opening operation



❇ When the power is switched ON, a 2200 pulse valve opening signal is output to make sure the valve's position, so that it is definitely at point Ⓐ. (Pulse signal is output for approximately 17 seconds.)

❇ When the valve operates smoothly, there is no sound from the LEV and no vibration occurs, but when the valve is locked or Ⓔ → Ⓐ, it emits a noise .

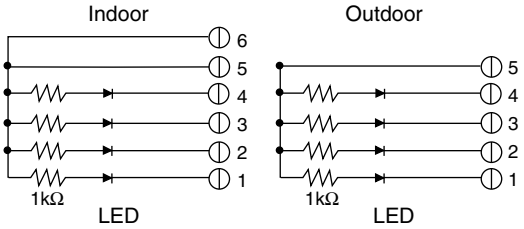
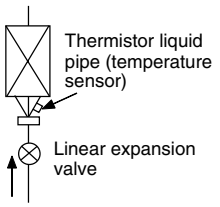
❇ Whether a sound is being emitted or not can be determined by holding a screwdriver, etc. against it, then placing your ear against the handle.

❇ If there is liquid refrigerant inside the LEV, the sound may become lower.

(3) Judgment methods and likely failure mode

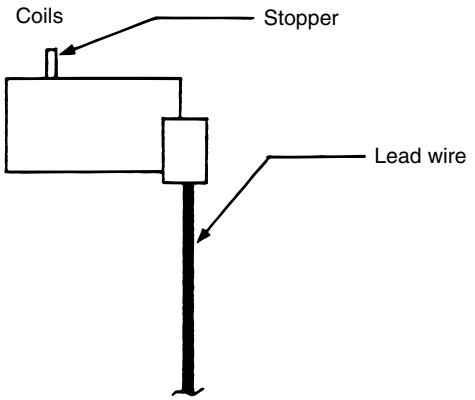
Caution:

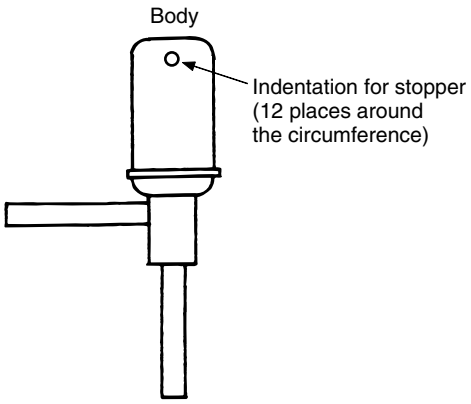
The specifications of the outdoor unit (outdoor LEV) and indoor unit (indoor LEV) differ. For this reason, there are cases where the treatment contents differ, so follow the treatment specified for the appropriate LEV as indicated in the right column.

Failure mode	Judgment method	Treatment	Affected LEV
Microcomputer driver circuit failure	1. Disconnect the control board connector and connect the check LED as shown in the figure below.  When the base power supply is turned on, the indoor LEV outputs pulse signals for 10 seconds, the outdoor LEV outputs pulse signals for 17 seconds. If the LED does not light up, or lights up and remains on, the driver circuit is abnormal.	In the case of driver circuit failure, replace the control board.	Indoor Outdoor
LEV mechanism is locked	1. If the LEV is locked up, the drive motor turns with no load and a small clicking sound is generated. Generation of this sound when the LEV is fully closed or fully open is abnormal.	Replace the LEV.	Indoor Outdoor
The LEV motor coils have a disconnected wire or is shorted	Measure the resistance between the coils (red - white, red - orange, brown - yellow, brown - blue) using a tester. They are normal if the resistance is within 150Ω ± 10%.	Replace the LEV coils.	Indoor
	Measure the resistance between the coils (gray - orange, gray - red, gray - yellow, gray - black) using a tester. They are normal if the resistance is within 46Ω ± 10%.	Replace the LEV coils.	Outdoor
Fully closed failure (valve leaks)	1. If you are checking the indoor unit's LEV, operate the indoor unit's blower and the other indoor units in the cooling mode, then check the piping temperatures (liquid pipe temperatures) of the indoor units by the operation monitor through the heat source unit's control board. When the fan is running, the linear expansion valve is fully closed, so if there is leakage, the temperature sensed by the thermistor (liquid pipe temperature sensor) will become low. If the temperature is considerably low compared to the remote control's intake temperature display, it can be judged that there is not a fully closed failure. In the case of minimal leakage, it is not necessary to replace the LEV if there are no other effects. 	If there is a large amount of leakage, replace the LEV.	Indoor
Faulty wire connections in the connector or faulty contact.	1. Check for pins not fully inserted 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 places where trouble is found.	Indoor Outdoor

(4) Outdoor LEV coil removal procedure (configuration)

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

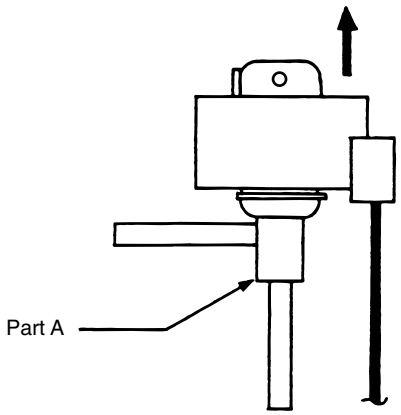




Removing the coils:

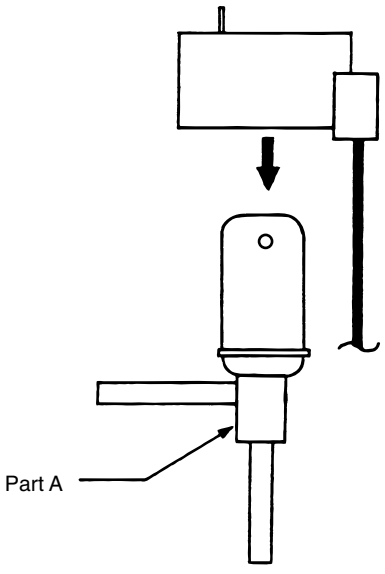
Fasten the body tightly at the bottom (Part A in the figure) so that the body will not move, then pull out the coils toward the top. If they catch on the stopper and are difficult to take out, turn the coils left and right until the stoppers are free from the stopper indentations, then pull the coils out.

If you take out the coils without gripping the body, undue force may be applied to the piping and the pipe may be bent, be sure to fasten the body in such a way that it will not move.



Installing the coils :

Fasten 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, inserting the coils' stopper securely in one of the indentations on the body. (There are four indentations for the stopper on the body around its circumference, and it doesn't matter which indentation is used. However, be careful not to apply undue force to the lead wires or twist them around inside the body.) If the coils are inserted without gripping the body, it may exert undue force on the piping, causing it to become bent, so be sure to hold the body firmly so that it won't move when installing the coils.



5. Inverter and compressor

a. **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.)
b. Replace the defective components if the inverter is found to be defective.
c. If both the compressor and the inverter are found to be defective, replace the defective components of both devices.

(1) Inverter related defect identification and countermeasures

	Error display/failure condition	Measure/inspection item
[1]	Inverter related errors (0403, 4200, 4220, 4230, 4240, 4250, 4260, 5110, 5301)	VII. [7] Check the details of the inverter error in the error log at the outdoor PCB LED monitor display. VII. [6] Perform the measures corresponding to the error code and error details determined using the remote control error display self diagnosis and countermeasures.
[2]	Main power breaker trip	a. Check the breaker capacity.
		b. Electrical system short circuit or grounding other than the inverter
		c. Refer to (3) - [1] if not a, or b.
[3]	Main power earth leakage breaker trip	a. Earth leakage breaker capacity/sensitivity current check
		b. Meg defect for electrical system other than the inverter
		c. Refer to (3) - [1] if not a, or b.
[4]	Only the compressor does not operate.	• Check the inverter frequency at the LED monitor and proceed to (2) - [3] if the status is operational.
[5]	The compressor always vibrates strongly or emits an abnormal noise.	Go to (2) - [3].
[6]	Noise has penetrated the peripheral device	a. Check to ensure that power supply wiring, etc. of the peripheral device is not in close contact with the power supply wiring of outdoor unit.
		b. Check to ensure that the inverter output wiring is not in close contact with the power supply wiring and transmission lines.
		c. Check to ensure that the transmission line shield wiring is being used properly in the necessary environment, and that the shield wire ground is appropriate.
		d. Meg defect for electrical system other than the inverter.
		e. Attach a ferrite core to the inverter output wiring. (Please contact the factory for details of the service part settings.)
		f. Change the power to another system.
		g. If this problem occurs suddenly, there is a possibility that the inverter output is grounded. Proceed to (2) - [3].
		• Contact the factory for cases other than those listed above.
[7]	Sudden malfunction (as a result of external noise.)	a. Check to ensure that the unit is grounded.
		b. Check to ensure that the transmission line shield wiring is being used properly in the necessary environment, and that the shield wire ground is appropriate.
		c. Check to ensure that the neither the transmission line or external connection wiring run close to another power supply system or run through the same conduct pipe.
		• Contact the factory for cases other than those listed above.

Notes: 1. Due to a large capacity electrolytic capacitor used in the inverter, voltage still flows through even after cutting the main power, creating the possibility of electric shock. As a result, wait for a sufficient length of time (5~10 minutes) after cutting the main power and check the voltage at both terminals of the electrolytic capacitor to performing any checks on the inverter.
2. Damage will result to the components of IPM, etc. if the inverter wiring is not properly secured with screws, or if the connector has not been properly inserted. It is likely that any errors occurring after replacing components are the result of wiring mistakes. Ensure that the wiring, screws, connectors and Faston, etc. are properly inserted.
3. Do not remove or insert inverter connectors with the main power supply on, as this will result in damage to the PCB.
4. The current sensor will be damaged if current flows without connecting to the PCB. Always insert connectors into the corresponding PCB when running the inverter.

(2) Treatment of inverter output related troubles

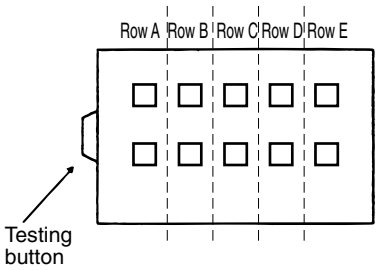
	Check item	Phenomena	Treatment
[1] Check the INV board error detection circuit.	Perform the following: 1. Disconnect INV board CNDR2. After removing, turn on the outdoor unit and check the error status. (The compressor does not operate because CNDR2, which carries the IPM drive signal, has been disconnected.)	(1) IPM/overcurrent error. (4250 detailed No. 101, 102, 103, 104, 105, 106, 107)	• Replace INV board.
		(2) ACCT sensor circuit error. (5301 detailed No. 117)	See to VII. 4 5 (4) "Current Sensor ACCT" Check the resistance and replace if erroneous. Replace the INV board if the ACCT status is normal.
		(3) DCCT sensor circuit error. (5301 detailed No. 118)	• Replace the DCCT After replacing the DCCT, operate the outdoor unit again. In the case when the error occurs again, replace the INV board. (The DCCT may be no problem.)
		(4) ACCT sensor circuit error. (5301 detailed No. 115)	• INV board error detection circuit is normal. Because IPM can not drive, if the CNDR2 is disconnected.
[2] Check for compressor ground fault or coil error.	Disconnect the compressor wiring, and check the compressor Meg, and coil resistance.	(1) Compressor Meg failure Error if less than 1MΩ. • When no refrigerant is accumulated in the compressor. (2) Compressor coil resistance failure Coil resistance value of 0.16Ω (20˚C)	• Replace compressor Check whether the refrigerant is accumulating in the compressor again.
[3] Check to see if the inverter is damaged. • Perform this check if an error occurs immediately before or after turning on the compressor.	Perform the following: 1. Reconnect the connector removed at item [1]. 2. Disconnect the compressor wiring. 3. Turn on SW1-1 on the INV board. Operate the outdoor unit after above steps. Check the inverter output voltage. • It is recommend to use the tester used to determine the VII. 4 5 (5) IPM troubleshooting when checking the inverter output voltage. • Measure when the inverter output frequency is stable.	(1) IPM/overcurrent error. (4250 detailed No. 101, 102, 103, 104, 105, 106, 107)	• Refer to item [5] for inverter circuit trouble.
		(2) There is a high possibility of an inverter circuit error if the voltage unbalance across all wiring is greater than the larger of the values represented by 5% or 5V.	
		(3) No voltage unbalance across all wiring	See item [2]. Proceed to item [5] however if there is no problem at [2]. Replace the compressor if there is no problem at [5].
[4] Check to see if the inverter is damaged. • Perform this check if an error occurs during steady operation.	Turn on the outdoor unit. Check the inverter output voltage. • It is recommend to use the tester used to determine the VII. 4 5 (5) IPM troubleshooting when checking the inverter output voltage. • Measure when the inverter output frequency is stable.	(1) There is a high possibility of an inverter circuit error if the voltage unbalance across all wiring is greater than the larger of the values represented by 5% or 5V.	• Refer to item [5] for inverter circuit trouble.
		(2) No voltage unbalance across all wiring	See item [2]. Proceed to item [5] however if there is no problem at [2]. Replace the compressor if there is no problem at [5].

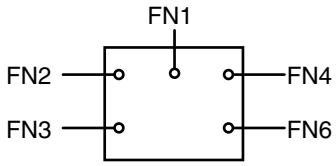
	Check item	Phenomena	Treatment
[5] Check the inverter circuit trouble.	1. Check to see if the IPM screw terminal is loose.	(1) Screw terminal is loose.	Check all IPM screw terminals and tighten.
	2. Check the exterior of the IPM.	(2) IPM is cracked due to swelling.	• IPM replacement Check the operation in [3] or [4] after replacing the IPM. In the case of an output voltage unbalance or error recurrence: →Replace the G/A board In the case of an output voltage unbalance or error recurrence after replacement: →Replace the INV board
	3. Check the resistances between each terminal of IPM. Refer to VII. 4 5 (5) for details on IPM troubleshooting.	(3) Resistance error between each terminal of IPM.	• IPM replacement Check the operation in [3] or [4] after replacing the IPM. In the case of an output voltage unbalance or error recurrence: →Replace the G/A board In the case of an output voltage unbalance or error recurrence after replacement: →Replace the INV board
		(4) All normal for items (1) ~ (3) above.	• IPM replacement In the case of an output voltage unbalance or error recurrence after replacement: →Replace the G/A board In the case of an output voltage unbalance or error recurrence after replacement: →Replace the INV board

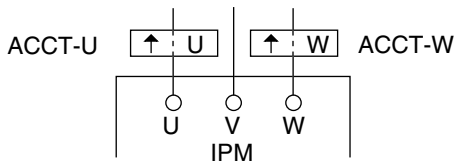
(3) Trouble measures when main power breaker tripped

	Check item	Phenomena	Treatment
[1]	Perform Meg check between the terminals in the power terminal block Tba.	(1) Zero to several ohm, or Meg failure.	Check each part in the main inverter circuit. • Refer to "Simple checking Procedure for individual components of main inverter circuit". a. Diode Stack b. IPM c. Rush current protection resistor d. Electromagnetic relay e. DC reactor f. Noise filter
[2]	Turn on the power again and check once more.	(1) Main power breaker trip	
		(2) No remote control display	
[3]	Turn on the outdoor unit and check that it operates normally.	(1) Operates normally without tripping the main breaker.	a. There is a possibility that the wiring shorted momentarily. Trace the short and repair. b. If a. above is not the case, there is a possibility that there was a compressor failure.
		(2) Main power breaker trip	• A compressor ground fault can be considered. Go to (2) - [2].

(4) Simple checking procedure for individual components of main inverter circuit

<table>
<tr><th>Part name</th><th>Judgement method</th></tr>
<tr><td>Diode stack</td><td>Refer to "Determining diode stack troubleshooting" (VII. 4 5 (6))</td></tr>
<tr><td>IPM
(Intelligent power module)</td><td>Refer to "Determining IPM interference" (VII. 4 5 (5))</td></tr>
<tr><td>Rush current protection resistor
R1</td><td>Measure the resistance between terminals: 22Ω ± 10%</td></tr>
<tr><td>Electromagnetic contactor (52C)</td><td>Check the resistance between terminals of each row
→ Fitting direction Upward
 

<table>
<tr><th>Checking position</th><th>Judgement value</th></tr>
<tr><td>Row A</td><td>50 ~ 100Ω</td></tr>
<tr><td>Row B ~ Row E</td><td>∞</td></tr>
</table></td></tr>
<tr><td>DC reactor DCL</td><td>Measure the resistance between terminals: 1Ω or lower (almost 0Ω)
Measure the resistance between terminals and the chassis : ∞</td></tr>
<tr><td>Noise filter</td><td>Check resistance between each terminal and between the terminal and case
 

<table>
<tr><th>Checking position</th><th>Judgement value</th></tr>
<tr><td>FN3-6, FN2-4</td><td>1Ω or less (Almost 0Ω)</td></tr>
<tr><td>FN1-2, FN2-3, FN4-6</td><td>∞</td></tr>
<tr><td>FN1, FN2, FN3, FN4, FN6</td><td>∞</td></tr>
</table></td></tr>
<tr><td>Current sensor
ACCT</td><td>Disconnect the CNCT2 target connector and check the resistance between terminals: 280Ω ± 30Ω
1-2PIN (U-phase)
3-4PIN (W-phase)
 

❊ Check the ACCT connecting phase and direction.</td></tr>
</table>

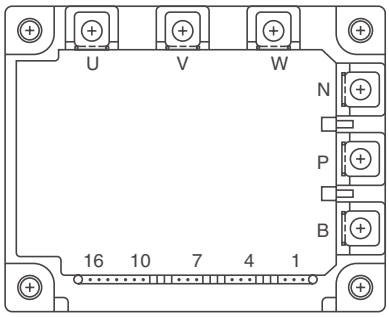
(5) Intelligent power module (IPM)

Measure resistances between each terminal of IPM with tester, and use the results for troubleshooting. Specified resistance value is dependent on tester type to be used for resistance measurement, because diode inside IPM has non-linearity, thus difference of impedance and voltage in tester being influential. As the internal impedance of resistance range of analog tester equals to the center value of meter indication, the affect of internal impedance can be minimized if the tester having close center value of resistance range. Because internal voltage is normally 1.5V, the tester to be used for troubleshooting of IPM should satisfy the following conditions.

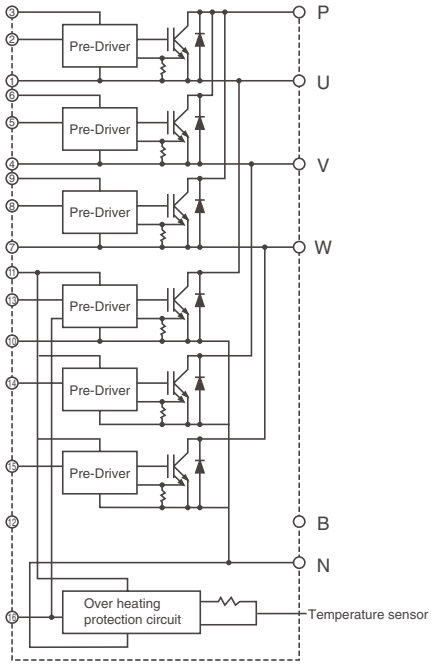
Internal voltage	1.5V (Power source : one dry cell battery)
Central value of resistance range	10 ~ 40Ω

The measured values for troubleshooting are shown in the table below.
(Use the minimum range for tester resistance range.)

• External view



• Internal circuit diagram

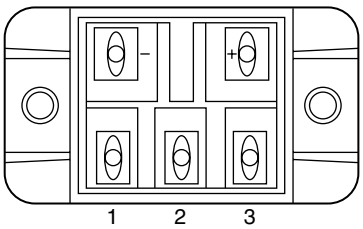


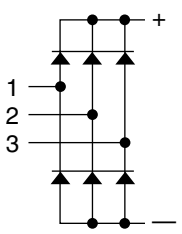
• Judgement value

Tester + / Tester −	P	U	V	W	N
P		∞	∞	∞	∞
U	2~100Ω		∞	∞	∞
V	2~100Ω	∞		∞	∞
W	2~100Ω	∞	∞		∞
N	2~100Ω	2~100Ω	2~100Ω	2~100Ω	

(6) Diode stack

Perform continuity check with tester. Judged as normal if the following characteristics are observed.
(Use the minimum range for tester resistance range.)



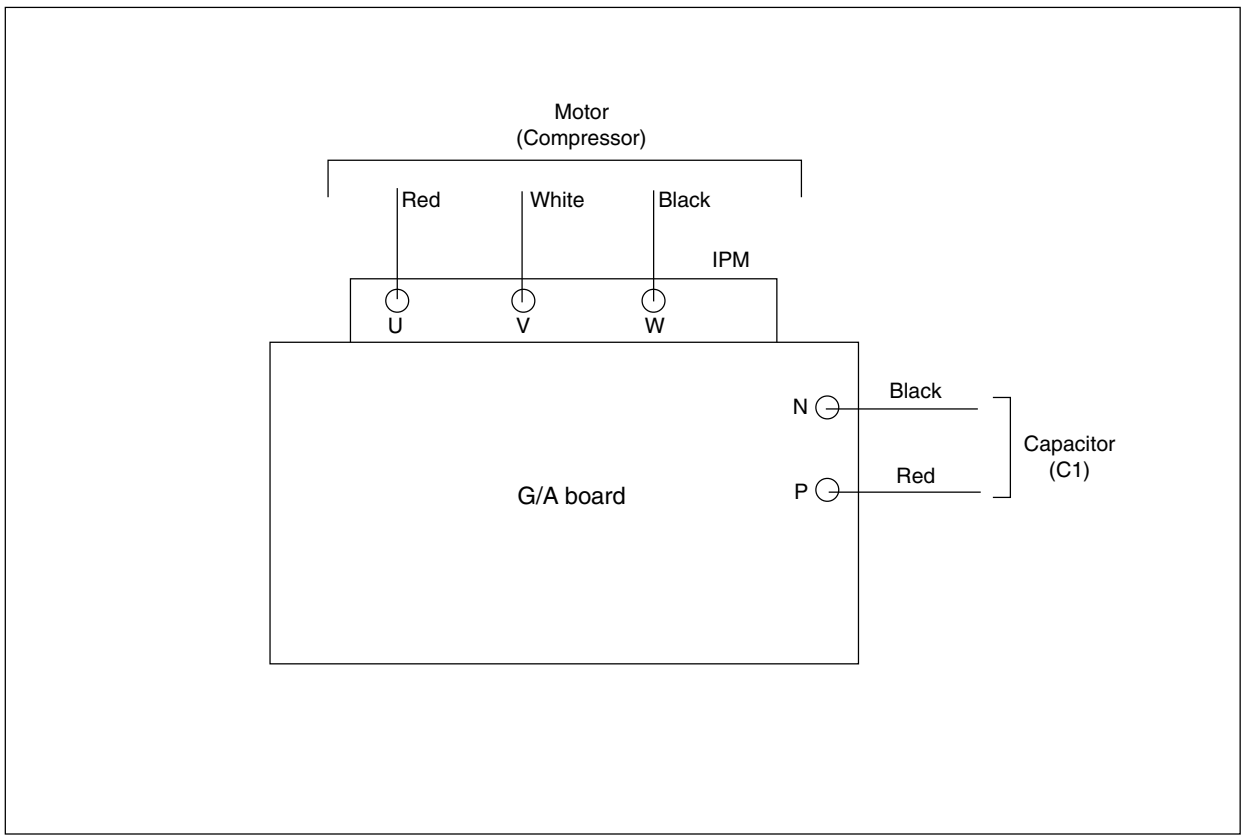


Tester + / Tester −	+	−
1	10 ~ 50Ω	∞
2	10 ~ 50Ω	∞
3	10 ~ 50Ω	∞
Tester − / Tester +	**+**	**−**
1	∞	10 ~ 50Ω
2	∞	10 ~ 50Ω
3	∞	10 ~ 50Ω

(7) Caution at replacement of inverter parts

(1) Fully check wiring for incorrect and loose connection.
The incorrect or loose connection of the power circuit part wiring like IPM and diode module causes to damage the IPM. Therefore, check the wiring fully. As the insufficient tightening of screws is difficult to find, tighten them together additionally after finishing other works. For the wiring of the base for IPM, observe the wiring diagram below carefully as it has many terminals.

(2) Coat the grease for radiation provided uniformly onto the radiation surface of IPM /diode modules.
Coat the grease for radiation on the full surface in a thin layer, and fix the module securely with the screw for fastening. As the radiation grease attached on the wiring terminal causes poor contact, wipe it off if attached.



6. Control circuit

(1) Power source for control

1) Outdoor unit controller
DC12V and DC5V produced by DC-DC converter (INV board) from the bus voltage (DC290 ~ 322V) of the outdoor unit inverter are fed to the main board.

2) Control line
The indoor control power source (DC30V) and centralized control power source are produced by DC-DC converter (INV board) from the bus voltage (DC290 ~ 322V) of the outdoor unit inverter. Meantime, the transmitting/receiving signals are piled up on the control power source.

3) Indoor unit
DC5V for the microcomputer and DC12V for the LEV and relay are produced by the transformer and stabilizing power source circuit from AC220V power source of the indoor unit.
However, during the power failure of AC220V power source, DC12V for LEV and DC5V for the microcomputer are produced by the control power source supplied from the outdoor unit via control line.

4) M-NET remote controller
The power source (DC5V) for the microcomputer, key input and liquid crystal is produced by the control power source DC17 ~ 30V supplied from the outdoor unit via control line.

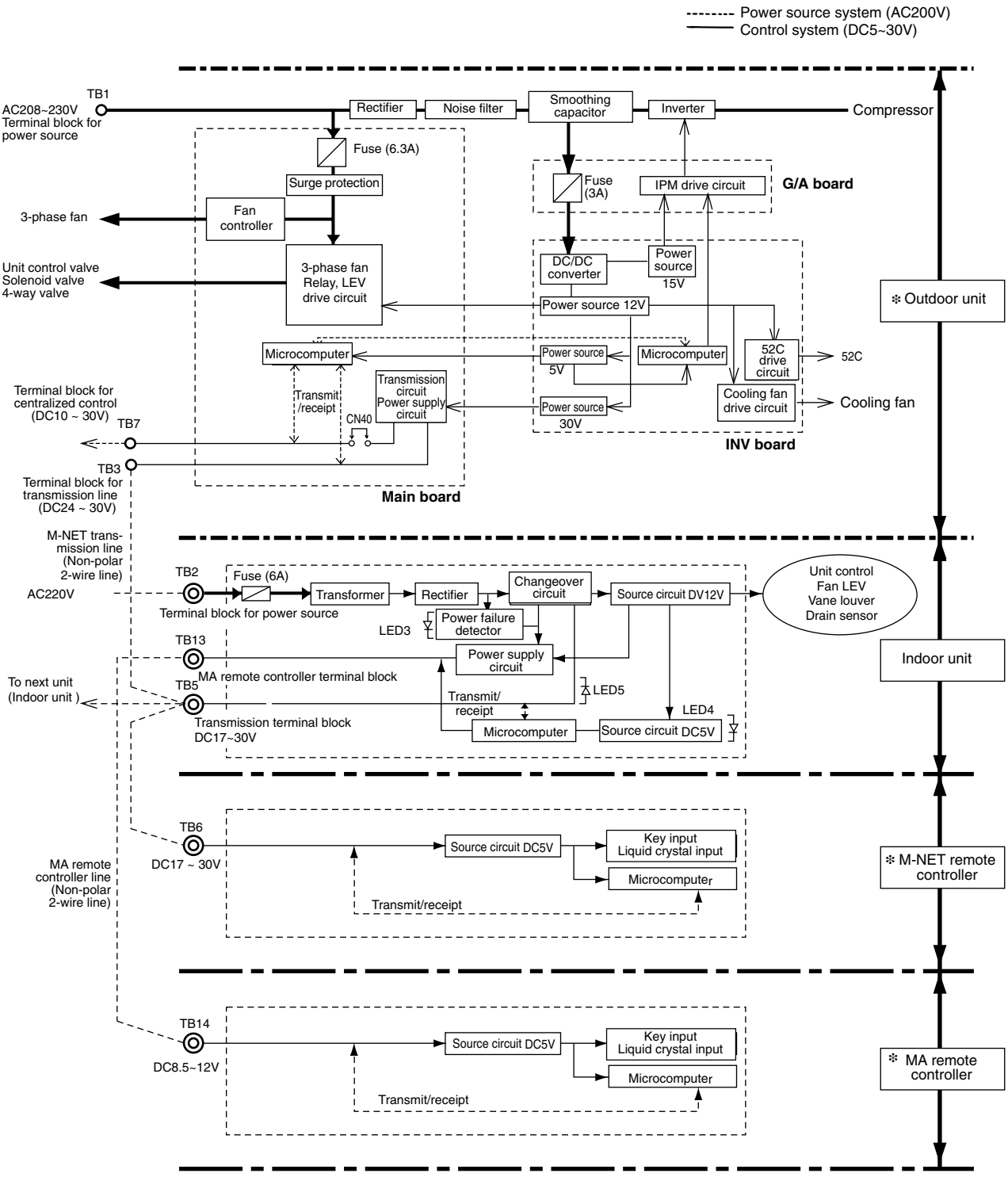
5) MA remote controller
The power source (DC5V) for the microcomputer, key input and liquid crystal is produced by the control power source DC8.5 ~ 12V supplied from the indoor unit via control line

(2) Transmitting/receiving system

1) M-NET
Serial transmission is performed by connecting M-NET remote controller (TB6) ~ Indoor unit (TB5) ~ Outdoor unit (TB3) with non-polar, 2-wire line.

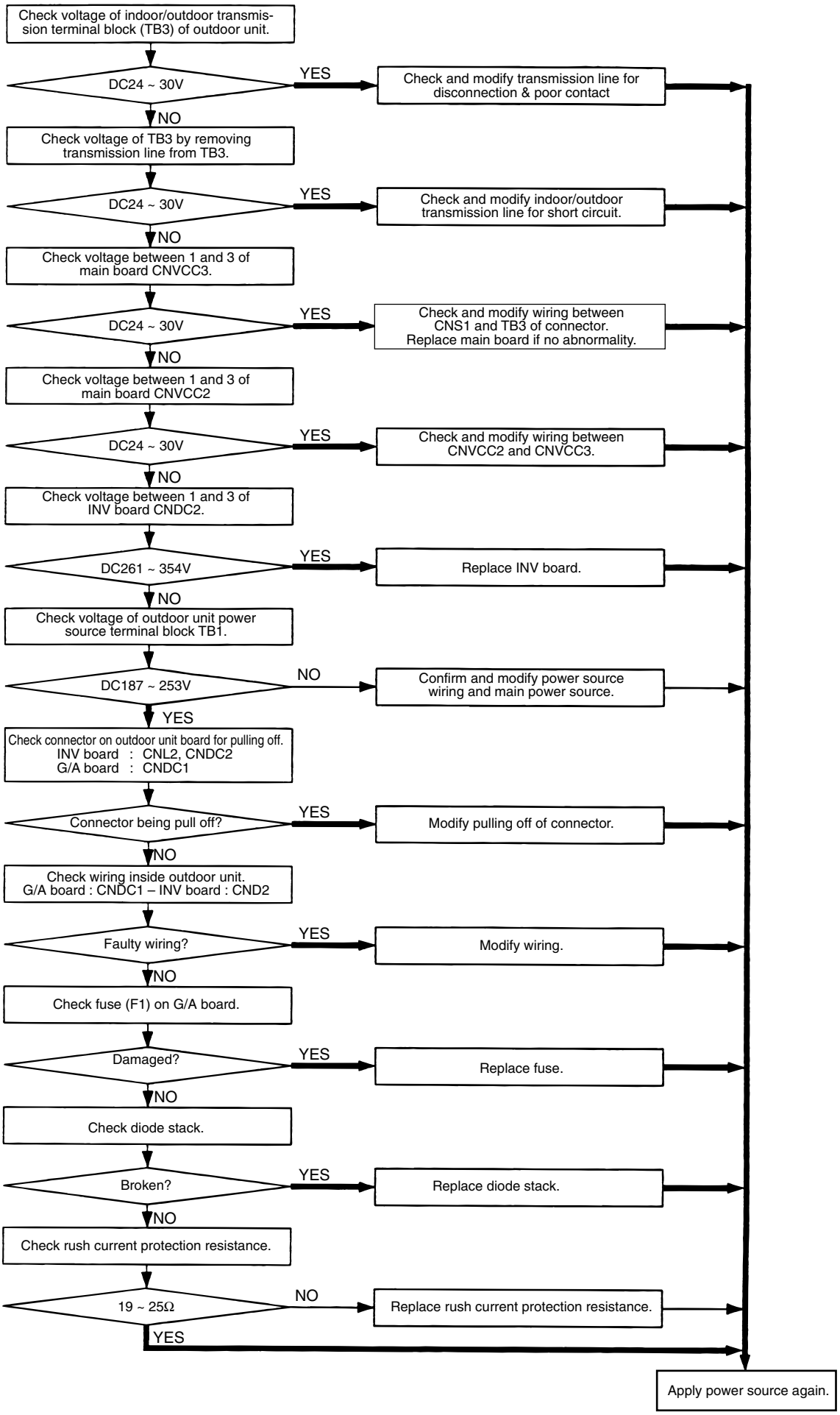
2) MA remote controller
Serial transmission is performed by connecting MA remote controller (TB14) ~ Indoor unit (TB15) with non-polar, 2-wire line.

(3) Control power source function block



❊ M-NET remote controller and MA remote controller can not be used together.

(4) Check method of outdoor unit power source circuit



VIII. MONITOR DISPLAY BY OUTDOOR BOARD LED

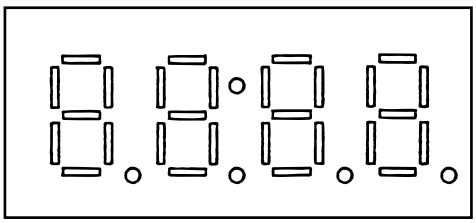
1 LED Monitor Display

1. How to read LED for service monitor

By setting of DIP SW1-1 ~ 1-10, the unit operating condition can be observed with the service LED on the control circuit board. (For the relation of each DIP SW to the content, see the table provided.)
As shown in the figure below, the LED consist of 7 segments is put in 4 sets side by side for numerical and graphic display.

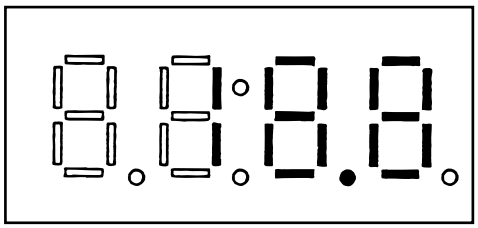
OC : Outdoor unit	SV : Solenoid valve	THHS : Inverter radiator panel
IC : Indoor unit L	EV : Electronic expansion valve	Th : Thermistor
	COMP : Compressor	
SW1 : Outdoor unit control circuit board		
E : Memory storage for service activities (sampling per minute)		

7 seg LED

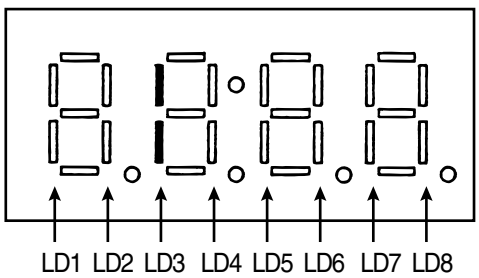


The numerical display includes that of pressure, temperature or the like, while the graphic display includes that of operating condition, solenoid valve ON/OFF state or the like.

• Numerical display
Example : Display at 18.8kg/cm²G (1.84MPa) of pressure sensor data (Item No. 56)



• Graphic display (Two LEDs aligned vertically express a flag.)
Example : At forcible powering in outdoor unit operation display



2. Time data storage function

❊ This function is not compatible with some units.

The outdoor unit has a simple clock function to receive the time setting from the system controller, such as the G50, and count the current time with an internal timer.

If an error (prediction) occurs, the error history data and the error detection time are saved in the service memory.

The error detection time saved in the service memory and the current time can be confirmed with the service LEDs.

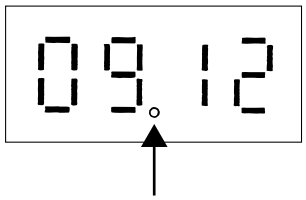
Notes: 1. This is a simple clock function so the time should be used only for reference.

2. The date and time data is all set to 00 as the default.
   If a system controller that sets the time in the outdoor unit, such as the G50, is not connected, the time and days elapsed from the first time the power was turned on will be displayed.
   If the time setting has been received, the count will start from the set date and time.

3. The time data is not updated when the outdoor unit's power is 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, a time differing from the actual time will be saved. (This also applies when a power failure occurs)
   The system controller, such as the G50, sets the time once a day. Thus, if this type of system controller is connected, the time will be updated to the correct time after the settings are received. (The data stored in the memory before the settings are received will not be corrected.)

Reading the time data:

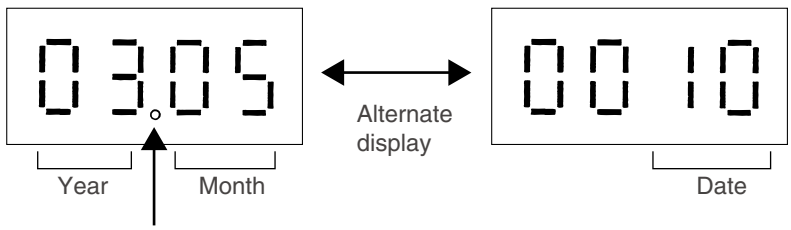
• For time display
  Example : 9 hours 12 minutes



" . " disappears if the time data is deviated due to a power failure, or if a system controller for setting the time is not connected.

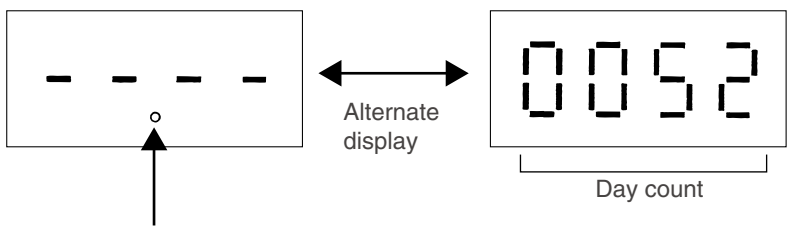
• Date display

(1) When upward controller that can set time is connected
  Example : May 10, 2003



❊ The year and month display uses " . ". The date display has no " . ".

(2) When upward controller that can set time is not connected
  Example : 52 days after power was turned ON



❊ The year and month display uses " . ". The date display has no " . ".

3. List of code on the LED monitor

LED monitor display

No.	SW1	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
0	0000000000	Relay output display 1 (lighting to display)	Compressor operation	Compressor operation			52C1			Lights for normal operation	LD8 is a relay output which lights up at all times when the microcomputers power is on. When sending off a monitoring request to IC is terminated if there is no error "----" is displayed.
		Check display 1 OC error	0000 ~ 9999 (Address and error code reversed)								
1	1000000000	Check display 2 (including the IC)	0000 ~ 9999 (Address and error code reversed)								If there is no error "----" is displayed.
2	0100000000	Relay output display 2 (lights up to display)	SV1								
3	1100000000	Relay output display 3 (lights up to display)						CH1			
4	0010000000	Relay output display 4 (lights up to display)			21S4a						
5	1010000000										
6	0110000000										
7	1110000000	Communication demand capacity	0000 ~ 9999								If no demand control, "----" is diaplayed.
8	0001000000	External signal	Compressor ON/OFF	Night mode	Snow sensor			Active filter operation	Active filter preiliminary error	Active filter error	
9	1001000000	Outdoor unit operation display		Warm up mode	3 minutes restart protection mode	Compressor operation	Preliminary error	Error	3 minutes restart afte instanta-neous po-wer failure	Vacuum operation protection delayed	
10	0101000000	Indoor unit check	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6	Unit No.7	Unit No.8	Lights up if an abnormal stop has occurres in the IC. The indicator for unit No.1 goes off when error reset is carried out.
11	1101000000		Unit No.9	Unit No.10	Unit No.11	Unit No.12	Unit No.13	Unit No.14	Unit No.15	Unit No.16	
12	0011000000										
13	1011000000										
14	0111000000	Indoor unit operation mode	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6	Unit No.7	Unit No.8	Lights up during cooling. Blinks during heating. Goesoff during stop and blower mode.
15	1111000000		Unit No.9	Unit No.10	Unit No.11	Unit No.12	Unit No.13	Unit No.14	Unit No.15	Unit No.16	
16	0000100000										
17	1000100000										
18	0100100000	Indoor unit thermostat ON	Unit No.1	Unit No.2	Unit No.3	Unit No.4	Unit No.5	Unit No.6	Unit No.7	Unit No.8	Lights up when thermo-stat is on. Goes off when thermostat is off.
19	1100100000		Unit No.9	Unit No.10	Unit No.11	Unit No.12	Unit No.13	Unit No.14	Unit No.15	Unit No.16	
20	0010100000										
21	1010100000										
22	0110100000										
23	1110100000	Outdoor operation mode	Pemiss-able stop	Standby	Defrost	Cooling		Heating		Demand	
24	0001100000	Outdoor unit control mode	Initial start	Cooling Refrigerant	Heating Refrigerant	Defrost	Oil recovery	Low frequency oil collection			
25	1001100000	Outdoor unit preliminary error	High pres-sure error 1				Low pressure Error	Discharge temper-ature			
26	0101100000		Overcurrent protection			Heat sink thermostat operating		Over-current break	Inverter error		

No.	SW1	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
27	1101100000		Excessive refrigerant charge	Configuration detection error	Oil temperature error						Corresponding flag lights during error delay.
28	0011100000		TH1						TH5		
29	1011100000		TH6		TH7		TH8				
30	0111100000										
31	1111100000		THHS						63HS	63LS	
32	0000010000	Outdoor unit preliminary error display	High pressure error 1				Low pressure error	Discharge temperature error			Address and error code are reversed and displayed. "-----" is displayed when there is no error.
33	1000010000		Overcurrent protection			Heatsink thermostat operating			Overcurrent break	Inverter error	
34	0100010000		Excessive refrigerant charge	Configuration detection error	Oil temperature error						
35	1100010000		TH1						TH5		
36	0010010000		TH6		TH7		TH8				
37	1010010000										
38	0110010000		THHS						63HS	63LS	
39	1110010000	Error history 1	0000~9999								"-----" is displayed if there is no error.
40	0001010000	Inverter error detail	Inverter error detail (0 ~ 255)								
41	1001010000	Error history 2	0000~9999								
42	0101010000	Inverter error detail	Inverter error detail (0 ~ 255)								
43	1101010000	Error history 3	0000~9999								
44	0011010000	Inverter error detail	Inverter error detail (0 ~ 255)								
45	1011010000	Error history 4	0000~9999								
46	0111010000	Inverter error detail	Inverter error detail (0 ~ 255)								
47	1111010000	Error history 5	0000~9999								
48	0000110000	Inverter error detail	Inverter error detail (0 ~ 255)								
49	1000110000	Error history 6	0000~9999								
50	0100110000	Inverter error detail	Inverter error detail (0 ~ 255)								
51	1100110000	Error history 7	0000~9999								
52	0010110000	Inverter error detail	Inverter error detail (0 ~ 255)								
53	1010110000	Error history 8	0000~9999								
54	0110110000	Inverter error detail	Inverter error detail (0 ~ 255)								
55	1110110000	Error history 9	0000~9999								
56	0001110000	Inverter error detail	Inverter error detail (0 ~ 255)								
57	1001110000	Error history 10	0000~9999								
58	0101110000	Inverter error detail	Inverter error detail (0 ~ 255)								
59	1101110000	Type of inverter preliminary error. (Details of the inverter error in 33)	0101~0121								

No.	SW1	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
60	0011110000	TH1	–99.9~999.9								
61	1011110000										
62	0111110000										
63	1111110000										
64	0000001000										
65	1000001000										
66	0100001000	TH5	–99.9~999.9								
67	1100001000										
68	0010001000	TH6	–99.9~999.9								
69	1010001000										
70	0110001000	TH7	–99.9~999.9								
71	1110001000										
72	0001001000	TH8	–99.9~999.9								
73	1001001000										
74	0101001000										
75	1101001000										
76	0011001000										
77	1011001000										
78	0111001000										
79	1111001000										
80	0000101000										
81	1000101000										
82	0100101000										
83	1100101000	THHS	–99.9~999.9								
84	0010101000										
85	1010101000										
86	0110101000										
87	1110101000										
88	0001101000	High pressure sensor data	–99.9~999.9								
89	1001101000	Low pressure sensor data	↑								
90											
91											
92	0011101000	Accumulator level	0~9 (“AL =” is display)								
93	1011101000	ΣQj	0000~9999								
94	0111101000	Target condensor temp. Tcm	–99.9~999.9								
95	1111101000	Target evaporator temp. Tem	↑								
96	0000011000	Condensor temp. Tc	↑								
97	1000011000	Evaporator temp. Te	↑								
98	0100011000	Compressor frequency (temporary)	0000~9999								
99	1100011000	Real compressor frequency	↑								
100	0010011000										
101	1010011000										

No.	SW1	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
102	0110011000	AK	0000~9999								
103	1110011000										
104	0001011000										
105	1001011000	LEV1									
106	0101011000										
107	1101011000										
108	0011011000	FANCON output value (Toff%)	0000~9999								Displays the FANCON output value used for control.
109	1011011000										
110	0111011000	Compressor current	–99.9~999.9								Amps
111	1111011000										
112	0000111000										
113	1000111000	Bus voltage (VDC)	–99.9~999.9								
114	0100111000										
115	1100111000										
116	0010111000										
117	1010111000	OC Address	–99.9~999.9								
118	0110111000	IC1 Address/ Capacity code	0000~9999				0000~9999				Displayed alternately every 5 seconds.
119	1110111000	IC2 Address/ Capacity code	↑				↑				
120	0001111000	IC3 Address/ Capacity code	↑				↑				
121	1001111000	IC4 Address/ Capacity code	↑				↑				
122	0101111000	IC5 Address/ Capacity code	↑				↑				
123	1101111000	IC6 Address/ Capacity code	↑				↑				
124	0011111000	IC7 Address/ Capacity code	↑				↑				
125	1011111000	IC8 Address/ Capacity code	↑				↑				
126	0111111000	IC9 Address/ Capacity code	↑				↑				
127	1111111000	IC10 Address/ Capacity code	↑				↑				
128	0000000100	IC11 Address/ Capacity code	↑				↑				
129	1000000100	IC12 Address/ Capacity code	↑				↑				
130	0100000100	IC13 Address/ Capacity code	↑				↑				
131	1100000100	IC14 Address/ Capacity code	↑				↑				
132	0010000100	IC15 Address/ Capacity code	↑				↑				
133	1010000100	IC16 Address/ Capacity code	↑				↑				
134	0110000100										
135	1110000100										
136	0001000100										
137	1001000100										

When there is an error stop with No.164~221, the data on error stops or the data immediately before the error postponement stop, which is stored in service memory, are displayed.

No.	SW1	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
138	0101000100										
139	1101000100										
140	0011000100										
141	1011000100										
142	0111000100										
143	1111000100										
144	0000100100										
145	1000100100										
146	0100100100										
147	1100100100										
148	0010100100										
149	1010100100										
150	0110100100	Compressor operating time upper 4 digits.	0000~9999								
151	1110100100	Lower 4 digits.	↑								
152	0001100100										
153	1001100100										
154	0101100100										
155	1101100100										
156	0011100100										
157	1011100100										
158	0111100100										
159	1111100100										
160	0000010100										
161	1000010100										
162	0100010100										
163	1100010100										
164	0010010100	Relay output display 1 (lighting to display)	Compres-sor operation	Compres-sor operation			52C			Lights for normal opetation	
165	1010010100	Relay output display 2 (lighting to display)	SV1								
166	0110010100	Relay output display 3 (lighting to display)						CH1			
167	1110010100	Relay output display 4 (lighting to display)			21S4a						
168	0001010100	TH1	–99.9~999.9								
169	1001010100										
170	0101010100										
171	1101010100										
172	0011010100										
173	1011010100										
174	0111010100	TH5	–99.9~999.9								
175	1111010100										
176	0000110100	TH6	–99.9~999.9								
177	1000110100										
178	0100110100	TH7	–99.9~999.9								

No.	SW1	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
179	1100110100										
180	0010110100	TH8	–99.9~999.9								
181	1010110100										
182	0110110100										
183	1110110100										
184	0001110100										
185	1001110100										
186	0101110100										
187	1101110100										
188	0011110100										
189	1011110100										
190	0111110100										
191	1111110100	THHS	–99.9~999.9								
192	0000001100										
193	1000001100										
194	0100001100										
195	1100001100										
196	0010001100	High pressure sensor data	–99.9~999.9								
197	1010001100	Low pressure sensor data	↑								
198											
199											
200	0001001100	Accumulator level	0~9 (“AL = “ is displayed)								
201	1001001100	ΣQj	0000~9999								
202	0101001100	Target condensor temp. Tcm	–99.9~999.9								
203	1101001100	Target evaporator temp. Tem	↑								
204	0011001100	Condensor temp. Tc	↑								
205	1011001100	Evaporator temp. Te	↑								
206	0111001100	Compressor frequency (temporary)	0000~9999								
207	1111001100	Real compressor frequency	↑								
208	0000101100										
209	1000101100										
210	0100101100	AK	0000~9999								
211	1100101100										
212	0010101100										
213	1010101100	LEV1	0000~9999								
214	0110101100										
215	1110101100										
216	0001101100	FANCON output value (Toff%)	0000~9999								
217	1001101100										
218	0101101100	Compressor current	–99.9~999.9								
219	1101101100										
220	0011101100										

No.	SW1	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
221	1011101100	Compressor voltage	–99.9~999.9								
222	0111101100										
223	1111101100										
224	0000011100	Offset from target composition	–99.9~999.9								
225											
226	0100011100	IC1 Room temp.	–99.9~999.9								
227	1100011100	IC2 Room temp.	↑								
228	0010011100	IC3 Room temp.	↑								
229	1010011100	IC4 Room temp.	↑								
230	0110011100	IC5 Room temp.	↑								
231	1110011100	IC6 Room temp.	↑								
232	0001011100	IC7 Room temp.	↑								
233	1001011100	IC8 Room temp.	↑								
234	0101011100	IC9 Room temp.	↑								
235	1101011100	IC10 Room temp.	↑								
236	0011011100	IC11 Room temp.	↑								
237	1011011100	IC12 Room tempe.	↑								
238	0111011100	IC13 Room temp.	↑								
239	1111011100	IC14 Room temp.	↑								
240	0000111100	IC15 Room temp.	↑								
241	1000111100	IC16 Room temp.	↑								
242	0100111100										
243	1100111100										
244	0010111100										
245	1010111100										
246	0110111100										
247	1110111100										
248	0001111100										
249	1001111100										
250	01011111001										
251	1101111100										
252	0011111100										
253	1011111100										
254	0111111100										
255	1111111100										
256	0000000010										
257	1000000010										
258	0100000010	IC1 Liquid pipe temp.	–99.9~999.9								
259	1100000010	IC2 Liquid pipe temp.	↑								
260	0010000010	IC3 Liquid pipe temp.	↑								
261	1010000010	IC4 Liquid pipe temp.	↑								
262	0110000010	IC5 Liquid pipe temp.	↑								
263	1110000010	IC6 Liquid pipe temp.	↑								

No.	SW1	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
264	0001000010	IC7 Liquid pipe temp.	–99.9~999.9								
265	1001000010	IC8 Liquid pipe temp.	↑								
266	0101000010	IC9 Liquid pipe temp.	↑								
267	1101000010	IC10 Liquid pipe temp.	↑								
268	0011000010	IC11 Liquid pipe temp.	↑								
269	1011000010	IC12 Liquid pipe temp.	↑								
270	0111000010	IC13 Liquid pipe temp.	↑								
271	1111000010	IC14 Liquid pipe temp.	↑								
272	0000100010	IC15 Liquid pipe temp.	↑								
273	1000100010	IC16 Liquid pipe temp.	↑								
274	0100100010										
275	1100100010										
276	0010100010										
277	1010100010										
278	0110100010										
279	1110100010										
280	0001100010										
281	1001100010										
282	0101100010										
283	1101100010										
284	0011100010										
285	1011100010										
286	0111100010										
287	1111100010										
288	0000010010										
289	1000010010										
290	0100010010	IC1 Gas pipe	–99.9~999.9								
291	1100010010	IC2 Gas pipe	↑								
292	0010010010	IC3 Gas pipe	↑								
293	1010010010	IC4 Gas pipe	↑								
294	0110010010	IC5 Gas pipe	↑								
295	1110010010	IC6 Gas pipe	↑								
296	0001010010	IC7 Gas pipe	↑								
297	1001010010	IC8 Gas pipe	↑								
298	0101010010	IC9 Gas pipe	↑								
299	1101010010	IC10 Gas pipe	↑								
300	0011010010	IC11 Gas pipe	↑								
301	1011010010	IC12 Gas pipe	↑								
302	0111010010	IC13 Gas pipe	↑								
303	1111010010	IC14 Gas pipe	↑								
304	0000110010	IC15 Gas pipe	↑								
305	1000110010	IC16 Gas pipe	↑								
306	0100110010										
307	1100110010										

No.	SW1	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
308	0010110010										
309	1010110010										
310	0110110010										
311	1110110010										
312	0001110010										
313	1001110010										
314	0101110010										
315	1101110010										
316	0011110010										
317	1011110010										
318	0111110010										
319	1111110010										
320	0000001010										
321	1000001010										
322	0100001010	IC1 SH				–99.9~999.9					
323	1100001010	IC2 SH				↑					
324	0010001010	IC3 SH				↑					
325	1010001010	IC4 SH				↑					
326	0110001010	IC5 SH				↑					
327	1110001010	IC6 SH				↑					
328	0001001010	IC7 SH				↑					
329	1001001010	IC8 SH				↑					
330	0101001010	IC9 SH				↑					
331	1101001010	IC10 SH				↑					
332	0011001010	IC11 SH				↑					
333	1011001010	IC12 SH				↑					
334	0111001010	IC13 SH				↑					
355	1111001010	IC14 SH				↑					
336	0000101010	IC15 SH				↑					
337	1000101010	IC16 SH				↑					
338	0100101010										
339	1100101010										
340	0010101010										
341	1010101010										
342	0110101010										
343	1110101010										
344	0001101010										
345	1001101010										
346	0101101010										
347	1101101010										
348	0011101010										
349	1011101010										
350	0111101010										
351	1111101010										

No.	SW1	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
352	0000011010										
353	1000011010										
354	0100011010	IC1 SC	–99.9~999.9								
355	1100011010	IC2 SC	↑								
356	0010011010	IC3 SC	↑								
357	1010011010	IC4 SC	↑								
358	0110011010	IC5 SC	↑								
359	1110011010	IC6 SC	↑								
360	0001011010	IC7 SC	↑								
361	1001011010	IC8 SC	↑								
362	0101011010	IC9 SC	↑								
363	1101011010	IC10 SC	↑								
364	0011011010	IC11 SC	↑								
365	1011011010	IC12 SC	↑								
366	0111011010	IC13 SC	↑								
367	1111011010	IC14 SC	↑								
368	0000111010	IC15 SC	↑								
369	1000111010	IC16 SC	↑								
370	0100111010										
371	1100111010										
372	0010111010										
373	1010111010										
374	0110111010										
375	1110111010										
376	0001111010										
377	1001111010										
378	0101111010										
379	1101111010										
380	0011111010										
381	1011111010										
382	0111111010										
383	1111111010										
384	0000000110										
385	1000000110										
386	0100000110	IC1 LEV opening pulses	0000~9999								
387	1100000110	IC2 LEV opening pulses	↑								
388	0010000110	IC3 LEV opening pulses	↑								
389	1010000110	IC4 LEV opening pulses	↑								
390	0110000110	IC5 LEV opening pulses	↑								
391	1110000110	IC6 LEV opening pulses	↑								
392	0001000110	IC7 LEV opening pulses	↑								
393	1001000110	IC8 LEV opening pulses	↑								
394	0101000110	IC9 LEV opening pulses	↑								
395	1101000110	IC10 LEV opening pulses	↑								

No.	SW1	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
396	0011000110	IC11 LEV opening pulses	0000~9999								
397	1011000110	IC12 LEV opening pulses	↑								
398	0111000110	IC13 LEV opening pulses	↑								
399	1111000110	IC14 LEV opening pulses	↑								
400	0000100110	IC15 LEV opening pulses	↑								
401	1000100110	IC16 LEV opening pulses	↑								
402	0100100110										
403	1100100110										
404	0010100110										
405	1010100110										
406	0110100110										
407	1110100110										
408	0001100110										
409	1001100110										
410	0101100110										
411	1101100110										
412	0011100110										
413	1011100110										
414	0111100110										
415	1111100110										
416	0000010110										
417	1000010110										
418	0100010110	IC1 Operation mode	00 : OFF 01 : Fan 02 : Cooling 03 : Heating 04 : Dry								
419	1100010110	IC2 Operation mode									
420	0010010110	IC3 Operation mode									
421	1010010110	IC4 Operation mode									
422	0110010110	IC5 Operation mode									
423	1110010110	IC6 Operation mode									
424	0001010110	IC7 Operation mode									
425	1001010110	IC8 Operation mode									
426	0101010110	IC9 Operation mode									
427	1101010110	IC10 Operation mode									
428	0011010110	IC11 Operation mode									
429	1011010110	IC12 Operation mode									
430	0111010110	IC13 Operation mode									
431	1111010110	IC14 Operation mode									
432	0000110110	IC15 Operation mode									
433	1000110110	IC16 Operation mode									
434	0100110110										
435	1100110110										
436	0010110110										
437	1010110110										
438	0110110110										
439	1110110110										

No.	SW1	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
440	0001110110										
441	1001110110										
442	0101110110										
443	1101110110										
444	0011110110										
445	1011110110										
446	0111110110										
447	1111110110										
448	0000001110										
449	1000001110										
450	0100001110	IC1 Filter	0000~9999								
451	1100001110	IC2 Filter	↑								
452	0010001110	IC3 Filter	↑								
453	1010001110	IC4 Filter	↑								
454	0110001110	IC5 Filter	↑								
455	1110001110	IC6 Filter	↑								
456	0001001110	IC7 Filter	↑								
457	1001001110	IC8 Filter	↑								
458	0101001110	IC9 Filter	↑								
459	1101001110	IC10 Filter	↑								
460	0011001110	IC11 Filter	↑								
461	1011001110	IC12 Filter	↑								
462	0111001110	IC13 Filter	↑								
463	1111001110	IC14 Filter	↑								
464	0000101110	IC15 Filter	↑								
465	1000101110	IC16 Filter	↑								
466	0100101110										
467	1100101110										
468	0010101110										
469	1010101110										
470	0110101110										
471	1110101110										
472	0001101110										
473	1001101110										
474	0101101110										
475	1101101110										
476	0011101110										
477	1011101110										
478	0111101110										
479	1111101110										
480	0000011110										
481	1000011110										
482	0100011110										
483	1100011110										

No.	SW1	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
484	0010011110										
485	1010011110										
486	0110011110										
487	1110011110										
488	0001011110										
489	1001011110										
490	0101011110										
491	1101011110										
492	0011011110										
493	1011011110										
494	0111011110										
495	1111011110										
496	0000111110										
497	1000111110										
498	0100111110										
499	1100111110										
500	0010111110										
501	1010111110										
502	0110111110										
503	1110111110										
504	0001111110										
505	1001111110										
506	0101111110										
507	1101111110										
508	0011111110										
509	1011111110										
510	0111111110										
511	1111111110										
512	0000000001										
513	1000000001										
514	0100000001										
515	1100000001										
516	0010000001										
517	1010000001										
518	0110000001										
519	1110000001										
520	0001000001	U phase current effective value 1	–99.9~999.9								
521	1001000001	W phase current effective value 1	↑								
522	0101000001	Power factor phase angle 1(deg)	↑								
523	1101000001										
524	0011000001										
525	1011000001										
526	0111000001										

No.	SW1	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
527	1111000001										
528	0000100001										
529	1000100001										
530	0100100001										
531	1100100001										
532	0010100001	Main circuit board WDT reset counter	0~255								
533	1010100001	INV circuit board WDT reset counter	↑								
534	0110100001										
535	1110100001										
536	0001100001	Instantaneous power failure counter	0~255								
537	1001100001	Comp.1 ON/OFF counter	↑								
538	0101100001										
539	1101100001										
540	0011100001										
541	1011100001										
542	0111100001	WDT reset/power ON time after power recovery (time)	0~9999								
543	1111100001										
544	0000010001										
545	1000010001										
546	0100010001										
547	1100010001										
548	0010010001										
549	1010010001	Current time	Hour: Minute								
550	0110010001	Current date	Year/Month				Day				Display alternately
551	1110010001	Error detection time 1	Hour: Minute								
552	0001010001	Error detection day 1	Year/Month				Day				Display alternately
553	1001010001	Error detection time 2	Hour: Minute								
554	0101010001	Error detection day 2	Year/Month				Day				Display alternately
555	1101010001	Error detection time 3	Hour: Minute								
556	0011010001	Error detection day 3	Year/Month				Day				Display alternately
557	1011010001	Error detection time 4	Hour: Minute								
558	0111010001	Error detection day 4	Year/Month				Day				Display alternately
559	1111010001	Error detection time 5	Hour: Minute								
560	0000110001	Error detection day	Year/Month				Day				Display alternately
561	1000110001	Error detection time 6	Hour: Minute								
562	0100110001	Error detection day 6	Year/Month				Day				Display alternately
563	1100110001	Error detection time 7	Hour: Minute								
564	0010110001	Error detection day 7	Year/Month				Day				Display alternately
565	1010110001	Error detection time 8	Hour: Minute								
566	0110110001	Error detection day 8	Year/Month				Day				Display alternately
567	1110110001	Error detection time 9	Hour: Minute								

No.	SW1	Item	LED								Remarks
	1234567890		LD1	LD2	LD3	LD4	LD5	LD6	LD7	LD8	
568	0001110001	Error detection day 9	Year/Month				Day				Display alternately
569	1001110001	Error detection time 10	Hour: Minute								
570	0101110001	Error detection day 10	Year/Month				Day				Display alternately
1023	1111111111	Request LED 7-segment LED mode									

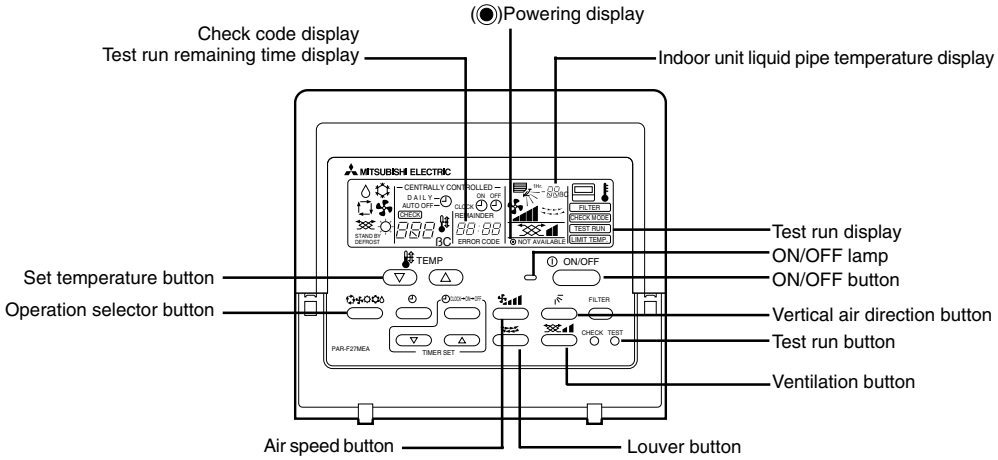
IX. TEST RUN

1 Check Items before Test Run

1	Check refrigerant leak, loose power source or transmission line if found.
2	Measure resistance between the power source terminal block and ground with a 500V megger to confirm it is exceeding 1.0MΩ. Notes: 1. Do not operate the unit when the insulation resistance stays below 1.0MΩ. 2. Never apply a megger to the transmission line terminal block. Otherwise, the control board will be damaged. 3. At immediately after installation or when the unit is left with the main power source turned off for a long time, the insulation resistance between the power source terminal block and ground may drop down to 1MΩ approximately due to refrigerant accumulated inside the compressor. 4. When the insulation resistance counts for more than 1MΩ, power the crankcase heater for 12 hours or more by turning the main power source on. Doing this way evaporates refrigerant inside the compressor leading to increase the insulation resistance.
3	Confirm that the ball valves are fully opened at both gas and liquid sides. Note: 1. Make sure to tighten the cap.
4	Check the phase order of the 3-phase power source and the voltage between each phase. Note: 1. Open phase or reverse phase causes the emergency stop of test run. (4103 error)
5	Turn the main power source on 12 hours at least before test run to power the crankcase heater. Note: 1. Shorter powering time may cause compressor trouble.

2 Test Run Method

❇ The illustration shows MA remote controller.



Operation procedure
Turn the main power source on. ⇒ Displays "HO" for about 3 minutes. Then leave for more than 12 hours (to power the crankcase heater)
Press the [Test run] button twice. ⇒ Liquid crystal display of [Test run]
Press the [Operation selector] button. ⇒ Confirm that air starts to blow.
Press the [Operation selector] button to select cooling (or heating) fi Confirm that cool (or warm) air starts to blow.
Press the [Air speed] button. ⇒ Confirm that the air speed changes.
Press the [Vertical air direction] or [Louver] button to select the airflow direction. fi Confirm that the airflow direction can be adjusted like horizontal blow or downward blow.
Check the operation of interlocked equipment like ventilation equipment.
Press the [ON/OFF] button to cancel test run. ⇒ Stop
Notes: 1. When the check code is displayed on the remote controller or normal operation can not be obtained, refer to the contents described on the following pages. 2. The test run operation stops automatically after 2 hours by the tripping of the OFF timer for 2 hours. 3. During test run operation, the remaining time of the test run will appear on the clock section. 4. During test run operation, the indoor unit liquid pipe temperature will appear on the room temperature display section on the remote controller. 5. When pressing the airflow direction adjustment button, "This function not available" is displayed on the remote controller for some models. However, this does not indicate a trouble.

(1) Troubleshooting and countermeasure relating to remote controller (at test run)

Symptom or check code	Factor	Check method and countermeasure
“ON" is displayed on remote controller, but indoor units do not run partially.	• Indoor unit is not powered. • Neglecting the wiring between indoor units in same group • Connected with SLIM model in same group • Blown fuse of indoor unit control board	• Confirm the object with error occurred among the items below. (1) Entire system (2) Entire inner part of refrigerant system (3) Only inside of same group (4) Only one indoor unit **In case of entire system and inner part of refrigerant system** • Check self-diagnosis LED of outdoor unit • Check items relating to outdoor unit among the items left. **In case the inside of same group only and one indoor unit only** • Check items relating to indoor unit among the items left.
Indoor unit runs but remote controller extinguishes soon.	• Indoor unit (Main) is not being powered. • Grouping with system controller is not matched • Blown fuse of indoor unit (main) control board	
Interlocking registration with Lossnay is not normal.	• Lossnay is not powered. • For Lossnay with different refrigerant, the outdoor unit with different refrigerant is not powered. • Lossnay is already registered to indoor unit (1 set) • The address of Lossnay is different.. • The address of Lossnay is being not set. • Lossnay is not connected to transmission line.	
Remote controller is not powered without signal (◉) (No power supply to MA remote controller)	With indoor unit, the remote controller will not be powered until completing the indoor/outdoor starting up normally. • Indoor unit is not powered. • Outdoor unit is not powered. • Excessive number of remote controller connected (2 sets) or indoor unit connected. • The address of outdoor unit is set to other than "00" which is being set to indoor unit. • Indoor/outdoor transmission line is connected to TB7. • MA remote controller is connected to indoor/outdoor transmission line. • Short circuit/disconnection of remote controller line • Blown fuse of indoor unit control board	
"H0" on remote controller does not disappear or "HO" display repeats in a cycle. ("HO" is normally displayed for 3 minutes maximum after powering the outdoor unit.)	• Outdoor unit is not powered. • Transmission line booster is not powered. • MA remote controller main/sub selection is set to the sub unit. • MA remote controller is connected to indoor/outdoor transmission line.	
Powering (◉) is displayed on remote controller but with no operation.	• Indoor unit (main) is not powered. • Indoor/outdoor transmission line is connected to TB7. • Indoor/outdoor transmission line is short circuited, disconnected or connected improperly. • Blown fuse of indoor unit (main) control board	

(2) In case of M-NET remote controller

Symptom or check code	Factor	Check method and countermeasure
"ON" is displayed on remote controller, but indoor units do not run partially.	• Indoor unit is not powered. • Erroneous addressing of indoor unit or remote controller within same group. • For grouping with different refrigerant, initial registration is not done with remote controller. • Blown fuse of indoor unit control board	• Confirm the object with error occurred among the items below. (1) Entire system (2) Entire inner part of refrigerant system (3) Only inside of same group (4) Only one indoor unit **In case of entire system and entire inner part of refrigerant system** • Check self-diagnosis LED of outdoor unit • Check items relating to outdoor unit among the items left. **In case the inside of same group only and one indoor unit only** • Check items relating to indoor unit among the items left.
Indoor unit runs but remote controller extinguishes soon.	• Indoor unit is not being powered. • Blown fuse of indoor unit control board	
Interlocking registration with Lossnay is not normal.	• Lossnay is not powered. • For Lossnay with different refrigerant, the outdoor unit with different refrigerant is not powered. • Lossnay is already registered to indoor unit (1 set) • The address of Lossnay is different.. • The address of Lossnay is being not set. • Lossnay is not connected to transmission line.	
Remote controller is not powered without signal (◉) (No power supply to MA remote controller)	• Outdoor unit is not powered. • Excessive number of remote controller connected or indoor unit connected inside refrigerant system. • M-NET remote controller is connected to MA remote controller line. • Short circuit/disconnection of indoor/outdoor transmission line. • Short circuit/disconnection of M-NET remote controller line.	
"H0" on remote controller does not disappear or "HO" display repeats in a cycle. ("HO" is normally displayed for 3 minutes maximum after powering the outdoor unit.)	• Transmission line booster is not powered. • Outdoor unit "00" is remains unchanged. • Erroneous address setting of indoor unit or remote controller. • MA remote controller is connected to indoor/outdoor transmission line.	
Powering (◉) is displayed on remote controller but with no operation.	• Indoor/outdoor transmission line is connected to TB7. • MA remote controller main/sub is set to Sub. • Short circuit or disconnection, or poor contact of indoor/outdoor transmission line.	

3 Symptoms that do not Signify Problems

Symptom	Remote controller display	Cause
Indoor unit does not run while operating for cooling (heating).	**"COOL (HEAT)" blinking display**	Unable to execute cooling (heating) operation while other indoor unit is under cooling (heating) operation.
Auto-vane runs freely.	**Normal display**	Because of the control action of the auto-vane, horizontal blow may be commenced automatically one hour after using for down blow in cooling. Horizontal blow will also be commenced at defrosting under heating, at the time of the hot adjust and the thermostat off.
Air speed setting switches over freely during heating operation.	**Normal display**	Very low speed operation is commenced at thermostat OFF. At thermostat ON, the very low speed operation automatically changes over to the set value by the time or piping temperature.
Fan stops during heating operation.	**Defrosting**	Fan stops under defrosting operation.
Fan does not stop while stopping operation.	**Extinguished**	When the auxiliary heater is turned on, fan operates for one minute after stopping to remove residual heat.
Air speed does not attain the set value even though turning operation switch to "ON."	**Preparing heating**	Very low speed for 5 minutes after SW "ON" or until the piping temperature reaches 35˚C. Thereafter, the set value is commenced after low speed for 2 minutes. (Hot adjust control)
Outdoor unit does not run while starting operation.	**Normal display**	When outdoor unit is cooled down with refrigerant stagnated, operate the compressor for 35 minutes maximum to warm up. (model 200) Fan operation will be done during the warming up.
The display shown right will appear on the indoor unit remote controller for about 3 minutes when the main power source is turned on.	**"HO" blinking display**	The system is under starting up. Operate the remote controller after the blinking of “HO” is disappeared.
Drain pump does not stop while the operation is stopped.	**Extinguished**	At stopping of cooling operation, drain pump operates for 3 minutes further.
Drain pump runs even during unit stopping.		Run drain pump if drain water is generated even under stopping.

4 Standard Operation Data (Reference Data)

1. Cooling operation

PUHY-200・250・315TEM-A

Items \ Outdoor unit					PUHY-200TEM-A				PUHY-250TEM-A				PUHY-315TEM-A			
Condition	Ambient temp.	Indoor		DB/WB	27.0/19.0				27.0/19.0				27.0/19.0			
		Outdoor			35.0/24.0				35.0/24.0				35.0/24.0			
	Indoor unit	Quantity		Set	4				4				4			
		Quantity in operation			4				4				4			
		Model		–	71	63	50	20	100	71	63	20	100	71	63	20
	Piping	Main pipe		m	5				5				5			
		Branch pipe			10	10	10	10	10	10	10	10	10	10	10	10
		Total piping length			45				45				45			
	Indoor unit fan notch			–	Hi	Hi	Hi	Hi	Hi	Hi	Hi	Hi	Hi	Hi	Hi	Hi
	Refrigerant volume			kg	11.7				11.7				11.7			
Outdoor unit	Total current			A	10.4		9.5		14.1		12.9		19.9		18.2	
	Volts			V	380		415		380		415		380		415	
LEV opening	Indoor unit			Pulse	270	420	360	250	360	270	420	250	360	270	420	250
	SC (LEV1)				122				150				150			
Pressure	High pressure/Low pressure (after O/S) (before accumulator)			MPa	1.95/0.55				2.02/0.54				2.08/0.52			
Sectional temp.	Outdoor unit	Discharge (TH1)		˚C	85				84				96			
		Heat exchanger outlet (TH5)			42				42				46			
		Accumulator	Inlet		16				16				16			
			Outlet		17				17				17			
		Suction (Compressor)			20				20				20			
		Shell bottom (Compressor)			42				42				42			
		SCC outlet (TH7)			20				20				24			
		Bypass outlet (TH8)			13				13				12			
	Indoor unit	LEV inlet			20				20				20			
		Heat exchanger outlet			14				14				14			

2. Heating operation

PUHY-200・250・315TEM-A

Items				Outdoor unit	PUHY-200TEM-A				PUHY-250TEM-A				PUHY-315TEM-A			
Condition	Ambient temp.		Indoor	DB/WB	20.0/–				20.0/–				20.0/–			
			Outdoor		7.0/6.0				7.0/6.0				7.0/6.0			
	Indoor unit		Quantity	Set	4				4				4			
			Quantity in operation		4				4				4			
			Model	–	71	63	50	20	100	71	63	20	100	71	63	20
	Piping		Main pipe	m	5				5				5			
			Branch pipe		10	10	10	10	10	10	10	10	10	10	10	10
			Total piping length		45				45				45			
	Indoor unit fan notch			–	Hi	Hi	Hi	Hi	Hi	Hi	Hi	Hi	Hi	Hi	Hi	Hi
	Refrigerant volume			kg	11.7				11.7				11.7			
Outdoor unit	Total current			A	11.2		10.2		15.1		13.8		15.1		13.8	
	Volts			V	380		415		380		415		380		415	
LEV opening	Indoor unit			Pulse	290	470	410	250	330	290	470	250	330	290	470	250
	SC (LEV1)				0				0				0			
Pressure	High pressure/Low pressure (after O/S) (before accumulator)			MPa	2.04/0.43				2.04/0.38				2.10/0.38			
Sectional temp.	Outdoor unit	Discharge (TH1)		˚C	73				84				85			
		Heat exchanger outlet (TH5)			0				–2				0			
		Accumulator	Inlet		2				0				–2			
			Outlet		2				0				–2			
		Suction (Compressor)			4				2				0			
		Shell bottom (Compressor)			31				31				37			
	Indoor unit	Heat exchanger inlet			60				60				60			
		Heat exchanger outlet			34				34				34			

3. Other types of operation data under other conditions

(1) Change of indoor unit operating capacity

Basically, the compressor frequency changes while the high pressure and low pressure are mostly constant. The compressor frequency is in proportion to the indoor unit operating capacity approximately.

(2) Change of outdoor temperature

Basically the compressor frequency changes while the high pressure and low pressure are mostly constant.
In cooling operation, the compressor frequency lowers as the outdoor temperature lowers.
In heating operation, the compressor frequency increases as the outdoor temperature lowers.